Altivar Process ATV600
Variable Speed Drives for Asynchronous and Synchronous Motors

BACnet MS/TP Manual - VW3A3725

11/2017

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical character-istics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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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.

Failure to observe this information can result in injury or equipment damage.

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.

Qualification Of Personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product, by changing the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used. All persons working on and with the product must be fully familiar with all applicable standards, directives, and accident prevention regulations when performing such work.

Intended Use

This product is a drive for three-phase synchronous, asynchronous motors and intended for industrial use according to this manual. The product may only be used in compliance with all applicable safety standard and local regulations and directives, the specified requirements and the technical data. The product must be installed outside the hazardous ATEX zone. Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety measures must be implemented.Since the product is used as a component in an entire system, you must ensure the safety of persons by means of the design of this entire system (for example, machine design). Any use other than the use explicitly permitted is prohibited and can result in hazards. Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel.

Product Related Information

Read and understand these instructions before performing any procedure with this drive.

⚡ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation and who have received safety training to recognize and avoid hazards involved are authorized to work on and with this drive system. Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- The system integrator is responsible for compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Many components of the product, including the printed circuit boards, operate with mains voltage.
- Only use properly rated, electrically insulated tools and measuring equipment.
- Do not touch unshielded components or terminals with voltage present.
- Motors can generate voltage when the shaft is rotated. Prior to performing any type of work on the drive system, block the motor shaft to prevent rotation.
- AC voltage can couple voltage to unused conductors in the motor cable. Insulate both ends of unused conductors of the motor cable.
- Do not short across the DC bus terminals or the DC bus capacitors or the braking resistor terminals.
- Before performing work on the drive system:
  - Disconnect all power, including external control power that may be present. Take into account that the circuit breaker or main switch does not de-energize all circuits.
  - Place a **Do Not Turn On** label on all power switches related to the drive system.
  - Lock all power switches in the open position.
  - Wait 15 minutes to allow the DC bus capacitors to discharge.
  - Follow the instructions given in the chapter "Verifying the Absence of Voltage" in the installation manual of the product.

- Before applying voltage to the drive system:
  - Verify that the work has been completed and that the entire installation cannot cause hazards.
  - If the mains input terminals and the motor output terminals have been grounded and short-circuited, remove the ground and the short circuits on the mains input terminals and the motor output terminals.
  - Verify proper grounding of all equipment.
  - Verify that all protective equipment such as covers, doors, grids is installed and/or closed.

Failure to follow these instructions will result in death or serious injury.

Drive systems may perform unexpected movements because of incorrect wiring, incorrect settings, incorrect data or other errors.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Carefully install the wiring in accordance with the EMC requirements.
- Do not operate the product with unknown or unsuitable settings or data.
- Perform a comprehensive commissioning test.

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

Damaged products or accessories may cause electric shock or unanticipated equipment operation.

⚠ ⚠ DANGER
ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION
Do not use damaged products or accessories.
Failure to follow these instructions will result in death or serious injury.

Contact your local Schneider Electric sales office if you detect any damage whatsoever.

⚠ WARNING
LOSS OF CONTROL
- The designer of any control scheme must consider the potential failure modes of control paths and, for critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop, overtravel stop, power outage and restart.   - Separate or redundant control paths must be provided for critical control functions.   - System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.   - Observe all accident prevention regulations and local safety guidelines (1).   - Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

(1) For USA: Additional information, refer to NEMA ICS 1.1 (latest edition), Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control and to NEMA ICS 7.1 (latest edition), Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.

NOTICE
DESTRUCTION DUE TO INCORRECT MAINS VOLTAGE
Before switching on and configuring the product, verify that it is approved for the mains voltage
Failure to follow these instructions can result in equipment damage.

The temperature of the products described in this manual may exceed 80 °C (176 °F) during operation.

⚠ WARNING
HOT SURFACES
- Ensure that any contact with hot surfaces is avoided.   - Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.   - Verify that the product has sufficiently cooled down before handling it.   - Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

⚠ DANGER
POTENTIAL FOR EXPLOSION
Install and use this equipment in non-hazardous locations only.
Failure to follow these instructions will result in death or serious injury.

Machines, controllers, and related equipment are usually integrated into networks. Unauthorized persons and malware may gain access to the machine as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to software and networks.

⚠ WARNING
UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE AND NETWORKS
● In your hazard and risk analysis, consider all hazards that result from access to and operation on the network/fieldbus and develop an appropriate cyber security concept. ● Verify that the hardware infrastructure and the software infrastructure into which the machine is integrated as well as all organizational measures and rules covering access to this infrastructure consider the results of the hazard and risk analysis and are implemented according to best practices and standards covering IT security and cyber security (such as: ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/ IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security). ● Verify the effectiveness of your IT security and cyber security systems using appropriate, proven methods.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING
LOSS OF CONTROL
● Perform a comprehensive commissioning test to verify that communication monitoring properly detects communication interruptions
Failure to follow these instructions can result in death, serious injury, or equipment damage.

About the Book

At a Glance

Document Scope

The purpose of this document is to:
- Show you how to install the BACnet fieldbus module on the drive.
- Show how to configure ATV600 drive to use BACnet for monitoring and control
- Provides example of setup using Continuum Software for BCX1 controllers.

NOTE: Read and understand this document and all related documents (see below) before installing, operating, or maintaining the drive.

Validity Note

Original instructions and information given in this manual is written in English (before optional translation).

This documentation is valid for the Altivar Process drives.

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

Use your tablet or your PC to quickly access detailed and comprehensive information on all our products on www.schneider-electric.com.

The internet site provides the information you need for products and solutions:
- The whole catalog for detailed characteristics and selection guides,
- The CAD files to help design your installation, available in over 20 different file formats,
- All software and firmware to maintain your installation up to date,
- A large quantity of White Papers, Environment documents, Application solutions, Specifications... to gain a better understanding of our electrical systems and equipment or automation,
- And finally all the User Guides related to your drive, listed below:

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

Title of Documentation	Catalog Number
Catalog: Altivar Process ATV600 variable speed drives	DIA2ED2140502EN (English), DIA2ED2140502FR (French)
ATV600 Getting Started	EAV63253 (English), EAV63254 (French), EAV63255 (German), EAV63256 (Spanish), EAV63257 (Italian), EAV64298 (Chinese)
ATV600 Getting Started Annex (SCCR)	EAV64300 (English)
ATV630, ATV650 Installation Manual	EAV64301 (English), EAV64302 (French), EAV64306 (German), EAV64307 (Spanish), EAV64310 (Italian), EAV64317 (Chinese), EAV64301PT (Portuguese)
ATV600 Programming Manual	EAV64318 (English), EAV64320 (French), EAV64321 (German), EAV64322 (Spanish), EAV64323 (Italian), EAV64324 (Chinese), EAV64318PT (Portuguese)
ATV600 Modbus Serial Link Manual (Embedded)	EAV64325 (English)
ATV600 Ethernet Manual (Embedded)	EAV64327 (English)
ATV600 Ethernet IP - Modbus TCP Manual (VW3A3720, 721)	EAV64328 (English)
ATV600 BACnet MS/TP Manual (VW3A3725)	QGH66984 (English)
ATV600 PROFIBUS DP manual (VW3A3607)	EAV64329 (English)
ATV600 DeviceNet manual (VW3A3609)	EAV64330 (English)
ATV600 PROFINET manual (VW3A3627)	EAV64331 (English)
ATV600 CANopen Manual (VW3A3608, 618, 628)	EAV64333 (English)
ATV600 Communication Parameters	EAV64332 (English)
ATV600 Embedded Safety Function manual	EAV64334 (English)
Altivar Process Drive Systems Installation manual	NHA37119 (English), NHA37121 (French), NHA37118 (German), NHA37122 (Spanish), NHA37123 (Italian), NHA37130 (Chinese), NHA37124 (Dutch - End of 2017), NHA37126 (Polish), NHA37127 (Portuguese), NHA37129 (Turkish)
ATV660 Handbook	NHA37111 (English), NHA37110 (German)
ATV680 Handbook	NHA37113 (English), NHA37112 (German)
ATV600F, ATV900F Installation Instruction sheet	NVE57369 (English)
ATV600, ATV900 ATEX manual	NVE42416 (English)
SoMove: FDT	SoMove_FDT (English, French, German, Spanish, Italian, Chinese)
ATV600: DTM	ATV6xx_DTM_Library_EN (English - to be installed first), ATV6xx_DTM_Lang_FR (French), ATV6xx_DTM_Lang_DE (German), ATV6xx_DTM_Lang_SP (Spanish), ATV6xx_DTM_Lang_IT (Italian), ATV6xx_DTM_Lang_CN (Chinese)
Application Note: ATV600 Multi Drives Booster Control Optimized	QGH36060 (English)
Application Note: ATV600 Multi Masters Booster Control Pressure Feedback with Service Continuity	QGH36061 (English)

Title of Documentation	Catalog Number
Application Note: ATV600 Multi Drives Standard Level Control	*QGH36059* (English)

Terminology

The technical terms, terminology, and the corresponding descriptions in this manual normally use the terms or definitions in the relevant standards.

In the area of drive systems this includes, but is not limited to, terms such as **error, error message, failure, fault, fault reset, protection, safe state, safety function, warning, warning message**, and so on.

Among others, these standards include:
- IEC 61800 series: Adjustable speed electrical power drive systems
- IEC 61508 Ed.2 series: Functional safety of electrical/electronic/programmable electronic safety-related
- EN 954-1 Safety of machinery - Safety related parts of control systems
- ISO 13849-1 & 2 Safety of machinery - Safety related parts of control systems
- IEC 61158 series: Industrial communication networks - Fieldbus specifications
- IEC 61784 series: Industrial communication networks - Profiles
- IEC 60204-1: Safety of machinery - Electrical equipment of machines – Part 1: General requirements

In addition, the term **zone of operation** is used in conjunction with the description of specific hazards, and is defined as it is for a **hazard zone** or **danger zone** in the EC Machinery Directive (2006/42/EC) and in ISO 12100-1.

Also see the glossary at the end of this manual.

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Chapter 1
Presentation

What Is in This Chapter?

This chapter contains the following topics:

Hardware Overview

General

The VW3A3725 is a BACnet MS/TP fieldbus module that can be used on BACnet MS/TP fieldbus architectures.

The figure shows the hardware presentation of the VW3A3725 BACnet MS/TP fieldbus module:

Software Overview

About BACnet

BACnet fieldbus was developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, INC. (ASHRAE).

This fieldbus allows integration of devices from different manufacturers in building automation control systems.

Within BACnet, it is possible to display and configure device properties in the same way.

What Is a BACnet Network

A BACnet network is a transport (LAN or WAN) that carries data from device to device, within a network and between networks. A BACnet network can be a high-speed backbone network:
● Ethernet
● BACnet/IP

It can also be a fieldbus network
● Master-Slave/Token-Passing (BACnet MS/TP)
● ARCNET
● LonTalk
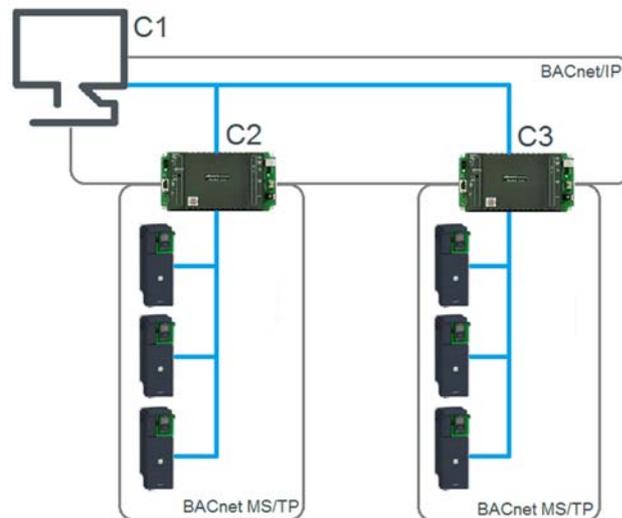
Chapter 2
Basics

What Is in This Chapter?

This chapter contains the following topics:

BACnet Devices

About BACnet Devices

A BACnet device conforms to the BACnet standard. The device can perform following services:
- Building controller
- Field controller
- Router
- Gateway
- End device (for example, a sensor or actuator)

Devices in a building are networked as peer-to-peer devices, slave devices, or master/slave devices.

Device Identifiers

The following table gives the structure of BACnet device identification characteristics for MS/TP networks:

Identifier	Description	Valid Numeric Values
Device identifier	This instance number is unique to the device across many different networks that comprise a BACnet system.	1…4194303
Network number	This number is unique to the network to which the device belongs.	1…65535
MAC address	This address is unique only within its own network.	1…254

NOTE: A MAC address is typically read from DIP switches or from non-volatile memory. Some devices auto-assign MAC addresses when devices are placed on the network.

BACnet devices can have input/output functionality or no input/output functionality.

BACnet Device Profiles and BIBBs

About BACnet Device Profiles

The BACnet standard identifies 6 device types, also known as device profiles:
- BACnet Operator Workstation (B-OWS)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Actuator (B-SA)
- BACnet Smart Sensor (B-SS)

VW3A3725 Supported Device Profile

The VW3A3725 fieldbus module supports the BACnet Application Specific Control (B-ASC) profile. This profile contains the following services according to ASHRAE 135-2016:
- DS-RP-B: Data Sharing - Read Property
- DS-RPM-B: Data Sharing - Read Property Multiple
- DS-WP-B: Data Sharing - Write Property
- DS-WPM-B: Data Sharing - Write Property Multiple
- DS-COV-B: Subscribe, confirm COV
- DM-DDB-B: Device Management - Dynamic Device Binding
- DM-DOB-B: Device Management - Dynamic Object Binding
- DM-DCC-B: Device Management - Device Communication Control
- DM-RD-B: Device Management - Reinitialize Device

About BIBBs

BACnet Interoperability Building Blocks (BIBBs) are collections of BACnet services.

