Advantys STB

Digital I/O Modules
Reference Guide

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

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Table of Contents

Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

At a Glance

Document Scope

This document describes the physical and functional characteristics of the Advantys STB digital I/O modules, power distribution modules, and digital module accessories.

Validity Note

This document is valid for Advantys 4.5 or later.

The technical characteristics of the devices described in this document also appear online. To access this information online:

Step	Action
1	Go to the Schneider Electric home page www.schneider-electric.com.
2	In the **Search** box type the reference of a product or the name of a product range. ● Do not include blank spaces in the reference or product range. ● To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the **Product Datasheets** search results and click on the reference that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one reference appears in the **Products** search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Related Documents

Title of Documentation	Reference Number
Advantys STB Analog I/O Modules Reference Guide	31007715 (English), 31007716 (French), 31007717 (German), 31007718 (Spanish), 31007719 (Italian)
Advantys STB Counter Modules Reference Guide	31007725 (English), 31007726 (French), 31007727 (German), 31007728 (Spanish), 31007729 (Italian)
Advantys STB Special Modules Reference Guide	31007730 (English), 31007731 (French), 31007732 (German), 31007733 (Spanish), 31007734 (Italian)
Advantys STB System Planning and Installation Guide	31002947 (English), 31002948 (French), 31002949 (German), 31002950 (Spanish), 31002951 (Italian)
Advantys STB Standard Profibus DP Network Interface Applications Guide	31002957 (English), 31002958 (French), 31002959 (German), 31002960 (Spanish), 31002961 (Italian)
Advantys STB Basic Profibus DP Network Interface Applications Guide	31005773 (English), 31005774 (French), 31005775 (German), 31005776 (Spanish), 31005777 (Italian)
Advantys STB Standard INTERBUS Network Interface Applications Guide	31004624 (English), 31004625 (French), 31004626 (German), 31004627 (Spanish), 31004628 (Italian)
Advantys STB Basic INTERBUS Network Interface Applications Guide	31005789 (English), 31005790 (French), 31005791 (German), 31005792 (Spanish), 31005793 (Italian)

Title of Documentation	Reference Number
Advantys STB Standard DeviceNet Network Interface Applications Guide	31003680 (English), 31003681 (French), 31003682 (German), 31003683 (Spanish), 31004619 (Italian)
Advantys STB Basic DeviceNet Network Interface Applications Guide	31005784 (English), 31005785 (French), 31005786 (German), 31005787 (Spanish), 31005788 (Italian)
Advantys STB Standard CANopen Network Interface Applications Guide	31003684 (English), 31003685 (French), 31003686 (German), 31003687 (Spanish), 31004621 (Italian)
Advantys STB Basic CANopen Network Interface Applications Guide	31005779 (English), 31005780 (French), 31005781 (German), 31005782 (Spanish), 31005783 (Italian)
Advantys STB Standard CANopen Devices	31006709 (English), 31006710 (French), 31006711 (German), 31006712 (Spanish), 31006713 (Italian)
Advantys STB Standard Ethernet Modbus TCP/IP Network Interface Applications Guide	31003688 (English), 31003689 (French), 31003690 (German), 31003691 (Spanish), 31004622 (Italian)
Advantys STB Standard Modbus Plus Network Interface Applications Guide	31004629 (English), 31004630 (French), 31004631 (German), 31004632 (Spanish), 31004633 (Italian)
Advantys STB Standard Fipio Network Interface Applications Guide	31003692 (English), 31003693 (French), 31003694 (German), 31003695 (Spanish), 31004623 (Italian)

Title of Documentation	Reference Number
Advantys STB Configuration Software Quick Start User Guide	31002962 (English), 31002963 (French), 31002964 (German), 31002965 (Spanish), 31002966 (Italian)
Advantys STB Reflex Actions Reference Guide	31004635 (English), 31004636 (French), 31004637 (German), 31004638 (Spanish), 31004639 (Italian)

You can download these technical publications and other technical information from our website at http://download.schneider-electric.com

Chapter 1
The Advantys STB Architecture: Theory of Operation

Overview

This chapter provides an overview of the Advantys STB system. It provides you with context for understanding the functional capabilities of an island and how its various hardware components interoperate with one other.

What Is in This Chapter?

This chapter contains the following topics:

Advantys STB Islands of Automation

System Definition

Advantys STB is an open, modular distributed I/O system designed for the machine industry, with a migration path to the process industry. Modular I/O, power distribution modules (PDMs) and a network interface module (NIM) reside in a structure called an *island*. The island functions as a node on a fieldbus control network and is managed by an upstream fieldbus master controller.

Open Fieldbus Choices

An island of Advantys STB modules can function on a variety of different open industry-standard fieldbus networks. Among these are:

- Profibus DP
- DeviceNet
- Ethernet
- CANopen
- Fipio
- Modbus Plus
- INTERBUS

A NIM resides in the first position on the island bus (leftmost on the physical setup). It acts as the gateway between the island and the fieldbus, facilitating data exchange between the fieldbus master and the I/O modules on the island. It is the only module on the island that is fieldbus-dependent—a different type of NIM module is available for each fieldbus. The rest of the I/O and power distribution modules on the island bus function exactly the same, regardless of the fieldbus on which the island resides. You have the advantage of being able to select the I/O modules to build an island independent of the fieldbus on which it will operate.

Granularity

Advantys STB I/O modules are designed to be small, economical devices that provide you with just enough input and output channels to satisfy your application needs. Specific types of I/O modules are available with two or more channels. You can select exactly the amount of I/O you need and you do not have to pay for channels that you don’t need.

Mechatronics

An Advantys STB system lets you place the control electronics in the I/O modules as close as possible to the mechanical devices they are controlling. This concept is known as *mechatronics*.

Depending on the type of NIM you use, an Advantys STB island bus may be extended to multiple segments of I/O on one or more DIN rails. Island bus extensions allow you to position the I/O as close as possible to the sensors and actuators they control. Using special extension cables and modules, an island bus may be stretched to distances up to 15 m (49.21 ft).

Environmental Considerations

This product supports operation at normal and extended temperature ranges and is ATEX certified for operation in hazardous environments. Refer to the Advantys STB System Installation and Planning Guide, 890 USE 171 00 for a complete summary of capabilities and limitations.

Types of Modules on an Advantys STB Island

Summary

Your island's performance is determined by the type of NIM that you use. NIMs for various field buses are available in different model numbers at different price points and with scalable operating capabilities. Standard NIMs, for example, can support up to 32 I/O modules in multiple (extension) segments. Low-cost basic NIMs, on the other hand, are limited to 16 I/O modules in a single segment.

If you are using a basic NIM, you may use only Advantys STB I/O modules on the island bus. With a standard NIM, you may use:

- Advantys STB I/O modules
- optional preferred modules
- optional standard CANopen devices

Advantys STB Modules

The core set of Advantys STB modules comprises:

- a set of analog, digital and special I/O modules
- open fieldbus NIMs
- power distribution modules (PDMs)
- island bus extension modules
- special modules

These core modules are designed to specific Advantys STB form factors and fit on base units on the island bus. They take full advantage of the island's communication and power distribution capabilities, and they are auto-addressable.

Preferred Modules

A *preferred module* is a device from another Schneider catalog, or potentially from a third-party developer, that fully complies with the Advantys STB island bus protocol. Preferred modules are developed and qualified under agreement with Schneider; they conform fully to Advantys STB standards and are auto-addressable.

For the most part, the island bus handles a preferred module as it does standard Advantys STB I/O module, with four key differences:

- A preferred module is not designed in the standard form factor of an Advantys STB module and does not fit into one of the standard base units. It therefore does not reside in an Advantys STB segment.
- A preferred module requires its own power supply. It does not get logic power from the island bus.
- To place preferred modules in your island, use the Advantys configuration software.
- You cannot use preferred modules with a basic NIM.

Preferred modules can be placed between segments of STB I/O or at the end of the island. If a preferred module is the last module on the island bus, it should be terminated with a 120 Ω terminator resistor.

Standard CANopen Devices

An Advantys STB island can support standard off-the-shelf CANopen devices. These devices are not auto-addressable on the island bus, and therefore they should be manually addressed, usually with physical switches built into the devices. They are configured using the Advantys configuration software. You cannot use a standard CANopen device with a basic NIM.

When standard CANopen devices are used, they should be installed at the end of the island. 120 Ω termination should be provided both at the end of the last Advantys STB segment and at the last standard CANopen device.

Island Segments

Summary

An Advantys STB system starts with a group of interconnected devices called the *primary segment*. This first segment is a mandatory piece of an island. Depending on your needs and on the type of NIM you are using *(see page 18)*, the island may optionally be expanded to additional segments of Advantys STB modules, called *extension segments* and to non-STB devices such as preferred modules and/or standard CANopen devices.

The Primary Segment

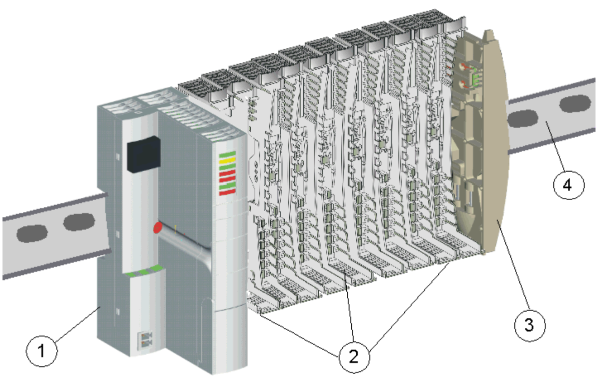
Every island bus begins with a primary segment. The primary segment consists of the island's NIM and a set of interconnected module bases attached to a DIN rail. The PDMs and Advantys STB I/O module mount in these bases on the DIN rail. The NIM is always the first (leftmost) module in the primary segment.

The Island Bus

The bases that you interconnect on the DIN rail form an island bus structure. The island bus houses the modules and supports the communications buses across the island. A set of contacts on the sides of the base units *(see page 34)* provides the bus structure for:

- logic power
- sensor field power to the input modules
- actuator power to the output modules
- the auto-addressing signal
- island bus communications between the I/O and the NIM

The NIM, unlike the PDMs and I/O modules, attaches directly to a DIN rail:



1 NIM
2 module bases
3 termination plate
4 DIN rail

The DIN Rail

The NIM and the module bases snap onto a conductive metal DIN rail. The rail may be 7.5 mm or 15 mm deep.

The NIM

A NIM performs several key functions:

- It is the master of the island bus, supporting the I/O modules by acting as their communications interface across the island backplane
- It is the gateway between the island and the fieldbus on which the island operates, managing data exchange between the island's I/O modules and the fieldbus master
- It may be the interface to the Advantys configuration software; basic NIMs to not provide a software interface
- It is the primary power supply for logic power on the island bus, delivering a 5 VDC logic power signal to the I/O modules in the primary segment

Different NIM models are available to support the various open fieldbuses and different operational requirements. Choose the NIM that meets your needs and operates on the appropriate fieldbus protocol. Each NIM is documented in its own user manual.

PDMs

The second module on the primary segment is a PDM. PDMs are available in different models to support:

- 24 VDC field power to the I/O modules in a segment
- 115 VAC or 230 VAC field power to the I/O modules in a segment

The number of different I/O voltage groups that are installed on the segment determine the number of PDMs that need to be installed. If your segment contains I/O from all three voltage groups, you will need to install at least three separate PDMs in the segment.

Different PDM models are available with scalable performance characteristics. A standard PDM, for example, delivers actuator power to the output modules and sensor power to the input modules in a segment over two separate power lines on the island bus. A basic PDM, on the other hand, delivers actuator power and field power over a single power line.

The Bases

There are six types of bases that can be used in a segment. Specific bases should be used with specific module types, and it is important that you always install the correct bases in the appropriate locations in each segment:

Base Model	Base Width	Advantys STB Modules It Supports
STB XBA 1000	13.9 mm (0.54 in)	the size 1 base that supports 13.9 mm wide I/O modules (24 VDC digital I/O and analog I/O)
STB XBA 2000	18.4 mm (0.72 in)	the size 2 base that supports 18.4 mm I/O modules and the STB XBE 2100 CANopen extension module *(see Advantys STB, Special Modules, Reference Guide)*
STB XBA 2100	18.4 mm (0.72 in)	the size 2 base that supports an auxiliary power supply
STB XBA 2200	18.4 mm (0.72 in)	the size 2 base that supports the PDMs
STB XBA 2300	18.4 mm (0.72 in)	the size 2 base that supports BOS modules
STB XBA 2400	18.4 mm (0.72 in)	the size 2 base that supports EOS modules
STB XBA 3000	28.1 mm (1.06 in)	the size 3 base that supports many of the special modules

As you plan and assemble the island bus, check that you choose and insert the correct base in each location on the island bus.

I/O

Each segment contains a minimum of one Advantys STB I/O module. The maximum number of modules in a segment is determined by their total current draw on the 5 VDC logic power supply in the segment. A built-in power supply in the NIM provides 5 VDC to the I/O modules in the primary segment. A similar power supply built into the BOS modules provides 5 VDC for the I/O modules in any extension segments. Each of these supplies produce 1.2 A, and the sum of the logic power current consumed by all the I/O modules in a segment cannot exceed 1.2 A.

The Last Device on the Primary Segment

The island bus should be terminated with a 120 Ω terminator resistor. If the last module on the island bus is an Advantys STB I/O module, use an STB XMP 1100 terminator plate at the end of the segment.

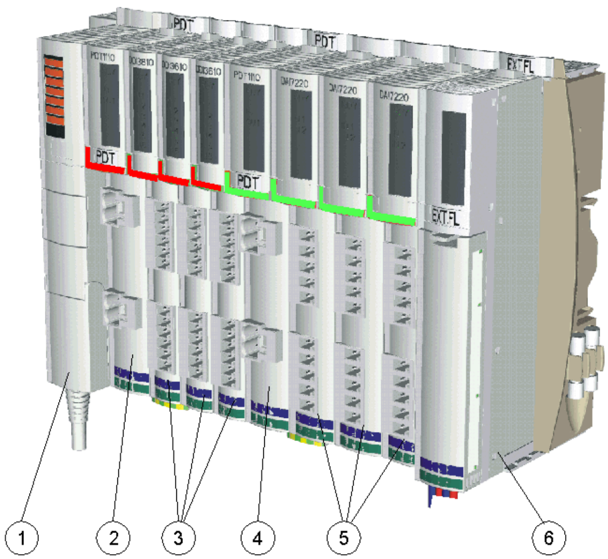
If the island bus is extended to another segment of Advantys STB modules or to a preferred module *(see page 19)*, you need to install an STB XBE 1000 EOS bus extension module in the last position of the segment that will be extended. Do not apply 120 Ω termination to the EOS module. The EOS module has an IEEE 1394-style output connector for a bus extension cable. The extension cable carries the island's communications bus and auto-addressing line to the extension segment or to the preferred module.

If the island bus is extended to a standard CANopen device *(see page 18)*, you need to install an STB XBE 2100 CANopen extension module in the rightmost position of the segment and apply 120 Ω termination to island bus after the CANopen extension module—use the STB XMP 1100 terminator plate. You should also provide 120 Ω termination on the last CANopen device that is installed on the island bus.

Remember that you cannot use extensions when a basic NIM is in the primary segment.

An Illustrative Example

The illustration below shows an example of a primary segment with PDMs and I/O modules installed in their bases:



1 The NIM resides in the first location. One and only one NIM is used on an island.
2 A 115/230 VAC STB PDT 2100 PDM, installed directly to the right of the NIM. This module distributes AC power over two separate field power buses, a sensor bus and an actuator bus.
3 A set of digital AC I/O modules installed in a voltage group directly to the right of the STB PDT 2100 PDM. The input modules in this group receive field power from the island's sensor bus, and the output modules in this group receive AC field power from the island's actuator bus.
4 A 24 VDC STB PDT 3100 PDM, which will distribute 24 VDC across the island's sensor and actuator buses to a voltage group of 24 VDC I/O modules. This PDM also provides isolation between the AC voltage group to its left and the DC voltage group to its right.
5 A set of analog and digital I/O modules installed directly to the right of the STB PDT 3100 PDM.
6 An STB XBE 1000 EOS extension module installed in the last location in the segment. Its presence indicates that the island bus will be extended beyond the primary segment and that you are not using a basic NIM.

Logic Power Flow

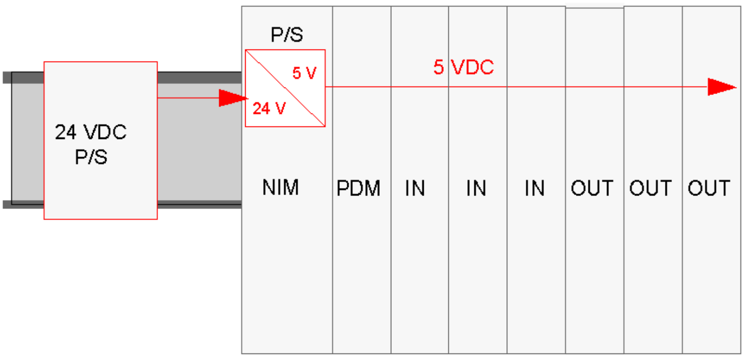
Summary

Logic power is the power that the Advantys STB I/O modules require to run their internal processing and light their LEDs. It is distributed across an island segment by a 5-to-24 VDC power supply. One of these power supplies is built into the NIM to support the primary segment; another is built into the STB XBE 1200 BOS modules to support any extension segments. If you need to provide more logic power in a primary or extension segment than the initial power supply can deliver, you may also use an STB CPS 2111 auxiliary power supply *(see Advantys STB, Special Modules, Reference Guide)*.

These power supplies require an external SELV-rated 24 VDC power source, which is usually mounted in the enclosure with the island.

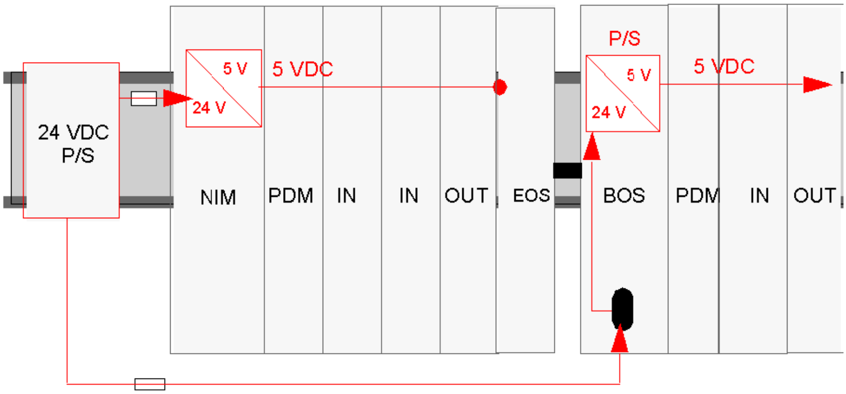
Logic Power Flow

The NIM converts the incoming 24 VDC to 5 VDC, and sends it across the island bus to the I/O modules in the primary segment:



This power supply provides 1.2 A of current to the primary segment. If the total current draw of all the modules on the island bus exceeds 1.2 A, you need to either use an auxiliary power supply or place some of the modules in one or more extension segment(s). If you use an extension segment, an EOS module is needed at the end of the primary segment, followed by an extension cable to a BOS module in an extension segment. The EOS terminates the 5 V logic power in the primary segment. The BOS in the next segment has its own 24-to-5 VDC power supply. It requires its own external 24 V power supply.

Here is an illustration of the extension segment scenario:



The Power Distribution Modules

Functions

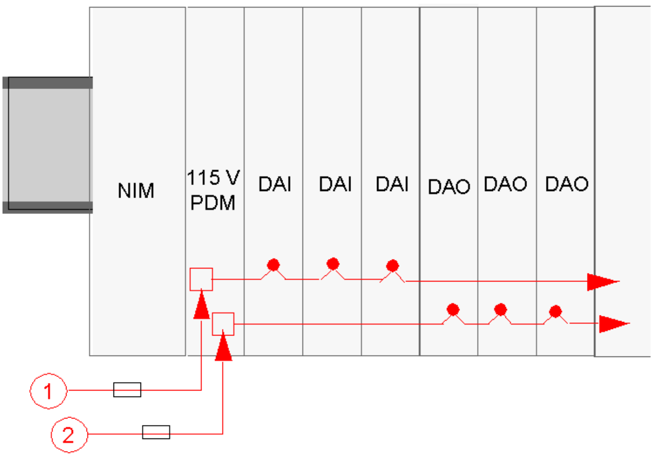
A PDM distributes field power to a set of Advantys STB I/O modules on the island bus. The PDM sends field power to the input and output modules in a segment. Depending on the PDM module you are using, it may distribute sensor power and actuator power on the same or on separate power lines across the island bus. The PDM helps to protect the input and output modules with a user-replaceable fuse. It also provides a protective earth (PE) connection for the island.

Voltage Groupings

I/O modules with different voltage requirements need to be isolated from each other in the segment, and the PDMs serve this role. Each voltage group requires its own PDM

Standard PDM Power Distribution

A PDM is placed immediately to the right of the NIM in slot 2 on the island. The modules in a specific voltage group follow in series to the right of the PDM. The following illustration shows a standard STB PDT 2100 PDM supporting a cluster of 115 VAC I/O modules:



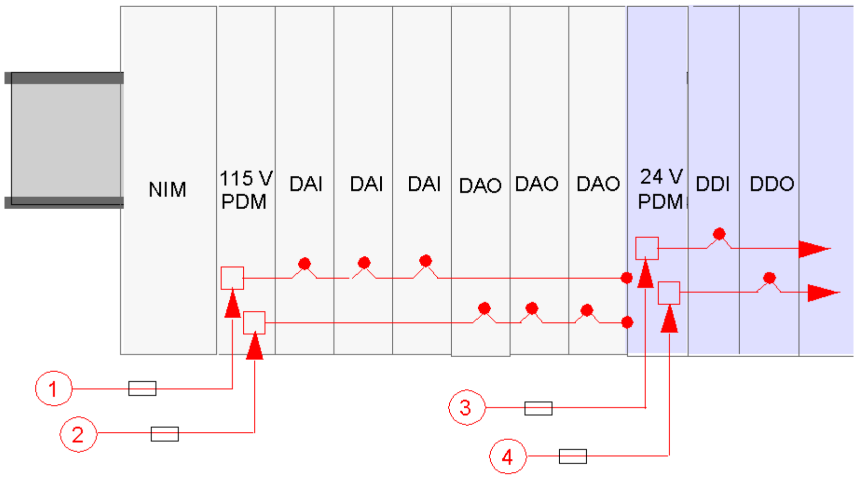
1 115 VAC sensor power signal to the PDM
2 115 VAC actuator power signal to the PDM

Notice that sensor power (to the input modules) and actuator power (to the output modules) are brought to the island via separate two-pin connectors on the PDM.

The island layout shown above assumes that all the I/O modules in the segment use 115 VAC for field power. Suppose, however, that your application requires a mix of 24 VDC and 115 VAC modules. A second PDM (this time a standard STB PDT 3100 module) is used for the 24 VDC I/O.

NOTE: When you plan the layout of an island segment that contains a mixture of AC and DC modules, we recommend that you place the AC voltage group(s) to the left of the DC voltage group(s) in a segment.

In this case, the STB PDT 3100 PDM is placed directly to the right of the last 115 VAC module. It terminates the sensor and actuator buses for the 115 VAC I/O voltage group and initiates new sensor and actuator buses for the 24 VDC modules:



1 115 VAC sensor power signal to the PDM
2 115 VAC actuator power signal to the PDM
3 24 VDC sensor power signal to the PDM
4 24 VDC actuator power signal to the PDM

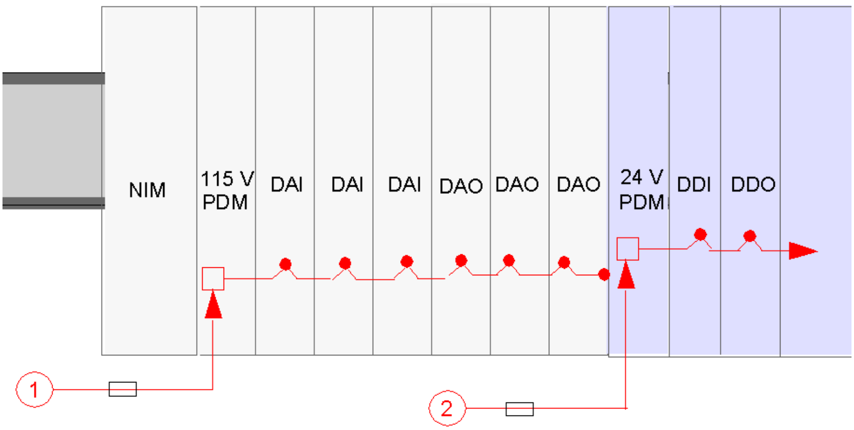
Each standard PDM contains a pair of time-lag fuses to help protect the I/O modules in the segment.:

- a 10 A fuse for the actuator bus—connected to output modules
- a 5 A fuse for the sensor bus—connected to input modules

These fuses are user-replaceable.

Basic PDM Power Distribution

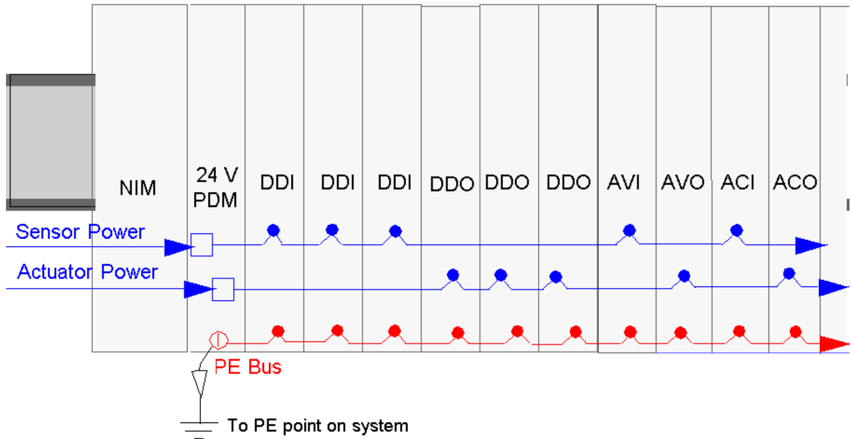
If your island uses basic PDMs instead of standard PDMs, then actuator power and sensor power are sent over a single power line:



Each basic PDM contains on 5 A time-lag fuse that helps to protect the I/O modules in the segment. This fuse is user-replaceable.

PE Grounding

A captive screw terminal on the bottom of the PDM base makes contact with pin 12 *(see page 35)* on each I/O base, establishing an island PE bus. The screw terminal on the PDM base meets IEC-1131 requirements for field power protection. The screw terminal should be wired to the PE point on your system.



Sensor Power and Actuator Power Distribution on the Island Bus

Summary

The sensor bus and the actuator bus need to be powered separately from external sources. Depending on your application, you may want to use the same or different external power supplies to feed the sensor bus and the actuator bus. The source power is fed to 2 two-pin power connectors on a PDM.

- The top connector is for the sensor power bus
- The bottom two-pin connector is for the actuator power bus

24 VDC Field Power Distribution

An external power supply delivers field power distributed to an STB PDT 3100 PDM.

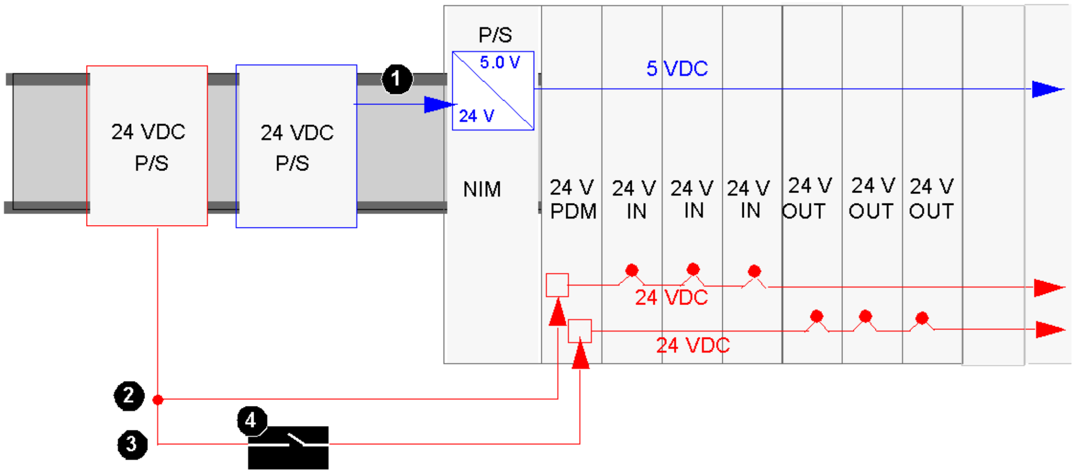
The power components are not galvanically isolated. They are intended for use only in systems designed to provide SELV isolation between the supply inputs or outputs and the load devices or system power bus. Use SELV-rated supplies to provide 24 VDC source power to the NIM.

NOTICE
EQUIPMENT DAMAGE Use only power supplies designed to provide SELV isolation between the � supply inputs, outputs, load devices and system power bus. **Failure to follow these instructions can result in equipment damage.**

NOTE: Above 130 VAC, the relay module may compromise the double insulation provided by a SELV-rated power supply.

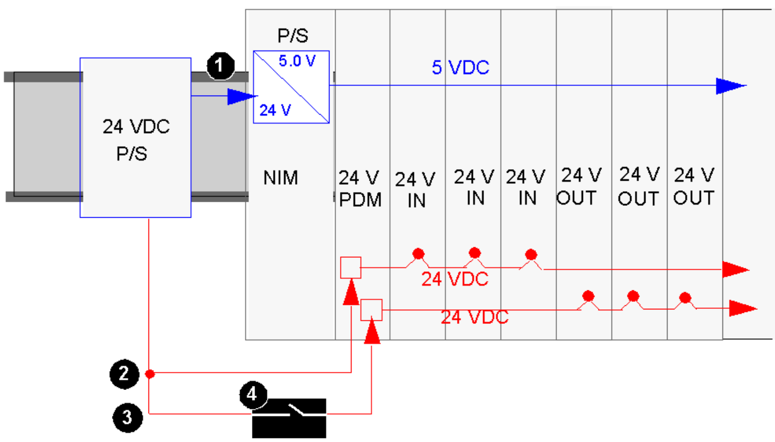
⚠ CAUTION
COMPROMISED DOUBLE INSULATION When you use a relay module, use separate external 24 VDC power supplies for the PDM supporting that module and the logic power to the NIM or BOS module when the contact voltage is above 130 VAC. **Failure to follow these instructions can result in injury or equipment damage.**

For more consistent system performance, use a separate 24 VDC supply for logic power to the NIM and for field power to the PDM:



1 24 VDC signal to the NIM's logic power supply
2 24 VDC signal to the segment's sensor bus
3 24 VDC signal to the segment's actuator bus
4 optional relay on the actuator bus

If the I/O load on the island bus is low and the system is operating in a low-noise environment, you may use the same supply for both logic power and field power:

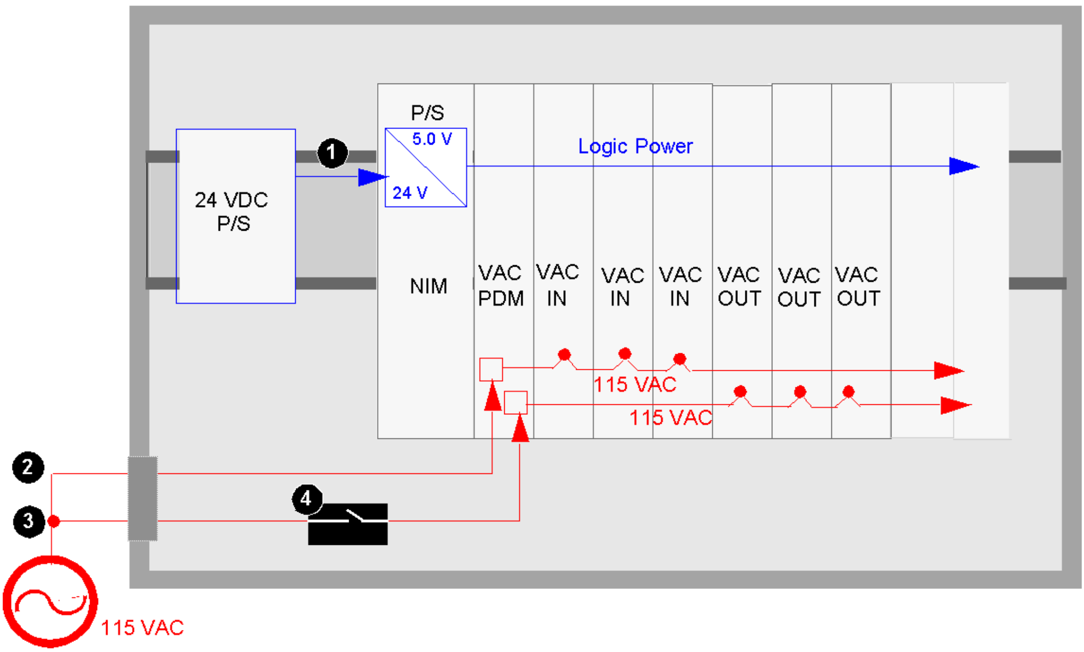


1 24 VDC signal to the NIM's logic power supply
2 24 VDC signal to the segment's sensor bus
3 24 VDC signal to the segment's actuator bus
4 optional relay on the actuator bus

NOTE: In the example above, a single power supply is used to provide 24 VDC to the NIM (for logic power) and the PDM. If any of the modules supported by the PDM is an STB relay module that operates at a contact voltage above 130 VAC, the double insulation provided by the SELV power supply is no longer present. Therefore, you will need to use a separate 24 VDC power supply to support the relay module.

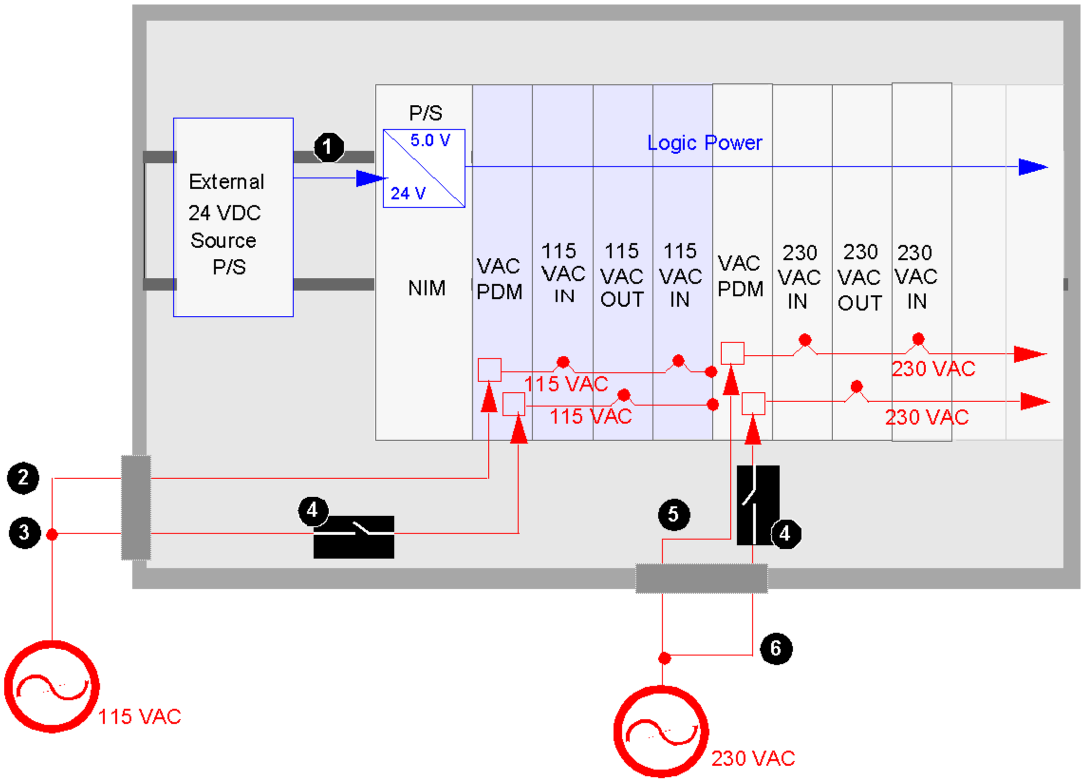
115 and 230 VAC Field Power Distribution

AC field power is distributed across the island by an STB PDT 2100 PDM. It can accept field power in the range 85 ... 264 VAC. The following illustration shows a simple view of 115 VAC power distribution:



1 24 VDC signal to the NIM's logic power supply
2 115 VAC signal to the segment's sensor bus
3 115 VAC signal to the segment's actuator bus
4 optional relay on the actuator bus

If the segment contains a mixture of both 115 VAC and 230 VAC I/O modules, you should take care to install them in separate voltage groups and support the different voltages with separate STB PDT 2100 PDMs:



1 24 VDC signal to the NIM's logic power supply
2 115 VAC signal to the segment's sensor bus
3 115 VAC signal to the segment's actuator bus
4 optional relay on the actuator bus
5 230 VAC signal to the segment's sensor bus
6 230 VAC signal to the segment's actuator bus

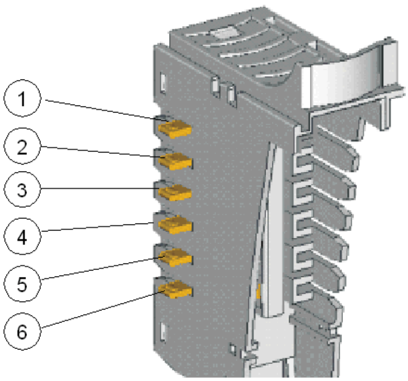
Communications Across the Island

Island Bus Architecture

Two sets of contacts on the left side of the base units—one set on the bottom and one on the top—enable the island to support several different communication and power buses. The contacts on the top left of a base support the island's logic side functions. The contacts at the bottom left of a base support the island's field power side.

Logic Side Contacts

The following illustration shows the location of the contacts as they appear on all the I/O bases. The six contacts at the top of the base support the logic side functionality:



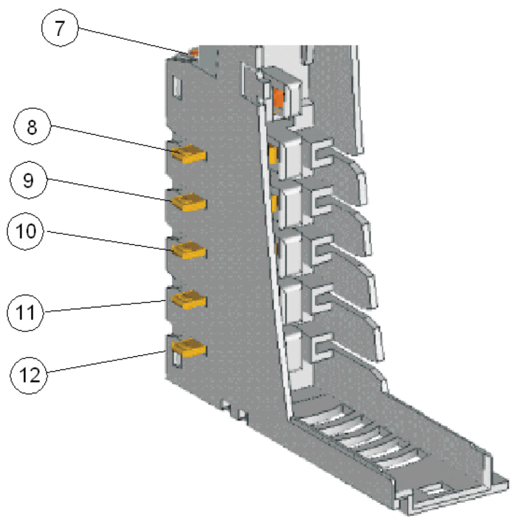
1 reserved
2 common ground contact
3 5 VDC logic power contact
4 island bus communications (+) contact
5 island bus communications (-) contact
6 address line contact

The following table lists the way the logic-side contacts are implemented on the different base units.

Base Unit	Logic-side Contacts
STB XBA 1000 size 1 I/O base	Contacts 2 ... 6 present and pass signals to the right. Contacts 2 and 3 terminate at the end of the segment; contacts 4, 5 and 6 pass to the end of the island bus.
STB XBA 2000 size 2 I/O base	Contacts 2 ... 6 present and pass signals to the right. Contacts 2 and 3 terminate at the end of the segment; contacts 4, 5 and 6 pass to the end of the island bus
STB XBA 2200 size 2 PDM base	Contacts 2 ... 6 present and pass signals to the right. Contacts 2 and 3 terminate at the end of the segment; contacts 4, 5 and 6 pass to the end of the island bus
STB XBA 2300 size 2 BOS base	Contacts 2 ... 6 are present and pass signals to the right
STB XBA 2400 size 2 EOS base	Contacts 1 ... 6 are present but the signals do not pass to the right
STB XBA 3000 size 3 I/O base	Contacts 2 ... 6 present and pass signals to the right. Contacts 2 and 3 terminate at the end of the segment; contacts 4, 5 and 6 pass to the end of the island bus

Field Power Distribution Contacts

The following illustration highlights the contacts at the bottom of the base, which support the island's field power distribution functionality:



7 a DIN rail clip that provides functional ground for noise immunity, RFI, etc.
8 and 9 sensor bus
10 and 11 actuator bus
12 PE, established via a captive screw on the PDM base units

The following table lists the way the field-side contacts are implemented on the different base units.

Base Unit	Logic-side Contacts
STB XBA 1000 size 1 I/O base	Contacts 7 ... 12 present. Contacts 7 and 12 are always made. Contacts 8 and 9 are made for input modules but not for output modules. Contacts 10 and 11 are made for output modules but not for input modules.
STB XBA 2000 size 2 I/O base	Contacts 7 ... 12 present. Contacts 7 and 12 are always made. Contacts 8 and 9 are made for input modules but not for output modules. Contacts 10 and 11 are made for output modules but not for input modules.
STB XBA 2200 size 2 PDM base	Contacts 7 and 12 present and are always made. Contacts 8 ... 11 are not connected on the left side—sensor and actuator power are delivered to the PDM from external power sources and passed to the right.
STB XBA 2300 size 2 BOS base	Contacts 7 ... 12 present but do not pass signals to the right. The BOS module does not receive field power.
STB XBA 2400 size 2 EOS base	Contacts 7 ... 12 are present but do not pass signals to the right. The EOS module does not receive field power.
STB XBA 3000 type 3 I/O base	Contacts 7 ... 12 present. Contacts 7 and 12 are always made. Contacts 8 and 9 are made for input modules but not for output modules. Contacts 10 and 11 are made for output modules but not for input modules.

Operating Environment

Environmental Specifications

The following information describes system-wide environmental requirements and specifications for the Advantys STB system.

Enclosure

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11, indicating there may be potential difficulties achieving electromagnetic compatibility in other environments due to conducted and/or radiated disturbance.

All Advantys STB modules meet CE mark requirements for *open equipment* as defined by EN61131-2, and should be installed in an enclosure that is designed for specific environmental conditions and designed to help reduce the chance of personal injury resulting from access to live parts. The interior of the enclosure should be accessible only by the use of a tool.

NOTE: Special requirements apply for enclosures located in hazardous (explosive) environments *(see Advantys STB, System Planning and Installation Guide)*.

Requirements

This equipment meets agency certification for UL, CSA, CE, FM class 1 div 2 and ATEX. This equipment is intended for use in a Pollution Degree 2 industrial environment, in over-voltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 m (6500 ft) without derating.

Parameter	Specification	
protection	ref. EN61131-2	IP20, class 1
agency	ref. EN61131-2	UL 508, CSA 1010-1, FM Class 1 Div. 2, CE, ATEX and Maritime
isolation voltage	ref. EN61131-2	1500 VDC field-to-bus for 24 VDC
		2500 VDC field-to-bus for 115/230 VAC
	Note: No internal isolation voltage; isolation requirements should be met by using SELV-based external power supply.	
over-voltage class	ref. EN61131-2	category II
operating temperature range	0 ... 60° C (32 ... 140° F)	
extended operating temperature ranges	-25 ... 0° C (-13 ... 32° F) and 60 ... 70° C (140 ... 158° F) for qualified modules (see *(see Advantys STB, System Planning and Installation Guide)*	
storage temperature	-40 ... +85° C (-40 ... +185° F)	
maximum humidity	95% relative humidity @ 60° C (non-condensing)	
supply voltage variation, interruption, shut-down and start-up	IEC 61000-4-11 ref. 61131-2	

Parameter	Specification	
shock	ref. IEC68, part 2-27	+/-15 g peak, 11 ms, half-sine wave for 3 shocks/axis
operating altitude	2000 m (2187 yd)	
transport altitude	3000 m (3281 yd)	
free-fall	ref. EN61131-2	1 m (1.09 yd)
agency certifications	ATEX @ 0 to 60°C and FM @ extended temperature ranges for specified modules *(see Advantys STB, System Planning and Installation Guide)*	

Electromagnetic Susceptibility

The following table lists the electromagnetic susceptibility specifications:

Characteristic	Specification
electrostatic discharge	ref. EN61000-4-2
radiated	ref. EN61000-4-3
fast transients	ref. EN61000-4-4
surge withstand (transients)	ref. EN61000-4-5
conducted RF	ref. EN61000-4-6

Radiated Emission

The following table lists the emission specification ranges:

Description	Specification	Range
radiated emission	ref. EN 55011 Class A	30 ... 230 MHz, 10 m @ 40 dBµV
		230 ... 1000 MHz, 10 m @ 47 dBµV

Chapter 2
The Advantys STB Digital Input Modules

Overview

This chapter describes the features of the standard and basic Advantys STB digital input modules.

What Is in This Chapter?

This chapter contains the following sections:

Section 2.1
STB DDI 3230 Digital 24 VDC Sink Input Module (two-channel, four-wire, IEC type 2, 0.2 ms-configurable, short-circuit protected)

Overview

This section provides a detailed description of the Advantys STB DDI 3230 digital input module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

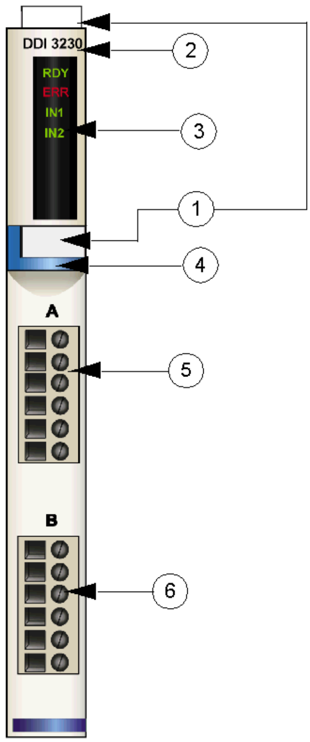
This section contains the following topics:

STB DDI 3230 Physical Description

Physical Characteristics

The STB DDI 3230 is a standard Advantys STB two-channel digital input module that reads inputs from 24 VDC sensor devices and provides power to the sensors. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Sensor 1 is wired to the top connector and sensor 2 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 light blue identification stripe, indicating a digital DC input module
5 sensor 1 connects to the top field wiring connector
6 sensor 2 connects to the bottom field wiring connector

Ordering Information

The module and its related parts can be ordered for stock or replacement as follows:

- a standalone STB DDI 3230 digital input module
- a standalone STB XBA 1000 *(see page 367)* size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spripng clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

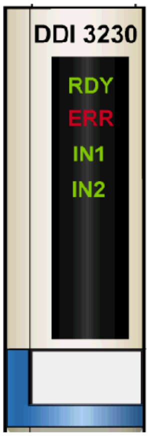
STB DDI 3230 LED Indicators

Purpose

The four LEDs on the STB DDI 3230 module provide visual indications of the operating status of module and its two digital input channels. The LED locations and their meanings are described below.

LED Locations

The four LEDs are positioned in a column on the top front of the module directly below the model number. The figure below shows their locations:



Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	ERR	IN1	IN2	Meaning	What to Do
off	off			The module is either not receiving logic power or has failed.	Check power
flicker*	off			Auto-addressing is in progress.	
on	off			The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational	
		on		Voltage is present on input channel 1.	
		off		Voltage is absent on input channel 1.	
			on	Voltage is present on input channel 2.	
			off	Voltage is absent on input channel 2.	
on	on	on	on	The watchdog has timed out.	Cycle power, restart the communications
		Note that the green input LEDs will be on even though the power is absent from the input channels when a watchdog time-out occurs.			
blink 1**				The module is in pre-operational mode.	
	flicker*			Field power absent or a PDM short circuit detected.	Check power
	blink 1**			A nonfatal error has been detected.	Cycle power, restart the communications
	blink 2***			The island bus is not running.	Check network connections, replace NIM
*	flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.				
**	blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.				
***	blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.				

NOTE: The detection of error conditions on the PDM input power connection may be delayed by as much as 15 ms from the event, depending on the sensor bus load, the system configuration and the nature of the fault.
Field power faults that are local to the input module are reported immediately.

STB DDI 3230 Field Wiring

Summary

The STB DDI 3230 module uses two six-terminal field wiring connectors. Sensor 1 is wired to the top connector, and sensor 2 is wired to the bottom connector. The choices of connector types and field wire types are described below, and a field wiring example is presented.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Sensors

The STB DDI 3230 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-, three-, or four-wire sensors that draw current up to:

- 100 mA at 30 degrees C
- 50 mA/channel at 60 degrees C

The module has IEC type 2 inputs designed to support sensor signals from solid state devices or mechanical contact switching devices such as relay contacts, push buttons (in normal or harsh environmental conditions), and two- or three-wire proximity switches.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wires in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire’s jacket for the module connection.

Local electrical codes take precedence over our recommended wire size for the protective earth (PE) connections on pin 6.

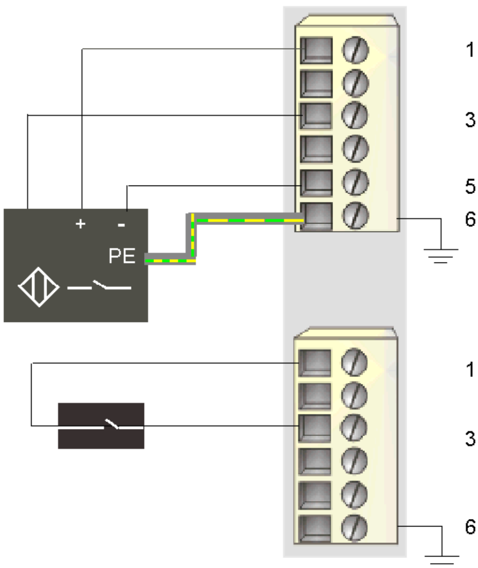
Field Wiring Pinout

The top connector supports the input from sensor 1, and the bottom connector supports the input from sensor 2:

Pin	Top Connector	Bottom Connector
1	+24 VDC from sensor bus for field device accessories	+24 VDC from sensor bus for field device accessories
2	+24 VDC from sensor bus for field device accessories	+24 VDC from sensor bus for field device accessories
3	input from sensor 1	input from sensor 2
4	field power return (to the module)	field power return (to the module)
5	field power return (to the module)	field power return (to the module)
6	protective earth	protective earth

Sample Wiring Diagram

The following field wiring example shows two sensors connected to the STB DDI 3230 module:



1 +24 VDC for sensor 1 (top) and for sensor 2 (bottom)
3 input from sensor 1 (top) and sensor 2 (bottom)
5 field power return to the module from sensor 1
6 protective earth connection for actuator 1 (top)

The four-wire sensor on the top connector has a PE connection that is tied to the PE connection on the PDM base through pin 6.

STB DDI 3230 Functional Description

Functional Characteristics

The STB DDI 3230 is a two-channel module that handles digital input data from two 24 VDC field sensors. Using the Advantys configuration software, you can customize the following operating parameters on the module:

- an input filter time constant for the module
- *logic normal* or *logic reverse* input polarity for each channel on the module

Using the RTP feature in your NIM, you can access the value of the following parameter:

- Input Filter Time Constant

Refer to the Advanced Configuration chapter in your NIM manual for general information on RTP.

NOTE: Standard NIMs with firmware version 2.0 or higher support RTP. RTP is not available in Basic NIMs.

Input Filter Time Constant

By default, the module filters the two input channels for 1.0 ms on-to-off and 1.0 ms off-to-on. If you want to change this input filtering value, you need to use the Advantys configuration software.

The following filter time constants may be configured:

- 0.2 ms (+/-0.1 ms)
- 0.5 ms (+/-0.1 ms)
- 1.0 ms (+/-0.1 ms)
- 2.0 ms (+/-0.1 ms)
- 4.0 ms (+/-0.1 ms)
- 8.0 ms (+/-0.1 ms)
- 16.0 ms (+/-0.1 ms)

Advantys STB products are designed to perform reliably at 1 ms in normal operating environments *(see page 37)*. If your island is operating in a harsher environment, you may set the filter time constant above 1 ms. In this case, performance will be slower.

If your application requires faster performance and if the island is operating in a low-noise environment, you may set the filter time constant below 1 ms. However, performance reliability cannot be guaranteed when the filter time is below 1 ms.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Operating with a filter time constant that is faster than 1 ms makes the system more susceptible to power transients and environmental noise.

Qualify the behavior of your system if you set the filter time to 0.2 ms or 0.5 ms.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To configure the input filter time constant:

Step	Action	Result
1	Double click on the STB DDI 3230 module you want to configure in the island editor.	The selected STB DDI 3230 module opens in the software module editor.
2	From the pull-down menu in the **Value** column of the **Filter Time Constant** row, select the desired time constant.	-

The input filter time constant is configured at the module level. One parameter value is set, and it applies to both input channels.

The value stored in the input filter time constant parameter is 10 times the actual value (in milliseconds) of the filter time constant.

This parameter is represented as an unsigned 8-bit number. To access this parameter using RTP, write the following values to the RTP request block:

Length	1
Index (low byte)	0x02
Index (high byte)	0x20
Sub-index	0
Data Byte 1	0x02 for filter time constant of 0.2 ms 0x05 for filter time constant of 0.5 ms 0x0A for filter time constant of 1.0 ms 0x14 for filter time constant of 2.0 ms 0x28 for filter time constant of 4.0 ms 0x50 for filter time constant of 8.0 ms 0xA0 for filter time constant of 16.0 ms

Input Polarity

By default, the polarity on both input channels is *logic normal*, where:

- an input value of 0 indicates that the physical sensor is off (or the input signal is low)
- an input value of 1 indicates that the physical sensor is on (or the input signal is high)

The input polarity on one or both channels may optionally be configured for *logic reverse*, where:

- an input value of 1 indicates that the physical sensor is off (or the input signal is low)
- an input value of 0 indicates that the physical sensor is on (or the input signal is high)

To change an input polarity parameter from the *logic normal* (0) or back to normal from *logic reverse* (1), use the Advantys configuration software.

You can configure input polarity values independently for each input channel:

Step	Action	Result
1	Double click on the STB DDI 3230 you want to configure in the island editor.	The selected STB DDI 3230 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Input Polarity** appears.
3	Expand the **+ Input Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Input Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have normal polarity and 3 means that both channels have reverse polarity.	Notice that when you select the **Input Polarity** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Input Polarity**, the values associated with the channels change. For example, if you choose an input polarity value of 2, **Channel 1** has normal polarity and **Channel 2** has reverse polarity.
4b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Input Polarity** row changes. For example, if you set channel 1 to *logic normal* and channel 2 to *logic reverse*, the **Input Polarity** value changes to 2.

STB DDI 3230 Data and Status for the Process Image

Representing Digital Input Data and Status

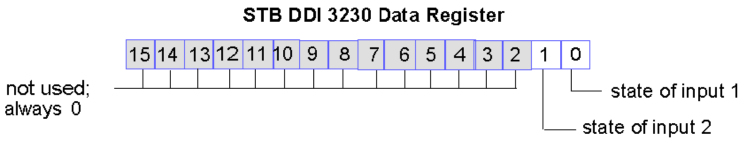
The STB DDI 3230 sends a representation of the operating state of its input channels to the NIM. The NIM stores this information in two 16-bit registers—one for data and one for error-detection status. The information can be read by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 through 49487) reserved in the NIM's memory. The STB DDI 3230 module is represented by two contiguous registers in this block—the data register followed by the status register. The specific registers used in the block are determined by the module's physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transmitted to the master in a fieldbus-specific format. For fieldbus-specific format descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus,

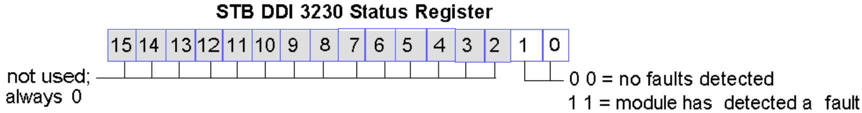
Input Data Register

The first STB DDI 3230 register in the input block of the process image is the data register. The least significant bit (LSB) in the represents the on/off state of input 1, and the bit to its immediate left represents the on/off state of input 2:



Input Status Register

The second STB DDI 3230 register in the input block of the process image is the status register. The STB DDI 3230 performs on-board error input filtering and short circuit power protection. The two LSBs in the status register indicate whether or not the module has detected a fault. The fault might be field power absent or a short circuit on the island's sensor bus:



NOTE: The detection of error conditions on the PDM input power connection may be delayed by as much as 15 ms from the event, depending on the sensor bus load, the system configuration and the nature of the fault.
Field power faults that are local to the input module are reported immediately.

