INTRINSIC SAFETY
BARRIERS - ATEX
## 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 wires 4-20 mA transmitters, or separately powered 3, 4 wires 4-20 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, or separately powered 3, 4 wires 4-20 mA transmitters located in Hazardous Area.**
- **Hazardous Area, and repeats the current in floating circuit to drive a Safe Area load.**
- **Hart compatible.**
- **Wide Band Smart Communication, 4-20 or 0-20 mA Input, Output Signal.**
- **Three port isolation, Input/Output/Supply.**
- **Input and Output short circuit proof.**
- **50 ms (10 to 90 % step change).**
- **≤ 0.05 % of full scale.**
- **≤ 0.05 % of full scale for a min to max supply change.**
- **± 0.05 % of full scale for a 0 to 100 % load resistance change.**
- **Temperature influence: ± 0.01 % on zero and span for a 1 °C change.**

## Technical Data:

### Supply:
- **24 Vdc nom (20 to 30 Vdc) reverse polarity protected.**
- **ripple within voltage limits ≤ 5 Vpp.**
- **Current consumption @ 24 V: 115 mA for 2 channels D1010D, 60 mA for 1 channel D1010S with 20 mA output typical.**
- **Power dissipation: 1.9 W for 2 channels D1010D, 1.0 W for 1 channel D1010S 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, 2.0 W for 1 channel D1010S.**

### Isolation (Test Voltage):
- **I.S. In/Out 1.5 KV; I.S. In/Supply 1.5 KV; I.S. In/In 500 V; Out/Supply 500 V; Out/Out 500 V.**
- **Input:**
  - 0/4 to 20 mA (separately powered input, voltage drop ≤ ±0.9 V) or
  - 4 to 20 mA (2 wire Tx current limited at ≈ 25 mA).
- **Transmitter line voltage:**
  - ± 15.0 V at 20 mA with max. 20 mVrms ripple on 0.5 to 40 kHz frequency band.
- **Output:**
  - 0/24 to 20 mA, on max. 600 Ohm in source mode; V min. 5 V at 0 Ohm load V max. 30 V in sink mode, current limited at ≈ 23 mA or
  - 0/1 to 5 V on internal 250 Ohm shunt (or 0/2 to 10 V on internal 500 Ohm shunt on request).
- **Response time:** 50 ms (10 to 90 % step change).
- **Output ripple:** ≤ ±20 mVrms on 250 Q 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:
- **Calibration accuracy:** ≤ ±0.1 % of full scale.
- **Linearity error:** ≤ ±0.05 % of full scale.
- **Supply voltage influence:** ≤ ±0.05 % of full scale for a min to max supply change.
- **Load influence:** ≤ ±0.05 % of full scale for a 0 to 100 % load resistance change.
- **Temperature influence:** ≤ ±0.01 % on zero and span for a 1 °C change.

### Ordering Information:
- **Model:** D1010
- **1 channel**
  - Power Bus enclosure S
- **2 channels**
  - Power Bus enclosure D

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### D1010 Smart-Hart compatible DIN-Rail Models D1010S, D1010D

**Manufacturer:**

**SIL 3 Repeater Power Supply**

**Front Panel and Features:**

- **SIL 3 according to IEC 61508 for Tprov = 1 year (20 % of total SIF).**
- **SIL 2 according to IEC 61508 for Tprov = 5 / 10 years (10 / 20 % of total SIF).**
- **PFDavg (1 year) 1.50 E-04, SFF 91.85 %.**
- **II (1) G [Ex ia Ga] IC, II (1) D [Ex ia Da] IIC, I (M1) [Ex ia M1] I, II 3G Ex nA II T4, [Ex ia Ga] IIC, [Ex ia Da] IIC, [Ex ia M1] I associated electrical apparatus.**
- **Uo/Voc = 26.3 V, Io/Isc = 1.9 mA, Po/Po = 597 mW at terminals 14-15, 10-11.**
- **Uo/Voc = 1.1 V, Io/Isc = 38 mA, Po/Po = 11 mW at terminals 15-16, 11-12.**
- **Ul/Vmax = 30 V, Il/Imax = 104 mA, Ci = 1.05 nF at terminals 15-16, 11-12.**
- **Um = 250 Vrms, -20 °C ≤ Ts ≤ +60 °C.**

**Approvals:**
- **DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN61241-0, EN61241-11, IECEx BVS 07.0227X to EN60079-0, IEC60079-11, IEC60079-26, IEC61241-0, IEC61241-11,**
- **IMO 09 ATEX 013 X conforms to EN60079-0, EN60079-15, UL & C-UL E22308 conforms to UL61010 (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-R92 (Div.1), CSA-E60079-0 (General, All Zones), CSA-E60079-11 (Intrinsic Safety “I” Zones 0 & 1), CSA-C22.2 No. 213-M1867 (Div. 2) and CSA-E60079-15 (“n” Zone 2) for C-UL, refer to control drawing ISM0125 for complete UL and C-UL safety and installation instructions, FM & FM-C No. 3024643, 3092921C, conforms to Classes 3600, 3610, 3611, 3810 and C22.2 No.142, C22.2 No.157, C22.2 No.213, E60079-0, E60079-11, E60079-15, Russia according to GOST 12.2.007.0-2007, 51330.0-99, P 51330.10-99 [Exial IIC X, Ukraine according to GOST 12.2.001.0-22782.0-22782.5 Exia IIC X. TUV Certificate No. C-183645-01, SIL 2 / SIL 3 according to IEC 61508.**
- Please refer to their Safety Manual for SIL applications.
- **DNV and KR Type Approval Certificate for marine 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 accomodate terminations up to 2.5 mm².
- **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
- **Protection class:** IP 20.
- **Dimensions:** Width 22.5 mm, Depth 99 mm, Height 114.5 mm.
Parameters Table:

<table>
<thead>
<tr>
<th>Safety Description</th>
<th>Maximum External Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group</td>
</tr>
<tr>
<td>Terminals 14-15, 10-11</td>
<td>Cenelec</td>
</tr>
<tr>
<td>Uo/Voc = 26.3 V</td>
<td>IIB</td>
</tr>
<tr>
<td>Io/Isc = 91 mA</td>
<td>II/A</td>
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<tr>
<td>Po/Po = 597 mW</td>
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<tr>
<td>Terminals 15-16, 11-12</td>
<td>Cenelec</td>
</tr>
<tr>
<td>Uo/Voc = 1.1 V</td>
<td>IIB</td>
</tr>
<tr>
<td>Io/Isc = 38 mA</td>
<td>II/A</td>
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</tbody>
</table>

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
- II/A equal to Gas Groups D, E, F and G

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
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

Safety Description

Terminals 14-11
(with 15-12 shorted)
Uo/Voc = 27.4 V
Io/Isc = 91 mA
Po/Po = 624 mW

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 (Vtx) is 14.1 V at 20 mA input
The safety parameters must be changed in: Uo/Voc = 27.4 V, Io/Isc = 91 mA, Po/Po = 624 mW

Table:

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<thead>
<tr>
<th>Group</th>
<th>Co/Ca (µF)</th>
<th>Lo/La (mH)</th>
<th>Lo/Ro (µH/Ω)</th>
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<tr>
<td>IIC</td>
<td>0.085</td>
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<td>IIB</td>
<td>0.675</td>
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<tr>
<td>IIA</td>
<td>2.258</td>
<td>34.5</td>
<td>437.9</td>
</tr>
</tbody>
</table>
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

Safety Description

Terminals 15-12
(with 16-11 shorted)
Uo/Voc = 2.2 V
Io/Isc = 38 mA
Po/Po = 21 mW

Connections for Duplication of Active Input Signals

Restriction on specifications for external powered Transmitter:
The voltage drop must be changed in 1.8 V maximum
The safety parameters must be changed in: Uo/Voc = 2.2 V, Io/Isc = 38 mA, Po/Po = 21 mW
Characteristics:

General Description:
The quadruple channel DIN Rail Repeater Power Supply D1012Q provides a fully floating dc supply for energizing conventional 2 wires 4-20 mA transmitters located in Hazardous Area, and repeats the current in Safe Area to drive a load.