VW3A3725 BIBBs

The following table shows the services supported by the fieldbus module:

BACnet Service	BIBB	Family	Description
ReadProperty	DS-RP-B	Data Sharing	Provide the current value of one object property
WriteProperty	DS-WP-B	Data Sharing	Modify the current value of one object property
WriteMultipleProperty	DS-WPM-B	Data Sharing	Write several properties of several objects
ReadMultipleProperty	DS-RPM-B	Data Sharing	Read several properties of several objects
SubscribeCOV	DS-COV-B	Data Sharing	The drive accepts subscription and sends COV notification to the remote device.
ConfirmedCOVNotification			
UnconfirmedCOVNotification			
Who-Is	DM-DDB-B	Device Management	The device provides information about its attributes and answers to request to identify itself.
I-am	DM-DDB-B	Device Management	
Who-Has	DM-DOB-B	Device Management	The device provides address information about its objects upon request.
I-Have	DM-DOB-B	Device Management	
ReinitializeDevice.	DM-RD-B	Device Management	The device performs reinitialization requests when requested.

NOTE: The VW3A3725 supports only the values `COLDSTART` and `WARMSTART` for the `ReinitializeDevice` service. It can be used to restart the communication.

BACnet Object

About BACnet Objects

BACnet objects are the logical representation of system data. Objects represent data that originate in physical inputs, physical outputs, or software processes (for example, single physical points or logical groupings / collections of points) that perform a specific function.

VW3A3725 Supported Objects

The VW3A3725 fieldbus module supports the following objects:

Objects	Description
Device (DV)	Defines the device characteristics
Analog Value (AV)	Control objects analog values
Binary Value (BV)	Control objects binary values
Analog inputs (AI)	Analog inputs status
Analog outputs (AO)	Analog outputs status and control
Binary Inputs (BI)	Binary Inputs status
Binary Outputs (BO)	Binary Outputs status and control

NOTE: The complete description of BACnet objects supported by the fieldbus module can be found in Appendix A .

BACnet Properties

About BACnet Properties

Objects are examined and controlled by a set of properties that belong to each object. A property contains the smallest piece of BACnet information, and it has a name and a value.

For every object, the BACnet standard requires some specific properties while others are optional. Some other properties can be manufacturer-specific.

VW3A3725 Properties

The VW3A3725 fieldbus module supports the following object properties:

Property	Property Data Type	Description
OBJECT_IDENTIFIER	BACnetObjectIdentifier	Identifier is a numeric code unique within the device.
OBJECT_NAME	Character string	Represent a name for the object that is unique within the device. User can edit the object name.The minimum size is fixed to 1 character, maximum 16.The default value of OBJECT_NAME per object is defined in object description.
OBJECT_TYPE	BACnetObjectType	Value of this property depends on the object.
SYSTEM_STATUS	BACnetDeviceStatus	Reflects the current physical status of the device: ● OPERATIONAL: is TRUE if device status is not in error ● OPERATIONAL_READ_ONLY: not supported by the device ● DOWNLOAD_IN_PROGRESS: indicates that a configuration download is in progress ● NON_OPERATIONAL: is TRUE if device is in error ● BACKUP_IN_PROGRESS: indicates that a configuration upload is in progress
VENDOR_NAME	Character string	Schneider Electric
VENDOR_IDENTIFIER	U16	10
MODEL_NAME	Character string	Indicates the drive reference
FIRMWARE_REVISION	Character string	Indicates the drive firmware version
APPLICATION_SOFTWARE_VERSION	Character string	Indicates the fieldbus module firmware version
PROTOCOL_VERSION	U16	Provide the current version of protocol
PROTOCOL_CONFORMANCE_CLASS	U16	Provide the conformance class of protocol
PROTOCOL_SERVICES_SUPPORTED	BACnetServicesSupported	Indicates which standardized protocol services are supported
PROTOCOL_OBJECT_TYPES_SUPPORTED	BACnetServicesSupported	Indicates which standardized objects are supported
OBJECT_LIST_COUNT	BACnetArray[N] of BACnetObjectIdentifier	Return the exact number of objects supported by the fieldbus module. The object count can change depending on the drive hardware configuration (presence of I/O extension modules or not for example)
MAX_APDU_LENGTH_ACCEPTED	U16	480

Property	Property Data Type	Description
SEGMENTATION_SUPPORTED	BACnetSegmentation	Indicates whether the device support segmentation. Refer to ASHRAE 12,11,19
APDU_TIMEOUT	U16	Return value of $t\,L\,P$ parameter
NUMBER_OF_APDU_RETRIES	U16	Indicates the maximum number of time that an APDU shall be retransmitted
MAX_MASTER	U16	Return value of $\Pi\,\Pi_n$ parameter
MAX_INFO_FRAMES	U16	Return value of $\Pi_{\,\iota}F$ parameter.
DEVICE_ADDRESS_BINDING	List of BACnetAdressBinding	–
DATABASE_REVISION	–	–
PRESENT_VALUE	Depends on object used.	Reflect the current value of the object
STATUS_FLAG	BACnetStatusFlag	Represents 4 boolean flag that indicates the status of the object: ● IN_ALARM: Not supported by the fieldbus module ● FAULT: Not supported by the fieldbus module ● OVERRIDEN: indicates that the present value is coming from prioritization ● OUT_OF_SERVICE: if OUT_OF_SERVICE is true
EVENT_STATE	BACnetEventState	Objects do not support intrinsic reporting. Value is NORMAL
OUT_OF_SERVICE	Boolean	Indicate wheter (TRUE) or not (FALSE) the object is in service. This property is used for local matter and has to be set by the user.
UNITS	BACnetEngineeringUnits	Displays the unit of the object.
PRIORITY_ARRAY	BACnetPriorityArray	Contains prioritized commands that are in effect for this object.
RELINQUISH_DEFAULT	Depends on object used.	Defines the value to be used when all command priority values in priority array are NULL.
POLARITY	BACnetPolarity	Indicate the relationship between the physical state and the logical state of the input. Polarity is local matter and has to be set by the end user.
ACTIVE_TEXT	Character string	Represent the text displayed to the final user when PRESENT_VALUE is ACTIVE.
INACTIVE_TEXT	Character string	Represent the text displayed to the final user when PRESENT_VALUE is INACTIVE.
COV INCREMENT	Real	Specify the minimum change of PRESENT_VALUE that will trigger a COV notification.

NOTE: The complete description of BACnet objects supported by the fieldbus module can be found in Appendix A .

BACnet Change of Value

Change of Value

The Change of Value (COV) service allows a client to subscribe to an object.

The device will send a notification according to the following conditions.
- For binary values objects, the notification is sent when the Present Value property changes.
- For analog values objects, the notification is sent when the Present Value property changes to a value greater than the COV increment configured.

Chapter 3
Hardware Setup

What Is in This Chapter?

This chapter contains the following topics:

Hardware Presentation

BACnet Fieldbus Module

The following figure shows the VW3A3725 BACnet module:

Firmware Version

VW3A3725 Compatibility

The VW3A3725 BACnet MS/TP module is compatible with ATV600 drives with, at least, V1.7 software version.

Installation of the Module

Before Starting

Check that the module catalog number marked on the label is the same as that on the delivery note corresponding to the purchase order.

Remove the fieldbus module from its packaging and check that it has not been damaged in transit.

Insertion of the Fieldbus Module

The table provides the procedure for insertion of the VW3A3725 BACnet module in the drive:

Step	Action
1	Ensure that the power is off.
2	Locate the fieldbus module slot (A) on the bottom of the control part.
3	Add the corresponding sticker on the LED front panel of the drive.
4	Insert the module.
5	Check that the module is correctly inserted and locked mechanically in the drive.
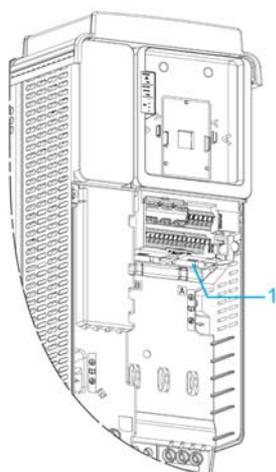
1 Slot A

Removal of the Fieldbus Module

The table provides the procedure for removal of the VW3A3725 BACnet module from the drive:

Step	Action
1	Ensure that the power is off.
2	Press the strip.
3	Remove the module while maintaining the strip pressed,

Electrical Installation

Pin Layout

The following table shows the wire connections for the 5-pin terminal blocks of VW3A3725 BACnet fieldbus module:

5-pin terminal block	BACnet MS/TP Pin Position	Signal
	A	Signal common
	B	Data -
	C	Shield
	D	Data +
	E	–
NOTE: ● The letters identifying the connector pins are included for illustrative purposes only, and do not appear on the device. ● Terminal tightening torque (max.): 0.56 - 0.79 n.m (5 - 7 lb.in)		

Maximum Number of Nodes

According EIA-485, the maximum number of nodes per segment is 32. Installation of repeaters allow the connection of additional nodes.

RS-485 Cable Specifications

Cables used to create the RS-485 network should conform to these specifications:

| Cable Type	Twisted-pair, copper wire, tinned **NOTE:** Use 60/75 or 75°C copper (CU) wire only, 14-30 AWG.
Shield	Braid
Nominal impedance	100-120 Ω
Velocity of Propagation	78 %
Capacitance	< 41.0105 pF/m (12.5 pF/ft) between conductors
	< 72.1784 pF/m (22 pF/ft) between the conductor connected to ground and the next conductor

Maximum Cable Length

Cable lengths of up 1200 m (4000 ft) daisy chained from device to device are supported.

A signal repeater is required after 1200 m (4000 ft) to add more nodes to the network or further extend the cabling.

Terminations

BACnet MS/TP EIA-485 networks do not have T connections. Terminator resistors of 120Ω are connected to both ends of the segment. Do not use other terminator resistors at intermediate nodes.

The following figure shows an EIA-485 network with three types of nodes:
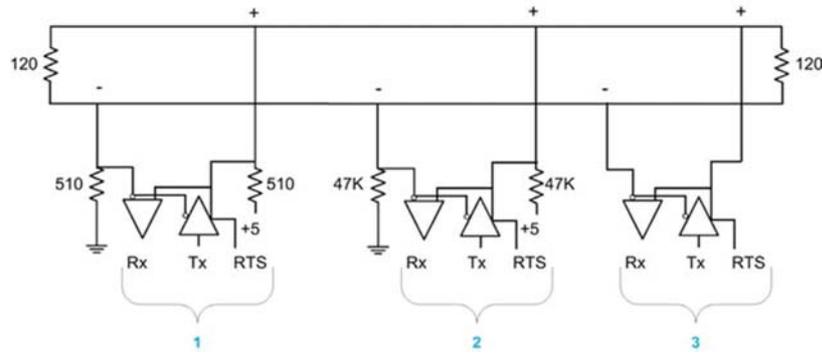
1 Node with network bias resistors
2 Node with local bias resistors
3 Node without bias resistors

NOTE: The VW3A3725 fieldbus modules are examples of node type 3.

RS-485 Termination

The BACnet MS/TP fieldbus requires a 120Ω terminator resistors at both ends of a daisy chain segment. Place the terminator resistors as close as possible to the modules at the end of the chain.

The following figure shows the connection of the terminator resistor on VW3A3725
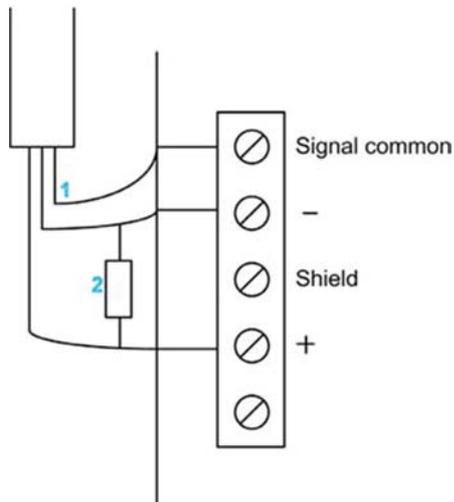
1 Signal common
2 Terminator resistor of 120 Ω ± 5%

BACnet MS/TP Network Configurations

Installation Topology

Daisy chain topology is the recommended topology to use on BACnet MS/TP networks. Star and ring networks are not supported.

Daisy chain configurations consist of a single cable that is routed to the first BACnet MS/TP device, the next device, and so on, in the sequence.

Unit Loads

A BACnet MS/TP network can support up to 32UL (Unit Loads) nodes per network segment. The unit load of a device can vary.

The VW3A3725 fieldbus module uses only a 0.5 UL.

Thus, if four VW3A3725 fieldbus modules are placed in the same network segment, their combined load is the equivalent of:(4 nodes) x (0.5 load/node) = 2UL.

In this case, the network segment could support these additional nodes:
- 30 1UL nodes
- 60 0.5UL nodes

Chapter 4
Software Setup

What Is in This Chapter?

This chapter contains the following sections:

Section 4.1
Basic Settings

What Is in This Section?

This section contains the following topics:

Configuring the Communication Parameters

Overview

The parameters are described according to the graphic display terminal. These settings are also possible from commissioning software.

Access

The parameters are accessible in the **[Communication]** $\mathit{C \, o \, \Pi}$ - , **[Comm Parameters]** $\mathit{C \, \Pi \, P}$ - , **[BACnet MS/TP]** $\mathit{b \, A \, C \, n}$ - menu.

[Address] *A d r C*

About This Parameter

This parameter defines the BACnet MS/TP slave address.

Access

This is a read/write parameter.

The parameter numbers is 6601.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
0...127	*0... 127*	0...127	BACnet MS/TP address. **Factory settings**: 0

[Bit rate] *b d r*

About This Parameter

This parameter defines the BACnet MS/TP baud rate.

Access

This is a read/write parameter.

The parameter number is 6603.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[Automatic] [9600 bsp] [19200 bps] [38.4 Kbps] [76.8 Kbps]	*Auto* *9600* *19200* *38400* *76800*	4 28 32 36 41	BACnet MS/TP baud rate. **Factory setting: [Automatic]**

[Frame format] *F o r*

About This Parameter

This parameter displays the BACnet MS/TP frame format.

Access

This is a read-only parameter.

The parameter number is 6604.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[8-N-1]	*8n1*	4	BACnet MS/TP frame format. **Factory setting**: [8-N-1]

[Fieldbus timeout] *t L P*

About This Parameter

This parameter defines the BACnet MS/TP fieldbus timeout.