STB DDI 3230 Specifications

Table of Technical Specifications

description		24 VDC IEC type 2 sink input
number of input channels		two
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping supported*		NIM-dependent**
reflex actions supported		as inputs only[1]
input protection		resistor-limited
isolation	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		the module is internally protected from damage
logic bus current consumption		55 mA
nominal sensor bus current consumption		200 mA, with no load
input voltage	on	+11 ... 30 VDC
	off	-3 ... +5 VDC
input current	on	6 mA min.
	off	2 mA max.
input impedance		3.3 kΩ @ 30 V
absolute maximum input	continuous	30 VDC
	for 1.3 ms	56 VDC, decaying pulse
input filter time constant	default	1.0 ms (+/-0.1 ms)
	user-configurable settings[1]	0.2 ms (+/-0.1 ms) 0.5 ms (+/-0.1 ms) 1.0 ms (+/-0.1 ms) 2.0 ms (+/-0.1 ms) 4.0 ms (+/-0.1 ms) 8.0 ms (+/-0.1 ms) 16.0 ms (+/-0.1 ms)
input response time	on-to-off	625 µs @ 0.2 ms input filter time
	off-to-on	610 µs @ 0.2 ms input filter time
polarity of the individual input channels	default	*logic normal* on both channels
	user-configurable settings	*logic reversed*, configurable by channel
		logic normal, configurable by channel
sensor bus power for accessories		100 mA/channel @ 30 degrees C
		50 mA/channel @ 60 degrees C

over-current protection for accessory power		yes
field power requirements	field power voltage	from a 24 VDC PDM
power protection		time-lag fuse on the PDM
operating voltage range		19.2 to 30 VDC
operating temperature range***		0 to 60°C
storage temperature		-40 to 85°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow you to hot swap I/O modules.		
***This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of cabalities and limitations.		
[1]Requires the Advantys configuration software.		

Section 2.2
STB DDI 3420 Digital 24 VDC Sink Input Module (four-channel, three-wire, IEC type 3, 0.5 ms-configurable, short-circuit protected)

Overview

This section provides you with a detailed description of the Advantys STB DDI 3420 digital input module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

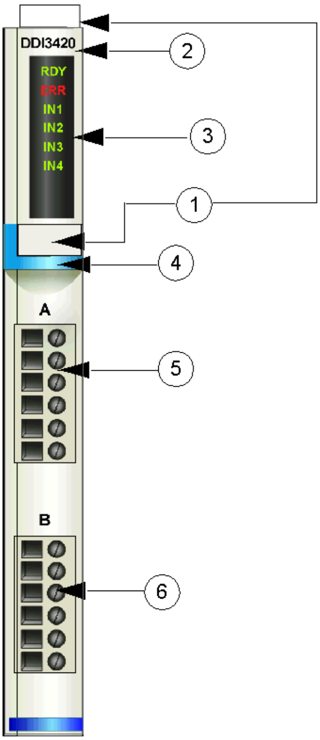
This section contains the following topics:

STB DDI 3420 Physical Description

Physical Characteristics

The STB DDI 3420 is a standard Advantys STB four-channel digital input module that reads inputs from 24 VDC sensor devices and provides power to the sensors. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Sensors 1 and 2 are wired to the top connector, and sensors 3 and 4 are wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 light blue identification stripe, indicating a digital DC input module
5 sensors 1 and 2 connect to the top field wiring connector
6 sensors 3 and 4 connect to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DDI 3420 K), which includes:

- one STB DDI 3420 digital input module
- one size 1 STB XBA 1000 *(see page 367)* I/O base
- two alternative sets of connectors:
  - two 6-terminal *screw type* connectors
  - two 6-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DDI 3420 digital input module
- a standalone STB XBA 1000 size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spring clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

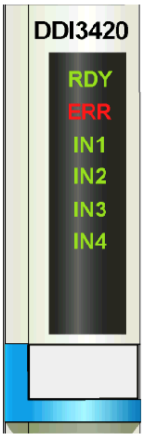
STB DDI 3420 LED Indicators

Overview

The six LEDs on the STB DDI 3420 module provide visual indications of the operating status of the module and its four digital input channels. The LED locations and their meanings are described below.

Location

The six LEDs are positioned in a column at the top of the STB DDI 3420 digital input module. The figure below shows their location:



Indications

The following table defines the meaning of the six LEDs (where an empty cell indicates that the pattern on the associated LED doesn’t matter):

<table>
<tr><th>RDY</th><th>ERR</th><th>IN1</th><th>IN2</th><th>IN3</th><th>IN4</th><th>Meaning</th><th>What to Do</th></tr>
<tr><td>off</td><td>off</td><td></td><td></td><td></td><td></td><td>The module is either not receiving logic power or has failed.</td><td>Check power</td></tr>
<tr><td>flicker*</td><td>off</td><td></td><td></td><td></td><td></td><td>Auto-addressing is in progress.</td><td></td></tr>
<tr><td rowspan="9">on</td><td rowspan="9">off</td><td></td><td></td><td></td><td></td><td>The module has achieved all of the following:
● it has power
● it has passed its confidence tests
● it is operational</td><td></td></tr>
<tr><td>on</td><td></td><td></td><td></td><td>Voltage is present on input channel 1.</td><td></td></tr>
<tr><td>off</td><td></td><td></td><td></td><td>Voltage is absent on input channel 1.</td><td></td></tr>
<tr><td></td><td>on</td><td></td><td></td><td>Voltage is present on input channel 2.</td><td></td></tr>
<tr><td></td><td>off</td><td></td><td></td><td>Voltage is absent on input channel 2.</td><td></td></tr>
<tr><td></td><td></td><td>on</td><td></td><td>Voltage is present on input channel 3.</td><td></td></tr>
<tr><td></td><td></td><td>off</td><td></td><td>Voltage is absent on input channel 3.</td><td></td></tr>
<tr><td></td><td></td><td></td><td>on</td><td>Voltage is present on input channel 4.</td><td></td></tr>
<tr><td></td><td></td><td></td><td>off</td><td>Voltage is absent on input channel 4.</td><td></td></tr>
<tr><td rowspan="2">on</td><td rowspan="2">on</td><td>on</td><td>on</td><td>on</td><td>on</td><td>The watchdog has timed out.</td><td rowspan="2">Cycle power, restart the communications</td></tr>
<tr><td colspan="5">Note that the green input LEDs will be on even though the power is absent from the input channels when a watchdog time-out occurs.</td></tr>
<tr><td>blink 1**</td><td></td><td></td><td></td><td></td><td></td><td>The module is in pre-operational mode.</td><td></td></tr>
<tr><td></td><td>flicker*</td><td></td><td></td><td></td><td></td><td>Field power absent or a PDM short circuit detected.</td><td>Check power</td></tr>
<tr><td></td><td>blink 1**</td><td></td><td></td><td></td><td></td><td>A nonfatal error has been detected.</td><td>Cycle power, restart the communications</td></tr>
<tr><td></td><td>blink 2***</td><td></td><td></td><td></td><td></td><td>The island bus is not running.</td><td>Check network connections, replace NIM</td></tr>
<tr><td colspan="8">* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.</td></tr>
<tr><td colspan="8">** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.</td></tr>
<tr><td colspan="8">*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.</td></tr>
</table>

NOTE: The detection of error conditions on the PDM input power connection may be delayed by as much as 15 ms from the event, depending on the sensor bus load, the system configuration and the nature of the fault.
Field power faults that are local to the input module are reported immediately.

STB DDI 3420 Field Wiring

Summary

The STB DDI 3420 module uses two six-terminal field wiring connectors. Sensors 1 and 2 are wired to the top connector, and sensors 3 and 4 are wired to the bottom connector. The choices of connector types and field wire types are described below, and a field wiring example is presented.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in kits of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors (available in kits of 20)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Sensors

The STB DDI 3430 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two- or three-wire sensors that draw current up to:

- 100 mA/channel at 30 degrees C
- 50 mA/channel at 60 degrees C

The module has IEC type 3 inputs designed to work with sensor signals from mechanical switching devices such as relay contacts, push buttons (in normal-to-moderate environmental conditions), three-wire proximity switches and two-wire proximity switches that have:

- a voltage drop of no more than 8 V
- a minimum operating current capability less than or equal to 2.5 mA
- a maximum off-state current less than or equal to 1.5 mA

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire's jacket for the module connection.

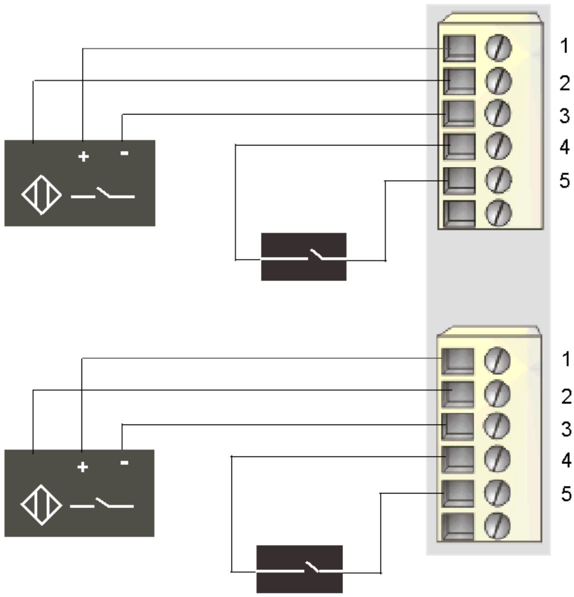
Field Wiring Pinout

The top connector supports sensors 1 and 2, and the bottom connector supports sensors 3 and 4:

Pin	Top Connector	Bottom Connector
1	+24 VDC from sensor bus for field device accessories	+24 VDC from sensor bus for field device accessories
2	input from sensor 1	input from sensor 3
3	field power return (to the module)	field power return (to the module)
4	+24 VDC from sensor bus for field device accessories	+24 VDC from sensor bus for field device accessories
5	input from sensor 2	input from sensor 4
6	field power return (to the module)	field power return (to the module)

Sample Wiring Diagram

The following field wiring example shows two- and three-wire sensors connected to the STB DDI 3420:



1 +24 VDC for sensor 1 (top and for sensor 3 (bottom)
2 input from sensor 1 (top) and sensor 3 (bottom)
3 field power return from sensor 1 (top) and sensor 3 (bottom)
4 +24 VDC for sensor 2 (top and for sensor 4 (bottom)
5 input from sensor 2 (top) and sensor 4 (bottom)

STB DDI 3420 Functional Description

Functional Characteristics

The STB DDI 3420 is a four-channel module that handles digital input data from four 24 VDC field sensors. Using the Advantys configuration software, you can customize the following operating parameters on the module:

- an input filter time constant for the module
- *logic normal* or *logic reverse* input polarity for each channel on the module

Using the RTP feature in your NIM, you can access the value of the following parameter:

- Input Filter Time Constant

Refer to the Advanced Configuration chapter in your NIM manual for general information on RTP.

NOTE: Standard NIMs with firmware version 2.0 or higher support RTP. RTP is not available in Basic NIMs.

Input Filter Time Constant

By default, the module filters each input channel for 1.0 ms on-to-off and 1.0 ms off-to-on. To increase or lower the input filtering value, you need to use the Advantys configuration software.

The following user-configurable input filtering times are available:

- 0.5 ms (+/-0.25 ms)
- 1.0 ms (+/-0.25 ms)
- 2.0 ms (+/-0.25 ms)
- 4.0 ms (+/-0.25 ms)
- 8.0 ms (+/-0.25 ms)
- 16.0 ms (+/-0.25 ms)

Advantys STB products are designed to perform reliably at 1 ms in normal operating environments *(see page 37)*. If your island is operating in a harsher environment, you may set the filter time constant above 1 ms. In this case, performance will be slower.

If your application requires faster performance and if the island is operating in a low-noise environment, you may set the filter time constant below 1 ms. However, performance reliability cannot be guaranteed when the filter time is below 1 ms.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Operating with a filter time constant that is faster than 1 ms makes the system more susceptible to power transients and environmental noise.

Qualify the behavior of your system if you set the filter time to 0.5 ms.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To configure the input filter time constant:

Step	Action	Result
1	Double click on the STB DDI 3420 you want to configure in the island editor.	The selected STB DDI 3420 module opens in the software module editor.
2	From the pull-down menu in the **Value** column of the **Filter Time Constant** row, select the desired time constant.	

The input filter time constant is configured at the module level. One parameter value is set, and it applies to all four input channels.

The value stored in the input filter time constant parameter is 4 times the actual value (in milliseconds) of the filter time constant.

This parameter is represented as an unsigned 8-bit number. To access this parameter using RTP, write the following values to the RTP request block:

Length	1
Index (low byte)	0x02
Index (high byte)	0x20
Sub-index	0
Data Byte 1	0x02 for filter time constant of 0.5 ms 0x04 for filter time constant of 1.0 ms 0x08 for filter time constant of 2.0 ms 0x10 for filter time constant of 4.0 ms 0x20 for filter time constant of 8.0 ms 0x40 for filter time constant of 16.0 ms

Input Polarity

By default, the polarity on all four input channels is *logic normal*, where:

- an input value of 0 indicates that the physical sensor is off (or the input signal is low)
- an input value of 1indicates that the physical sensor is on (or the input signal is high)

The input polarity on one or more of the channels may optionally be configured for *logic reverse*, where:

- an input value of 1 indicates that the physical sensor is off (or the input signal is low)
- an input value of 0 indicates that the physical sensor is on (or the input signal is high)

To change an input polarity parameter from *logic normal* (0) or back to normal from *logic reverse* (1), you need to use the Advantys configuration software.

You can configure input polarity values independently on each input channel:

Step	Action	Result
1	Double click on the STB DDI 3420 you want to configure in the island editor.	The selected STB DDI 3420 module opens in the software module editor.
2	Choose the data display format by either checking or unchecking the **Hexadecimal** checkbox at the top right of the editor.	Hexadecimal values will appear in the editor if the box is checked; decimal values will appear if the box is unchecked.
3	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Input Polarity** appears.
4	Expand the **+ Input Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1**, **Channel 2**, **Channel 3** and **Channel 4** appear.
5a	To change the polarity settings *at the module level*, select the integer that appears in the **Value** column of the **Input Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 15 (0x0 to 0xF), where 0 means that all channels have normal polarity and 0xF means that all four channels have reverse polarity.	Notice that when you select the **Input Polarity** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new integer value for **Input Polarity**, the values associated with the channels change. For example, if you choose an input polarity value of 6, **Channel 1** and **Channel 4** will have *normal polarity*, while **Channel 2** and **Channel 3** will have *reverse polarity*.
5b	To change the polarity settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new integer value for a channel setting, the value for the module in the **Input Polarity** row changes. For example, if you set channels 1 and 4 to *normal polarity* and channels 2 and 3 to *reverse polarity*, the **Input Polarity** value changes to 6.

STB DDI 3420 Data and Status for the Process Image

Representing Digital Input Data and Status

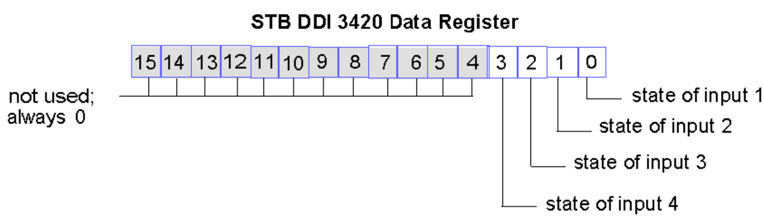
The STB DDI 3420 sends a representation of the operating state of its input points to the NIM. The NIM stores this information in two 16-bit registers—one for data and one for error-detection status. The information can be read by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 through 49487) reserved in the NIM's memory. The STB DDI 3420 module is represented by two contiguous registers in this block—the data register followed by the status register. The specific registers used are based on the module's physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transmitted to the master in a fieldbus-specific format. For fieldbus-specific format descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus,

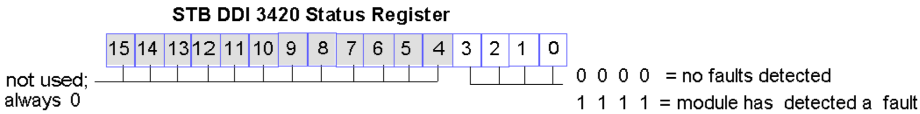
Input Data Register

The first STB DDI 3420 register in the input block of the process image is the data register. The least significant bit (LSB) in the represents the on/off state of input 1, and the three bits to its immediate left represent the on/off states of inputs 2, 3, and 4 respectively:



Input Status Register

The second STB DDI 3420 register in the input block of the process image is the status register. The STB DDI 3420 provides on-board error input filtering and short circuit power protection. The four LSBs indicate whether or not the module has detected a fault. The fault might be field power absent or a short circuit on the island's sensor bus:



NOTE: The detection of error conditions on the PDM input power connection may be delayed by as much as 15 ms from the event, depending on the sensor bus load, the system configuration and the nature of the fault.
Field power faults that are local to the input module are reported immediately.

STB DDI 3420 Specifications

Table of Technical Specifications

description		24 VDC IEC type 3 sink input
number of input channels		four
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping supported*		NIM-dependent**
reflex actions supported		as inputs only[1]
input protection		resistor-limited
isolation	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		the module is internally protected from damage
logic bus current consumption		45 mA
nominal sensor bus current consumption		400 mA, with no load
input voltage	on	11 ... 30 VDC
	off	-3 ... +5 VDC
input current	on	2.5 mA min.
	off	1.2 mA max.
input impedance		2.8 kΩ @ 30 V
absolute maximum input	continuous	30 VDC
	for 1.3 ms	56 VDC, decaying pulse
input filter time constant	default	1.0 ms (+/-0.25 ms)
	user-configurable settings[1]	0.5 ms (+/-0.25 ms)) 1.0 ms (+/-0.25 ms) 2.0 ms (+/-0.25 ms) 4.0 ms (+/-0.25 ms) 8.0 ms (+/-0.25 ms) 16.0 ms (+/-0.25 ms)
input response time	on-to-off	1.35 ms @ 05 ms input filter time
	off-to-on	925 µs @ 0.5 ms input filter time
polarity of the individual input channels	default	*logic normal* on all channels
	user-configurable settings[1]	*logic reversed*, configurable by channel
		logic normal, configurable by channel
sensor bus power for accessories		100 mA/channel @ 30 degrees C
		50 mA/channel @ 60 degrees C

over-current protection for accessory power		yes
field power requirements	field power voltage	from a 24 VDC PDM
power protection		time-lag fuse on the PDM
operating voltage range		19.2 to 30 VDC
operating temperature range***		0 to 60°C
storage temperature		-40 to 85°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* ** Basic NIMs do not allow you to hot swap I/O modules.		
***This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of cabalities and limitations.		
[1]Requires the Advantys configuration software.		

Section 2.3
STB DDI 3425 Digital 24 VDC Sink Input Module (four-channel, three-wire, IEC type 3)

Overview

This section provides you with a detailed description of the Advantys STB DDI 3425 digital input module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

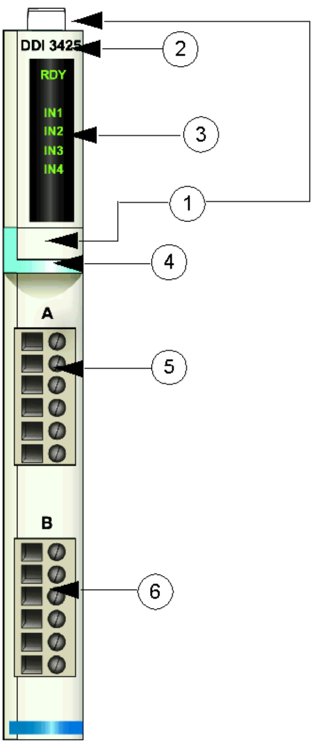
This section contains the following topics:

STB DDI 3425 Physical Description

Physical Characteristics

The STB DDI 3425 is a basic Advantys STB four-channel digital input module that reads inputs from 24 VDC sensor devices and provides power to the sensors. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Sensors 1 and 2 are wired to the top connector, and sensors 3 and 4 are wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 light blue identification stripe, indicating a digital DC input module
5 sensors 1 and 2 connect to the top field wiring connector
6 sensors 3 and 4 connect to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DDI 3425 K), which includes:

- one STB DDI 3425 digital input module
- one size 1 STB XBA 1000 *(see page 367)* I/O base
- two alternative sets of connectors:
  - two 6-terminal *screw type* connectors
  - two 6-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DDI 3425 digital input module
- a standalone STB XBA 1000 size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spring clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

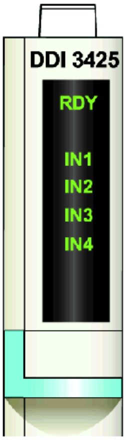
STB DDI 3425 LED Indicators

Overview

The five LEDs on the STB DDI 3425 module provide visual indications of the operating status of the module and its four digital input channels.

Location

The LEDs are located on the front bezel of the module below the model number:



Indications

The following table defines the meaning of the five LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	IN1	IN2	IN3	IN4	Meaning
off					The module is either not receiving logic power, has experienced a watchdog timer error or has failed.
flicker*					Auto-addressing is in progress.

RDY	IN1	IN2	IN3	IN4	Meaning
on					The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational
	on				Voltage is present on input channel 1.
	off				Voltage is absent on input channel 1.
		on			Voltage is present on input channel 2.
		off			Voltage is absent on input channel 2.
			on		Voltage is present on input channel 3.
			off		Voltage is absent on input channel 3.
				on	Voltage is present on input channel 4.
				off	Voltage is absent on input channel 4.
blink 1**					The module is in pre-operational mode.
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.					
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.					

STB DDI 3425 Field Wiring

Summary

The STB DDI 3425 module uses two six-terminal field wiring connectors. Sensors 1 and 2 are wired to the top connector, and sensors 3 and 4 are wired to the bottom connector.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in kits of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors (available in kits of 20)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Sensors

The STB DDI 3425 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two- or three-wire sensors that draw current up to:

- 50 mA/channel at 30 degrees C
- 25 mA/channel at 60 degrees C

The module has IEC type 3 inputs designed to work with sensor signals from mechanical switching devices such as relay contacts, push buttons (in normal-to-moderate environmental conditions), three-wire proximity switches and two-wire proximity switches that have:

- a voltage drop of no more than 8 V
- a minimum operating current capability less than or equal to 2.5 mA
- a maximum off-state current less than or equal to 1.5 mA

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire’s jacket for the module connection.

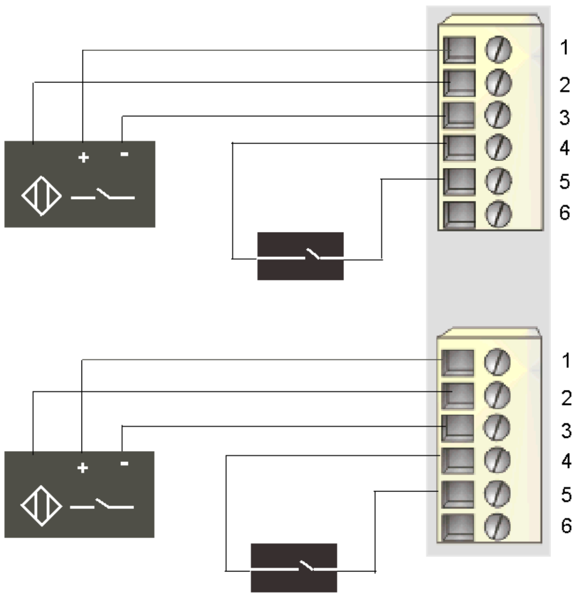
Field Wiring Pinout

The top connector supports sensors 1 and 2, and the bottom connector supports sensors 3 and 4:

Pin	Top Connector	Bottom Connector
1	+24 VDC from sensor bus for field device accessories	+24 VDC from sensor bus for field device accessories
2	input from sensor 1	input from sensor 3
3	field power return (to the module)	field power return (to the module)
4	+24 VDC from sensor bus for field device accessories	+24 VDC from sensor bus for field device accessories
5	input from sensor 2	input from sensor 4
6	field power return (to the module)	field power return (to the module)

Sample Wiring Diagram

The following field wiring example shows two- and three-wire sensors connected to the STB DDI 3425:



1 +24 VDC for sensor 1 (top and for sensor 3 (bottom)
2 input from sensor 1 (top) and sensor 3 (bottom)
3 field power return from sensor 1 (top) and sensor 3 (bottom)
4 +24 VDC for sensor 2 (top and for sensor 4 (bottom)
5 input from sensor 2 (top) and sensor 4 (bottom)

STB DDI 3425 Functional Description

Functional Characteristics

The STB DDI 3425 is a four-channel module that handles digital input data from four 24 VDC field sensors. It does not support user-configurable operating parameters or reflex actions.

Input Filter Time Constant

The module filters each input channel for 3.0 ms on-to-off and 3.0 ms off-to-on.

Input Polarity

The input polarity on all four input channels is *logic normal*, where:

- 0 indicates that the physical sensor is off (or the input signal is low)
- 1 indicates that the physical sensor is on (or the input signal is high)

STB DDI 3425 Data for the Process Image

Representing Digital Input Data

The STB DDI 3425 sends a representation of the operating state of its input points to the NIM. The NIM stores this information in a 16-bit data register. The information can be read by the fieldbus master. If you are not using a basic NIM, the information can also be read by an HMI panel connected to the NIM's CFG port.

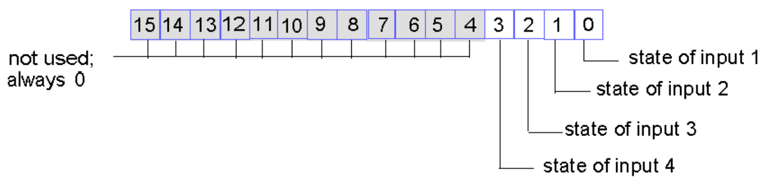
The input data process image is part of a block of 4096 registers (in the range 45392 through 49487) reserved in the NIM's memory. The STB DDI 3425 module is represented by one register in this block. The specific registers used are based on the module's physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transmitted to the master in a fieldbus-specific format. For fieldbus-specific format descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Input Data Register

The least significant bit in the register represents the on/off state of input 1, and the three bits to its immediate left represent the on/off states of inputs 2, 3, and 4 respectively:

STB DDI 3425 Data Register



STB DDI 3425 Specifications

Table of Technical Specifications

description		24 VDC IEC type 3 sink input
number of input channels		four
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping supported*		NIM-dependent**
reflex actions supported		no
input protection		resistor-limited
isolation	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		the module is internally protected from damage
logic bus current consumption		45 mA
nominal sensor bus current consumption		200 mA, with no load
input voltage	on	11 ... 30 VDC
	off	-3 ... +5 VDC
input current	on	2.5 mA min.
	off	1.2 mA max.
input impedance		2.8 kΩ @ 30 V
absolute maximum input	continuous	30 VDC
	for 1.3 ms	56 VDC, decaying pulse
input filter time constant		3.0 ms
input response time	on-to-off	3.8 ms
	off-to-on	3.5 ms
polarity		*logic normal* on all channels
sensor bus power for accessories		50 mA/channel @ 30 degrees C
		25 mA/channel @ 60 degrees C
over-current protection for accessory power		yes
field power requirements		from a 24 VDC PDM
power protection		time-lag fuse on the PDM
operating voltage range		19.2 to 30 VDC
operating temperature range		0 to 60°C
storage temperature		-40 to 85°C

agency certifications	refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow you to hot swap I/O modules.	

Section 2.4
STB DDI 3610 Digital 24 VDC Sink Input Module (six-channel, two-wire, IEC type 1, fixed 1 ms)

Overview

This section provides you with a detailed description of the Advantys STB DDI 3610 digital input module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

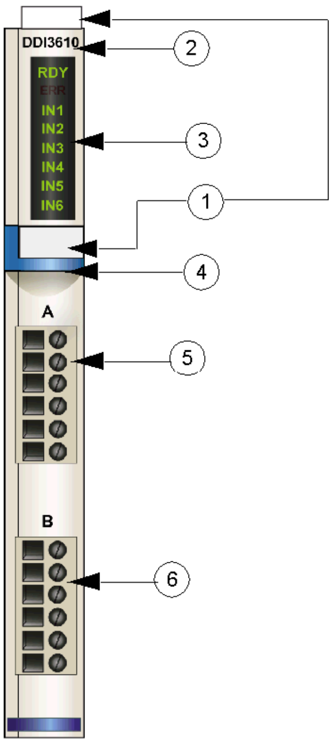
This section contains the following topics:

STB DDI 3610 Physical Description

Physical Characteristics

The STB DDI 3610 is a standard Advantys STB six-channel digital input module that reads inputs from 24 VDC sensor devices and provides power to the sensors. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Sensors 1, 2 and 3 are wired to the top connector, and sensors 4, 5 and 6 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 light blue identification stripe, indicating a digital DC input module
5 sensors 1 ... 3 connect to the top field wiring connector
6 sensors 4 ... 6 connect to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DDI 3610 K), which includes:

- one STB DDI 3610 digital input module
- one size 1 STB XBA 1000 *(see page 367)* I/O base
- two alternative sets of connectors:
  - two 6-terminal *screw type* connectors
  - two 6-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DDI 3610 digital input module
- a standalone STB XBA 1000 size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spring clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

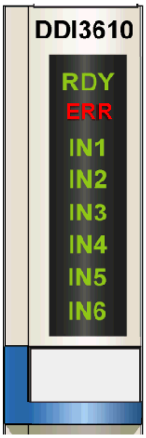
STB DDI 3610 LED Indicators

Overview

The eight LEDs on the STB DDI 3610 module are visual indications of the operating status of the module and its six digital input channels. The LED locations and their meanings are described below.

Location

The eight LEDs are positioned in a column on the top front of the STB DDI 3610 digital input module. The figure below shows their location:



Indications

The following table defines the meaning of the eight LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	ERR	IN1	IN2	IN3	IN4	IN5	IN6	Meaning	What to Do
off	off							The module is either not receiving logic power or has failed.	Check power

RDY	ERR	IN1	IN2	IN3	IN4	IN5	IN6	Meaning	What to Do
flicker*	off							Auto-addressing is in progress.	
on	off							The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational	
		on						Voltage is present on input channel 1.	
		off						Voltage is absent on input channel 1.	
			on					Voltage is present on input channel 2.	
			off					Voltage is absent on input channel 2.	
				on				Voltage is present on input channel 3.	
				off				Voltage is absent on input channel 3.	
					on			Voltage is present on input channel 4.	
					off			Voltage is absent on input channel 4.	
						on		Voltage is present on input channel 5.	
						off		Voltage is absent on input channel 5.	
							on	Voltage is present on input channel 6.	
							off	Voltage is absent on input channel 6.	
on	on	on	on	on	on	on	on	The watchdog has timed out.	Cycle power, restart the communications
		Note that the green input LEDs will be on even though the power is absent from the input channels when a watchdog time-out occurs.							
blink 1**								The module is in pre-operational mode.	
	flicker*							Field power absent or a PDM short circuit detected.	Check power

RDY	ERR	IN1	IN2	IN3	IN4	IN5	IN6	Meaning	What to Do
	blink 1**							A nonfatal error has been detected.	Cycle power, restart the communications
	blink 2***							The island bus is not running.	Check network connections, replace NIM
*	flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.								
**	blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.								
***	blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.								

NOTE: The detection of error conditions on the PDM input power connection may be delayed by as much as 15 ms from the event, depending on the sensor bus load, the system configuration and the nature of the fault.
Field power faults that are local to the input module are reported immediately.

STB DDI 3610 Field Wiring

Summary

The STB DDI 3610 module uses two six-terminal field wiring connectors. Sensors 1, 2 and 3 are wired to the top connector, and sensors 4, 5 and 6 are wired to the bottom connector. The choices of connector types and field wire types are described below, and a field wiring example is presented.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Sensors

The STB DDI 3610 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-wire sensors.

The module has IEC type 1 inputs that support sensor signals from mechanical switching devices such as relay contacts and push buttons operating in normal environmental conditions.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 .to 16 AWG).

We recommend that you strip at least 9 mm from the wire's jacket for the module connection.

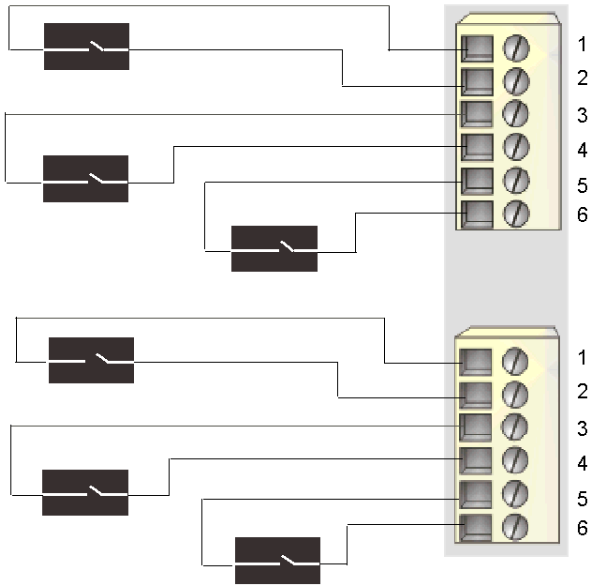
Field Wiring Pinout

The top connector supports digital sensors 1, 2 and 3; the bottom connector supports digital sensors 4, 5 and 6:

Pin	Top Connector	Bottom Connector
1	+24 VDC sensor bus power	+24 VDC sensor bus power
2	input from sensor 1	input from sensor 4
3	+24 VDC sensor bus power	+24 VDC sensor bus power
4	input from sensor 2	input from sensor 5
5	+24 VDC sensor bus power	+24 VDC sensor bus power
6	input from sensor 3	input from sensor 6

Sample Wiring Diagram

The following illustration shows a field wiring example where six two-wire switches are connected to the STB DDI 3610:



1 +24 VDC to sensor 1 (top) and to sensor 4 (bottom)
2 input from sensor 1 (top) and sensor 4 (bottom)
3 +24 VDC to sensor 2 (top) and to sensor 5 (bottom)
4 input from sensor 2 (top) and sensor 5 (bottom)
5 +24 VDC to sensor 3 (top) and to sensor 6 (bottom)
6 input from sensor 3 (top) and sensor 6 (bottom)

STB DDI 3610 Functional Description

Functional Characteristics

The STB DDI 3610 is a six-channel module that handles digital input data from six 24 VDC field sensors. Using the Advantys configuration software, you can customize each channel for *logic normal* or *logic reverse* input polarity.

Input Polarity

By default, the polarity on all six input channels is *logic normal*, where:

- an input value of 0 indicates that the physical sensor is off (or the input signal is low)
- an input value of 1 indicates that the physical sensor is on (or the input signal is high)

The input polarity on one or more of the channels may optionally be configured for *logic reverse*, where:

- an input value of 1 indicates that the physical sensor is off (or the input signal is low)
- an input value of 0 indicates that the physical sensor is on (or the input signal is high)

To change an input polarity parameter from the default or back to the normal from reverse, you need to use the Advantys configuration software.

You can configure input polarity values independently for each input channel:

Step	Action	Result
1	Double click on the STB DDI 3610 you want to configure in the island editor.	The selected STB DDI 3610 module opens in the software module editor.
2	Choose the format in which you want your values to be displayed by either checking or unchecking the **Hexadecimal** checkbox (at the top right of the editor.	Hexadecimal values will appear in the editor if the box is checked; decimal values will appear if the box is unchecked.
3	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Input Polarity** appears.
4	Expand the **+ Input Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1**, **Channel 2**, **Channel 3**, **Channel 4**, **Channel 5** and **Channel 6** appear.
5a	To change the polarity settings *at the module level*, select the integer that appears in the **Value** column of the **Input Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 63 (0x0 to 0x3F), where 0 means that all six channels have normal polarity and 0x3F means that all six channels have reverse polarity.	Notice that when you select the **Input Polarity** value, the maxi/min values of the range appear at the bottom of the module editor screen. Notice that when you accept a new integer value for **Input Polarity**, the values associated with the channels change. For example, if you choose an input polarity value of 0x2F, **Channel 5** will have *normal polarity* and the other five channels will have *reverse polarity*.

Step	Action	Result
5b	To change the polarity settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new integer value for a channel setting, the value for the module in the **Input Polarity** row changes. For example, if you set channel 5 to *normal polarity* and the other five channel to *reverse polarity*, the **Input Polarity** value changes to 0x2F.

STB DDI 3610 Data for the Process Image

Representing Digital Input Data

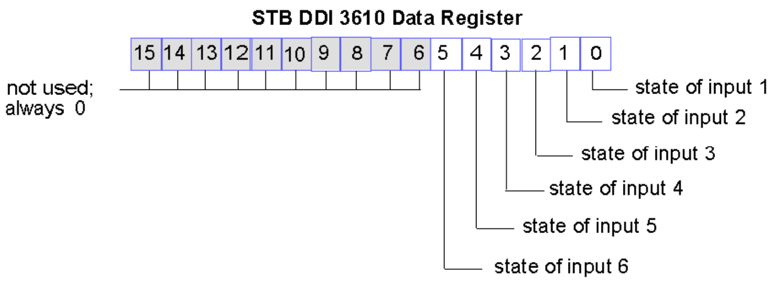
The STB DDI 3610 sends a representation of the operating state of its input channels to the NIM. The NIM stores this information in two 16-bit registers—one for data and one for error-detection status. The information can be read by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 through 49487) reserved in the NIM's memory. The STB DDI 3610 module is represented by two contiguous registers in this block—the data register followed by the status register. The specific registers used in the block are determined by the module's physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transmitted to the master in a fieldbus-specific format. For fieldbus-specific format descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus,

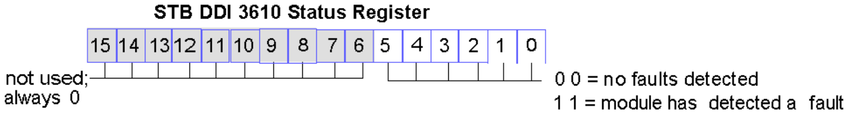
Input Data Register

The first STB DDI 3610 register in the input block of the process image is the data register. The least significant bit (LSB) represents the on/off state of input 1, and the five bits to its immediate left represent the on/off states of inputs 2, 3, 4, 5 and 6, respectively:



Input Status Register

The second STB DDI 3610 register in the input block of the process image is the status register. The STB DDI 3610 provide on-board error input filtering and short circuit power protection. The six LSBs indicate whether or not the module has detected a fault. The fault might be field power absent or a short circuit on the island's sensor bus:



NOTE: The detection of error conditions on the PDM input power connection may be delayed by as much as 15 ms from the event, depending on the sensor bus load, the system configuration and the nature of the fault.

Field power faults that are local to the input module are reported immediately.

STB DDI 3610 Specifications

Table of Technical Specifications

description		24 VDC IEC type 1 sink input
number of input channels		six
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping supported*		NIM-dependent**
reflex actions supported		for inputs only[1]
input protection		resistor-limited
isolation voltage	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		the module is internally protected from damage
logic bus current consumption		55 mA
nominal sensor bus current consumption		60 mA, with no load
input voltage	on	+15 ... 30 VDC
	off	-3 ... +5 VDC
input current	on	2 mA min.
	off	0.5 mA max.
input impedance		5.3 kΩ @ 30 V
absolute maximum input	continuous	30 VDC
	for 1.3 ms	56 VDC, decaying pulse
input filter time constant		1.0 ms
input response time	on-to-off	1.74 ms
	off-to-on	1.21 ms
polarity of the individual input channels	default	*logic normal* on both channels
	user-configurable settings[1]	*logic reversed*, configurable by channel
		logic normal, configurable by channel
field power requirements		from a 24 VDC PDM
operating voltage range		19.2 to 30 VDC
operating temperature range***		0 to 60°C
storage temperature		-40 to 85°C

agency certifications	refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow you to hot swap I/O modules.	
***This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of cabalities and limitations.	
[1]Requires the Advantys configuration software.	

Section 2.5
STB DDI 3615 Digital 24 VDC Sink Input Module (six-channel, two-wire, IEC type 1)

Overview

This section provides you with a detailed description of the Advantys STB DDI 3615 digital input module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

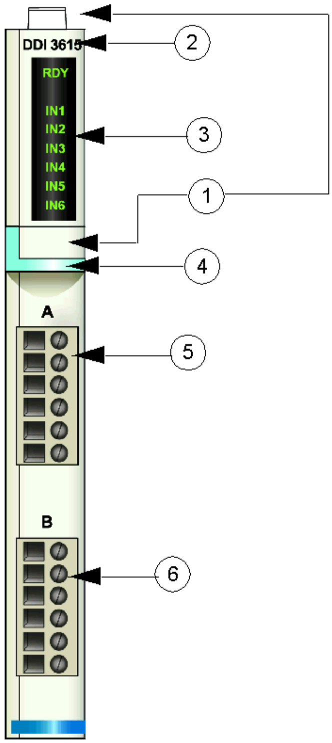
This section contains the following topics:

STB DDI 3615 Physical Description

Physical Characteristics

The STB DDI 3615 is a basic Advantys STB six-channel digital input module that reads inputs from 24 VDC sensor devices and provides power to the sensors. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Sensors 1, 2 and 3 are wired to the top connector, and sensors 4, 5 and 6 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 light blue identification stripe, indicating a digital DC input module
5 sensors 1 ... 3 connect to the top field wiring connector
6 sensors 4 ... 6 connect to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DDI 3615 K), which includes:

- one STB DDI 3615 digital input module
- one size 1 STB XBA 1000 *(see page 367)* I/O base
- two alternative sets of connectors:
  - two 6-terminal *screw type* connectors
  - two 6-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DDI 3615 digital input module
- a standalone STB XBA 1000 size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spring clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

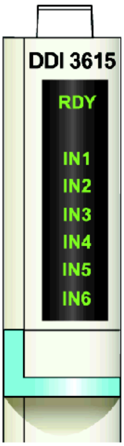
STB DDI 3615 LED Indicators

Overview

The seven LEDs on the STB DDI 3615 module are visual indications of the operating status of the module and its six digital input channels.

Location

The LEDs are located on the front bezel of the module below the model number



Indications

The following table defines the meaning of the seven LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	IN1	IN2	IN3	IN4	IN5	IN6	Meaning
off							The module is either not receiving logic power, has experienced a watchdog timer error or has failed.
flicker*							Auto-addressing is in progress.

RDY	IN1	IN2	IN3	IN4	IN5	IN6	Meaning
on							The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational
	on						Voltage is present on input channel 1.
	off						Voltage is absent on input channel 1.
		on					Voltage is present on input channel 2.
		off					Voltage is absent on input channel 2.
			on				Voltage is present on input channel 3.
			off				Voltage is absent on input channel 3.
				on			Voltage is present on input channel 4.
				off			Voltage is absent on input channel 4.
					on		Voltage is present on input channel 5.
					off		Voltage is absent on input channel 5.
						on	Voltage is present on input channel 6.
						off	Voltage is absent on input channel 6.
blink 1**							The module is in pre-operational mode.
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.							
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.							

STB DDI 3615 Field Wiring

Summary

The STB DDI 3615 module uses two six-terminal field wiring connectors. Sensors 1 ... 3 are wired to the top connector, and sensors 4 ... 6 are wired to the bottom connector.

Connectors

Use a set of either:

- Two *screw type* field wiring connectors, available in a kit of 20 (model STB XTS 1100)
- Two *spring clamp* field wiring connectors, available in a kit of 20 (model STB XTS 2100)

NOTE: These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Sensors

The STB DDI 3615 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-wire sensors.

The module has IEC type 1 inputs that support sensor signals from mechanical switching devices such as relay contacts and push buttons operating in normal environmental conditions.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.51 ... 1.29 mm (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire's jacket for the module connection.

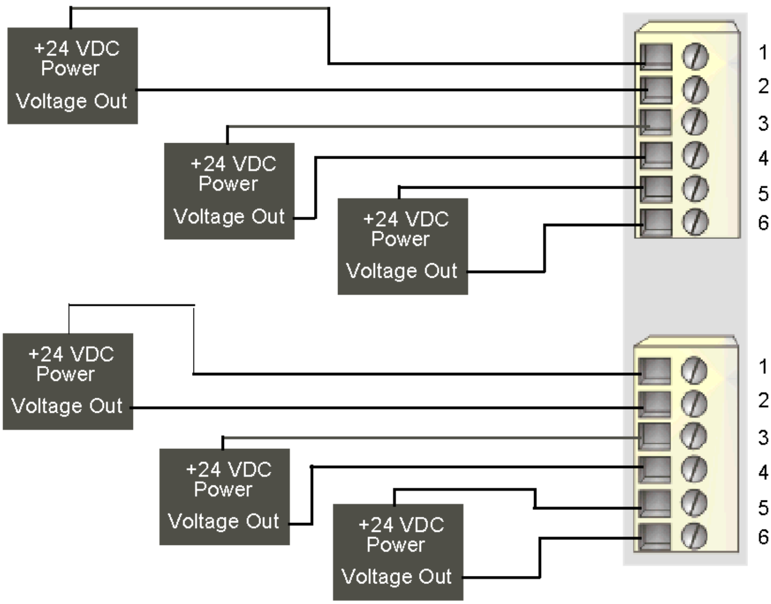
Field Wiring Pinout

The top connector supports digital sensors 1, 2 and 3; the bottom connector supports digital sensors 4, 5 and 6. Two terminals on each connector support each of the six sensors:

Pin	Top Connector	Bottom Connector
1	+24 VDC Field Power (from the PDM)	+24 VDC Field Power (from the PDM)
2	Input from Sensor 1	Input from Sensor 4
3	+24 VDC Field Power (from the PDM)	+24 VDC Field Power (from the PDM)
4	Input from Sensor 2	Input from Sensor 5
5	+24 VDC Field Power (from the PDM)	+24 VDC Field Power (from the PDM)
6	Input from Sensor 3	Input from Sensor 6

Sample Wiring Diagram

The following illustration shows an example where six two-wire sensors are field wiring to the STB DDI 3615.



STB DDI 3615 Functional Description

Functional Characteristics

The STB DDI 3615 is a six-channel module that handles digital input data from six 24 VDC field sensors. It does not support user-configurable operating parameters or reflex actions.

Input Polarity

The input polarity on all six input channels is *logic normal*, where:

- 0 indicates that the physical sensor is off (or the input signal is low)
- 1 indicates that the physical sensor is on (or the input signal is high)

STB DDI 3615 Data for the Process Image

Representing Digital Input Data

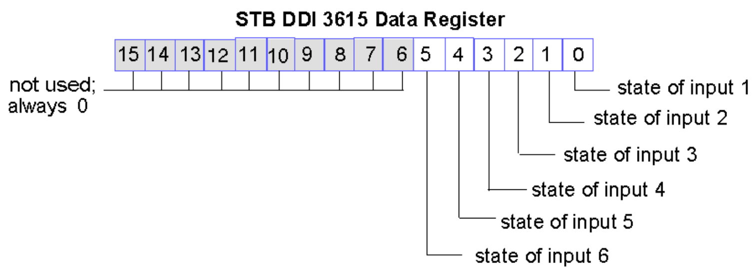
The STB DDI 3615 sends a representation of the operating state of its input channels to the NIM. The NIM stores this information in a 16-bit data register. The information can be read by the fieldbus master. If you are not using a basic NIM, the information can also be read by an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 through 49487) reserved in the NIM's memory. The STB DDI 3615 module is represented by one register in this block. The specific registers used in the block are determined by the module's physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transmitted to the master in a fieldbus-specific format. For fieldbus-specific format descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus,

Input Data Register

The least significant bit represents the on/off state of input 1, and the five bits to its immediate left represent the on/off states of inputs 2, 3, 4, 5 and 6, respectively:



STB DDI 3615 Specifications

Table of Technical Specifications

description		24 VDC IEC type 1 sink input
number of input channels		six
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping supported*		NIM-dependent**
reflex actions supported		no
input protection		resistor-limited
isolation voltage	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		the module is internally protected from damage
logic bus current consumption		45 mA
nominal sensor bus current consumption		60 mA, with no load
input voltage	on	+15 ... 30 VDC
	off	-3 ... +5 VDC
input current	on	2 mA min.
	off	0.5 mA max.
input impedance		5.3 kΩ @ 30 V
absolute maximum input	continuous	30 VDC
	for 1.3 ms	56 VDC, decaying pulse
input filter time constant		5.0 ms
input response time	on-to-off	5.75 ms
	off-to-on	5.25 ms
polarity of the individual input channels		*logic normal*
field power requirements	field power voltage	from a 24 VDC PDM
operating voltage range		19.2 to 30 VDC
operating temperature range		0 to 60°C
storage temperature		-40 to 85°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow you to hot swap I/O modules.		

Section 2.6
STB DDI 3725 High Density Input Module

Introduction

The STB DDI 3725 - described below - is a basic Advantys STB sixteen-channel digital input module.

What Is in This Section?

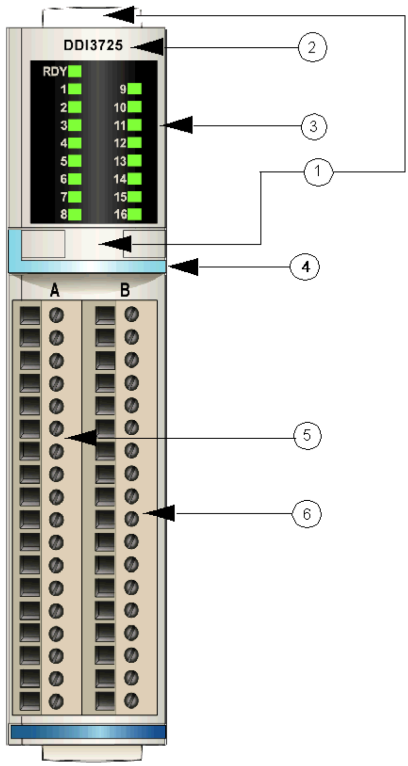
This section contains the following topics:

STB DDI 3725 Physical Description

Physical Characteristics

The STB DDI 3725 is a basic Advantys STB sixteen-channel digital input module that reads inputs from 24 VDC sensor devices and provides power to the sensors. The module mounts in a size 3 base and uses two 18-pin field wiring connectors. The connectors are positioned side-by-side on the bezel; connector A (which supports input channels 1 ... 8) is on the left, and connector B (which supports input channels 9 ... 16) is on the right.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 light blue identification stripe, indicating a digital DC input module
5 sensor power groups 1 and 2 are wired to the left connector (A)
6 sensor power groups 3 and 4 are wired to the right connector (B)

Ordering Information

The module can be ordered in either of two kits:

- STB DDI 3725 KS which includes:
  - one STB DDI 3725 digital input module
  - one size 3 STB XBA 3000 *(see page 375)* I/O base
  - two 18-terminal *screw type* connectors
- STB DDI 3725 KC, which includes:
  - one STB DDI 3725 digital input module
  - one size 3 STB XBA 3000 *(see page 375)* I/O base
  - two 18-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DDI 3275 digital input module
- a standalone STB XBA 3000 size 3 base
- a bag of *screw type* connectors (STB XTS 1180) or *spring clamp* connectors (STB XTS 2180)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module
- the STB XTS 5510 and STB XTS 6510 high density I/O Telefast connector interfaces *(see page 389)* can replace the standard field wiring connectors and facilitate a Telefast connection

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide*.

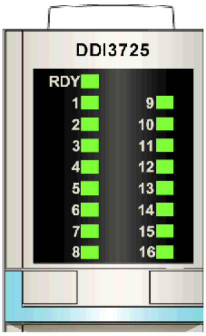
STB DDI 3725 LED Indicators

Overview

The seventeen LEDs on the STB DDI 3725 module are visual indications of the operating status of the module and its sixteen digital input channels.

Location

The LEDs are positioned in two columns at the top of the STB DDI 3725 digital input module's bezel. Indicators for the RDY signal and input channels 1...8 are in the left column, and input channels 9...16 in the right column.



Indications

The following two-part table defines the meaning of the 17 LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter). The STB DDI 3725 high-density digital input module features 16 green LEDs to indicate the state of each input point, and one green RDY LED to indicate the health of the input module. The first part of the table corresponds to the left column of LED indicators:

RDY	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	Meaning
off									The module is either not receiving logic power, has experienced a watchdog timer error or has failed.
flicker*									Auto-addressing is in progress.
blink 1**									The module is in pre-operational mode.

RDY	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	Meaning
on									The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational
	on								Voltage is present on input ch. 1.
	off								Voltage is absent on input ch. 1.
		on							Voltage is present on input ch. 2.
		off							Voltage is absent on input ch. 2.
			on						Voltage is present on input ch. 3.
			off						Voltage is absent on input ch. 3.
				on					Voltage is present on input ch. 4.
				off					Voltage is absent on input ch. 4.
					on				Voltage is present on input ch. 5.
					off				Voltage is absent on input ch. 5.
						on			Voltage is present on input ch. 6.
						off			Voltage is absent on input ch. 6.
							on		Voltage is present on input ch. 7.
							off		Voltage is absent on input ch. 7.
								on	Voltage is present on input ch. 8.
								off	Voltage is absent on input ch. 8.
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.									
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.									

The second part of the table describes the combination of the left column RDY indicator plus the right column LED indicators:

RDY	IN9	IN10	IN11	IN12	IN13	IN14	IN15	IN16	Meaning
	on								Voltage is present on input ch. 9
	off								Voltage is absent on input ch. 9.
		on							Voltage is present on input ch. 10.
		off							Voltage is absent on input ch. 10.
			on						Voltage is present on input ch. 11.
			off						Voltage is absent on input ch. 11.
				on					Voltage is present on input ch. 12.
				off					Voltage is absent on input ch. 12.
					on				Voltage is present on input ch. 13.
					off				Voltage is absent on input ch. 13.
						on			Voltage is present on input ch. 14
						off			Voltage is absent on input ch. 14.
							on		Voltage is present on input ch. 15.
							off		Voltage is absent on input ch. 15.
								on	Voltage is present on input ch. 16.
								off	Voltage is absent on input ch. 16
blink 1**									The module is in pre-operational mode.
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.									
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.									

STB DDI 3725 Field Wiring

Summary

The STB DDI 3725 module uses two eighteen-terminal field wiring connectors. Sensor power group 1 (sensors 1-4) and sensor power group 2 (sensors 5-8) are wired to the left connector (A); sensor power group 3 (sensors 9-12) and sensor power group 4 (sensors 13-16) are wired to the right connector (B).

Connectors

Use a set of either:

- two STB XTS 1180 *screw type* field wiring connectors, available in a kit of 2
- two STB XTS 2180 *spring clamp* field wiring connectors, available in a kit of 2

These field wiring connectors each have eighteen-connection terminals, with a 3.81 mm (0.15 in) pitch between each pin.

Field Sensors

The STB DDI 3725 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-wire and three-wire sensors.

The module has IEC type 3 inputs that support sensor signals from mechanical switching devices such as relay contacts and push buttons operating in normal environmental conditions, and solid state input devices such as proximity switches.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.51 ... 1.52 mm^2 (24 ... 16 AWG).

We recommend that you strip 9 mm from the wire’s jacket for the module connection.

