

**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.

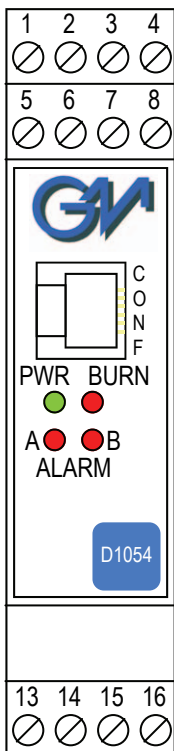
To operate PPC1090 or PPC1092 refer to instruction manual.

**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 61508, IEC 61511
  - 1) for Tproof = 4 / 8 years (10 / 20 % of total SIF, current out) PFDavg (1 year) 2.10 E-04, SFF 90.46%;
  - 2) for Tproof = 6 / 10 years (10 / 20 % of total SIF, alarm trip amplifiers), PFDavg (1 year) 1.57 E-04, SFF 93.65%.
- 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.
- Fully programmable operating parameters.
- ATEX, IECEx, UL & C-UL, FM & FM-C, Russian Certifications.
- Type Approval Certificate DNV and KR for marine 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.

**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  $\pm 1$   $^{\circ}$ 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  $^{\circ}$ 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  $^{\circ}$ C change.

**Compatibility:**

**CE** CE mark compliant, conforms to 94/9/EC Atex Directive and to 2004/108/CE EMC Directive.

**Environmental conditions: Operating:** temperature limits -20 to + 60  $^{\circ}$ C, relative humidity max 90 % non condensing, up to 35  $^{\circ}$ C.

**Storage:** temperature limits - 45 to + 80  $^{\circ}$ C.

**Safety Description:**


II (1) GD [EEx ia] IIC, I (M2) [EEx ia] II, II 3G Ex nA IIC T4, [Ex ia] IIC 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  $^{\circ}$ C  $\leq$  Ta  $\leq$  60  $^{\circ}$ C.

**Approvals:**

DNV-2004-OSL-ATEX-0199 conforms to EN50014, EN50020, EN50284,

IECEX DNV 07.0001 conforms to IEC60079-0, IEC60079-11,

GM International CRR028 conforms to EN60079-0, EN60079-15,

UL & C-UL E222308 conforms to UL913 (Div.1), UL 60079-0 (General, All Zones),

UL60079-11 (Intrinsic Safety "i" Zones 0 & 1) for UL and

CSA-C22.2 No.157-92 (Div.1), CSA-E60079-0 (General, All Zones),

CSA-E60079-11 (Intrinsic Safety "i" Zones 0 & 1) for C-UL, refer to control drawing

ISM0139 for complete UL and C-UL safety and installation instructions,

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

C22.2 No.142, C22.2 No.157, C22.2 No.213, E60079-0, E60079-11, E60079-15,

Russia according to GOST 12.2.007.0-75, R 51330.0-99, R 51330.10-99 [Exia] IIC X,

DNV and KR Type Approval Certificate for marine applications.

TUV Certificate No. C-IS-204194-02, SIL 2 according to IEC 61508, IEC 61511.

Please refer to Functional Safety Manual for SIL 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	2.508	34.5	476.8
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