NOTE: A **[Fieldbus Com Interrupt]** *C n F* error is triggered if the fieldbus module does not received any BACnet messages at its address within a defined time period defined by **[Fieldbus timeout]** *t L P* parameter.

Access

This is a read/write parameter.

The parameter address is 6605.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[0.1...60.0 s]	*1...6 0 0*	1...600	BACnet MS/TP timeout. **Factory setting**: 1.0 s

[Instance nb] *i n X P*

About This Parameter

This parameter defines the BACnet MS/TP device instance number.

Access

This is a read/write parameter

The parameter address is 6634.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[0...4194303]	*0...4 1 9 4 3 0 3*	0...4194303	BACnet MS/TP device instance number. **Factory setting**: 0

[Max master address] *П П n*

About This Parameter

This parameter defines the max master device address on the BACnet MS/TP subnetwork.

Access

This is a read/write parameter.

The parameter address is 6632.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[0...127]	*0... 1 2 7*	0...255	Max master device address on the subnetwork. **Factory setting**: 127

[Max info frames] *Ⲙ ⲓ F*

About This Parameter

This parameter defines the maximum number of frames that can be send before passing token to the next master.

Access

This is a read/write parameter.

The parameter number is 6633.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[1...100]	*I... I◻◻*	1...100	Maximum information frames. **Factory setting**: 10

[Data rate used] *b d r u*

About This Parameter

This parameter displays the current baud rate.

Access

This is a read-only parameter.

The parameter number is 6660.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[Automatic] [9600 bsp] [19200 bps] [38.4 Kbps] [76.8 Kbps]	*Auto* *9600* *19200* *38400* *76800*	4 28 32 36 41	BACnet MS/TP current baud rate. **Factory setting: [Automatic]**

[Rx frame count] *t F C r*

About This Parameter

This parameter displays the total number of received frames.

Access

This is a read-only parameter.

The parameter number is 6661.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[0...65535]	*0...6 5 5 3 5*	0...65535	Total number of received frames. **Factory setting**: –

[Incorrect frame count] *E F C*

About This Parameter

This parameter displays the total number of incorrect frames received.

Access

This is a read-only parameter.

The parameter number is 6662.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[0...65535]	*0...6 5 5 3 5*	0...65535	Total number of incorrect frames received. **Factory setting**: –

[Tx frame count] *t F C t*

About This Parameter

This parameter displays the total number of transmitted frames.

Access

This is a read-only parameter.

The parameter number is 6664.

Possible Settings

The table presents the parameter settings:

Settings	Code	Value	Description
[0...65535]	*0...6 5 5 3 5*	0...65535	Total number of transmitted frames. **Factory setting**: –

Section 4.2
Profile

What Is in This Section?

This section contains the following topics:

Definition of a Profile

Types of Profiles

There are 3 types of profile:
- Communication profiles
- Functional profiles
- Application profiles

Communication Profile

A communication profile describes the characteristics of a bus or network:
- Cables
- Connectors
- Electrical characteristics
- Access protocol
- Addressing system
- Periodic exchange service
- Messaging service
- ...

A communication profile is unique to a type of fieldbus (such as Modbus, PROFIBUS DP, and so on) and is used by different types of devices.

Functional Profile

A functional profile describes the behavior of a type of device:
- Functions
- Parameters (such as name, format, unit, type, and so on.)
- Periodic I/O variables
- State chart
- ...

A functional profile is common to all members of a device family (such as variable speed drives, encoders, I/O modules, displays, and so on).

They can feature common or similar parts. The standardized (IEC 61800-7) functional profiles of variable speed drives are:
- CiA402
- PROFIDRIVE
- CIP AC Drive

CiA402 device profile for drives and motion control represents the next stage of this standard development and is now part of the IEC 61800-7 standard.

Application Profile

Application profile defines the services to be provided by the devices on a machine. For example, CiA DSP 417-2 V 1.01 part 2: CANopen application profile for lift control systems - virtual device definitions.

Interchangeability

The aim of communication and functional profiles is to achieve interchangeability of the devices connected via the fieldbus.

Functional Profiles Supported by the Drive

I/O Profile

Using the I/O profile simplifies PLC programming.

The I/O profile mirrors the use of the terminal strip for control by utilizing 1 bit to control a function.

The I/O profile for the drive can also be used when controlling via a fieldbus.The drive starts up as soon as the `run` command is sent.15 bits of the control word (bits 1...15) can be assigned to a specific function.

This profile can be developed for simultaneous control of the drive via:
● The terminals
● The Modbus control word
● The CANopen control word
● Ethernet Modbus TCP embedded control word
● The fieldbus module control word

The I/O profile is supported by the drive itself and therefore in turn by all the communication ports.

CiA402 Profile

The drive only starts up following a command sequence.

The control word is standardized.

5 bits of the control word (bits 11...15) can be assigned to a function.

The CiA402 profile is supported by the drive itself and therefore by all the communication ports.

The drive supports the `velocity` mode of CiA402 profile.

In the CiA402 profile, there are two modes that are specific to the drive and characterize commands and references value management:
● `Separate` **[Separate]** _5 E P_
● `Not separate` **[Not separ.]** _5 ı П,_

Functional Description

Introduction

Drive operation involves two main functions, which are illustrated in the diagrams below.

CiA402

The main parameters are shown with their CiA402 name and their CiA402/Drivecom index (the values in brackets are the CANopen addresses of the parameter).

The following figure shows the control diagram for drive operation:
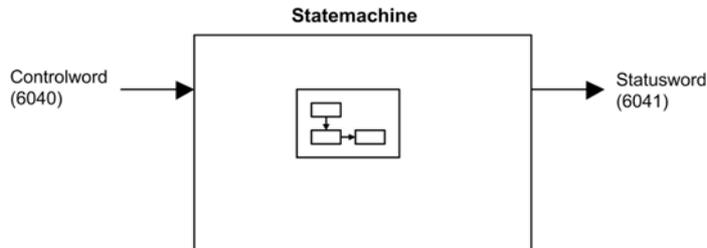
Simplified diagram for speed control in `Velocity` mode:
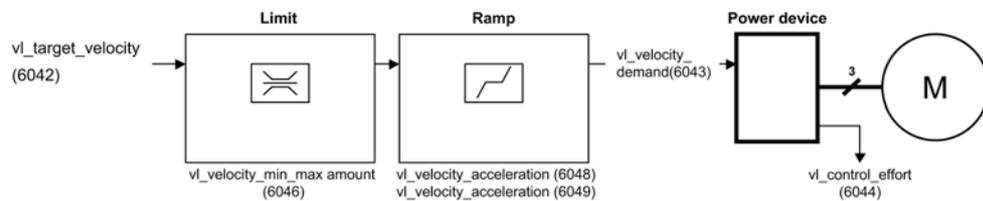
Altivar Drive

These diagrams translate as follows for the Altivar drive.

The following figure shows the control diagram for drive operation:
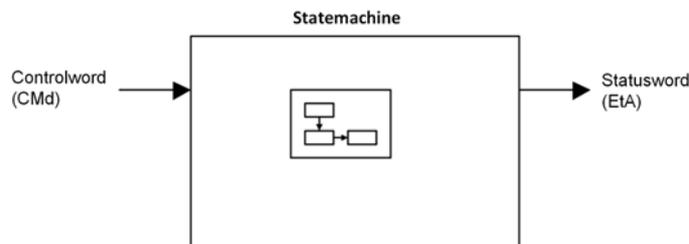
Simplified diagram for speed control in `Velocity` mode:
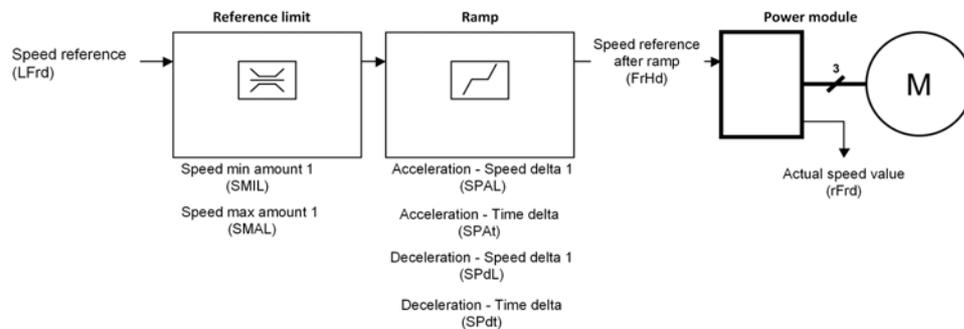
CIA402 Operating State Diagram

State Diagram

After switching on and when an operating mode is started, the product goes through a number of operating states.

The state diagram (state machine) shows the relationships between the operating states and the state transitions. The operating states are internally monitored and influenced by monitoring functions.

The following figure shows the CIA402 state diagram:
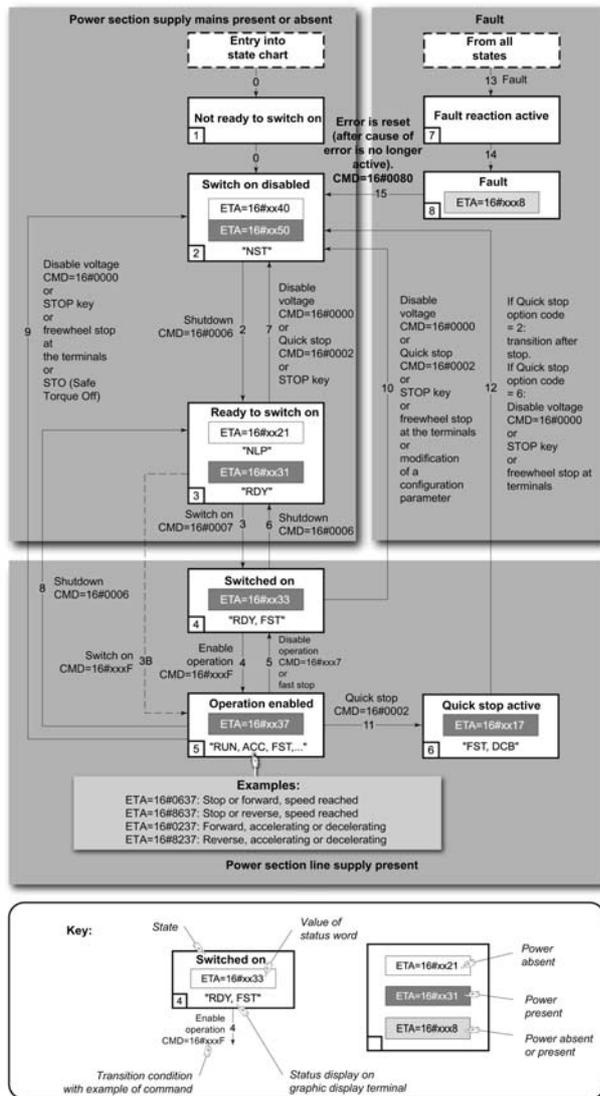
Description of Operating States

Drive Operating State

The operating state of the drive changes depending on whether the control word **[Cmd Register]** *C П d* , is sent or an event occurs (an error detection, for example).

The drive operating state can be identified by the value of the status word **[CIA402 State Reg]** *E t A* .

| Operating State	Description
`1 - Not ready to switch on`	Initialization starts. This is a transient state invisible to the communication network.
`2 - Switch on disabled`	The power stage is not ready to switch on. The drive is locked, no power is supplied to the motor. For a separate control stage, it is not necessary to supply the power. For a separate control stage with mains contactor, the contactor is not closed. The configuration and adjustment parameters can be modified.
`3 - Ready to switch on`	The power stage is ready to switch on and awaiting power stage supply mains. For a separate control stage, it is not necessary to supply the power stage, but the system expects it in order to change to state `4 - Switched on.` For a separate control stage with mains contactor, the contactor is not closed. The drive is locked, no power is supplied to the motor. The configuration and adjustment parameters can be modified.
`4 - Switched on`	Power stage is switched on. For a separate control stage, the power stage must be supplied. For a separate control stage with mains contactor, the contactor is closed. The drive is locked, no power is supplied to the motor. The power stage of the drive is ready to operate, but voltage has not yet been applied to the output. The adjustment parameters can be modified. If a configuration parameter is modified, the drive returns to the state `2 - Switch on disable .`
`5 - Operation enabled`	Power stage is enabled. The drive is in running state For a separate control stage, the power stage must be supplied. For a separate control stage with mains contactor, the contactor is closed. The drive is unlocked, power is supplied to the motor. The drive functions are activated and voltage is applied to the motor terminals. If the reference value is zero or the `Halt` command is applied, no power is supplied to the motor and no torque is applied. To perform **[Auto tuning]** *t u n* , the drive must be in state 5 - Operation enabled. The adjustment parameters can be modified. The configuration parameters cannot be modified. **NOTE:** The command `4 - Enable operation` must be taken into consideration only if the channel is valid. In particular, if the channel is involved in the command and the reference value, transition 4 is possible only after the reference value has been received once. The reaction of the drive to a `Disable operation` command depends on the value of the **[SwitchOnDisable Stp]** *d o t d* parameter: ● If the **[SwitchOnDisable Stp]** *d o t d* parameter is set to 0, the drive changes to operating state `4 - Switched on` and stops in freewheel stop. ● If the **[SwitchOnDisable Stp]** *d o t d* parameter is set to 1, the drive stops on ramp and then changes to operating state `4 - Switched on.`

Operating State	Description
6 – Quick stop active	The drive performs a fast stop and remains locked in the operating state `6-Quick stop active`. Before restarting the motor, it is required to go to the operating state `2-switch on disabled`. During fast stop, the drive is unlocked and power is supplied to the motor. The configuration parameters cannot be modified. The condition for transition 12 to state `2 – Switch on disabled` depends on the value of the parameter Quick stop mode (QStd): If the `Quick stop` mode parameter has the value FST2, the drive stops according to the fast stop ramp and then changes to state `2 – Switch on disabled`. If the `Quick stop` mode parameter has the value FST6, the drive stops according to the fast stop ramp and then remains in state `6 – Quick stop active` until: ● A `Disable voltage` command is received or ● The **STOP** key is pressed or ● A freewheel stop command via the digital input of the terminal.
7 – Fault reaction active	Transient state during which the drive performs an action corresponding to the selected error response.
8 – Fault	Error response terminated. Power stage is disabled. The drive is locked, no power is supplied to the motor.