Field Wiring Pinout

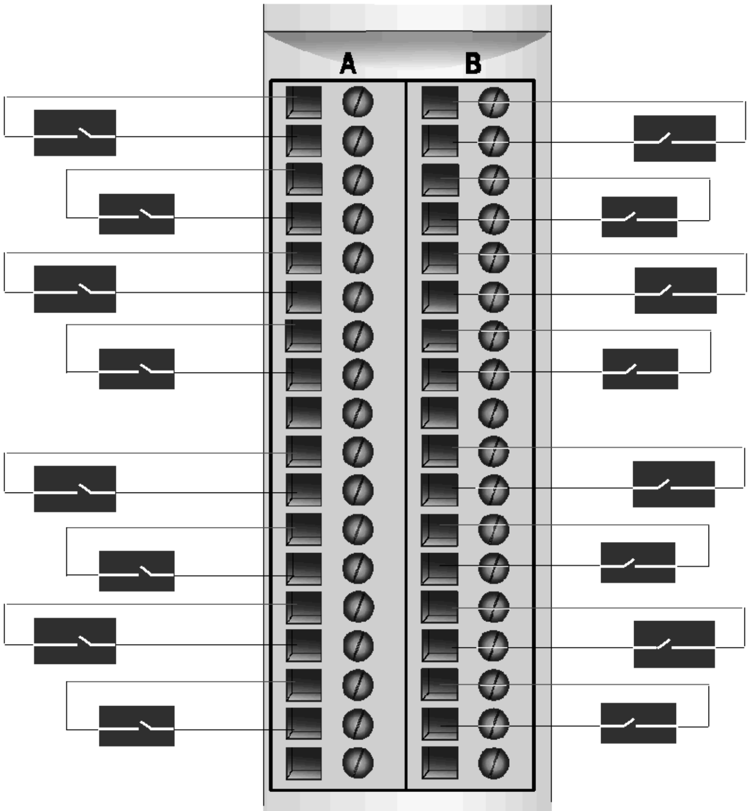
The left connector supports digital sensor power groups 1 and 2; the right connector supports digital sensor power groups 3 and 4. Two terminals on each connector support each of the sixteen sensors, as follows:

Pin	Left Connector	Right Connector
1	Sensor power group 1 (+)	Sensor power group 3 (+)
2	Input from Sensor 1	Input from Sensor 9
3	Sensor power group 1 (+)	Sensor power group 3 (+)
4	Input from Sensor 2	Input from Sensor 10
5	Sensor power group 1 (+)	Sensor power group 3 (+)
6	Input from Sensor 3	Input from Sensor 11

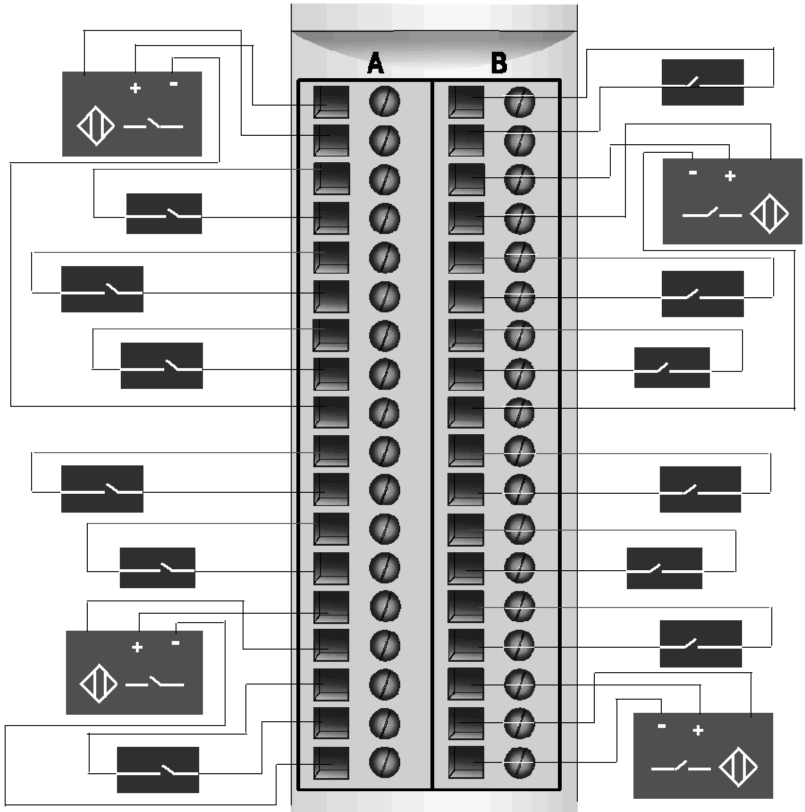
Pin	Left Connector	Right Connector
7	Sensor power group 1 (+)	Sensor power group 3 (+)
8	Input from Sensor 4	Input from Sensor 12
9	Sensor power (-) for a 3-wire sensor (PDM-)	Sensor power (-) for a 3-wire sensor (PDM-)
10	Sensor power group 2 (+)	Sensor power group 4 (+)
11	Input from Sensor 5	Input from Sensor 13
12	Sensor power group 2 (+)	Sensor power group 4 (+)
13	Input from Sensor 6	Input from Sensor 14
14	Sensor power group 2 (+)	Sensor power group 4 (+)
15	Input from Sensor 7	Input from Sensor 15
16	Sensor power group 2 (+)	Sensor power group 4 (+)
17	Input from Sensor 8	Input from Sensor 16
18	Sensor power (-) for a 3-wire sensor (PDM-)	Sensor power (-) for a 3-wire sensor (PDM-)

Sample Wiring Diagrams

The following illustration shows 16 two-wire sensors: sensors 1-4 in group 1 and sensors 5-8 in group 2 connected to the left-side connector (A); and sensors 9-12 in group 3 and sensors 13-16 in group 4 connected to the right-side connector (B). When only two-wire sensors are used, pins 9 and 18 on both connectors are not used:



The following illustration shows you how you could connect four 3-wire sensors - one per input group - using the pins 9 and 18:



STB DDI 3725 Functional Description

Functional Characteristics

The STB DDI 3725 is a sixteen-channel module that handles digital input data from 4 groups of four 24 VDC field sensors. The module's operating parameters are auto-configured when the module is installed. The module does not support user-configurable operating parameters or reflex actions.

Input Polarity

The input polarity on all sixteen input channels is *logic normal*, where:

- 0 indicates that the physical sensor is off (or the input signal is low)
- 1 indicates that the physical sensor is on (or the input signal is high)

Module Sensor Power

The module provides sensor power on a per group basis. Refer to the Field Wiring Pinout section, below, for a listing of sensor power groups. Each sensor power connection is thermally protected. In the event of a short-circuit, all field devices that receive power from this connection will no longer receive power. When the short-circuit condition is removed, power will be restored to all devices in that sensor power group.

STB DDI 3725 Data for the Process Image

Representing Digital Input Data

The STB DDI 3725 sends a representation of the operating state of its input channels to the NIM. The NIM stores this information in a 16-bit data register. The information can be read by the fieldbus master. If you are not using a basic NIM, the information can also be read by an HMI panel connected to the NIM's CFG port.

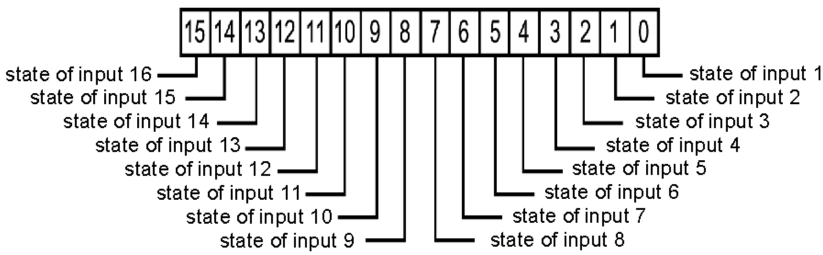
The input data process image is part of a block of 4096 registers (in the range 45392 through 49487) reserved in the NIM's memory. The STB DDI 3725 module is represented by one register in this block. The specific registers used in the block are determined by the module's physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transmitted to the master in a fieldbus-specific format. For fieldbus-specific format descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus,

Input Data Register

The least significant bit represents the on/off state of input 1, and all remaining bits to its left represent the on/off states of inputs 2...16, respectively:

STB DDI 3725 Data Register



STB DDI 3725 Specifications

Table of Technical Specifications

description		24 VDC IEC type 3 sink input
number of input channels		16
module width		28.1 mm (1.11 in)
I/O base		STB XBA 3000 *(see page 375)*
hot swapping supported*		NIM-dependent**
reflex actions supported		no
input protection		resistor-limited
isolation voltage	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		the module is internally protected from damage
logic bus current consumption		100 mA
nominal sensor bus current consumption		30 mA, with no load
Sensor power	per group	50 mA
	per module	200 mA
input voltage	on	+11 ... 30 VDC
	off	-3 ... +5 VDC
input current	on	2 mA min. @ 11 V
	off	1.5 mA
input impedance		5.3 kΩ @ 30 V
absolute maximum input	continuous	30 VDC
	for 1.3 ms	35 VDC, decaying pulse
input filter time constant		1 ms
input response time	on-to-off	2 ms
	off-to-on	2 ms
polarity of the individual input channels		*logic normal*
field power requirements	field power voltage	from a 24 VDC PDM
operating voltage range		19.2 to 30 VDC
operating temperature range***		0 to 60 °C
storage temperature		-40 to 85 °C

agency certifications	refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow the user to hot swap I/O modules.	
***This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of cabalities and limitations.	

Section 2.7
STB DAI 5230 Digital 115 VAC Input Module (two-channel, three-wire, IEC type 1)

Overview

This section provides you with a detailed description of the Advantys STB DAI 5230 digital input module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

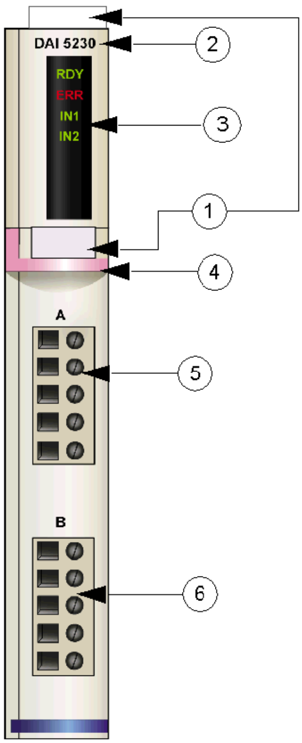
This section contains the following topics:

STB DAI 5230 Physical Description

Physical Characteristics

The STB DAI 5230 is a standard Advantys STB two-channel digital input module that reads inputs from 115 VAC sensor devices and provides power to the sensors. The module mounts in a size 2 I/O base and uses two five-terminal field wiring connectors. Sensor 1 is wired to the top connector, and sensor 2 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 pink identification stripe, indicating a digital AC input module
5 sensor 1 connects to the top field wiring connector
6 sensor 2 connects to the bottom field wiring connector

Ordering Information

This module and its related parts may be ordered for stock or replacement as follows:

- a standalone STB DAI 5230 digital input module
- a standalone STB XBA 2000 *(see page 371)* size 2 base
- a bag of *screw type* connectors (STB XTS 1110) or *spring clamp* connectors (STB XTS 2110)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	18.4 mm (0.72 in)
height	module only	125 mm (4.92 in)
	on a base	128.25 mm (5.05 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

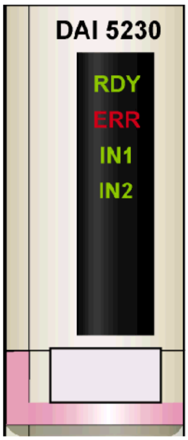
STB DAI 5230 LED Indicators

Purpose

The four LEDs on the STB DAI 5230 module provide visual indications of the operating status of the module and its two digital input channels. Their locations and meanings are described below.

Location

The four LEDs are located in a column on the top of the front bezel of the module, directly below the model number:



Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	ERR	IN1	IN2	Meaning	What to Do
off	off			The module is either not receiving logic power or has failed.	Check power
flicker*	off			Auto-addressing is in progress.	
on	off			The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational	
		on		Voltage is present on input channel 1.	
		off		Voltage is absent on input channel 1.	
			on	Voltage is present on input channel 2.	
			off	Voltage is absent on input channel 2.	
on	on	on	on	The watchdog has timed out.	Cycle power, restart the communications
		Note that the green input LEDs will be on even though the power is absent from the input channels when a watchdog time-out occurs.			
blink 1**				The module is in pre-operational mode.	
	blink 1**			A nonfatal error has been detected.	Cycle power, restart the communications
	blink 2***			The island bus is not running.	Check network connections, replace NIM
*	flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.				
**	blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.				
***	blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.				

STB DAI 5230 Field Wiring

Summary

The STB DAI 5230 module uses two five-terminal field wiring connectors. Sensor 1 is wired to the top connector, and sensor 2 is wired to the bottom connector. The choices of connector types and field wire types are described below, and some field wiring options are presented.

Connectors

Use a set of either:

- two STB XTS 1110 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2110 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have five connection terminals, with a 5.08 mm (0.2 in) pitch between each pin.

Field Sensors

The STB DAI 5230 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-, three-, or four-wire sensors that draw current up to:

- 100 mA/channel at 30 degrees C
- 50 mA/channel at 60 degrees C

The module has IEC type 1 inputs that support sensor signals from mechanical switching devices such as relay contacts and push buttons operating in normal environmental conditions.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire’s jacket for the module connection.

Local electrical codes take precedence over our recommended wire size for the protective earth (PE) connection on pin 5.

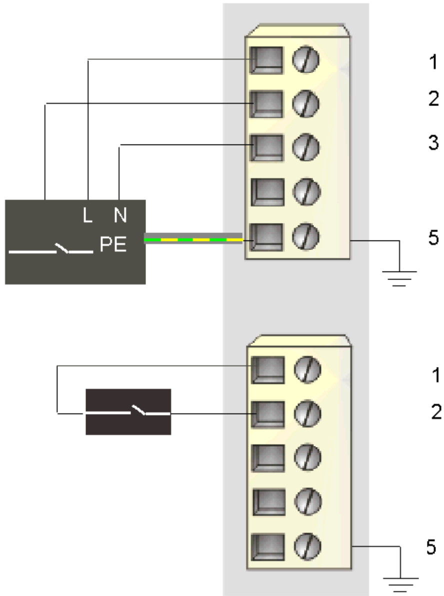
Field Wiring Pinout

The top connector supports sensor 1, and the bottom connector supports sensor 2:

Pin	Top Connector	Bottom Connector
1	115 VAC sensor bus power (L)	115 VAC sensor bus power (L)
2	input from sensor 1	input from sensor 2
3	field power neutral (to the module)	field power neutral (to the module)
4	field power neutral (to the module)	field power neutral (to the module)
5	protective earth	protective earth

Sample Wiring Diagram

The following field wiring example shows two sensors connected to an STB DAI 5230 module:



1 115 VAC (L) to sensor 1 (top) and to sensor 2 (bottom)
2 input from sensor 1 (top) and from sensor 2 (bottom)
3 field power neutral from sensor 1
5 PE connection point for field device (top)

The four-wire sensor on the top connector has a PE connection that is tied to the PE connection on the PDM base through pin 5.

STB DAI 5230 Functional Description

Functional Characteristics

The STB DAI 5230 is a two-channel module that handles digital input data from two 115 VAC field sensors. Each channel is user-configurable for *logic normal* or *logic reverse* input polarity.

Input Polarity

By default, the polarity on both input channels is *logic normal*, where:

- 0 indicates that the physical sensor is off (or the input signal is low)
- 1indicates that the physical sensor is on (or the input signal is high)

The input polarity on one or both channels may optionally be configured for *logic reverse*, where:

- 1 indicates that the physical sensor is off (or the input signal is low)
- 0 indicates that the physical sensor is on (or the input signal is high)

To change an input polarity parameter from the default or back to the normal from reverse, you need to use the Advantys configuration software.

You can configure input polarity values independently for each input channel:

Step	Action	Result
1	Double click on the STB DAI 5230 you want to configure in the island editor.	The selected STB DAI 5230 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Input Polarity** appears.
3	Expand the **+ Input Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the polarity settings *at the module level*, select the integer that appears in the **Value** column of the **Input Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have normal polarity and 3 means that both channels have reverse polarity.	Notice that when you select the **Input Polarity** value, the maxi/min values of the polarity range appear at the bottom of the module editor screen. When you accept a new integer value for **Input Polarity**, the values associated with the channels change. For example, if you choose an input polarity value of 2, **Channel 1** = 0 and **Channel 2** = 1.
4b	To change the polarity settings *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s).	When you accept a new integer value for a channel setting, the value for the module in the **Input Polarity** row changes. For example, if you set channel 1 to 0 and channel 2 to 1, the **Input Polarity** value changes to 2.

STB DAI 5230 Data and Status for the Process Image

Representing Digital Input Data

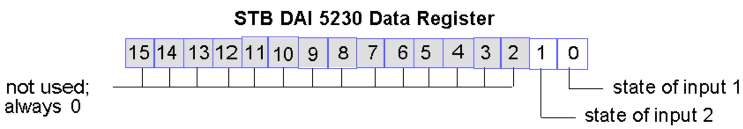
The STB DAI 5230 sends a representation of the operating state of its input channels to the NIM. The NIM stores this information in one 16-bit register. The information can be read by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 through 49487) reserved in the NIM's memory. The specific registers used in the block are determined by the module's physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transmitted to the master in a fieldbus-specific format. For fieldbus-specific format descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus,

Input Data Register

The first STB DAI 5230 register in the input block of the process image is the data register. The least significant bit (LSB) in the represents the on/off state of input 1, and the bit to its immediate left represents the on/off state of input 2:



STB DAI 5230 Specifications

Table of Technical Specifications

description		115 VAC IEC type 1 (47 ... 63 Hz) input
number of input channels		two
module width		18.4 mm (0.72 in)
I/O base		STB XBA 2000 *(see page 371)*
operating voltage range		74 to 132 VAC
hot swapping supported*		NIM-dependent**
reflex actions supported		no — cannot be used as inputs to a reflex action
input surge protection		metal oxide varistor
isolation voltage	field-to-bus	1780 VAC for 1 min
nominal logic bus current consumption		40 mA
nominal sensor bus current consumption		0 mA, with no load
sensor bus power to field		100 mA @ 60 degrees C
sensor power limit		100 mA/channel @ 30 degrees C
		50 mA/channel @ 60 degrees C
current field		60 mA
input voltage	on	74 ... 132 VAC
	off	0 ... 20 VAC
input current	on	4 mA min.
	off	2 mA max.
absolute maximum input	continuous	132 VAC
	for one cycle	200 VAC
input response time	on-to-off	1.5 line cycles
	off-to-on	1.5 line cycles
polarity of the individual input channels	default	*logic normal* on both channels
	user-configurable settings[1]	*logic reversed*, configurable by channel
		logic normal, configurable by channel
field power requirement		from a 115 VAC PDM
power protection		time-lag fuse on the PDM
operating temperature range		0 to 60°C
storage temperature		-40 to 85°C

agency certifications	refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow you to hot swap I/O modules.	
[1]Requires the Advantys configuration software.	

Section 2.8
STB DAI 5260 Digital 115 VAC Input Module (two-channel, isolated, IEC type 1)

Overview

This section provides you with a detailed description of the Advantys STB DAI 5260 digital input module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

This section contains the following topics:

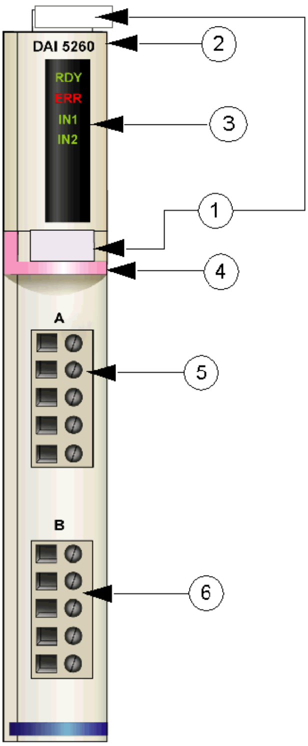
STB DAI 5260 Physical Description

Physical Characteristics

The STB DAI 5260 is a standard Advantys STB two-channel isolated digital input module that reads inputs from 115 VAC sensor devices. This module can receive power from different phases of an AC power source. The module mounts in a size 2 I/O base and uses two five-terminal field wiring connectors. Sensor 1 is wired to the top connector, and sensor 2 is wired to the bottom connector.

The STB DAI 5260 module does not receive power from the PDM.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 pink identification stripe, indicating a digital AC input module
5 sensor 1 connects to the top field wiring connector
6 sensor 2 connects to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DAI 5260 K), which includes:

- one STB DAI 5260 digital input module
- one size 2 STB XBA 2000 *(see page 371)* I/O base
- two alternative sets of connectors:
  - two 5-terminal *screw type* connectors
  - two 5-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DAI 5260 digital input module
- a standalone STB XBA 2000 size 2 base
- a bag of *screw type* connectors (STB XTS 1110) or *spring clamp* connectors (STB XTS 2110)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	18.4 mm (0.72 in)
height	module only	125 mm (4.92 in)
	on a base	128.25 mm (5.05 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

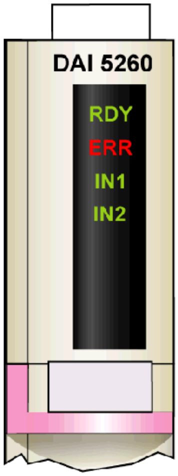
STB DAI 5260 LED Indicators

Purpose

The four LEDs on the STB DAI 5260 module provide visual indications of the operating status of the module and its two digital input channels. Their locations and meanings are described below.

Location

The four LEDs are located in a column on the top of the front bezel of the module, directly below the model number:



Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	ERR	IN1	IN2	Meaning	What to Do
off	off			The module is either not receiving logic power or has failed.	Check power
flicker*	off			Auto-addressing is in progress.	
on	off			The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational	
		on		Voltage is present on input channel 1.	
		off		Voltage is absent on input channel 1.	
			on	Voltage is present on input channel 2.	
			off	Voltage is absent on input channel 2.	
on	on	on	on	The watchdog has timed out.	Cycle power, restart the communications
		Note that the green input LEDs will be on even though the power is absent from the input channels when a watchdog time-out occurs.			
blink 1**				The module is in pre-operational mode.	
	blink 1**			A nonfatal error has been detected.	Cycle power, restart the communications
	blink 2***			The module is not communicating with the island bus.	If all Standard I/O modules have the same blink pattern, cycle power to the island and/or replace the NIM. If the blink pattern applies only to this module, replace it.

* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.

** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.

*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.

STB DAI 5260 Field Wiring

Summary

The STB DAI 5260 module uses two five-terminal field wiring connectors. Sensor 1 is wired to the top connector, and sensor 2 is wired to the bottom connector. The choices of connector types and field wire types are described below, and some field wiring options are presented.

Connectors

Use a set of either:

- two STB XTS 1110 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2110 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have five connection terminals, with a 5.08 mm (0.2 in) pitch between each pin.

Field Sensors

The STB DAI 5260 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-wire sensors.

The module has IEC type 1 inputs that support sensor signals from mechanical switching devices such as relay contacts and push buttons operating in normal environmental conditions.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip 9 mm from the wire’s jacket for the module connection.

Local electrical codes take precedence over our recommended wire size for the protective earth (PE) connection on pin 5.

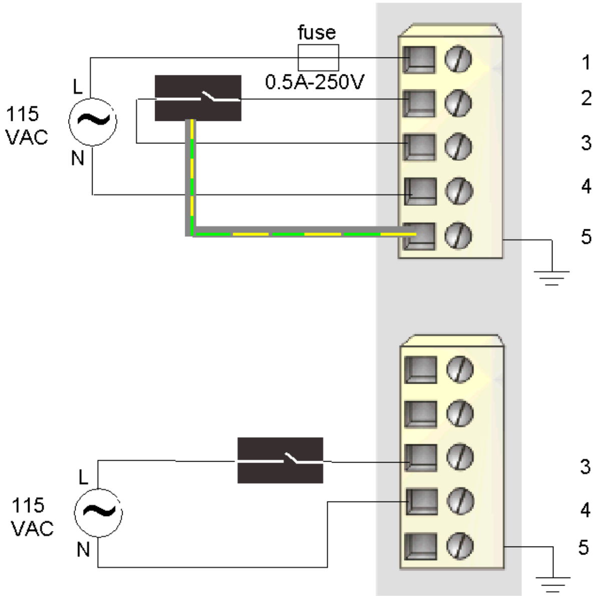
Field Wiring Pinout

The top connector supports sensor 1, and the bottom connector supports sensor 2:

Pin	Top Connector	Bottom Connector
1	115 VAC source power 1 (to the module)	115 VAC source power 2 (to the module)
2	sensor power 1	sensor power 2
3	input from sensor 1	input from sensor 2
4	field power neutral 1 (to the module)	field power neutral 2 (to the module)
5	protective earth	protective earth

Sample Wiring Diagram

The following field wiring example shows two sensors connected to an STB DAI 5260 module:



Within each connector, pins 1 and 2 are internally tied. The sensor on the top connector has a PE connection that is tied to the PE connection on the PDM base through pin 5.

STB DAI 5260 Functional Description

Functional Characteristics

The STB DAI 5260 is a two-channel module that handles digital input data from two 115 VAC field sensors. Each channel is user-configurable for *logic normal* or *logic reverse* input polarity.

Input Polarity

By default, the polarity on both input channels is *logic normal*, where:

- 0 indicates that the physical sensor is off (or the input signal is low)
- 1indicates that the physical sensor is on (or the input signal is high)

The input polarity on one or both channels may optionally be configured for *logic reverse*, where:

- 1 indicates that the physical sensor is off (or the input signal is low)
- 0 indicates that the physical sensor is on (or the input signal is high)

To change an input polarity parameter from the default or back to the normal from reverse, you need to use the Advantys configuration software.

You can configure input polarity values independently for each input channel:

Step	Action	Result
1	Double click on the STB DAI 5260 you want to configure in the island editor.	The selected STB DAI 5260 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Input Polarity** appears.
3	Expand the **+ Input Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the polarity settings *at the module level*, select the integer that appears in the **Value** column of the **Input Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have normal polarity and 3 means that both channels have reverse polarity.	Notice that when you select the **Input Polarity** value, the maxi/min values of the polarity range appear at the bottom of the module editor screen. When you accept a new integer value for **Input Polarity**, the values associated with the channels change. For example, if you choose an input polarity value of 2, **Channel 1** = 0 and **Channel 2** = 1.
4b	To change the polarity settings *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s).	When you accept a new integer value for a channel setting, the value for the module in the **Input Polarity** row changes. For example, if you set channel 1 to 0 and channel 2 to 1, the **Input Polarity** value changes to 2.

STB DAI 5260 Data for the Process Image

Representing Digital Input Data

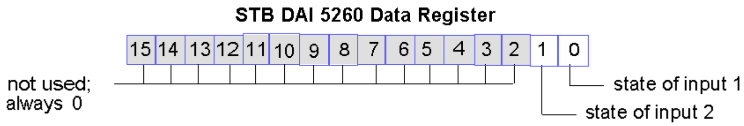
The STB DAI 5260 sends a representation of the operating state of its input channels to the NIM. The NIM stores this information in one 16-bit register. The information can be read by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM’s CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 through 49487) reserved in the NIM’s memory. The specific registers used in the block are determined by the module’s physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transmitted to the master in a fieldbus-specific format. For fieldbus-specific format descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus,

Input Data Register

The first STB DAI 5260 register in the input block of the process image is the data register. The least significant bit (LSB) in the represents the on/off state of input 1, and the bit to its immediate left represents the on/off state of input 2:



STB DAI 5260 Specifications

Table of Technical Specifications

description		115 VAC IEC type 1 (47 ... 63 Hz) input
number of input channels		two
module width		18.4 mm (0.72 in)
I/O base		STB XBA 2000 *(see page 371)*
operating voltage range		74 to 132 VAC
hot swapping supported*		NIM-dependent**
reflex actions supported		no — cannot be used as inputs to a reflex action
prioritization supported		yes
input surge protection		metal oxide varistor
isolation voltage	field-to-bus	1780 VAC for 1 min
	input-to-input	1780 VAC for 1 min
logic bus current consumption		45 mA
input voltage	on	74 ... 132 VAC
	off	0 ... 20 VAC
input current	on	4 mA min.
	off	2 mA max.
absolute maximum input	continuous	132 VAC
	for one cycle	200 VAC
input response time	on-to-off	1.5 line cycles
	off-to-on	1.5 line cycles
polarity of the individual input channels	default	*logic normal* on both channels
	user-configurable settings[1]	*logic reversed*, configurable by channel
		logic normal, configurable by channel
field power requirement		from a 115 VAC field source
power protection		0.5A external fuse required (e.g. Wickmann 1910500000)
operating temperature range		0 to 60°C
storage temperature		-40 to 85°C

agency certifications	refer to *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow you to hot swap I/O modules.	
[1]Requires the Advantys configuration software.	

Section 2.9
STB DAI 7220 Digital 230 VAC Input Module (two-channel, three-wire, IEC type 1)

Overview

This section provides you with a detailed description of the Advantys STB DAI 7220 digital input module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

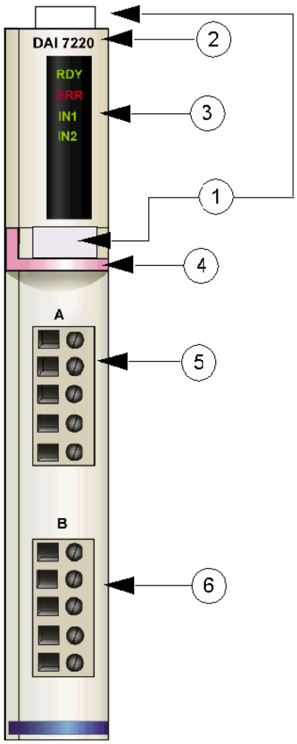
This section contains the following topics:

STB DAI 7220 Physical Description

Physical Characteristics

The STB DAI 7220 is a standard Advantys STB two-channel digital input module that reads inputs from 230 VAC sensor devices and provides power to the sensors. The module mounts in a size 2 I/O base and uses two five-terminal field wiring connectors. Sensor 1 is wired to the top connector, and sensor 2 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 pink identification stripe, indicating a digital AC input module
5 sensor 1 connects to the top field wiring connector
6 sensor 2 connects to the bottom field wiring connector

Ordering Information

The module and its related parts may be ordered for stock or replacement as follows:

- a standalone STB DAI 7220 digital input module
- a standalone STB XBA 2000 *(see page 371)* size 2 base
- a bag of *screw type* connectors (STB XTS 1110) or *spring clamp* connectors (STB XTS 2110)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	18.4 mm (0.72 in)
height	module only	125 mm (4.92 in)
	on a base	128.25 mm (5.05 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

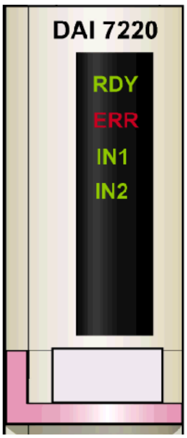
STB DAI 7220 LED Indicators

Purpose

The four LEDs on the STB DAI 7220 module are visual indicators of the operating status of the module and its two digital input channels. The LED locations and their meanings are described below.

Location

The four LEDs are positioned in a column on the top front of the STB DAI 7220 digital input module. The figure below shows their location:



Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

<table>
<tr><th>RDY</th><th>ERR</th><th>IN1</th><th>IN2</th><th>Meaning</th><th>What to Do</th></tr>
<tr><td>off</td><td>off</td><td></td><td></td><td>The module is either not receiving logic power or has failed.</td><td>Check power</td></tr>
<tr><td>flicker*</td><td>off</td><td></td><td></td><td>Auto-addressing is in progress.</td><td rowspan="7"></td></tr>
<tr><td rowspan="5">on</td><td rowspan="5">off</td><td></td><td></td><td>The module has achieved all of the following:
● it has power
● it has passed its confidence tests
● it is operational</td></tr>
<tr><td>on</td><td></td><td>Voltage is present on input channel 1.</td></tr>
<tr><td>off</td><td></td><td>Voltage is absent on input channel 1.</td></tr>
<tr><td></td><td>on</td><td>Voltage is present on input channel 2.</td></tr>
<tr><td></td><td>off</td><td>Voltage is absent on input channel 2.</td></tr>
<tr><td rowspan="2">on</td><td rowspan="2">on</td><td>on</td><td>on</td><td>The watchdog has timed out.</td><td rowspan="2">Cycle power, restart the communications</td></tr>
<tr><td colspan="3">Note that the green input LEDs will be on even though the power is absent from the input channels when a watchdog time-out occurs.</td></tr>
<tr><td>blink 1**</td><td></td><td></td><td></td><td>The module is in pre-operational mode.</td><td></td></tr>
<tr><td></td><td>blink 1**</td><td></td><td></td><td>A nonfatal error has been detected.</td><td>Cycle power, restart the communications</td></tr>
<tr><td></td><td>blink 2***</td><td></td><td></td><td>The island bus is not running.</td><td>Check network connections, replace NIM</td></tr>
<tr><td colspan="6">* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.</td></tr>
<tr><td colspan="6">** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.</td></tr>
<tr><td colspan="6">*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.</td></tr>
</table>

STB DAI 7220 Field Wiring

Summary

The STB DAI 7220 module uses two five-terminal field wiring connectors. Sensor 1 is wired to the top connector, and sensor 2 is wired to the bottom connector. The choices of connector types and field wire types are described below, and a field wiring example is presented.

Connectors

Use a set of either:

- two STB XTS 1110 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2110 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have five connection terminals, with a 5.08 mm (0.2 in) pitch between each pin.

Field Sensors

The STB DAI 7220 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-, three-, or four-wire sensors that draw current up to:

- 100 mA/channel at 30 degrees C
- 50 mA/channel at 60 degrees C

The module has IEC type 1 inputs that support sensor signals from mechanical switching devices such as relay contacts and push buttons operating in normal environmental conditions.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire's jacket for the module connection.

Local electrical codes take precedence over our recommended wire size for the protective earth (PE) connection on pin 5.

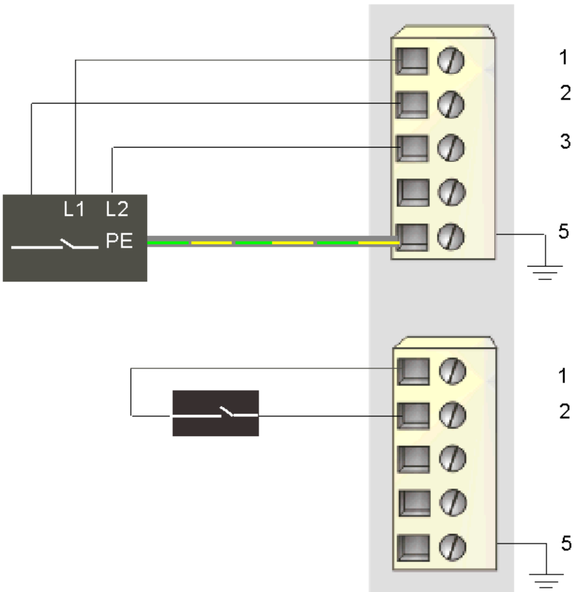
Field Wiring Pinout

The top connector supports digital input channel 1, and the bottom connector supports digital input channel 2:

Pin	Top Connector	Bottom Connector
1	230 VAC sensor bus power (L1)	230 VAC sensor bus power (L1)
2	input from sensor 1	input from sensor 2
3	field power neutral or L2 (to the module)	field power neutral or L2 (to the module)
4	field power neutral or L2 (to the module)	field power neutral or L2 (to the module)
5	protective earth	protective earth

Sample Wiring Diagram

The following field wiring example shows two sensors connected to an STB DAI 7220 module:



1 230 VAC (L1) to sensor 1 (top) and to sensor 2 (bottom)
2 input from sensor 1 (top) and from sensor 2 (bottom)
3 field power neutral or L2 from sensor 1
5 PE connection point for sensor 1 (top)

The four-wire sensor on the top connector has a PE connection that is tied to the PE connection on the PDM base through pin 5.

STB DAI 7220 Functional Description

Functional Characteristics

The STB DAI 7220 module is a two-channel module that handles digital input data from two 230 VAC field sensors. Using the Advantys configuration software, you can customize each channel for *logic normal* or *logic reverse* input polarity.

Input Polarity

By default, the polarity on both input channels is *logic normal*, where:

- 0 indicates that the physical sensor is off (or the input signal is low)
- 1 indicates that the physical sensor is on (or the input signal is high)

The input polarity on one or both channels may optionally be configured for *logic reverse*, where:

- 1 indicates that the physical sensor is off (or the input signal is low)
- 0 indicates that the physical sensor is on (or the input signal is high)

To change an input polarity parameter from the default or back to the normal from reverse, you need to use the Advantys configuration software.

You can configure input polarity values independently for each input channel:

Step	Action	Result
1	Double click on the STB DAI 7220 you want to configure in the island editor.	The selected STB DAI 7220 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Input Polarity** appears.
3	Expand the **+ Input Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the polarity settings *at the module level*, select the integer that appears in the **Value** column of the **Input Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have normal polarity and 3 means that both channels have reverse polarity.	When you select the **Input Polarity** value, the maxi/min values of the polarity range appear at the bottom of the module editor screen. When you accept a new integer value for **Input Polarity**, the values associated with the channels change. For example, if you choose an input polarity value of 2, **Channel 1** = 0 and **Channel 2** = 1.
4b	To change the polarity settings *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s).	When you accept a new integer value for a channel setting, the value for the module in the **Input Polarity** row changes. For example, if you set channel 1 to 0 and channel 2 to 1, the **Input Polarity** value changes to 2.

STB DAI 7220 Data for the Process Image

Representing Digital Input Data

The STB DAI 7220 sends a representation of the operating state of its input channels to the NIM. The NIM stores this information in one 16-bit register.The information can be read by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port.

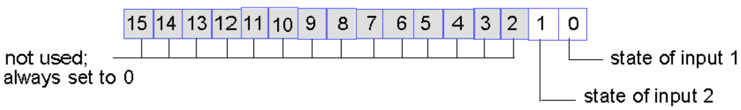
The input data process image is part of a block of 4096 reserved registers (in the range 45392 through 49487) in the NIM's memory. The specific registers used in the block are determined by the module's physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transmitted to the master in a fieldbus-specific format. For fieldbus-specific format descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus,

Input Data Register

The first STB DAI 7220 register in the input block of the process image is the data register. The least significant bit (LSB) in the register represents the on/off state of input 1, and the bit to its immediate left represents the on/off state of input 2:

STB DAI 7220 Data Register



STB DAI 7220 Specifications

Table of Technical Specifications

description		230 VAC IEC type 1 (47 ... 63 Hz) input
number of input channels		two
module width		18.4 mm (0.72 in)
I/O base		STB XBA 2000 *(see page 371)*
operating voltage range		159 to 265 VAC
hot swapping supported*		NIM-dependent**
reflex actions supported		no — cannot be used as inputs to a reflex action
input surge protection		metal oxide varistor
isolation voltage	field-to-bus	1780 VAC for 1 min
logic bus current consumption		40 mA
nominal sensor bus current consumption		0 mA, with no load
sensor bus power to field		200 mA @60 degrees C
sensor power limit		100 mA/channel @ 30 degrees C
		50 mA/channel @ 60 degrees C
input voltage	on	+159 ... 265 VAC
	off	0 ... 40 VAC
input current	on	4 mA min.
	off	2 mA max.
absolute maximum input	continuous	265 VAC
	for one cycle	400 VAC
input response time	on-to-off	1.5 line cycles
	off-to-on	1.5 line cycles
polarity of the individual input channels	default	*logic normal* on both channels
	user-configurable settings[1]	*logic reversed*, configurable by channel
		logic normal, configurable by channel
field power requirements		from a 230 VAC PDM
power protection		time-lag fuse on the PDM
operating temperature range		0 to 60°C
storage temperature		-40 to 85°C

agency certifications	refer to *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow you to hot swap I/O modules.	
[1]Requires the Advantys configuration software.	

Chapter 3
The Advantys STB Digital Output Modules

Overview

This chapter describes the features of the standard and basic Advantys STB digital output modules.

What Is in This Chapter?

This chapter contains the following sections:

Section 3.1
STB DDO 3200 Digital 24 VDC Source Output Module (two-channel, 0.5 A, over-current protected)

Overview

This section provides a detailed description of the Advantys STB DDO 3200 digital output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

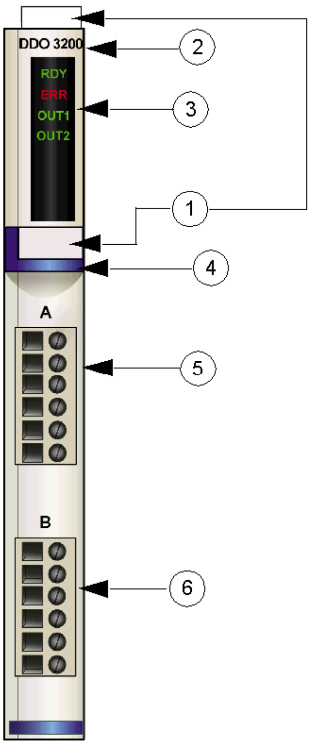
This section contains the following topics:

STB DDO 3200 Physical Description

Physical Characteristics

The STB DDO 3200 is a standard Advantys STB two-channel digital output module that writes outputs to 24 VDC actuator devices and provides power to the actuators. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Actuator 1 is wired to the top connector, and actuator 2 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 dark blue identification stripe, indicating a digital VDC output module
5 actuator 1 connects to the top field wiring connector
6 actuator 2 connects to the bottom field wiring connector

Ordering Information

The module and its related parts may be ordered for stock or replacement as follows:

- a standalone STB DDO 3200 digital output module
- a standalone STB XBA 1000 *(see page 367)* size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spring clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

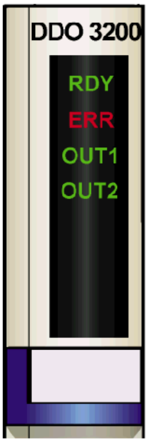
STB DDO 3200 LED Indicators

Overview

The four LEDs on the STB DDO 3200 module provide visual indications of the operating status of the module and its two digital output channels. The LED locations and their meanings are described below.

Location

The four LEDs are positioned in a column on the top front of the module directly below the model number. The figure below shows their locations:



Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

<table>
<tr><th>RDY</th><th>ERR</th><th>OUT1</th><th>OUT2</th><th>Meaning</th><th>What to Do</th></tr>
<tr><td>off</td><td>off</td><td></td><td></td><td>The module is either not receiving logic power or has failed.</td><td>Check power</td></tr>
<tr><td>flicker*</td><td>off</td><td></td><td></td><td>Auto-addressing is in progress.</td><td rowspan="6"></td></tr>
<tr><td rowspan="5">on</td><td rowspan="5">off</td><td></td><td></td><td>The module has achieved all of the following:
● it has power
● it has passed its confidence tests
● it is operational</td></tr>
<tr><td>on</td><td></td><td>Voltage is present on output channel 1.</td></tr>
<tr><td>off</td><td></td><td>Voltage is absent on output channel 1.</td></tr>
<tr><td></td><td>on</td><td>Voltage is present on output channel 2.</td></tr>
<tr><td></td><td>off</td><td>Voltage is absent on output channel 2.</td></tr>
<tr><td rowspan="2">on</td><td rowspan="2">on</td><td>on</td><td>on</td><td>The watchdog has timed out.</td><td rowspan="2">Cycle power, restart the communications</td></tr>
<tr><td colspan="3">Note that the green output LEDs will be on even though the power is absent from the output channels when a watchdog time-out occurs.</td></tr>
<tr><td>blink 1**</td><td></td><td></td><td></td><td>The module is in pre-operational mode or in its fallback state.</td><td></td></tr>
<tr><td></td><td>flicker*</td><td></td><td></td><td>Field power absent or a short circuit detected at the actuator.</td><td>Check power</td></tr>
<tr><td></td><td>blink 1**</td><td></td><td></td><td>A nonfatal error has been detected.</td><td>Cycle power, restart the communications</td></tr>
<tr><td></td><td>blink 2***</td><td></td><td></td><td>The island bus is not running.</td><td>Check network connections, replace NIM</td></tr>
<tr><td>blink 3****</td><td></td><td></td><td></td><td>Some of the output channels are in fallback and some are operational. This condition can occur only if the module is used in a reflex action.</td><td></td></tr>
<tr><td colspan="6">* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.</td></tr>
<tr><td colspan="6">** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.</td></tr>
<tr><td colspan="6">*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.</td></tr>
<tr><td colspan="6">**** blink 3—the LED blinks on for 200 ms, off for 200 ms, on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.</td></tr>
</table>

STB DDO 3200 Field Wiring

Summary

The STB DDO 3200 module uses two six-terminal field wiring connectors. Actuator 1 is wired to the top connector, and actuator 2 is wired to the bottom connector. The choices of connector types and field wire types are described below, and a field wiring example is presented.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors, available in a kit of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Actuators

The STB DDO 3200 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two- or three-wire actuators such as solenoids, contactors, relays, alarms or panel lamps that draw current up to:

- 100 mA/channel at 30 degrees C
- 50 mA/channel at 60 degrees C

NOTE: If you are using this module to provide operating power to a large inductive load (at or near a maximum of 0.5 H), make sure that you turn the field device off before removing the field power connector from the module. The output channel on the module may be damaged if you remove the connector while the field device is on.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire’s jacket for the module connection.

External Fusing

The STB DDO 3200 does not provide electronic over-current protection for the field power. To achieve over-current protection, you should place external fuses in-line on pin 1 or 2.

If you do not use fuses, an over-current condition could damage the module and blow the 10 A fuse in the PDM.

Use a 0.5 A, 250 V 5 x 20 mm time-lag fuse such as the Wickmann 1910500000.

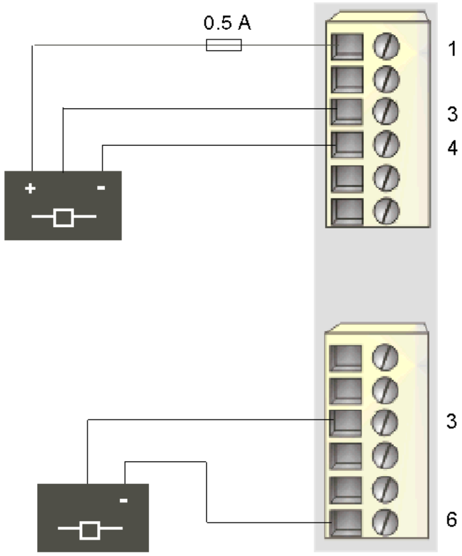
Field Wiring Pinout

The top connector supports actuator 1, and the bottom connector supports actuator 2:

Pin	Top Connector	Bottom Connector
1	+24 VDC from actuator bus for field device accessories	+24 VDC from actuator bus for field device accessories
2	+24 VDC from actuator bus for field device accessories	+24 VDC from actuator bus for field device accessories
3	output to actuator 1	output to actuator 2
4	field power return	field power return
5	field power return	field power return
6	field power return	field power return

Sample Wiring Diagram

The following field wiring example shows two actuators connected to the STB DDO 3200 module:



1 +24 VDC for actuator 1
3 output to actuator 1 (top) and actuator 2 (bottom)
4 field power return from actuator 1
6 field power return from actuator 2

STB DDO 3200 Functional Description

Functional Characteristics

The STB DDO 3200 is a two-channel module that sends digital output data to two 24 VDC field actuators. Using the Advantys configuration software, you can customize the following operating parameters:

- the module's response to fault recovery
- *logic normal* or *logic reverse* output polarity for each channel on the module
- a fallback state for each channel on the module

Fault Recovery Responses

The module can detect a short circuit on the actuator bus, an overcurrent fault or a loss of PDM power on an output channel when the channel is turned on. If a fault is detected on either channel, the module will do one of the following:

- automatically latch off the channel, or
- automatically recover and resume operation on the channel when the fault is corrected

The factory default setting is *latched off*, where the module turns off an output channel that is on if it detects a fault and keeps the channel off until you explicitly reset it.

If you want to set the module to *auto-recover* when the fault is corrected, you need to use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DDO 3200 module you want to configure in the island editor.	The selected STB DDO 3200 module opens in the software module editor.
2	From the pull-down menu in the **Value** column of the **Fault Recovery Response** row, select the desired response mode.	Two choices appear in the pull-down menu—**Latched Off** and **Auto Recovery**.

The fault recovery mode is set at the module level—you cannot configure one channel to latch off and the other to auto-recover. Once the module is operational, an output channel on which a fault has been detected will implement the specified recovery mode; the other healthy channel will continue to operate.

Resetting a Latched-off Output

When an output channel has been latched off because of fault detection, it will not recover until two things happen:

- the error has been corrected
- you explicitly reset the channel

To reset a latched-off output channel, you must send it a value of 0. The 0 value resets the channel to a standard off condition and restores its ability to respond to control logic. You need to provide the reset logic in your application program.

Auto-recovery

When the module is configured to auto-recover, a channel that has been turned off because of fault detection will start operating again as soon as the fault is corrected. No user intervention is required to reset the channels. If the fault was transient, the channel may reactivate itself without leaving any history of the short circuit.

Output Polarity

By default, the polarity on both output channels is *logic normal*, where:

- an output value of 0 indicates that the physical actuator is off (or the output signal is low)
- an output value of 1indicates that the physical actuator is on (or the output signal is high)

The output polarity on one or both channels may optionally be configured for *logic reverse*, where:

- an output value of 1 indicates that the physical actuator is off (or the output signal is low)
- an output value of 0 indicates that the physical actuator is on (or the output signal is high)

To change an output polarity parameter from *logic normal* or back to normal from *logic reverse*, you need to use the Advantys configuration software.

You can configure the output polarity on each output channel independently:

Step	Action	Result
1	Double click on the STB DDO 3200 you want to configure in the island editor.	The selected STB DDO 3200 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Output Polarity** appears.
3	Expand the **+ Output Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Output Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have *logic normal* polarity, and 3 means that both channels have *logic reverse* polarity.	When you select the **Output Polarity** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Output Polarity**, the values associated with the channels change. For example, if you choose an output polarity value of 2, **Channel 1** has *normal* polarity and **Channel 2** has *reverse* polarity.

Step	Action	Result
4b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Output Polarity** row changes. For example, if you set channel 1 to *logic normal*, and channel 2 to *logic reverse*, the **Output Polarity** value changes to 2.

Fallback Modes

When communications are lost between the output module and the fieldbus master, the module's output channels must go to a known state where they will remain until communications are restored. This is known as the channel's *fallback state*. You may configure fallback states for each channel individually. Fallback configuration is accomplished in two steps:

- first by configuring fallback modes for each channel
- then (if necessary) configuring the fallback states

All output channels have a fallback mode—either *predefined state* (1) or *hold last value* (0). When a channel has *predefined* (1) as its fallback mode, it can be configured with a fallback state, either 1 or 0. When a channel has *hold last value* (0) as its fallback mode, it stays at its last known state when communication is lost— it cannot be configured with a predefined fallback state.

By default, the fallback mode for both channels is a *predefined state*. To change the fallback mode to *hold last value*, use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DDO 3200 module you want to configure in the island editor.	The selected STB DDO 3200 module opens in the software module editor.
2	Expand the **+ Fallback Mode Settings** fields by clicking on the **+** sign.	A row called **+ Fallback Mode** appears.
3	Expand the **+ Fallback Mode** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Fallback Mode** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels hold their last values and 3 means that both channels go to a predefined state.	When you select the **Fallback Mode** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Fallback Mode**, the values associated with the channels change. For example, if you configure a fallback mode value of 2, **Channel 1** is *hold last value* and **Channel 2** is *predefined state*.
4b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Fallback Mode** row changes. For example, if you set channel 1 to *hold last value* and channel 2 to *predefined*, the **Fallback Mode** value changes to 2.

Fallback States

If an output channel's fallback mode is *predefined state*, you may configure that channel to either turn on or turn off when communication between the module and the fieldbus master is lost. By default, both channels are configured to go to 0 as their fallback states:

- If the output polarity of a channel is *logic normal*, 0 indicates that the predefined fallback state of the output is *off*
- If the output polarity of a channel is *logic reverse*, 0 indicates that the predefined fallback state of the output is *on*

NOTE: If an output channel has been configured with *hold last value* as its fallback mode, any value that you try to configure as a **Predefined Fallback Value** will be ignored.

To modify a fallback state from *hold last value*, or to revert back to the default from a *predefined* state, you need to use the Advantys configuration software:

Step	Action	Result
1	Make sure that the **Fallback Mode** value for the channel you want to configure is 1 (*predefined state*).	If the **Fallback Mode** value for the channel is 0 (*hold last value*), any value entered in the associated **Predefined Fallback Value** row will be ignored.
2	Expand the **+ Predefined Fallback Value Settings** fields by clicking on the **+** sign.	A row called **+ Predefined Fallback Value** appears.
3	Expand the **+ Predefined Fallback Value** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change a setting *at the module level*, select the integer that appears in the **Value** column of the **Predefined Fallback Value** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have 0 as their predefined fallback value and 3 means that both channels have 1 as their predefined fallback value.	When you select the value associated with **Predefined Fallback Value**, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new **Predefined Fallback Value**, the values associated with the channels change. For example, suppose that the fallback mode for both channels is *predefined state* and the polarity setting for each channel is *logic normal*. If you configure a value of 2 as the **Predefined Fallback Value**, **Channel 2** will have a fallback state of 1 (actuator on) and **Channel 1** will have fallback state of 0 (actuator off).
4b	To change a setting *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu. You can configure a fallback state of either 0 or 1 for each channel on the module.	When you accept a new value for a channel setting, the value for the module in the **Predefined Fallback Value** row changes. For example, if you configure channel 2 to a value of 1 and configure channel 1 to a value of 0, the **Predefined Fallback Value** value changes from 0 to 2.

STB DDO 3200 Data and Status for the Process Image

Representing Digital Output Data and Status

The NIM keeps a record of output data in one block of registers in the process image and a record of output status in another block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master and is used to update the output module. The information in the status block is provided by the module itself.

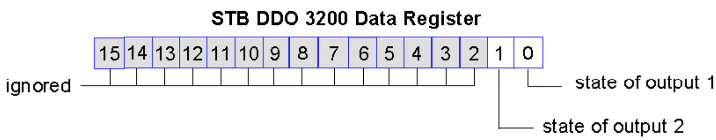
This process image information can be monitored by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port. The specific registers used by the STB DDO 3200 module are based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Output Data Register

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The STB DDO 3200 uses one register in the output data block.

The STB DDO 3200's output data register displays the most current on/off states of the module's two output channels:



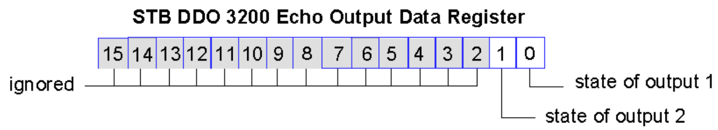
These values are written to the island bus by the fieldbus master.

Echo and Status Registers

The echo output data and I/O status process image is a reserved block of 4096 16-bit registers (in the range 45392 through 49487) that represents the status of all the I/O modules (along with the data for the input modules) on the island bus.

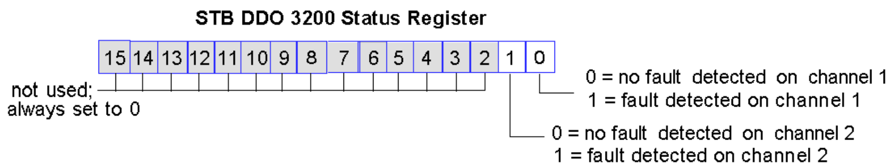
The STB DDO 3200 is represented by two contiguous registers in this block—one register that echoes the information in the output data register followed by one that displays the status of the output channels.

The first STB DDO 3200 register in the I/O status block is the module's *echo output data* register. This register represents the data that has just been sent to the output field devices by the STB DDO 3200 module:



Under normal operating conditions, the bit values in this register should be an exact replica of the bits in the output data register. A difference between the bit values in the output data register and the echo register could result from an output channel used for a reflex action, where the channel is updated directly by the output module instead of by the fieldbus master.

The next contiguous register is the STB DDO 3200's status register. It indicates whether or not a fault condition has been detected on either of the module's two output channels. The fault might be field power absent or actuator power shorted:



STB DDO 3200 Specifications

Table of Technical Specifications

description		24 VDC, 0.5 A source output
number of output channels		two
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping supported*		NIM-dependent**
reflex actions supported		two maximum[1]
output protection (internal)		transient voltage suppression
short circuit protection		per channel
short circuit feedback		per channel
isolation voltage	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		internal protection on the module
fault recovery response	default	channels latched off—requires user reset
	user-configurable settings[1]	auto-recovery
		latched off
logic bus current consumption		50 mA
nominal actuator bus current consumption		1.216 A, with no load
maximum load current		0.5 A/channel
minimum load current		none
output response time	off-to-on	620 µs @ 0.5 A load
	on-to-off	575 µs @ 0.5 A load
output voltage	working	19.2 ... 30 VDC
	absolute maximum	56 VDC for 1.3 ms, decaying voltage pulse
	on-state drop/channel	0.4 VDC max.
off-state leakage/channel		0.4 mA @ 30 VDC max.
maximum surge current		5 A/channel @ 500 µs (no more than six/min)
maximum load capacitance		50 µF

maximum load inductance		0.5 H @ 4 Hz switch frequency $L = 0,5 / I^2 \times F$ where: L = load inductance (H) I = load current (A) F = switching frequency (Hz)
fallback mode	default	predefined fallback values on both channels
	user-configurable settings	hold last value
		predefined fallback value on one or both channels
fallback states (when *predefined* is the fallback mode)	default	both channels go to 0
	user-configurable settings	each channel configurable for 1 or 0
polarity on individual outputs	default	*logic normal* on both channels
	user-configurable settings	*logic reverse* on one or both channels
		logic normal on one or both channels
actuator bus power for accessories		100 mA/channel @ 30 degrees C
		50 mA/channel @ 60 degrees C
over-current protection for accessory power		none
external fusing		0.5 A time-lag fuses on pin 1 or 2 for accessory power over-current protection
field power requirements		from a 24 VDC PDM
operating voltage range		19.2 to 30 VDC
operating temperature range***		0 to 60°C
storage temperature		-40 to 85°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* ** Basic NIMs do not allow you to hot swap I/O modules.		
***This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of cabalities and limitations.		
[1]Requires the Advantys configuration software.		

Section 3.2
STB DDO 3230 Digital 24 VDC Source Output Module (two-channel, 2.0 A, over-current protected)

Overview

This section provides you with a detailed description of the Advantys STB DDO 3230 digital output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

This output module supports high-current actuators, and special field wiring capabilities are provided. If your actuators require field power, the +24 VDC should be delivered by an independent power supply connected directly to the actuator, not from the island's actuator bus. The implications of this alternative field wiring are described.

What Is in This Section?

This section contains the following topics:

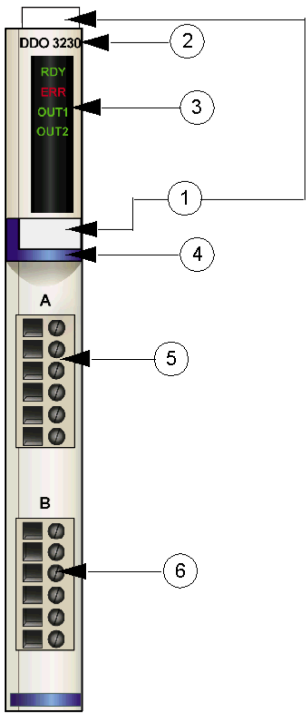
STB DDO 3230 Physical Description

Physical Characteristics

The STB DDO 3230 is a standard Advantys STB two-channel digital output module that writes outputs to 24 VDC actuator devices that draw current up to 2.0 A each. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Actuator 1 is wired to the top connector, and actuator 2 is wired to the bottom connector.

