

## Characteristics:

### General Description:

The single channel DIN Rail Repeater Power Supply and Trip Amplifier D1054S, provides a fully floating dc supply for energizing conventional 2 wires 4-20 mA transmitters, or separately powered 3, 4 wires 4-20, 0-20 mA transmitters located in Hazardous Area, and repeats the current in floating circuit to drive a Safe Area load. Output signal can be direct or reverse.

The circuit allows bi-directional communication signals, for Hart-Smart transmitters. Two independent Alarm Trip Amplifiers are also provided. Each alarm energizes, or de-energizes, an SPST relay for high, low, low-startup or burnout alarm functions. The two alarm relays trip points are settable over the entire input signal range.

### Function:

1 channel I.S. analog input for 2 wires loop powered or separately powered Smart transmitters, provides 3 port isolation (input/output/supply) and current (source mode) or voltage output signal.

In addition it provides two SPST relay alarm contacts with adjustable alarm trip point.

### Signalling LEDs:

Power supply indication (green), burnout (red), alarm A (red), alarm B (red).

### Configurability:

Totally software configurable, no jumpers or switches, mA or V output signal, linear or reverse, alarm trip point, high, low, low-startup or burnout alarm mode, NE/ND relay operation, hysteresis, delay time, by GM Pocket Portable Configurator PPC1090, powered by the unit or configured by PC via RS-232 serial line with PPC1092 Adapter and SWC1090 Configurator software.

To operate PPC1090 or PPC1092 refer to instruction manual.

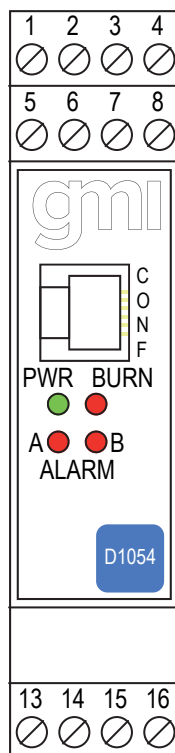
### Smart Communication Frequency Band:

0.5 to 40 KHz within 3 dB (Hart and higher frequency protocols), only with mA direct current output.

### EMC:

Fully compliant with CE marking applicable requirements.

## Front Panel and Features:



- SIL 2 according to IEC 61511
  - 1) for Tproof = 4 / 10 years ( $\leq 10\%$  /  $> 10\%$  of total SIF current out) PFDavg (1 year) 2.13 E-04, SFF 84.47%;
  - 2) for Tproof = 6 / 10 years ( $\leq 10\%$  /  $> 10\%$  of total SIF alarm trip amplifiers), PFDavg (1 year) 1.58 E-04, SFF 89.35%.
- Input from Zone 0 (Zone 20), Division 1, installation in Zone 2, Division 2.
- 4-20 mA loop or 0/4-20 mA externally powered Input Signal.
- 0/4-20 mA, 0/1-5 V, 0/2-10 V Output Signal linear or reverse.
- Wide Band Smart Communication, Hart compatible.
- Input and Output short circuit proof.
- Two independent trip amplifiers.
- Output for burnout detection.
- Common burnout detection available when using Power Bus enclosure.
- High Accuracy,  $\mu$ P controlled A/D converter.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1
- Fully programmable operating parameters.
- ATEX, IECEx, UL & C-UL, FM & FM-C, INMETRO, EAC-EX, UKR TR n. 898, TÜV Certifications.
- TÜV Functional Safety Certification.
- Type Approval Certificate DNV and KR for maritime applications.
- High Reliability, SMD components.
- High Density, one channel, 2 trips per unit.
- Simplified installation using standard DIN Rail and plug-in terminal blocks.
- 250 Vrms (Um) max. voltage allowed to the instruments associated with the barrier.

## Ordering Information:

Model:	D1054S	
Power Bus enclosure	/B	

Operating parameters are programmable by the GM Pocket Portable Configurator PPC1090 or via RS-232 serial line with PPC1092 Adapter and SWC1090 Configurator software. If the parameters are provided with the purchasing order the unit will be configured accordingly, otherwise the unit will be supplied with default parameters.