Summary

Device Status Summary

Operating State	Power Stage Supply for Separate Control Stage	Power Supplied to Motor	Modification of Configuration Parameters
1 – Not ready to switch on	Not required	No	Yes
2 – Switch on disabled	Not required	No	Yes
3 – Ready to switch on	Not required	No	Yes
4 – Switched on	Required	No	Yes, return to 2 – Switch on disabled operating state
5 – Operation enabled	Required	Yes	No
6 – Quick stop active	Required	Yes, during fast stop	No
7 – Fault reaction active	Depends on error response configuration	Depends on error response configuration	–
8 – Fault	Not required	No	Yes

NOTE:
- Configuration parameters are described in communication parameter file as R/WS access type parameters. Other parameters can be accessed whatever the operating state.
- A Setting parameter can be accessed in all operating state of the drive.

Cmd Register $\mathcal{C}\ \Pi\ \mathcal{d}$

Bit Mapping of the Control Word

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault reset	Reserved (=0)	Reserved (=0)	Reserved (=0)	Enable operation	Quick stop	Enable voltage	Switch on
0 to 1 transition = Error is reset (after cause of error is no longer active)				1 = Run command	0 = Quick stop active	Authorization to supply AC power	Mains contactor control

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific assignable	Manufacturer specific assignable	Manufacturer specific assignable	Manufacturer specific assignable	Manufacturer specific	Reserved (=0)	Reserved (=0)	Halt
				0 = Forward direction asked 1= Reverse direction asked			Halt

Command	State Transition	Final Operating State	Bit 7 Fault Reset	Bit 3 Enable Operation	Bit 2 Quick Stop	Bit 1 Enable Voltage	Bit 0 Switch On	Example Value
Shutdown	2, 6, 8	3 – Ready to switch on	X	X	1	1	0	0006 hex
Switch on	3	4 – Switched on	X	X	1	1	1	0007 hex
Enable operation	4	5 – Operation enabled	X	1	1	1	1	000F hex
Disable operation	5	4 – Switched on	X	0	1	1	1	0007 hex
Disable voltage	7, 9, 10, 12	2 – Switch on disabled	X	X	X	0	X	0000 hex
Quick stop	11	6 – Quick stop active	X	X	0	1	X	0002 hex
	7, 10	2 – Switch on disabled						
Fault reset	15	2 – Switch on disabled	0 → 1	X	X	X	X	0080 hex
X: Value is of no significance for this command. 0→1: Command on rising edge.								

Stop Commands

Halt Command

The `Halt` command enables movement to be interrupted without having to leave the `5 - Operation enabled` state. The stop is performed in accordance with the [Type of stop] *5 t t* parameter.

If the `Halt` command is active, no power is supplied to the motor and no torque is applied.

Regardless of the assignment of the [Type of stop] *5 t t* parameter [Fast stop Assign] *F 5 t*, [Ramp stop] *r ΠP*, [Freewheel Stop] *n 5 t*, or [DC Injection Assign] *d C ι*, the drive remains in the `5 - Operation enabled` state.

Fast Stop Command

A `Fast Stop` command at the terminals or using a bit of the control word assigned to `Fast Stop` causes a change to the `4 - Switched on`

Freewheel Command

A `Freewheel Stop` command using a digital input of the terminal or a bit of the control word assigned to `Freewheel Stop` causes a change to operating state `2 - Switch on disabled.`

Assigning Control Word Bits

Function Codes

In the CiA402 profile, fixed assignment of a function input is possible using the following codes:

Bit	Fieldbus Module
Bit 11	C311
Bit 12	C312
Bit 13	C313
Bit 14	C314
Bit 15	C315

For example, to assign the DC injection braking to bit13 of a fieldbus module, simply configure the [DC Injection Assign] *d C ι* parameter with the [C313] *C 3 ι 3* value.

Bit 11 is assigned by default to the operating direction command [Reverse Assign] *r r 5*.

[CIA402 State Reg] $E t A$

Bit Mapping of the Status Word

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on
A warning is active	Power stage supply disabled	0 = Quick stop is active	Power stage supply present	Error detected	Running	Ready	1 = Awaiting power Stage supply

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer-specific Direction of rotation	Manufacturer-specific Stop via STOP key	Reserved (=0)	Reserved (=0)	Internal limit active	Target reached	Remote	Reserved (=0)
				Reference value outside limits	Reference value reached	Command or reference value via fieldbus	

| Operating State	Bit 6 Switch On Disabled	Bit 5 Quick Stop	Bit 4 Voltage Enabled	Bit 3 Fault	Bit 2 Operation Enabled	Bit 1 Switched On	Bit 0 Ready to Switch On	ETA Masked by 006F H [1]
1 –Not ready to switch on	0	X	X	0	0	0	0	–
2 –Switch on disabled	1	X	X	0	0	0	0	0040 hex
3 –Ready to switch on	0	1	X	0	0	0	1	0021 hex
4 – Switched on	0	1	1	0	0	1	1	0023 hex
5 – Operation enabled	0	1	1	0	1	1	1	0027 hex
6 –Quick stop active	0	0	1	0	1	1	1	0007 hex
7 –Fault reaction active	0	X	X	1	1	1	1	002F hex
8 –Fault	0	X	X	1	0	0	0	0008 hex[2]...0028 hex
[1] This mask can be used by the PLC program to test the diagram state. [2] detected error following operating state 6 – Quick stop active. X: In this state, the value of the bit can be 0 or 1.								

Starting Sequence

Description

The command sequence in the state diagram depends on how power is being supplied to the drive.

There are 3 possible scenarios:

Power stage supply	Direct	Direct	Mains contactor controlled by the drive
Control stage supply	Not separate [(1)]	Separate	Separate
[(1)] The power stage supplies the control stage.			

## Sequence for a Drive Powered by the Power Stage Supply

Description

Both the power and control stages are powered by the power stage supply.

If power is supplied to the control stage, it has to be supplied to the power stage as well.

The following sequence must be applied:

Step 1

Apply the `2 - Shut down` command
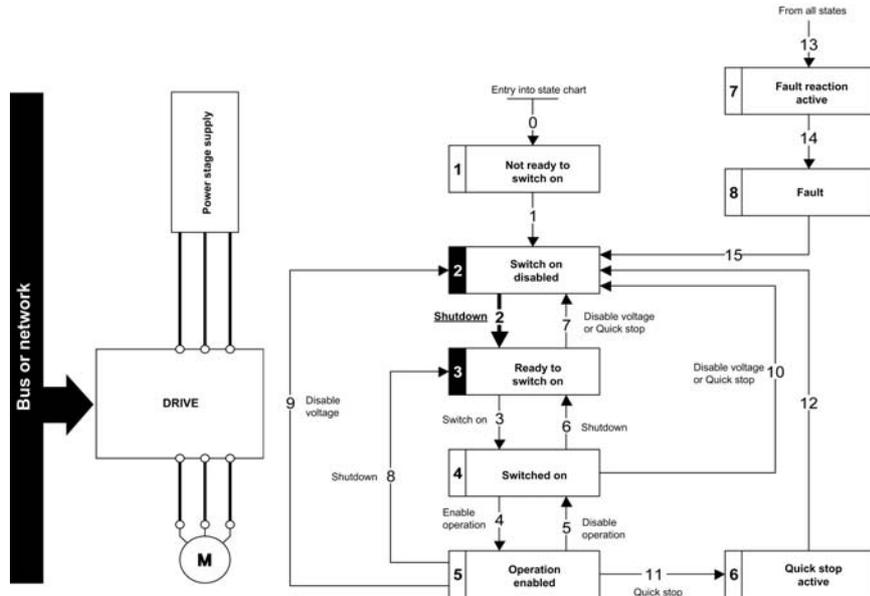
Step 2

- Check that the drive is in the operating state `3 - Ready to switch on`.
- Then apply the `4 - Enable operation` command.
- The motor can be controlled (send a reference value not equal to zero).
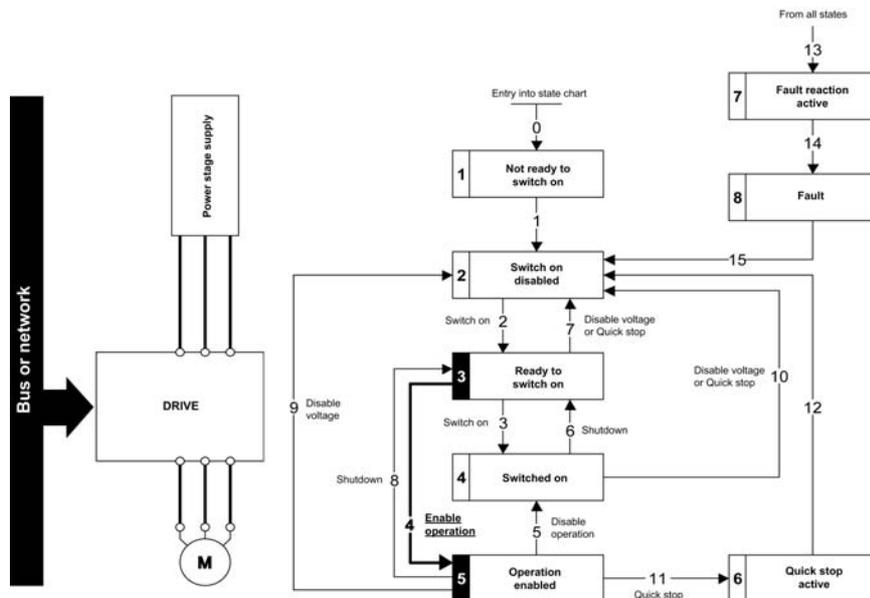
NOTE: It is possible, but not necessary to apply the `3 - Switch on` command followed by the `4 - Enable Operation` command to switch successively into the operating states `3 - Ready to Switch on`, `4 - Switched on` and then `5 - Operation Enabled`. The `4 - Enable operation` command is sufficient.

## Sequence for a Drive with Separate Control Stage

Description

Power is supplied separately to the power and control stages.

If power is supplied to the control stage, it does not have to be supplied to the power stage as well.

The following sequence must be applied:

Step 1

- The power stage supply is not necessarily present.
- Apply the `2 - Shut down` command
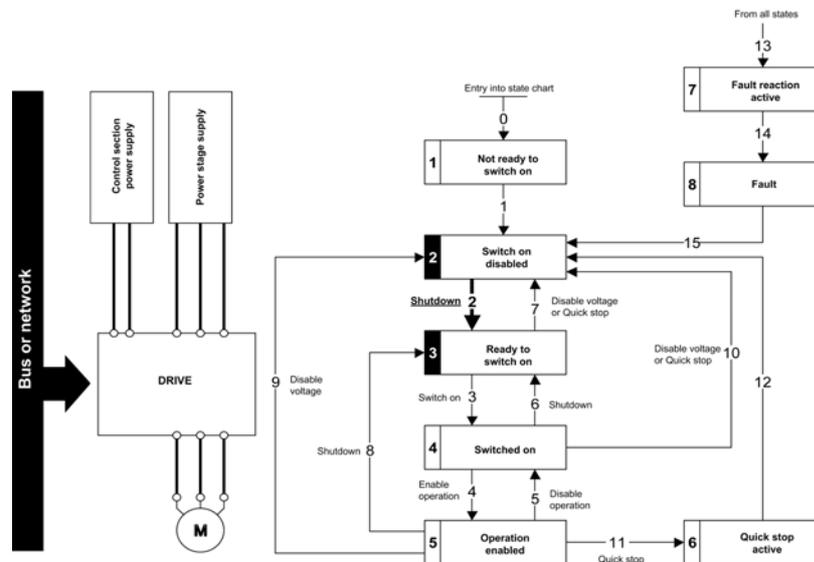
Step 2

- Check that the drive is in the operating state `3 - Ready to switch on`.
- Check that the power stage supply is present (`Voltage enabled` of the status word).

Power Stage Supply	Terminal Display	Status Word
Absent	n L P	21 hex
Present	r d Y	31 hex

- Apply the `3 - Switch on` command
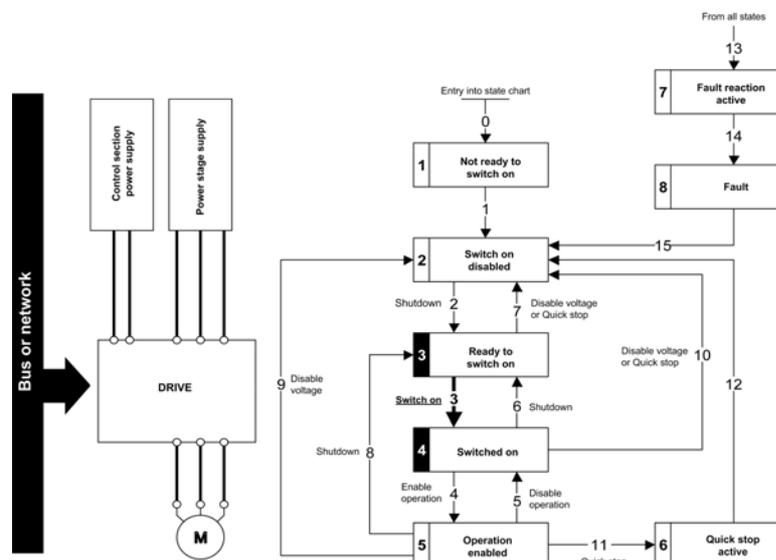
Step 3

- Check that the drive is in the operating state `4 - Switched on`.
- Then apply the `4 - Enable operation` command.
- The motor can be controlled (send a reference value not equal to zero).
- If the power stage supply is still not present in the operating state `4 - Switched on` after a time delay **[Mains V. time out]** $L\,C\,b$, the drive triggers an error **[Input Contactor]** $L\,C\,F$.
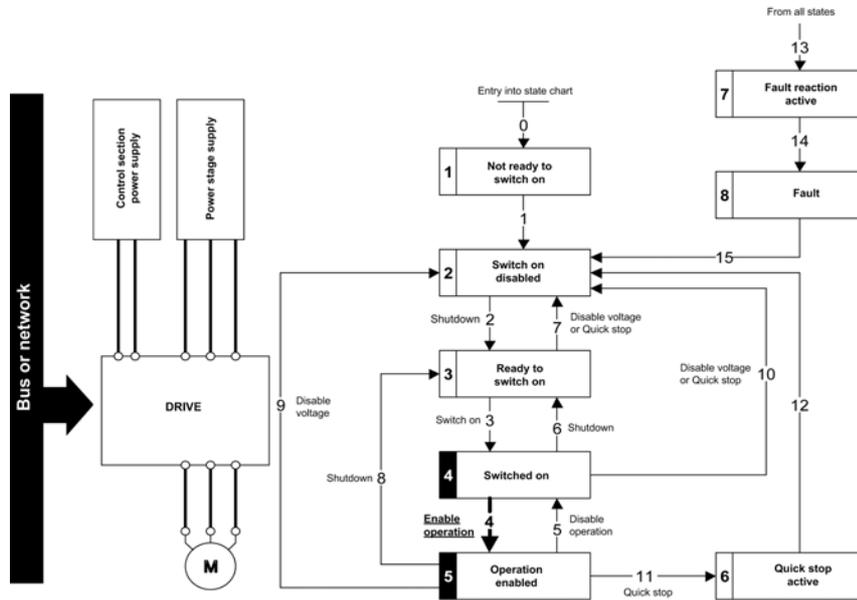
## Sequence for a Drive with Mains Contactor Control

Description

Power is supplied separately to the power and control stages.

