

# SIL 2 Repeater Power Supply

## Smart-Hart Compatible DIN-Rail

### Models D1010S, D1010D

#### Characteristics:

##### General Description:

The single and dual channel DIN Rail Repeater Power Supply, D1010S and D1010D, provides a fully floating dc supply for energizing conventional 2-wire 4-20 mA Transmitter, or separately powered 3, 4 wire 4-20, 0-20 mA Transmitter located in Hazardous Area, and repeats the current in floating circuit to drive a Safe Area load.

The circuit allows bi-directional communication signals, for Smart Transmitters.

##### Function:

1 or 2 channels I.S. analog input for 2 wire loop powered or separately powered Smart Transmitters, provides 3 port isolation (input/output/supply) and current (source or sink) or voltage output signal.

##### Signalling LED:

Power supply indication (green).

##### Field Configurability:

mA (source or sink) or V output signal.

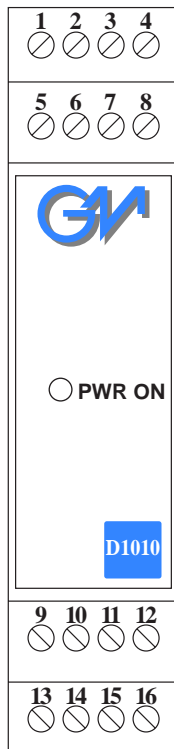
##### Smart Communication Frequency Band:

0.5 to 40 KHz within 3 dB (Hart and higher frequency protocols).

##### EMC:

Fully compliant with CE marking applicable requirements.

#### Front Panel and Features:



- SIL 2 according to EN61508.
- 4-20 or 0-20 mA Input, Output Signal.
- Wide Band Smart Communication, Hart compatible.
- Input and Output short circuit proof.
- High Accuracy.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4.
- Field programmability by DIP Switch.
- ATEX, UL & C-UL, Russia and Ukraine Certifications.
- High Reliability, SMD components.
- High Density, two channels per unit.
- Simplified installation using standard DIN Rail plug-in terminal blocks.
- 250 Vrms (Um) max. voltage applied to the instruments associated with barrier.

#### Ordering Information:

<b>Model:</b>	<b>D1010</b>		
1 channel		S	
2 channels		D	
Power Bus enclosure			/B

#### Technical Data:

##### Supply:

24 V nom (20 to 30 V) reverse polarity protected ripple within voltage limits  $\leq 5$  Vpp.

**Current consumption @ 24 V:** 115 mA for 2 channels D1010D, 60 mA for 1 channel D1010S with 20 mA output typical.

**Max. power consumption:** 3.70 W for 2 channels, 2.00 W for 1 channel with 30 V supply voltage and short circuit condition.

##### Isolation (Test Voltage):

I.S. In/Out 1.5 KV; I.S. In/Supply 1.5 KV; I.S. In/I.S. In 500 V; Out/Out 500 V; Out/Supply 500 V.

##### Input:

0/4 to 20 mA (separately powered input, voltage drop  $\leq 1.0$  V) or 4 to 20 mA (2 wire Tx current limited at  $\approx 23$  mA).

##### Transmitter line voltage:

$\geq 15.0$  V at 20 mA with max. 20 mVrms ripple on 0.5 to 40 KHz frequency band.

##### Output:

0/4 to 20 mA, on max. 600  $\Omega$  load in source mode; V min. 5 V at 0  $\Omega$  load V max. 30 V in sink mode, current limited at  $\approx 23$  mA or 0/1 to 5 V on internal 250  $\Omega$  shunt (or 0/2 to 10 V on internal 500  $\Omega$  shunt on request).

**Response time:** 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).

##### Performance:

Ref. Conditions 24 V supply, 250  $\Omega$  load,  $23 \pm 1$  °C ambient temp.

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

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

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

**Load influence:**  $\leq \pm 0.05$  % of full scale for a 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 94/9/EC Atex Directive and to 89/336/CEE EMC Directive.

##### Environmental conditions:

**Operating:** Temperature limits -20 to +60 °C, relative humidity max 90 % non condensing, up to 35 °C.

**Storage:** Temperature limits -40 to +80 °C.

##### Safety Description:

**Ex** II (1) G D [EEx ia] IIC or I M2 [EEx ia] I associated electrical apparatus. Uo/Voc = 27 V, Io/Isc = 93 mA, Po/Po = 625 mW at terminals 14-15, 10-11.