Because the module supports field actuators with loads up to 2.0 A/channel, the module lets you connect directly to an external 24 VDC power supply for field power instead of using a PDM. You can also use the island's actuator bus for field power. In either case, use the module in conjunction with a 24 VDC PDM.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 dark blue identification stripe, indicating a digital VDC output module
5 actuator 1 connects to the top field wiring connector
6 actuator 2 connects to the bottom field wiring connector

Ordering Information

The module and its related parts may be ordered for stock or replacement as follows:

- a standalone STB DDO 3230 digital output module
- a standalone STB XBA 1000 *(see page 367)* size 1 base
- a bag of *screw type* connectors (STB XST 1100) or *spring clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

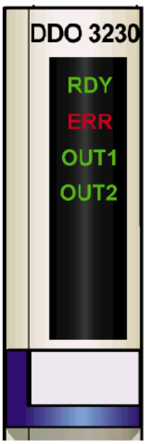
STB DDO 3230 LED Indicators

Overview

The four LEDs on the STB DDO 3230 module are visual indications of the operating status of the module and its two digital output channels. The LED locations and their meanings are described below.

Location

The four LEDs are positioned in a column on the top front of the STB DDO 3230 digital output module. The figure below shows their location:



Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	ERR	OUT1	OUT2	Meaning	What to Do
off	off			The module is either not receiving logic power or has failed.	Check power
flicker*	off			Auto-addressing is in progress.	
on	off			The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational	
		on		Voltage is present on output channel 1.	
		off		Voltage is absent on output channel 1.	
			on	Voltage is present on output channel 2.	
			off	Voltage is absent on output channel 2.	
on	on	on	on	The watchdog has timed out.	Cycle power, restart the communications
		Note that the green output LEDs will be on even though the power is absent from the output channels when a watchdog time-out occurs.			
blink 1**				The module is either in pre-operational mode or in its fallback state.	
	flicker*			Field power absent or a short circuit detected at the actuator.	Check power
	blink 1**			A nonfatal error has been detected.	Cycle power, restart the communications
	blink 2***			The island bus is not running.	Check network connections, replace NIM
blink 3****				Some of the output channels are in fallback and some are operational. This condition can occur only if the module is used in a reflex action.	
*	flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.				
**	blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.				
***	blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.				
****	blink 3—the LED blinks on for 200 ms, off for 200 ms, on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.				

STB DDO 3230 Field Wiring

Summary

The STB DDO 3230 module uses two six-terminal field wiring connectors. Actuator 1 is wired to the top connector, and actuator 2 is wired to the bottom connector. The choices of connector types and field wire types are described below, and some field wiring examples are presented.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Actuators

The STB DDO 3230 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two- or three-wire actuators. The actuators may be high-power devices such as motor starters, valves or incandescent lamps that draw current up to 2.0 A/channel.

When field power is required for the actuators, the recommended procedure is to connect the field devices to an external 24 VDC power supply.

NOTE: If you are using this module to provide operating power to a large inductive load (at or near a maximum of 0.5 H), make sure that you turn the field device off before removing the field power connector from the module. The output channel on the module may be damaged if you remove the connector while the field device is on.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire's jacket for the module connection.

External Fusing

If you field-wire an STB DDO 3230 output module with an independent power supply instead of through a PDM, the overcurrent protection provided by the PDM *(see page 350)* is lost. You must provide external protection with a 2.5 A time-lag fuse (such as the Wickmann 1911250000).

⚠ WARNING

FIRE HAZARD

When an independent power supply is used, you must fuse each unprotected channel independently.

- Install a fuse between the external power supply and pin 2 on the unprotected field wiring connector(s).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Field Wiring Pinout

The top connector supports the actuator 1, and the bottom connector supports actuator 2. The module may be field wired in either of two ways:

- so that the module delivers field power to the actuators from the PDM
- so that the actuators get field power from an independent power source

Use pin 1 if field power comes from the island's actuator bus. Use pin 2 if an independent power supply is used for the actuators:

Pin	Top Connector	Bottom Connector
1	+24 VDC actuator bus power	+24 VDC actuator bus power
2	independent power supply in	independent power supply in
3	output to actuator 1	output to actuator 2
4	independent power supply return	independent power supply return
5	field power return (to the module)	field power return (to the module)
6	field power return (to the module)	field power return (to the module)

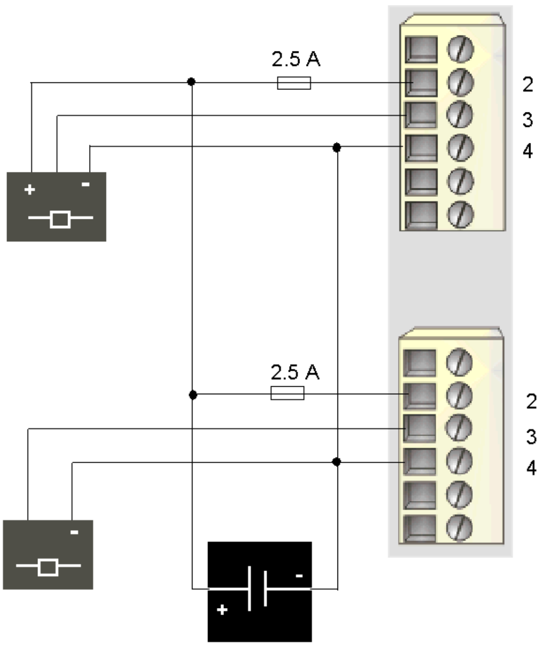
NOTE: If you are using the island's actuator bus for +24 VDC operating power:
- externally jumper pin 1 to pin 2
- externally jumper pin 4 to pin 5
- use pin 6 as the field power return from the actuators

If you are using an independent power supply, use pin 2 as the +24 VDC line and pin 4 as the return line.

Sample Wiring Diagrams

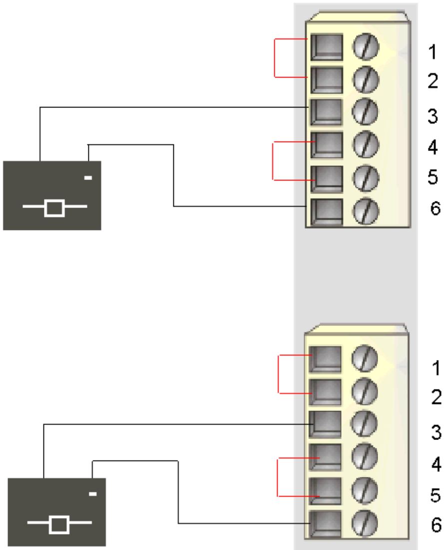
⚠ WARNING
UNINTENDED EQUIPMENT OPERATION If you field-wire an STB DDO 3230 output module with an independent power supply instead of through a PDM, the mechanism in the PDM that protects the actuators from miswiring is no longer present. ● Make certain that you wire pins 2, 3 and 4 correctly as shown below. A miswired field connection will cause the field actuator devices wired to this module to turn on as soon as field power is applied, even if logic control is not present. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

The following illustration shows two field actuators connected to the STB DDO 3230 module and receiving field power from an independent 24 VDC power supply instead of the PDM:



2 +24 VDC from an independent power supply, with user-supplied external fuses (top and bottom)
3 output to actuator 1 (top) and actuator 2 (bottom)
4 power supply return from actuator 1 (top) and actuator 2 (bottom)

The following field wiring example shows two two-wire actuators wired to the STB DDO 3230 module. These devices do not use field power from the actuator bus. The jumpers between pins 1 and 2 and between pins 4 and 5 are required:



1 +24 VDC field power from the PDM (top) jumpered to pin 2 (top and bottom)
2 jumpered to pin 1 (top and bottom)
3 output to actuator 1 (top) and actuator 2 (bottom)
4/5 jumpered together (top and bottom)
6 field power return from actuator 1 (top) and actuator 2 (bottom)

STB DDO 3230 Functional Description

Functional Characteristics

The STB DDO 3230 module is two-channel module that sends digital output data to two 24 VDC field actuators. Using the Advantys configuration software, you can customize the following operating parameters:

- the module's response to fault recovery
- *logic normal* or *logic reverse* output polarity for each channel on the module
- a fallback state for each channel on the module

Fault Recovery Responses

The module can detect an overcurrent situation or a loss of PDM power on an output channel when the channel is turned on. If a fault is detected on either channel, the module will do one of the following:

- automatically latch off the channel, or
- automatically recover and resume operation on the channel when the fault is corrected

The factory default setting is *latched off*, where the module turns off an output channel that is on if it detects a fault and keeps the channel off until you reset it explicitly.

If you want to set the module to *auto-recover* when the fault is corrected, you need to use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DDO 3230 you want to configure in the island editor.	The selected STB DDO 3230 module opens in the software module editor.
2	From the pull-down menu in the **Value** column of the **Fault Recovery Response** row, select the desired response mode.	Two choices appear in the pull-down menu—**Latched Off** and **Auto Recovery**.

The fault recovery mode is set at the module level—you cannot configure one channel to latch off and the other to auto-recover. Once the module is operational, an output channel on which a fault has been detected will implement the specified recovery mode; the other healthy channel will continue to operate.

Resetting a Latched-off Output

When an output channel has been latched off because of fault detection, it will not recover until two things happen:

- the error has been corrected
- you explicitly reset the channel

To reset a latched off output channel, you must send it a value of 0. The 0 value resets the channel to a standard off condition and restores its ability to respond to control logic. You need to provide the reset logic in your application program.

Auto-recovery

When the module is configured to auto-recover, a channel that has been turned off because of a short circuit will start operating again as soon as the fault is corrected. No user intervention is required to reset the channels. If the fault was transient, the channel may reactivate itself without leaving any history of the short circuit.

Output Polarity

By default, the polarity on both output channels is *logic normal*, where:

- an output value of 0 indicates that the physical actuator is off (or the output signal is low)
- an output value of 1indicates that the physical actuator is on (or the output signal is high)

The output polarity on one or both channels may optionally be configured for *logic reverse*, where:

- an output value of 1 indicates that the physical actuator is off (or the output signal is low)
- an output value of 0 indicates that the physical actuator is on (or the output signal is high)

To change an output polarity parameter from the default or back to the normal from reverse, you need to use the Advantys configuration software.

You can configure the output polarity on each output channel independently:

Step	Action	Result
1	Double click on the STB DDO 3230 you want to configure in the island editor.	The selected STB DDO 3230 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Output Polarity** appears.
3	Expand the **+ Output Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.

Step	Action	Result
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Output Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have normal polarity and 3 means that both channels have reverse polarity.	When you select the **Output Polarity** value, the max./min. values of the range appear at the bottom of the module editor screen. When you accept a new value for **Output Polarity**, the values associated with the channels change. For example, if you choose an output polarity value of 2, **Channel 1** has normal polarity and **Channel 2** has reverse polarity.
4b	To change the settings *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s).	When you accept a new value for a channel setting, the value for the module in the **Output Polarity** row changes. For example, if you set channel 1 to normal polarity and channel 2 to reverse polarity, the **Output Polarity** value changes to 2.

Fallback Modes

When communications are lost between the output module and the fieldbus master, the module's output channels must go to a known state where they will remain until communications are restored. This is known as the channel's *fallback state*. You may configure fallback states for each individual channel. Fallback configuration is accomplished in two steps:

- first by configuring fallback modes for each channel
- then (if necessary) configuring the fallback states

All output channels have a fallback mode—either *predefined* (1) or *hold last value* (0). When a channel has *predefined* as its fallback mode, it can be configured with a fallback state, either 1 or 0. When a channel has *hold last value* as its fallback mode, it stays at its last known state when communication is lost— it cannot be configured with a predefined fallback state.

By default, the fallback mode for both channels is a *predefined* state (1). If you want to change the fallback mode to *hold last value* (0), use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DDO 3230 you want to configure in the island editor.	The selected STB DDO 3230 module opens in the software module editor.
2	Expand the **+ Fallback Mode Settings** fields by clicking on the **+** sign.	A row called **+ Fallback Mode** appears.
3	Expand the **+ Fallback Mode** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.

Step	Action	Result
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Fallback Mode** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels hold their last values and 3 means that both channels go to a predefined state.	When you select the **Fallback Mode** value, the max./min. values of the range appear at the bottom of the module editor screen. When you accept a new value for **Fallback Mode**, the values associated with the channels change. For example, if you choose a fallback mode value of 2, then **Channel 1** goes to *hold last value* and **Channel 2** goes to a *predefined* state.
4b	To change the settings *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s).	When you accept a new value for a channel setting, the value for the module in the **Fallback Mode** row changes. For example, if you set channel 1 to *hold last value* and channel 2 to *predefined*, the **Fallback Mode** value changes to 2.

Fallback States

If an output channel's fallback mode is *predefined state*, you may configure that channel to either turn on or turn off when communication between the module and the fieldbus master is lost. By default, both channels are configured to go to 0 as their fallback states:

- If the output polarity of a channel is *logic normal*, 0 indicates that the predefined fallback state of the output is *off*
- If the output polarity of a channel is *logic reverse*, 0 indicates that the predefined fallback state of the output is *on*

NOTE: If an output channel has been configured with *hold last value* as its fallback mode, any value that you try to configure as a **Predefined Fallback Value** will be ignored.

To modify a fallback state from its default setting or to revert back to the default from an on setting, you need to use the Advantys configuration software:

Step	Action	Result
1	Make sure that the **Fallback Mode** value for the channel you want to configure is 1 (*predefined state*).	If the **Fallback Mode** value for the channel is 0 (*hold last value*), any value entered in the associated **Predefined Fallback Value** row will be ignored.
2	Expand the **+ Predefined Fallback Value Settings** fields by clicking on the **+** sign.	A row called **+ Predefined Fallback Value** appears.
3	Expand the **+ Predefined Fallback Value** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.

Step	Action	Result
4a	To change a setting *at the module level*, select the integer that appears in the **Value** column of the **Predefined Fallback Value** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have 0 as their predefined fallback value and 3 means that both channels have 1 as their predefined fallback value.	When you select the value associated with **Predefined Fallback Value**, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new **Predefined Fallback Value**, the values associated with the channels change. For example, if you choose a fallback state value of 2, then **Channel 2** will turn on as its fallback state. **Channel 1** will either turn off or be ignored, depending on its fallback mode setting.
4b	To change a setting *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s). You can configure a fallback state of either 0 or 1 for each channel on the module.	When you accept a new value for a channel setting, the value for the module in the **Predefined Fallback Value** row changes. For example, if you set channel 2 to 1 and leave channel 1 at 0, the **Predefined Fallback Value** value changes from 0 to 2.

STB DDO 3230 Data and Status for the Process Image

Representing Digital Output Data and Status

The NIM keeps a record of output data in one block of registers in the process image and a record of output status in another block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master and is used to update the output module. The information in the status block is provided by the module itself.

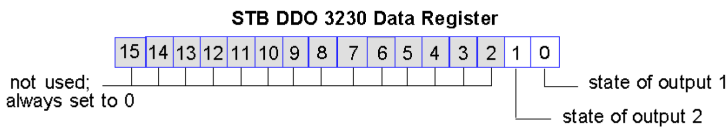
This process image information can be monitored by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port. The specific registers used by the STB DDO 3230 module are based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Output Data Register

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The STB DDO 3230 uses one register in the output data block.

The STB DDO 3230's output data register displays the most current on/off states of the module's two output channels:



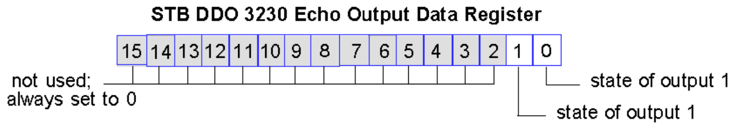
These values are written to the island bus by the fieldbus master.

Output Status Registers

The input data and I/O status process image is a reserved block of 4096 16-bit registers (in the range 45392 through 49487) that represents the status of all the I/O modules (along with the data for the input modules) on the island bus.

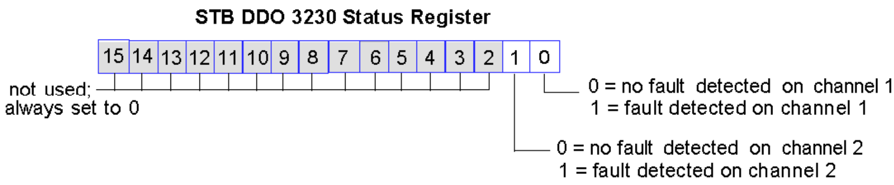
The STB DDO 3230 is represented by two contiguous registers—one register that echoes the output data register followed by one that displays the status of the output channels.

The first STB DDO 3230 register in the I/O status block is the module's *echo output data* register. This register represents the data that has just been sent to the output field devices by the STB DDO 3200 module.



Under most normal operating conditions, the bit values in this register should be an exact replica of the bits in the output data register. A difference between the bit values in the output data register and the echo register could result from an output channel used for a reflex action, where the channel is updated directly by the output module instead of by the fieldbus master.

The next contiguous register is the STB DDO 3230's status register. It indicates whether or not a fault condition has been detected on either of the module's two output channels. The fault would be either field power absent or actuator power shorted:



STB DDO 3230 Specifications

Table of Technical Specifications

description		24 VDC, 2.0 A source output
number of output channels		two
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping supported*		NIM-dependent**
reflex actions supported		two maximum[1]
output protection (internal)		transient voltage suppression
short circuit protection		per channel
short circuit feedback		per channel
isolation voltage	channel-to-channel	500 VDC for 1 min
reverse polarity protection from a miswired PDM		internal protection on the module
fault recovery response	default	channel latched off—requires user reset
	user-configurable settings[1]	auto-recovery
		latched off
logic bus current consumption		45 mA
nominal actuator bus current consumption		5.005 A, with no load
maximum load current		2.0 A/channel
minimum load current		none
output response time	off-to-on	520 µs
	on-to-off	720 µs
output voltage	working	19.2 ... 30 VDC
	absolute maximum	56 VDC for 1.3 ms, decaying voltage pulse
	on-state drop/channel	0.4 VDC max.
off-state leakage/channel		1.0 mA @ 30 VDC max.
maximum surge current		10 A/channel for 500 µs (no more than six/min)
maximum load capacitance		50 µF

maximum load inductance		$L = 0{,}5 / I^2 \times F$ where: L = load inductance (H) I = load current (A) F = switching frequency (Hz)
fallback mode	default	predefined
	user-configurable settings[1]	hold last value
		predefined fallback value on one or both channels
fallback states (when *predefined* is the fallback mode)	default	both channels go to 0
	user-configurable settings[1]	each channel configurable for 1 or 0
polarity on individual outputs	default	*logic normal* on both channels
	user-configurable settings[1]	*logic reverse* on one or both channels
		logic normal on one or both channels
field power requirements	field power voltage	19.2 to 30 VDC
	recommended source	external 24 VDC power supply
power protection		recommendation: user-supplied 2.5 A time-lag fuses externally applied to each channel
storage temperature		-40 to 85°C
operating temperature range***		0 to 60°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* ** Basic NIMs do not allow you to hot swap I/O modules.		
***This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of cabalities and limitations.		
[1]Requires the Advantys configuration software.		

Section 3.3
STB DDO 3410 Digital 24 VDC Source Output Module (four-channel, 0.5 A, over-current protected)

Overview

This section provides you with a detailed description of the Advantys STB DDO 3410 digital output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

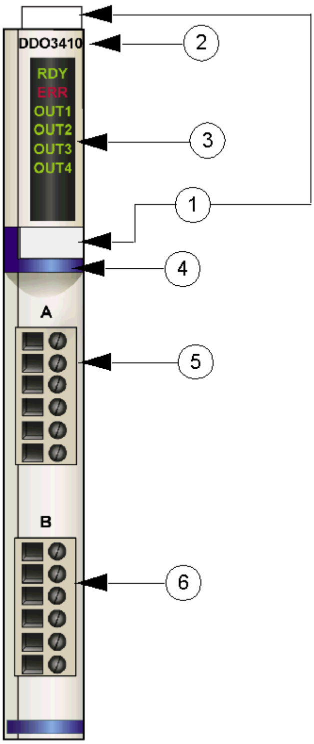
This section contains the following topics:

STB DDO 3410 Physical Description

Physical Characteristics

The STB DDO 3410 is a standard Advantys STB four-channel digital input module that writes outputs to 24 VDC actuator devices and provides power to the actuators. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Actuators 1and 2 are wired to the top connector, and actuators 3 and 4 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 dark blue identification stripe, indicating a digital VDC output module
5 actuator 1 connects to the top field wiring connector
6 actuator 2 connects to the bottom field wiring connector

Ordering Information

The module and its related parts may be ordered for stock or replacement as follows:

- a standalone STB DDO 3410 digital output module
- a standalone STB XBA 1000 *(see page 367)* size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spring clamp*p connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

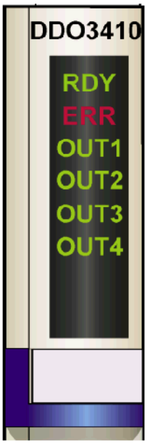
STB DDO 3410 LEDs

Overview

The six LEDs on the STB DDO 3410 module are visual indicators of the operating status of the module and its four digital output channels. The LED locations and their meanings are described below.

Location

The six LED are positioned in a column on the top front of the STB DDO3410 digital output module. The figure below shows their locations:



Indications

The following table defines the meaning of the six LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	ERR	OUT1	OUT2	OUT3	OUT4	Meaning	What to Do
off	off					The module is either not receiving logic power or has failed.	Check power
flicker*	off					Auto-addressing is in progress.	
on	off					The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational	
		on				Voltage is present on output channel 1.	
		off				Voltage is absent on output channel 1.	
			on			Voltage is present on output channel 2.	
			off			Voltage is absent on output channel 2.	
				on		Voltage is present on output channel 3.	
				off		Voltage is absent on output channel 3.	
					on	Voltage is present on output channel 4.	
					off	Voltage is absent on output channel 4.	
on	on	on	on	on	on	The watchdog has timed out.	Cycle power, restart the communications
		Note that the green output LEDs will be on even though the power is absent from the output channels when a watchdog time-out occurs.					
blink 1**						The module is either in pre-operational mode or in its fallback state.	
	flicker*					Field power absent or a short circuit detected at the actuator.	Check power
	blink 1**					A nonfatal error has been detected.	Cycle power, restart the communications

RDY	ERR	OUT1	OUT2	OUT3	OUT4	Meaning	What to Do
	blink 2***					The island bus is not running.	Check network connections, replace NIM
blink 3****						Some of the output channels are in fallback and some are operational. This condition can occur only if the module is used in a reflex action.	
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.							
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.							
*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.							
**** blink 3—the LED blinks on for 200 ms, off for 200 ms, on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.							

STB DDO 3410 Field Wiring

Summary

The STB DDO 3410 module uses two six-terminal field wiring connectors. Actuators 1 and 2 are wired to the top connector, and actuators 3 and 4 are wired to the bottom connector. The choices of connector types and field wire types are described below, and some field wiring options are presented.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Actuators

The STB DDO 3410 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to four two-wire actuators such as solenoids, contactors, relays, alarms or panel lamps that draw current up to 0.5 A/channel.

NOTE: If you are using this module to provide operating power to a large inductive load (at or near a maximum of 0.5 H), make sure that you turn the field device off before removing the field power connector from the module. The output channel on the module may be damaged if you remove the connector while the field device is on.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 to 16 AWG).

We recommend that you strip at least 9 mm from the wire’s jacket for the module connection.

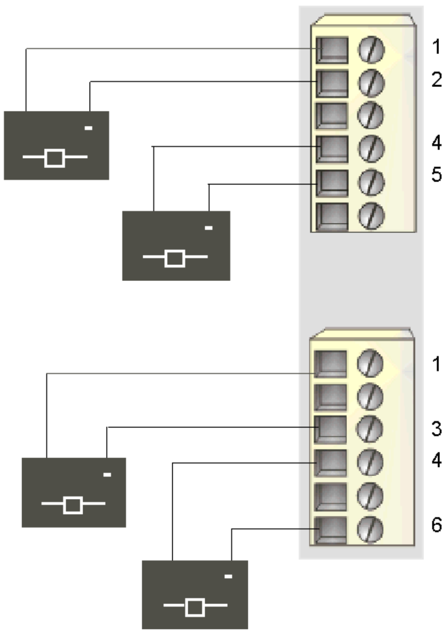
Field Wiring Pinout

The top connector supports digital output channels 1and 2; the bottom connector supports digital output channels 3 and 4:

Pin	Top Connector	Bottom Connector
1	output to actuator 1	output to actuator 3
2	field power return	field power return
3	field power return	field power return
4	output to actuator 2	output to actuator 4
5	field power return	field power return
6	field power return	field power return

Sample Wiring Diagram

The following field wiring example shows four actuators connected to the STB DDO 3410 module:



1 output to actuator 1 (top) and actuator 3 (bottom)
2 field power return from actuator 1 (top)
3 field power return from actuator 3 (bottom)
4 output to actuator 2 (top) and actuator 4 (bottom)
5 field power return from actuator 2 (top)
6 field power return from actuator 4 (bottom)

STB DDO 3410 Functional Description

Functional Characteristics

The STB DDO 3410 module is a four-channel module that sends digital output data to four 24 VDC field actuators. Using the Advantys configuration software, you can customize the following operating parameters:

- the module's response to fault recovery
- *logic normal* or *logic reverse* output polarity for each channel on the module
- a fallback state for each channel on the module

Fault Recovery Responses

The module can detect a short circuit on the actuator bus, an overcurrent fault or a PDM power failure on an output channel when the channel is turned on. If a fault is detected on any channel, the module will do one of the following:

- automatically latch off that channel plus another channel with which that channel is grouped, if that other channel is on, or
- automatically recover and resume operation on the channel group when the fault is corrected

The factory default setting is *latched off*, where the module turns off the output channels in a group when a short circuit or overcurrent condition is detected on any channel in that group. The channels will remain off until you explicitly reset them.

If you want to set the module to *auto-recover* when the fault is corrected, you need to use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DDO 3410 you want to configure in the island editor.	The selected STB DDO 3410 module opens in the software module editor.
2	From the pull-down menu in the **Value** column of the **Fault Recovery Response** row, select the desired response mode.	Two choices appear in the pull-down menu—**Latched Off** and **Auto Recovery**.

The fault recovery parameter is set at the module level—you cannot configure one group of channels to latch off and another to auto-recover. The module will apply the fault recovery response the channels in two groups (two channels/group):

- group 1 comprises output channels 1 and 2
- group 2 comprises output channels 3 and 4

For example, suppose the module is configured to *latch off* a shorted output channel. If a short circuit occurs on output channel 1, both group 1 channels (output 1 and output 2) are latched off. Channels 1 and 2 remain latched off until they are reset, and channels 3 and 4 continue to operate.

Resetting a Latched-off Output

When an output channel (or channel group) has been latched off because of fault detection, it will not recover until two things happen:

- the error has been corrected
- you explicitly reset the channel

To reset a latched off output channel, send a value of 0 to both channels in the latched-off group. The 0 value resets the channels to a standard off condition and restores their ability to respond to control logic. You need to provide the reset logic in your application program.

Auto-recovery

When the module is configured to auto-recover, a channel group that has been turned off because of a short circuit will start operating again as soon as the faulty channel is corrected. No user intervention is required to reset the channels. If the fault was transient, the channels may reactivate themselves without leaving any history of the short circuit.

Output Polarity

By default, the polarity on all four output channels is *logic normal*, where:

- an output value of 0 indicates that the physical actuator is off (or the output signal is low)
- an output value of 1 indicates that the physical actuator is on (or the output signal is high)

The output polarity on one or more channels may optionally be configured for *logic reverse*, where:

- an output value of 1 indicates that the physical actuator is off (or the output signal is low)
- an output value of 0 indicates that the physical actuator is on (or the output signal is high)

To change an output polarity parameter from *logic normal*, or back to normal from *logic reverse*, you need to use the Advantys configuration software.

You can configure the output polarity on each output channel independently:

Step	Action	Result
1	Double click on the STB DDO 3410 you want to configure in the island editor.	The selected STB DDO 3410 module opens in the software module editor.
2	Choose the data display format by either checking or unchecking the **Hexadecimal** checkbox at the top right of the editor.	Hexadecimal values will appear in the editor if the box is checked; decimal values will appear if the box is unchecked.
3	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Output Polarity** appears.
4	Expand the **+ Output Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1**, **Channel 2**, **Channel 3** and **Channel 4** appear.

Step	Action	Result
5a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Output Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 15 (0 to 0xF), where 0 means all channels have normal polarity and 0xF means that all four channels have reverse polarity.	When you select the **Output Polarity** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Output Polarity**, the values associated with the channels change. For example, if you choose an output polarity value of 6, **Channel 1** and **Channel 4** will have *normal polarity* while **Channel 2** and **Channel 3** will have *reverse polarity*.
5b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Output Polarity** row changes. For example, if you set channels 1 and 4 to *normal polarity* and channels 2 and 3 to *reverse polarity*, the **Output Polarity** value changes to 6.

Fallback Modes

When communications are lost between the output module and the fieldbus master, the module's output channels must go to a known state where they will remain until communications are restored. This is known as the channel's *fallback state*. You may configure fallback states for each channel individually. Fallback configuration is accomplished in two steps:

- first by configuring fallback modes for each channel
- then (if necessary) configuring the fallback states

All output channels have a fallback mode—either *predefined state* (1) or *hold last value* (0). When a channel has *predefined state* as its fallback mode, it can be configured with a fallback state, either 1 or 0. When a channel has *hold last value* as its fallback mode, it remains in its last known state when communication is lost— it cannot be configured with a predefined fallback state.

By default, the fallback mode for all four channels is a *predefined state*. To change the fallback mode to *hold last value*, use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DDO 3410 you want to configure in the island editor.	The selected STB DDO 3410 module opens in the software module editor.
2	Choose the data display format by either checking or unchecking the **Hexadecimal** checkbox at the top right of the editor.	Hexadecimal values will appear in the editor if the box is checked; decimal values will appear if the box is unchecked.
3	Expand the **+ Fallback Mode Settings** fields by clicking on the **+** sign.	A row called **+ Fallback Mode** appears.

Step	Action	Result
4	Expand the **+ Fallback Mode** row further by clicking on the **+** sign.	Rows for **Channel 1**, **Channel 2**, **Channel 3** and **Channel 4** appear.
5a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Fallback Mode** row and enter a hexadecimal or decimal integer in the range 0 to 15 (0 to 0xF), where 0 means all four channels hold their last values and 0xF means that all four channels go to a predefined state.	When you select the **Fallback Mode** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Fallback Mode**, the values associated with the channels change. For example, if you choose a fallback mode value of 6, **Channel 1** and **Channel 4** will be configured to *hold last value*, while **Channel 2** and **Channel 3** will be configured to *predefined state*.
5b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Fallback Mode** row changes. For example, if you set channel 2 to *hold last value*, and leave the remaining channels in their *predefined state*, the **Fallback Mode** value changes to 0xD.

Fallback States

If an output channel's fallback mode is *predefined state*, you may configure that channel to either turn on or turn off when communication between the module and the fieldbus master is lost. By default, all four channels are configured to go to a *predefined state* (1) as their fallback states:

- If the output polarity of a channel is *logic normal*, 0 indicates that the predefined fallback state of the output is *off*
- If the output polarity of a channel is *logic reverse*, 0 indicates that the predefined fallback state of the output is *on*

NOTE: If an output channel has been configured with *hold last value* as its fallback mode, any value that you try to configure as a **Predefined Fallback Value** will be ignored.

To modify a fallback state from its *predefined state*, or to revert back tonormal from an on setting, you need to use the Advantys configuration software:

Step	Action	Result
1	Make sure that the **Fallback Mode** value for the channel you want to configure is 1 (*predefined state*).	If the **Fallback Mode** value for the channel is 0 (*hold last value*), any value entered in the associated **Predefined Fallback Value** row will be ignored.

Step	Action	Result
2	Choose the data display format by either checking or unchecking the **Hexadecimal** checkbox at the top right of the editor.	Hexadecimal values will appear in the editor if the box is checked; decimal values will appear if the box is unchecked.
3	Expand the **+ Predefined Fallback Value Settings** fields by clicking on the **+** sign.	A row called **+ Predefined Fallback Value** appears.
4	Expand the **+ Predefined Fallback Value** row further by clicking on the **+** sign.	Rows for **Channel 1**, **Channel 2**, **Channel 3** and **Channel 4** appear.
5a	To change a setting *at the module level*, select the integer that appears in the **Value** column of the **Predefined Fallback Value** row and enter a hexadecimal or decimal integer in the range 0 to 15 (0 to 0xF), where 0 means both channels have 0 as their predefined fallback value and 15 means that all channels have 1 as their predefined fallback value.	When you select the value associated with **Predefined Fallback Value**, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new **Predefined Fallback Value**, the values associated with the channels change. For example, if you choose a fallback state value of 6, **Channel 1** and **Channel 4** will be 0, while **Channel 2** and **Channel 3** will be 1.
5b	To change a setting *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down men. You can configure a fallback state of either 0 or 1 for each channel on the module.	When you accept a new value for a channel setting, the value for the module in the **Predefined Fallback Value** row changes. For example, if you set channels 1 and 4 to a value of 0, and set channels 2 and 3 to 1, the **Predefined Fallback Value** changes to 6.

STB DDO 3410 Data and Status for the Process Image

Representing Digital Output Data and Status

The NIM keeps a record of output data in one block of registers in the process image and a record of output status in another block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master and is used to update the output module. The information in the status block is provided by the module itself.

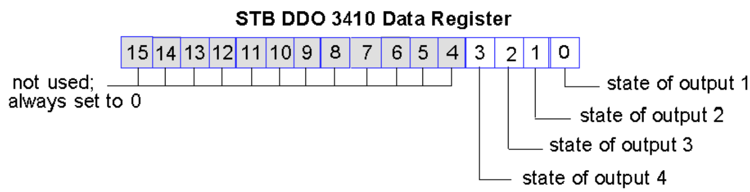
This process image information can be monitored by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port. The specific registers used by the STB DDO 3410 module are based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Output Data Register

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The STB DDO 3410 uses one register in the output data block.

The STB DDO 3410's output data register displays the most current on/off states of the module's four output channels:



These values are written to the island bus by the fieldbus master.

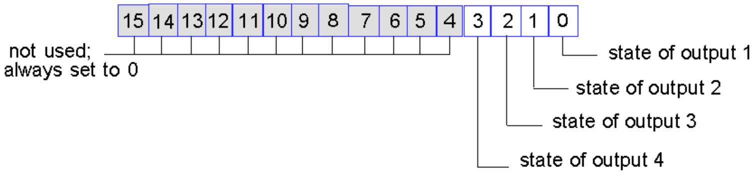
Output Status Registers

The input data and I/O status process image is a reserved block of 4096 16-bit registers (in the range 45392 through 49487) that represents the status of all the I/O modules (along with the data for the input modules) on the island bus.

The STB DDO 3410 is represented by two contiguous registers—one register that echoes the output data register followed by one that displays the status of the output channels.

The first STB DDO 3410 register in the I/O status block is the module's *echo output data* register. This register represents the data that has just been sent to the output field devices by the STB DDO 3410 module:

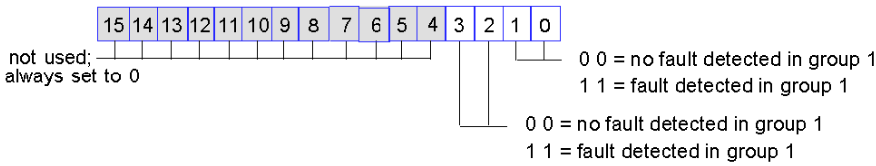
STB DDO 3410 Echo Output Data Register



Under most normal operating conditions, the bit values in this register should be an exact replica of the bits in the output data register. A difference between the bit values in the output data register and the echo register could result from an output channel used for a reflex action, where the channel is updated directly by the output module instead of by the fieldbus master.

The next contiguous register is the STB DDO 3410's status register. It indicates whether or not a fault condition has been detected on any of the module's four output channels.The fault might be field power absent or actuator power shorted:

STB DDO 3410 Status Register



Group 1 comprises outputs 1 and 2. Group 2 comprises outputs 3 and 4.

STB DDO 3410 Specifications

Table of Technical Specifications

description		24 VDC, 0.5 A source output
number of output channels		four
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping supported*		NIM-dependent**
reflex actions supported		two maximum [1]
output protection (internal)		transient voltage suppression
short circuit protection		per channel
short circuit feedback		per group: group 1 comprises channels 1 and 2; group 2 comprises channels 3 and 4
isolation voltage	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		internal protection on the module
fault recovery response	default	channel latched off; requires off-on command to reset
	user-configurable settings[1]	auto-recovery
		latched off
logic bus current consumption		70 mA
nominal actuator bus current consumption		2.01 A, with no load
maximum load current		0.5 A/channel
minimum load current		none
output response time	off-to-on	560 µs @ 0.5 A load
	on-to-off	870 µs @ 0.5 A load
output voltage	working	19.2 ... 30 VDC
	absolute maximum	56 VDC for 1.3 ms, decaying voltage pulse
	on-state drop/channel	0.4 VDC max.
off-state leakage/channel		0.4 mA @ 30 VDC max.
maximum surge current		5 A/channel for 500 µs (no more than six/min)
maximum load capacitance		50 µF

maximum load inductance		0.5 H @ 4 Hz switch frequency $L = 0,5/I^2 \times F$ where: L = load inductance (H) I = load current (A) F = switching frequency (Hz)
fallback mode	default	predefined
	user-configurable settings[1]	hold last value
		predefined fallback value on one or more channels
fallback states (when *predefined* is the fallback mode)	default	both channels go to 0
	user-configurable settings[1]	each channel configurable for 1 or 0
polarity on individual outputs	default	*logic normal* on all four channels
	user-configurable settings1	*logic reverse* on one or more channels
		logic normal on one or more channels
field power requirements		from a 24 VDC PDM
power protection		time-lag fuse on the PDM
storage temperature		-40 to 85°C
operating temperature range		0 to 60°C
operating voltage range***		19.2 to 30 VDC
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow you to hot swap I/O modules.		
***This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of cabalities and limitations.		
[1]Requires the Advantys configuration software.		

Section 3.4
STB DDO 3415 Digital 24 VDC Source Output Module (four-channel, 0.25 A, over-current protected)

Overview

This section provides you with a detailed description of the Advantys STB DDO 3415 digital output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

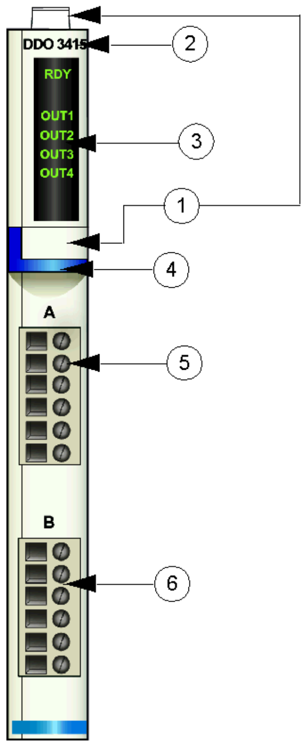
This section contains the following topics:

STB DDO 3415 Physical Description

Physical Characteristics

The STB DDO 3415 is a basic Advantys STB four-channel digital output module that writes outputs to 24 VDC actuator devices and provides power to the actuators. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Actuators 1and 2 are wired to the top connector, and actuators 3 and 4 are wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 dark blue identification stripe, indicating a digital VDC output module
5 actuators 1 and 2 connect to the top field wiring connector
6 actuator 3 and 4 connect to the bottom field wiring connector

Ordering Information

The module and its related parts may be ordered for stock or replacement as follows:

- a standalone STB DDO 3415 digital output module
- a standalone STB XBA 1000 *(see page 367)* size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spring clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

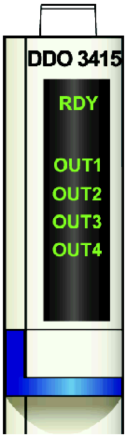
STB DDO 3415 LEDs

Overview

The five LEDs on the STB DDO 3415 module are visual indicators of the operating status of the module and its four digital output channels.

Location

The LEDs are located on the front bezel of the module below the model number:



Indications

The following table defines the meaning of the LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	OUT1	OUT2	OUT3	OUT4	Meaning
off					The module is either not receiving logic power, has experienced a watchdog timer error or has failed.
flicker*					Auto-addressing is in progress.

RDY	OUT1	OUT2	OUT3	OUT4	Meaning
on					The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational
	on				Voltage is present on output channel 1.
	off				Voltage is absent on output channel 1.
		on			Voltage is present on output channel 2.
		off			Voltage is absent on output channel 2.
			on		Voltage is present on output channel 3.
			off		Voltage is absent on output channel 3.
				on	Voltage is present on output channel 4.
				off	Voltage is absent on output channel 4.
blink 1**					The module is either in pre-operational mode or in its fallback state.
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.					
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.					

STB DDO 3415 Field Wiring

Summary

The STB DDO 3415 module uses two six-terminal field wiring connectors. Actuators 1 and 2 are wired to the top connector, and actuators 3 and 4 are wired to the bottom connector.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Actuators

The STB DDO 3415 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to four two-wire actuators such as solenoids, contactors, relays, alarms or panel lamps that draw current up to 250 mA/channel.

NOTE: If you are using this module to provide operating power to a large inductive load (at or near a maximum of 0.5 H), make sure that you turn the field device off before removing the field power connector from the module. The output channel on the module may be damaged if you remove the connector while the field device is on.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 to 16 AWG).

We recommend that you strip at least 9 mm from the wire's jacket for the module connection.

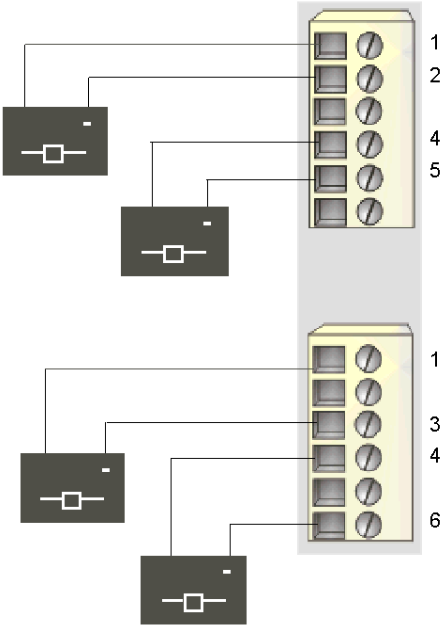
Field Wiring Pinout

The top connector supports digital output channels 1and 2; the bottom connector supports digital output channels 3 and 4:

Pin	Top Connector	Bottom Connector
1	output to actuator 1	output to actuator 3
2	field power return	field power return
3	field power return	field power return
4	output to actuator 2	output to actuator 4
5	field power return	field power return
6	field power return	field power return

Sample Wiring Diagram

The following field wiring example shows four actuators connected to the STB DDO 3415 module:



1 output to actuator 1 (top) and actuator 3 (bottom)
2 field power return from actuator 1 (top)
3 field power return from actuator 3 (bottom)
4 output to actuator 2 (top) and actuator 4 (bottom)
5 field power return from actuator 2 (top)
6 field power return from actuator 4 (bottom)

STB DDO 3415 Functional Description

Functional Characteristics

The STB DDO 3415 module is a four-channel module that sends digital output data to four 24 VDC field actuators. It does not support user-configurable operating parameters or reflex actions.

Auto-recovery from Detected Faults

If an overcurrent fault is detected on any channel, that channel plus the one with which it is grouped turns off. The module applies the fault recovery response to the channels in two groups:

- group 1 comprises output channels 1 and 2
- group 2 comprises output channels 3 and 4

A channel group that has been turned off because of a short circuit will start operating automatically as soon as the faulty channel is corrected. No user intervention is required to reset the channels.

Fallback States

When communications are lost between the output module and the fieldbus master, the module's output channels must go to a known state where they will remain until communications are restored. This is known as the channel's *fallback state*. All four channels go to a predefined fallback state of 0 VDC.

STB DDO 3415 Data for the Process Image

Representing Digital Output Data

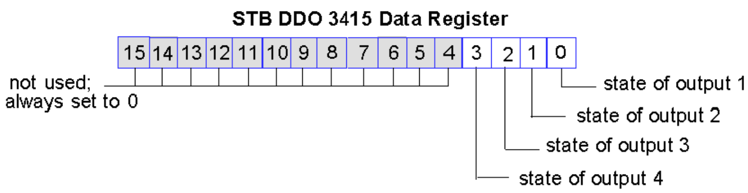
The NIM keeps a record of output data in one block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master and is used to update the output modules. This information can be monitored by the fieldbus master. If you are not using a basic NIM, the information may also be monitored by an HMI panel connected to the NIM's CFG port.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. An STB DDO 3415 uses one register in the output data block. The specific register is based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Output Data Register

The STB DDO 3415's output data register displays the most current on/off states of the module's four output channels:



STB DDO 3415 Specifications

Table of Technical Specifications

description		24 VDC, 0.25 A source output
number of output channels		four
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping supported*		NIM-dependent**
reflex actions supported		no
output protection (internal)		transient voltage suppression
short circuit protection		no
fault recovery		per group: ● group 1 comprises channels 1 and 2 ● group 2 comprises channels 3 and 4
isolation voltage	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		internal protection on the module
fault recovery response		auto-recovery
logic bus current consumption		70 mA
nominal actuator bus current consumption		1.01 A, with no load
maximum load current		0.25 A/channel
minimum load current		none
output response time	off-to-on	560 µs @ 0.25 A load
	on-to-off	870 µs @ 0.25 A load
output voltage	working	19.2 ... 30 VDC
	absolute maximum	56 VDC for 1.3 ms, decaying voltage pulse
	on-state drop/channel	0.4 VDC max.
off-state leakage/channel		0.4 mA @ 30 VDC max.
maximum surge current		2.5 A/channel for 500 µs (no more than six/min)
maximum load capacitance		50 µF
maximum load inductance		0.5 H @ 4 Hz switch frequency $L = 0,5 / I^2 \times F$ where: L = load inductance (H) I = load current (A) F = switching frequency (Hz)

fallback mode	predefined
fallback states	both channels go to 0
output polarity	*logic normal* on all four channels
field power requirements	from a 24 VDC PDM
power protection	time-lag fuse on the PDM
storage temperature	-40 to 85°C
operating temperature range	0 to 60°C
operating voltage range	19.2 to 30 VDC
agency certifications	refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* ** Basic NIMs do not allow you to hot swap I/O modules.	

Section 3.5
STB DDO 3600 Digital 24 VDC Source Output Module (six-channel, 0.5 A, over-current protected)

Overview

This section provides you with a detailed description of the Advantys STB DDO 3600 digital output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

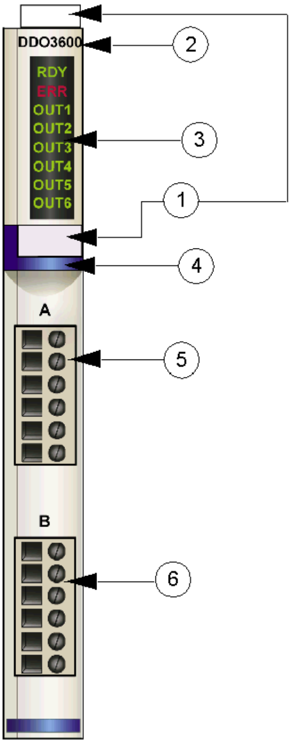
This section contains the following topics:

STB DDO 3600 Physical Description

Physical Characteristics

The STB DDO 3600 is a standard Advantys STB six-channel digital output module that writes outputs to 24 VDC actuator devices and provides power to the actuators. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Actuators 1, 2 and 3 are wired to the top connector, and actuators 4, 5 and 6 are wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 dark blue identification stripe, indicating a digital VDC output module
5 actuators 1 ... 3 connect to the top field wiring connector
6 actuator 4 ... 6 connect to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DDO 3600 K), which includes:

- one STB DDO 3600 digital output module
- one size 1 STB XBA 1000 *(see page 367)* I/O base
- two alternative sets of connectors:
  - two 6-terminal *screw type* connectors
  - two 6-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DDO 3600 digital output module
- a standalone STB XBA 1000 size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spring clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

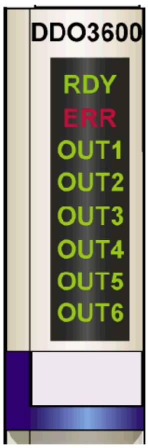
STB DDO 3600 LED Indicators

Overview

The eight LEDs on the STB DDO 3600 module are visual indications of the operating status of the module and its six digital output channels. The LED locations and their meanings are described below.

Location

The eight LED indicators are positioned in a column at the top front of the STB DDO 3600 digital output module. The figure below shows their location:



Indications

The following table defines the meaning of the eight LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	ERR	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	Meaning	What to Do
off	off							The module is either not receiving logic power or has failed.	Check power

RDY	ERR	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	Meaning	What to Do
flicker*	off							Auto-addressing is in progress.	
on	off							The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational	
		on						Voltage is present on output channel 1.	
		off						Voltage is absent on output channel 1.	
			on					Voltage is present on output channel 2.	
			off					Voltage is absent on output channel 2.	
				on				Voltage is present on output channel 3.	
				off				Voltage is absent on output channel 3.	
					on			Voltage is present on output channel 4.	
					off			Voltage is absent on output channel 4.	
						on		Voltage is present on output channel 5.	
						off		Voltage is absent on output channel 5.	
							on	Voltage is present on output channel 6.	
							off	Voltage is absent on output channel 6.	
on	on	on	on	on	on	on	on	The watchdog has timed out.	Cycle power, restart the communications
		Note that the green output LEDs will be on even though the power is absent from the output channels when a watchdog time-out occurs.							
blink 1**								The module is either in pre-operational mode or in its fallback state.	

RDY	ERR	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	Meaning	What to Do
	flicker*							Field power absent or a short circuit detected at the actuator.	Check power
	blink 1**							A nonfatal error has been detected.	Cycle power, restart the communications
	blink 2***							The island bus is not running.	Check network connections, replace NIM
blink 3****								Some of the output channels are in fallback and some are operational. This condition can occur only if the module is used in a reflex action.	
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.									
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.									
*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.									
**** blink 3—the LED blinks on for 200 ms, off for 200 ms, on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.									

STB DDO 3600 Field Wiring

Summary

The STB DDO 3600 module uses two six-terminal field wiring connectors. Actuators 1, 2 and 3 are wired to the top connector, and actuators 4, 5 and 6 are wired to the bottom connector. The choices of connector types and field wire types are described below, and some field wiring options are presented.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors, available in a kit of 20 (model STB XTS 2100)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Actuators

The STB DDO 3600 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-wire actuators such as solenoids, contactors, relays, alarms or panel lamps that draw current up to 0.5 A/channel.

NOTE: If you are using this module to provide operating power to a large inductive load (at or near a maximum of 0.5 H), make sure that you turn the field device off before removing the field power connector from the module. The output channel on the module may be damaged if you remove the connector while the field device is on.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 to 16 AWG).

We recommend that you strip at least 9 mm from the wire's jacket for the module connection.

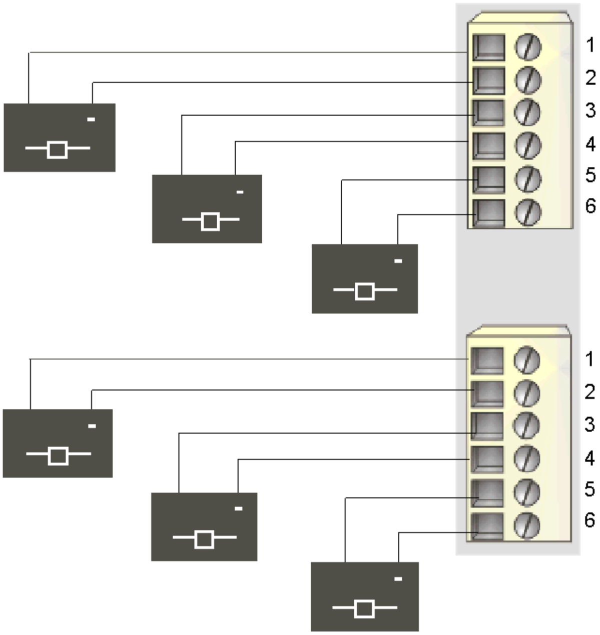
Field Wiring Pinout

The top connector supports digital input channels 1, 2, and 3; the bottom connector supports digital input channels 4, 5, and 6:

Pin	Top Connector	Bottom Connector
1	output to actuator 1	output to actuator 4
2	field power return	field power return
3	output to actuator 2	output to actuator 5
4	field power return	field power return
5	output to actuator 3	output to actuator 6
6	field power return	field power return

Sample Wiring Diagram

The following field wiring example shows six actuators connected to the STB DDO 3600 module:



1 output to actuator 1 (top) and actuator 4 (bottom)
2 field power return from actuator 1 (top) and actuator 4 (bottom)
3 output to actuator 2 (top) and actuator 5 (bottom)
4 field power return from actuator 2 (top) and actuator 5 (bottom)
5 output to actuator 3 (top) and actuator 6 (bottom)
6 field power return from actuator 3 (top) and actuator 6 (bottom)

STB DDO 3600 Functional Description

Functional Characteristics

The STB DDO 3600 is a six-channel module that sends digital output data to six 24 VDC field actuators. Using the Advantys configuration software, you can customize the following operating parameters:

- the module's response to fault recovery
- *logic normal* or *logic reverse* output polarity for each channel on the module
- a fallback state for each channel on the module

Fault Recovery Responses

The module can detect a short circuit on the actuator bus, an overcurrent fault or a loss of PDM power on an output channel when the channel is turned on. If a fault is detected on any channel, the module will do one of the following:

- automatically latch off that channel plus another channel with which that channel is grouped, if that other channel is on, or
- automatically recover and resume operation on the channel group when the fault is corrected

The factory default setting is *latched off*, where the module turns off the output channels in a group when a short circuit or overcurrent condition is detected on any channel in that group. The channels will remain off until you reset them explicitly.

If you want to set the module to *auto-recover* when the fault is corrected, you need to use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DDO 3600 module you want to configure in the island editor.	The selected STB DDO 3600 module opens in the software module editor.
2	From the pull-down menu in the **Value** column of the **Fault Recovery Response** row, select the desired response mode.	Two choices appear in the pull-down menu—**Latched Off** and **Auto Recovery**.

The fault recovery parameter is set at the module level—you cannot configure one group of channels to latch off and another to auto-recover. The module will apply the fault recovery response the channels in three groups (two channels/group):

- group 1 comprises output channels 1 and 2
- group 2 comprises output channels 3 and 4
- group 3 comprises output channels 5 and 6

For example, suppose the module is configured to *latch off* a shorted output channel. If a short circuit occurs on output channel 1, both group 1 channels (output 1 and output 2) are latched off. Channels 1 and 2 remain latched off until they are reset, and channels 3 through 6 continue to operate.

Resetting a Latched-off Output

When an output channel (or channel group) has been latched off because of fault detection, it will not recover until two things happen:

- the error has been corrected
- you explicitly reset the channel

To reset a latched off output channel, send a value of 0 to both channels in the latched-off group. The 0 value resets the channels to a standard off condition and restores their ability to respond to control logic. You need to provide the reset logic in your application program.

Auto-recovery

When the module is configured to auto-recover, a channel group that has been turned off because of a short circuit will start operating again as soon as the faulty channel is corrected. No user intervention is required to reset the channels. If the fault was transient, the channels may reactivate themselves without leaving any history of the short circuit having occurred.

Output Polarity

By default, the polarity on all six output channels is *logic normal*, where:

- a output value of 0 indicates that the physical actuator is off (or the output signal is low)
- an output value of 1indicates that the physical actuator is on (or the output signal is high)

The output polarity on one or more channels may optionally be configured for *logic reverse*, where:

- an output value of 1 indicates that the physical actuator is off (or the output signal is low)
- an output value of 0 indicates that the physical actuator is on (or the output signal is high)

To change an output polarity parameter from *logic normal*, or back to normal from *logic reverse*, you need to use the Advantys configuration software.

You can configure the output polarity on each output channel independently:

Step	Action	Result
1	Double click on the STB DDO 3600 module you want to configure in the island editor.	The selected STB DDO 3600 module opens in the software module editor.
2	Choose the data display format by either checking or unchecking the **Hexadecimal** checkbox at the top right of the editor.	Hexadecimal values will appear in the editor if the box is checked; decimal values will appear if the box is unchecked.
3	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Output Polarity** appears.
4	Expand the **+ Output Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1**, **Channel 2**, **Channel 3**, **Channel 4**, **Channel 5** and **Channel 6** appear.