If power is supplied to the control stage, it does not have to be supplied to the power stage as well. The drive controls the mains contactor.

The following sequence must be applied:

Step 1

- The power stage supply is not present as the mains contactor is not being controlled.
- Apply the `2 - Shutdown` command.
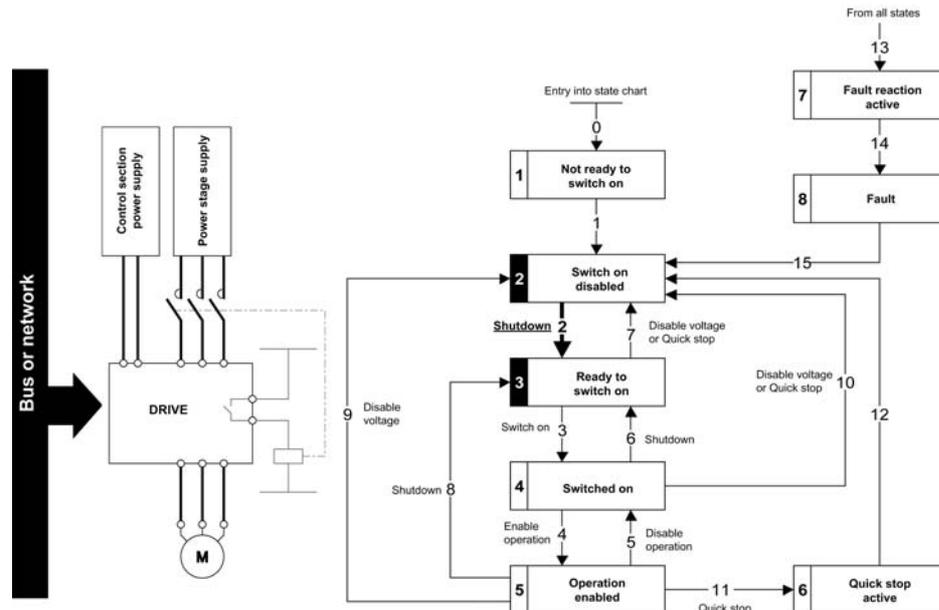
Step 2

- Check that the drive is in the operating state `3 - Ready to switch on`.
- Apply the `3 - Switch on` command, which closes the mains contactor and switch on the power stage supply.
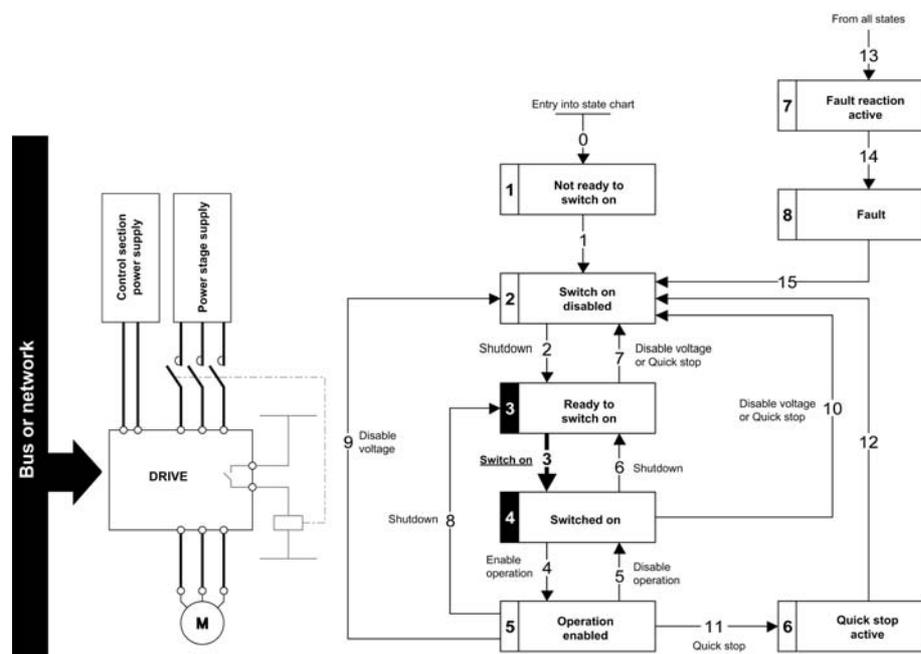
Section 4.3
Software Setup with Continuum (BCX1)

What Is in This Section?

This section contains the following topics:

Introduction

Overview

In the following example
- Drive is connected to the BCX1 controller equipped with BACnet MS/TP port.
- Drive can be controlled through the continuum software

Drive Configuration

Factory Setting

Before configuring the drive, make sure that you reset the drive to factory setting. Go to:
- **[File management]** *F ∏ Ł -* menu
- **[Factory settings]** *F C 5 -* submenu

Then configure the following parameters
- **[Parameters group list]** *F r Y -* to **[All]** *A L L*
- **[Go to Factory Settings]** *G F 5* to OK

Command Configuration

To control the drive with a BACnet MS/TP controller, select communication module as the active command channel.

Go to:
- **[Complete Settings]** *C 5 Ł -*
- **[Command and Reference]** *C r P -* menu

Then configure **[Ref Freq 1Config]** *F r 1* parameter to **[Ref. Freq-Com. Module]** *n E Ł* value

Communication Configuration

Select the BACnet MS/TP address in the menu:
- **[Communication]** *C o ∏ -*
- **[Comm parameters]** *C ∏ P -*
- **[BACnet MS/TP]** *b A C ∏*

Then configure **[Address]** *A d r C* to **[2]** *2*

BCX1 Configuration

Overview

In the following example, BCX1 controller is configured via Continuum software.

Connection to the Controller

1. After starting **Andover Continuum Cyberstation** software, click **Explorer**.
   Result: Opens the following window.
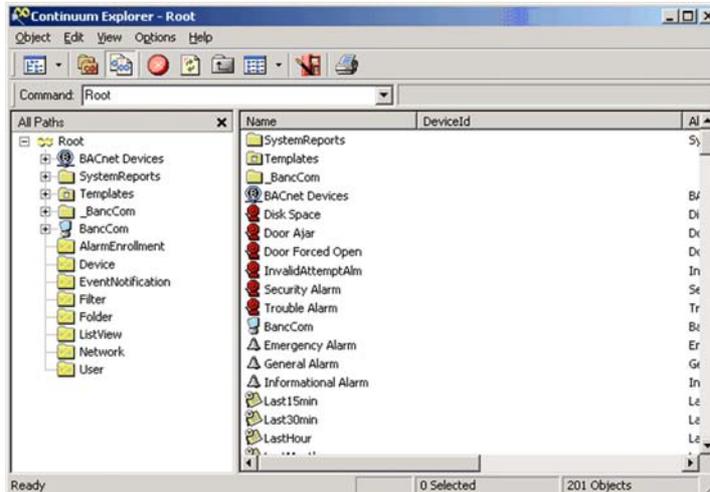
2. Right-click **Network** and then click **New Network**
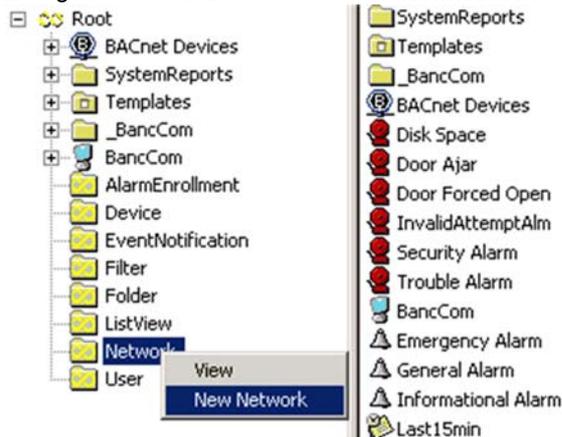
   Result: Opens a **New** window

3. In the **New** window, enter an **Object name** (in the follwing example it is **BCX connection**), and then click **Create**.
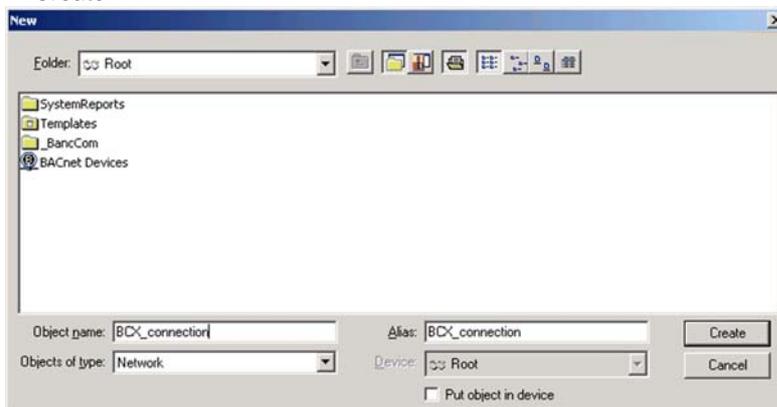
4. Note the controller **ACCNetId** and **Model** by connecting to the controller webserver:
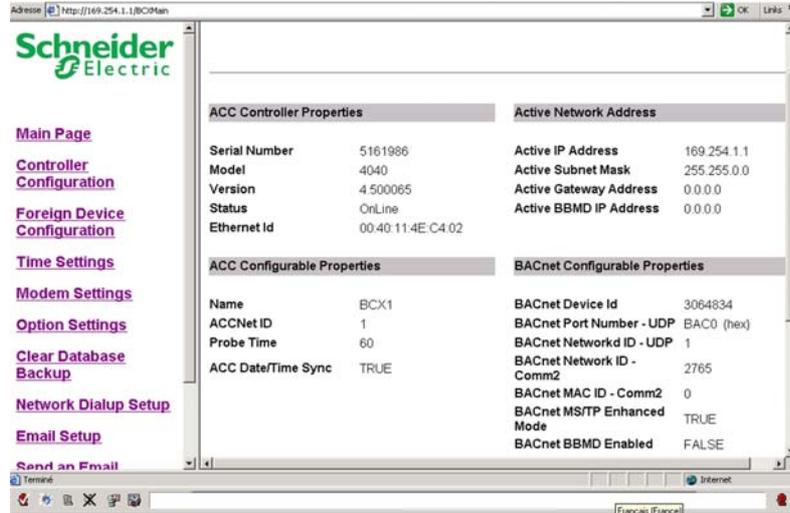
5. On the created connection, right click and then click **New→InfinityController**:
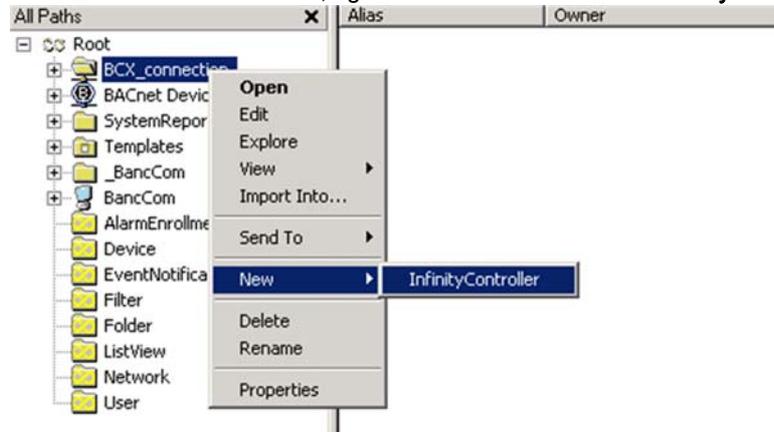
Result: Opens the **InfinityController** dialog box

6. In **InfinityController** dialog box
- ❍ on the **General** tab, enter the **ACCNetId** and the **Controler Type** according to the infromation form the webserver.

- ❍ On the **Network** tab, enter the **IP Address**, **Subnet Mask**, and then click **Apply**.