Function:
4 channels I.S. analog input for 2 wires loop powered transmitters, provides isolation between input versus output and supply, and current (source mode) output signal. On demand it is possible to supply the following combination of input/output: 2 independent input // 2+2 independent groups of output or 1 input // 4 outputs.

Signalling LED:
Power supply indication (green).

EMC:
Fully compliant with CE marking applicable requirements.

Technical Data:

Supply:
24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.

Current consumption @ 24 V: 160 mA with 20 mA output typical.

Power dissipation:
2.3 W for 4 channels with 24 V supply voltage and 20 mA output typical.

Max. power consumption:
at 30 V supply voltage, 4.0 W for 4 channels.

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

Input:
4 to 20 mA (2 wire Tx current limited at ≈ 22 mA).

Transmitter line voltage:
14.0 V at 20 mA with max. 30 mVrms ripple.

Output:
4 to 20 mA, on max. 300 Ω load source mode, current limited at 20.6 mA.

Response time:
500 ms (10 to 90 % step change).

Output ripple:
≤ 30 mVrms.

Performance:
Ref. Conditions 24 V supply, 250 Ω load, 23 ± 1 °C ambient temperature.

Calibration accuracy:
≤ ± 0.1 % of full scale.

Linearity error:
≤ ± 0.05 % of full scale.

Supply voltage influence:
≤ ± 0.05 % of full scale for a min to max supply change.

Load influence:
≤ ± 0.05 % of full scale for a 0 to 100 % load resistance change.

Temperature influence:
≤ ± 0.01 % on zero and span for a 1 °C change.

Compatibility:

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

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

Safety Description:
II (1) G [Ex ia Ga] IIC, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I, II 3G Ex nA II T4, [Ex ia Ga] [IC, [Ex ia Da] [IIC, [Ex ia Ma] I associated electrical apparatus.

Uo/Voc = 21.5 V, Io/Isc = 93 mA, P/Rs = 496 mW at terminals 13-14, 15-16, 9-10, 11-12.

Um = 250 Vrms, -20 °C ≤ Ta ≤ 60 °C.

Approvals:
DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN61241-0, EN61241-11, IECEx BVS 07.0027X conforms to IEC60079-0, IEC60079-11, IEC60079-26, IEC61241-0, IEC61241-11, IMQ 09 ATEX 013 X conforms to EN60079-0, EN60079-15, FM & FM-C No. 3024643, 3029921C, conforms to Class 3600, 3610, 3810 and C22.2 No.142, C22.2 No.157, C22.2 No.213, EN60079-0, EN60079-11, EN60078-15, Russia according to GOST 12.2.007.0-75, R 51330.0-99, R 51330.10-99 [Exia] IIC X.

Mounting:
T35 DIN Rail according to EN50022.

Weight:
about 140 g.

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 IC, IIB, IIA T4 installation.

Protection class:
IP 20.

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

Front Panel and Features:

- Input from Zone 0 (Zone 20), Division 1, installation in Zone 2, Division 2.
- Quadruple channels for 2 wires Transmitters.
- 4-20 mA Input, Output Signal.
- High Accuracy.
- EMC Compatibility to EN61000-6-2, EN61000-6-4.
- ATEX, IECEx, FM & FM-C, Russian Certifications.
- Type Approval Certificate DNV and KR for marine applications.
- High Reliability, SMD components.
- High Density, four 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: D1012Q
### Parameters Table:

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<td>Group Cenelec</td>
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<tr>
<td>Terminals 13-14, 15-16</td>
<td>IIC</td>
</tr>
<tr>
<td>Uo/Voc = 21.5 V</td>
<td>IIB</td>
</tr>
<tr>
<td>Io/IsC = 93 mA</td>
<td>IIA</td>
</tr>
</tbody>
</table>

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

### 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
**General Description:**
The single and dual channel DIN Rail Isolating Driver, D1020S and D1020D, isolates and transfers a 4-20, 0-20 mA signal from a controller located in Safe Area to a load of up to 750 Ω in Hazardous Area. It has a high output capacity of 15 V at 20 mA combined with a low drop across its input terminals.

**Function:**
1 or 2 channels I.S. mA analog output for 2 wire I/P Smart converters or valve device output circuit.

**Front Panel and Features:**
- **Power supply indication (green).**
- **Positioners, provides 3 port isolation (input/output/supply).**
- **1 or 2 channels I.S. mA analog output for 2 wire I/P Smart converters or valve device output circuit.**
- In the 4-20 mA input range, a field open circuit reflects a high impedance to the control device output circuit.

**Technical Data:**
- **Supply:** 24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.
- **Current consumption @ 24 V:** 95 mA for 2 channels D1020D, 50 mA for 1 channel D1020S with 20 mA output typical.
- **Power dissipation:** 1.5 W for 2 channels D1020D, 1.0 W for 1 channel D1020S with 24 V supply voltage and 20 mA output typical.
- **Max. power consumption:** at 30 V supply voltage and overload condition, 2.7 W for 2 channels D1020D, 1.4 W for 1 channel D1020S.

**Isolation (Test Voltage):**
- I.S. Out/I.S. In: 1.5 KV; I.S. Out/Supply: 1.5 KV; I.S. Out/I.S. Out: 500 V; In/Supply: 500 V; In/In: 500 V.

**Input:**
- 0/4 to 20 mA with ≤ 2.0 V voltage drop, reverse polarity protected.

**Output:**
- 0/4 to 20 mA, on max. 750 Ω load, current limited at ≈ 23 mA.

**Response time:**
- 50 ms (10 to 90 % step change).

**Output ripple:**
- ≤ 20 mVrms on 250 Ω 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 Ωload, 23 ± 1 °C ambient temperature.

**Calibration accuracy:**
- ≤ 0.1 % of full scale.

**Linearity error:**
- ≤ 0.05 % of full scale.

**Supply voltage influence:**
- ≤ 0.05 % of full scale for a min to max supply change.

**Load influence:**
- ≤ 0.05 % of full scale for a 0 to 100 % load resistance change.

**Temperature influence:**
- ≤ 0.01 % on zero and span for a 1 °C change.

**Compatibility:**
- CE mark compliant, conforms to Directives: 94/9EC. International is certified by TÜV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.

**Power Bus accessories:**
- Cover and fix MCHP196
- Terminal block male MCR017
- Terminal block female MCR022

**Power Bus enclosure:**
- S
- D

**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 IIC T4 X, 2ExnAIIT4 X.
- UL: 2 X 20 mVrms on 250 Ωcommunication load on 0.5 to 40 KHz band.
- FM: NS / I / 2 / ABC/CD/ T4, AIS / I, II / 1 / ABC/DEFG
- FM-C: NS / I / 2 / ABC/CD/ T4, AIS / I, II / 1 / ABC/DEFG
- GOST: ≈ 25 V, 20 mVrms on 250 Ωcommunication load on 0.5 to 40 KHz band.
- IECEx IMQ 13.0011X conforms to IEC60079-0, IEC60079-15, Enexoscope.
- IMQ IECEx: [Ex ia IIC] I, (M1) [Ex ia Ma] II [D1] [Ex ia Da] IIC
- IECEx: [Ex ia Ga] IIC, [Ex ia Ma] I, [Ex da Da] IIC
- ATEX: II 3G Ex nA IIC T4 Gc IMQ IECEx: Ex nA IIC T4 Gc
- IECEx: [Ex ia Ga] IIC, [Ex ia Ma] I, [Ex Da Da] IIC
- UL: AEX nC [a] cIIc CL: Ex nC [a] cIIc
- FM: NS / I / 2 / ABC/CD/ T4, AIS / I, II / 1 / ABC/DEFG
- FM-C: NS / I / 2 / ABC/CD/ T4, AIS / I, II / 1 / ABC/DEFG

**Approvals:**
- DMT 01 ATEX 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN600303.
- 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, GOST R 22.1.07.05-75, GOST R 51330.9-99, R 51330.10-99, GOST R 12.2.007.0-22782.2.22782.5
- DINV No.A-13778 and KR No.MIL02709-EL001 Certificates for marine applications.