Step	Action	Result
5a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Output Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 63 (0 to 0x3F), where 0 means all channels have normal polarity and 0x3F means that all six channels have reverse polarity.	When you select the **Output Polarity** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Output Polarity**, the values associated with the channels change. For example, if you choose an output polarity value of 0x2F, **Channel 5** will have normal polarity and the other five channels will have reverse polarity.
5b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Output Polarity** row changes. For example, if you set channels 2 and 3 to *reverse polarity*, and leave the other four channels set to *normal polarity*, the **Output Polarity** value changes to 0x6.

Fallback Modes

When communications are lost between the output module and the fieldbus master, the module's output channels must go to a known state where they will remain until communications are restored. This is known as the channel's *fallback state*. You may configure fallback states for each channel individually. Fallback configuration is accomplished in two steps:

- first by configuring fallback modes for each channel
- then (if necessary) configuring the fallback states

All output channels have a fallback mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its fallback mode, it can be configured with a fallback state, either 1 or 0. When a channel has *hold last value* (0) as its fallback mode, it stays at its last known state when communication is lost— it cannot be configured with a predefined fallback state.

By default, the fallback mode for all six channels is a *predefined state* (1). If you want to change the fallback mode to *hold last value* (0), use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DDO 3600 module you want to configure in the island editor.	The selected STB DDO 3600 module opens in the software module editor.
2	Choose the data display format by either checking or unchecking the **Hexadecimal** checkbox at the top right of the editor.	Hexadecimal values will appear in the editor if the box is checked; decimal values will appear if the box is unchecked.
3	Expand the **+ Fallback Mode Settings** fields by clicking on the **+** sign.	A row called **+ Fallback Mode** appears.

Step	Action	Result
4	Expand the **+ Fallback Mode** row further by clicking on the **+** sign.	Rows for **Channel 1**, **Channel 2**, **Channel 3**, **Channel 4**, **Channel 5** and **Channel 6** appear.
5a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Fallback Mode** row and enter a hexadecimal or decimal integer in the range 0 to 63 (0 to 0x3F), where 0 means all six channels hold their last values and 0x3F means that all six channels go to a predefined state.	When you select the **Fallback Mode** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Fallback Mode**, the values associated with the channels change. For example, if you choose a fallback mode value of 0x2F, **Channel 5** will be set to *hold last value* and the other five channels will be set to *predefined state*.
5b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Fallback Mode** row changes. For example, if you set channel 5 to *hold last value*, and leave the other five channels set to *predefined state*, the **Fallback Mode** value changes to 0x2F.

Fallback States

If an output channel's fallback mode is *predefined state*, you may configure that channel to either turn on or turn off when communication between the module and the fieldbus master is lost. By default, all four channels are instructed to go to *hold last value* (0) as their fallback states:

- If the output polarity of a channel is *logic normal*, 0 indicates that the predefined fallback state of the output is *off*
- If the output polarity of a channel is *logic reverse*, 0 indicates that the predefined fallback state of the output is *on*

NOTE: If an output channel has been configured with *hold last value* as its fallback mode, any value that you try to configure as a **Predefined Fallback Value** will be ignored.

To modify a fallback state from its default setting or to revert back to the default from an on setting, you need to use the Advantys configuration software:

Step	Action	Result
1	Make sure that the **Fallback Mode** value for the channel you want to configure is 1 (*predefined state*).	If the **Fallback Mode** value for the channel is 0 (*hold last value*), any value entered in the associated **Predefined Fallback Value** row will be ignored.

Step	Action	Result
2	Choose the data display format by either checking or unchecking the **Hexadecimal** checkbox at the top right of the editor.	Hexadecimal values will appear in the editor if the box is checked; decimal values will appear if the box is unchecked.
3	Expand the **+ Predefined Fallback Value Settings** fields by clicking on the **+** sign.	A row called **+ Predefined Fallback Value** appears.
4	Expand the **+ Predefined Fallback Value** row further by clicking on the **+** sign.	Rows for **Channel 1**, **Channel 2**, **Channel 3**, **Channel 4**, **Channel 5** and **Channel 6** appear.
5a	To change a setting *at the module level*, select the integer that appears in the **Value** column of the **Predefined Fallback Value** row and enter a hexadecimal or decimal integer in the range 0 to 63 (0 to 0x3F), where 0 means all six channels have 0 as their predefined fallback value and 0x3F means that all six channels have 1 as their predefined fallback value.	When you select the value associated with **Predefined Fallback Value**, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new **Predefined Fallback Value**, the values associated with the channels change. For example, if you choose a fallback state value of 0x2F, **Channel 5** will have a value of 0 (off) and the other five channels will have 1 (on) as their value.
5b	To change a setting *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu. You can configure a fallback state of either 0 or 1 for each channel on the module.	When you accept a new value for a channel setting, the value for the module in the **Predefined Fallback Value** row changes. For example, if you set channel 5 to 0 and leave the other five channels set to 1, the **Predefined Fallback Value** value changes to 0x2F.

STB DDO 3600 Data and Status for the Process Image

Representing Digital Output Data and Status

The NIM keeps a record of output data in one block of registers in the process image and a record of output status in another block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master ad is used to update the output module. The information in the status block is provided by the module itself.

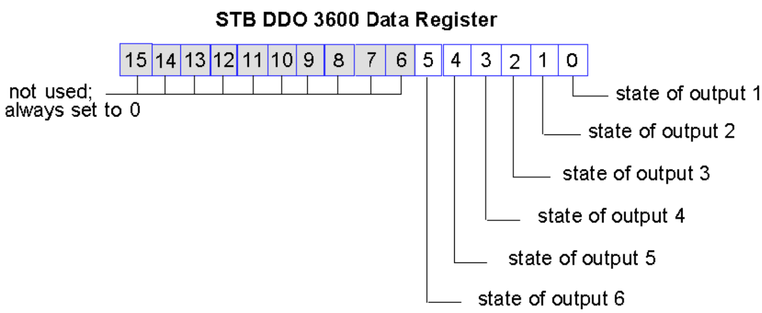
This process image information can be monitored by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port. The specific registers used by the STB DDO 3600 module are based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Output Data Register

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in a register in this data block. The STB DDO 3600 uses one register in the output data block.

The STB DDO 3600's output data register displays the most current on/off states of the module's six output channels:



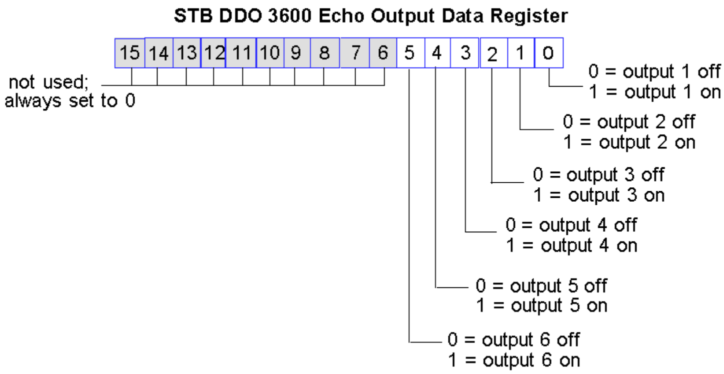
These values are written to the island bus by the fieldbus master.

Output Status Registers

The echo output data and I/O status process image is a reserved block of 4096 16-bit registers (in the range 45392 through 49487) that represents the status of all the I/O modules (along with the data for the input modules) on the island bus.

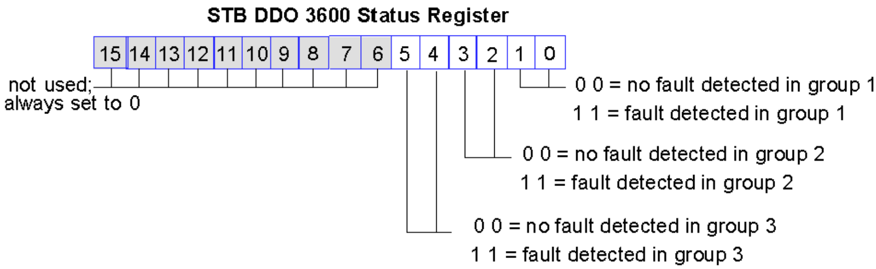
The STB DDO 3600 is represented by two contiguous registers—one register that echoes the output data register followed by one that displays the status of the output channels.

The first STB DDO 3600 register in the I/O status block is the module's *echo output data* register. This register represents the data that has just been sent to the output field devices by the STB DDO 3600 module.



Under most normal operating conditions, the bit values in this register should be an exact replica of the bits in the output data register. A difference between the bit values in the output data register and the echo register could result from an output channel used for a reflex action, where the channel is updated directly by the output module instead of by the fieldbus master.

The next contiguous register is the STB DDO 3600's status register. It indicates whether or not a fault condition has been detected on either of the module's two output channels. The fault might be field power absent or actuator power shorted:



Group 1 comprises outputs 1 and 2. Group 2 comprises outputs 3 and 4. Group 3 comprises outputs 5 and 6.

STB DDO 3600 Specifications

Table of Technical Specifications

description		24 VDC, 0.5 A source output
number of output channels		six
module width		13.9 mm (0.58 in)
I/O base		STB XBA 1000 *(see page 367)*
hot swapping* supported		NIM-dependent**
reflex actions supported		two maximum[1]
output protection (internal)		transient voltage suppression
short circuit protection		per channel
short circuit feedback		per group: ● group 1 comprises channels 1 and 2 ● group 2 comprises channels 3 and 4 ● group 3 comprises channels 5 and 6
fault recovery response	default setting	shorted channel latched off—requires user reset action
	user-configurable settings[1]	auto-recovery
		latched off
isolation voltage	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		internal protection on the module
logic bus current consumption		90 mA
nominal actuator bus current consumption		3.015 A, with no load
maximum load current		0.5 A/channel
minimum load current		none
output response time	off-to-on	715 µs @ 0.5 A load
	on-to-off	955 µs @ 0.5 A load
output voltage	working	19.2 ... 30 VDC
	absolute maximum	56 VDC for 1.3 ms, decaying voltage pulse
	on-state drop/channel	0.4 VDC max.
off-state leakage/channel		0.4 mA @ 30 VDC max.
maximum surge current		5 A/channel for 500 µs (no more than six/min)
maximum load capacitance		50 µF

maximum load inductance		0.5 H @ 4 Hz switch frequency $L = 0{,}5 / I^2 \times F$ where: L = load inductance (H) I = load current (A) F = switching frequency (Hz)
fallback mode	default	predefined fallback values on all six channels
	user-configurable settings[1]	hold last value
		predefined fallback value on one or more channels
fallback states (when *predefined* is the fallback mode)	default	all six channels go to 0
	user-configurable settings[1]	each channel configurable for 1 or 0
polarity on individual outputs	default	*logic normal* on all six channels
	user-configurable settings[1]	*logic reverse* on one or more channels
		logic normal on one or more channels
field power requirements		from a 24 VDC PDM
power protection		time-lag fuse on the PDM
operating voltage range		19.2 to 30 VDC
operating temperature range***		0 to 60°C
storage temperature		-40 to 85°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not let you hot swap I/O modules.		
***This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of cabalities and limitations.		
[1]Requires the Advantys configuration software.		

Section 3.6
STB DDO 3605 Digital 24 VDC Source Output Module (six-channel, 0.25 A, over-current protected)

Overview

This section provides you with a detailed description of the Advantys STB DDO 3605 digital output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

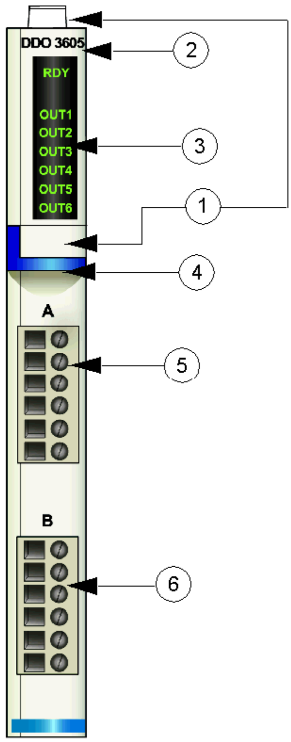
This section contains the following topics:

STB DDO 3605 Physical Description

Physical Characteristics

The STB DDO 3605 is a basic Advantys STB six-channel digital output module that writes outputs to 24 VDC actuator devices and provides power to the actuators. The module mounts in a size 1 I/O base and uses two six-terminal field wiring connectors. Actuators 1, 2 and 3 are wired to the top connector, and actuators 4, 5 and 6 are wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 dark blue identification stripe, indicating a digital VDC output module
5 actuators 1 ... 3 connect to the top field wiring connector
6 actuator 4 ... 6 connect to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DDO 3605 K), which includes:

- one STB DDO 3605 digital output module
- one size 1 STB XBA 1000 *(see page 367)* I/O base
- two alternative sets of connectors:
  - two 6-terminal *screw type* connectors
  - two 6-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DDO 3605 digital output module
- a standalone STB XBA 1000 size 1 base
- a bag of *screw type* connectors (STB XTS 1100) or *spring clamp* connectors (STB XTS 2100)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	13.9 mm (0.58 in)
height	module only	125 mm (4.92 in)
	on a base	128.3 mm (5.05 in)
depth	module only	64.1 mm (2.52 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

STB DDO 3605 LED Indicators

Overview

The seven LEDs on the STB DDO 3605 module are visual indications of the operating status of the module and its six digital output channels.

Location

The LED indicators are positioned in a column at the top front of the STB DDO 3605 digital output module:

Indications

The following table defines the meaning of the eight LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	Meaning
off							The module is either not receiving logic power, has experienced a watchdog timer error or has failed.
flicker*							Auto-addressing is in progress.

RDY	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	Meaning
on							The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational
	on						Voltage is present on output channel 1.
	off						Voltage is absent on output channel 1.
		on					Voltage is present on output channel 2.
		off					Voltage is absent on output channel 2.
			on				Voltage is present on output channel 3.
			off				Voltage is absent on output channel 3.
				on			Voltage is present on output channel 4.
				off			Voltage is absent on output channel 4.
					on		Voltage is present on output channel 5.
					off		Voltage is absent on output channel 5.
						on	Voltage is present on output channel 6.
						off	Voltage is absent on output channel 6.
blink 1**							The module is either in pre-operational mode or in its fallback state.
*	flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.						
**	blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.						

STB DDO 3605 Field Wiring

Summary

The STB DDO 3605 module uses two six-terminal field wiring connectors. Actuators 1, 2 and 3 are wired to the top connector, and actuators 4, 5 and 6 are wired to the bottom connector.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors, available in a kit of 20 (model STB XTS 2100)

These field wiring connectors each have six connection terminals, with a 3.8 mm (0.15 in) pitch between each pin.

Field Actuators

The STB DDO 3605 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-wire actuators such as solenoids, contactors, relays, alarms or panel lamps that draw current up to 250 mA/channel.

NOTE: If you are using this module to provide operating power to a large inductive load (at or near a maximum of 0.5 H), make sure that you turn the field device off before removing the field power connector from the module. The output channel on the module may be damaged if you remove the connector while the field device is on.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 to 16 AWG).

We recommend that you strip at least 9 mm from the wire's jacket for the module connection.

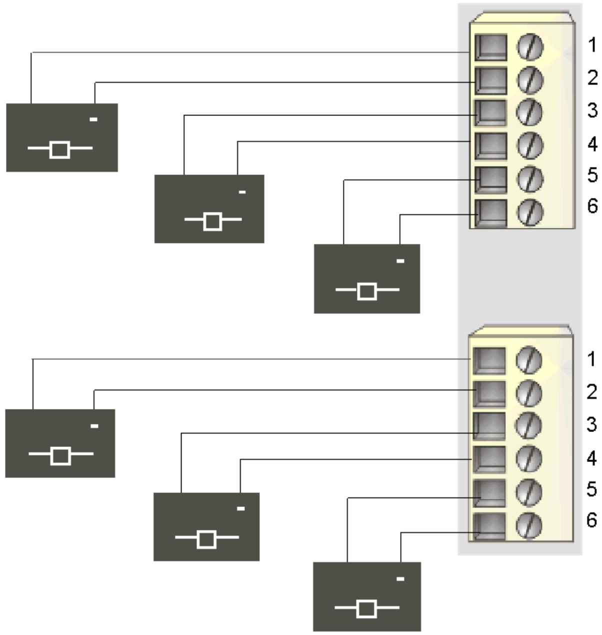
Field Wiring Pinout

The top connector supports digital input channels 1, 2, and 3; the bottom connector supports digital input channels 4, 5, and 6:

Pin	Top Connector	Bottom Connector
1	output to actuator 1	output to actuator 4
2	field power return	field power return
3	output to actuator 2	output to actuator 5
4	field power return	field power return
5	output to actuator 3	output to actuator 6
6	field power return	field power return

Sample Wiring Diagram

The following field wiring example shows six actuators connected to the STB DDO 3605 module:



1 output to actuator 1 (top) and actuator 4 (bottom)
2 field power return from actuator 1 (top) and actuator 4 (bottom)
3 output to actuator 2 (top) and actuator 5 (bottom)
4 field power return from actuator 2 (top) and actuator 5 (bottom)
5 output to actuator 3 (top) and actuator 6 (bottom)
6 field power return from actuator 3 (top) and actuator 6 (bottom)

STB DDO 3605 Functional Description

Functional Characteristics

The STB DDO 3605 is a six-channel module that sends digital output data to six 24 VDC field actuators. It does not support user-configurable operating parameters or reflex actions.

Auto-recovery from Detected Faults

If an overcurrent fault is detected on any channel, that channel plus the one with which it is grouped turns off. The module applies the fault recovery response to the channels in three groups:

- group 1 comprises output channels 1 and 2
- group 2 comprises output channels 3 and 4
- group 3 comprises output channels 5 and 6

A channel group that has been turned off because of a short circuit will start operating again as soon as the faulty channel is corrected. No user intervention is required to reset the channels.

Output Polarity

The polarity on all four output channels is *logic normal*, where:

- 0 indicates that the physical actuator is off (or the output signal is low)
- 1 indicates that the physical actuator is on (or the output signal is high)

Fallback States

When communications are lost between the output module and the fieldbus master, the module’s output channels must go to a known state where they will remain until communications are restored. This is known as the channel’s *fallback state*. All six channels go to a predefined fallback state of 0 VDC.

STB DDO 3605 Data for the Process Image

Representing Digital Output Data

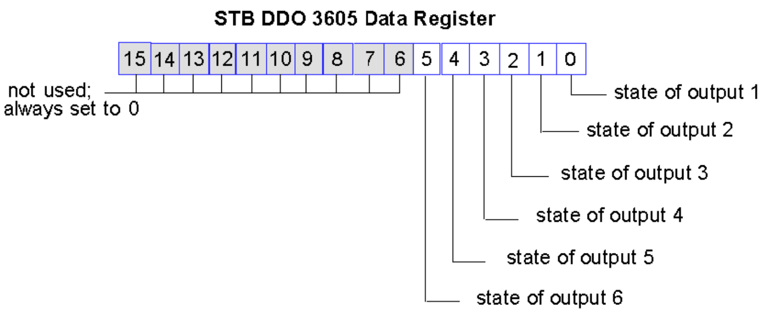
The NIM keeps a record of output data in one block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master ad is used to update the output module. If you are not using a basic NIM, the information may also be monitored by an HMI panel connected to the NIM's CFG port.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. The STB DDO 3605 uses one register in the output data block. The specific register is based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Output Data Register

The STB DDO 3605's output data register displays the most current on/off states of the module's six output channels:



STB DDO 3605 Specifications

Table of Technical Specifications

<table>
<tr><td colspan="2">description</td><td>24 VDC, 0.25 A source output</td></tr>
<tr><td colspan="2">number of output channels</td><td>six</td></tr>
<tr><td colspan="2">module width</td><td>13.9 mm (0.58 in)</td></tr>
<tr><td colspan="2">I/O base</td><td>STB XBA 1000 (see page 367)</td></tr>
<tr><td colspan="2">hot swapping supported*</td><td>NIM-dependent**</td></tr>
<tr><td colspan="2">reflex actions supported</td><td>no</td></tr>
<tr><td colspan="2">output protection (internal)</td><td>transient voltage suppression</td></tr>
<tr><td colspan="2">short circuit protection</td><td>no</td></tr>
<tr><td colspan="2">fault recovery</td><td>per group:
● group 1 comprises channels 1 and 2
● group 2 comprises channels 3 and 4
● group 3 comprises channels 5 and 6</td></tr>
<tr><td colspan="2">fault recovery response</td><td>auto-recovery</td></tr>
<tr><td>isolation voltage</td><td>field-to-bus</td><td>1500 VDC for 1 min</td></tr>
<tr><td colspan="2">reverse polarity protection from a miswired PDM</td><td>internal protection on the module</td></tr>
<tr><td colspan="2">logic bus current consumption</td><td>90 mA</td></tr>
<tr><td colspan="2">nominal island bus current consumption</td><td>1.515 A, with no load</td></tr>
<tr><td colspan="2">maximum load current</td><td>250 mA/channel</td></tr>
<tr><td colspan="2">minimum load current</td><td>none</td></tr>
<tr><td rowspan="2">output response time</td><td>off-to-on</td><td>550 µs @ 250 mA resistive load</td></tr>
<tr><td>on-to-off</td><td>900 µs @ 250 mA resistive load</td></tr>
<tr><td rowspan="3">output voltage</td><td>working</td><td>19.2 ... 30 VDC</td></tr>
<tr><td>absolute maximum</td><td>56 VDC for 1.3 ms, decaying voltage pulse</td></tr>
<tr><td>on-state drop/channel</td><td>0.4 VDC max.</td></tr>
<tr><td colspan="2">off-state leakage/channel</td><td>0.4 mA @ 30 VDC max.</td></tr>
<tr><td colspan="2">maximum surge current</td><td>2.5 A/channel for 500 µs (no more than six/min)</td></tr>
<tr><td colspan="2">maximum load capacitance</td><td>50 µF</td></tr>
</table>

maximum load inductance	0.5 H @ 4 Hz switch frequency $L = 0{,}5 / I^2 \times F$ where: L = load inductance (H) I = load current (A) F = switching frequency (Hz)
fallback mode	predefined fallback values on all six channels
fallback states	all six channels go to 0
polarity on individual outputs	*logic normal* on all six channels
field power requirements	from a 24 VDC PDM
power protection	time-lag fuse on the PDM
operating voltage range	19.2 to 30 VDC
operating temperature	0 to 60 °C
storage temperature	-40 to 85°C
agency certifications	refer to *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not let you hot swap I/O modules.	

Section 3.7
STB DDO 3705 High Density Output Module

Introduction

The STB DDO 3705 - described below - is a basic Advantys STB sixteen-channel digital output module

What Is in This Section?

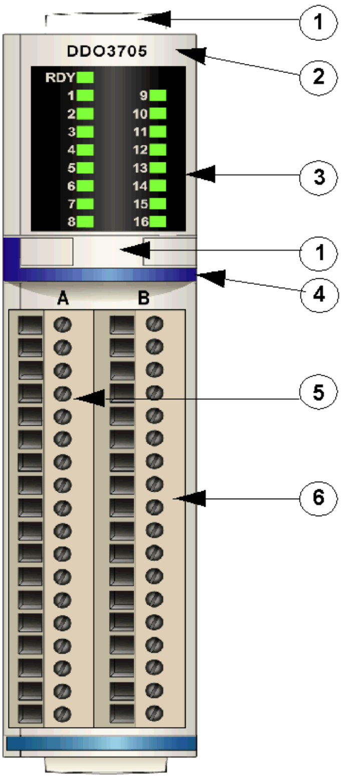
This section contains the following topics:

STB DDO 3705 Physical Description

Physical Characteristics

The STB DDO 3705 is a basic Advantys STB sixteen-channel digital output module that writes outputs to 24 VDC actuator devices and provides power to the actuators. The module mounts in a size 3 base and uses two 18-pin field wiring connectors. The connectors are positioned side-by-side on the bezel; connector A (which supports output channels 1...8) is on the left, and connector B (which supports output channels 9...16) is on the right.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 dark blue identification stripe, indicating a digital VDC output module
5 group 1 actuators (1 - 8) connect to the left field wiring connector (A)
6 group 2 actuators (9 - 16) connect to the right field wiring connector (B)

Ordering Information

The module can be ordered in either of two kits:

- STB DDO 3705 KS, which includes:
  - one STB DDO 3705 digital output module
  - one size 3 STB XBA 3000 *(see page 375)* I/O base
  - two 18-terminal *screw type* connectors
- STB DDO 3705 KC, which includes:
  - one STB DDO 3705 digital output module
  - one size 3 STB XBA 3000 *(see page 375)* I/O base
  - two 18-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DDO 3705 digital output module
- a standalone STB XBA 3000 size 3 base
- a bag of *screw type* connectors (STB XTS 1180) or *spring clamp* connectors (STB XTS 2180)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module
- the STB XTS 5610 and STB XTS 6610 high density I/O connector interfaces *(see page 389)* can replace the standard field wiring connectors and facilitate a Telefast connection

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

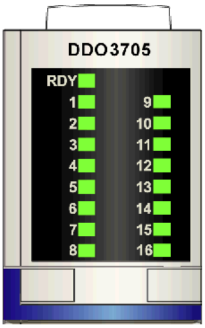
STB DDO 3705 LED Indicators

Overview

The seventeen LEDs on the STB DDO 3705 module are visual indicators of the module's operating status and its sixteen digital output channels.

Location

The LED indicators are positioned in two columns at the top of the STB DDO 3705 digital output module's bezel. Indicators for the RDY signal and output channels 1...8 are in the left column, and output channels 9...16 in the right column.



Indicators

The following two-part table defines the meaning of the seventeen LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter). The first part of the table corresponds to the left column of LED indicators:

RDY	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	Meaning
off									The module is either not receiving logic power, has experienced a watchdog timer error or has failed.
flicker*									Auto-addressing is in progress.
blink 1**									The module is in pre-operational mode and in its fallback state.

RDY	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	Meaning
on									The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational
	on								Voltage is present on output channel 1.
	off								Voltage is absent on output channel 1.
		on							Voltage is present on output channel 2.
		off							Voltage is absent on output channel 2.
			on						Voltage is present on output channel 3.
			off						Voltage is absent on output channel 3.
				on					Voltage is present on output channel 4.
				off					Voltage is absent on output channel 4.
					on				Voltage is present on output channel 5.
					off				Voltage is absent on output channel 5.
						on			Voltage is present on output channel 6.
						off			Voltage is absent on output channel 6.
							on		Voltage is present on output channel 7.
							off		Voltage is absent on output channel 7.
								on	Voltage is present on output channel 8.
								off	Voltage is absent on output channel 8.
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.									
** blink 1—the LED blinks on for 200 ms then off for 200 ms.									

The second part of the table describes combinations of the RDY indicator in the left column plus the right column LED indicators:

RDY	OUT9	OUT10	OUT11	OUT12	OUT13	OUT14	OUT15	OUT16	Meaning
on	on								Voltage is present on output ch. 9.
	off								Voltage is absent on output ch. 9.
		on							Voltage is present on output ch. 10.
		off							Voltage is absent on output ch. 10.
			on						Voltage is present on output ch. 11.
			off						Voltage is absent on output ch. 11.
				on					Voltage is present on output ch. 12.
				off					Voltage is absent on output ch. 12.
					on				Voltage is present on output ch. 13.
					off				Voltage is absent on output ch. 13.
						on			Voltage is present on output ch. 14.
						off			Voltage is absent on output ch. 14.
							on		Voltage is present on output ch. 15.
							off		Voltage is absent on output ch. 15.
								on	Voltage is present on output ch. 16.
								off	Voltage is absent on output ch. 16.
blink 1**									The module is either in pre-operational mode or in its fallback state.
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.									
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.									

STB DDO 3705 Field Wiring

Summary

The STB DDO 3705 module uses two eighteen-terminal field wiring connectors. Actuators 1 ... 8 are wired to the left connector (A), and actuators 9 ... 16 are wired to the right connector (B).

Connectors

Use a set of either:

- two STB XTS 1180 *screw-type* field wiring connectors (available in a kit of 2)
- two STB XTS 2180 *spring clamp* field wiring connectors (available in a kit of 2)

These field wiring connectors each have eighteen-channel connection terminals, with a 3.81 mm (0.15 in) pitch between each pin.

Field Actuators

The STB DDO 3705 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-wire actuators such as solenoids, contactors, relays, alarms or panel lamps that draw current up to 500 mA/channel.

NOTE: If you are using this module to provide operating power to a large inductive load (at or near a maximum of 0.5 H), make sure that you turn the field device off before removing the field power connector from the module. The output channel on the module may be damaged if you remove the connector while the field device is on.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 to 16 AWG).

We recommend that you strip 9 mm from the wire's jacket for the module connection.

Field Wiring Pinout

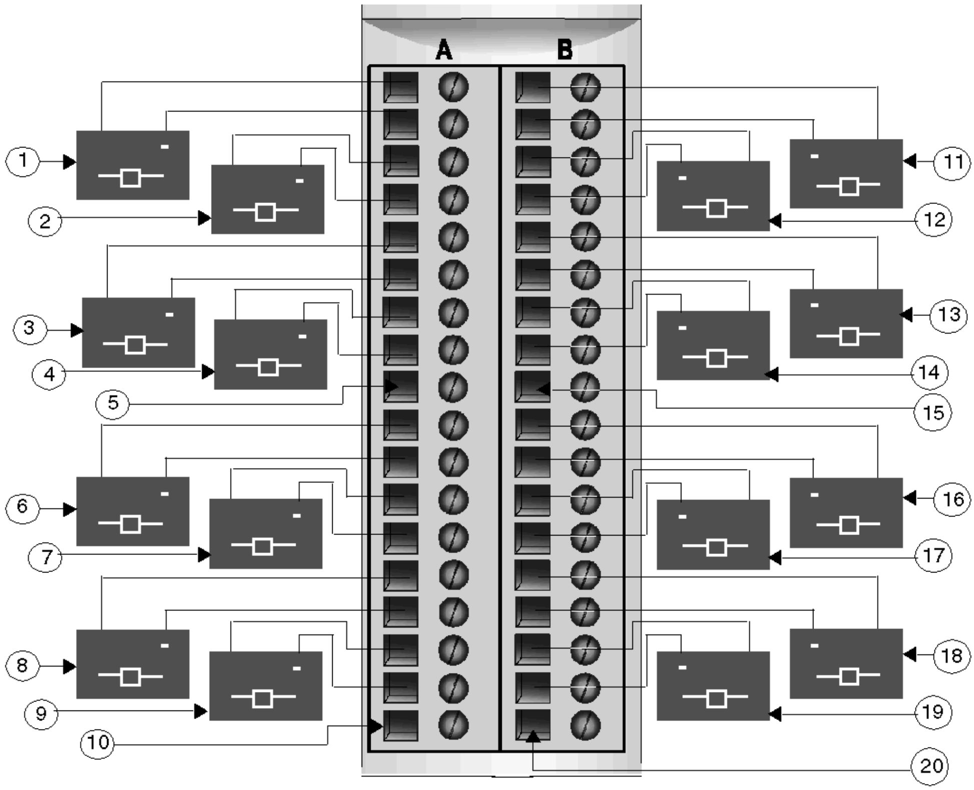
The left connector (A) supports digital output channels 1 ... 8; the right connector (B) supports digital output channels 9 ... 16:

Pin	Left Connector	Right Connector
1	output to actuator 1	output to actuator 9
2	field power return	field power return
3	output to actuator 2	output to actuator 10
4	field power return	field power return
5	output to actuator 3	output to actuator 11
6	field power return	field power return

Pin	Left Connector	Right Connector
7	output to actuator 4	output to actuator 12
8	field power return	field power return
9	no connection	no connection
10	output to actuator 5	output to actuator 13
11	field power return	field power return
12	output to actuator 6	output to actuator 14
13	field power return	field power return
14	output to actuator 7	output to actuator 15
15	field power return	field power return
16	output to actuator 8	output to actuator 16
17	field power return	field power return
18	no connection	no connection

Sample Wiring Diagram

The following field wiring example shows 16 actuators - 8 in group 1 (channels 1-8) and 8 in group 2 (channels 9-16) - connected to the STB DDO 3705 module. Pins 9 and 18 on each connector are not used.



#	Group 1	#	Group 2
1	Channel 1, Connector A, Actuator	11	Channel 1, Connector B, Actuator
2	Channel 2, Connector A, Actuator	12	Channel 2, Connector B, Actuator
3	Channel 3, Connector A, Actuator	13	Channel 3, Connector B, Actuator
4	Channel 4, Connector A, Actuator	14	Channel 4, Connector B, Actuator
5	Pin 9, Connector A (not used)	15	Pin 9, Connector B (not used)
6	Channel 5, Connector A, Actuator	16	Channel 5, Connector B, Actuator
7	Channel 6, Connector A, Actuator	17	Channel 6, Connector B, Actuator

#	Group 1	#	Group 2
8	Channel 7, Connector A, Actuator	18	Channel 7, Connector B, Actuator
9	Channel 8, Connector A, Actuator	19	Channel 8, Connector B, Actuator
10	Pin 18, Connector A (not used)	20	Pin 18, Connector B (not used)

STB DDO 3705 Functional Description

Functional Characteristics

The STB DDO 3705 is a basic sixteen-channel module that writes digital output data to 2 groups of eight 24 VDC field actuators, sd follows:

- group 1 comprises output channels 1 through 8
- group 2 comprises output channels 9 through 16

The module does not support user-configurable operating parameters or reflex actions.

Auto-recovery from Detected Faults

If an overcurrent fault is detected on any channel, that channel plus the others with which it is grouped turns off. The module applies the fault recovery response to the channels in two groups:

- group 1 comprises output channels 1 through 8
- group 2 comprises output channels 9 through 16

A channel group that has been turned off because of a short circuit will start operating again as soon as the faulty channel is corrected. The module is permanently set to *auto-recover*, no user intervention is required to reset the channels.

Output Polarity

The polarity on all output channels is *logic normal*, where:

- 0 indicates that the physical actuator is off (or the output signal is low)
- 1 indicates that the physical actuator is on (or the output signal is high)

Fallback States

When communications are lost between the output module and the fieldbus master, the module's output channels must go to a known state where they will remain until communications are restored. This is known as the channel's *fallback state*. All sixteen channels go to a predefined fallback state of 0 VDC.

STB DDO 3705 Data for the Process Image

Representing Digital Output Data

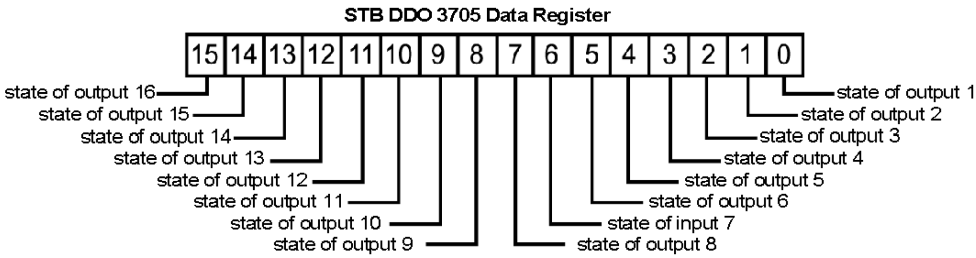
The NIM keeps a record of output data in one block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master and is used to update the output module. If you are not using a basic NIM, the information may also be monitored by an HMI panel connected to the NIM's CFG port.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. The STB DDO 3705 uses one register in the output data block. The specific register is based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module (*NIM*) Application Guides. Separate guides are available for each supported fieldbus.

Output Data Register

The STB DDO 3705 basic high density output module's output data register displays the most current on/off states of the module's sixteen output channels:



STB DDO 3705 Specifications

Table of Technical Specifications

description		24 VDC, 0.5 A source output
number of output channels		sixteen
module width		28.1 mm (1.11 in)
I/O base		STB XBA 3000 *(see page 375)*
hot swapping supported*		NIM-dependent**
reflex actions supported		no
short circuit protection		yes
fault recovery		per group: ● group 1 comprises channels 1...8 ● group 2 comprises channels 9...16
fault recovery response		auto-recovery
isolation voltage	field-to-bus	1500 VDC for 1 min
reverse polarity protection from a miswired PDM		PDM will blow the fuse
logic bus current consumption		135 mA
nominal actuator bus current consumption		4.05 A, with no load
maximum load current		4 A total per module: ● 2 A per group ● .5 A per channel
minimum load current		None
output response time	off-to-on	2 ms@ 500 mA resistive load
	on-to-off	2 ms @ 500 mA resistive load
output voltage	working	19.2 ... 30 VDC
	absolute maximum	35 VDC for 1.3 ms, decaying voltage pulse
	on-state drop/channel	0.4 VDC max.
off-state leakage/channel		0.4 mA @ 30 VDC max.
maximum surge current		Self Limiting Per Point
maximum load capacitance		10 µF
maximum load inductance		1 H @ 4 Hz switch frequency $L = 0,5 / I^2 \times F$ where: L = load inductance (H) I = load current (A) F = switching frequency (Hz)

fallback mode	predefined fallback values on all sixteen channels
fallback states	all sixteen channels go to 0 VDC
polarity on individual outputs	*logic normal* on all sixteen channels
field power requirements	from a 24 VDC PDM
power protection	time-lag fuse on the PDM
operating voltage range	19.2 to 30 VDC
operating temperature range	0 to 60°C
storage temperature	-40 to 85°C
agency certifications	refer to *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow the user to hot swap I/O modules.	

Section 3.8
STB DAO 5260 Digital 115 VAC Source, Isolated Output Module (two-channel, 2 A)

Overview

This section provides you with a detailed description of the Advantys STB DAO 5260 digital output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

This section contains the following topics:

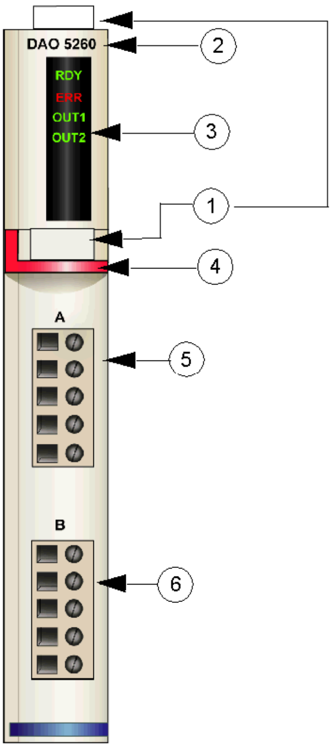
STB DAO 5260 Physical Description

Physical Characteristics

The STB DAO 5260 is a standard Advantys STB two-channel isolated digital output module that writes outputs to 115 VAC actuator devices and provides power to the actuators. This module can receive power from different phases of an AC power source. The module mounts in a size 2 I/O base and uses two five-terminal field wiring connectors. Actuator 1 is wired to the top connector, and actuator 2 is wired to the bottom connector.

The STB DAO 5260 module does not receive power from the PDM.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 red identification stripe, indicating a digital AC output module
5 actuator 1 connects to the top field wiring connector
6 actuator 2 connects to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DAO 5260 K), which includes:

- one STB DAO 5260 digital output module
- one size 2 STB XBA 2000 *(see page 371)* I/O base
- two alternative sets of connectors:
  - two 5-terminal *screw type* connectors
  - two 5-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DAO 5260 digital output module
- a standalone STB XBA 2000 size 2 base
- a bag of *screw type* connectors (STB XTS 1110) or *spring clamp* connectors (STB XTS 2110)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	18.4 mm (0.72 in)
height	module only	125 mm (4.92 in)
	on a base	128.25 mm (5.05 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

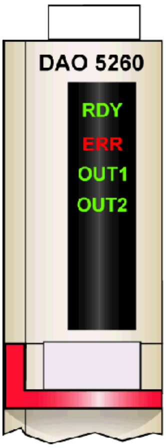
STB DAO 5260 LED Indicators

Purpose

The four LEDs on the STB DAO 5260 module are visual indications of the operating status of the module and its two digital output channels. The LED locations and their meanings are described below.

Location

The four LEDs are positioned in a column on the top front of the STB DAO 5260 digital output module. The figure below shows their location:



Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn’t matter):

<table>
<tr><th>RDY</th><th>ERR</th><th>OUT1</th><th>OUT2</th><th>Meaning</th><th>What to Do</th></tr>
<tr><td>off</td><td>off</td><td></td><td></td><td>The module is either not receiving logic power or has failed.</td><td>Check power</td></tr>
<tr><td>flicker*</td><td>off</td><td></td><td></td><td>Auto-addressing is in progress.</td><td rowspan="6"></td></tr>
<tr><td rowspan="5">on</td><td rowspan="5">off</td><td></td><td></td><td>The module has achieved all of the following:
● it has power
● it has passed its confidence tests
● it is operational</td></tr>
<tr><td>on</td><td></td><td>Voltage is present on output channel 1.</td></tr>
<tr><td>off</td><td></td><td>Voltage is absent on output channel 1.</td></tr>
<tr><td></td><td>on</td><td>Voltage is present on output channel 2.</td></tr>
<tr><td></td><td>off</td><td>Voltage is absent on output channel 2.</td></tr>
<tr><td rowspan="2">on</td><td rowspan="2">on</td><td>on</td><td>on</td><td>The watchdog has timed out.</td><td rowspan="2">Cycle power, restart the communications</td></tr>
<tr><td colspan="3">Note that the green output LEDs will be on even though the power is absent from the output channels when a watchdog time-out occurs.</td></tr>
<tr><td>blink 1**</td><td></td><td></td><td></td><td>The module is either in pre-operational mode or in its fallback state.</td><td></td></tr>
<tr><td></td><td>blink 1**</td><td></td><td></td><td>A nonfatal error has been detected.</td><td>Cycle power, restart the communications</td></tr>
<tr><td></td><td>blink 2***</td><td></td><td></td><td>The module is not communicating with the island bus.</td><td>If all I/O modules have a blink 2 pattern, cycle power to the island or replace the NIM. If only this module has a blink 2 pattern, replace the module.</td></tr>
<tr><td>blink 3****</td><td></td><td></td><td></td><td>One or more of the output channels are in fallback. This condition can occur only if one or more output channels are configured for reflex aciton.</td><td></td></tr>
<tr><td colspan="6">* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.</td></tr>
<tr><td colspan="6">** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.</td></tr>
<tr><td colspan="6">*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.</td></tr>
<tr><td colspan="6">**** blink 3—the LED blinks on for 200 ms, off for 200 ms, on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.</td></tr>
</table>

STB DAO 5260 Field Wiring

Summary

The STB DAO 5260 module uses two five-terminal field wiring connectors. Actuator 1 is wired to the top connector, and actuator 2 is wired to the bottom connector. Each output must be wired with an external fuse to protect the module from possible damage. The choices of connector types and field wire types are described below, and some field wiring considerations are presented.

Connectors

Use a set of either:

- two STB XTS 1110 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2110 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have five connection terminals, with a 5.08 mm (0.2 in) pitch between each pin.

Field Actuators

The STB DAO 5260 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-, three- or four-wire devices such as solenoids, contactors, relays, alarms or panel lamps.

When the module is operating at 30 degrees C, it supports two actuators that can draw current up to 2.0 A/channel. At 60 degrees C, it supports two actuators that can draw current up to 1.0 A/channel.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire’s jacket for the module connection.

Local electrical codes take precedence over our recommended wire size for the protective earth (PE) connection on pin 5.

External Fusing

External fusing is required for each output. Use a 5 A fuse for each output.

To achieve over-current protection on the outputs, you must place external fuses in-line on each output channel. Use a 5 A, 250 V 5 x 20 mm fuse such as the Wickmann 1911500000 on the wires that connect the field device to pin 1 on each connector.

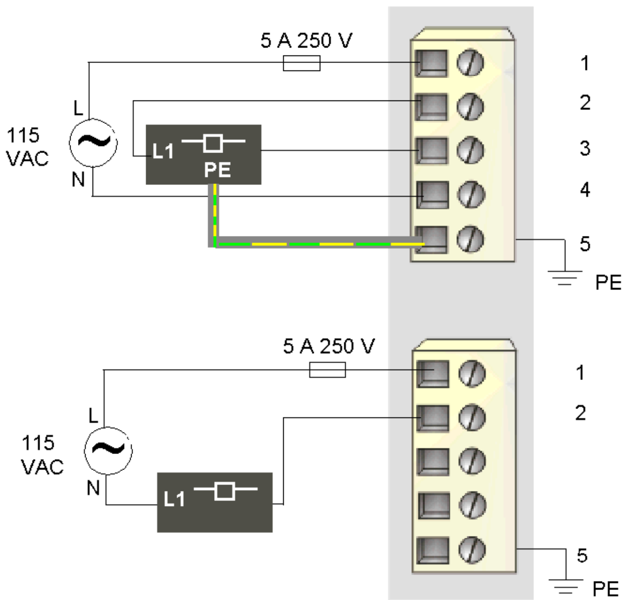
Field Wiring Pinout

The top connector supports actuator 1, and the bottom connector supports actuator 2:

Pin	Top Connector	Bottom Connector
1	115VAC source power 1 (to the module)	115VAC source power 2 (to the module)
2	output to actuator 1	output to actuator 2
3	output neutral 1	output neutral 2
4	field power neutral 1 (to the module)	field power neutral 2 (to the module)
5	protective earth	protective earth

Sample Wiring Diagram

The following field wiring example shows two actuators connected to an STB DAO 5260 output module, with user-installed external fuses on each channel connection:



Within each connector, pins 3 and 4 are internally tied. The actuator on the top connector has a PE connection that is tied to the PE connection on the PDM base through pin 5.

STB DAO 5260 Functional Description

Functional Characteristics

The STB DAO 5260 module is a two-channel module that sends digital output data to two field actuators that may be operating at 115 VAC. Using the Advantys configuration software, you can customize the following operating parameters:

- *logic normal* or *logic reverse* output polarity for each channel on the module
- a fallback state for each channel on the module

Output Polarity

By default, the polarity on both output channels is *logic normal*, where:

- 0 indicates that the physical actuator is off (or the output signal is low)
- 1 indicates that the physical actuator is on (or the output signal is high)

The output polarity on one or both channels may optionally be configured for *logic reverse*, where:

- 1 indicates that the physical actuator is off (or the output signal is low)
- 0 indicates that the physical actuator is on (or the output signal is high)

To change an output polarity parameter from the default or back to the normal from reverse, you need to use the Advantys configuration software.

You can configure the output polarity on each output channel independently:

Step	Action	Result
1	Double click on the STB DAO 5260 module you want to configure in the island editor.	The selected STB DAO 5260 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Output Polarity** appears.
3	Expand the **+ Output Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Output Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have normal polarity and 3 means that both channels have reverse polarity.	When you select the **Output Polarity** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Output Polarity**, the values associated with the channels change. For example, if you choose an output polarity value of 2, **Channel 1** has normal polarity and **Channel 2** has reverse polarity.

Step	Action	Result
4b	To change the settings *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s).	When you accept a new value for a channel setting, the value for the module in the **Output Polarity** row changes. For example, if you set channel 1 to 0 and channel 2 to 1, the **Output Polarity** value changes to 2.

Fallback Modes

When communications are lost between the output module and the fieldbus master, the module's output channels must go to a known state where they will remain until communications are restored. This is known as the channel's *fallback state*. You may configure fallback states for each channel individually. Fallback configuration is accomplished in two steps:

- first by configuring fallback modes for each channel
- then (if necessary) configuring the fallback states

All output channels have a fallback mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its fallback mode, it can be configured with a fallback state, either 1 or 0. When a channel has *hold last value* as its fallback mode, it stays at its last known state when communication is lost— it cannot be configured with a predefined fallback state.

By default, the fallback mode for both channels is a predefined state. If you want to change the fallback mode to *hold last value*, you need to use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DAO 5260 module you want to configure in the island editor.	The selected STB DAO 5260 module opens in the software module editor.
2	Expand the **+ Fallback Mode Settings** fields by clicking on the **+** sign.	A row called **+ Fallback Mode** appears.
3	Expand the **+ Fallback Mode** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Fallback Mode** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels hold their last values and 3 means that both channels go to a predefined state.	When you select the **Fallback Mode** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Fallback Mode**, the values associated with the channels change. For example, if you choose a fallback mode value of 2, then **Channel 1** goes to hold last value and **Channel 2** goes to a predefined state.

Step	Action	Result
4b	To change the settings *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s).	When you accept a new value for a channel setting, the value for the module in the **Fallback Mode** row changes. For example, if you set channel 1 to 0 and channel 2 to 1, the **Fallback Mode** value changes to 2.

Fallback States

If an output channel's fallback mode is *predefined state*, you may configure that channel to either turn on or turn off when communication between the module and the fieldbus master is lost. By default, both channels are configured to go to 0 as their fallback states:

- If the output polarity of a channel is *logic normal*, 0 indicates that the predefined fallback state of the output is *off*
- If the output polarity of a channel is *logic reverse*, 0 indicates that the predefined fallback state of the output is *on*

NOTE: If an output channel has been configured with *hold last value* as its fallback mode, any value that you try to configure as a **Predefined Fallback Value** will be ignored.

To modify a fallback state from its default setting or to revert back to the default from an on setting, you need to use the Advantys configuration software:

Step	Action	Result
1	Make sure that the **Fallback Mode** value for the channel you want to configure is 1 (*predefined state*).	If the **Fallback Mode** value for the channel is 0 (*hold last value*), any value entered in the associated **Predefined Fallback Value** row will be ignored.
2	Expand the **+ Predefined Fallback Value Settings** fields by clicking on the **+** sign.	A row called **+ Predefined Fallback Value** appears.
3	Expand the **+ Predefined Fallback Value** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change a setting *at the module level*, select the integer that appears in the **Value** column of the **Fallback Mode** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have 0 as their predefined fallback value and 3 means that both channels have 1 as their predefined fallback value.	When you select the value associated with **Predefined Fallback Value**, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new **Predefined Fallback Value**, the values associated with the channels change. For example, if you choose a fallback state value of 2, then **Channel 2** will turn on as its fallback state. **Channel 1** will either turn off or be ignored, depending on its fallback mode setting.

Step	Action	Result
4b	To change a setting *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s). You can configure a fallback state of either 0 or 1 for each channel on the module.	When you accept a new value for a channel setting, the value for the module in the **Fallback Mode** row changes. For example, if you set channel 2 to 1 and leave channel 1 at 0, the **Predefined Fallback Value** value changes from 0 to 2.

STB DAO 5260 Data and Status for the Process Image

Representing Digital Output Data

The NIM keeps a record of output data in one block of registers in the process image and a record of output status in another block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master and is used to update the output module. The information in the status block is provided by the module itself.

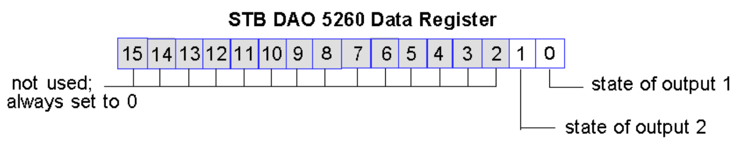
This process image information can be monitored by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port. The specific registers used by the STB DAO 5260 module are based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Output Data Register

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus has its data values represented in a register in this data block. The STB DAO 5260 uses one register in the output data block.

The STB DAO 5260's output data register displays the most current on/off states of the module's two output channels:



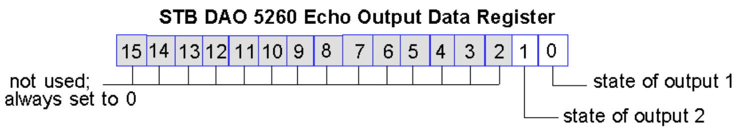
These values are written to the island bus by the fieldbus master.

Output Echo Register

The input data and I/O status process image is a reserved block of 4096 16-bit registers (in the range 45392 through 49487) that represents the status of all the I/O modules (along with the data for the input modules) on the island bus.

The STB DAO 5260 is represented by one register that echoes the output data register.

This register represents the data that has just been sent to the output field devices by the STB DAO 5260 module:



Under most normal operating conditions, the bit values in this register should be an exact replica of the bits in the output data register. A difference between the bit values in the output data register and the echo register could result from an output channel used for a reflex action, where the channel is updated directly by the output module instead of by the fieldbus master.

STB DAO 5260 Specifications

Table of Technical Specifications

description		115 VAC source (47 ... 63 Hz) output
number of output channels		two
module width		18.4 mm (0.72 in)
I/O base		STB XBA 2000 *(see page 371)*
hot swapping supported*		NIM-dependent**
reflex actions supported		two maximum
output surge protection		metal oxide varistor and RC suppression
output voltage (rms)	working	20 ... 132 VAC
	absolute maximum	200 VAC for 1 cycle
	on-state drop/channel	2.0 VAC max.
off-state leakage/channel	132 VAC max.	2.0 mA
maximum surge current (rms)	one cycle	30 A/channel
	two cycles	20 A/channel
isolation voltage	output-to-output	1780 VAC for 1 min
	field-to-bus	1780 VAC for 1 min
logic bus current consumption		70 mA
maximum load current (rms)		2 A/channel @ 30 degrees C
		1 A/channel @ 60 degrees C
external fusing for the outputs		5 A time-lag fuses
minimum load current (rms)		1 mA
output response time output turns on at AC voltage 0 crossing	off-to-on	0.5 line cycle
	on-to-off	0.5 line cycle
fallback mode	default	predefined
	user-configurable setting[1]	hold last value
		predefined fallback value on one or both channels
fallback states (when *predefined* is the fallback mode)	default	both channels go to 0
	user-configurable settings[1]	each channel configurable for 1 or 0

description		115 VAC source (47 ... 63 Hz) output
polarity on individual outputs	default	*logic normal* on both channels
	user-configurable settings[1]	*logic reverse* on one or both channels
		logic normal on one or both channels
field power requirements		from a 115 VAC field source
power protection	-	5 A external fuse required (e.g. Wickmann 1911500000)
operating voltage range		19.2 to 30 VDC
operating temperature range		0 to 60°C
storage temperature		-40 to 85°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* ** Basic NIMs do not allow you to hot swap I/O modules.		
[1]Requires the Advantys configuration software.		

Section 3.9
STB DAO 8210 Digital 115/230 VAC Source Output Module (two-channel, 2 A)

Overview

This section provides you with a detailed description of the Advantys STB DAO 8210 digital output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

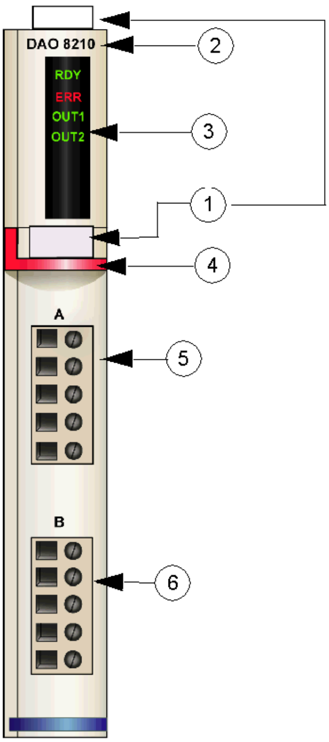
This section contains the following topics:

STB DAO 8210 Physical Description

Physical Characteristics

The STB DAO 8210 is a standard Advantys STB two-channel digital output module that writes outputs to either 115 VAC or 230 VAC actuator devices and provides power to the actuators. The module mounts in a size 2 I/O base and uses two five-terminal field wiring connectors. Actuator 1 is wired to the top connector, and actuator 2 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 red identification stripe, indicating a digital AC output module
5 actuator 1 connects to the top field wiring connector
6 actuator 2 connects to the bottom field wiring connector

Ordering Information

The module and its related parts may be ordered for stock or replacement as follows:

- a standalone STB DAO 8210 digital output module
- a standalone STB XBA 2000 *(see page 371)* size 2 base
- a bag of *screw type* connectors (STB XTS 1110) or *spring clamp* connectors (STB XTS 2110)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Module Dimensions

width	module on a base	18.4 mm (0.72 in)
height	module only	125 mm (4.92 in)
	on a base	128.25 mm (5.05 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

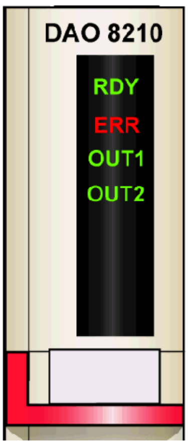
STB DAO 8210 LED Indicators

Purpose

The four LEDs on the STB DAO 8210 module are visual indications of the operating status of the module and its two digital output channels. The LED locations and their meanings are described below.