❍ In the **Select Teach Mode** dialog box, select **Global Teach** and then click **OK**
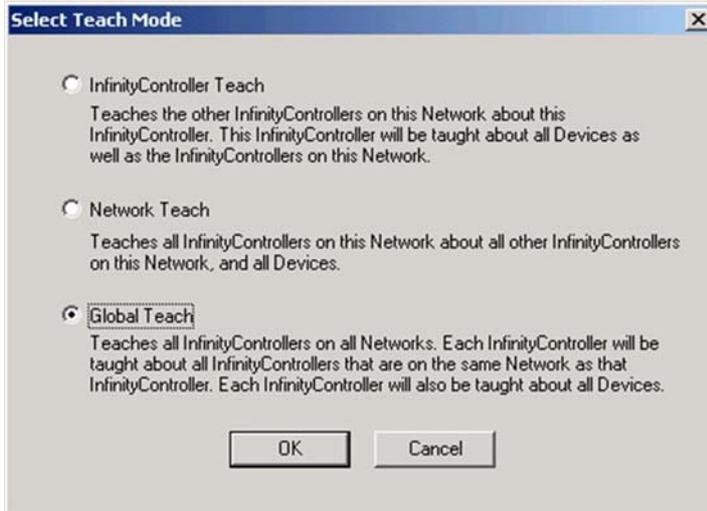
❍ Click **Refresh**,some fields are updated according to the controller configuration:
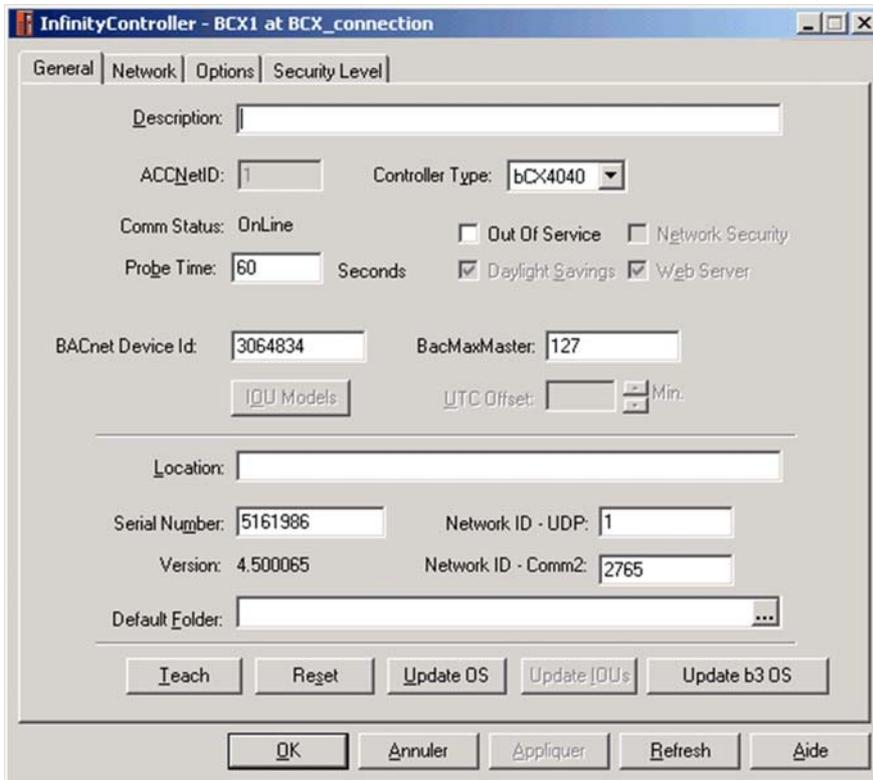
Configuration of the BACnet MS/TP Communication Port

1. On the arborescence tree, go to the **BCX_connection**, **BCX1**, **CommPort**, right-click **comm2** and then click **Open**:
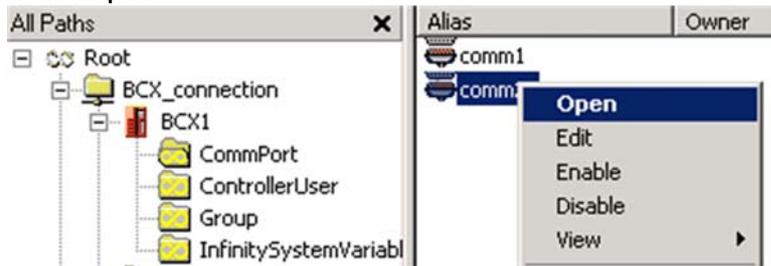
   Result: Opens the **CommPort** dialog box

2. In the **CommPort** dialog box
   ○ On the **General** tab, make sure that **Default Mode** is configured to **MSTP**

   ○ On the **Settings** tab, select the **Baud Rate** to **76.8K**, click **Apply**, and then click **OK**
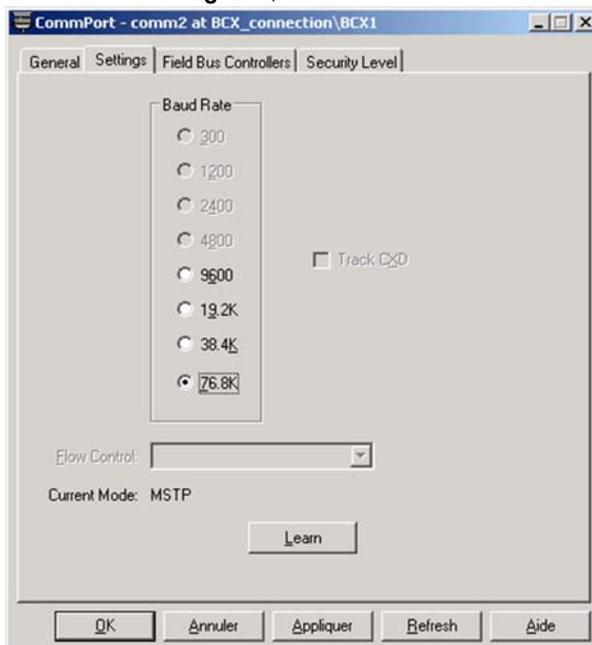
Network Scan

1. On the arborescence tree, right click on **Root** and click **Find New BACnet Devices**:

2. The controller is added on the **BACnet Devices** arborescence tree:
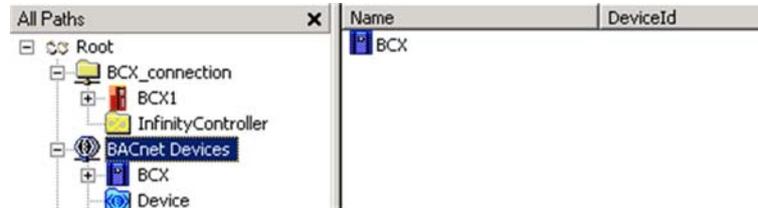
3. Right-click BCX and then click **Send To → Database**
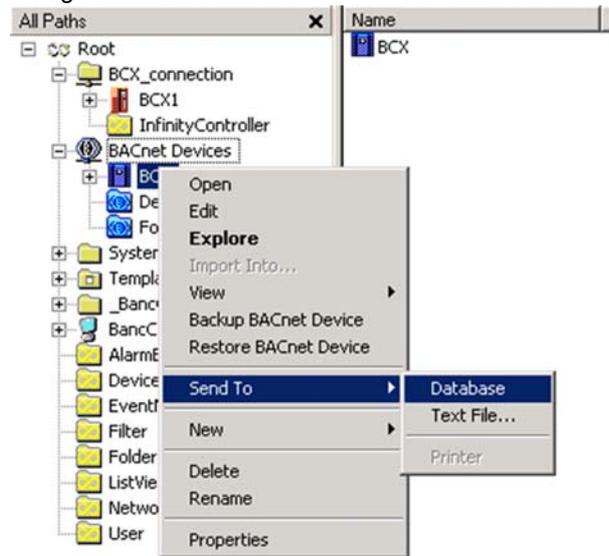
On the opened window, click **OK**

4. Click on the **Refresh** button, a **BACnet Network** structure containing the Altivar Drive is added on the **BACnet Devices** arborescence tree.
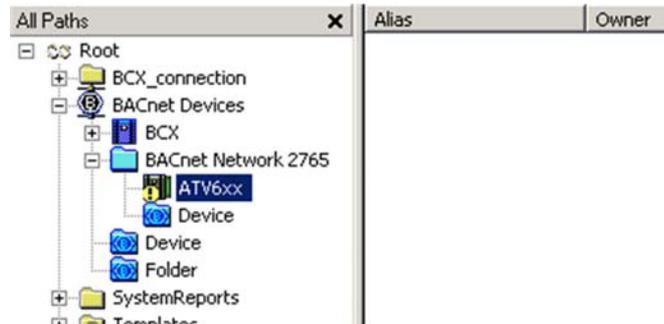
Update of the BACnet Objects

After scanning the devices, it is necessary to update the list of BACnet objects.

1. Make a right click on the Device and select **Send To** → **Database**:
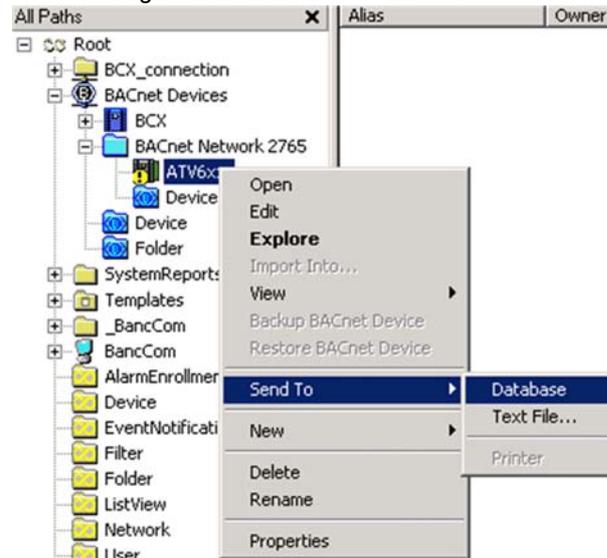
on the opened window, click on **OK**

2. BACnet objects are refreshed and can be used to program the controller:

Chapter 5
Operation

What Is in This Chapter?

This chapter contains the following sections:

Section	Topic	Page
5.1	Operating States	66
5.2	Operating Modes	67

Section 5.1
Operating States

Configuring Communication Error Response

Description

The response of the drive in the event of communication interruption can be configured. Configuration can be performed using the display terminal from the **[Complete settings]** *C S t -* , **[Error/Warning handling]** *C S W M -* menu, **[Communication Module]** *C o M o -* submenu, via the **[Fieldbus Interrupt Resp]** *C L L* parameter.

The values of the **[Fieldbus Interrupt Resp]** *C L L* parameter, which triggers a transition to the operating state fault **[Fieldbus Com Interrupt]** *C n F* are:

Value	Meaning
[Freewheel Stop] *Y E S*	Freewheel stop (factory setting)
[Ramp stop] *r M P*	Stop on ramp
[Fast stop] *F S t*	Fast stop
[DC injection] *d C i*	DC injection stop

The values of the parameter **[Fieldbus Interrupt Resp]** *C L L* , which does not trigger a transition to the operating state fault are:

Value	Meaning
[Ignore] *n o*	Detected error ignored
[Per STT] *S t t*	Stop according to configuration of **[Type of stop]** *S t t*
[Fallback Speed] *L F F*	Change to fallback speed, maintained as long as the detected error persists and the run command has not been removed
[Speed maintained] *r L S*	The drive maintains the speed at the time the detected error occurred, as long as the detected error persists, and the run command has not been removed

The fallback speed can be configured in the **[Complete settings]** *C S t -* , **[Error/Warning handling]** *C S W M -* menu, **[Fallback speed]** *L F F -* submenu, using the **[FallbackSpeed]** *L F F* parameter.

⚠ **WARNING**
LOSS OF CONTROL
If this parameter is set to *n o* , fieldbus communication monitoring is disabled.
● Only use this setting after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
● Only use this setting for tests during commissioning.
● Verify that communication monitoring has been re-enabled before completing the commissioning procedure and performing the final commissioning test.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Section 5.2
Operating Modes

What Is in This Section?

This section contains the following topics:

Configuring the Control Channel

Overview

This chapter explains how to configure the drive for operation from the communication network through two following examples.

- Combined mode (with native profile CiA 402) - Both reference value and command word come from the communication network.
- Separate (with native profile CiA 402) - reference value and command word come from separate sources: for example, the command word (in CiA 402) comes from the communication network and the reference value from the HMI.

Configuration of the Drive for Operation with CiA 402 Profile in Combined Mode

Description

This section describes how to configure the settings of the drive if it is controlled in CiA 402 mode. The example focuses on the not separate mode. Additional modes are detailed in the drive programming manual.

In the **[Complete settings]** $C 5 t -$ menu, **[Command and Reference]** $C r P -$ submenu :
● **[Ref Freq 1 Config]** $F r I$: is set on according to the communication source you can choose in the following table:

Origin of the Control	Ref1 Channel Setting
BACnet	**[Com. Module]** $n E t$

● **[Freq Switch Assign]** $r F C$ is set to default value (**[Ref Freq 1 Config]** $F r I$).
● **[Control Mode]** $C H C F$: defines if the drive operates in combined mode (reference and command from the same channel).

For the current example, **[Control Mode]** $C H C F$ is adjusted to **[Not separ.]** $5 i \Pi$ as reference and control are originated from the communication network:

Profile	Ref1 Channel setting
CiA 402 combined mode	**[Not separ.]** $5 i \Pi$
CiA 402 separate mode	**[Separate]** $5 E P$

Configuration of the Drive for Operation with CiA 402 Profile in Separate Mode

Description

Alternate combinations are possible, see the drive programming manual for the list of possible settings.

For Example

The drive is controlled from the fieldbus (BACnet) but the reference value is adjusted with analog input 1. The control word comes from the controller and is written according to CiA 402 profile.

The settings are as shown in the table:

[Ref Freq 1 Config] ($F r I$)		**[AI1]** $A i I$	
[Control Mode] ($C H C F$)		**[Separate]** $5 E P$	
[Cmd channel 1] ($C d I$)		**[Com. Module]** $n E t$	
[Freq Switch Assign] ($r F C$)		**[Ref Freq Channel 1]** $F r I$	

Chapter 6
Diagnostic and Troubleshooting

What Is in This Chapter?

This chapter contains the following topics:

Fieldbus Status LEDs

LED Indicators
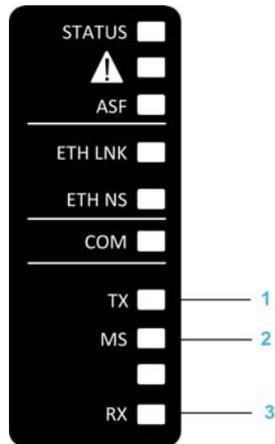
LEDs Description

Item	LED	Description
1	TX	Transmitted frames activity
2	MS	Module status
3	RX	Received frames activity

TX and RX LEDs

These LEDs indicate the activity on transmitted and received frames.