Uo/Voc = 1.1 V, Io/Isc = 45 mA, Po/Po = 13 mW at terminals 15-16, 11-12 (non energy storing apparatus connection). Um = 250 Vrms, -20 °C  $\leq$  Ta  $\leq$  60 °C.

**Approvals:** DMT 01 ATEX E 042 X conforms to EN50014, EN50020, UL & C-UL E222308 conforms to UL913 (Div.1), UL 60079-0 (General, All Zones), UL60079-11 (Intrinsic Safety "i" Zones 0 & 1), UL60079-15 ("n" Zone 2), UL 1604 (Div.2) 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), CSA-C22.2 No. 213-M1987 (Div. 2) and CSA-E60079-15 ("n" Zone 2) for C-UL, TCCEXEE (Russia) Nr.665 according to GOST R 51330.0-99, 51330.10-99 [Exia]IIC X, TCCEXEE (Ukraine) Nr.665 according to GOST 12.2.007.0, 22782.0, 22782.5 ExiaIIC X, Gosgortekhnadzor of Russia Permit Nr. PPC 04-11284. EXIDA Report No. GM03/07-24 R001, SIL 2 according to EN61508. Please refer to Functional Safety Manual for SIL applications.

##### Mounting:

T35 DIN Rail according to EN50022.

**Weight:** about 175 g D1010D, 125 g D1010S.

**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 Class I, Division 2, Groups A, B, C, D and Class I, Zone 2, Group IIC installation.

**Protection class:** IP 20.

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

## Parameters Table:

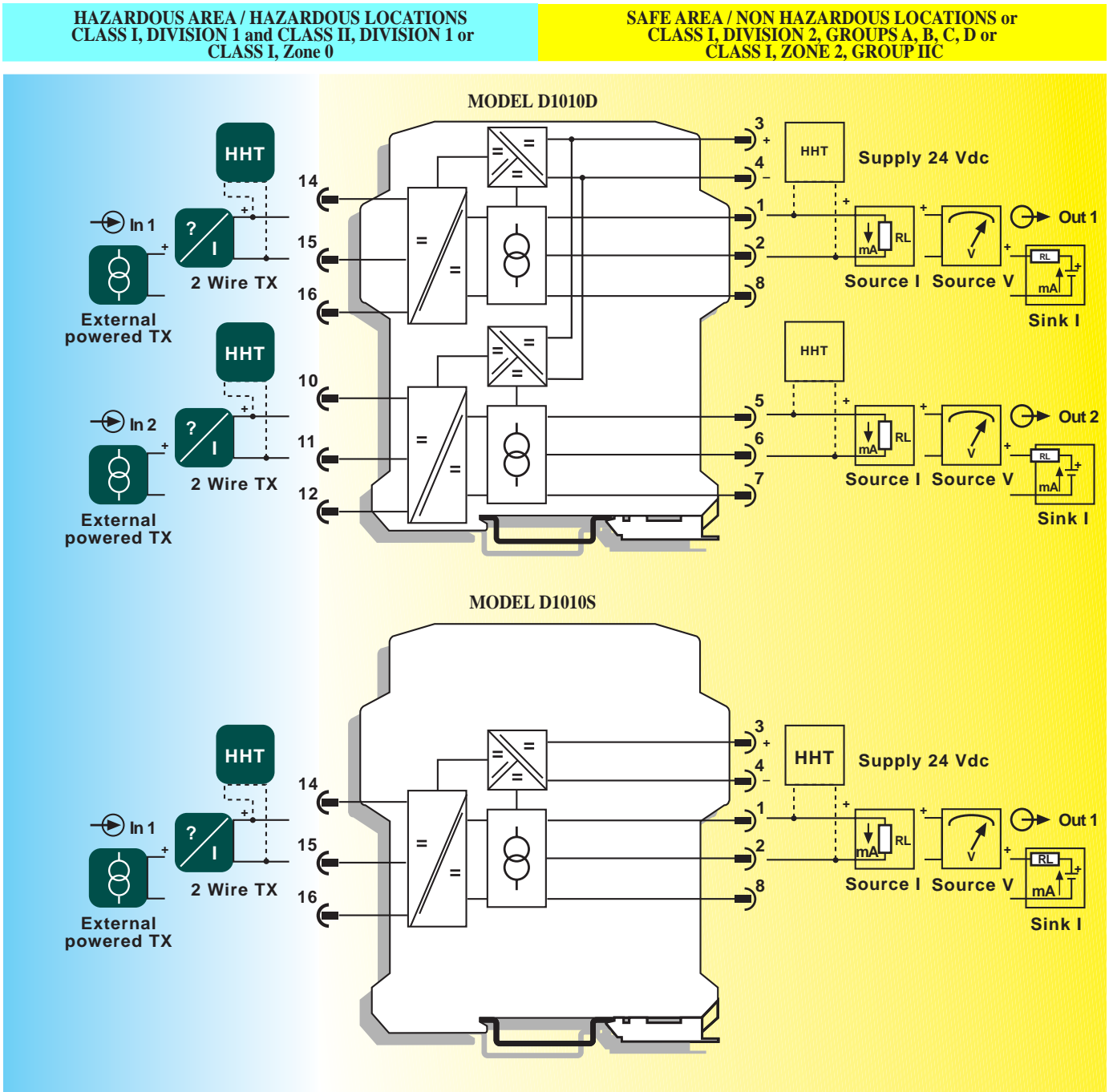
Safety Description	Maximum External Parameters			
	Group Cenelec	Co/Ca (μF)	Lo/La (mH)	L/R / La/Ra (μH/Ω)
<b>Terminals 14-15, 10-11</b>				
Uo/Voc = 27 V	II C	0.089	4.2	56.5
Io/Isc = 93 mA	II B	0.705	15.0	226.1
Po/Po = 625 mW	II A	2.320	33.0	452.3
<b>Terminals 15-16, 11-12</b>				
<b>Non energy storing apparatus connection</b>				
Uo/Voc = 1.1 V	II C			
Io/Isc = 45 mA	II B			
Po/Po = 13 mW	II A			



