

**Characteristics:**
**General Description:**

The single and dual channel DIN Rail Repeater Power Supply, D1010S-046 and D1010D-046, 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.

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

**Function:**

1 or 2 channels I.S. analog input for 2 wires 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:**

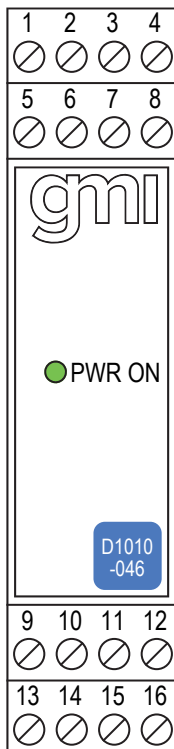
0.5 to 40 KHz within 3 dB (Hart and higher frequency protocols).

**EMC:**

Fully compliant with CE marking applicable requirements.

**Functional Safety Management Certification:**

G.M. International is certified by TÜV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.


**Front Panel and Features:**


- SIL 2 according to IEC 61508:2010 Ed. 2 for Tproof = 7 / 10 years ( $\leq 10\%$  /  $> 10\%$  of total SIF) with active input.
- SIL 2 according to IEC 61508:2010 Ed. 2 for Tproof = 6 / 10 years ( $\leq 10\%$  /  $> 10\%$  of total SIF) with passive input.
- PFDavg (1 year) 1.30 E-04, SFF 80.51 % with active input.
- PFDavg (1 year) 1.47 E-04, SFF 80.81 % with passive input.
- SIL 3 Systematic capability.
- Input from Zone 0 (Zone 20), installation in Zone 2.
- 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, EN61326-1
- In-field programmability by DIP Switch.
- ATEX, IECEx, 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, two channels 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:	D1010	
1 channel	S-046	
2 channels	D-046	
Power Bus enclosure		/B
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:**

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

**Current consumption @ 24 V:** 115 mA for 2 channels D1010D-046, 60 mA for 1 channel D1010S-046 with 20 mA output typical.

**Power dissipation:** 1.9 W for 2 channels D1010D-046,

1.0 W for 1 channel D1010S-046 with 24 V supply voltage and 20 mA output typical.

**Max. power consumption:** at 30 V supply voltage and short circuit condition, 3.7 W for 2 channels D1010D-046, 2.0 W for 1 channel D1010S-046.

**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/Supply 500 V; Out/Out 500 V.

**Input:**

0/4 to 20 mA (separately powered input, voltage drop  $\leq 1.1$  V) or 4 to 20 mA (2 wire Tx current limited at  $\approx 25$  mA).

**Transmitter line voltage:**

$\geq 14.0$  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 temperature.

**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 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 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] IIIC, I (M1) [Ex ia Ma] I; II 3G Ex ec IIC T4 Gc

**IECEx:** [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I; Ex ec IIC T4 Gc

**INMETRO:** [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I

**EAC-EX:** 2Ex nA [ia Ga] IIC T4 Gc X, [Ex ia Da] IIIC X, [Ex ia Ma] I X

**UKR TR n. 898:** 2ExnAialICT4 X, Exial X

associated apparatus and non-sparking electrical equipment.

Uo/Voc = 26.3 V, Io/Isc = 79 mA, Po/Po = 514 mW at terminals 14-15, 10-11.

Uo/Voc = 1.1 V, Io/Isc = 28 mA, Po/Po = 8 mW at terminals 15-16, 11-12.

Ui/Vmax = 30 V, li/lmax = 104 mA, Ci = 1.05 nF, Li = 0 nH at terminals 15-16, 11-12.

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

**Approvals:**

DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11.

IECEx BVS 07.0027X conforms to IEC60079-0, IEC60079-11.

IMQ 09 ATEX 013 X conforms to EN60079-0, EN60079-7.

IECEx IMQ 13.0011X conforms to IEC60079-0, IEC60079-7.

INMETRO DNV 13.0108 X conforms to ABNT NBR IEC60079-0, ABNT NBR IEC60079-11.

EAC RU C-IT.HA67.B.00113/20 conforms to GOST 31610.0, GOST 31610.11, GOST 31610.15.