Power Bus and DIN-Rail accessories:  
DIN rail anchor MCHP065      DIN rail stopper MOR016  
Terminal block male MOR017      Terminal block female MOR022

## Technical Data:

**Supply:** 12-24 Vdc nom (10 to 30 Vdc) reverse polarity protected, ripple within voltage limits  $\leq 5$  Vpp.

**Current consumption @ 24 V:** 90 mA with 20 mA input/output and relays energized.

**Current consumption @ 12 V:** 190 mA with 20 mA input/output and relays energized.

**Power dissipation:** 1.7 W with 24 V supply, 20 mA input/output and relays energized.

**Max. power consumption:** at 30 V supply voltage, input short circuit, overload condition, relays energized and PPC1090 connected, 2.9 W.

**Isolation (Test Voltage):** I.S. In/Outs 1.5 KV; I.S. In/Supply 1.5 KV;

Analog Out/Supply 500 V; Analog Out/Alarm Outs 1.5 KV;

Alarm Outs/Supply 1.5 KV; Alarm Out/Alarm Out 1.5 KV.

**Input:** 0/4 to 20 mA (separately powered input, voltage drop  $\leq 1$  V) or

4 to 20 mA (2 wire Tx current limited at  $\approx 25$  mA).

**Integration time:** 100 ms.

**Resolution/Visualization:** 1  $\mu$ A.

**Input range:** 0 to +22 mA.

**Transmitter line voltage:**  $\geq 15.0$  V at 20 mA with max. 20 mVrms ripple

on 0.5 to 40 KHz frequency band.

**Burnout:** enabled or disabled. Analog output can be programmed to detect burnout condition with downscale or highscale forcing.

Alarms can be programmed to detect burnout condition.

**Burnout range:** low and high separated trip point value programmable between

-5 to +25 mA.

**Output:** 0/4 to 20 mA, on max. 600  $\Omega$  load source mode, current limited at 22 mA or 0/1 to 5 V or 0/2 to 10 V signal, limited at 11 V.

**Resolution:** 1  $\mu$ A current output or 1 mV voltage output.

**Transfer characteristic:** linear or reverse.

**Response time:**  $\leq 50$  ms (10 to 90 % step change).

**Output ripple:**  $\leq 20$  mVrms on 250  $\Omega$  communication load on 0.5 to 40 KHz band.

**Frequency response:** 0.5 to 40 KHz bidirectional within 3 dB

(Hart and higher frequency protocols) only with mA direct current output.

### Alarm:

**Trip point range:** within rated limits of input sensor (see input for step resolution).

**ON-OFF delay time:** 0 to 1000 s, 100 ms step, separate setting.

**Hysteresis:** 0 to 5 mA (see input for step resolution).

**Output:** voltage free SPST relay contact.

**Contact rating:** 2 A 250 Vac 500 VA, 2 A 250 Vdc 80 W (resistive load).

**Performance:** Ref. Conditions 24 V supply, 250  $\Omega$  load,  $23 \pm 1$  °C ambient temperature.

**Input:** Calibration and linearity accuracy:  $\leq \pm 20$   $\mu$ A

Temperature influence:  $\leq \pm 1$   $\mu$ A of input for a 1 °C change.

**Analog:** Calibration accuracy:  $\leq \pm 0.1$  % of full scale.

**Output:** Linearity error:  $\leq \pm 0.05$  % of full scale.

Supply voltage influence:  $\leq \pm 0.05$  % of full scale for min to max supply change

Load influence:  $\leq \pm 0.05$  % of full scale for 0 to 100 % load resistance change

Temperature influence:  $\leq \pm 0.01$  % on zero and span for a 1 °C change.

### Compatibility:

**CE** CE mark compliant, conforms to Directive:

2014/34/EU ATEX, 2014/30/EU EMC, 2014/35/EU LVD, 2011/65/EU RoHS.

**Environmental conditions: Operating:** temperature limits -20 to + 60 °C,

relative humidity max 95 %.