### NOTE for USA and Canada:

II C equal to Gas Groups A, B, C, D, E, F and G.  
 II B equal to Gas Groups C, D, E, F and G.  
 II A equal to Gas Groups D, E, F and G.

## Function Diagram:



## Function Diagram:

HAZARDOUS AREA / HAZARDOUS LOCATIONS  
CLASS I, DIVISION 1 and CLASS II, DIVISION 1 or  
CLASS I, Zone 0

SAFE AREA / NON HAZARDOUS LOCATIONS or  
CLASS I, DIVISION 2, GROUPS A, B, C, D or  
CLASS I, ZONE 2, GROUP IIC

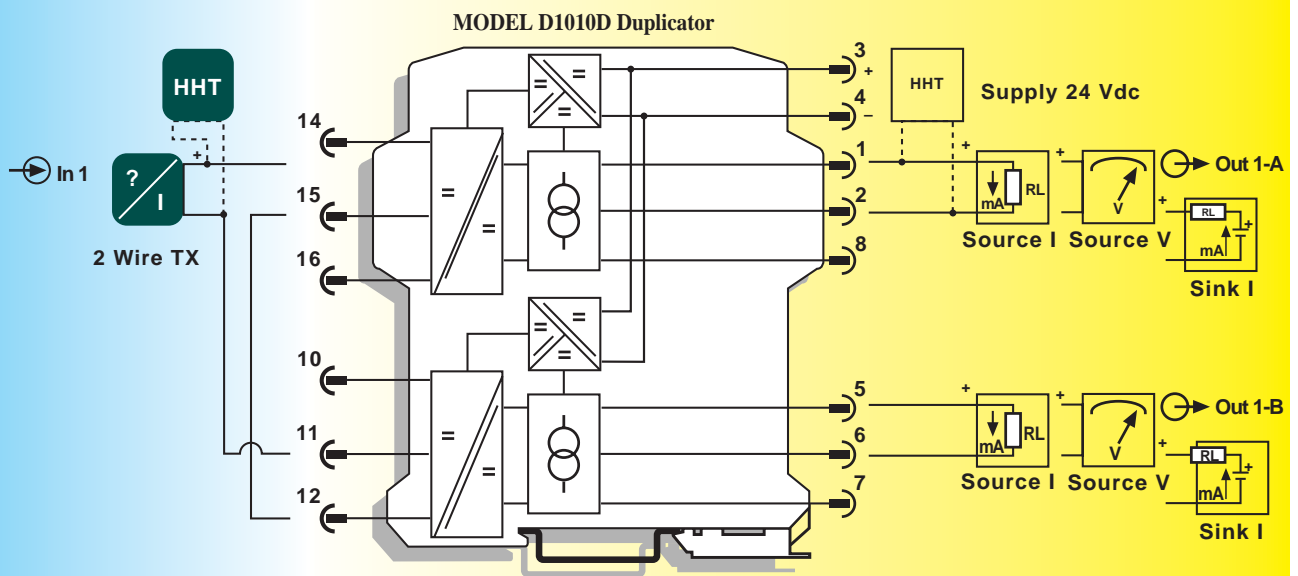
### Safety Description

#### Terminals 14-15

$U_o/V_{oc} = 28.1 \text{ V}$

$I_o/I_{sc} = 93 \text{ mA}$

$P_o/P_o = 654 \text{ mW}$



### Connections for Duplication of 2 wire Transmitter Input.

Restriction on Specifications for 2 wire Transmitter Input.