Location

The four LEDs are positioned in a column on the top front of the STB DAO 8210 digital output module. The figure below shows their location:



Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn’t matter):

<table>
<tr><th>RDY</th><th>ERR</th><th>OUT1</th><th>OUT2</th><th>Meaning</th><th>What to Do</th></tr>
<tr><td>off</td><td>off</td><td></td><td></td><td>The module is either not receiving logic power or has failed.</td><td>Check power</td></tr>
<tr><td>flicker*</td><td>off</td><td></td><td></td><td>Auto-addressing is in progress.</td><td rowspan="6"></td></tr>
<tr><td rowspan="5">on</td><td rowspan="5">off</td><td></td><td></td><td>The module has achieved all of the following:
● it has power
● it has passed its confidence tests
● it is operational</td></tr>
<tr><td>on</td><td></td><td>Voltage is present on output channel 1.</td></tr>
<tr><td>off</td><td></td><td>Voltage is absent on output channel 1.</td></tr>
<tr><td></td><td>on</td><td>Voltage is present on output channel 2.</td></tr>
<tr><td></td><td>off</td><td>Voltage is absent on output channel 2.</td></tr>
<tr><td rowspan="2">on</td><td rowspan="2">on</td><td>on</td><td>on</td><td>The watchdog has timed out.</td><td rowspan="2">Cycle power, restart the communications</td></tr>
<tr><td colspan="3">Note that the green output LEDs will be on even though the power is absent from the output channels when a watchdog time-out occurs.</td></tr>
<tr><td>blink 1**</td><td></td><td></td><td></td><td>The module is either in pre-operational mode or in its fallback state.</td><td></td></tr>
<tr><td></td><td>blink 1**</td><td></td><td></td><td>A nonfatal error has been detected.</td><td>Cycle power, restart the communications</td></tr>
<tr><td></td><td>blink 2***</td><td></td><td></td><td>The island bus is not running.</td><td>Check network connections, replace NIM</td></tr>
<tr><td>blink 3****</td><td></td><td></td><td></td><td>The output channels on this module are operational while the rest of the island modules are in their fallback states. This condition could occur if the module is used in a reflex action.</td><td></td></tr>
<tr><td colspan="6">* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.</td></tr>
<tr><td colspan="6">** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.</td></tr>
<tr><td colspan="6">*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.</td></tr>
<tr><td colspan="6">**** blink 3—the LED blinks on for 200 ms, off for 200 ms, on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.</td></tr>
</table>

STB DAO 8210 Field Wiring

Summary

The STB DAO 8210 module uses two five-terminal field wiring connectors. Actuator 1 is wired to the top connector, and actuator 2 is wired to the bottom connector. Each output should be wired with an external fuse to protect the module from possible damage. The choices of connector types and field wire types are described below, and some field wiring considerations are presented.

Connectors

Use a set of either:

- two STB XTS 1100 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2100 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have five connection terminals, with a 5.08 mm (0.2 in) pitch between each pin.

Field Actuators

The STB DAO 8210 is designed to handle high duty cycles and to control continuous-operation equipment. It supports field wiring to two-, three- or four-wire devices such as solenoids, contactors, relays, alarms or panel lamps.

When the module is operating at 30 degrees C, it supports two actuators that can draw current up to 2.0 A/channel. At 60 degrees C, it supports two actuators that can draw current up to 1.0 A/channel.

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire’s jacket for the module connection.

Local electrical codes take precedence over our recommended wire size for the protective earth (PE) connection on pin 5.

External Fusing

Two different external fuse types may be used:

- 5 A fuses for the outputs
- 0.5 A fuses for accessory power

Because of the triac used in this module, the 10 A fuse in the PDM will not provide over-current protection to the outputs. To achieve over-current protection on the outputs, you must place external fuses in-line on each output channel. Use a 5 A, 250 V 5 x 20 mm fuse such as the Wickmann 1911500000 on the wires that connect the field device to pin 2 on each connector.

The STB DAO 8210 does not provide electronic over-current protection when the actuator bus is supplying accessory power to a field device. To achieve over-current protection for accessories, you should place external fuses in-line on pin 1. If you do not use fuses, an over-current condition could damage the module and blow the 10 A fuse in the PDM. Use a 0.5 A, 250 V 5 x 20 mm time-lag fuse such as the Wickmann 1910500000.

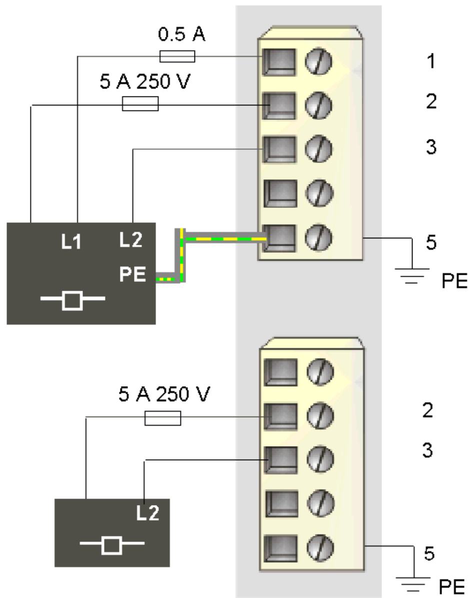
Field Wiring Pinout

The top connector supports actuator 1, and the bottom connector supports actuator 2:

Pin	Top Connector	Bottom Connector
1	actuator bus power (L1)	actuator bus power (L1)
2	output to actuator 1 (common with L1)	output to actuator 2 (common with L1)
3	field power neutral or L2	field power neutral or L2
4	field power neutral or L2	field power neutral or L2
5	protective earth	protective earth

Sample Wiring Diagram

The following field wiring example shows two actuators connected to an STB DAO 8210 output module, with user-installed external fuses on each channel connection:



1 actuator bus power (L1) to actuator 1 (top)
2 output to actuator 1 (top) and actuator 2 (bottom)
3 L2 from actuator 1 (top) and field power neutral from actuator 2 (bottom)
5 PE connection point for actuator 1 (top)

The four-wire actuator on the top connector has a PE connection that is tied to the PE connection on the PDM base through pin 5.

STB DAO 8210 Functional Description

Functional Characteristics

The STB DAO 8210 module is a two-channel module that sends digital output data to two field actuators that may be operating at either 115 or 230 VAC. Using the Advantys configuration software, you can customize the following operating parameters:

- *logic normal* or *logic reverse* output polarity for each channel on the module
- a fallback state for each channel on the module

Output Polarity

By default, the polarity on both output channels is *logic normal*, where:

- 0 indicates that the physical actuator is off (or the output signal is low)
- 1 indicates that the physical actuator is on (or the output signal is high)

The output polarity on one or both channels may optionally be configured for *logic reverse*, where:

- 1 indicates that the physical actuator is off (or the output signal is low)
- 0 indicates that the physical actuator is on (or the output signal is high)

To change an output polarity parameter from the default or back to the normal from reverse, you need to use the Advantys configuration software.

You can configure the output polarity on each output channel independently:

Step	Action	Result
1	Double click on the STB DAO 8210 module you want to configure in the island editor.	The selected STB DAO 8210 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Output Polarity** appears.
3	Expand the **+ Output Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Output Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have normal polarity and 3 means that both channels have reverse polarity.	When you select the **Output Polarity** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Output Polarity**, the values associated with the channels change. For example, if you choose an output polarity value of 2, **Channel 1** has normal polarity and **Channel 2** has reverse polarity.

Step	Action	Result
4b	To change the settings *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s).	When you accept a new value for a channel setting, the value for the module in the **Output Polarity** row changes. For example, if you set channel 1 to 0 and channel 2 to 1, the **Output Polarity** value changes to 2.

Fallback Modes

When communications are lost between the output module and the fieldbus master, the module's output channels must go to a known state where they will remain until communications are restored. This is known as the channel's *fallback state*. You may configure fallback states for each channel individually. Fallback configuration is accomplished in two steps:

- first by configuring fallback modes for each channel
- then (if necessary) configuring the fallback states

All output channels have a fallback mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its fallback mode, it can be configured with a fallback state, either 1 or 0. When a channel has *hold last value* as its fallback mode, it stays at its last known state when communication is lost— it cannot be configured with a predefined fallback state.

By default, the fallback mode for both channels is a predefined state. If you want to change the fallback mode to *hold last value*, you need to use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DAO 8210 module you want to configure in the island editor.	The selected STB DAO 8210 module opens in the software module editor.
2	Expand the **+ Fallback Mode Settings** fields by clicking on the **+** sign.	A row called **+ Fallback Mode** appears.
3	Expand the **+ Fallback Mode** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Fallback Mode** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels hold their last values and 3 means that both channels go to a predefined state.	When you select the **Fallback Mode** value, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Fallback Mode**, the values associated with the channels change. For example, if you choose a fallback mode value of 2, then **Channel 1** goes to hold last value and **Channel 2** goes to a predefined state.

Step	Action	Result
4b	To change the settings *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s).	When you accept a new value for a channel setting, the value for the module in the **Fallback Mode** row changes. For example, if you set channel 1 to 0 and channel 2 to 1, the **Fallback Mode** value changes to 2.

Fallback States

If an output channel's fallback mode is *predefined state*, you may configure that channel to either turn on or turn off when communication between the module and the fieldbus master is lost. By default, both channels are configured to go to 0 as their fallback states:

- If the output polarity of a channel is *logic normal*, 0 indicates that the predefined fallback state of the output is *off*
- If the output polarity of a channel is *logic reverse*, 0 indicates that the predefined fallback state of the output is *on*

NOTE: If an output channel has been configured with *hold last value* as its fallback mode, any value that you try to configure as a **Predefined Fallback Value** will be ignored.

To modify a fallback state from its default setting or to revert back to the default from an on setting, you need to use the Advantys configuration software:

Step	Action	Result
1	Make sure that the **Fallback Mode** value for the channel you want to configure is 1 (*predefined state*).	If the **Fallback Mode** value for the channel is 0 (*hold last value*), any value entered in the associated **Predefined Fallback Value** row will be ignored.
2	Expand the **+ Predefined Fallback Value Settings** fields by clicking on the **+** sign.	A row called **+ Predefined Fallback Value** appears.
3	Expand the **+ Predefined Fallback Value** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.
4a	To change a setting *at the module level*, select the integer that appears in the **Value** column of the **Predefined Fallback Value** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have 0 as their predefined fallback value and 3 means that both channels have 1 as their predefined fallback value.	When you select the value associated with **Predefined Fallback Value**, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new **Predefined Fallback Value**, the values associated with the channels change. For example, if you choose a fallback state value of 2, then **Channel 2** will turn on as its fallback state. **Channel 1** will either turn off or be ignored, depending on its fallback mode setting.

Step	Action	Result
4b	To change a setting *at the channel level*, double click on the channel value(s) you want to change, then select the desired setting(s) from the pull-down menu(s). You can configure a fallback state of either 0 or 1 for each channel on the module.	When you accept a new value for a channel setting, the value for the module in the **Predefined Fallback Value** row changes. For example, if you set channel 2 to 1 and leave channel 1 at 0, the **Predefined Fallback Value** value changes from 0 to 2.

STB DAO 8210 Data for the Process Image

Representing Digital Output Data

The NIM keeps a record of output data in one block of registers in the process image and a record of output status in another block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master and is used to update the output module. The information in the status block is provided by the module itself.

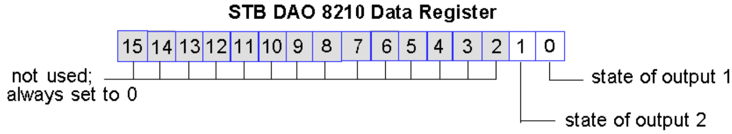
This process image information can be monitored by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port. The specific registers used by the STB DAO 8210 module are based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Output Data Register

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus has its data values represented in a register in this data block. The STB DAO 8210 uses one register in the output data block.

The STB DAO 8210's output data register displays the most current on/off states of the module's two output channels:



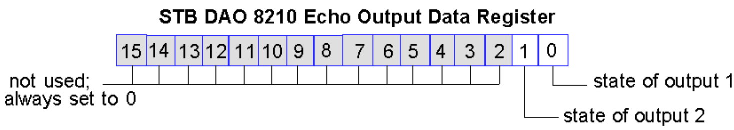
These values are written to the island bus by the fieldbus master.

Output Status Registers

The input data and I/O status process image is a reserved block of 4096 16-bit registers (in the range 45392 through 49487) that represents the status of all the I/O modules (along with the data for the input modules) on the island bus.

The STB DAO 8210 is represented by one register that echoes the output data register.

This register represents the data that has just been sent to the output field devices by the STB DAO 8210 module:



Under most normal operating conditions, the bit values in this register should be an exact replica of the bits in the output data register. A difference between the bit values in the output data register and the echo register could result from an output channel used for a reflex action, where the channel is updated directly by the output module instead of by the fieldbus master.

STB DAO 8210 Specifications

Table of Technical Specifications

description		115/230 VAC source output
number of output channels		two
module width		18.4 mm (0.72 in)
I/O base		STB XBA 2000 *(see page 371)*
hot swapping supported*		NIM-dependent**
reflex actions supported		two maximum[1]
output surge protection		metal oxide varistor and RC suppression
output voltage (rms)	working	20 ... 265 VAC
	absolute maximum	300 VAC for 10 s 400 VAC for 1 cycle
	on-state drop/channel	1.5 VAC max.
off-state leakage/channel	@ 230 VAC max.	2.5 mA
	@ 115 VAC max.	2.0 mA
maximum surge current (rms)	one cycle	30 A/channel
	two cycles	20 A/channel
logic bus current consumption		45 mA
nominal actuator bus current consumption		4.2 A, with no load
maximum load current (rms)		2 A/channel @ 30 degrees C
		1 A/channel @ 60 degrees C
external fusing for the outputs		5 A time-lag fuses
minimum load current (rms)		5 mA
Applied dV/dt		400 V/µs
output response time output turns on at AC voltage 0 crossing	off-to-on	10.0 ms
	on-to-off	10.5 ms
fallback mode	default	predefined
	user-configurable setting**	hold last value
		predefined fallback value on one or both channels
fallback states (when *predefined* is the fallback mode)	default	both channels go to 0
	user-configurable settings[1]	each channel configurable for 1 or 0

polarity on individual outputs	default	*logic normal* on both channels
	user-configurable settings[1]	*logic reverse* on one or both channels
		logic normal on one or both channels
actuator bus power for accessories		100 mA/channel @ 30 degrees C
		50 mA/channel @ 60 degrees C
over-current protection for accessory power		none
external fusing for accessories		0.5 A time-lag fuses
field power requirements		from a 115 VAC or 230 VAC PDM
power protection	with an STB PDT 2100	time-lag fuse on the PDM
storage temperature		- 40 to 85°C
operating temperature		0 to 60°C
operating voltage range		19.2 to 30 VDC
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* **Basic NIMs do not allow you to hot swap I/O modules.		
[1]Requires the Advantys configuration software.		

Chapter 4
The Advantys STB Relay Modules

Overview

This chapter describes in detail the features of the relay modules in the Advantys STB family.

What Is in This Chapter?

This chapter contains the following sections:

Section 4.1
STB DRC 3210 Relay Output Module (two-point, form C, 2 A, 24 V coil)

Overview

This section provides you with a detailed description of the Advantys STB DRC 3210 relay output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

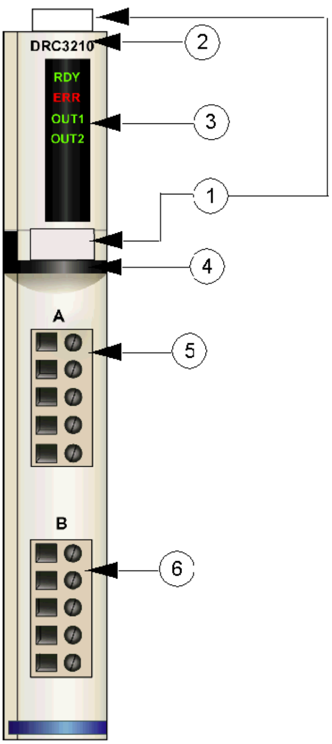
This section contains the following topics:

STB DRC 3210 Physical Description

Physical Characteristics

The STB DRC 3210 is a standard Advantys STB form C relay module that switches 24 VDC, 115 VAC or 230 VAC field devices. Its coil runs on 24 VDC from the island's actuator bus. The module provides access to both the normally open (N.O.) and normally closed (N.C.) contacts of the internal relays. It mounts in a size 2 I/O base and uses two five-terminal field wiring connectors. Field device 1 is wired to the top connector, and field device 2 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 black identification stripe, indicating a relay output module
5 field device 1 connects to the top field wiring connector)
6 field device 2 connects to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DRC 3210 K), which includes:

- one STB DRC 3210 digital relay output module
- one size 2 STB XBA 2000 *(see page 371)* I/O base
- two alternative sets of connectors:
  - two 5-terminal *screw type* connectors
  - two 5-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DRC 3210 digital relay output module
- a standalone STB XBA 2000 size 2 base
- a bag of *screw type* connectors (STB XTS 1110) or *spring clamp* connectors (STB XTS 2110)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Dimensions

width	module on a base	18.4 mm (0.72 in)
height	module only	125 mm (4.92 in)
	on a base	128.25 mm (5.05 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

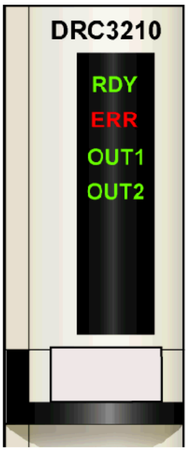
STB DRC 3210 LED Indicators

Overview

The four LEDs on the STB DRC 3210 module are visual indications of the operating status of the module and its two relay outputs. The LED locations and their meanings are described below.

Location

The four LEDs are positioned in a column on the top of the STB DRC 3210 relay output module. The figure below shows their location:



Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

RDY	ERR	OUT1	OUT2	Meaning	What to Do
off	off			The module is either not receiving power or has failed.	Check power
flicker*	off			Auto-addressing is in progress.	
on	off			The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational	
		on		Relay 1 is energized.	
		off		Voltage is absent on relay 1.	
			on	Relay 2 is energized.	
			off	Voltage is absent on relay 2.	
on	on	on	on	The watchdog has timed out.	Cycle power, restart the communications
		Note that the green output LEDs will be on even though the power is absent from the output channels when a watchdog time-out occurs.			
blink 1**				The module is either in pre-operational mode or in its fallback state.	
on or blink 1**	blink 1**			A nonfatal error has been detected—e.g., a counter overflow.	Cycle power, restart communications
	blink 2***			The island bus is not running.	Check network connections, replace NIM
blink 3****				The relays on this module are operational while the rest of the island modules are in their fallback states—i.e., it is a reflex action module.	
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.					
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.					
*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.					
**** blink 3—the LED blinks on for 200 ms, off for 200 ms, on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.					

STB DRC 3210 Field Wiring

Summary

The STB DRC 3210 module uses two five-terminal field wiring connectors. Relay output 1 is wired from the top connector, and relay output 2 is wired from the bottom connector. The choices of connector types and field wire types are described below, and some field wiring options are presented.

NOTE: For operation between 60 and 70 °C (140 and 158 °F), only 1 relay output point, rated at a maximum load of 2 amps, can be on.

Connectors

Use a set of either:

- two STB XTS 1110 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2110 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have five connection terminals, with a 5.08 mm (0.2 in) pitch between each pin.

Field Devices

The STB DRC 3210 module provides two form C relay outputs that can be independently field wired as N.O. and/or N.C. contacts The module is designed to handle high duty cycles and to control continuous-operation equipment. It can switch 24 VDC, 115 VAC, and/or 230 VAC field devices that draw up to 2 A/relay at 30 degrees C.

The relay module needs to be placed in a voltage group supported by a 24 VDC PDM.

⚠ CAUTION
COMPROMISED DOUBLE INSULATION
Above 130 VAC, the relay module may compromise the double insulation provided by a SELV-rated power supply. When you use a relay module, use separate external 24 VDC power supplies for the PDM supporting that module and the logic power to the NIM or BOS module when the contact voltage is above 130 VAC. **Failure to follow these instructions can result in injury or equipment damage.**

Field Wire Requirements

Individual connector terminals accept one field wire. Use wire sizes in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire's jacket for the module connection.

Local electrical codes take precedence over our recommended wire size for the protective earth (PE) connection on pin 5.

External Fusing

The STB DRC 3210 does not provide internal over-current protection. You must provide external fuse protection with 2.0 A time-lag fuses (such as the Wickmann 1911200000). If you do not use fuses, an over-current condition could damage the module. Place a fuse in series with each relay on the common line (pin 1).

Field Wiring Pinout

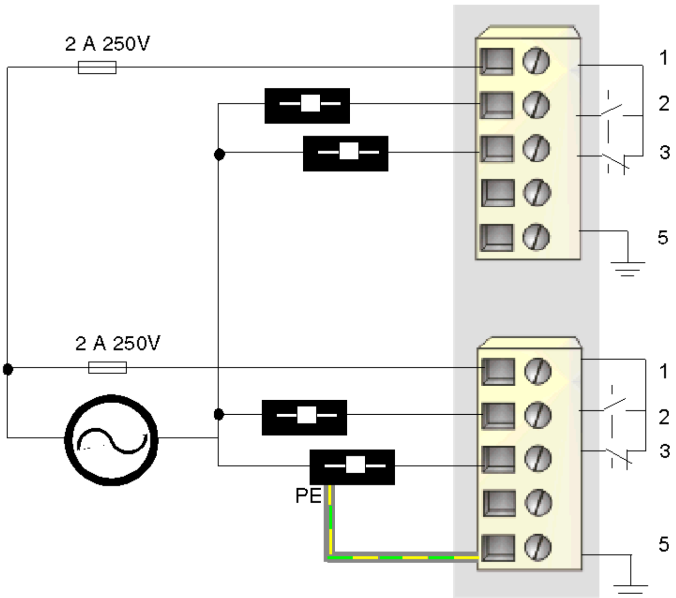
The top connector supports relay 1, and the bottom connector supports relay 2. Field actuators can be wired as normally open (N.O.) or normally closed (N.C.). Two- and three-wire actuators are supported.

The table below shows the pinouts:

Pin	Top Connector	Bottom Connector
1	relay common 1	relay common 2
2	N.O. connection for relay 1	N.O. connection for relay 2
3	N.C. connection for relay 1	N.C. connection for relay 2
4	no connection	no connection
5	PE	PE

Sample Wiring Diagrams

The following field wiring example shows a N.O. device and a N.C. device wired to each connector:



1 relay common connections
2 N.O. connections
3 N.C. connections
5 PE connection point for field device (bottom)

The N.C. load on the bottom connector has a PE connection that is tied to the PE connection on the PDM base through pin 5.

STB DRC 3210 Functional Description

Functional Characteristics

The STB DRC 3210 module provides two form C relay outputs that can be independently field wired as N.O. and/or N.C. contacts. Using the Advantys configuration software, you can customize the following operating parameters:

- *logic normal* or *logic reverse* polarity for each relay contact on the module
- a fallback state for each of the two channels

Output Polarity

By default, the polarity on both output channels is *logic normal* (0). Polarity on one or both channels may optionally be configured for *logic reverse* (1). Depending on whether the field devices are wired as N.O. or N.C., the output will behave as follows:

If the channel is field wired to be:	and the polarity is configured to be:	when the channel's value is:	the output will be:
N.O.	*logic normal* (the factory default setting	0	open
		1	closed
N.C.		0	closed
		1	open
N.O.	*logic reverse*	0	closed
		1	open
N.C.		0	open
		1	closed

Essentially, if you reverse the polarity on a N.O. contact it will behave as an N.C. contact, and if you reverse the polarity on an N.C. contact it will behave as an N.O. contact.

To change an output polarity parameter from *logic normal* (0), or back to normal from *logic reverse* (1), use the Advantys configuration software.

You can configure the output polarity on each output channel independently:

Step	Action	Result
1	Double click on the STB DRC 3210 you want to configure in the island editor.	The selected STB DRC 3210 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Output Polarity** appears.
3	Expand the **+ Output Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.

Step	Action	Result
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Output Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have normal polarity and 3 means that both channels have reverse polarity.	When you select the **Output Polarity** value, the maxi/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Output Polarity**, the values associated with the channels change. For example, if you choose an output polarity value of 2, **Channel 1** has *normal polarity* and **Channel 2** has *reverse polarity*.
4b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Output Polarity** row changes. For example, if you set channel 1 to *normal polarity* and channel 2 to *reverse polarity*, the **Output Polarity** value changes to 2.

Fallback Modes

When communications are lost between the relay module and the fieldbus master, the module's output relays must go to a known state where they will remain until communications are restored. This is known as the relay's *fallback state*. You may configure fallback states for each relay individually. Fallback configuration is accomplished in two steps:

- first by configuring fallback modes for each relay
- then (if necessary) configuring the fallback states

All relay outputs have a fallback mode—either *predefined state* (1), or *hold last value* (0). When a relay has *predefined state* as its fallback mode, it can be configured with a fallback state, either 1 or 0. When a relay has *hold last value* (0) as its fallback mode, it stays at its last known state when communication is lost— it cannot be configured with a predefined fallback state.

By default, the fallback mode for both relays is a *predefined state*. In order to change the fallback mode to *hold last value*, use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DRC 3210 module you want to configure in the island editor.	The selected STB DDO 3200 module opens in the software module editor.
2	Expand the **+ Fallback Mode Settings** fields by clicking on the **+** sign.	A row called **+ Fallback Mode** appears.
3	Expand the **+ Fallback Mode** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.

Step	Action	Result
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Fallback Mode** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both relays hold their last values and 3 means that both relays go to a predefined state.	When you select the **Fallback Mode** value, the max./min. values of the range appear at the bottom of the module editor screen. When you accept a new value for **Fallback Mode**, the values associated with the channels change. For example, if you choose a fallback mode value of 2, then **Channel 1** goes to *hold last value*, and **Channel 2** goes to its *predefined state*.
4b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Fallback Mode** row changes. For example, if you set channel 1 to *hold last value*, and channel 2 to *predefined state*, the **Fallback Mode** value changes to 2.

Fallback States

If a relay's fallback mode is *predefined state*, you may configure that channel to either turn on or turn off when communication between the module and the fieldbus master is lost. By default, both channels are configured to go to 0 as their fallback states:

- 0 indicates that the predefined fallback state of the relay is *de-energized*
- 1 indicates that the predefined fallback state of the relay is *energized*

NOTE: If a relay channel has been configured with *hold last value* as its fallback mode, any value that you try to configure as a **Predefined Fallback Value** will be ignored.

To modify a fallback state from its *predefined state*, or to revert back to the default from *hold last value*, use the Advantys configuration software:

Step	Action	Result
1	Make sure that the **Fallback Mode** value for the relay you want to configure is 1 (*predefined state*).	If the **Fallback Mode** value is 0 (*hold last value*), any value entered in the associated **Predefined Fallback Value** row will be ignored.
2	Expand the **+ Predefined Fallback Value Settings** fields by clicking on the **+** sign.	A row called **+ Predefined Fallback Value** appears.
3	Expand the **+ Predefined Fallback Value** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.

Step	Action	Result
4a	To change a setting *at the module level*, select the integer that appears in the **Value** column of the **Predefined Fallback Value** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both relays will turn off as their fallback state and 3 means that both relays will turn on as their predefined state.	When you select the value associated with **Predefined Fallback Value**, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new **Predefined Fallback Value**, the values associated with the channels change. For example, if you choose a fallback state value of 2, then **Channel 2** will turn on as its fallback state. **Channel 1** will either turn off or be ignored, depending on its fallback mode setting.
4b	To change a setting *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu. Select 0 if you want the fallback state to be *relay de-energized*; select 1 if you want the fallback state to be *relay energized*.	When you accept a new value for a channel setting, the value for the module in the **Predefined Fallback Value** row changes. For example, if you set channel 2 to 1 and leave channel 1 on 0, the **Predefined Fallback Value** value changes from 0 to 2.

STB DRC 3210 Data for the Process Image

Representing Relay Output Data

The NIM keeps a record of relay data in one block of registers in the process image and a record of relay status in another block of registers in the process image. Relay data is written to the output data block by the fieldbus master and is used to update the relay module. The information in the status block is provided by the module itself.

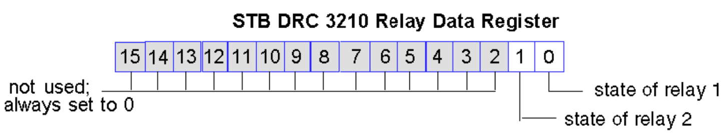
This process image information can be monitored by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port. The specific registers used by the STB DRC 3210 module are based on its physical location on the island bus.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Relay Data Register

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The STB DRC 3210 uses one register in the output data block.

The STB DRC 3210's data register represents the energized/de-energized states of the two relays:



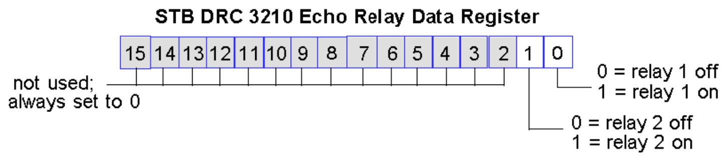
These values are written to the island bus by the fieldbus master.

Relay Status Registers

The echo output data and I/O status process image is a reserved block of 4096 16-bit registers (in the range 45392 through 49487) that represents the status of all the I/O modules (along with the data for the input modules) on the island bus.

The STB DRC 3210 is represented by one register that echoes the relay data register.

This register represents the data that has just been sent to the field devices by the relay module.



Under most normal operating conditions, the bit values in this register should be an exact replica of the bits in the relay data register. A difference between the bit values in the output data register and the echo register could result from a relay channel used for a reflex action, where the channel is updated directly by the output module instead of by the fieldbus master.

STB DRC 3210 Specification

Table of Technical Specifications

The module's technical specifications are described in the following table.

description		form C N.O./N.C. contact relay pairs
number of relay channels		two
module width		18.4 mm (0.72 in)
I/O base		STB XBA 2000 *(see page 371)*
hot swapping supported*		NIM-dependent**
reflex actions supported		two maximum[1]
relay contact life	mechanical	1,000,000 operations
	electrical	100,000 operations (resistive load @ maximum voltage and current)
output surge protection		metal oxide varistor
output voltage	working DC	5 ... 30 VDC
	working AC	20 ... 250 VAC
isolation voltage	logic bus-to-actuator bus	1500 VDC for 1 min
	point-to-point	500 VAC for 1 min
	field-to-logic bus	1780 VAC for 1 min
logic bus current consumption		55 mA
nominal actuator bus current consumption		25 mA with no load
load current	maximum	2.0 A./relay
	minimum	50 mA
output response time	off-to-on	5.25 ms
	on-to-off	6.75 ms
maximum surge current		20 A/relay capacitive load@ τ = 10 ms
off-state leakage current	for resistive loads	2 mA (internal MOV)
switching capability		600 VA resistive load
fallback mode	default	predefined
	user-configurable settings[1]	hold last value
		predefined fallback value on one or both relays
fallback states (when *predefined* is the fallback mode)	default	both relays de-energized
	user-configurable settings[1]	each relay configurable for energized or de-energized

polarity on individual relay contacts	default	*logic normal* on both relays
	user-configurable settings[1]	*logic reverse* on one or both relays
		logic normal on one or both relays
coil power requirements		from a 24 VDC PDM
coil protection		time lag fuse on the PDM
***operating temperature range[2]		0 to 60°C
storage temperature		-40to 85°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* ** Basic NIMs do not allow you to hot swap I/O modules.		
*** This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of capabilities and limitations.		
[1] Requires the Advantys configuration software.		
[2]For operation between 60 to 70°C, only 1 relay output point, rated at a maximum load of 2 Amps, may be used. The relay module resides in the DC power group. The PDT 3100 is restricted to operate from 19.2 to 24.5 V in the 60 to 70°C temperature range.		

Section 4.2
STB DRA 3290 Relay Output Module (two-point, form A/B, 7 A/contact, 24 V coil)

Overview

This section provides you with a detailed description of the Advantys STB DRA 3290 relay output module—its functions, physical design, technical specifications, field wiring requirements, and configuration options.

What Is in This Section?

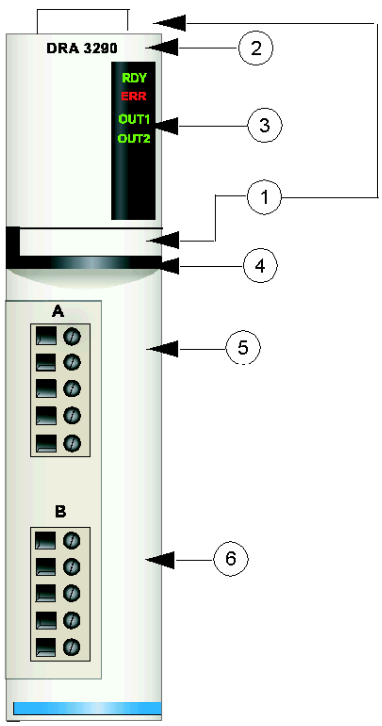
This section contains the following topics:

STB DRA 3290 Physical Description

Physical Characteristics

The STB DRA 3290 is a standard Advantys STB Form A/Form B, high current relay module that switches 24 VDC, 115 VAC, or 230 VAC field devices. Its coil runs on 24 VDC from the island's actuator bus. The module provides access to both the normally open (N.O.) and normally closed (N.C.) contacts of the internal relays. The module mounts in a size 3 I/O base and uses two five-terminal field wiring connectors. Field device 1 is wired to the top connector, and field device 2 is wired to the bottom connector.

Front Panel View



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 black identification stripe, indicating that this is a special module (the contacts can use either AC or DC power)
5 field device 1 connects to the top field wiring connector
6 field device 2 connects to the bottom field wiring connector

Ordering Information

The module can be ordered as part of a kit (STB DRA 3290 K), which includes:

- one STB DRA 3290 digital relay output module
- one size 3 STB XBA 3000 *(see page 375)* I/O base
- two alternative sets of connectors:
  - two 5-terminal *screw type* connectors
  - two 5-terminal *spring clamp* connectors

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB DRA 3290 digital relay output module
- a standalone STB XBA 3000 size 3 base
- a bag of *screw type* connectors (STB XTS 1110) or *spring clamp* connectors (STB XTS 2110)

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 keying pin kit for inserting the module into the base
- the STB XMP 7800 keying pin kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Dimensions

width	module on a base	28.1 mm (1.06 in)
height	module only	125 mm (4.92 in)
	on a base	128.25 mm (5.05 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)

STB DRA 3290 LED Indicators

Overview

Four LEDs on the STB DRA 3290 module are visual indications of the operating status of the module and its two relay outputs. The LED locations and their meanings are described below.

Location

The four LED indicators are positioned in a column on the top of the STB DRA 3290 relay output module. The figure below shows their location:

Indications

The following table defines the meaning of the four LEDs (where an empty cell indicates that the pattern on the associated LED doesn’t matter):

RDY	ERR	OUT1	OUT2	Meaning	What to Do
off	off			The module is either not receiving power or has failed.	Check power
flicker*	off			Auto-addressing is in progress.	
on	off			The module has achieved all of the following: ● it has power ● it has passed its confidence tests ● it is operational	
		on		Relay 1 is energized.	
		off		Relay 1 is not energized.	
			on	Relay 2 is energized.	
			off	Relay 2 is not energized.	

RDY	ERR	OUT1	OUT2	Meaning	What to Do
on	on	on	on	The watchdog has timed out.	Cycle power, restart the communications
		Note that the green output LEDs will be on even though the power is absent from the output channels when a watchdog time-out occurs.			
blink 1**				The module is either in pre-operational mode or in its fallback state.	
on or blink 1**	blink 1**			A nonfatal error has been detected—e.g., a counter overflow.	Cycle power, restart communications
	blink 2***			The island bus is not running.	Check network connections, replace NIM
blink 3****				The relays on this module are operational while the rest of the island modules are in their fallback states—i.e., it is a reflex action module.	
* flicker—the LED flickers when it is repeatedly on for 50 ms then off for 50 ms.					
** blink 1—the LED blinks on for 200 ms then off for 200 ms. This pattern is repeated until the causal condition changes.					
*** blink 2—the LED blinks on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.					
**** blink 3—the LED blinks on for 200 ms, off for 200 ms, on for 200 ms, off for 200 ms, on again for 200 ms then off for 1 s. This pattern is repeated until the causal condition changes.					

STB DRA 3290 Field Wiring

Summary

The STB DRA 3290 module uses two five-terminal field wiring connectors to connect the two field devices. Output 1 is wired from the top connector, and output 2 is wired from the bottom connector. The choices of connector types and field wire types are described below, and a field wiring diagram is presented.

NOTE: For operation between 60 and 70 °C (140 and 158 °F), only 1 relay output point, rated at a maximum load of 4 amps, can be on.

Connectors

Use a set of either:

- two STB XTS 1110 *screw type* field wiring connectors (available in a kit of 20)
- two STB XTS 2110 *spring clamp* field wiring connectors (available in a kit of 20)

These field wiring connectors each have five connection terminals, with a 5.08 mm (0.2 in) pitch between each pin.

The relay module needs to be placed in a voltage group supported by a 24 VDC PDM.

⚠ CAUTION

COMPROMISED DOUBLE INSULATION

Above 130 VAC, the relay module may compromise the double insulation provided by a SELV-rated power supply.

When you use a relay module, use separate external 24 VDC power supplies for the PDM supporting that module and the logic power to the NIM or BOS module when the contact voltage is above 130 VAC.

Failure to follow these instructions can result in injury or equipment damage.

Field Devices

The STB DRA 3290 module provides two form A/B relay outputs that can be independently field wired as N.O. and/or N.C. contacts The module is designed to handle high duty cycles and to control continuous-operation equipment. It can switch 24 VDC, 115 VAC, and/or 230 VAC field devices that draw up to 7.0 A/contact at 60° C (140° F).

Field Wire Requirements

Individual connector terminals accept one field wire in the range 0.5 ... 1.5 mm^2 (24 ... 16 AWG).

We recommend that you strip at least 9 mm from the wire’s jacket for the module connection.

External Fusing

The STB DRA 3290 does not provide internal over-current protection. You must provide external fuse protection with 7.0 A/ time-lag fuses (such as the Wickmann 1911700000). If you do not use fuses, an over-current condition could damage the module. Place a fuse in series with each contact used on each relay (pins 1 and 4).

Surge Protection

The STB DRA 3290 relay outputs have internal metal oxide varistors (MOVs) that enable the contacts to control:

- electrically isolated inputs with low energy levels, which require zero leakage current
- power circuits—by eliminating induced overvoltages at the source

However, when the contacts are exposed to large dv/dt we recommend that additional surge protection be used. The specifications for the MOV are listed in the module specification chart at the end of this section *(see page 316)*.

Field Wiring Pinout

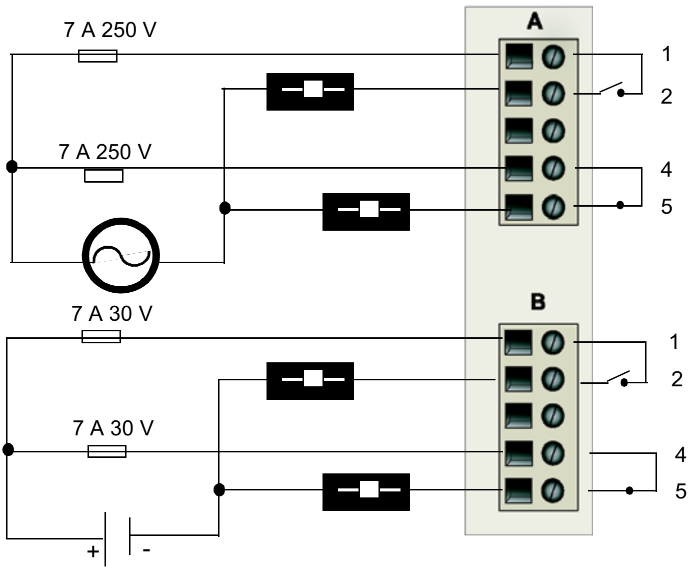
The top connector supports relay 1, and the bottom connector supports relay 2. Field actuators can be wired for normally open (N.O.) or normally closed (N.C.) operations.

The table below shows the pinouts:

Pin	Top Connector	Bottom Connector
1	N.O. connection for relay 1	N.O. connection for relay 2
2	N.O. connection for relay 1	N.O. connection for relay 2
3	no connection	no connection
4	N.C. connection for relay 1	N.C. connection for relay 2
5	N.C. connection for relay 1	N.C. connection for relay 2

Sample Wiring Diagram

The following field wiring example shows an N.O. device and an N.C. device wired to each connector. An AC power supply is used for the circuits on the top connector, and a DC power supply is used for the circuits on the bottom connector:



1 and 2 N.O. contacts
4 and 5 N.C. contacts

STB DRA 3290 Functional Description

Functional Characteristics

The STB DRA 3290 module provides two form A/B relays that can be independently field wired as either N.O. or N.C. contacts. The module is designed to handle high duty cycles and to control continuous-operation equipment. Using the Advantys configuration software, you can customize the following operating parameters:

- *logic normal* or *logic reverse* polarity for each relay contact on the module
- a fallback state for each of the two channels

Output Polarity

By default, the polarity on both output channels is *logic normal*. Polarity on one or both channels may optionally be configured for *logic reverse*. Depending on whether the field devices are wired as N.O. or N.C., the output will behave as follows:

If the channel is field wired to be:	and the polarity is configured to be:	when the channel's output value is:	the output will be:
N.O.	*logic normal* (the factory default setting	0	open
		1	closed
N.C.		0	closed
		1	open
N.O.	*logic reverse*	0	closed
		1	open
N.C.		0	open
		1	closed

Essentially, if you reverse the polarity on a N.O. contact it will behave as an N.C. contact, and if you reverse the polarity on an N.C. contact it will behave as an N.O. contact.

To change an output polarity parameter from *logic normal*, or back to normal from *logic reverse*, you need to use the Advantys configuration software.

You can configure the output polarity on each output channel independently:

Step	Action	Result
1	Double click on the STB DRA 3290 you want to configure in the island editor.	The selected STB DRA 3290 module opens in the software module editor.
2	Expand the **+ Polarity Settings** fields by clicking on the **+** sign.	A row called **+ Output Polarity** appears.
3	Expand the **+ Output Polarity** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.

Step	Action	Result
4a	To change the settings *at the module level*, select the integer that appears in the **Value** column of the **Output Polarity** row and enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both channels have normal polarity and 3 means that both channels have reverse polarity.	When you select the **Output Polarity** value, the maxi/min values of the range appear at the bottom of the module editor screen. When you accept a new value for **Output Polarity**, the values associated with the channels change. For example, if you choose an output polarity value of 2, **Channel 1** has *normal polarity* and **Channel 2** has *reverse polarity*.
4b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Output Polarity** row changes. For example, if you set channel 1 to *normal polarity*, and channel 2 to *reverse polarity*, the **Output Polarity** value changes to 2.

Fallback Modes

When communications on the island bus are stopped between the module and the NIM, the module will set both output channels to a known state where they will remain until communications are restored. This is known as the relay's *fallback state*. You may configure fallback states for each relay individually. Fallback configuration is accomplished in two steps:

- first by configuring fallback modes for each relay
- then (if necessary) configuring the fallback states

Both output channels have a fallback mode—either *predefined state* or *hold last value*. When a channel has *predefined state* (1) as its fallback mode, it can be configured with a fallback state, either 1 or 0. When a channel has *hold last value* (0) as its fallback mode, it stays at its last known state when communication is lost— it cannot be configured with a predefined fallback state.

By default, the fallback mode for both channels is a *predefined state* (1). To change the fallback mode to *hold last value* (0), use the Advantys configuration software:

Step	Action	Result
1	Double click on the STB DRA 3290 module you want to configure in the island editor.	The selected STB DRA 3290 module opens in the software module editor.
2	Expand the **+ Fallback Mode Settings** fields by clicking on the **+** sign.	A row called **+ Fallback Mode** appears.
3	Expand the **+ Fallback Mode** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.

Step	Action	Result
4a	To change the settings *at the module level*, double-click on the integer that appears in the **Value** column of the **Fallback Mode** row, then enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both relays hold their last values and 3 means that both relays go to a predefined state.	When you select the **Fallback Mode** value, the max/min values of the range appear at the bottom left and right of the module editor screen. When you accept a new value for **Fallback Mode**, the values associated with the channels change. For example, if you choose a fallback mode value of 2, then **Channel 1** goes to hold last value and **Channel 2** goes to a predefined state.
4b	To change the settings *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu.	When you accept a new value for a channel setting, the value for the module in the **Fallback Mode** row changes. For example, if you set channel 1 to *hold last value*, and channel 2 to its *predefined state*, the **Fallback Mode** value changes to 2.

Fallback States

If a channel's fallback mode is *predefined state*, you may configure that channel to either turn on or turn off when communication between the NIM and the fieldbus master is lost. By default, both channels are configured to 0 as their fallback states:

- 0 indicates that the predefined fallback state of the relay is *de-energized*
- 1 indicates that the predefined fallback state of the relay is *energized*

NOTE: If a relay channel has been configured with *hold last value* as its fallback mode, any value that you try to configure as a **Predefined Fallback Value** will be ignored.

To modify a fallback state from *hold last value*, or to revert back to the default from a *predefined state*, use the Advantys configuration software:

Step	Action	Result
1	Make sure that the **Fallback Mode** value for the relay you want to configure is 1 (*predefined state*).	If the **Fallback Mode** value is 0 (*hold last value*), any value entered in the associated **Predefined Fallback Value** row will be ignored.
2	Expand the **+ Predefined Fallback Value Settings** fields by clicking on the **+** sign.	A row called **+ Predefined Fallback Value** appears.
3	Expand the **+ Predefined Fallback Value** row further by clicking on the **+** sign.	Rows for **Channel 1** and **Channel 2** appear.

Step	Action	Result
4a	To change a setting *at the module level*, double-click on the integer that appears in the **Value** column of the **Predefined Fallback Value** row, then enter a hexadecimal or decimal integer in the range 0 to 3, where 0 means both relays will turn off as their fallback state and 3 means that both relays will turn on as their predefined state.	When you select the value associated with **Predefined Fallback Value**, the max/min values of the range appear at the bottom of the module editor screen. When you accept a new **Predefined Fallback Value**, the values associated with the channels change. For example, if you choose a fallback state value of 2, then **Channel 2** will turn on as its fallback state. **Channel 1** will either turn off or be ignored, depending on its fallback mode setting.
4b	To change a setting *at the channel level*, double click on the channel values you want to change, then select the desired settings from the pull-down menu. Select 0 if you want the fallback state to be *relay de-energized*; select 1 if you want the fallback state to be *relay energized*.	When you accept a new value for a channel setting, the value for the module in the **Predefined Fallback Value** row changes. For example, if you set channel 2 to 1, and leave channel 1 set to 0, the **Predefined Fallback Value** value changes from 0 to 2.

STB DRA 3290 Data for the Process Image

Representing Relay Output Data

The NIM keeps a record of relay data in one block of registers in the process image and a record of relay status in another block of registers in the process image. Relay data is written to the output data block by the fieldbus master and is used to update the relay module. The information in the status block is provided by the module itself.

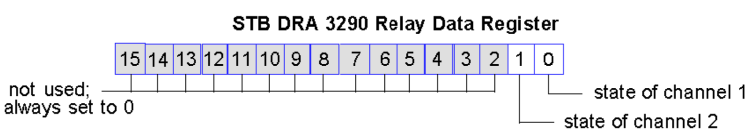
This process image information can be monitored by the fieldbus master or, if you are not using a basic NIM, by an HMI panel connected to the NIM's CFG port. The specific registers used by the STB DRA 3290 module are based on its physical location on the island bus; they can be viewed using the Advantys configuration software.

NOTE: The data format illustrated below is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Relay Data Register

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data received by the fieldbus master. Each output module on the island bus is represented in this data block. The STB DRA 3290 uses one register in the output data block.

The STB DRA 3290's data register represents the energized/de-energized states of the two channels:

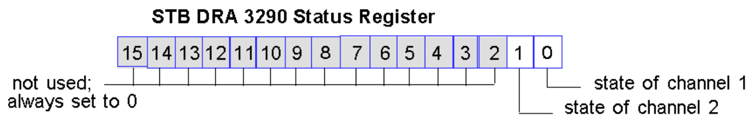


These values are written to the island bus by the fieldbus master.

Relay Status Register

The echo output data and I/O status process image is a reserved block of 4096 16-bit registers (in the range 45392 through 49487) that represents the status of all the I/O modules (along with the data for the input modules) on the island bus.

The STB DRA 3290 status register is the module's *echo relay data* register. This register represents the data that has just been sent to the field devices by the relay module:



Under most normal operating conditions, the bit values in this register should be an exact replica of the bits in the relay data register. A difference between the bit values in the output data and the echo relay data could result from a relay channel used for a reflex action, where the channel is updated directly by the output module instead of by the fieldbus master.

STB DRA 3290 Specifications

Table of Technical Specifications

description		form A/B N.O./N.C. contact high current relay
number of channels		two
module width		28.1 mm (1.06 in)
I/O base		STB XBA 3000 *(see page 375)*
hot swapping supported*		NIM-dependent**
reflex actions supported		two maximum[1]
protection		IP20
protection class		class 1
relay contact life	mechanical	1,000,000 operations
	electrical	100,000 operations @ 60 degrees C ambient, 7 A, 0.5 Hz resistive load (or with external protection for inductive loads)
output surge protection		two MOVs, one/relay
MOV characteristics	Vrms	300 V
	VDC	375 V
	Imax (8/20 µs)	400 A
	Wmax (2 ms)	9.6 J
	Pmax	0.1 W
output voltage	working DC	5 ... 30 VDC
	working AC	20 ... 250 VAC
isolation voltage	logic bus-to-actuator bus	1500 VDC for 1 min
	point-to-point	500 VAC for 1 min
	field-to-logic bus	1780 VAC for 1 min
actuator voltage	@ ambient temperature	19.2 ... 30 VDC
	@ maximum temperature	22 ... 30 VDC
logic bus current consumption		55 mA
nominal actuator bus current consumption		25 mA with no load
maximum load current		7.0 A/contact
minimum load current		50 mA
output response time	off-to-on	20 ms maximum
	on-to-off	20 ms maximum

switching frequency		30 operations/min (0.5 Hz)
maximum surge current		70 A for 10 ms for a capacitive load
off-state leakage current	for resistive loads	2 mA (internal MOV)
external user-supplied surge protection (recommended for inductive loads)	with an AC power supply	RC circuit or MOV (ZNO) peak limiter
	with a DC power supply	discharge diode
switching capability		2100 VA resistive load
fallback mode	default	predefined
	user-configurable setting[1]	hold last value
		predefined fallback value on one or both relays
fallback states (when *predefined* is the fallback mode)	default	both channels de-energized
	user-configurable settings[1]	each channel configurable for energized or de-energized
polarity on individual relay contacts	default	*logic normal* on both relays
	user-configurable settings[1]	*logic reverse* on one or both relays
		logic normal on one or both relays
coil power requirements		from a 24 VDC PDM
coil protection		time-lag fuse on the PDM
***operating temperature range[2]		0 to 60°C
storage temperature		-40 to 85°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*

*ATEX applications prohibit hot swapping-refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
** Basic NIMs do not allow you to hot swap I/O modules.

*** This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of cabalities and limitations.

[1] Requires the Advantys configuration software.

[2]For operation between 60 to 70°C, only 1 relay output point, rated at a maximum load of 4 Amps, may be used. The relay module resides in the DC power group. The PDT 3100 is restricted to operate from 19.2 to 24.5 V in the 60 to 70°C temperature range.

Chapter 5
Advantys Power Distribution Modules

Overview

The island bus uses special-purpose PDMs to distribute field power to the I/O modules in its segment(s). There are two classes of PDMs, those that distribute:

- 24 VDC power to digital and analog I/O that operate with DC-powered field devices
- 115 or 230 VAC to digital I/O modules that operate with AC-power field devices

All PDMs distribute sensor and actuator power, provide PE resistance for the I/O modules they support and provide over-current protection. Within each class are standard and basic PDM models.

What Is in This Chapter?

This chapter contains the following sections:

Section 5.1
STB PDT 2100 Standard 115/230 VAC Power Distribution Module

Overview

This section provides you with a detailed description of the STB PDT 2100 PDM—its functions, physical design, technical specifications, and power wiring requirements.

What Is in This Section?

This section contains the following topics:

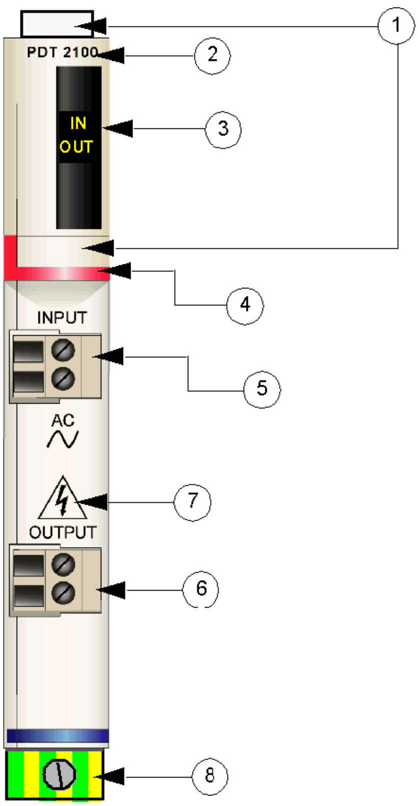
STB PDT 2100 Physical Description

Physical Characteristics

The STB PDT 2100 is a standard module that distributes field power independently over the island's sensor bus to the input modules and over the island's actuator bus to the output modules. This PDM mounts in a special size 2 base. It requires two AC power inputs from external power source. Source power signals (either 115 VAC or 230 VAC) are brought into the PDM via a pair of two-pin power connectors, one for sensor power and one for actuator power. The module also houses two user-replaceable fuses that independently protect the island's sensor power bus and actuator power bus.

NOTE: If there is a mix of 115 VAC and 230 VAC modules in a segment, each voltage group needs to be supported by a separate STB PDT 2100 PDM.

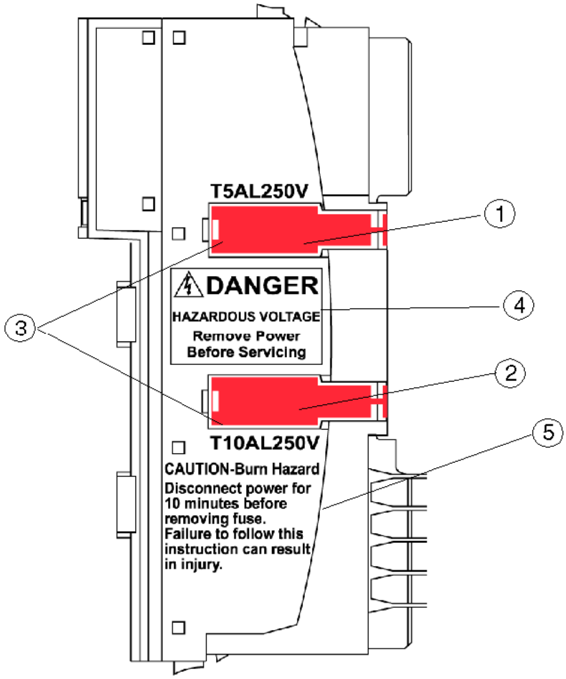
Front and Side Panel Views



1 locations for the STB XMP 6700 user-customizable labels
2 model name

3 LED array
4 red identification stripe, indicating an AC PDM
5 input field power connection receptacle (for the sensor bus)
6 output field power connection receptacle (for the actuator bus)
7 electric shock hazard symbol
8 PE captive screw clamp on the PDM base

The fuses for the sensor power and actuator power are housed in slots on the right side of the module:



1 housing door for the 5 A sensor power fuse
2 housing door for the 10 A actuator power fuse
3 notches in the two doors
4 electric shock hazard statement
5 burn hazard statement

The two red plastic doors house a pair of fuses:

- a 5 A fuse protects the input modules on the island's sensor bus
- a 10 A protects the output modules on the island's actuator bus

If a fuse is blown, it can be replaced with a fuse from the STB XMP 5600 fuse kit.

⚠ DANGER

HAZARDOUS VOLTAGE

Remove power before servicing.

Failure to follow these instructions will result in death or serious injury.

The marking on the side of the module describes a simple precaution you need to take before replacing a fuse *(see page 351)* to prevent burns:

⚠ CAUTION

BURN HAZARD - HOT FUSE

Disconnect power for 10 minutes before removing fuse.

Failure to follow these instructions can result in injury or equipment damage.

Ordering Information

The module can be ordered as part of a kit (STB PDT 2100 K), which includes:

- one STB PDT 2100 power distribution module
- one STB XBA 2200 *(see page 379)* PDM base
- two alternative sets of connectors:
  - two 2-terminal *screw type* connectors, keying pins included
  - two 2-terminal *spring clamp* connectors, keying pins included
- a 5 A, 250 V time-lag, low-breaking-capacity (glass) fuse to protect the input modules on the island's sensor bus
- a 10 A, 250 V time-lag, glass fuse to protect the output modules on the island's actuator bus

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB PDT 2100 power distribution module
- a standalone STB XBA 2200 *(see page 367)* PDM base
- a bag of screw type connectors (STB XTS 1130) or spring clamp connectors (STB XTS 2130)
- the STB XMP 5600 fuse kit, which contains five 5 A replacement fuses and five 10 A replacement fuses

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 kit for inserting the module into the base (to make sure that a DC PDM *(see page 320)* is not inadvertently placed on the island where an STB PDT 2100 PDM belongs)
- the STB XMP 7800 kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Dimensions

width	module on a base	18.4 mm (0.72 in
height	module only	125 mm (4.92 in)
	on a base*	138 mm (5.43 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)
* PDMs are the tallest modules in an Advantys STB island segment. The 138 mm height dimension includes the added height imposed by the PE captive screw clamp on the bottom of the STB XBA 2200 base.		