**Storage:** temperature limits - 45 to + 80 °C.

### Safety Description:

**ATEX:** II (1)G [Ex ia Ga] IIC, II (1)D [Ex ia Da] IIC, I (M1) [Ex ia Ma] I, II 3G Ex nAC IIC T4 Gc.  
**IECEx:** [Ex ia Ga] IIC, [Ex ia Da] IIC, [Ex ia Ma] I, Ex nAC IIC T4 Gc  
**INMETRO:** [Ex ia Ga] IIC, [Ex ia Da] IIC, [Ex ia Ma] I  
**UL:** AIS / I, II, III / 1 / ABCDEFG, [AEx ia] IIC  
**C-UL:** AIS / I, II, III / 1 / ABCDEFG, [Ex ia] IIC  
**FM:** NI / I / 2 / ABCD / T4, NI / I / 2 / IIC / T4, AIS / I, II, III / 1 / ABCDEFG, AEx [ia] IIC  
**FM-C:** NI / I / 2 / ABCD / T4, NI / I / 2 / IIC / T4, AIS / I, II, III / 1 / ABCDEFG, Ex [ia] IIC  
**EAC-EX:** 2Ex nA nC [ia Ga] IIC T4 Gc X, [Ex ia Da] IIC X, [Ex ia Ma] I X  
**UKR TR n. 898:** 2Ex nA nC IIC T4 X, Exial X associated electrical apparatus.

Uo/Voc = 26.3 V, Io/Isc = 91 mA, Po/Po = 597 mW at terminals 14-15.

Uo/Voc = 1.1 V, Io/Isc = 56 mA, Po/Po = 16 mW at terminals 15-16.

Ui/Vmax = 30 V, li/lmax = 128 mA, Ci = 1.05 nF, Li = 0 nH at terminals 15-16.

Um = 250 Vrms, -20 °C  $\leq$  Ta  $\leq$  60 °C.

### Approvals:

Presafe 16ATEX8917 conforms to EN60079-0, EN60079-11, EN50303.

IECEx PRE 16.0084 conforms to IEC60079-0, IEC60079-11.

IMQ 09 ATEX 013 X conforms to EN60079-0, EN60079-15.

IECEx IMQ 13.0011X conforms to IEC60079-0, IEC60079-15.

INMETRO DNV 13.0135 X conforms to ABNT NBR IEC60079-0, ABNT NBR IEC60079-11.

UL & C-UL E222308 conforms to UL913, UL 60079-0, UL60079-11, UL60079-15

ANSI/ISA 12.12.01 for UL and CSA-C22.2 No.157-92, CSA-E60079-0, CSA-E60079-11,

CSA-C22.2 No. 213 and CSA-E60079-15 for C-UL, refer to control drawing ISM0125.

FM & FM-C No. 3024643, 3029921C, conforms to Class 3600, 3610, 3611, 3810,

ANSI/ISA 12.12.02, ANSI/ISA 60079-0, ANSI/ISA 60079-11, C22.2 No.142,

C22.2 No.157, C22.2 No.213, E60079-0, E60079-11, E60079-15.

C-IT.MH04.B.00306 conforms to GOST R IEC 60079-0, GOST R IEC 60079-11,

GOST R IEC 60079-15.

CU 16.0034 X conforms to DCTY 7113, GOCT 22782.5-78, DCTY IEC 60079-15.

TUV Certificate No. C-IS-236198-02, SIL 2 according to IEC 61511.

DNV No.A-14279 and KR No.MIL20769-EL001 Certificates for maritime applications.

**Mounting:** T35 DIN Rail according to EN50022.

**Weight:** about 175 g.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Location:** Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4, Class I, Division 2, Groups A, B, C, D Temperature Code T4 and Class I, Zone 2, Group IIC, IIB, IIA T4 installation.

**Protection class:** IP 20.

**Dimensions:** Width 22.5 mm, Depth 99 mm, Height 114.5 mm.

Parameters Table:

Safety Description	Maximum External Parameters			
	Group Cenelec	Co/Ca (μF)	Lo/La (mH)	Lo/Ro (μH/Ω)
Terminals 14-15				
Uo/Voc = 26.3 V	IIC	0.095	4.3	59.6
Io/Isc = 91 mA	IIB	0.738	17.2	238.4
Po/Po = 597 mW	IIA	2.5	34.5	476.8
	I	4.39	60	782.2
	IIIC	0.738	17.2	238.4
Terminals 15-16				
Uo/Voc = 1.1 V	IIC	100	11.3	2327
Io/Isc = 56 mA	IIB	1000	45.3	9309
Po/Po = 16 mW	IIA	1000	90.7	18618
Ui/Vmax = 30 V	I	1000	148	30550
Ii/Imax = 128 mA	IIIC	1000	45.3	9309
Ci = 1.05 nF, Li = 0 nH				