Color & Status	Description
OFF	No link
Green blinking	Frames are being transmitted or received

MS LED

Color & Status	Description
OFF	No power is supplied to the device
Green blinking	The device is operating correctly
Green triple flashing	The device is waiting for auto baudrate detection
Red ON	The device has detected an ILF error
Red blinking	The device has received an invalid message
Red double flashing	The device has detected an invalid configuration
Red triple flashing	The device has detected a communication interruption

LED Behavior
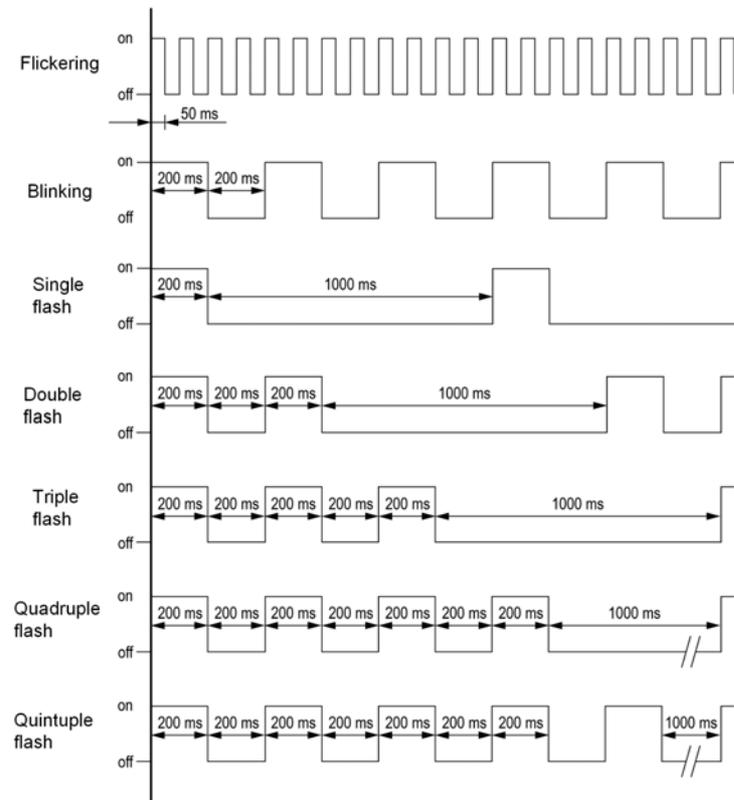
Connection for Fieldbus Mode

Description

If the product cannot be addressed via the fieldbus, first check the connections. The product manual contains the technical data of the device and information on network and device installation. Check the following:
● Power connections to the device
● Fieldbus cable and fieldbus wiring
● Network connection to the device

Monitoring of Communication Channel

Channel for Command and Reference Frequency

All the drive commands and reference value parameters are managed on a channel-by-channel basis.

Parameter Name	Parameter Code				
	Taken Into Account by the Drive	Modbus Serial	CANopen	Fieldbus Module	Ethernet Embedded
Control word	CMd	CMd1	CMd2	CMd3	CMd5
Extended control word	CMi	CMi1	CMi2	CMi3	CMi5
Reference speed (rpm)	LFrd	LFd1	LFd2	LFd3	LFd5
Reference frequency (0.1 Hz)	LFr	LFr1	LFr2	LFr3	LFr5
Reference value for torque control mode (0.1% of the nominal torque)(1)	LtR	Ltr1	Ltr2	Ltr3	Ltr5
Reference value supplied by PI controller	PiSP	Pir1	Pir2	Pir3	Pir5
Reference value supplied by analog multiplier function	MFr	MFr1	MFr2	MFr3	MFr5
(1): If available					

Network Monitoring Criteria

The table provides the details of the detected errors

Protocol	Criteria	Error Code
BACnet MS/TP	10: Network timeout	[Fieldbus Com Interrupt] CnF
	18: Interface connection timeout 19: EEPROM error 21: No memory or background watchdog or IOC scanner error.	[Internal Link Error] iLF
	Incorrect command settings (I/O Profile configured)	[Fieldbus Error] EPF2

Monitoring of Communication Channels

Communication channels are monitored if they are involved in one of the following parameters:
- The control word ([Cmd Register] *C П d*) from the active command channel
- The control word containing the command switch (bit configured on [Cmd switching] *C C S*)
- The control word containing the switch for reference value 1'1B (bit configured on [Ref 1B switching] *r C b*)
- The control word containing the switch for reference value 1'2 (bit configured on [Freq Switch Assign] *r F C*)
- The reference frequency or reference speed ([Ref Frequency] *L F r* or LFRD: Nominal speed value) from the active channel for reference value
- Summing reference frequency or reference speed ([Ref Frequency] *L F r* or LFRD: Nominal speed value) 2 (assigned to [Summing Input 2] *S A 2*)
- Summing reference frequency or reference speed ([Ref Frequency] *L F r* or LFRD: Nominal speed value) 3 (assigned to [Summing Input 3] *S A 3*)
- Subtracting reference frequency or reference speed ([Ref Frequency] *L F r* or LFRD: Nominal speed value) 2 (assigned to [Subtract Ref Freq 2] *d A 2*)
- Subtracting reference frequency or reference speed ([Ref Frequency] *L F r* or LFRD: Nominal speed value) 3 (assigned to [Subtract Ref Freq 3] *d A 3*)
- The reference value given by the PID controller (PISP)
- The PID controller feedback ([AI Virtual 1] *A i u 1*)
- The multiplication coefficient of the reference values ([Multiplying coeff.] *П F r*) 2 (assigned to [Ref Freq 2 Multiply] *П A 2*)
- The multiplication coefficient of the reference values ([Multiplying coeff.] *П F r*) 3 (assigned to [Ref Freq 3 Multiply] *П A 3*)

As soon as one of these parameters has been written once to a communication channel, it activates monitoring for that channel.

If a communication warning is sent (in accordance with the protocol criteria) by a monitored port or fieldbus module, the drive triggers a communication interruption.

The drive reacts according to the communication interruption configuration (operating state Fault, maintenance, fallback, and so on)

If a communication warning occurs on a channel that is not being monitored, the drive does not trigger a communication interruption.

Enabling of Communication Channels

A communication channel is enabled once all the parameters involved have been written at least one time.The drive is only able to start if all channels involved in command and reference are enabled.

For example:

A drive in DSP402 profile is connected to an active communication channel.

It is mandatory to write at least 1 time the reference and the command in order to switch from `4-Switched on` to `5-Operation enabled` state.

A communication channel is disabled:
- In the event of a communication alarm.
- In `forced local` mode.
  NOTE: On exiting `forced local` mode:

- The drive copies the `run` commands, the direction, and the forced local reference to the active channel (maintained).
- Monitoring of the active command and reference channels resumes following a time delay [Time-out forc. local] *F L o t*.
- Drive control only takes effect once the drive has received the reference and the command from the active channel.

Control-Signal Diagnostics

Introduction

On the display terminal, the **[Display]** $\Pi o n -$, **[Communication map]** $\Gamma \Pi \Pi -$ submenu can be used to display control-signal diagnostic information between the drive and the controller:

- Active command channel **[Command Channel]** $\Gamma \Pi d \Gamma$
- Value of the control word **[Cmd Register]** $\Gamma \Pi d$ from the active command channel **[Command Channel]** $\Gamma \Pi d \Gamma$
- Active reference frequency channel **[Ref Freq Channel]** $r F \Gamma \Gamma$
- Value of the reference frequency **[Pre-Ramp Ref Freq]** $F r H$ from the active target channel **[Ref Freq Channel]** $r F \Gamma \Gamma$
- Value of the operating state word **[CIA402 State Reg]** $E E R$
- Specific data for all available fieldbus are in dedicated submenus.
- In the **[Command word image]** $\Gamma W i -$ submenu: control words from all channels
- In the **[Freq. ref. word map]** $r W i -$ submenu: reference frequency values produced by all channels

Control Word Display

The **[Command Channel]** $\Gamma \Pi d \Gamma$ parameter indicates the active command channel.

The **[Cmd Register]** $\Gamma \Pi d$ parameter indicates the hexadecimal value of the control word (CMD) used to control the drive.

The **[Command word image]** $\Gamma W i -$ submenu **[COM. Module cmd.]** $\Gamma \Pi d \exists$ parameter is used to display the hexadecimal value of the control word from he fieldbus module.

Reference Frequency Display

The **[Ref Freq Channel]** $r F \Gamma \Gamma$ parameter indicates the active channel for reference frequency.

The **[Ref Frequency]** $L F r$ parameter indicates the value (in 0.1 Hz units) of the reference frequency used to control the drive.

The **[Freq. ref. word map]** $r W i -$ submenu **[[Com Module Ref Freq]** $L F r \exists$ parameter is used to display the value (in 0.1 Hz units) of the reference frequency from the fieldbus.

Operating State Word Display

The **[CIA402 State Reg]** $E E R$ parameter gives the value of the operating state word (ETA).

The table provides the bit details of $E E R$ parameter:

Bit	Description
DRIVECOM	Status word
Bit0 = 1	Ready to switch on
Bit1 = 1	Switched on
Bit2 = 1	Operation enabled
Bit3 = 1	Operating state fault
Bit4 = 1	Power stage is switched on
Bit5 = 0	Quick stop
Bit6 = 1	Switch on disabled
Bit7 = 1	Warning
Bit8 = 1	Drivecom reserved
Bit9 = 0	Forced local mode in progress
Bit10 = 1	Reference value reached (steady state)
Bit11 = 1	Reference value exceeded (< LSP or > HSP)
Bit12	Reserved
Bit13	Reserved
Bit14 = 1	Stop imposed via **STOP** key
Bit15 = 0	Motor rotation in forward direction (or stopped)

Chapter 7
Appendix A - VW3A3725 Objects

What Is in This Chapter?

This chapter contains the following topics:

Object Properties

Object Properties Depending of Object Type

The following table shows the complete list of properties supported by the fieldbus module and their availability depending on the object type.

Property	Objects Type						
	Device	Binary Input	Binary Output	Binary Value	Analog Input	Analog Output	Analog Value
OBJECT_IDENTIFIER	✓	✓	✓	✓	✓	✓	✓
OBJECT_NAME	✓	✓	✓	✓	✓	✓	✓
OBJECT_TYPE	✓	✓	✓	✓	✓	✓	✓
SYSTEM_STATUS	✓	—	—	—	—	—	—
VENDOR_NAME	✓	—	—	—	—	—	—
VENDOR_IDENTIFIER	✓	—	—	—	—	—	—
MODEL_NAME	✓	—	—	—	—	—	—
FIRMWARE_REVISION	✓	—	—	—	—	—	—
APPLICATION_SOFTWARE_VERSION	✓	—	—	—	—	—	—
PROTOCOL_VERSION	✓	—	—	—	—	—	—
PROTOCOL_CONFORMANCE_CLASS	✓	—	—	—	—	—	—
PROTOCOL_SERVICES_SUPPORTED	✓	—	—	—	—	—	—
PROTOCOL_OBJECT_TYPES_SUPPORTED	✓	—	—	—	—	—	—
OBJECT_LIST_COUNT	✓	—	—	—	—	—	—
MAX_APDU_LENGTH_ACCEPTED	✓	—	—	—	—	—	—
SEGMENTATION_SUPPORTED	✓	—	—	—	—	—	—
APDU_TIMEOUT	✓	—	—	—	—	—	—
NUMBER_OF_APDU_RETRIES	✓	—	—	—	—	—	—
MAX_MASTER	✓	—	—	—	—	—	—
MAX_INFO_FRAMES	✓	—	—	—	—	—	—
DEVICE_ADDRESS_BINDING	✓	—	—	—	—	—	—
DATABASE_REVISION	✓	—	—	—	—	—	—
PRESENT_VALUE	—	✓	✓	✓	✓	✓	✓
STATUS_FLAG	—	✓	✓	✓	✓	✓	✓
EVENT_STATE	—	✓	✓	✓	✓	✓	✓
OUT_OF_SERVICE	—	✓	✓	✓	✓	✓	✓
UNITS	—	—	—	—	✓	✓	✓
PRIORITY_ARRAY	—	—	✓	✓[1]	—	✓	✓[1]
RELINQUISH_DEFAULT	—	—	✓	✓[1]	—	✓	✓[1]
POLARITY	—	✓	✓	—	—	—	—
ACTIVE_TEXT	—	✓	✓	✓	—	—	—
INACTIVE_TEXT	—	✓	✓	✓	—	—	—

[1]: Only for commandable parameters.

Device Identification

Information relative to the drive are stored in a unique object. The following list of properties describes the content of this object. The type of these properties is character string.

Property	Description
`VendorName`	Brand label
`ModelName`	Drive catalog number
`Firmware_Revision`	Fieldbus module software version
`Application_Software_Version`	Control card software version
`Location`	Not supported
`Description`	Device name, can be edited with the Graphic Display Terminal (**[Device Name]** *P A n 0* to *P A n 7* parameters)

About Objects Access

The table provides the access type of each object supported by the VW3A3725

Access Type	Description
R	Read object
W	Write object
C	Commandable object

A Commandable object has two additional properties: `PRIORITY_ARRAY` and `RELINQUISH_DEFAULT`.

These two properties are used to resolve commands conflict. When a write command is sent to a commandable object, it always contains a priority. If the priority is not specified, it is considered as the lowest priority. There are 16 priorities.

When the command is received, the device updates the object in the `PRIORITY_ARRAY` that corresponds to the commanded priority with the new value.

The device continuously scans the `PRIORITY_ARRAY` of each commandable object and updates it with the highest priority value.

Write access to `PRESENT_VALUE` of a commandable object will always succeed. If the drive is not ready or not allowed to accept write access to its parameter, the write access will be accepted without returning an error code.

Read access to commandable object is not forwarded to the drive. It returns the value in the highest priority position. If the `PRIORITY_ARRAY` is null, it returns the `RELINQUISH_DEFAULT`.