**Mounting:**
- T3S DIN Rail according to EN50022.

**Connection:**
- about 180 g D1020D, 120 g D1020S.

**Protection class:**
- IP: 20.

**Dimensions:**
- Width 22.5 mm, Depth 99 mm, Height 114.5 mm.
### Parameters Table:

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<tr>
<td>Terminals 14-15, 10-11</td>
<td>IIC</td>
</tr>
<tr>
<td>Uo/Voc = 25.2 V</td>
<td>IIB</td>
</tr>
<tr>
<td>Io/Isc = 87 mA</td>
<td>IIA</td>
</tr>
</tbody>
</table>

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

### 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**
D1030

Characteristics:

General Description:
The Switch/Proximity Detector Repeater type D1030 is a DIN Rail unit with one to two independent channels. The unit can be configured for contact or proximity detector, NO or NC and for NE or ND SPDT relay output contact.

Each channel enables a Safe Area load to be controlled by a switch, or a proximity detector. Located in Hazardous Areas.

D1030D dual channel type has two independent input channels and actuates the corresponding output relay. Two activation modes can be independently DIP switch configured on each input channel. NO input/NE relay or NO input/ND relay.

Contact or proximity sensor and its connection line short or open circuit fault detection is also DIP switch configurable: fault detection can be enabled (in case of fault it de-energizes the corresponding output relay and turns the fault LED on) or disabled (in case of fault the corresponding output relay repeats the input line open or closed status as configured).

D1030S single channel type has one input channel and two output relays; the unit has two DIP switch configurable operating modes:

Mode A: input channel actuates in parallel the two output relays (DPDT contact).

Relay activation mode can be independently configured for each output in two modes: NO input/NE relay or NO input/ND relay.

Mode B: input channel actuates output relay A configurable in two modes as in mode A above. Output relay B operates as a fault output (in case of input fault, relay B actuates and the fault LED turns on while relay A repeats the input line as configured).

Actuation can be DIP switch configured in two modes:

No input fault/energized relay (it de-energizes in case of fault) or
No input fault/de-energized relay (it energizes in case of fault).

Function:
1 or 2 channels I.S. switch repeater for contact or EN60947-5-6 proximity.
Provides 3 port isolation (input/output/supply).

Signalling LEDs:
Power supply indication (green), output status (yellow), line fault (red).

Field Configurability:
NO/NC input for contact/proximity, NE/ND relay operation and fault detection enable/disable.

EMC:
Fully compliant with CE marking applicable requirements.

Front Panel and Features:

- Input from Zone 0 (Zone 20), Division 1, installation in Zone 2, Division 2.
- NO/NC contact/proximity Detector Input.
- Two SPDT Relay Output Signals.
- SPDT Relay Output for fault detection on single channel version.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4.
- In-field programmability by DIP Switch.
- ATEX, IECEx, UL & C-UL, FM & FM-C, Russian and Ukrainian Certifications.
- Type Approval Certificate DNV and KR for marine 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: D1030
1 channel S
2 channels D

Power Bus enclosure /B

Technical Data:

Supply: 24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits ±5 Vpp.

Current consumption @ 24 V, 60 mA for 2 channels D1030D,
55 mA for 1 channel D1030S with input closed and relays energized.

Power dissipation: 1.4 W for 2 channels D1030D, 1.3 W for 1 channel D1030S with 24 V supply voltage, input closed and relays energized.

Max. power consumption: at 20 V supply voltage, short circuit input and relays energized, 1.8 W for 2 channels D1030D, 1.7 W for 1 channel D1030S.

Isolation (Test Voltage):
I.S. In/Out 1.5 kV; I.S. In/Supply 1.5 kV; Out/Supply 1.5 kV; Out/Out 1.5 kV.

Input switching current levels:
ON ≥ 2.1 mA, OFF ≤ 1.2 mA, switch current ± 1.65 mA ± 0.2 mA hysteresis.

Fault current levels:
Open fault ≤ 0.2 mA, short fault ≥ 6.8 mA (when enabled both faults de-energize channel relay with dual channel unit D1030D or actuate fault relay with single channel unit D1030S).

Input equivalent source: 8 V 1 KΩ typical (8 V no load, 8 mA short circuit).

Output: voltage free SPDT relay contact.
Contact material: AgCuO.
Contact ratings: 2 A 250 Vac 500 VA, 2 A 250 Vdc 80 W (resistive load).

DC Load breaking capacity:

Mechanical / Electrical life: 30 * 10^6 / 1 * 10^6 operation, typical.

Release / Operation time: 7 / 3 ms typical.

Bounce time NO / NC contact: 3 / 5 ms.

Response time: 20 ms.
Frequency response: 10 Hz maximum.

Compatibility:

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

Storage: temperature limits - 45 to + 60 °C.

Safety Description:

II (1) G [Ex ia Ga] IIC, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I, II 3G Ex nA IIC T4, [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I associated electrical apparatus.

Uo/Voc = 10.7 V, Io/Isc = 15 mA, Po/Po = 39 mW at terminals 13-14, 15-16.

Um = 250 Vrms, -20 °C ≤ Ta ≤ 60 °C.

Approvals:
DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN61241-0, EN61241-11, IECEx BVS 01.0027X conforms to IEC60079-0, IEC60079-11, IEC60079-26, IEC61241-0, IEC61241-11.
GM International CR0028 conforms to EN60079-0, EN60079-15, UL & C-UL E222008 conforms to UL913 (Div.1),UL 00079-0 (General, All Zones), UL60079-11 (Intrinsic Safety “i” Zones 0 & 1) for UL and CSA-CSA-C22.2 No.157-92 (Div.1), CSA-ES60079-0 (General, All Zones), CSA-CSA-CSA-ES60079-11 (Intrinsic Safety “i” Zones 0 & 1) for C-U, refer to control drawing ISM0128 for complete UL and C-U safety and installation instructions, FM & FM-C No. 3024643, 3029821C, conforms to Class 3600, 3610, 3611, 3810 and CSA-CSA-CSA-C22.2 No.157, CSA-ES60079-0, E60079-0, E60079-15, Russia according to GOST 12.2.007.0-75, R 51330.0-99, R 51330.10-99 [Exia] IIC X, Ukraine according to GOST 12.2.007.0.2278.0.2278.2 Exia IIC X, DNV and KR Type Approval Certificate for marine applications.

Mounting: T35 DIN Rail according to EN60222.

Weight: about 135 g D1030D, 130 g D1030S.

Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².

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:**

<table>
<thead>
<tr>
<th>Safety Description</th>
<th>Maximum External Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Cenelec</td>
<td>Co/Ca (μF)</td>
</tr>
<tr>
<td>Terminals 13-14, 15-16</td>
<td>IIC</td>
</tr>
<tr>
<td>Uo/Voc = 10.7 V</td>
<td>IIC</td>
</tr>
<tr>
<td>Io/Isc = 15 mA</td>
<td>IIA</td>
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<tr>
<td>Po/Jo = 39 mW</td>
<td>IIA</td>
</tr>
</tbody>
</table>

**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

**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**

MODEL D1030S

- Supply 24 Vdc
- Out 1-A, 1-B
- Common positive connection

MODEL D1030D

- Supply 24 Vdc
- Out 1, 2
- Common positive connection

Relay contact shown in de-energized position

**Image:**

- Group Cenelec
- Safety Description
- Maximum External Parameters
- Function Diagram
- Image of the product

**AECO srl - Via Giacomo Leopardi 5 I-20065 Inzago (MI) Italia**

**www.aecosensors.com**
Characteristics:

General Description:
The Switch/Proximity Detector Repeater type D1031 is a DIN Rail unit with two or four independent input channels. The unit can be configured for contact or proximity detector, NO or NC and for NO or NC optocoupled open collector transistor output.

Each channel enables a Safe Area load to be controlled by a switch, or a proximity detector, located in Hazardous Area.

D1031Q quad channel type has four independent input channels and actuates the corresponding output transistor. Two actuation modes can be independently DIP switch configured on each input channel: NO input/NC transistor or NO input/NO transistor.

Contact or proximity sensor and its connection line short or open circuit fault detection is also DIP switch configurable: fault detection can be enabled (in case of fault it de-energizes the corresponding output transistor and turns the fault LED on) or disabled (in case of fault the corresponding output transistor repeats the input line open or closed status as configured).