NOTE for USA and Canada:  
IIC equal to Gas Groups A, B, C, D, E, F and G  
IIB equal to Gas Groups C, D, E, F and G  
IIA equal to Gas Groups D, E, F and G

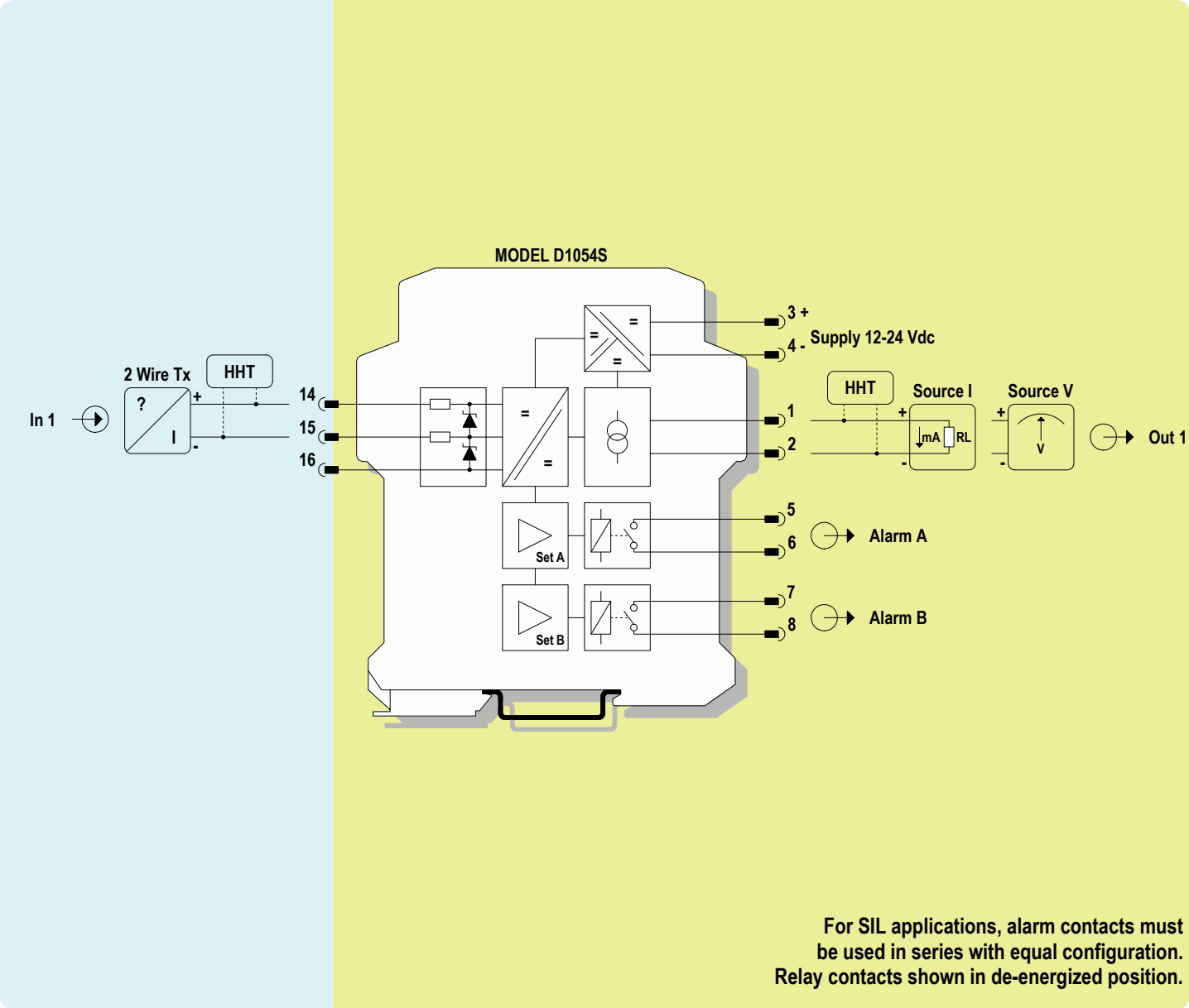
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Function Diagram:

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC,  
HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D,  
CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1,  
CLASS I, ZONE 0, GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4,  
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,  
GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4

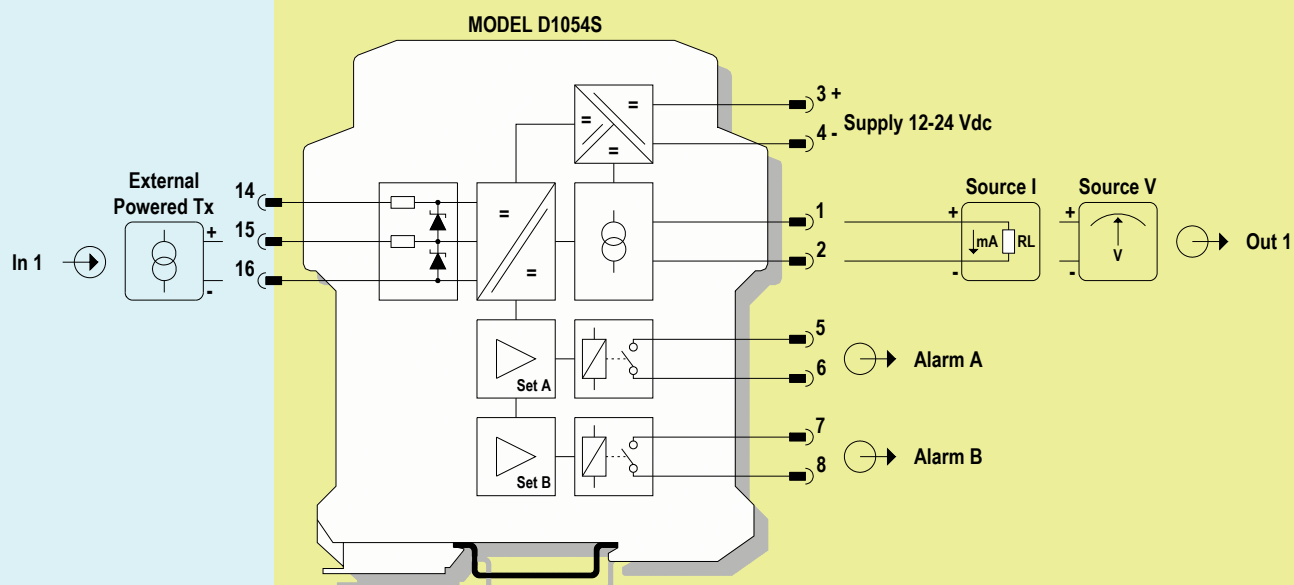


For SIL applications, alarm contacts must be used in series with equal configuration. Relay contacts shown in de-energized position.

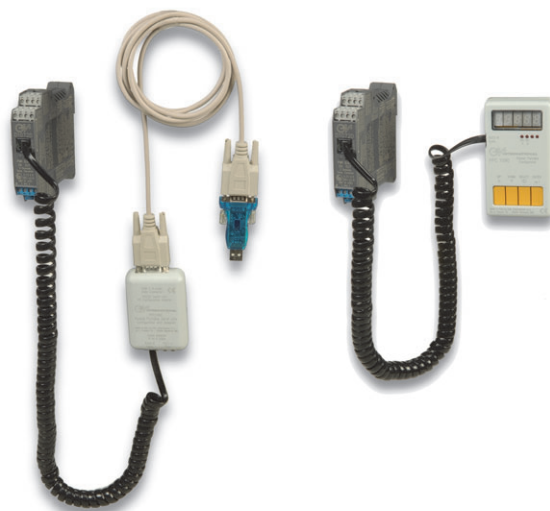
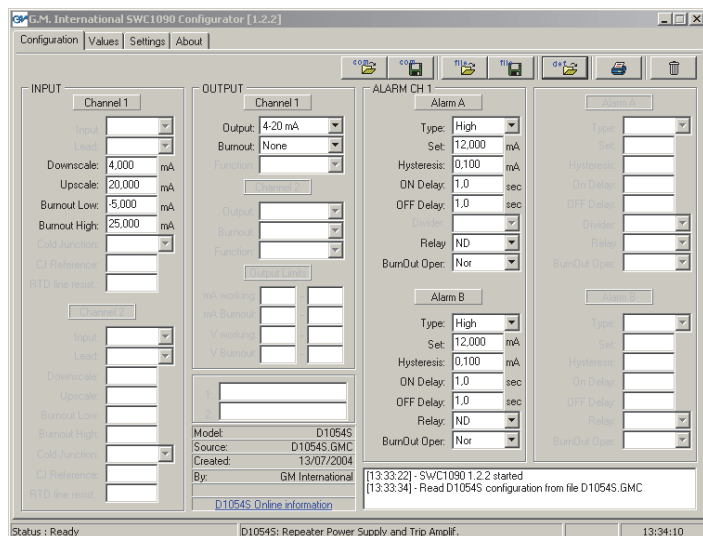
## Function Diagram:

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC,  
HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D,  
CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1,  
CLASS I, ZONE 0, GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4,  
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,  
GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4



For SIL applications, alarm contacts must be used in series with equal configuration. Relay contacts shown in de-energized position.



## Configuration Parameters:

### INPUT SECTION:

Input range is from 0 to +22 mA from loop powered or externally powered transmitter.  
**Downscale:** input value of measuring range corresponding to defined low output value.  
**Upscale:** input value of measuring range corresponding to defined high output value.  
**Burnout Low:** low burnout condition trip point value;  
 below this value a burnout fault condition is activated and the analog output is driven to the configured state (see Burnout in Output Section).  
 Setting this value outside the measuring range will disable this function.  
**Burnout High:** high burnout condition trip point value;  
 above this value a burnout fault condition is activated and the analog output is driven to the configured state (see Burnout in Output Section).  
 Setting this value outside the measuring range will disable this function.

### OUTPUT SECTION:

**Output:** analog output type  
☐ 4-20 mA current output range from 4 to 20 mA (for SIL applications)  
☐ 0-20 mA current output range from 0 to 20 mA  
☐ 1-5 V voltage output range from 1 to 5 V  
☐ 0-5 V voltage output range from 0 to 5 V  
☐ 2-10 V voltage output range from 2 to 10 V  
☐ 0-10 V voltage output range from 0 to 10 V  
**Burnout:** analog output burnout state  
☐ None burnout function is disabled;  
 analog output represents the input measure as configured  
☐ Downscale analog output is forced at zero  
☐ Upscale analog output is forced to 22 mA for current output or 11 V for voltage output

### ALARM SECTION:

**Type:** alarm type configuration  
☐ Off alarm functionality is disabled  
☐ High alarm is set to high condition, the alarm output is triggered whenever the input variable goes above the trip point value (Set)  
☐ Low alarm is set to low condition, the alarm output is triggered whenever the input variable goes below the trip point value (Set)  
☐ Low & Sec alarm is set to low condition with start-up, the alarm output is inhibited until the input variable goes above the trip point value (Set); afterwards it behaves as a Low configuration; typically used to solve start-up issues  
☐ Burnout a burnout condition of the input triggers the alarm output  
**Set:** input value of measuring range at which the alarm output is triggered  
**Hysteresis:** alarm hysteresis value, valid range: 0 to 5 mA  
**ON Delay:** time for which the input variable has to be in alarm condition before the alarm output is triggered; configurable from 0 to 1000 seconds in steps of 100 ms.  
**OFF Delay:** time for which the input variable has to be in normal condition before the alarm output is deactivated; configurable from 0 to 1000 seconds in steps of 100 ms.  
**Relay:** relay condition  
☐ ND the relay is in normally de-energized condition, it energizes (the output contact is closed) in alarm condition  
☐ NE the relay is in normally energized condition (for SIL applications) it de-energizes (the output contact is opened) in alarm condition  
**BurnOut Oper:** alarm status when a burnout condition is detected  
☐ Nor the burnout detection on the alarm output is disabled, the alarm follows the condition of the input variable  
☐ Lock maintain the same alarm condition as before the burnout detection  
☐ On the alarm condition is activated when a burnout is detected  
☐ Off the alarm condition is deactivated when a burnout is detected

Each alarm output has independent configurations.