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

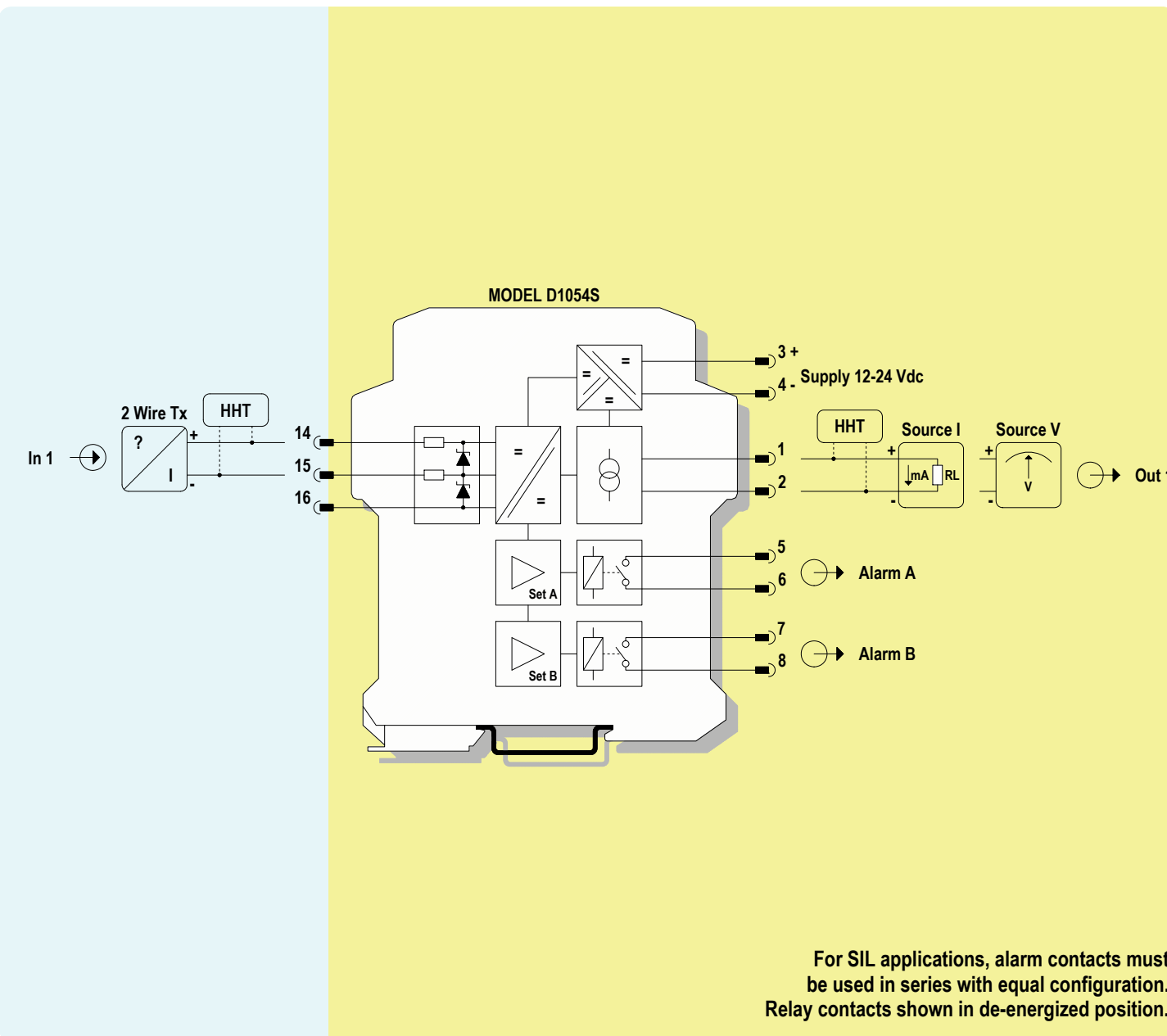
**Image:**



**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

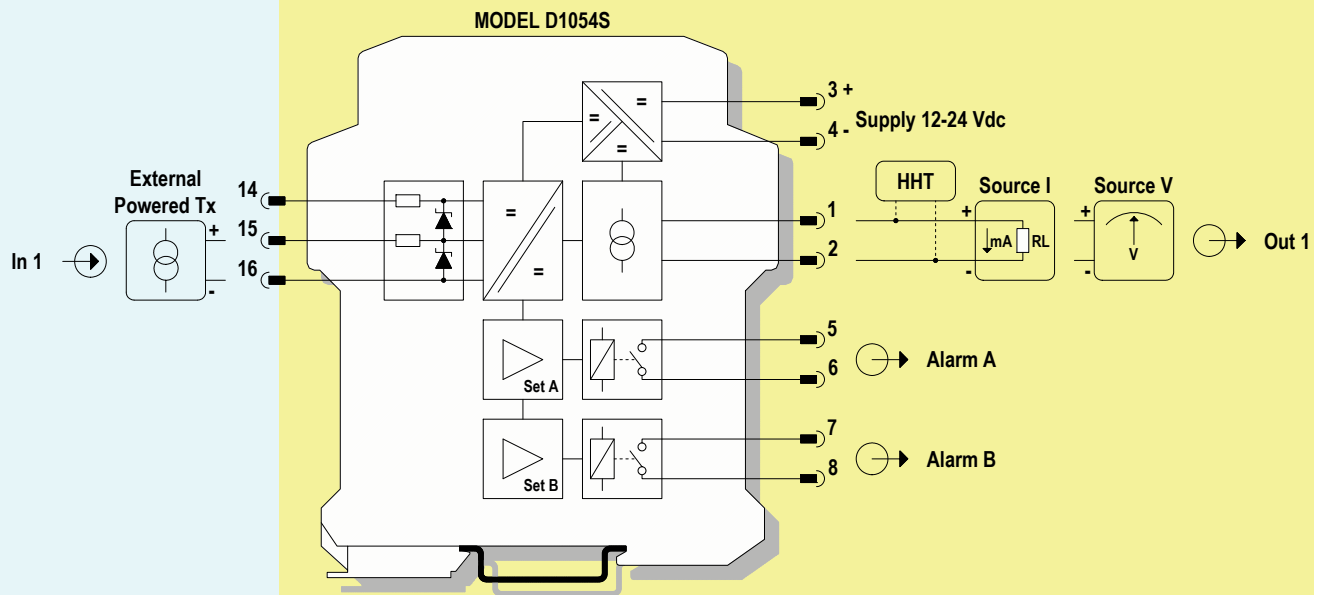


**For SIL applications, alarm contacts must be used in series with equal configuration. Relay contacts shown in de-energized position.