D1031D dual channel type has two input channels and four output transistors; the unit has two DIP switch configurable operating modes:

- Mode A) input channel actuates in parallel the two output transistors. Transistor actuation mode can be independently configured for each output in two modes: NO input/NC transistor or NO input/NO transistor.
- Mode B) input channel actuates output transistor A configurable in two modes as in mode A above. Output transistor B operates as a fault output (in case of input fault, transistor B actuates and the fault LED turns on while transistor A repeats the input line as configured). Actuation can be DIP switch configured in two modes: No input fault/energized transistor (it de-energizes in case of fault) or No input fault/de-energized transistor (it energizes in case of fault).

Function:
- 2 or 4 channels I.S. switch repeater for contact or EN60947-5-6 proximity.
- Provides 3 port isolation (input/output/supply).

Signalling LEDs:
- Power supply indication (green), output status (yellow), line fault (red).

Field Configurability:
- NO/NC input for contact/proximity sensor and its connection line short or open circuit fault detection is configured on each input channel: NO input/NC transistor or NO input/NO transistor.

EMC:
- Full comply with CE marking applicable requirements.

Front Panel and Features:
- Input from Zone 0 (Zone 20), Division 1, installation in Zone 2, Division 2.
- NO/NC contact/proximity Detector Input.
- Four opto isolated voltage free Transistor Output Signals.
- Transistor Output for fault detection on dual channel version.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4.
- In-field programmability by DIP Switch.
- ATEX, IECEx, UL & C-UL, FM & FM-C, Russian and Ukrainian Certifications.
- Type Approval Certificate DNV and KR for marine applications.
- High Reliability, SMD components.
- High Density, four 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:
- D1031
- 2 channels D
- 4 channels Q
- Power Bus enclosure /B

Technical Data:

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

Current consumption @ 24 V:
- 50 mA for 4 channels D1031Q, 40 mA for 2 channels D1031D with input closed and transistors energized.

Current consumption @ 12 V:
- 100 mA for 4 channels D1031Q, 80 mA for 2 channels D1031D with input closed and transistors energized.

Power dissipation:
- 1.2 W for 4 channels D1031Q, 1.0 W for 2 channels D1031D with 24 V supply voltage, input closed and transistors energized.

Max. power consumption:
- at 30 V supply voltage, short circuit input and transistors energized, 1.4 W for 4 channels D1031Q, 1.0 W for 2 channels D1031D.

Isolation (Test Voltage):
- I.S. in/out 1.5 kV; I.S. Insupply 1.5 kV; Out/Supply 500 V; Out 1-3/Out 2-4-5 500 V.

Input switching current levels:
- ON ≥ 2.1 mA, OFF ≤ 1.2 mA, switch current ≥ 1.65 mA ± 0.2 mA hysteresis.

Fault current levels:
- open fault ≤ 0.2 mA, short fault ≥ 6.8 mA (when enabled both faults de-energize channel transistor with quad channel unit D1031Q or actuate fault transistor with dual channel unit D1031D).

Input equivalent source:
- 8 V 1 KΩ (typical 8 V no load, 8 mA short circuit).

Output:
- voltage free SPST optocoupled open-collector transistor.

Open-collector rating:
- 100 mA at 35 V (≤ 20 V voltage drop).

Leakage current:
- ≤ 50 µA at 35 V.

Response time:
- 0.5 ms.

Frequency response:
- 1 kHz maximum.

Compatibility:

Environmental conditions:
- Operating: temperature limits -20 to + 60 °C, relative humidity max 90 % non condensing, up to 35 °C.
- Storage: temperature limits -45 to + 80 °C.

Safety Description:
- II (1) G (Ex ia IIC T4) IIC, II (1) D (Ex ea IIC T4), I (M1) (Ex ia Ma I), II 3G Ex nA II T4, II 3G Ex ia IIC T4, II 3G Ex ia IIC.II, [Ex ia Ma] I associated electrical apparatus.
- Uo/Voc = 10.7 V, Isc/Isc = 15 mA, Po/Po = 39 mW at terminals 13-14, 15-16, 9-10, 11-12.
- Uo = 250 Vrms, -20 °C ≤Ta ≤ 60 °C.
- Approvals:
  - DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN61241-0, EN61241-11, IECEx BVS 07/0027X conforms to IEC60079-0, IEC60079-11, IEC60079-26, IEC61241-10, IEC61241-11, IMQ 09 ATEX 013 X conforms to EN60079-0, EN60079-15, UL & C-UL E22380 conforms to UL913 (Div.1), UL 60079-0 (General, All Zones), UL913 (Div.1), (Intrinsic Safety “I” Zones 0 & 1), UL60079-15 ("n" Zone 2), UL 1664 (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-U, refer to control drawing IMS129 for complete UL and C-U safety and installation instructions, FM & FM-C, No. 3026463, 3029212, 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, Ukraine according to GOST 122.2.007.0-75, R 51330.0-99, Exia IIC X, DNV and KR Type Approval Certificate for marine applications.

Mounting:
- T35 DIN Rail according to EN50022.
- Weight: about 130 g D1031Q, 120 g D1031D.
- Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².
- 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.
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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

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
SIL 2 Switch/Proximity Detector Repeater Relay Output DIN-Rail Models D1032D, D1032Q

Manufacturer: GM TECHNOLOGY FOR SAFETY

Technical Data:

Supply: 24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits ±5 Vdc.

Current consumption @ 24 V: 7.5 mA for 4 channels D1032Q, 60 mA for 2 channels D1032Q with input closed and relays energized.

Power dissipation: 1.8 W for 4 channels D1032Q, 1.4 W for 2 channels D1032Q with 24 V supply voltage, input closed and relays energized.

Max. power consumption: at 30 V supply voltage, short circuit input and relays energized, 2.4 W for 4 channels D1032Q, 2.0 W for 2 channels D1032D.

Isolation (Test Voltage): I.S. In/Out 1.5 kV; I.S. In/Supply 1.5 kV; I.S. In/In. 500 V; Out/Supply 1.5 kV; Out 1-2 2.2 kV 4.5 kV.

Input switching current levels:
ON ≥ 2.1 mA, OFF ≤ 1.2 mA, switch current = 1.65 mA ± 0.2 mA hysteresis.

Fault current levels: open fault ≤ 0.2 mA; short fault ≥ 6.8 mA (when enabled both faults de-energize channel relay with quad channel unit D1032Q or actuate fault relay with dual channel unit D1032D).

Input equivalent source: 8 V 1 KΩ typical (8 V no load, 8 mA short circuit).

Output: voltage free SPST relay contact.

Contact material: AgNi90/10.

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

DC Load breaking capacity:

Mechanical / Electrical life: 15 × 10⁶ / 1 × 10⁶ operation, typical.

Operate / Release time: 5 / 2 ms typical.

Bounce time NO / NC contact: 1 / 5 ms.

Response time: 20 ms.

Frequency response: 10 Hz maximum.

Compatibility:


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

Storage: temperature limits – 45 to + 80 °C.

Safety Description:

II (1) G (Ex ia IIC) IIC, II (1) D (Ex ia Da) IIC, I (M1) (Ex ia Ma) I, II 3G Ex na IIC T4, [Ex ia Da] IIC, [Ex ia Da] IIC, [Ex ia Ma] I associated electrical apparatus.

Uo/Voc = 9.6 V, Io/Isc = 10 mA, Po/Po = 24 mW at terminals 13-14, 15-16, 9-10, 11-12.

± 5 Vpp.

60 °C.

≤ 8 V 1 KΩtypical (8 V no load, 8 mA short circuit).

δ 0 ≤ Ta ≤ 20 °C ± 5 °C.

1 * 10^6 operation, typical.

δ 0 ≤ Ta ≤ 20 °C.

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<tr>
<td>Terminals 13-14, 15-16</td>
<td>IIC</td>
</tr>
<tr>
<td>9-10, 11-12</td>
<td>IIB</td>
</tr>
<tr>
<td>Uo/Voc = 9.6 V</td>
<td>IIA</td>
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</tbody>
</table>

**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

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

Relay contact shown in de-energized position
SIL 2 Switch/Proximity Detector
Repeater Transistor Output DIN-Rail Models D1033D, D1033Q

Manufacturer: GM

Technical Data:

Supply:
24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.