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

TÜV Certificate No. C-IS-236198-03, SIL 2 conforms to IEC61508:2010 Ed.2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

DNV No. TAA0002BM and KR No.MIL20769-EL001 Cert. for maritime applications.

**Mounting:**

EN/IEC60715 TH 35 DIN-Rail.

**Weight:** about 175 g D1010D-046, 125 g D1010S-046.

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

**Location:** Safe Area or Zone 2, Group IIC 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, 10-11				
Uo/Voc = 26.3 V	IIC	0.095	5.8	69.2
Io/Isc = 79 mA	IIB	0.738	23.2	276.8
Po/Po = 514 mW	IIA	2.51	46.5	553.6
	I	3.95	76.3	908.3
	IIIC	0.738	23.2	276.8
Terminals 15-16, 11-12				
Uo/Voc = 1.1 V	IIC	100	45	4654
Io/Isc = 28 mA	IIB	1000	181.4	18618
Po/Po = 8 mW	IIA	1000	362.8	37236
U <sub>i</sub> /V <sub>max</sub> =30V, I <sub>l</sub> max=104mA	I	1000	595.2	61090
Ci = 1.05 nF, Li = 0 nH	IIIC	1000	181.4	18618

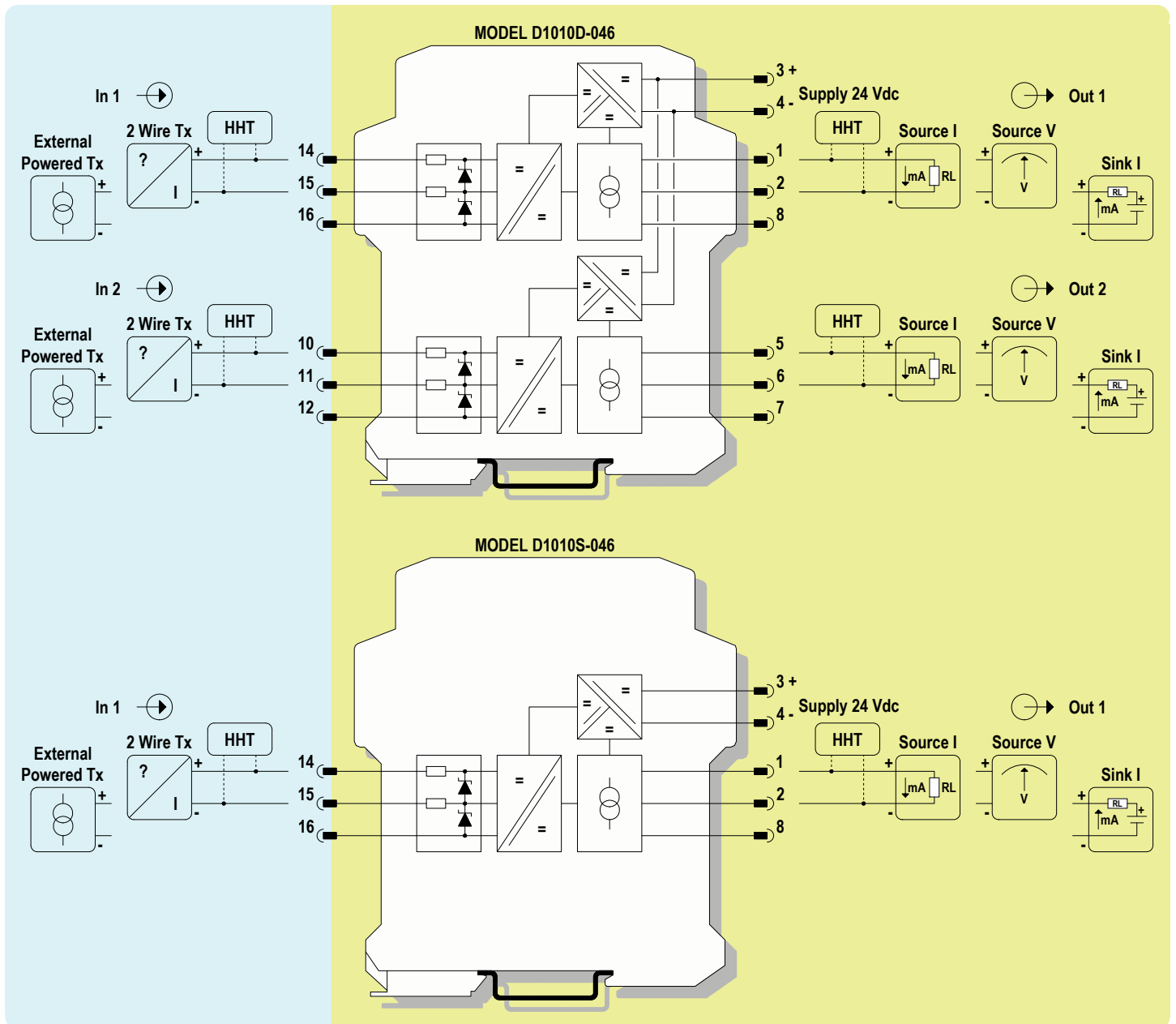
**Image:**



**Function Diagram:**

HAZARDOUS AREA ZONE 0 (ZONE 20), GROUP IIC

SAFE AREA, ZONE 2, GROUP IIC T4



## Function Diagram:

HAZARDOUS AREA ZONE 0 (ZONE 20), GROUP IIC

SAFE AREA, ZONE 2, GROUP IIC T4

### Safety Description

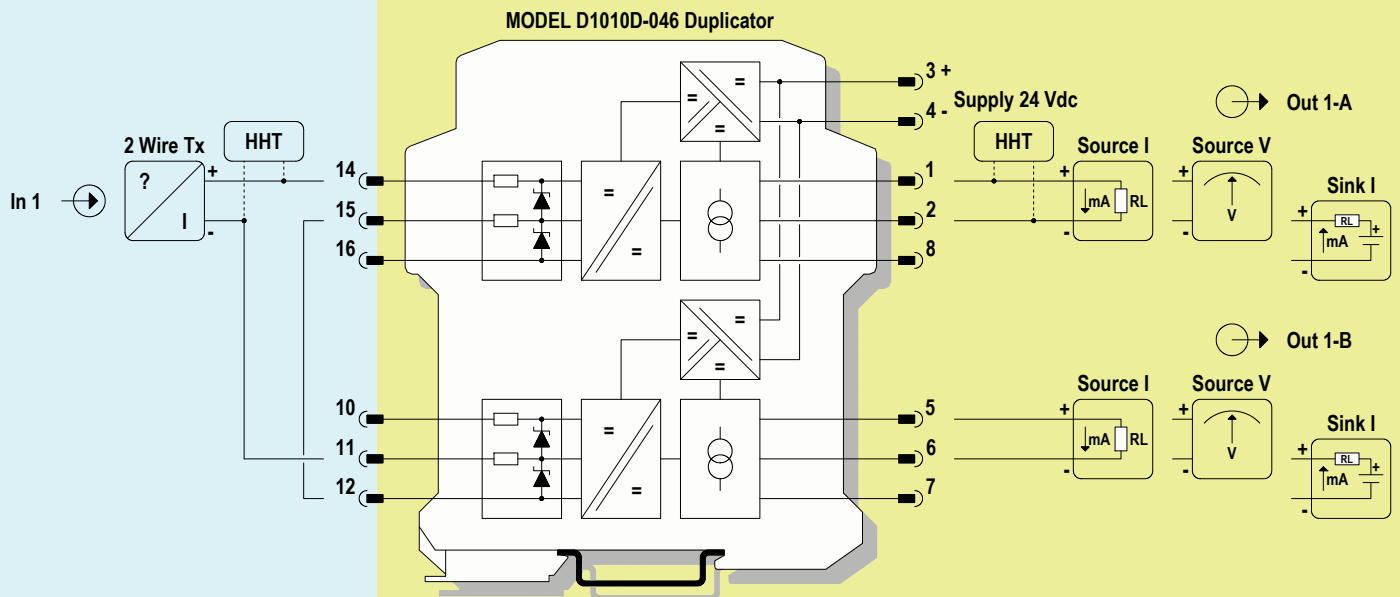
Terminals 14-11

$U_o/V_{oc} = 27.4 \text{ V}$

$I_o/I_{sc} = 79 \text{ mA}$

$P_o/P_o = 542 \text{ mW}$

Group	Co/Ca ( $\mu\text{F}$ )	Lo/La (mH)	Lo/Ro ( $\mu\text{H}/\Omega$ )
Cenelec			
IIC	0.085	5.8	63.0
IIB	0.675	23.2	252.2
IIA	2.258	46.5	504.5