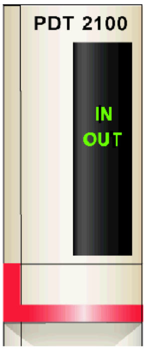
STB PDT 2100 LED Indicators

Overview

The two LEDs on the STB PDT 2100 are visual indications of the presence of sensor power and actuator power. The LED locations and their meanings are described below.

Location

Two yellow LEDs are located on the top front bezel of the module, directly below the model number:



Indications

The following table defines the meaning of the two LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

IN	OUT	Meaning
on		turns on at 70 VAC, indicating power for the sensor bus
off		The module either: ● receiving less than 50 VAC ● has a blown fuse ● has failed
	on	turns on at 70 VAC, indicating power for the actuator bus
	off	The module either: ● receiving less than 50 VAC ● has a blown fuse ● has failed

NOTE: The power required to illuminate these LEDs comes from the AC power supplies that provide the sensor bus and actuator bus power. These LED indicators operate regardless of whether or not the NIM is transmitting logic power.

STB PDT 2100 Source Power Wiring

Summary

The STB PDT 2100 uses two two-pin power entry connectors that let you connect the PDM to one or two AC field power source(s). Field power may be either 115 or 230 VAC. Source power for the sensor bus is connected to the top connector, and source power for the actuator bus is connected to the bottom connector. The choices of connector types and wire types are described below, and a power wiring example is presented.

Connectors

Use a set of either:

- Two STB XTS 1130 *screw type* field wiring connectors
- Two STB XTS 2130 *spring clamp* field wiring connectors

Both connector types are provided in kits of 10 connectors/kit.

These power wiring connectors each have two connection terminals, with a 5.08 mm (0.2 in) pitch between pins.

Power Wire Requirements

Individual connector terminals can accept one power wire in the range 1.29 ... 2.03 mm^2 (16 ... 12 AWG). When 1.29 mm^2 (16 AWG) power wire is used, two wires can be connected to a terminal.

We recommend that you strip at least 10 mm from the wire jackets to make the connections.

Safety Keying

NOTE: The same screw type and spring clamp connectors are used to deliver power to the STB PDT 3100 PDM and to the STB PDT 2100 PDM. To avoid accidentally connecting VAC power to a VDC module or vice versa, Schneider offers a kit of optional safety keying pins.

Refer the *Advantys STB System Planning and Installation Guide* (890 USE 171) for a detailed discussion of keying strategies.

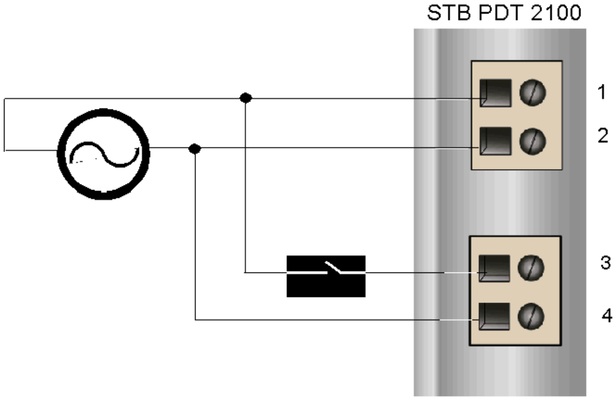
Power Wiring Pinout

The top connector receives AC source power for the sensor bus, and the bottom connector receives AC source power for the actuator bus.

Pin	Top Connector	Bottom Connector
1	+115/230 VAC for the sensor bus	+115/230 VAC for the actuator bus
2	-115/230 VAC sensor power return	-115/230 VAC actuator power return

Sample Wiring Diagram

This example shows the field power connections to both the sensor bus and the actuator bus coming from an AC power source:



1 +AC sensor bus power
2 -AC sensor power return
3 +AC actuator bus power
4 -AC actuator power return

The diagram above shows a protection relay, which you may optionally place on the +AC power wire to the actuator bus connector. A protection relay enables you to disable the output devices receiving power from the actuator bus while you test the input devices that receive power from the sensor bus. For a detailed discussion and some recommendations, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

STB PDT 2100 Field Power Over-current Protection

Fuse Requirements

Input modules on the sensor bus and output modules on the actuator bus are protected by fuses in the STB PDT 2100 PDM. The sensor bus is protected by a 5 A fuse and the actuator bus is protected by a 10 A fuse. These fuses are accessible and replaceable via two side panels on the PDM.

Recommended Fuses

- Overcurrent protection for the input modules on the sensor bus needs to be provided by a 5 A lag-time fuse such as the Wickmann 1951500000.
- Overcurrent protection for the output modules on the actuator bus needs to be provided by a 10 A lag-time fuse such as the Wickmann 1952100000.

Performance Considerations

When the island is operating at an ambient temperature of 30 degrees C (86 degrees F), the fuses can pass 10 A continuously on the actuator bus and 5 A continuously on the sensor bus.

When the island is operating at an ambient temperature of 60 degrees C (140 degrees F), the fuses can pass 5 A continuously on the actuator bus and 2.5 A continuously on the sensor bus.

Accessing the Fuse Panels

⚠ DANGER

HAZARDOUS VOLTAGE

Remove power before servicing.

Failure to follow these instructions will result in death or serious injury.

The two panels that house the actuator bus protection fuse and the sensor bus protection fuse are located on the right side of the PDM housing *(see page 321)*. The panels are red doors with fuse holders inside them. The 5 A sensor power fuse is in the top door. The 10 A actuator power fuse is in the bottom door.

Replacing a Fuse

Before you replace a fuse in the STB PDT 2100, you need to remove the power sources to the actuator bus and sensor bus.

⚠ CAUTION

BURN HAZARD - HOT FUSE

Disconnect power for 10 minutes before removing fuse.

Failure to follow these instructions can result in injury or equipment damage.

Step	Action	Notes
1	After you have removed the power connectors from the module and let the unit cool down for 10 minutes, pull the PDM from its base. Push the release buttons at the top and bottom of the PDM and pull it from the base.	
2	Insert a small flathead screwdriver in the slot on the left side of the fuse panel door and use it to pop the door open.	The slot is molded to protect the tip of the screwdriver from accidentally touching the fuse.
3	Remove the old fuse from the fuse holder inside the panel door, and replace it with another fuse or with a fuse bypass plug.	If you are replacing one fuse with another, make sure that the new fuse is the same type as the old one.
4	Optionally, you may repeat steps 3 and 4 to replace the fuse in the other panel.	
5	Snap the panel door(s) shut and plug the PDM back into its base. Then plug the connectors back into the receptacles, close the cabinet and reapply field power.	

Protective Earth Connection

PE Contact for the Island Bus

One of the key functions of a PDM, in addition to distributing sensor and actuator power to the I/O modules, is the provision of PE to the island. On the bottom of each STB XBA 2200 PDM base is a captive screw in a plastic block. By tightening this captive screw, you can make a PE contact with the DIN rail. Every PDM base on the island bus should make PE contact.

How PE Contact Is Made

PE is brought to the island by a heavy-duty cross-sectional wire, usually a copper braided cable, 4.2 mm^2 (10 gage) or larger. The wire needs to be tied to a single grounding point. The ground conductor connects to the bottom of the each PDM base and is secured by the PE captive screw.

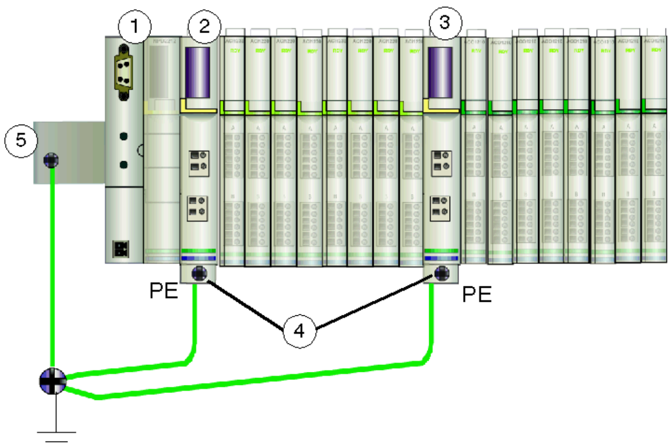
Local electrical codes take precedence over our PE wiring recommendations.

Handling Multiple PE Connections

It is possible that more than one PDM will be used on an island. Each PDM base on the island will receive a ground conductor and distribute PE as described above.

NOTE: Tie the PE lines from more than one PDM to a single PE ground point in a star configuration. This will minimize ground loops and excessive current from being created in PE lines.

This illustration shows separate PE connections tied to a single PE ground:



1 the NIM
2 a PDM
3 another PDM
4 captive screws for the PE connections
5 FE connection on the DIN rail

STB PDT 2100 Specifications

Table of Technical Specifications

The STB PDT 2100 module's technical specifications are described in the following table.

<table>
<tr><td colspan="2">description</td><td>115 or 230 VAC power distribution module</td></tr>
<tr><td colspan="2">module width</td><td>18.4 mm (0.72 in)</td></tr>
<tr><td colspan="2">module height in its base</td><td>137.9 mm (5.43 in)</td></tr>
<tr><td colspan="2">PDM base</td><td>STB XBA 2200</td></tr>
<tr><td colspan="2">hot swapping supported</td><td>no</td></tr>
<tr><td colspan="2">nominal logic power current consumption</td><td>0 mA</td></tr>
<tr><td colspan="2" rowspan="2">sensor/actuator bus voltage range</td><td>85 ... 264 VAC</td></tr>
<tr><td>AC sources should be the same phase reference</td></tr>
<tr><td colspan="2">reverse polarity protection</td><td>yes, on the actuator bus</td></tr>
<tr><td rowspan="4">module current field</td><td rowspan="2">for outputs</td><td>10 A rms max @ 30° C (86° F)</td></tr>
<tr><td>5 A rms max @ 60° C (140° F)</td></tr>
<tr><td rowspan="2">for inputs</td><td>5 A rms max @ 30° C (86° F)</td></tr>
<tr><td>2.5 A rms max @ 60° C (140° F)</td></tr>
<tr><td rowspan="2">overcurrent protection</td><td>for inputs</td><td>user-replaceable 5 A time-lag fuse from an STB XMP 5600 fuse kit</td></tr>
<tr><td>for outputs</td><td>user-replaceable 10 A time-lag fuse from an STB XMP 5600 fuse kit</td></tr>
<tr><td colspan="2">PE current</td><td>30 A for 2 min</td></tr>
<tr><td colspan="2">voltage surge protection</td><td>yes</td></tr>
<tr><td rowspan="2">status reporting</td><td rowspan="2">to the two yellow LEDs</td><td>sensor bus power present</td></tr>
<tr><td>actuator bus power present</td></tr>
<tr><td rowspan="2">voltage-detect threshold</td><td>LED turns on</td><td>70 VAC (+/- 5 VAC)</td></tr>
<tr><td>LED turns off</td><td>50 VAC (+/- 5 VAC)</td></tr>
<tr><td colspan="2">storage temperature</td><td>-40 to 85°C</td></tr>
<tr><td colspan="2">operating temperature</td><td>0 to 60°C</td></tr>
<tr><td colspan="2">agency certifications</td><td>refer to the Advantys STB System Planning and Installation Guide, 890 USE 171 00</td></tr>
</table>

Section 5.2
STB PDT 2105 Basic 115/230 VAC Power Distribution Module

Overview

This section provides you with a detailed description of the STB PDT 2105 PDM—its functions, physical design, technical specifications, and power wiring requirements.

What Is in This Section?

This section contains the following topics:

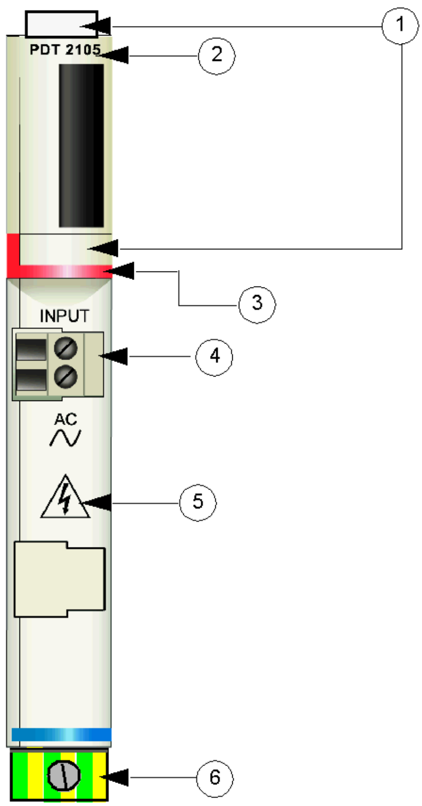
STB PDT 2105 Physical Description

Physical Characteristics

The STB PDT 2105 is a basic module that distributes sensor power to the input modules and actuator power to the output modules over a single power bus. This PDM mounts in a special size 2 base. It requires an AC power input from external 115 VAC or 230 VAC source, which is brought into the PDM via a two-pin power connector. The module also houses a user-replaceable fuse that protects the island's I/O power bus.

NOTE: If there is a mix of 115 VAC and 230 VAC modules in a segment, each voltage group needs to be supported by a separate AC power distribution module (either an STB PDT 2100 or another STB PDT 2105).

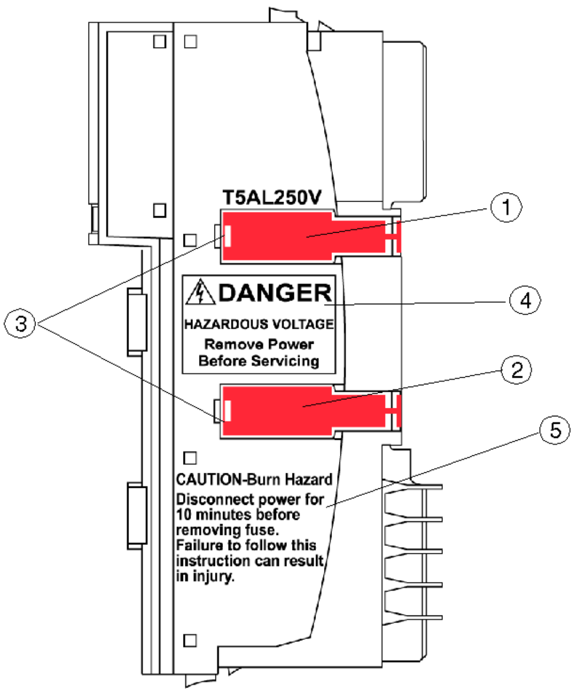
Front and Side Panel Views



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 red identification stripe, indicating an AC PDM

4 I/O field power connection
5 electric shock hazard symbol
6 PE captive screw clamp on the PDM base

The fuse for sensor and actuator power is housed in a slot on the right side of the module:



1 housing door for the 5 A fuse
2 this slot is not used
3 notches in the two doors
4 electric shock hazard statement
5 burn hazard statement

The 5 A fuse protects both the input and output modules. If the fuse blows, it can be replaced with a fuse from the STB XMP 5600 fuse kit.

⚠ DANGER

HAZARDOUS VOLTAGE

Remove power before servicing.

Failure to follow these instructions will result in death or serious injury.

The marking on the side of the module describes a simple precaution you need to take before replacing a fuse *(see page 351)* to prevent burns:

⚠ CAUTION
BURN HAZARD - HOT FUSE
Disconnect power for 10 minutes before removing fuse.
Failure to follow these instructions can result in injury or equipment damage.

Ordering Information

The module can be ordered as part of a kit (STB PDT 2105 K), which includes:

- one STB PDT 2105 power distribution module
- one STB XBA 2200 *(see page 379)* PDM base
- two alternative sets of connectors:
  - one 2-terminal *screw type* connector, keying pins included
  - one 2-terminal *spring clamp* connector, keying pins included
- a 5 A, 250 V time-lag, low-breaking-capacity (glass) fuse to protect the input modules on the island’s sensor bus
- a 10 A, 250 V time-lag, glass fuse to protect the output modules on the island’s actuator bus

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB PDT 2105 power distribution module
- a standalone STB XBA 2200 *(see page 367)* PDM base
- a bag of screw type connectors (STB XTS 1130) or spring clamp connectors (STB XTS 2130)
- the STB XMP 5600 fuse kit, which contains five 5 A replacement fuses and five 10 A replacement fuses

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 kit for inserting the module into the base (to make sure that an AC PDM *(see page 320)* is not inadvertently placed on the island where an STB PDT 2105 PDM belongs)
- the STB XMP 7800 kit for inserting the field wiring connectors into the module

Additional optional accessories include:

- STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 kit for inserting the module into the base (to make sure that a DC PDM is not inadvertently placed on the island where an STB PDT 2105 PDM belongs)
- the STB XMP 5600 fuse kit, which contains five 5 A replacement fuses and five 10 A replacement fuses

NOTE: Do not use the 10 A fuses in the STB PDT 3105 module.

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Dimensions

width	module on a base	18.4 mm (0.72 in
height	module only	125 mm (4.92 in)
	on a base*	138 mm (5.43 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)
* PDMs are the tallest modules in an Advantys STB island segment. The 138 mm height dimension includes the added height imposed by the PE captive screw clamp on the bottom of the STB XBA 2200 base.		

STB PDT 2105 Source Power Wiring

Summary

The STB PDT 2105 uses a two-pin power entry connector that let you connect the PDM to an AC field power source. Field power may be either 115 or 230 VAC. The choices of connector types and wire types are described below, and a power wiring example is presented.

Connectors

Use either:

- an STB XTS 1130 *screw type* field wiring connector
- an STB XTS 2130 *spring clamp* field wiring connector

Both connector types are provided in kits of 10 connectors/kit.

These power wiring connectors each have two connection terminals, with a 5.08 mm (0.2 in) pitch between pins.

Power Wire Requirements

Individual connector terminals can accept one power wire in the range 1.29 ... 2.03 mm^2 (16 ... 12 AWG). When 1.29 mm^2 (16 AWG) power wire is used, two wires can be connected to a terminal.

We recommend that you strip at least 10 mm from the wire jackets to make the connections.

Safety Keying

NOTE: The same screw type and spring clamp connectors are used to deliver power to a 24 VDC PDM (an STB PDT 3100 or anSTB_PDT 3105) and to the STB PDT 2105 PDM. To avoid accidentally connecting AC power to a DC module or vice versa, Schneider offers a kit of optional safety keying pins.

Refer the *Advantys STB System Planning and Installation Guide* (890 USE 171) for a detailed discussion of keying strategies.

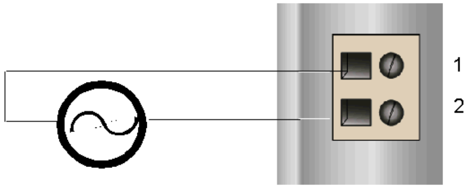
Power Wiring Pinout

The connector receives AC source power for the sensor bus, and the bottom connector receives AC source power for the actuator bus.

Pin	Connection
1	+115/230 VAC field power
2	-115/230 VAC return

Sample Wiring Diagram

This example shows the field power connection coming from an AC power source:



1 +AC sensor bus power
2 -AC sensor power return

For a detailed discussion and some recommendations, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

STB PDT 2105 Protective Earth Connection

PE Contact for the Island Bus

One of the key functions of a PDM, in addition to distributing sensor and actuator power to the I/O modules, is the provision of PE to the island. On the bottom of each STB XBA 2200 PDM base is a captive screw in a plastic block. By tightening this captive screw, you can make a PE contact with the DIN rail. Every PDM base on the island bus should make PE contact.

How PE Contact Is Made

PE is brought to the island by a heavy-duty cross-sectional wire, usually a copper braided cable, 4.2 mm^2 (10 gauge) or larger. The wire needs to be tied to a single grounding point. The ground conductor connects to the bottom of the each PDM base and is secured by the PE captive screw.

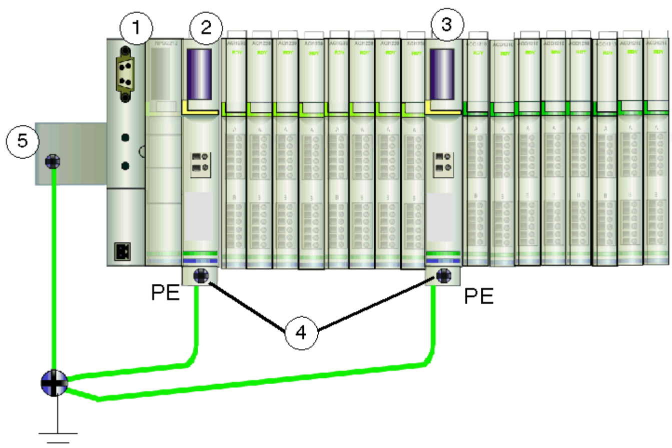
Local electrical codes take precedence over our PE wiring recommendations.

Handling Multiple PE Connections

It is possible that more than one PDM will be used on an island. Each PDM base on the island will receive a ground conductor and distribute PE as described above.

NOTE: Tie the PE lines from more than one PDM to a single PE ground point in a star configuration. This will minimize ground loops and excessive current from being created in PE lines.

This illustration shows separate PE connections tied to a single PE ground:



1 the NIM
2 a PDM
3 another PDM
4 captive screws for the PE connections
5 FE connection on the DIN rail

STB PDT 2105 Specifications

Table of Technical Specifications

description	115 or 230 VAC power distribution module
module width	18.4 mm (0.72 in)
module height in its base	137.9 mm (5.43 in)
PDM base	STB XBA 2200
hot swapping supported	no
nominal logic power current consumption	0 mA
I/O power bus voltage range	85 ... 265 VAC
	AC sources should be the same phase reference
reverse polarity protection	yes
module current field	4 A max
overcurrent protection for sensor and actuator power	user-replaceable 5 A time-lag fuse
	one fuse ships with the PDM; replacements are available in an STB XMP 5600 fuse kit
PE current	30 A for 2 min
voltage surge protection	yes
storage temperature	-40 to 85°C
operating temperature	0 to 60°C
agency certifications	refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*

Section 5.3
STB PDT 3100 24 VDC Power Distribution Module

Overview

This section provides you with a detailed description of the STB PDT 3100 PDM—its functions, physical design, technical specifications, and power wiring requirements.

What Is in This Section?

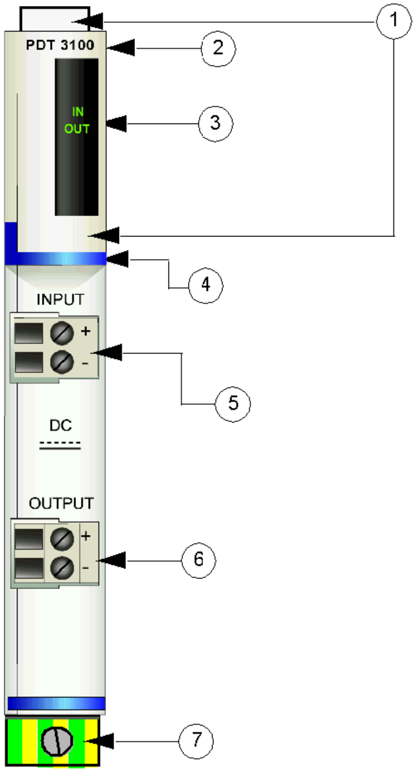
This section contains the following topics:

STB PDT 3100 Physical Description

Physical Characteristics

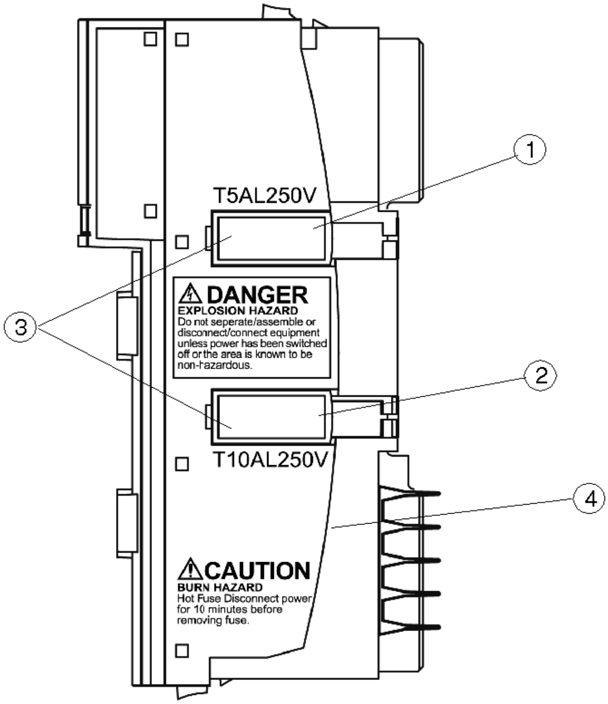
The STB PDT 3100 is a standard module that distributes field power independently over the island's sensor bus to the input modules and over the island's actuator bus to the output modules. This PDM requires two DC power inputs from an external power source. 24 VDC source power signals are brought into the PDM via a pair of two-pin power connectors, one for sensor power and one for actuator power. The module also houses two user-replaceable fuses that independently help protect the island's sensor power bus and actuator power bus.

Front and Side Panel Views



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 LED array
4 dark blue identification stripe, indicating a DC PDM
5 input field power connection receptacle (for the sensor bus)
6 output field power connection receptacle (for the actuator bus)
7 PE captive screw clamp on the PDM base

The fuses for the sensor power and actuator power are housed in slots on the right side of the module:



1 housing door for the 5 A sensor power fuse
2 housing door for the 10 A actuator power fuse
3 notches in the two doors
4 burn hazard statement

⚠ WARNING

EXPLOSION HAZARD

- Ensure all power supplies are switched off, locked out and tagged out before separating/assembling, connecting/disconnecting equipment.
- Ensure the surrounding area is non hazardous before separating/assembling, connecting/disconnecting equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

BURN HAZARD - HOT FUSE

Disconnect power for 10 minutes before removing fuse.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The two red plastic doors house a pair of fuses:

- a 5 A fuse helps protect the input modules on the island's sensor bus
- a 10 A helps protect the output modules on the island's actuator bus

Follow the instructions on the side of the module when replacing a fuse *(see page 351)*.

Ordering Information

The module can be ordered as part of a kit (STB PDT 3100 K), which includes:

- one STB PDT 3100 power distribution module
- one STB XBA 2200 *(see page 379)* PDM base
- two alternative sets of connectors:
  - two 2-terminal *screw type* connectors, keying pins included
  - two 2-terminal *spring clamp* connectors, keying pins included
- a 5 A, 250 V time-lag, low-breaking-capacity (glass) fuse to help protect the input modules on the island's sensor bus
- a 10 A, 250 V time-lag, glass fuse to help protect the output modules on the island's actuator bus

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB PDT 3100 power distribution module
- a standalone STB XBA 2200 PDM base
- a bag of screw type connectors (STB XTS 1130) or spring clamp connectors (STB XTS 2130)
- the STB XMP 5600 fuse kit, which contains five 5 A replacement fuses and five 10 A replacement fuses

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 kit for inserting the module into the base (to check that an AC PDM is not inadvertently placed on the island where an STB PDT 3100 PDM belongs)
- the STB XMP 7800 kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Dimensions

width	module on a base	18.4 mm (0.72 in
height	module only	125 mm (4.92 in)
	on a base*	138 mm (5.43 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)
* PDMs are the tallest modules in an Advantys STB island segment. The 138 mm height dimension includes the added height imposed by the PE captive screw clamp on the bottom of the STB XBA 2200 base.		

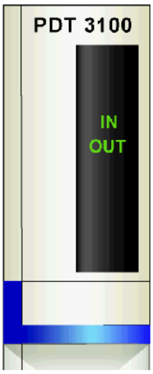
STB PDT 3100 LED Indicators

Overview

The two LEDs on the STB PDT 3100 are visual indications of the presence of sensor power and actuator power. The LED locations and their meanings are described below.

Location

The two LEDs are located on the top front bezel of the module, directly below the model number:



Indications

The following table defines the meaning of the two LEDs (where an empty cell indicates that the pattern on the associated LED doesn't matter):

IN	OUT	Meaning
on		sensor (input) field power is present
off		The module either: ● is not receiving sensor field power ● has a blown fuse ● has stopped functioning
	on	actuator (output) field power is present
	off	The module either: ● is not receiving sensor field power ● has a blown fuse ● has stopped functioning

NOTE: The power required to illuminate these LEDs comes from the 24 VDC power supplies that provide the sensor bus and actuator bus power. These LED indicators operate regardless of whether or not the NIM is transmitting logic power.

STB PDT 3100 Source Power Wiring

Summary

The STB PDT 3100 uses two two-pin source power connectors that let you connect the PDM to one or two 24 VDC field power source(s). Source power for the sensor bus is connected to the top connector, and source power for the actuator bus is connected to the bottom connector. The choices of connector types and wire types are described below, and a power wiring example is presented.

Connectors

Use a set of either:

- Two STB XTS 1130 *screw type* field wiring connectors
- Two STB XTS 2130 *spring clamp* field wiring connectors

Both connector types are provided in kits of 10 connectors/kit.

These power wiring connectors each have two connection terminals, with a 5.08 mm (0.2 in) pitch between pins.

Power Wire Requirements

Individual connector terminals can accept one power wire in the range 1.29 ... 2.03 mm^2 (16 ... 12 AWG). When 1.29 mm^2 (16 AWG) power wire is used, two wires can be connected to a terminal.

We recommend that you strip at least 10 mm from the wire jackets to make the connections.

Safety Keying

NOTE: The same screw type and spring clamp connectors are used to deliver power to the STB PDT 3100 PDM and to the STB PDT 2100 PDM. To help avoid connecting VAC power to a VDC module or vice versa, Schneider offers an optional STB XMP 7810 safety keying pin kit for the PDMs.
Refer the *Advantys STB System Planning and Installation Guide* (890 USE 171) for a detailed discussion of keying strategies.

Power Wiring Pinout

The top connector receives 24 VDC source power for the sensor bus, and the bottom connector receives 24 VDC source power for the actuator bus.

Pin	Top Connector	Bottom Connector
1	+24 VDC for the sensor bus	+24 VDC for the sensor bus
2	-24 VDC sensor power return	-24 VDC actuator power return

Source Power

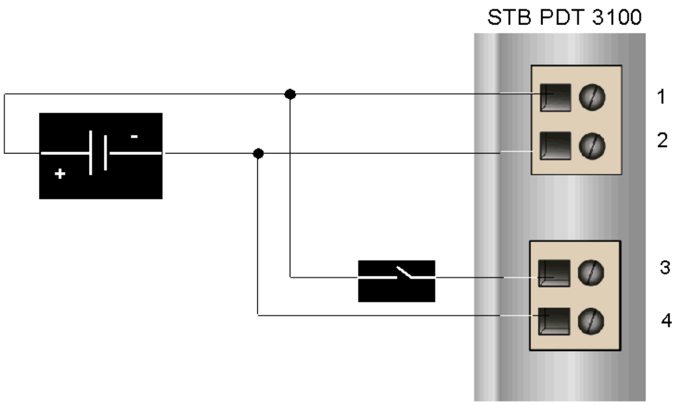
The STB PDT 3100 PDM requires source power from at least one independent, SELV-rated 19.2 ... 30 VDC power supply.

Sensor power and actuator power are isolated from one another on the island. You may provide source power to these two buses via a single power supply or by two separate power supplies.

Refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171) for a detailed discussion of external power supply selection considerations.

Sample Wiring Diagrams

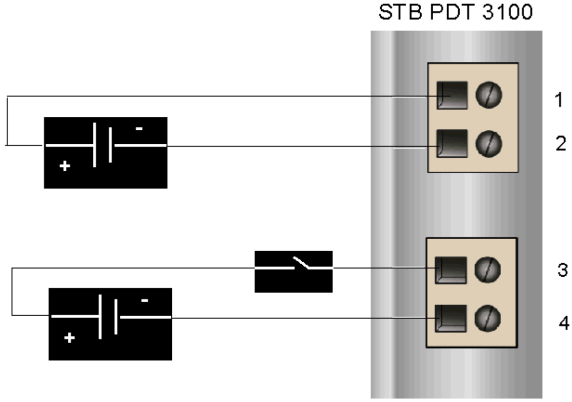
This example shows the field power connections to both the sensor bus and the actuator bus coming from a single 24 VDC SELV power supply.



1 +24 VDC sensor bus power
2 -24 VDC sensor power return
3 +24 VDC actuator bus power
4 -24 VDC actuator power return

The diagram above shows a protection relay, which you may optionally place on the +24 VDC power wire to the actuator bus connector. A protection relay enables you to disable the output devices receiving power from the actuator bus while you test the input devices that receive power from the sensor bus. For a detailed discussion and some recommendations, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

This example shows field power for the sensor bus and field power for the actuator bus being derived from separate SELV power supply sources.



1 +24 VDC sensor bus power
2 24 VDC sensor power return
3 +24 VDC actuator bus power
4 -24 VDC actuator power return

An optional protection relay is shown on the +24 VDC power wire to the actuator bus connector.

STB PDT 3100 Field Power Over-current Fuses

Fuse Requirements

The STB PDT 3100 PDM includes fuses that help protect input modules on the sensor bus and output modules on the actuator bus. The fuses are:

- a 5 A fuse on the sensor bus
- a 10 A fuse on the actuator bus

These fuses are accessible and replaceable via two side panels on the PDM.

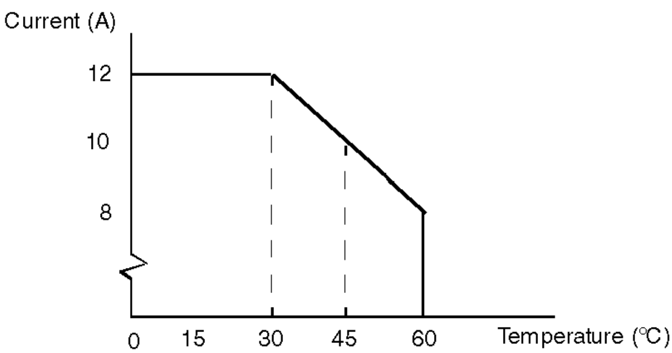
Recommended Fuses

- Overcurrent protection for the input modules on the sensor bus needs to be provided by a 5 A time-lag fuse such as the Wickmann 1951500000.
- Overcurrent protection for the output modules on the actuator bus needs to be provided by a 10 A time-lag fuse such as the Wickmann 1952100000.

Performance Considerations

The maximum combined module current - the sum of actuator current and sensor current - depends upon the island's ambient temperature, as displayed in the following diagram:

Maximum Current (A) to Temperature (°C)



For example:

- At 60 °C, total maximum combined module current is 8 A.
- At 45 °C, total maximum combined module current is 10 A.
- At 30 °C, total maximum combined module current is 12 A.

At any temperature, the maximum actuator current is 8 A, and the maximum sensor current is 4 A.

Accessing the Fuse Panels

The two panels that house the actuator bus protection fuse and the sensor bus protection fuse are located on the right side of the PDM housing *(see page 342)*. The panels are red doors with fuse holders inside them. The 5 A sensor power fuse is in the top door. The 10 A actuator power fuse is in the bottom door.

Replacing a Fuse

⚠ WARNING

BURN HAZARD - HOT FUSE

Disconnect power for 10 minutes before removing fuse.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Before you replace a fuse in the STB PDT 3100, remove the power sources to the actuator bus and sensor bus.

Step	Action	Notes
1	After you have removed the power connectors from the module and let the unit cool down for 10 minutes, pull the PDM from its base. Push the release buttons at the top and bottom of the PDM and pull it from the base.	
2	Insert a small flathead screwdriver in the slot on the left of the fuse panel door and use it to pop the door open.	The slot is molded to reduce the likelihood that the tip of the screwdriver accidentally touches the fuse.
3	Remove the old fuse from the fuse holder inside the panel door, and replace it with another fuse or with a fuse bypass plug.	Check that the new fuse is the same type as the old one.
4	Optionally, you may repeat steps 3 and 4 to replace the fuse in the other panel.	
5	Snap the panel door(s) shut and plug the PDM back into its base. Then plug the connectors back into the receptacles, close the cabinet and reapply field power.	

The Protective Earth Connection

PE Contact for the Island

One of the key functions of a PDM, in addition to distributing sensor and actuator power to the I/O modules, is the provision of protective earth (PE) to the island. On the bottom of each STB XBA 2200 PDM base is a captive screw in a plastic block. By tightening this captive screw, you can make a PE contact with the island bus. Every PDM base on the island bus should make PE contact.

How PE Contact Is Made

PE is brought to the island by a heavy-duty cross-sectional wire, usually a copper braided cable, 4.2 mm^2 (10 gage) or larger. The wire needs to be tied to a single grounding point. The ground conductor connects to the bottom of the each PDM base and is secured by the PE captive screw.

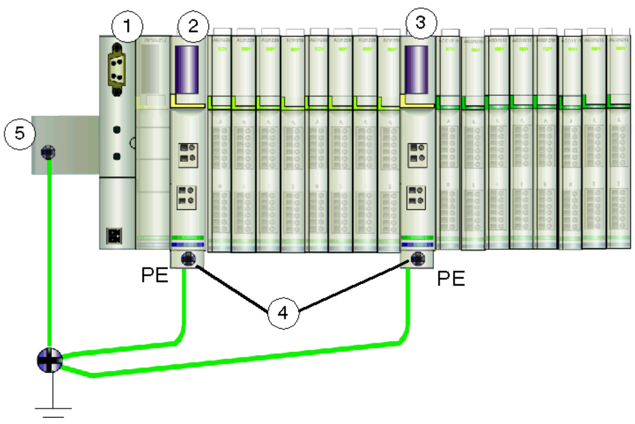
Local electrical codes take precedence over our PE wiring recommendations.

Handling Multiple PE Connections

It is possible that more than one PDM will be used on an island. Each PDM base on the island will receive a ground conductor and distribute PE as described above.

NOTE: Tie the PE lines from more than one PDM to a single PE ground point in a star configuration. This will minimize ground loops and excessive current from being created in PE lines.

This illustration shows separate PE connections tied to a single PE ground:



1 the NIM
2 a PDM
3 another PDM
4 captive screws for the PE connections
5 FE connection on the DIN rail

STB PDT 3100 Specifications

Table of Technical Specifications

The STB PDT 3100 module's technical specifications are described in the following table.

description		24 VDC power distribution module
module width		18.4 mm (0.72 in)
module height in its base		137.9 mm (5.43 in)
PDM base		STB XBA 2200
hot swapping supported		no
nominal logic power current consumption		0 mA
sensor/actuator bus voltage range		19.2 ... 30 VDC
reverse polarity protection		yes, on the actuator bus
module current field	for outputs	8 A rms max @ 30° C (86° F)
		5 A rms max @ 60° C (140° F)
	for inputs	4 A rms max @ 30° C (86° F)
		2.5 A rms max @ 60° C (140° F)
overcurrent protection	for inputs	user-replaceable 5 A time-lag fuse from an STB XMP 5600 fuse kit
	for outputs	user-replaceable 10 A time-lag fuse from an STB XMP 5600 fuse kit
bus current		0 mA
voltage surge protection		yes
PE current		30 A for 2 min
status reporting	to the two green LEDs	sensor bus power present
		actuator bus power present
voltage-detect threshold	LED turns on	at 15 VDC (+/- 1 VDC)
	LED turns off	less than15 VDC (+/- 1 VDC)
storage temperature		-40 to 85°C
operating temperature range*		0 to 60°C
agency certifications		refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*
*This product supports operation at normal and extended temperature ranges. Refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00* for a complete summary of capabilities and limitations.		

Section 5.4
STB PDT 3105 24 VDC Basic Power Distribution Module

Overview

This section provides you with a detailed description of the STB PDT 3105 PDM—its functions, physical design, technical specifications, and power wiring requirements.

What Is in This Section?

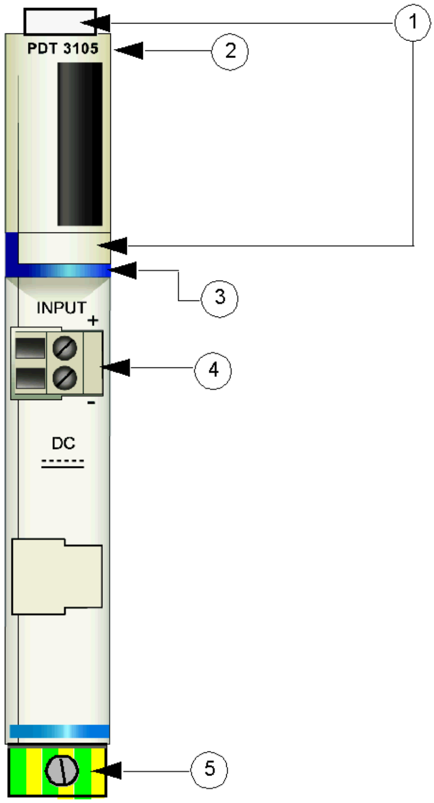
This section contains the following topics:

STB PDT 3105 Physical Description

Physical Characteristics

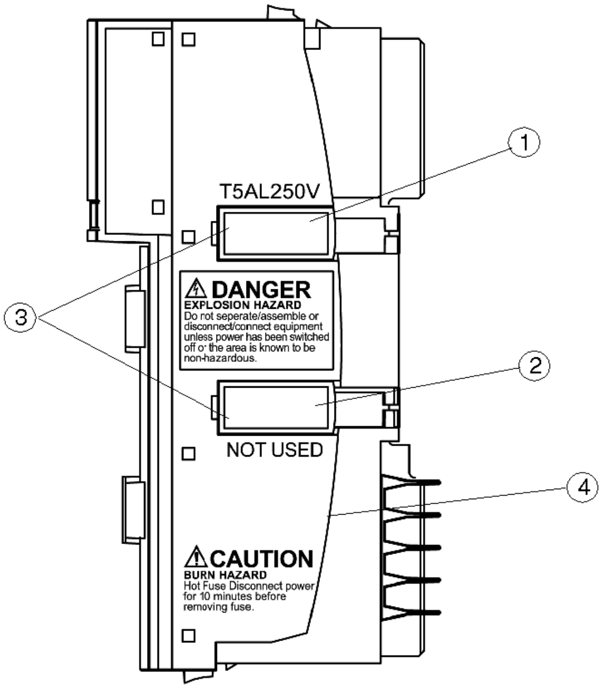
The STB PDT 3105 is a basic Advantys STB module that distributes sensor power and actuator power over a single power bus to the I/O modules in a segment. This PDM mounts in a special size 2 base. It requires a 24 VDC source power input from an external power source, which is brought into the PDM via a two-pin power connector. The module also houses a user-replaceable fuse that helps protect the island’s I/O power bus.

Front and Side Panel Views



1 locations for the STB XMP 6700 user-customizable labels
2 model name
3 dark blue identification stripe, indicating a DC PDM
4 I/O field power connection
5 PE captive screw clamp on the PDM base

The following illustration shows the right side of the module, where the user-replaceable fuse is housed:



1 housing door for the 5 A fuse
2 this slot is not used
3 notches in the two doors
4 burn hazard statement

⚠ WARNING

EXPLOSION HAZARD

- Ensure all power supplies are switched off, locked out and tagged out before separating/assembling, connecting/disconnecting equipment.
- Ensure the surrounding area is non hazardous before separating/assembling, connecting/disconnecting equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow the instructions on the side of the module when you are replacing a fuse *(see page 351)*:

⚠ WARNING

BURN HAZARD - HOT FUSE

Disconnect power for 10 minutes before removing fuse.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Ordering Information

The module can be ordered as part of a kit (STB PDT 3105 K), which includes:

- one STB PDT 3105 power distribution module
- one STB XBA 2200 *(see page 379)* PDM base
- two alternative sets of connectors:
  - one 2-terminal *screw type* connector, keying pins included
  - one 2-terminal *spring clamp* connector, keying pins included
- a 5 A, 250 V time-lag, low-breaking-capacity (glass) fuse to help protect the input and output modules

Individual parts may also be ordered for stock or replacement as follows:

- a standalone STB PDT 3105 power distribution module
- a standalone STB XBA 2200 PDM base
- a bag of screw type connectors (STB XTS 1130) or spring clamp connectors (STB XTS 2130)
- the STB XMP 5600 fuse kit, which contains five 5 A replacement fuses and five 10 A replacement fuses

NOTE: Do not use the 10 A fuses in the STB PDT 3105 module.

Additional optional accessories are also available:

- the STB XMP 6700 user-customizable label kit, which may be applied to the module and the base as part of your island assembly plan
- the STB XMP 7700 kit for inserting the module into the base (to check that an AC PDM *(see page 320)* is not inadvertently placed on the island where an STB PDT 3105 PDM belongs)
- the STB XMP 7800 kit for inserting the field wiring connectors into the module

For installation instructions and other details, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

Dimensions

width	module on a base	18.4 mm (0.72 in
height	module only	125 mm (4.92 in)
	on a base*	138 mm (5.43 in)
depth	module only	65.1 mm (2.56 in)
	on a base, with connectors	75.5 mm (2.97 in) worst case (with screw clamp connectors)
* PDMs are the tallest modules in an Advantys STB island segment. The 138 mm height dimension includes the added height imposed by the PE captive screw clamp on the bottom of the STB XBA 2200 base.		

STB PDT 3105 Source Power Wiring

Summary

The STB PDT 3105 uses a two-pin source power connector that let you connect the PDM to a 24 VDC field power source. The choices of connector types and wire types are described below, and a power wiring example is presented.

Connectors

Use either:

- an STB XTS 1130 *screw type* field wiring connector
- an STB XTS 2130 *spring clamp* field wiring connector

Both connector types are provided in kits of 10 connectors/kit.

These power wiring connectors each have two connection terminals, with a 5.08 mm (0.2 in) pitch between pins.

Power Wire Requirements

Individual connector terminals can accept one power wire in the range 1.29 ... 2.03 mm^2 (16 ... 12 AWG). When 1.29 mm^2 (16 AWG) power wire is used, two wires can be connected to a terminal.

We recommend that you strip at least 10 mm from the wire jackets to make the connections.

Safety Keying

NOTE: The same screw type and spring clamp connectors are used to deliver power to the STB PDT 3105 PDM and to the STB PDT 2100 and STB PDT 2105 PDMs. To help avoid connecting VAC power to a VDC module or vice versa, Schneider offers an optional STB XMP 7810 safety keying pin kit for the PDMs.
Refer the *Advantys STB System Planning and Installation Guide* (890 USE 171) for a detailed discussion of keying strategies.

Power Wiring Pinout

The connector receives 24 VDC source power for the sensor bus, and the bottom connector receives 24 VDC source power for the actuator bus.

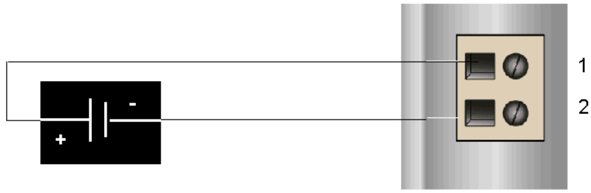
Pin	Connection
1	+24 VDC I/O power
2	-24 VDC return

Source Power

The STB PDT 3105 PDM requires source power from an independent, SELV-rated 19.2 ... 30 VDC power supply. Refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171) for a detailed discussion of external power supply selection considerations.

Sample Wiring Diagrams

This example shows the field power connections to both the sensor bus and the actuator bus coming from a single 24 VDC SELV power supply.



1 +24 VDC I/O power
2 -24 VDC return

For a detailed discussion and some recommendations, refer to the *Advantys STB System Planning and Installation Guide* (890 USE 171).

STB PDT 3105 Field Power Over-current Fuses

Fuse Requirements

The STB PDT 3105 PDM includes a 5 A fuse that helps to protect the I/O modules. The fuse is accessible and replaceable via a side panel on the PDM.

Recommended Fuses

Overcurrent protection for the input and output modules on the island bus needs to be provided by a 5 A time-lag fuse such as the Wickmann 1951500000.

Performance Considerations

When the island is operating at an ambient temperature of 60 degrees C (140 degrees F), the fuse can pass 4 A continuously.

Accessing the Fuse Panels

Two panels are located on the right side of the PDM housing *(see page 355)*. The top panel houses the active protection fuse and the other is not used. The top panel has a fuse holder inside it.

Replacing a Fuse

⚠ WARNING

BURN HAZARD - HOT FUSE

Disconnect power for 10 minutes before removing fuse.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Before you replace a fuse in the STB PDT 3105, remove the power source.

Step	Action	Notes
1	After you have removed the power connector from the module and let the unit cool down for 10 minutes, pull the PDM from its base. Push the release buttons at the top and bottom of the PDM and pull it from the base.	
2	Insert a small flathead screwdriver in the slot on the left of the fuse panel door and use it to pop the door open.	The slot is molded to reduce the likelihood that the tip of the screwdriver accidentally touches the fuse.

Step	Action	Notes
3	Remove the old fuse from the fuse holder inside the panel door, and replace it with another fuse.	Check that the new fuse is a 5 A fuse. **Note** 10 A fuses are provided in the fuse kit, but they should not be used with an STB PDT 3105 module.
4	Snap the panel door(s) shut and plug the PDM back into its base. Then plug the connectors back into the receptacles, close the cabinet and reapply field power.	

STB PDT 3105 Protective Earth Connection

PE Contact for the Island Bus

One of the key functions of a PDM, in addition to distributing sensor and actuator power to the I/O modules, is the provision of PE to the island. On the bottom of each STB XBA 2200 PDM base is a captive screw in a plastic block. By tightening this captive screw, you can make a PE contact with the DIN rail. Every PDM base on the island bus should make PE contact.

How PE Contact Is Made

PE is brought to the island by a heavy-duty cross-sectional wire, usually a copper braided cable, 4.2 mm^2 (10 gauge) or larger. The wire needs to be tied to a single grounding point. The ground conductor connects to the bottom of the each PDM base and is secured by the PE captive screw.

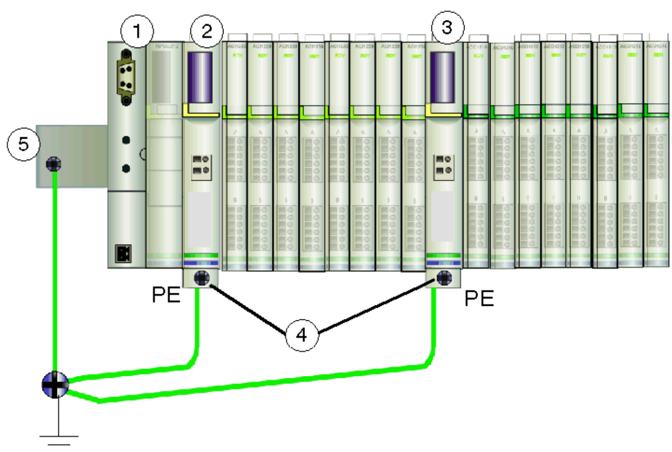
Local electrical codes take precedence over our PE wiring recommendations.

Handling Multiple PE Connections

It is possible that more than one PDM will be used on an island. Each PDM base on the island will receive a ground conductor and distribute PE as described above.

NOTE: Tie the PE lines from more than one PDM to a single PE ground point in a star configuration. This will minimize ground loops and excessive current from being created in PE lines.

This illustration shows separate PE connections tied to a single PE ground:



1 the NIM
2 a PDM
3 another PDM
4 captive screws for the PE connections
5 FE connection on the DIN rail

STB PDT 3105 Specifications

Table of Technical Specifications

description	basic 24 VDC power distribution module
module width	18.4 mm (0.72 in)
module height in its base	137.9 mm (5.43 in)
PDM base	STB XBA 2200
hot swapping supported	no
nominal logic power current consumption	0 mA
I/O power bus voltage range	19.2 ... 30 VDC
reverse polarity protection	on the outputs only
module current field	4 A max
overcurrent protection for sensor and actuator power	user-replaceable 5 A time-lag fuse
	one fuse ships with the PDM; replacements are available in an STB XMP 5600 fuse kit
bus current	0 mA
voltage surge protection	yes
PE current	30 A for 2 min
storage temperature	-40 to 85°C
operating temperature	0 to 60°C
agency certifications	refer to the *Advantys STB System Planning and Installation Guide, 890 USE 171 00*

Chapter 6
STB Module Bases

Overview

The physical communications bus that supports the island is constructed by interconnecting a series of base units and snapping them on a DIN rail. Different Advantys modules require different types of bases. Install bases in the proper sequence as you construct the island bus. This chapter provides you with a description of each base type.

What Is in This Chapter?

This chapter contains the following topics:

Advantys Bases

Summary

There are six different base units. When interconnected on a DIN rail, these bases form the physical backplane onto which the Advantys modules are mounted. This physical backplane also supports the transmission of power, communications and PE across the island bus.

Base Models

The table below lists the bases by model number, size and types of Advantys modules that they support.

Base Model	Width	Modules Supported
STB XBA 1000 *(see page 367)*	13.9 mm (0.58 in)	size 1 Advantys input and output modules
STB XBA 2000 *(see page 371)*	18.4 mm (0.72 in)	size 2 Advantys input and output modules and the STB XBE 2100 CANopen extension module
STB XBA 2200 *(see page 379)*	18.4 mm (0.72 in)	All Advantys PDM modules
STB XBA 2300 *(see Advantys STB, Special Modules, Reference Guide)*	18.4 mm (0.72 in)	STB XBE 1200 BOS island bus extension modules
STB XBA 2400	18.4 mm (0.72 in)	STB XBE 1000 EOS island bus extension modules
STB XBA 3000 *(see page 375)*	27.8 mm (1.09 in)	size 3 Advantys specialty modules

NOTE: You should insert the correct base in each location on the island bus to support the desired module type. Notice that there are three different size 2 (18.4 mm) bases. Check that you choose and install the correct one at each position on the island bus.

STB XBA 1000 I/O Base

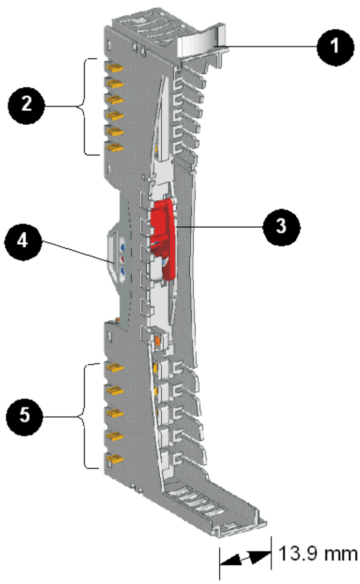
Summary

The STB XBA 1000 I/O base is 13.9 mm (0.58 in) wide. It provides the physical connections for a size 1 input or output module on the island bus. These connections let you communicate with the NIM over the island bus and hot swap the module when the island bus is operational. They also enable the module to receive:

- logic power from the NIM or from a BOS module
- sensor power (for inputs) or actuator power (for outputs) from the PDM

Physical Overview

The following illustration shows some of the key components an STB XBA 1000 base:



1 user-customizable label tab
2 six island bus contacts
3 DIN rail lock/release latch
4 DIN rail contact
5 five field power distribution contacts

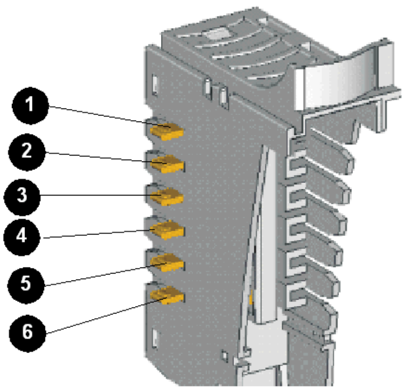
The Label Tab

A label can be positioned on the tab shown above in item 1. The label helps identify the specific module that will reside at this base unit's island bus location. A similar label can be placed on the module itself so that they can be matched up properly during the island installation.

Labels are provided on an STB XMP 6700 marking label sheet, which can be ordered from your Schneider Electric service provider.

The Island Bus Contacts

The six contacts located at the top left side of the STB XBA 1000 base provide logic power and island bus communications connections between the module and the island bus:



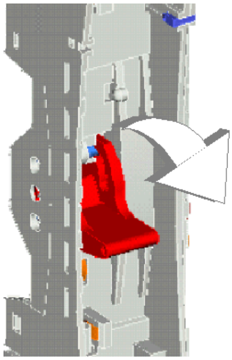
In the primary segment of the island bus, the signals that make these contacts come from the NIM. In extension segments, these signals come from an STB XBE 1000 BOS extension module:

Contacts	Signals
1	not used
2	the common ground contact
3	the 5 VDC logic power signal generated by the power supply in either the NIM (in the primary segment) or a BOS module (in an extension segment)
4 and 5	used for communications across the island bus between the I/O and the NIM—contact 4 is positive (+ve), and contact 5 is negative (-ve).
6	connects the module in the base to the island's address line. The NIM uses the address line to validate that the expected module is located at each physical address.

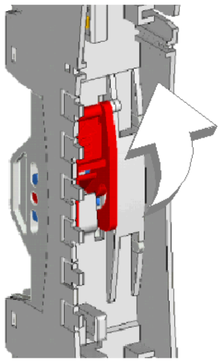
The Lock/ Release Latch

The latch in the center front of the STB XBA 1000 base has two positions, as shown below:

Release position



Lock position



The latch needs to be in release position while the base is being inserted on the DIN rail and when it is being removed from the DIN rail. It needs to be in lock position when the base has been pushed and snapped into place on the rail before the module is inserted into the base.