Current consumption @ 24 V: 55 mA for 4 channels D1033Q, 35 mA for 2 channels D1033D with input closed and transistors energized.

Power dissipation: 1.3 W for 4 channels D1033Q, 0.9 W for 2 channels D1033Q with 24 V supply voltage, input closed and transistors energized.

Max. power consumption: at 30 V supply voltage, short circuit input and transistors energized, 1.5 W for 4 channels D1033Q, 1.1 W for 2 channels D1033D.

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 1-3/Out 2-4 500 V.

Input switching current levels:
ON: ≥ 2.1 mA, OFF: ≤ 1.2 mA, switch current = 1.65 mA ± 0.2 mA hysteresis.

Fault current levels: open fault ≤ 0.2 mA, short fault ≥ 6.8 mA

when enabled both faults de-energize channel transistor with quan channel unit D1033Q or actuate fault transistor with dual channel unit D1033D.

Input equivalent source: 8 V 1 KΩ (typical (8 V no load, 8 mA short circuit).

Output:
Voltage free SPST optocoupled open-collector transistor.

Open-collector rating: 100 mA at 35 V

≤ 2.5 V voltage drop or ≤ 1.0 V voltage drop for versions -052 and -058.

Leakage current: ≤ 50 µA at 35 V.

Response time: 500 µs.

Frequency response: 2 KHz maximum.

Compatibility:

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

Storage: temperature limits – 45 to + 80 °C.

Safety Description:


IIa Voc = 9.6 V, Io lsc = 10 mA, Po/Po = 24 mW at terminals 13-14, 15-16, 9-10, 11-12.

Um = 250 Vrms, -20 °C ≤ Ta ≤ 60 °C.

Approvals:

DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN60124-1, EN60124-11, IECEx BVS 67.0027 X, conforms to IEC60079-0, IEC60079-11, IEC60124-1, IEC60124-11, IECEx BVS 67.0027 X.

IMO 09 ATEX 013 X conforms to EN60079-0, EN60079-15, UL & C-UL E223080 conforms to UL913 (Div.1), UL60079-0 (General, All Zones), UL60079-11 (Intrinsic Safety “I” Zones 0 & 1), UL60079-15 (”Y” Zone 2), UL1684 (Div.2) for UL and CSA-C22.2 No.197-92 (Div.1), CSA-60609-0 (General, All Zones), CSA-E60979-11 (Intrinsic Safety “I” Zones 0 & 1), CSA-C22.2 No.213-M1987 (Div.2) and CSA-E60979-15 (”Y” Zone 2) for C-UL, refer to control drawing ISM0131 for complete UL and C-UL safety and installation instructions.

FM & FM-C No. 3024643, 302921C, conforms to Class 3600, 3610, 3611, 3810 and C22.2 No.142, C22.2 No.157, C22.2 No.213, E60079-9, E60079-11, E60079-15, Russia according to GOST 12.2.007-75, R 51330.0-99, R 51330.10-99 [Exia IIC, X, Ukraine according to GOST 12.2.007.0-22872.0-22872.9 Exa IIC X, TUV Certificate No. C-SIS-189845-01, SIL 2 according to IEC 61508.

Please refer to Functional Safety Manual for SIL applications.

DINV and KR Type Approval Certificate for marine applications.

Mounting:
T35 DIN Rail according to EN50522.

Weight: about 165 g D1033Q, 140 g D1033D.

Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².

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.

Ordering Information:

Model: D1033

2 channels D 4 channels Q

Common negative and positive blank
Common negative only 0-52
Common positive only 0-58
Power Bus enclosure B
**Parameters Table:**

<table>
<thead>
<tr>
<th>Safety Description</th>
<th>Maximum External Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group Cenelec</td>
</tr>
<tr>
<td>Terminals 13-14, 15-16</td>
<td>IIC</td>
</tr>
<tr>
<td>9-10, 11-12</td>
<td>IIB</td>
</tr>
<tr>
<td>Uo/Voc = 9.6 V</td>
<td>IIa</td>
</tr>
<tr>
<td>Io/Isc = 10 mA</td>
<td>IIa</td>
</tr>
<tr>
<td>Poi/Po = 24 mW</td>
<td>IIa</td>
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</table>

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

**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
Signalling LED:

Function:

1 channel I.S. input from frequency-pulse signals, provides 3 port isolation (input/output/supply). Repeats the frequency input and provides one SPST transistor output.

Field Configurability:

Power supply indication (green), frequency input (yellow).

EMC:

- Fully compliant with CE marking applicable requirements.
- EMC Compatibility to EN61000-6-2, EN61000-6-4.
- Magnetic pick-up sensitivity: ≥20 mVpp up to 100 Hz input, ≥50 mVpp up to 1 KHz, ≥100 mVpp up to 5 KHz, ≥500 mVpp up to 20 KHz, ≥1 Vpp up to 50 KHz.

Technical Data:

Supply:

12-24 Vdc input (10 to 30 Vdc) reverse polarity protected, ripple within voltage limits ±5 Vpp.

Current consumption @ 24 V: 40 mA with output transistor energized.

Current consumption @ 12 V: 60 mA with output transistor energized.

Power dissipation: 1.0 W with 24 V supply voltage and output transistor energized.

Max. power consumption: at 30 V supply voltage, output transistor energized, 1.2 W.

Isolation (Test Voltage): I.S. In/Out 1.5 KV; I.S. In/Supply 1.5 KV; Out/Supply 500 V.

Input:

- Input range: 0 to 50 KHz maximum.
- Magnetic pick-up sensitivity: ≥20 mVpp up to 100 Hz input, ≥50 mVpp up to 1 KHz, ≥100 mVpp up to 5 KHz, ≥500 mVpp up to 20 KHz, ≥1 Vpp up to 50 KHz.

Repeater Output:

- Repeating frequency input and provides one SPST transistor output.
- Equivalent source: 8 V 1 KΩ (typical 8 V no load, 8 mA short circuit).

Frequency Response:

- Frequency response: 12-24 Vdc nominal (10 to 30 Vdc) reverse polarity protected, ripple within voltage limits ±5 Vpp.
- Switching current levels:
  - ON: ≥1.65 mA ±0.2 mA hysteresis (for proximity or transistor input).

Environmental conditions:

- Operating: temperature limits -20 to +60 °C, relative humidity max 90 % non condensing, up to 35 °C.
- Storage: temperature limits -45 to +80 °C.

Safety Description:

- Approvals:
  - DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN61241-0, EN61241-11, IECEx BVS 07.0027X conforms to IEC60079-0, IEC60079-15, IEC60079-11, IEC60079-26, IEC61241-0, IEC61241-111, IMQ 09 ATEX 013 X conforms to EN60079-0, EN60079-15, FM & FM-C No. 302463, 3020921C, conforms to Class 3600, 3610, 3611, 3810 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, KR Type Approval Certificate for marine applications.
- Mounting: T3S DIN Rail according to EN50022.
- Weight: about 145 g.
- Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².
- 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.
- Dimensions: Width 22.5 mm, Depth 99 mm, Height 114.5 mm.
Parameters Table:

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<tr>
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<tbody>
<tr>
<td></td>
<td>Group Cenelec</td>
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<tr>
<td>Terminals 13-16</td>
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</tr>
<tr>
<td>Uo/Voc = 10.9 V</td>
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</tr>
<tr>
<td>Io/Isc = 1.1 mA</td>
<td>IIB</td>
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<tr>
<td>Po/Pr = 3 mW</td>
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<tr>
<td>Terminals 14-15</td>
<td>IIC</td>
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<tr>
<td>Uo/Voc = 15.5 V</td>
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<tr>
<td>Io/Isc = 13 mA</td>
<td>IIB</td>
</tr>
<tr>
<td>Po/Pr = 48 mW</td>
<td>IIA</td>
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<tr>
<td>Terminals 15-16</td>
<td>IIC</td>
</tr>
<tr>
<td>Uo/Voc = 10.9 V</td>
<td></td>
</tr>
<tr>
<td>Io/Isc = 23 mA</td>
<td>IIB</td>
</tr>
<tr>
<td>Po/Pr = 60 mW</td>
<td>IIA</td>
</tr>
</tbody>
</table>

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

Terminals 14-15
Uo/Voc = 10.9 V
Io/Isc = 13 mA
Po/Pr = 48 mW

Terminals 13-16
Uo/Voc = 10.9 V
Io/Isc = 1.1 mA
Po/Pr = 3 mW

Terminals 15-16
Uo/Voc = 10.9 V
Io/Isc = 23 mA
Po/Pr = 60 mW

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

MODEL D1035S

Note: pull-up resistor is mounted inside the unit
**Characteristics:**

**General Description:**
The D104* series are quad channel DIN Rail Digital Output Modules enabling a Safe Area contact, logic level or drive signal, to control a device in Hazardous Area, providing 3 port isolation (input/output/supply).