Binary Inputs

Binary Inputs Objects List

The table provides the list of binary input objects and the associated drive parameters

Object Identifier	Object Name	Description	Active/Inactive Text	Access	ATV600 corresponding register
0x00C00001	RO1 ACT	R1 status	ON/OFF	R	OL1R bit 0
0x00C00002	RO2 ACT	R2 status	ON/OFF	R	OL1R bit 1
0x00C00003	RO3 ACT	R3 status	ON/OFF	R	OL1R bit 2
0x00C00006	DI 1 ACT	DI1 value	ON/OFF	R	IL1R bit 0
0x00C00007	DI 2 ACT	DI2 value	ON/OFF	R	IL1R bit 1
0x00C00008	DI 3 ACT	DI3 value	ON/OFF	R	IL1R bit 2
0x00C00009	DI 4 ACT	DI4 value	ON/OFF	R	IL1R bit 3
0x00C0000A	DI 5 ACT	DI5 value	ON/OFF	R	IL1R bit 4
0x00C0000B	DI 6 ACT	DI6 value	ON/OFF	R	IL1R bit 5
0x00C0000C	DI 7 ACT	Not used on ATV600	ON/OFF	R	IL1R bit 6
0x00C0000D	DI 8 ACT	Not used on ATV600	ON/OFF	R	IL1R bit 7
0x00C00010	DI 11 ACT	DI11 value[1]	ON/OFF	R	IL1R bit 10
0x00C00011	DI 12 ACT	DI12 value[1]	ON/OFF	R	IL1R bit 11
0x00C00012	DI 13 ACT	DI13 value[1]	ON/OFF	R	IL1R bit 12
0x00C00013	DI 14 ACT	DI14 value[1]	ON/OFF	R	IL1R bit 13
0x00C00014	DI 15 ACT	DI15 value[1]	ON/OFF	R	IL1R bit 14
0x00C00015	DI 16 ACT	DI16 value[1]	ON/OFF	R	IL1R bit 15
0x00C00020	RO4 ACT	R4 status	ON/OFF	R	OL1R bit 3
0x00C00021	RO5 ACT	R5 status	ON/OFF	R	OL1R bit 4
0x00C00022	RO6 ACT	R6 status	ON/OFF	R	OL1R bit 5
0x00C00023	DO11 ACT	DQ11 status	ON/OFF	R	OL1R bit 12
0x00C00024	DO12 ACT	DQ12 status	ON/OFF	R	OL1R bit 13

[1]: These objects can be used if a VW3A3203 extension module is available.

Binary Outputs

Binary Outputs Objects List

NOTE: The following objects can be used if no function is assigned to the dedicated drive output.

The table provides the list of binary output objects and the associated drive parameters

Object Identifier	Object Name	Description	Active/Inactive Text	Access
0x01000000	RO 1 CMD	R1 command	ON/OFF	C
0x01000001	RO 2 CMD	R2 command	ON/OFF	C
0x01000002	RO 3 CMD	R3 command	ON/OFF	C
0x01000003	RO 4 CMD	R4 command[1]	ON/OFF	C
0x01000004	RO 5 CMD	R5 command[1]	ON/OFF	C
0x01000005	RO 6 CMD	R6 command[1]	ON/OFF	C
0x01000006	DO 11 CMD	DO11 command[2]	ON/OFF	C
0x01000007	DO 12 CMD	DO12 command[2]	ON/OFF	C

[1]: These objects can be used if a VW3A3204 extension module is available.
[2]: These objects can be used if a VW3A3203 extension module is available.

Binary Values

Binary Values Objects List

The following table provides the list of Binary Values objects and the associated drive parameter.

Object Identifier	Object Name	Description	Active/Inactive Text	Access	ATV600 corresponding register
0x01400000	RUN/STOP ACT	Indicates the drive status	RUN/READY	R	ETA bit 2
0x01400001	FWD/REV ACT	Indicates the motor rotation direction	REV/FWD	R	ETA bit 15
0x01400002	FAULT ACT	Indicates if the drives is in " Operating State Fault "	FAULTED/NONE	R	ETA bit 3
0x01400004	HAND/AUTO ACT	Indicates if the drive is locally controlled or not	HAND/AUTO	R	ETA bit 9
0x01400007	DRIVE READY	The drive is ready and waits a start command	READY/NOT READY	R	ETA bit 1
0x01400008	AT SETPOINT	The drive has reached the target speed	REACHED/NO	R	ETA bit 10
0x0140000A	RUN/STOP CMD	Commands a drive start	START/STOP	C	OFF: CMD bits 1 and 2 ON: CMD bits 0 and 3
0x0140000B	FWD/REV CMD	Commands a motor direction change	REV/FWD	C	CMD bit 11
0x0140000E	FAULT RESET	Resets fault (on rising edge)	RESET/NO	W	CMD bit 7
0x0140000F	MBOX READ	Command to read a parameter	READ/RESET	W	–
0x01400010	MBOX WRITE	Command to write a parameter	WRITE/RESET	W	–
0x01400012	C311CMD	CMD word 3 bit 11	ON/OFF	C	CMD3 bit 11
0x01400013	C312CMD	CMD word 3 bit 12	ON/OFF	C	CMD3 bit 12
0x01400014	C313CMD	CMD word 3 bit 13	ON/OFF	C	CMD3 bit 13
0x01400015	C314CMD	CMD word 3 bit 14	ON/OFF	C	CMD3 bit 14
0x01400016	C315CMD	CMD word 3 bit 15	ON/OFF	C	CMD3 bit 15
0x01400017	STORE CONFIG	Stores all non-volatiles data of the fieldbus module[1]	STORE/INACTIVE	W	-
[1]: This command is valid after a product restart.					

Analog Inputs

Analog Inputs Objects List

The following table provides the list of analog inputs objects and the associated drive parameter.

Object Identifier	Object Name	Description	Units	Access	ATV600 corresponding register
0x00000000	`ANALOG INPUT 1`	Analog input 1 value	`ASN.1-98 - %`	R	AI1C
0x00000001	`ANALOG INPUT 2`	Analog input 2 value	`ASN.1-98 - %`	R	AI2C
0x00000002	`ANALOG INPUT 3`	Analog input 3 value	`ASN.1-98 - %`	R	AI3C
0x00000003	`ANALOG INPUT 4`	Analog input 4 value[1]	`ASN.1-98 - %`	R	AI4C
0x00000004	`ANALOG INPUT 5`	Analog input 5 value[1]	`ASN.1-98 - %`	R	AI5C
0x00000010	`ANALOG OUTPUT 1`	Analog output 1 value	`ASN.1-98 - %`	R	AO1C
0x00000011	`ANALOG OUTPUT 2`	Analog output 2 value	`ASN.1-98 - %`	R	AO2C
[1]: These objects can be used if a VW3A3203 extension module is available.					

Analog Outputs

Analog Outputs Objects List

NOTE: The following objects can be used if no function is assigned to the dedicated drive output.

The table provides the list of binary output objects and the associated drive parameters

Object Identifier	Object Name	Description	Units	Access	ATV600 corresponding register
0x00400000	`AO1 COMMAND`	Analog output 1 value	`ASN.1-98 - %`	C	AO1C
0x00400001	`AO2 COMMAND`	Analog output 2 value	`ASN.1-98 - %`	C	AO2C

Analog Values

Analog Values Objects List

The table provides the list of binary output objects and the associated drive parameters

Object Identifier	Object Name	Description	Active/Inactive Text	Access	ATV600 corresponding register
0x00800000	OUTPUT SPEED	Output speed	ASN.1-104 - rpm	R	SPD
0x00800001	OUTPUT FREQ	Output frequency	ASN.1-27 - Hz	R	RFRD
0x00800002	DC BUS VOLT	DC bus voltage	ASN.1-5 - V	R	VBUS
0x00800003	OUTPUT VOLT	Motor voltage	ASN.1-5 - V	R	UOP
0x00800004	CURRENT	Motor current	ASN.1-3 - A	R	LCR
0x00800005	TORQUE	Motor torque	ASN.1-98 - %	R	OTR
0x00800006	POWER	Motor power	ASN.1-98 - %	R	OPR
0x00800007	DRIVE TEMP	Drive thermal state	ASN.1-98 - %	R	THD
0x00800008	KWH (R)	Energy counter (resettable)	ASN.1-19 - kWh	R	Based on values given by following registers: IC4 IC3 IC2 IC1 IC0
0x00800009	KWH (NR)	Energy counter (non resettable)	ASN.1-19 - kWh	R	Based on values given by following registers: IC4 IC3 IC2 IC1 IC0
0x0080000A	PRC PID FBCK	PID controller feedback	ASN.1-98 - %	R	RPF
0x0080000B	PRC PID ERR	PID controller error	ASN.1-98 - %	R	RPE
0x0080000E	RUN TIME	Operating time	ASN.1-71 - H	R	RTH
0x0080000F	MOTOR TEMP	Motor temperature	ASN.1-98 - %	R	THR
0x00800010	INPUT REF 1	Velocity/frequency setpoint from BACnet	ASN.1-98 - %	R	LFR
0x00800012	LAST FAULT	Current error n	ASN.1-95 - NULL	R	DP0
0x00800013	PREV FLT 1	Previous error n-1	ASN.1-95 - NULL	R	DP1
0x00800014	PREV FLT 2	Previous error n-2	ASN.1-95 - NULL	R	DP2
0x00800017	ACCEL1 TIME	Acceleration time	ASN.1-73 - s	W	ACC
0x00800018	DECEL1 TIME	Deceleration time	ASN.1-98 - %	W	DEC
0x00800019	MBOX PARAM	Parameter number	ASN.1-98 - %	W	–
0x0080001A	MBOX DATA	Parameter value	ASN.1-95 - NULL	W	–
0x0080001B	EXT PID STPT	PID controller setpoint from BACnet	ASN.1-95 - NULL	C	PISP
0x0080001C	COM SCAN OUT1	General purpose AV →Comm. Scan	ASN.1-95 - NULL	C	NC1 (drive forward the value to register pointed by NCA1)
0x0080001D	COM SCAN OUT2	General purpose AV →Comm. Scan	ASN.1-95 - NULL	C	NC2 (drive forward the value to register pointed by NCA2)

Object Identifier	Object Name	Description	Active/Inactive Text	Access	ATV600 corresponding register
0x0080001E	`COM SCAN OUT3`	General purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	C	NC3 (drive forward the value to register pointed by NCA3)
0x0080001F	`COM SCAN OUT4`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	C	NC4 (drive forward the value to register pointed by NCA4)
0x00800020	`COM SCAN OUT5`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	C	NC5 (drive forward the value to register pointed by NCA5)
0x00800021	`COM SCAN OUT6`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	C	NC6 (drive forward the value to register pointed by NCA6)
0x00800022	`COM SCAN OUT7`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	C	NC7 (drive forward the value to register pointed by NCA7)
0x00800023	`COM SCAN OUT8`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	C	NC8 (drive forward the value to register pointed by NCA8)
0x00800024	`COM SCAN IN1`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	R	NM1 (drive forward the value to register pointed by NMA1)
0x00800025	`COM SCAN IN2`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	R	NM2 (drive forward the value to register pointed by NMA2)
0x00800026	`COM SCAN IN3`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	R	NM3 (drive forward the value to register pointed by NMA3)
0x00800027	`COM SCAN IN4`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	R	NM4 (drive forward the value to register pointed by NMA4)
0x00800028	`COM SCAN IN5`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	R	NM5 (drive forward the value to register pointed by NMA5)
0x00800029	`COM SCAN IN6`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	R	NM6 (drive forward the value to register pointed by NMA6)
0x0080002A	`COM SCAN IN7`	General-purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	R	NM7 (drive forward the value to register pointed by NMA7)
0x0080002B	`COM SCAN IN8`	General purpose AV →Comm. Scan	`ASN.1-95 -` `NULL`	R	NM8 (drive forward the value to register pointed by NMA8)

Additional Functions

Full Parameter Access

By the use of indirect access, it is possible to read or write any of the internal parameters of the drive.

This functionality is done by the following 4 objects:

`MBOX DATA, MBOX PARAM, MBOX READ, MBOX WRITE.`

NOTE: `MBOX READ` and `MBOX WRITE` automatically return back to inactive once command is sent. Always return 0 when read action is performed.

Reading a Parameter

1. Write the logical address of the parameter to the Present Value property of the MBOX PARAM object.
2. Set `Present Value` property of the `MBOX READ` to read.
3. The current value of the parameter can be read in the `Present Value` property of `MBOX DATA` object.

Writing a Parameter

1. Write the logical address of the parameter to the Present Value property of the `MBOX PARAM` object.
2. Write the new value in the Present Value property of the MBOX DATA object.
3. Set the `Present Value` property of `MBOX WRITE` to write.

NOTE: The modified parameters are not saved in EEPROM. If the values written have to be saved, it is needed to specify it by writing CMI bit 1 to 1. This command is only active if the drive is stopped.

Glossary

A

ASN.1

Abstract Syntax Notation One is a standard and notation for representation of units.

For BACnet, refer to BACnetEngineeringUnits ASN.1.

F

Factory setting

Default configuration of the product.

Fault

Fault is an operating state. If the monitoring functions detect an error, a transition to this operating state is triggered, depending on the error class. A "Fault reset" is required to exit this operating state after the cause of the detected error has been removed. Further information can be found in the pertinent standards such as IEC 61800-7, ODVA Common Industrial Protocol (CIP).

Fault Reset

A function used to restore the drive to an operational state after a detected error is cleared by removing the cause of the error so that the error is no longer active.

P

Parameter

Device data and values that can be read and set (to a certain extent) by the user.

PLC

Programmable logic controller

U

Unit Load

According to the TIA-485A, a single Unit Load is equivalent to a 12 kΩ Impedance attached to the + and - data lines (connected to ground or supply).

W

Warning

If the term is used outside the context of safety instructions, a warning alerts to a potential problem that was detected by a monitoring function. A warning does not cause a transition of the operating state.

Z

Zone of operation

This term is used in conjunction with the description of specific hazards, and is defined as it is for a **hazard zone** or **danger zone** in the EC Machinery Directive (2006/42/EC) and in ISO 12100-1.