- Bi-directional communication for Smart Transmitter is provided only output channel 1.
- The minimum supply voltage available for transmitters (VTx) is 14.0 V at 20 mA input.
- The allowable safety parameters must be changed in:
  - $U_o/V_{oc} = 28.1 \text{ V}$ .
  - $I_o/I_{sc} = 93 \text{ mA}$ .
  - $P_o/P_o = 654 \text{ mW}$ .

## Function Diagram:

HAZARDOUS AREA / HAZARDOUS LOCATIONS  
CLASS I, DIVISION 1 and CLASS II, DIVISION 1 or  
CLASS I, Zone 0

SAFE AREA / NON HAZARDOUS LOCATIONS or  
CLASS I, DIVISION 2, GROUPS A, B, C, D or  
CLASS I, ZONE 2, GROUP IIC

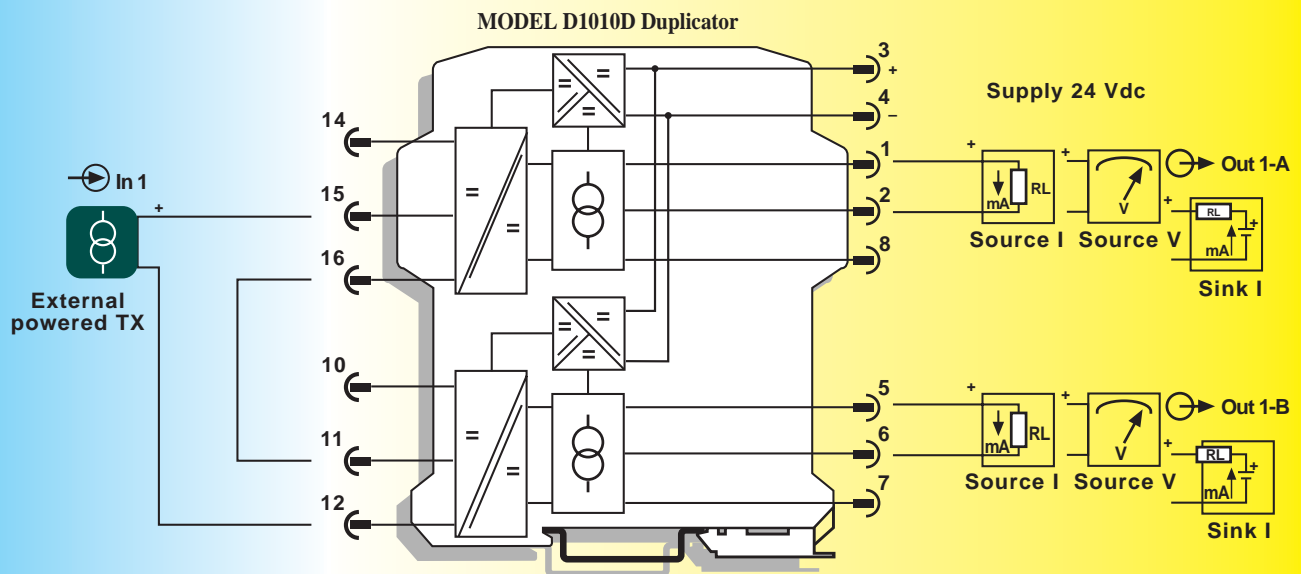
### Safety Description

#### Terminals 15-16

$U_o/V_{oc} = 2.2\text{ V}$

$I_o/I_{sc} = 45\text{ mA}$

$P_o/P_o = 25\text{ mW}$



### Connections for Duplication of Active Input Signals.

Restriction on Specifications for external powered Transmitter.

- The voltage drop must be changed in 2.0 V max.
- The allowable safety parameters must be changed in:
  - $U_o/V_{oc} = 2.2\text{ V}$ .
  - $I_o/I_{sc} = 45\text{ mA}$ .
  - $P_o/P_o = 25\text{ mW}$ .