Typical applications include driving signalling LED's, visual or audible alarms to alert a plant operator or driving a solenoid valve or other process control devices. It can also be used as a controllable supply to power measuring or process control equipments in Hazardous Area.

Output channels can be paralleled if more power is required: 2 or 3 channels in parallel (depending on the model) are still suitable for Gas Group II C.

Four basic models meet a large number of applications: it is possible to select 16 different combinations of safety parameters and driving currents.

**Function:**
- 4 channels I.S. actuated independently or in parallel to operate Hazardous Area loads from contacts, logic levels or drive logics in Safe Area providing 3 port isolation (input/output/supply), loop or bus powered.
- Signalising LEDs: Power supply indication (green), outputs status (yellow).

**Field Configurability:**
- Contact / logic levels inputs, loop powered operating mode, configurable by external wiring.
- EMC: Fully compliant with CE marking applicable requirements.

**Front Panel and Features:**

<table>
<thead>
<tr>
<th>D104*Q</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>

SIL 3 according to IEC 61508, IEC 61511 in Loop Powered mode for Lifet ime = 10 years.

**Technical Data:**

**Supply:**
- 24 Vdc nom (21.5 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.

**Current consumption @ 24 V:**
- 130 mA with four channels energized at nominal load, 150 mA with short circuit output (90 mA type D1041Q).

**Power dissipation:**
- 2.3 W (1.9 W type D1041Q) with 24 V supply voltage and four channels energized at nominal load.

**Max. power consumption:**
- at 30 V supply voltage and short circuit output, 4.0 W (2.4 W type D1041Q).

**Isolation (Test Voltage):**
- I.S. Out/ln 1.5 kV, I.S. Out/Supply 1.5 kV, In/Supply 500 V.

**Input:**
- switch contact, logic level common positive or common negative or loop powered.

**Trip voltage levels:**
- OFF status ≤ 1.0 V, ON status ≥ 6.0 V (maximum 30 V).

**Output:**
- D1040Q: 22 mA at 13.2 V per channel (20.5 V no load, 334 Ω series resistance).
- D1041Q-10 mA for LED driving per channel (20.5 V no load, 484 Ω series resistance).
- D1042Q: 22 mA at 14.5 V per channel (20.5 V no load, 273 Ω series resistance).
- D1043Q: 22 mA at 9.8 V per channel (20.5 V no load, 484 Ω series resistance).

**Short circuit current:**
- ≤ 15 mA per channel for D1041Q (13 mA typical).

**Response time:**
- 20 ms (power up in 600 ms typical in loop powered mode).

**Compatibility:**

**Environmental conditions:**

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

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

**Safety Description:**

**II (1) G [Ex ia Ga] IIIC, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I, II 3G Ex nA IIC T4, [Ex ia Ga] II, [Ex ia Da] IIIC, [Ex ia Ma] I | associated electrical apparatus.

D1040Q single channel parameters:
- Uo/Voc = 23.6 V, Io/Isc = 72 mA, Po/Po = 422 mW at terminals 13-14,15-16,9-10,11-12.

D1041Q single channel parameters:
- Uo/Voc = 26.3 V, Io/Isc = 49.6 mA, Po/Po = 292 mW at terminals 13-14,15-16,9-10,11-12.

D1042Q single channel parameters:
- Uo/Voc = 26.3 V, Io/Isc = 88.2 mA, Po/Po = 519 mW at terminals 13-14,15-16,9-10,11-12.

D1043Q single channel parameters:
- Uo/Voc = 26.3 V, Io/Isc = 49.6 mA, Po/Po = 292 mW at terminals 13-14,15-16,9-10,11-12.

For channels in parallel see Safety Parameters tables

Um = 250 Vrms, -20 °C ≤ Ta ≤ 60 °C.

**Approvals:**
- DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN12411-11, EN60530, IECEx BVS 07.0027X conforms to IEC60079-0, IEC60079-11, IEC60079-29, IEC61241-11, IMQ 09 ATEX D13 X 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), UL60079-15 (“n” Zone 2).
- ANSII/ISA 12.12.01 (Div.2) for UL and CSA-CSA-22.2 No.157-92 (Div.1), CSA-CSA-60790-0 (General, All Zones), CSA-CSA-60797-11 (Intrinsic Safety “i” Zones 0 & 1), CSA-CSA-22.2 No.213-M1987 (Div.2) and CSA-CSA-60795-19 (“n” Zone 2) for C-UL, refer to control drawing ISM0133 for complete UL and C-UL safety and installation instructions.
- Please refer to Functional Safety Manual for SIL applications.

**Mounting:**
- T3S DIN Rail according to EN50022.

**Weight:**
- about 130 g.

**Connection:**
- by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².

**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:

<table>
<thead>
<tr>
<th>Safety Description</th>
<th>Maximum External Parameters</th>
<th>Group Cenelec</th>
<th>Co/Ca (µF)</th>
<th>Lo/La (mH)</th>
<th>Lo/Ro (µH/Ω)</th>
</tr>
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<tbody>
<tr>
<td><strong>D1040Q</strong></td>
<td></td>
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<tr>
<td>Terminals 13-14, 15-16</td>
<td>Single channel</td>
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</tr>
<tr>
<td>Uo/Voc = 23.6 V</td>
<td>IIC</td>
<td>0.13</td>
<td>6.8</td>
<td>83.9</td>
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</tr>
<tr>
<td>Io/Isc = 72 mA</td>
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<td>0.97</td>
<td>27.4</td>
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<tr>
<td>Po/Po = 424 mW</td>
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<td>Two channels in parallel</td>
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<tr>
<td>Uo/Voc = 23.6 V</td>
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<td>1.7</td>
<td>41.9</td>
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<tr>
<td>Io/Isc = 144 mA</td>
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<td>Po/Po = 847 mW</td>
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<td>13.7</td>
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<tr>
<td>Uo/Voc = 23.6 V</td>
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<td>Four channels in parallel</td>
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<td>4.5</td>
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</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Safety Description</th>
<th>Maximum External Parameters</th>
<th>Group Cenelec</th>
<th>Co/Ca (µF)</th>
<th>Lo/La (mH)</th>
<th>Lo/Ro (µH/Ω)</th>
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<tr>
<td>Terminals 13-14, 15-16</td>
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<tr>
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<tr>
<td>Uo/Voc = 23.6 V</td>
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**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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<th>Group Cenelec</th>
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<th>Lo/La (mH)</th>
<th>Lo/Ro (µH/Ω)</th>
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<td>Terminals 13-14, 15-16</td>
<td>Single channel</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Uo/Voc = 23.6 V</td>
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<tr>
<td>Uo/Voc = 23.6 V</td>
<td>IIC</td>
<td>0.13</td>
<td>1.6</td>
<td>40.6</td>
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<tr>
<td>Io/Isc = 148.8 mA</td>
<td>IIB</td>
<td>0.97</td>
<td>6.4</td>
<td>162.5</td>
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<tr>
<td>Po/Po = 875 mW</td>
<td>IIA</td>
<td>3.50</td>
<td>12.8</td>
<td>325.0</td>
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<tr>
<td></td>
<td>Four channels in parallel</td>
<td></td>
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<tr>
<td>Uo/Voc = 23.6 V</td>
<td>IIC</td>
<td>0.13</td>
<td>3.6</td>
<td>121.9</td>
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<tr>
<td>Io/Isc = 198.4 mA</td>
<td>IIB</td>
<td>0.97</td>
<td>7.2</td>
<td>243.8</td>
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<tr>
<td>Po/Po = 1167 mW</td>
<td>IIA</td>
<td>3.50</td>
<td>3.6</td>
<td>60.9</td>
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</table>