### Connections for Duplication of 2 wires Transmitter Input

Restriction on specifications for 2 wires Transmitter Input:

Bidirectional communication for Smart Transmitter is provided only on channel 1

The minimum supply voltage available for Transmitter ( $V_{tx}$ ) is 12.9 V at 20 mA input

The safety parameters must be changed in:  $U_o/V_{oc} = 27.4 \text{ V}$ ,  $I_o/I_{sc} = 79 \text{ mA}$ ,  $P_o/P_o = 542 \text{ mW}$

## Function Diagram:

HAZARDOUS AREA ZONE 0 (ZONE 20), GROUP IIC

SAFE AREA, ZONE 2, GROUP IIC T4

### Safety Description

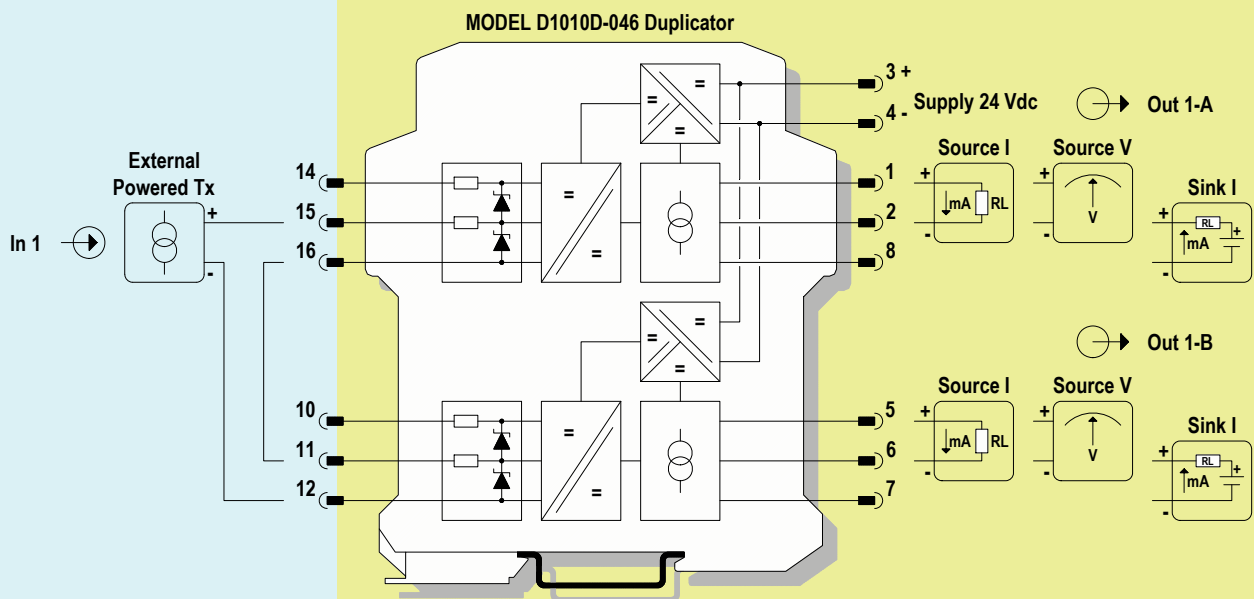
Terminals 15-12

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

$I_o/I_{sc} = 28\text{ mA}$

$P_o/P_o = 16\text{ mW}$

Group	Co/Ca ( $\mu\text{F}$ )	Lo/La (mH)	Lo/Ro ( $\mu\text{H}/\Omega$ )
Cenelec			
IIC	100	45.3	1151
IIB	1000	181.4	4607
IIA	1000	362.8	9215



### Connections for Duplication of Active Input Signals

Restriction on specifications for external powered Transmitter:

The voltage drop must be changed in 2.2 V maximum

The safety parameters must be changed in:  $U_o/V_{oc} = 2.2\text{ V}$ ,  $I_o/I_{sc} = 28\text{ mA}$ ,  $P_o/P_o = 16\text{ mW}$