**

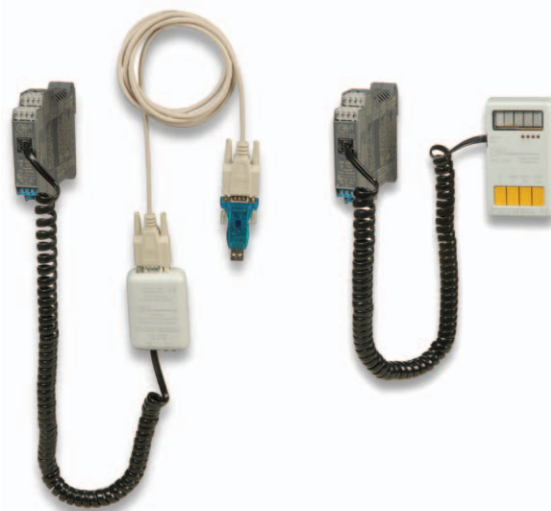
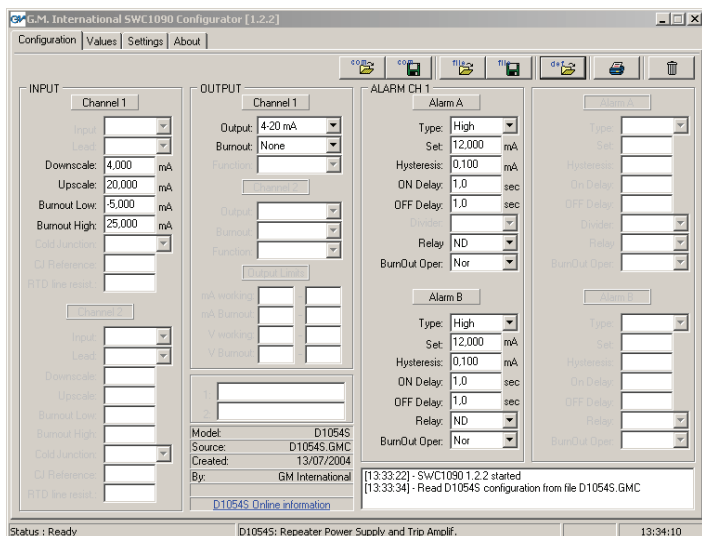
**Function Diagram:**

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  
 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, 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.