**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

<table>
<thead>
<tr>
<th>Safety Description</th>
<th>Maximum External Parameters</th>
<th>Group Cenelec</th>
<th>Co/Ca (µF)</th>
<th>Lo/La (mH)</th>
<th>Lo/Ro (µH/Ω)</th>
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<tr>
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<tr>
<td>Terminals 13-14, 15-16</td>
<td>Single channel</td>
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<tr>
<td>Uo/Voc = 23.6 V</td>
<td>IIC</td>
<td>0.13</td>
<td>1.6</td>
<td>40.6</td>
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<tr>
<td>Io/Isc = 99.2 mA</td>
<td>IIB</td>
<td>0.97</td>
<td>6.4</td>
<td>162.5</td>
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</tr>
<tr>
<td>Po/Po = 584 mW</td>
<td>IIA</td>
<td>3.50</td>
<td>12.8</td>
<td>325.0</td>
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<tr>
<td></td>
<td>Two channels in parallel</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uo/Voc = 23.6 V</td>
<td>IIC</td>
<td>0.13</td>
<td>1.6</td>
<td>40.6</td>
<td></td>
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<td>Io/Isc = 148.8 mA</td>
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<td>6.4</td>
<td>162.5</td>
<td></td>
</tr>
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<td>Po/Po = 875 mW</td>
<td>IIA</td>
<td>3.50</td>
<td>12.8</td>
<td>325.0</td>
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<td>Three channels in parallel</td>
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<tr>
<td>Uo/Voc = 23.6 V</td>
<td>IIC</td>
<td>0.13</td>
<td>1.6</td>
<td>40.6</td>
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<td>Po/Po = 1167 mW</td>
<td>IIA</td>
<td>3.50</td>
<td>3.6</td>
<td>121.9</td>
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**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
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

MODEL D104*Q

Out 1
LED
Solenoid Valve
Out 2
Out 3
Out 4

3 +
4 -
2
1
5
6
+
-

Common positive connection

Supply 24 Vdc

Control

In 1
In 2
In 3
In 4

Bus powered,
Common negative control input

MODEL D104*Q

Out 1
LED
Solenoid Valve
Out 2
Out 3
Out 4

3 +
4 -
2
1
5
6
+
-

Common positive connection

Supply 24 Vdc

Control

In 1
In 2
In 3
In 4

Bus powered,
Common positive control input

MODEL D104*Q

Out 1
LED
Solenoid Valve
Out 2
Out 3
Out 4

3 +
4 -
2
1
5
6
+
-

Common positive connection

Supply 24 Vdc

Control

In 1
In 2
In 3
In 4

Loop powered,
all output channels ON
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

**MODEL D104*Q**

Supply 24 Vdc

Out 1

Common connection

Out 2

Solenoid Valve

In 1

Control

Bus powered, Common negative (or common positive) control input, 2 Output channels (2 ch. + 2 ch. parallel)

**MODEL D104*Q**

Supply 24 Vdc

Out 1

Common connection

Out 2

Solenoid Valve

In 1

Control

Bus powered, Common negative (or common positive) control input, 1 + 1 Output channels (1 ch. single + 3 ch. parallel)

**MODEL D104*Q**

Supply 24 Vdc

Out 1

Common connection

Out 2

Solenoid Valve

In 1

Control

Bus powered, Common negative (or common positive) control input, 1 Output channel (4 ch. parallel)
Output Diagram:

D1040Q OUTPUT DIAGRAM

V (V) vs. I (mA) for 1 Channel:
- **Vo**: 20.5 V (no load)
- **Rout**: 334.0 Ω
- **Ilm**: 24 mA

D1041Q OUTPUT DIAGRAM

V (V) vs. I (mA) for 2 Channels:
- **Vo**: 20.5 V (no load)
- **Rout**: 484.0 Ω
- **Ilm**: 15 mA

V (V) vs. I (mA) for 3 Channels:
- **Vo**: 20.5 V (no load)
- **Rout**: 167.0 Ω
- **Ilm**: 15 mA

V (V) vs. I (mA) for 4 Channels:
- **Vo**: 20.5 V (no load)
- **Rout**: 111.4 Ω
- **Ilm**: 15 mA
- **Rout**: 83.5 Ω (4 Ch.)

V (V) vs. I (mA) for 4 Channels:
- **Vo**: 20.5 V (no load)
- **Rout**: 83.5 Ω (4 Ch.)
- **Ilm**: 15 mA
Output Diagram:

D1042Q Output Diagram

- $V_o \geq 20.5 \, V$ (no load)
- $R_{out} \leq 273.0 \, \Omega$ (1 Ch.)
- $R_{out} \leq 136.5 \, \Omega$ (2 Ch.)
- $R_{out} \leq 91.0 \, \Omega$ (3 Ch.)
- $R_{out} \leq 68.3 \, \Omega$ (4 Ch.)
- $I_{lim} \geq 24 \, mA$ (per channel)

D1043Q Output Diagram

- $V_o \geq 20.5 \, V$ (no load)
- $R_{out} \leq 484.0 \, \Omega$ (1 Ch.)
- $R_{out} \leq 242.0 \, \Omega$ (2 Ch.)
- $R_{out} \leq 161.4 \, \Omega$ (3 Ch.)
- $R_{out} \leq 121.0 \, \Omega$ (4 Ch.)
- $I_{lim} \geq 24 \, mA$ (per channel)
### Technical Data:

**Supply:** 115-230 Vac, 50-60 Hz nom (85 to 250 Vac, 48 to 400 Hz), ripple within voltage limits ≤ 10 Vpp, 500 mA time lag fuse and 275 Vrms transient voltage surge suppressor protected.

Limit supply voltage to 250 Vrms for Intrinsically Safe applications.

**Current consumption** @ 115 Vac: 25 mA with short input and relays energized.

**Current consumption** @ 230 Vac: 15 mA with short input and relays energized.

**Max. power consumption:** at 264 Vac supply voltage, short circuit input and relays energized, 2.0 W for 2 channels D1130D, 1.9 W for 1 channel D1130S.

**Isolation (Test Voltage):** I.S. In/Out 2.5 kV; I.S. In/Supply 2.5 kV; Out/Supply 2.5 kV; Out/2 Out 2.5 kV.

**Input switching current levels:**
- ON: ≥ 2 mA, OFF: ≤ 1.2 mA, switch current ≈ 1.65 mA ± 0.2 mA hysteresis.

**Fault current levels:** open fault ≤ 0.2 mA, short fault ≥ 6.8 mA.

(When enabled both faults de-energize channel relay with dual channel unit D1130D or actuate relay fault with single channel unit D1130S).

**Input equivalent source:** B V 1 KΩtypical (8 V no load, 8 V short circuit).

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

**Contact material:** Ag/AgO.

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

**DC Load breaking capacity:**

### Manufacturer:

**D1130**

### Characteristics:

#### General Description:

The Switch/Proximity Detector Repeater type D1130 is a DIN Rail unit with one or two independent channels. The unit can be configured for contact or proximity detector, NO or NC and for NE or ND SPDT relay output contact.

Each channel enables a Safe Area load to be controlled by a switch, or a proximity detector, located in Hazardous Area.

**D1130 dual channel** type has two independent input channels and actuates the corresponding output relay. Two actuation modes can be independently DIP switch configured on each input channel: NO input/NE relay or NO input/ND relay.

Contact or proximity sensor and its connection line short or open circuit fault detection is also DIP switch configurable: fault detection can be enabled (in case of fault it de-energizes the corresponding output relay and turns the fault LED on) or disabled (in case of fault the corresponding output relay repeats the input line open or closed status as configured).

**D1130 single channel** type has one input channel and two output relays; the unit has two DIP switch configurable operating modes:

- Mode A) input channel actuates in parallel the two output relays (DPDT contact).
- Mode B) input channel actuates output relay A configurable in two modes as in mode A above. Output relay B operates as a fault output (in case of input fault, relay B actuates and the fault LED turns on while relay A resets the input line as configured).