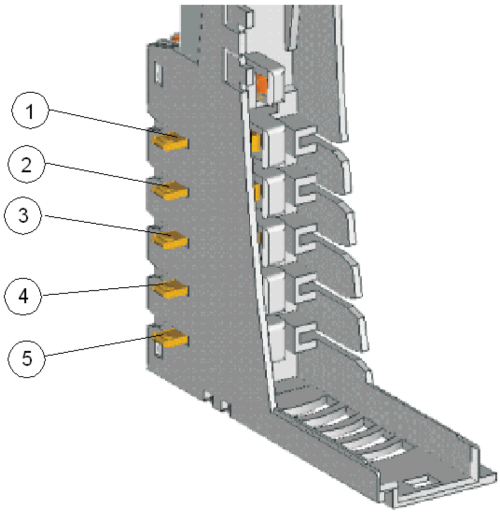
The DIN Rail Contacts

One of the functions of the DIN rail is to provide the island with functional earth. Functional earth provides the island with noise immunity control and RFI/EMI protection.

When an I/O base is snapped onto the DIN rail, two contacts on the back of the rail provide the earth ground connection between the rail and the I/O module that will be seated on the base.

The Field Power Distribution Contacts

The five contacts located in a column at the bottom of the STB XBA 1000 I/O base provide field power and a protective earth (PE) connections to the I/O module:



Field power (sensor power for inputs and actuator power for outputs) is distributed across the island bus to the STB XBA 1000 bases by a PDM:

Contacts	Signals
1 and 2	when the module inserted in the base has input channels, contacts 1 and 2 deliver sensor bus power to the module
3 and 4	when the module inserted in the base has output channels, contacts 3 and 4 deliver actuator bus power to the module
5	PE is established via a captive screw on the PDM base units *(see page 383)* and is delivered to the Advantys STB I/O module via contact 5

If the module in the STB XBA 1000 base supports only input channels, contacts 3 and 4 are not used. If the module in the STB XBA 1000 base supports only output channels, contacts 1 and 2 are not used.

STB XBA 2000 I/O Base

Summary

The STB XBA 2000 I/O base is 18.4 mm (0.72 in) wide. It provides the physical connections for a size 2 input or output module on the island bus. These connections let you communicate with the NIM over the island bus and hot swap the module when the island bus is operational. They also enable the module to receive:

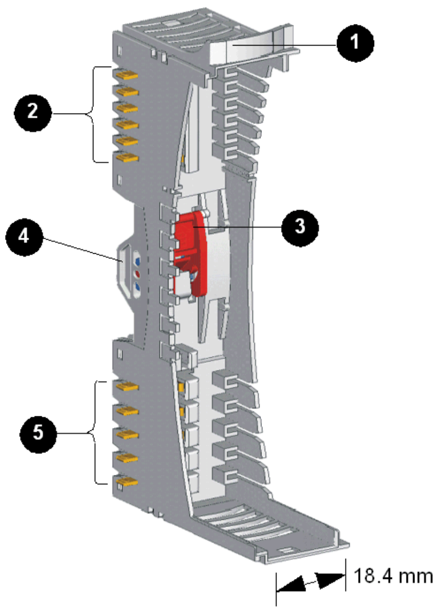
- logic power from the NIM or from a BOS module
- sensor power (for inputs) or actuator power (for outputs) from the PDM

The base also support an STB XBE 2100 CANopen extension module on the island bus.

NOTE: The STB XBA 2000 is designed only for the size 2 modules described above. Do not use this base for other size 2 Advantys modules such as the PDMs, EOS modules or BOS modules.

Physical Overview

The following illustration shows some of the key components an STB XBA 2000 base:



1 user-customizable label tab
2 six island bus contacts
3 DIN rail lock/release latch
4 DIN rail contact
5 five field power distribution contacts

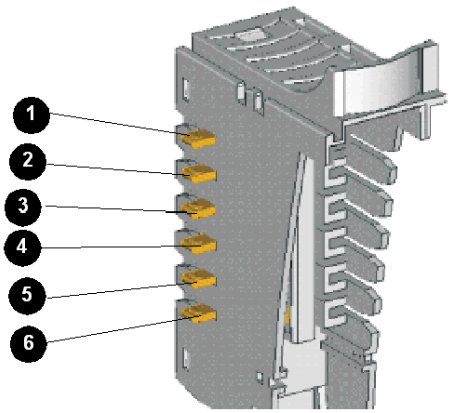
The Label Tab

A label can be positioned on the tab shown above in item 1. The label helps identify the specific module that will reside at this base unit's island bus location. A similar label can be placed on the module itself so that they can be matched up properly during the island installation.

Labels are provided on an STB XMP 6700 marking label sheet, which can be ordered from your Schneider Electric service provider.

The Island Bus Contacts

The six contacts located in a column at the top of the I/O base provide logic power and island bus communications connections between the module and the island bus:



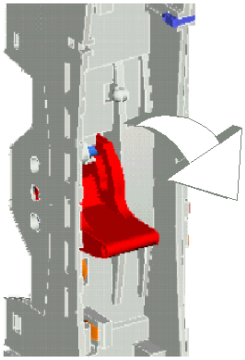
In the primary segment of the island bus, the signals that make these contacts come from the NIM. In extension segments, these signals come from an STB XBE 1000 BOS extension module:

Contacts	Signals
1	not used
2	the common ground contact
3	the 5 VDC logic power signal generated by the power supply in either the NIM (in the primary segment) or a BOS module (in an extension segment)
4 and 5	used for communications across the island bus between the I/O and the NIM—contact 4 is positive (+ve), and contact 5 is negative (-ve).
6	connects the module in the base to the island's address line. The NIM uses the address line to validate that the expected module is located at each physical address.

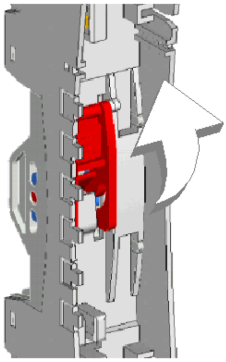
The Lock/Release Latch

The latch in the center front of the STB XBA 2000 base has two positions, as shown below:

Release position



Lock position



The latch needs to be in release position while the base is being inserted on the DIN rail and when it is being removed from the DIN rail. It needs to be in lock position when the base has been pushed and snapped into place on the rail before the module is inserted into the base.

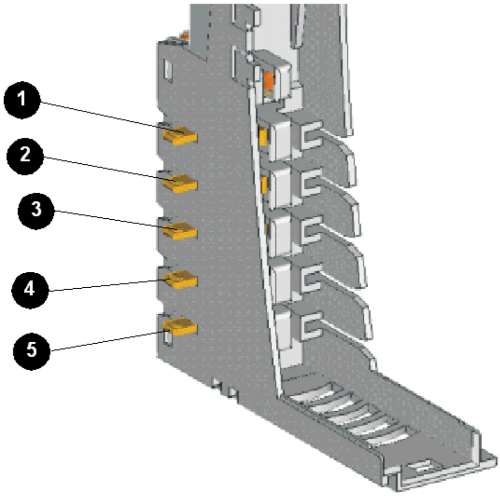
The DIN Rail Contacts

One of the functions of the DIN rail is to provide the island with functional earth. Functional earth provides the island with noise immunity control and RFI/EMI protection.

When an I/O base is snapped onto the DIN rail, two contacts on the back of the rail provide the earth ground connection between the rail and the I/O module that will be seated on the base.

The Field Power Distribution Contacts

The five contacts located in a column at the bottom of the STB XBA 2000 base provide AC or DC field power and a protective earth (PE) connections to the I/O module. They are as follows:



Field power (sensor power for inputs and actuator power for outputs) is distributed across the island bus to the STB PDT 2100 PDM:

Contacts	Signals
1 and 2	when the module inserted in the base has input channels, contacts 1 and 2 deliver sensor bus power to the module
3 and 4	when the module inserted in the base has output channels, contacts 3 and 4 deliver actuator bus power to the module
5	PE is established via a captive screw on the PDM base units *(see page 383)* and is delivered to the Advantys STB I/O module via contact 5

If the module in the STB XBA 2000 base supports only input channels, contacts 3 and 4 are not used. If the module in the STB XBA 1000 base supports only output channels, contacts 1 and 2 are not used.

STB XBA 3000 I/O Base

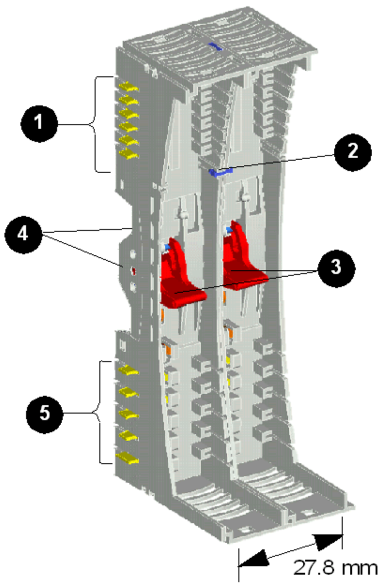
Summary

The STB XBA 3000 I/O base is 27.8 mm (1.1 in) wide. provides the physical connections for a size 3 input and output module on the island bus. These connections let you communicate with the NIM over the island bus and hot swap the module when the island bus is operational. They also enable the module to receive:

- logic power from the NIM or from a BOS module
- sensor power (for inputs) or actuator power (for outputs) from the PDM

Physical Overview

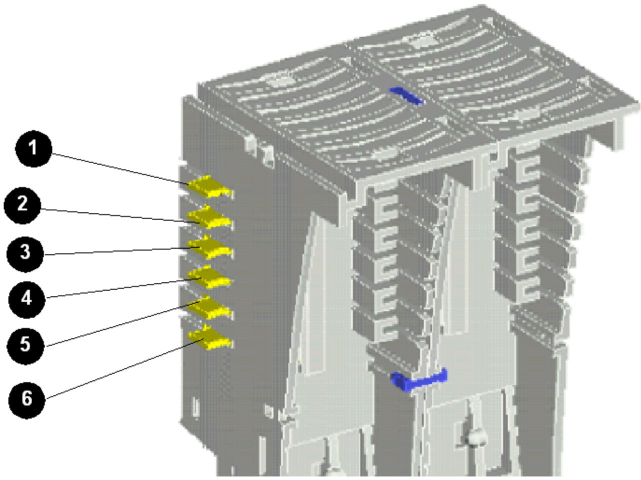
The following illustration shows some of the key components an STB XBA 3000 base:



1 six island bus contacts
2 size 3 security pin
3 DIN rail lock/release latches
4 DIN rail contacts
5 five field power distribution contacts

The Island Bus Contacts

The six contacts located in a column at the top of the I/O base provide logic power *(see page 24)* and island bus communications connections between the module and the island backplane. They are as follows:



In the primary segment of the island bus, the signals that make these contacts come from the NIM. In extension segments, these signals come from an STB XBE 1000 BOS extension module:

Contacts	Signals
1	not used
2	the common ground contact
3	the 5 VDC logic power signal generated by the power supply in either the NIM (in the primary segment) or a BOS module (in an extension segment)
4 and 5	used for communications across the island bus between the I/O and the NIM—contact 4 is positive (+ve), and contact 5 is negative (-ve).
6	connects the module in the base to the island's address line. The NIM uses the address line to validate that the expected module is located at each physical address.

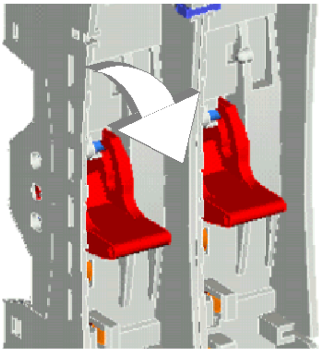
The Size 3 Module Security Pin

The STB XBA 3000 I/O base looks very much like a pair of interlocked STB XBA 1000 I/O bases. It is designed, however, to house only size 3 I/O modules. The security pin located in the center front of the base above the two lock/release latches reduces the likelihood you will inadvertently install two size 1 modules in the base.

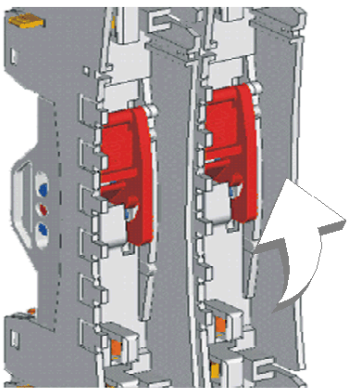
The Lock/Release Latch

Two latches in the center front of the STB XBA 3000 base each have two positions, as shown below:

Release positions



Lock positions



The latches need to be in their release positions while the base is being inserted on the DIN rail and when it is being removed from the DIN rail. They need to be in their lock positions when the base has been pushed and snapped into place on the rail before the module is inserted into the base.

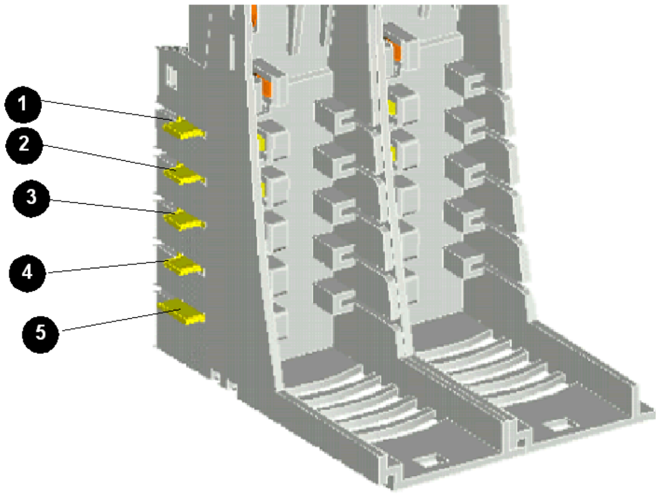
The DIN Rail Contacts

One of the functions of the DIN rail is to provide the island with functional earth. Functional earth provides the island with noise immunity control and RFI/EMI protection.

When an STB XBA 3000 I/O base is snapped onto the DIN rail, four contacts on the back of the rail provide functional ground connections between the rail and the I/O module that will be seated on the base.

The Field Power Distribution Contacts

The five contacts located in a column at the bottom of the STB XBA 3000 base provide field power and protective earth (PE) connections to the I/O module. They are as follows:



Field power (sensor power for inputs and actuator power for outputs) is distributed across the island bus to the STB XBA 3000 bases by a PDM:

Contacts	Signals
1 and 2	when the module inserted in the base has input channels, contacts 1 and 2 deliver sensor bus power to the module
3 and 4	when the module inserted in the base has output channels, contacts 3 and 4 deliver actuator bus power to the module
5	PE is established via a captive screw on the PDM base units *(see page 383)* and is delivered to the Advantys STB I/O module via contact 5

If the module in the STB XBA 3000 base supports only input channels, contacts 3 and 4 are not used. If the module in the STB XBA 1000 base supports only output channels, contacts 1 and 2 are not used.

STB XBA 2200 PDM Base

Summary

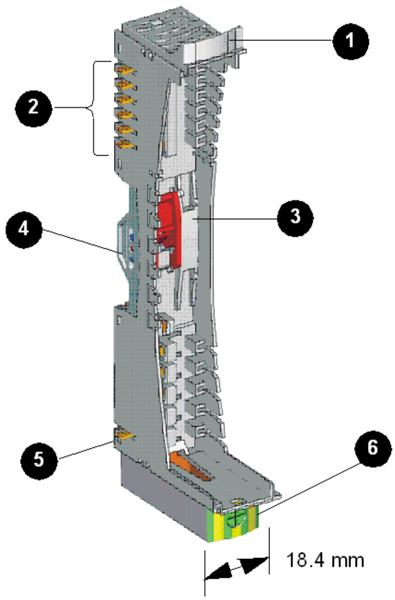
The STB XBA 2200 PDM base is 18.4 mm (0.72 in) wide. It is the mounting connection for any PDM(s) on the island bus. It allows you to easily remove and replace the module from the island for maintenance. It also enables the PDM to distribute sensor bus power to input modules and actuator power to output modules in the voltage group of I/O modules supported by that NIM.

A plastic block at the bottom of the base houses a PE captive screw *(see page 383)*, which should be used to make protective earth connections for the island. This captive screw block gives the PDM an added height dimension of 138 mm (5.44 in). As a result, the PDMs are always the tallest Advantys modules in an island segment.

NOTE: The STB XBA 2200 is designed only for PDMs. Do not attempt to use this base for other size 2 Advantys modules such as STB I/O modules or island bus extension modules.

Physical Overview

The following illustration shows an STB XBA 2200 PDM base and highlights some of its key physical components.



1 user-customizable label
2 six island bus contacts
3 DIN rail lock/release latch
4 DIN rail contact
5 PE contact
6 PE captive screw

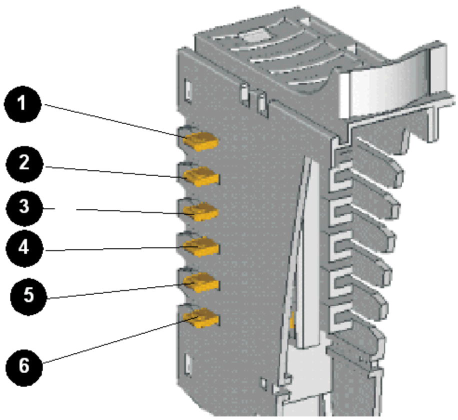
The Label Tab

A label can be positioned on the tab shown above in item 1 to help identify the module that will reside at this base unit's island bus location. A similar label can be placed on the PDM itself so that they can be matched up properly during the island installation.

Labels are provided on an STB XMP 6700 marking label sheet, which can be ordered at no charge from your Scneider Electric service provider.

The Island Bus Contacts

The six contacts located in a column at the top of the I/O base allow island bus logic power and communication signals flow through the PDM downstream to the I/O modules:



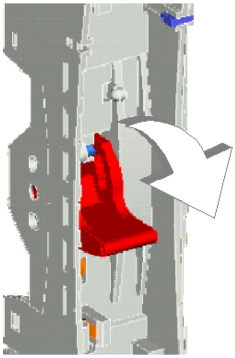
1 not used
2 common ground contact
3 5 VDC logic power contact
4 island bus communications + contact
5 island bus communications - contact
6 address line contact

The STB PDT 3100 and STB PDT 2100 PDMs are non-addressable modules, and they do not use the island's logic power or communication buses. The six island bus contacts at the top of the base are used for 5 V ground and for LED power.

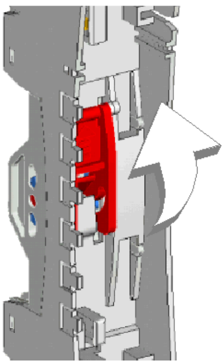
The Lock/Release Latch

The latch in the center front of the STB XBA 2200 base has two positions, as shown below:

Release position



Lock position



The latch needs to be in release position while the base is being inserted on the DIN rail and when it is being removed from the DIN rail. It needs to be in lock position when the base has been pushed and snapped into place on the rail before the module is inserted into the base.

The DIN Rail Contacts

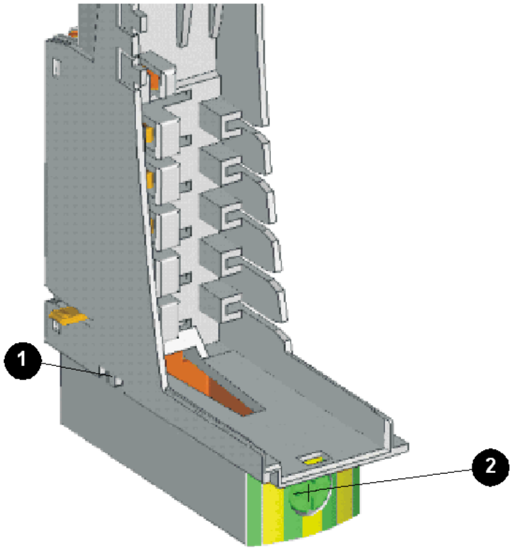
One of the roles of the DIN rail is to provide the island with functional earth. Functional earth provides the island with noise immunity control and RFI/EMI protection.

When a PDM base is snapped onto the DIN rail, two contacts on the back of the rail provide the functional ground connection between the rail and the PDM that will be seated on the base.

Protective Earth

One of the key functions of a PDM, in addition to distributing sensor and actuator power to the I/O modules, is the provision of protective earth to the island. PE is essentially a return line across the bus for detected fault currents generated at a sensor or actuator device in the control system.

A captive screw at the bottom of the STB XBA 2200 base secures a PE wire to the island:



1 The PE contact
2 The PE captive screw

PE is brought to the island by an insulated ground conductor, usually a copper wire that is tied to a single grounding point on the cabinet. The ground conductor is secured by the PE captive screw.

The STB XBA 2200 base distributes PE to the island via a single contact located at the bottom left side of the base (item 2 above). The PDM base distributes PE to its right and left along the island bus.

The single contact on the bottom left of the base is one of the ways to discriminate the STB XBA 2200 from other size 2 bases. The PDM base does not need the four field power contacts on its bottom left side—the PDM takes field power from an external power supply via two power connectors on the front of the module and distributes that power downstream to the I/O modules it supports.

The Protective Earth Connection

PE Contact for the Island

One of the key functions of a PDM, in addition to distributing sensor and actuator power to the I/O modules, is the provision of protective earth (PE) to the island. On the bottom of each STB XBA 2200 PDM base is a captive screw in a plastic block. By tightening this captive screw, you can make a PE contact with the island bus. Every PDM base on the island bus should make PE contact.

How PE Contact Is Made

PE is brought to the island by a heavy-duty cross-sectional wire, usually a copper braided cable, 6 mm^2 or larger. The wire needs to be tied to a single grounding point. The ground conductor connects to the bottom of the each PDM base and is secured by the PE captive screw.

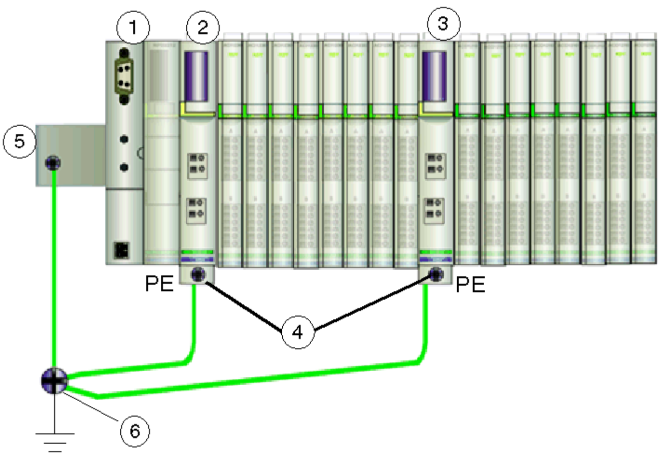
Local electrical codes take precedence over our PE wiring recommendations.

Handling Multiple PE Connections

It is possible that more than one PDM will be used on an island. Each PDM base on the island will receive a ground conductor and distribute PE as described above.

NOTE: Tie the PE lines from more than one PDM to a single PE ground point in a star configuration. This will minimize ground loops and excessive current from being created in PE lines.

This illustration shows separate PE connections tied to a single PE ground:



1 the NIM
2 a PDM
3 another PDM

4 captive screws for the PE connections
5 FE connection on the DIN rail
6 PE ground point

Appendices

IEC Symbols

This appendix illustrates the IEC symbols used in the field wiring examples in this book and some of the installation examples in the *Advantys STB Planning and Installation Guide* (890 USE 171).

What Is in This Appendix?

The appendix contains the following chapters:

Appendix A
IEC Symbols

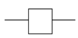
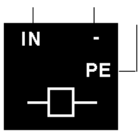
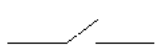
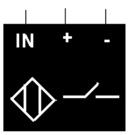
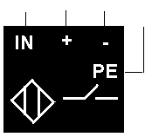
IEC Symbols

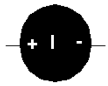
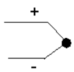
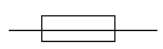
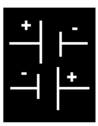
Introduction

The following table contains illustrations and definitions of the common IEC symbols used in describing the Advantys STB modules and system.

List of Symbols

Here are some common IEC symbols used in the field wiring examples throughout this book:

Symbol	Definition
	two-wire actuator/output
	three-wire actuator/output
	two-wire digital sensor/input
	three-wire digital sensor/input
	four-wire digital sensor/input

Symbol	Definition
	analog voltage sensor
	analog current sensor
	thermocouple element
	fuse
	VAC power
	VDC power
	earth ground

Appendix B
STB HIgh Density I/O Telefast Connector Interfaces

High-density Telefast I/O Connector Interfaces

Interface Models

Four connector interfaces are available to connect an Advantys STB high-density digital input module or output module to an ABE7 Telefast wiring block:

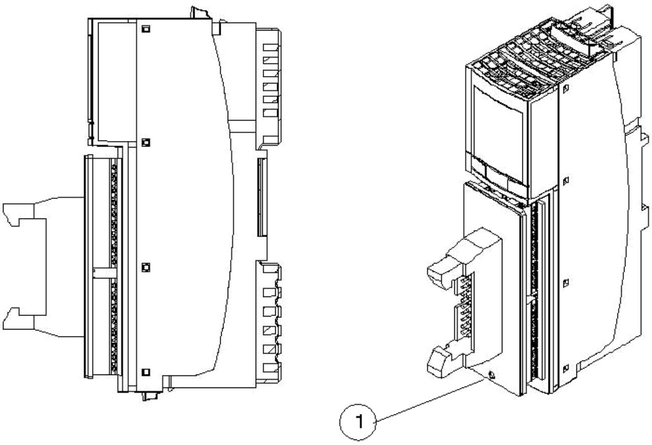
Advantys STB Module Type	Interface Connector Type	Interface Model
digital input	Telefast Twido sub-base HE10	STB XTS 5510
	Telefast2 HE10	STB XTS 6510
digital output	Telefast Twido sub-base HE10	STB XTS 5610
	Telefast2 HE10	STB XTS 6610

Physical Characteristics

The interface fits in the I/O module's field wiring connector headers. It is compatible with existing wire plug headers on the I/O modules. The mating plugs on the interface are similar to those on the 18-terminal STB XTS 1180 screw type connectors and STB XTS 2180 spring clamp connectors.

The interface mates with a Telefast interconnect cable assembly that has 20-position HE10 style sockets.

The following illustration shows side and front isometric views of the connector interface on a high density STB I/O module.



1 Make sure that this hole is positioned at the bottom of the module.

The interface is made up of a 20-position HE10 style header with locking latches and a label where the commercial reference is marked

Interconnect Assemblies

The connector interfaces work with existing Telefast interconnect cable assemblies that have 20-position HE10 connector sockets. No new or specially designed Telefast interconnect assemblies are required. The following table lists the interface cable assemblies and the Telefast wiring blocks that are approved for use with Advantys STB high density modules:

Interface	Telefast Wiring Block)	Telefast Cable)
STB XTS 5510 Telefast Twido HE10 input sub-base	ABE 7E16EPN20	TSXCDP102
		TSXCDP202
		TSXCDP302
		ABFT20E050
		ABTF20E200
		ABTF20E300

STB XTS 5610 Telefast Twido HE10 output sub-base	ABE 7E16SRM20	ABFT20E050
		ABFT20E100
		ABFT20E200
		TSXCDP102
		TSXCDP202
		TSXCDP302
STB XTS 6510 Telefast2 input HE10	ABE 7S16E2B1	ABFH20H100
	ABE 7S16E2E0	ABFH20H200
	ABE 7S16E2E1	ABFH20H300
	ABE 7S16E2F0	TSXCDP053
	ABE 7S16E2M0	TSXCDP103
		TSXCDP203
		TSXCDP301
		TSXCDP303
		TSXCDP503
		TSXCDP501
STB XTS 6610 Telefast2 output HE10	ABE 7R16S210	ABFH20H100
	ABE 7R16S212	ABFH20H200
	ABE 7R16T210	ABFH20H300
	ABE 7R16T212	TSXCDP053
	ABE 7R16T230	TSXCDP103
	ABE 7R16T231	TSXCDP203
	ABE 7R16T330	TSXCDP301
	ABE 7R16T332	TSXCDP303
	ABE 7R16T370	TSXCDP501
	ABE 7R16S2B0	TSXCDP503
	ABE 7R16S2B2	
	ABE 7R16S111	

Use only the Telefast blocks listed above with the Advantys STB high density interfaces.

⚠ DANGER

RISK OF FIRE OR LOSS OF CONTROL

Do not use unfused Telefast passive output wiring blocks with the Advantys STB high density connectors. These blocks have current limitations that are not compatible with Advantys STB operations.

Always respect the current limitations of the Telefast wiring blocks that you choose. Do not place loads on the high density I/O modules that can produce currents in excess of the specified current rating of the wiring block in use.

Failure to follow these instructions will result in death or serious injury.

Installing a Connector Interface

To install a Telefast I/O connector interface:

Step	Action
1	Remove the interface from its packaging.
2	Attach the interface to the field I/O headers on the front of the Advantys STB high-density digital I/O module. Make sure that you use an input connector for an input module or an output connector for an output module.
3	Insert one of the interconnect cable assembly’s 20-position HE10 sockets into the HE10 style header on the interface and secure locking latches.
4	Insert the other 20-position HE10 socket of the interconnect cable assembly into the HE10 style header on the Telefast wiring block and secure locking latches.

Glossary

!

100Base-T

An adaptation of the IEEE 802.3u (Ethernet) standard, the 100Base-T standard uses twisted-pair wiring with a maximum segment length of 100 m (328 ft) and terminates with an RJ-45 connector. A 100Base-T network is a baseband network capable of transmitting data at a maximum speed of 100 Mbit/s. "Fast Ethernet" is another name for 100Base-T, because it is ten times faster than 10Base-T.

10Base-T

An adaptation of the IEEE 802.3 (Ethernet) standard, the 10Base-T standard uses twisted-pair wiring with a maximum segment length of 100 m (328 ft) and terminates with an RJ-45 connector. A 10Base-T network is a baseband network capable of transmitting data at a maximum speed of 10 Mbit/s.

802.3 frame

A frame format, specified in the IEEE 802.3 (Ethernet) standard, in which the header specifies the data packet length.

A

agent

1. SNMP – the SNMP application that runs on a network device.

2. Fipio – a slave device on a network.

analog input

A module that contains circuits that convert analog DC input signals to digital values that can be manipulated by the processor. By implication, these analog inputs are direct. That means a data table value directly reflects the analog signal value.

analog output

A module that contains circuits that transmit an analog DC signal proportional to a digital value input to the module from the processor. By implication, these analog outputs are direct. That means a data table value directly controls the analog signal value.

application object

In CAN-based networks, application objects represent device-specific functionality, such as the state of input or output data.

ARP

The ARP (address resolution protocol) is the IP network layer protocol, which uses ARP to map an IP address to a MAC (hardware) address.

auto baud

The automatic assignment and detection of a common baud rate as well as the ability of a device on a network to adapt to that rate.

auto-addressing

The assignment of an address to each Island bus I/O module and preferred device.

auto-configuration

The ability of Island modules to operate with predefined default parameters. A configuration of the Island bus based completely on the actual assembly of I/O modules.

B

basic I/O

Low-cost Advantys STB input/output modules that use a fixed set of operating parameters. A basic I/O module cannot be reconfigured with the Advantys Configuration Software and cannot be used in reflex actions.

basic network interface

A low-cost Advantys STB network interface module that supports up to 12 Advantys STB I/O modules. A basic NIM does not support the Advantys Configuration Software, reflex actions, nor the use of an HMI panel.

basic power distribution module

A low-cost Advantys STB PDM that distributes sensor power and actuator power over a single field power bus on the Island. The bus provides a maximum of 4 A total power. A basic PDM includes a 5 A fuse.

BootP

BootP (bootstrap protocol) is an UDP/IP protocol that allows an internet node to obtain its IP parameters based on its MAC address.

BOS

BOS stands for beginning of segment. When more than 1 segment of I/O modules is used in an Island, an STB XBE 1200 or an STB XBE 1300 BOS module is installed in the first position in each extension segment. Its job is to carry Island bus communications to and generate logic power for the modules in the extension segment. Which BOS module has to be selected depends on the module types that shall follow.

bus arbitrator

A master on a Fipio network.

C

CAN

The CAN (controller area network) protocol (ISO 11898) for serial bus networks is designed for the interconnection of smart devices (from multiple manufacturers) in smart systems for real-time industrial applications. CAN multi-master systems provide high data integrity through the implementation of broadcast messaging and advanced diagnostic mechanisms. Originally developed for use in automobiles, CAN is now used in a variety of industrial automation control environments.

CANopen protocol

An open industry standard protocol used on the internal communication bus. The protocol allows the connection of any enhanced CANopen device to the Island bus.

CI

This abbreviation stands for command interface.

CiA

CiA (CAN in Automation) is a non-profit group of manufacturers and users dedicated to developing and supporting CAN-based higher layer protocols.

CIP

Common Industrial Protocol. Networks that include CIP in the application layer can communicate seamlessly with other CIP-based networks. For example, the implementation of CIP in the application layer of an Ethernet TCP/IP network creates an EtherNet/IP environment. Similarly, CIP in the application layer of a CAN network creates a DeviceNet environment. Devices on an EtherNet/IP network can therefore communicate with devices on a DeviceNet network via CIP bridges or routers.

COB

A COB (communication object) is a unit of transportation (a message) in a CAN-based network. Communication objects indicate a particular functionality in a device. They are specified in the CANopen communication profile.

configuration

The arrangement and interconnection of hardware components within a system and the hardware and software selections that determine the operating characteristics of the system.

CRC

cyclic redundancy check. Messages that implement this detected error mechanism have a CRC field that is calculated by the transmitter according to the message’s content. Receiving nodes recalculate the field. Disagreement in the two codes indicates a difference between the transmitted message and the one received.

CSMA/CS
carrier sense multiple access/collision detection. CSMA/CS is a MAC protocol that networks use to manage transmissions. The absence of a carrier (transmission signal) indicates that a network channel is idle. Multiple nodes may try to simultaneously transmit on the channel, which creates a collision of signals. Each node detects the collision and immediately terminates transmission. Messages from each node are retransmitted at random intervals until the frames are successfully transmitted.

D

DDXML
Device Description eXtensible Markup Language

device name
A customer-driven, unique logical personal identifier for an Ethernet NIM. A device name (or *role name*) is created when you combine the numeric rotary switch setting with the NIM (for example, STBNIP2212_010).

After the NIM is configured with a valid device name, the DHCP server uses it to identify the island at power up.

DeviceNet protocol
DeviceNet is a low-level, connection-based network that is based on CAN, a serial bus system without a defined application layer. DeviceNet, therefore, defines a layer for the industrial application of CAN.

DHCP
dynamic host configuration protocol. A TCP/IP protocol that allows a server to assign an IP address based on a device name (host name) to a network node.

differential input
A type of input design where two wires (+ and -) are run from each signal source to the data acquisition interface. The voltage between the input and the interface ground are measured by two high-impedance amplifiers, and the outputs from the two amplifiers are subtracted by a third amplifier to yield the difference between the + and - inputs. Voltage common to both wires is thereby removed. When ground differences exist, use differential signalling instead of single ended signalling to help reduce cross channel noise.

digital I/O
An input or output that has an individual circuit connection at the module corresponding directly to a data table bit or word that stores the value of the signal at that I/O circuit. It allows the control logic to have discrete access to the I/O values.

DIN
Deutsche industrial norms. A German agency that sets engineering and dimensional standards and now has worldwide recognition.

Drivecom Profile

The Drivecom profile is part of CiA DSP 402 (profile), which defines the behavior of drives and motion control devices on CANopen networks.

E

economy segment

A special type of STB I/O segment created when an STB NCO 1113 economy CANopen NIM is used in the first location. In this implementation, the NIM acts as a simple gateway between the I/O modules in the segment and a CANopen master. Each I/O module in an economy segment acts as a independent node on the CANopen network. An economy segment cannot be extended to other STB I/O segments, preferred modules or enhanced CANopen devices.

EDS

electronic data sheet. The EDS is a standardized ASCII file that contains information about a network device's communications functionality and the contents of its object dictionary. The EDS also defines device-specific and manufacturer-specific objects.

EIA

Electronic Industries Association. An organization that establishes electrical/electronic and data communication standards.

EMC

electromagnetic compatibility. Devices that meet EMC requirements can operate within a system's expected electromagnetic limits without interruption.

EMI

electromagnetic interference. EMI can cause an interruption or disturbance in the performance of electronic equipment. It occurs when a source electronically transmits a signal that interferes with other equipment.

EOS

This abbreviation stands for end of segment. When more than 1 segment of I/O modules is used in an Island, an STB XBE 1000 or an STB XBE 1100 EOS module is installed in the last position in every segment that has an extension following it. The EOS module extends Island bus communications to the next segment. Which EOS module has to be selected depends on the module types that shall follow.

Ethernet

A LAN cabling and signaling specification used to connect devices within a defined area, e.g., a building. Ethernet uses a bus or a star topology to connect different nodes on a network.

Ethernet II

A frame format in which the header specifies the packet type, Ethernet II is the default frame format for NIM communications.

EtherNet/IP
EtherNet/IP (the Ethernet Industrial Protocol) is especially suited to factory applications in which there is a need to control, configure, and monitor events within an industrial system. The ODVA-specified protocol runs CIP (the Common Industrial Protocol) on top of standard Internet protocols, like TCP/IP and UDP. It is an open local (communications) network that enables the interconnectivity of all levels of manufacturing operations from the plant's office to the sensors and actuators on its floor.

F

fallback state
A known state to which an Advantys STB I/O module can return in the event that its communication connection is not open.

fallback value
The value that a device assumes during fallback. Typically, the fallback value is either configurable or the last stored value for the device.

FED_P
Fipio extended device profile. On a Fipio network, the standard device profile type for agents whose data length is more than 8 words and equal to or less than 32 words.

Fipio
Fieldbus Interface Protocol (FIP). An open fieldbus standard and protocol that conforms to the FIP/World FIP standard. Fipio is designed to provide low-level configuration, parameterization, data exchange, and diagnostic services.

Flash memory
Flash memory is nonvolatile memory that can be overwritten. It is stored on a special EEPROM that can be erased and reprogrammed.

FRD_P
Fipio reduced device profile. On a Fipio network, the standard device profile type for agents whose data length is two words or less.

FSD_P
Fipio standard device profile. On a Fipio network, the standard device profile type for agents whose data length is more than two words and equal to or less than 8 words.

full scale
The maximum level in a specific range—e.g., in an analog input circuit the maximum allowable voltage or current level is at full scale when any increase beyond that level is over-range.

function block
A function block performs a specific automation function, such as speed control. A function block comprises configuration data and a set of operating parameters.

function code

A function code is an instruction set commanding 1 or more slave devices at a specified address(es) to perform a type of action, e.g., read a set of data registers and respond with the content.

G

gateway

A program or hardware that passes data between networks.

global_ID

global_identifier. A 16-bit integer that uniquely identifies a device's location on a network. A global_ID is a symbolic address that is universally recognized by all other devices on the network.

GSD

generic slave data (file). A device description file, supplied by the device's manufacturer, that defines a device's functionality on a Profibus DP network.

H

HMI

human-machine interface. An operator interface, graphical, for industrial equipment.

hot swapping

Replacing a component with a like component while the system remains operational. When the replacement component is installed, it begins to function automatically.

HTTP

hypertext transfer protocol. The protocol that a web server and a client browser use to communicate with one another.

I

I/O base

A mounting device, designed to seat an Advantys STB I/O module, connect it on a DIN rail, and connect it to the Island bus. It provides the connection point where the module can receive either 24 VDC or 115/230 VAC from the input or output power bus distributed by a PDM.

I/O module

In a programmable controller system, an I/O module interfaces directly to the sensors and actuators of the machine/process. This module is the component that mounts in an I/O base and provides electrical connections between the controller and the field devices. Normal I/O module capacities are offered in a variety of signal levels and capacities.

I/O scanning

The continuous polling of the Advantys STB I/O modules performed by the COMS to collect data bits, status, nd diagnostics information.

IEC

International Electrotechnical Commission Carrier. Founded in 1884 to focus on advancing the theory and practice of electrical, electronics, and computer engineering, and computer science. EN 61131-2 is the specification that deals with industrial automation equipment.

IEC type 1 input

Type 1 digital inputs support sensor signals from mechanical switching devices such as relay contacts and push buttons operating in normal environmental conditions.

IEC type 2 input

Type 2 digital inputs support sensor signals from solid state devices or mechanical contact switching devices such as relay contacts, push buttons (in normal or harsh environmental conditions), and 2- or 3-wire proximity switches.

IEC type 3 input

Type 3 digital inputs support sensor signals from mechanical switching devices such as relay contacts, push buttons (in normal-to-moderate environmental conditions), 3-wire proximity switches and 2-wire proximity switches that have:

- a voltage drop of no more than 8 V
- a minimum operating current capability less than or equal to 2.5 mA
- a maximum off-state current less than or equal to 1.5 mA

IEEE

Institute of Electrical and Electronics Engineers, Inc. The international standards and conformity assessment body for all fields of electrotechnology, including electricity and electronics.

IGMP

(Internet group management protocol). This Internet standard for multicasting allows a host to subscribe to a particular multicast group.

industrial I/O

An Advantys STB I/O module designed at a moderate cost for typical continuous, high-duty-cycle applications. Modules of this type often feature standard IEC threshold ratings, providing user-configurable parameter options, on-board protection, good resolution, and field wiring options. They are designed to operate in moderate-to-high temperature ranges.

input filtering

The amount of time that a sensor has to hold its signal on or off before the input module detects the change of state.

input polarity

An input channel's polarity determines when the input module sends a 1 and when it sends a 0 to the master controller. If the polarity is *normal*, an input channel sends a 1 to the controller when its field sensor turns on. If the polarity is *reverse*, an input channel sends a 0 to the controller when its field sensor turns on.

input response time

The time it takes for an input channel to receive a signal from the field sensor and put it on the Island bus.

INTERBUS protocol

The INTERBUS fieldbus protocol observes a master/slave network model with an active ring topology, having all devices integrated in a closed transmission path.

IOC object

Island operation control object. A special object that appears in the CANopen object dictionary when the remote virtual placeholder option is enabled in a CANopen NIM. It is a 16-bit word that provides the fieldbus master with a mechanism for issuing reconfiguration and start requests.

IOS object

Island operation status object. A special object that appears in the CANopen object dictionary when the remote virtual placeholder option is enabled in a CANopen NIM. It is a 16-bit word that reports the success of reconfiguration and start requests or records diagnostic information in the event that a request is not completed.

IP

internet protocol. That part of the TCP/IP protocol family that tracks the internet addresses of nodes, routes outgoing messages, and recognizes incoming messages.

IP Rating

Ingress Protection rating according to IEC 60529. Each IP rating requires the following standards to be met with respect to a rated device:

- IP20 modules are protected against ingress and contact of objects larger than 12.5 mm. The module is not protected against harmful ingress of water.
- IP67 modules are completely protected against ingress of dust and contact. Ingress of water in harmful quantity is not possible when the enclosure is immersed in water up to 1 m.

L

LAN

local area network. A short-distance data communications network.

light industrial I/O

An Advantys STB I/O module designed at a low cost for less rigorous (e.g., intermittent, low-duty-cycle) operating environments. Modules of this type operate in lower temperature ranges with lower qualification and agency requirements and limited on-board protection; they have limited or no user-configuration options.

linearity

A measure of how closely a characteristic follows a straight-line function.

LSB

least significant bit, least significant byte. The part of a number, address, or field that is written as the rightmost single value in conventional hexadecimal or binary notation.

M

MAC address
media access control address. A 48-bit number, unique on a network, that is programmed into each network card or device when it is manufactured.

mandatory module
When an Advantys STB I/O module is configured to be mandatory, it should be present and healthy in the Island configuration for the Island to be operational. If a mandatory module is inoperable or is removed from its location on the Island bus, the Island goes to a pre-operational state. By default, all I/O modules are not mandatory. You should use the Advantys Configuration Software to set this parameter.

master/slave model
The direction of control in a network that implements the master/slave model is from the master to the slave devices.

Modbus
Modbus is an application layer messaging protocol. Modbus provides client and server communications between devices connected on different types of buses or networks. Modbus offers many services specified by function codes.

MOV
metal oxide varistor. A 2-electrode semiconductor device with a voltage-dependant nonlinear resistance that drops markedly as the applied voltage is increased. It is used to suppress transient voltage surges.

MSB
most significant bit, most significant byte. The part of a number, address, or field that is written as the leftmost single value in conventional hexadecimal or binary notation.

N

N.C. contact
normally closed contact. A relay contact pair that is closed when the relay coil is de-energized and open when the coil is energized.

N.O. contact
normally open contact. A relay contact pair that is open when the relay coil is de-energized and closed when the coil is energized.

NEMA
National Electrical Manufacturers Association

network cycle time
The time that a master requires to complete a single scan of the configured I/O modules on a network device; typically expressed in microseconds.

NIM

network interface module. This module is the interface between an Island bus and the fieldbus network of which the Island is a part. A NIM enables all the I/O on the Island to be treated as a single node on the fieldbus. The NIM also provides 5 V of logic power to the Advantys STB I/O modules in the same segment as the NIM.

NMT

network management. NMT protocols provide services for network initialization, diagnostic control, and device status control.

O

object dictionary

Part of the CANopen device model that provides a map to the internal structure of CANopen devices (according to CANopen profile DS-401). A device's object dictionary (also called the *object directory*) is a lookup table that describes the data types, communications objects, and application objects the device uses. By accessing a particular device's object dictionary through the CANopen fieldbus, you can predict its network behavior and build a distributed application.

ODVA

Open Devicenet Vendors Association. The ODVA supports the family of network technologies that are built on the Common Industrial Protocol (EtherNet/IP, DeviceNet, and CompoNet).

open industrial communication network

A distributed communication network for industrial environments based on open standards (EN 50235, EN50254, and EN50170, and others) that allows the exchange of data between devices from different manufacturers.

output filtering

The amount that it takes an output channel to send change-of-state information to an actuator after the output module has received updated data from the NIM.

output polarity

An output channel's polarity determines when the output module turns its field actuator on and when it turns the actuator off. If the polarity is *normal*, an output channel turns its actuator on when the master controller sends it a 1. If the polarity is *reverse*, an output channel turns its actuator on when the master controller sends it a 0.

output response time

The time it takes for an output module to take an output signal from the Island bus and send it to its field actuator.

P

parameterize

To supply the required value for an attribute of a device at run-time.

PDM

power distribution module. A module that distributes either AC or DC field power to a cluster of I/O modules directly to its right on the Island bus. A PDM delivers field power to the input modules and the output modules. It is important that all the I/O installed directly to the right of a PDM be in the same voltage group—either 24 VDC, 115 VAC, or 230 VAC.

PDO

process data object. In CAN-based networks, PDOs are transmitted as unconfirmed broadcast messages or sent from a producer device to a consumer device. The transmit PDO from the producer device has a specific identifier that corresponds to the receive PDO of the consumer devices.

PE

protective ground. A return line across the bus to keep improper currents generated at a sensor or actuator device out of the control system.

peer-to-peer communications

In peer-to-peer communications, there is no master/slave or client/server relationship. Messages are exchanged between entities of comparable or equivalent levels of functionality, without having to go through a third party (like a master device).

PLC

programmable logic controller. The PLC is the brain of an industrial manufacturing process. It automates a process as opposed to relay control systems. PLCs are computers suited to survive the harsh conditions of the industrial environment.

PowerSuite Software

PowerSuite Software is a tool for configuring and monitoring control devices for electric motors, including ATV31x, ATV71, and TeSys U.

preferred module

An I/O module that functions as an auto-addressable device on an Advantys STB Island but is not in the same form factor as a standard Advantys STB I/O module and therefore does not fit in an I/O base. A preferred device connects to the Island bus via an EOS module and a length of a preferred module extension cable. It can be extended to another preferred module or back into a BOS module. If it is the last device on the Island, it should be terminated with a 120 Ω terminator.

premium network interface

A premium NIM has advanced features over a standard or basic NIM.

prioritization

An optional feature on a standard NIM that allows you to selectively identify digital input modules to be scanned more frequently during a the NIM’s logic scan.

process I/O

An Advantys STB I/O module designed for operation at extended temperature ranges in conformance with IEC type 2 thresholds. Modules of this type often feature high levels of on-board diagnostics, high resolution, user-configurable parameter options, and higher levels of agency approval.

process image

A part of the NIM firmware that serves as a real-time data area for the data exchange process. The process image includes an input buffer that contains current data and status information from the Island bus and an output buffer that contains the current outputs for the Island bus, from the fieldbus master.

producer/consumer model

In networks that observe the producer/consumer model, data packets are identified according to their data content rather than by their node address. All nodes *listen* on the network and consume those data packets that have appropriate identifiers.

Profibus DP

Profibus Decentralized Peripheral. An open bus system that uses an electrical network based on a shielded 2-wire line or an optical network based on a fiber-optic cable. DP transmission allows for high-speed, cyclic exchange of data between the controller CPU and the distributed I/O devices.

Q

QoS

(quality of service). The practice of assigning different priorities to traffic types for the purpose of regulating data flow on the network. In an Industrial network, QoS can help provide a predictable level of network performance.

R

reflex action

A simple, logical command function configured locally on an Island bus I/O module. Reflex actions are executed by Island bus modules on data from various Island locations, like input and output modules or the NIM. Examples of reflex actions include compare and copy operations.

repeater

An interconnection device that extends the permissible length of a bus.

reverse polarity protection

Use of a diode in a circuit to help protect against damage and unintended operation in the event that the polarity of the applied power is accidentally reversed.

rms

root mean square. The effective value of an alternating current, corresponding to the DC value that produces the same heating effect. The rms value is computed as the square root of the average of the squares of the instantaneous amplitude for 1 complete cycle. For a sine wave, the rms value is 0.707 times the peak value.

role name

A customer-driven, unique logical personal identifier for an Ethernet NIM. A role name (or *device name*) is created when you:

- combine the numeric rotary switch setting with the NIM (for example, STBNIP2212_010), or . . .
- edit the **Device Name** setting in the NIM's embedded web server pages

After the NIM is configured with a valid role name, the DHCP server uses it to identify the island at power up.

RSTP

(rapid spanning tree protocol). Allows a network design to include spare (redundant) links that provide automatic backup paths when an active link becomes inoperable, without loops or manual enabling/disabling of backup links. Loops should be avoided because they result in flooding the network.

RTD

resistive temperature detect. An RTD device is a temperature transducer composed of conductive wire elements typically made of platinum, nickel, copper, or nickel-iron. An RTD device provides a variable resistance across a specified temperature range.

RTP

run-time parameters. RTP lets you monitor and modify selected I/O parameters and Island bus status registers of the NIM while the Advantys STB Island is running. The RTP feature uses 5 reserved output words in the NIM’s process image (the RTP request block) to send requests, and 4 reserved input words in the NIM’s process image (the RTP response block) to receive responses. Available only in standard NIMs running firmware version 2.0 or higher.

Rx

reception. For example, in a CAN-based network, a PDO is described as an RxPDO of the device that receives it.

S

SAP

service access point. The point at which the services of 1 communications layer, as defined by the ISO OSI reference model, is made available to the next layer.

SCADA

supervisory control and data acquisition. Typically accomplished in industrial settings by means of microcomputers.

SDO

service data object. In CAN-based networks, SDO messages are used by the fieldbus master to access (read/write) the object directories of network nodes.

segment

A group of interconnected I/O and power modules on an Island bus. An Island should have at least 1 segment and, depending on the type of NIM used, may have as many as 7 segments. The first (leftmost) module in a segment needs to provide logic power and Island bus communications to the I/O modules on its right. In the primary or basic segment, that function is filled by a NIM. In an extension segment, that function is filled by an STB XBE 1200 or an STB XBE 1300 BOS module.

SELV

safety extra low voltage. A secondary circuit designed so that the voltage between any 2 accessible parts (or between 1 accessible part and the PE terminal for Class 1 equipment) does not exceed a specified value under normal conditions or under single-fault conditions.

SIM

subscriber identification module. Originally intended for authenticating users of mobile communications, SIMs now have multiple applications. In Advantys STB, configuration data created or modified with the Advantys Configuration Software can be stored on a SIM (referred to as the “removable memory card”) and then written to the NIM’s Flash memory.

single-ended inputs

An analog input design technique whereby a wire from each signal source is connected to the data acquisition interface, and the difference between the signal and ground is measured. For the success of this design technique, 2 conditions are imperative: the signal source should be grounded, and the signal ground and data acquisition interface ground (the PDM lead) should have the same potential.

sink load

An output that, when turned on, receives DC current from its load.

size 1 base

A mounting device, designed to seat an STB module, install it on a DIN rail, and connect it to the Island bus. It is 13.9 mm (0.55 in.) wide and 128.25 mm (5.05 in.) high.

size 2 base

A mounting device, designed to seat an STB module, install it on a DIN rail, and connect it to the Island bus. It is 18.4 mm (0.73 in.) wide and 128.25 mm (5.05 in.) high.

size 3 base

A mounting device, designed to seat an STB module, install it on a DIN rail, and connect it to the Island bus. It is 28.1 mm (1.11 in.) wide and 128.25 mm (5.05 in.) high.

slice I/O

An I/O module design that combines a small number of channels (between 2 and 6) in a small package. The idea is to allow a system developer to purchase just the right amount of I/O and to be able to distribute it around the machine in an efficient, mechatronics way.

SM_MPS

state management_message periodic services. The applications and network management services used for process control, data exchange, diagnostic message reporting, and device status notification on a Fipio network.

SNMP

simple network management protocol. The UDP/IP standard protocol used to manage nodes on an IP network.

snubber

A circuit generally used to suppress inductive loads—it consists of a resistor in series with a capacitor (in the case of an RC snubber) and/or a metal-oxide varistor placed across the AC load.

source load

A load with a current directed into its input; has to be driven by a current source.

standard I/O

Any of a subset of Advantys STB input/output modules designed at a moderate cost to operate with user-configurable parameters. A standard I/O module may be reconfigured with the Advantys Configuration Software and, in most cases, may be used in reflex actions.

standard network interface

An Advantys STB network interface module designed at moderate cost to support the configuration capabilities, multi-segment design and throughput capacity suitable for most standard applications on the Island bus. An Island run by a standard NIM can support up to 32 addressable Advantys STB and/or preferred I/O modules, up to 12 of which may be standard CANopen devices.

standard power distribution module

An Advantys STB module that distributes sensor power to the input modules and actuator power to the output modules over two separate power buses on the Island. The bus provides a maximum of 4 A to the input modules and 8 A to the output modules. A standard PDM requires a 5 A fuse for the input modules and an 8 A fuse for the outputs.

STD_P

standard profile. On a Fipio network, a standard profile is a fixed set of configuration and operating parameters for an agent device, based on the number of modules that the device contains and the device's total data length. There are 3 types of standard profiles: Fipio reduced device profile (FRD_P), Fipio standard device profile (FSD_P), and the Fipio extended device profile (FED_P).

stepper motor

A specialized DC motor that allows discrete positioning without feedback.

subnet

A part of a network that shares a network address with the other parts of a network. A subnet may be physically and/or logically independent of the rest of the network. A part of an internet address called a subnet number, which is ignored in IP routing, distinguishes the subnet.

surge suppression

The process of absorbing and clipping voltage transients on an incoming AC line or control circuit. Metal-oxide varistors and specially designed RC networks are frequently used as surge suppression mechanisms.

T

TC

thermocouple. A TC device is a bimetallic temperature transducer that provides a temperature value by measuring the voltage differential caused by joining together two different metals at different temperatures.

TCP

transmission control protocol. A connection-oriented transport layer protocol that provides full-duplex data transmission. TCP is part of the TCP/IP suite of protocols.

telegram

A data packet used in serial communication.

TFE

transparent factory Ethernet. Schneider Electric’s open automation framework based on TCP/IP.

Tx

transmission. For example, in a CAN-based network, a PDO is described as a TxPDO of the device that transmits it.

U

UDP

user datagram protocol. A connectionless mode protocol in which messages are delivered in a datagram to a destination computer. The UDP protocol is typically bundled with the Internet Protocol (UPD/IP).

V

varistor

A 2-electrode semiconductor device with a voltage-dependant nonlinear resistance that drops markedly as the applied voltage is increased. It is used to suppress transient voltage surges.

voltage group

A grouping of Advantys STB I/O modules, all with the same voltage requirement, installed directly to the right of the appropriate power distribution module (PDM) and separated from modules with different voltage requirements. Install modules with different voltage requirements in different voltage groups.

VPCR object

virtual placeholder configuration read object. A special object that appears in the CANopen object dictionary when the remote virtual placeholder option is enabled in a CANopen NIM. It provides a 32-bit subindex that represents the actual module configuration used in a physical Island.

VPCW object

virtual placeholder configuration write object. A special object that appears in the CANopen object dictionary when the remote virtual placeholder option is enabled in a CANopen NIM. It provides a 32-bit subindex where the fieldbus master can write a module reconfiguration. After the fieldbus writes to the VPCW subindex, it can issue a reconfiguration request to the NIM that begins the remote virtual placeholder operation.

W

watchdog timer

A timer that monitors a cyclical process and is cleared at the conclusion of each cycle. If the watchdog runs past its programmed time period, it reports a time-out.

Index

I

K

L

O

P

R

S

U