Actuation can be DIP switch configured in two modes:

- No input fault/energized relay (it de-energizes in case of fault) or
- No input fault/de-energized relay (it energizes in case of fault).

**Function:**

1 or 2 channels I.S. switch repeater for contact or proximity sensor and its connection line short or open circuit fault detection is independent channels. The unit can be configured for contact or proximity detector, NO or NC and for NE or ND SPDT relay output contact.

**Signalling LEDs:**

- Power supply indication (green), output status (yellow), line fault (red).

**Field Configurability:**

- NO/NC input for contact/proximity, NE/ND relay operation and fault detection enable/disable.

**EMC:**

Fully compliant with CE marking applicable requirements.

### Front Panel and Features:

SIL 2 according to IEC 61511.

Tprob = 2 / 10 years (≤ 10% / >10% of total SIF).

Safety Description:

- FMECA: Ex ia IIC T4, Ex ia Da IIIC X, Ex ia Ma I.
- IECEx / INMETRO:
  - 2Ex nA nC IA IC T4 X, [Ex ia Ga] IA, 2Ex nA nC IA IC T4 X, [Ex ia Da] IA, [Ex ia Ma] IA

- UL: AIS / I, II, III, I / 1 / ABCDEFG, [Ex ia] IA
- C-UL: AIS / I, II, III, I / 1 / ABCDEFG, [Ex ia] IA
- C-UL: AIS / I, II, III, I / 1 / ABCDEFG, [Ex ia] IA
- EAC-EX:
  - Ex ia IC T4 X, [Ex ia Da] IA, [Ex ia Ma] IA
- Type Approval Certificate DNV and KR for maritime applications.

**Compatiblity:**

CE mark compliant, conforms to Directive:

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

**Environmental conditions:**

- Operating: temperature limits –20 °C to + 60 °C, relative humidity max 90 % non condensing, up to 35 °C.
- Storage: temperature limits –45 to + 80 °C.

### Ordering Information:

**Model:**

- D1130

1 channel

2 channels

### DIN-Rail accessories:

DIN rail stopper MGR016

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Parameters Table:

<table>
<thead>
<tr>
<th>Safety Description</th>
<th>Maximum External Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group</td>
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<tr>
<td>Terminals 13-14, 15-16</td>
<td>IIC</td>
</tr>
<tr>
<td>Uo/Voc = 10.7 V</td>
<td>IIB</td>
</tr>
<tr>
<td>Io/Isc = 15 mA</td>
<td>II</td>
</tr>
<tr>
<td>Po/Po = 39 mW</td>
<td>IIC</td>
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</table>

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

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

MODEL D1130D

MODEL D1130S

Relay contact shown in de-energized position

Uo/Voc = 10.7 V
Io/Isc = 15 mA
Po/Po = 39 mW
SIL 3 Repeater Power Supply
Hart, DIN-Rail and Termination Board,
Models D5014S, D5014D

Technical Data:

Supply:
24 Vdc nom (18 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ ±5 Vpp. 2 A time lag fuse internally protected.

Current consumption @ 24 V: 85 mA for 2 channels D5014D, 42.5 mA for 1 channel D5014S with 20 mA output typical.

Power dissipation: 1.25 W for 2 channels D5014D, 0.62 W for 1 channel D5014S with 24 V supply voltage and 20 mA output typical.

Isolation (Test Voltage):
1.5 kV @ 50 Hz, 1.5 kV @ Supply, 2.5 kV @ I/S, 1.5 kV @ In 500 V; Out/Supply 500 V; Out/Out 500 V.

Input:
4 to 20 mA (separately powered input, voltage drop ≤ ±0.5 V) or 4 to 20 mA (2 wires Tx current limited at ≈25 mA), reading range 0 to 24 mA.

Transmitter line voltage: 15.0 V typical at 20 mA with max. 20 mVrms ripple on 0.5 to 2.5 kHz bandwidth, 14.5 V minimum.

Output:
4 to 20 mA, on max. 550 Ω load in source mode (typical 12 V compliance); V min. 8 V at 0 V load V max. 30 V in sink mode, current limited at ≈25 mA or 1 to 5 V on internal 250 Ω shunt (or 2 to 10 V on internal 500 Ω shunt on request). Response time: 5 ms (0 to 100 % step change).

Output ripple: ≤0.20 mVrms on 250 Q communication load on 0.5 to 2.5 kHz band.

Frequency response: 0.5 to 2.5 kHz bidirectional within 3 dB (Hart protocol).

Performance:
Ref. Conditions 24 V supply, 250 Ohm, 23 ± 1 °C ambient temperature.

Calibration accuracy: ≤±0.1 % of full scale.

Linearity error: ≤±0.5 % of full scale.

Supply voltage influence: ≤±0.02 % of full scale for a min to max supply change.

Load influence: ≤±0.02 % of full scale for a 0 to 100 % load resistance change.

Temperature influence: ≤±0.01 % of full scale on zero and span for a ±1 °C change.

Compatibility:

Environmental conditions:

Operating: temperature limits – 40 to +70 °C, relative humidity 95 %, up to 55 °C.

Storage: temperature limits – 45 to +80 °C.

Safety Description:
ATEX: II 3(1)G Ex nA [ia] Ga IIC T4 Gc, II (1)D [Ex ia Da] IIC, I (M1) [Ex ia Ma] I

IECEx / INMETRO / NEPSI / Exia IA [ia] Ga IIC T4 Gc, [Ex ia Da] IIC, [Ex ia Ma] I


C-U/L: Ni / I / 2 / ABCD / T4, AIS / I, II, III, IV / 1 / ABCDEFG, Ex na [a] Ga IIC T4 Gc

FM: Ni-AIS / I / 2 / ABCD / T4, AIS / I, II, III, IV / 1 / ABCDEFG, 1 / 2 / Aex na [a] IIC / T4

FM: Ni-AIS / I / 2 / ABCD / T4, AIS / II, III, IV / 1 / ABCDEFG, 1 / 2 / Aex na [a] IIC / T4

EAC-EX: E2014aA01C7T4X


Uo/Vo = 25.9 V, Io/Vo = 92 mA, Po/Po = 594 mW at terminals 7-8, 9-10, 11-12.

Uo/Vo = 1.1 V, Io/Vo = 56 mA, Po/Po = 16 mW at terminals 8-11, 10-12.

Uo/Vo = 70 mA, V/Io = 128 mA, Po/Po = 594 mW at terminals 7-8, 9-10.

Uo/Vo = 1.1 V, Io/Vo = 56 mA, Po/Po = 16 mW at terminals 8-11, 10-12.

Uo/Vo = 70 mA, V/Io = 128 mA, Po/Po = 594 mW at terminals 7-8, 9-10.

In-field programmability by DIP Switch.


C-UL: FM 3046304 and FMC 3046304C conforms to Class 3600, 3610, 3810, 3611, 3612.

CSA-C22.2 No. 213 and CSA-E60079-15 for C-UL.

Approvals:

BS5 10072 X conforms to EN61800-7-9, EN60797-11, EN60797-15.

IECEx IECEx BS 10072 X conforms to IEC61508-7-9, IEC61508-7-15, IEC61508-7-19.


UL: C-U/L E222398 conforms to UL913, UL60797-09, UL60797-11, UL60797-15, ANS/ISA-12.12.01 for UL and CSA-C22.2 No. 157-92, CSA-E60797-09, CSA-E60797-11, CSA-C22.2 No. 213 and CSA-E60770-15 for C-U/L.

FM: 3046304 and FMC 3046304C conforms to Class 3600, 3610, 3810, 3611, 3612.

ANS/ISA-60079-0, ANS/ISA-60079-11, ANS/ISA-60079-15, ANS/ISA-60079-15, Exia Exia I X

C-IEx: E2014aA01C7T4X

TC21005 for TIIIS approval.


Mounting:
T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.

Dimensions: Width 12.5 mm, Depth 122 mm, Height 120 mm.

Ordering Information:

Model: D5014

1 channel
2 channels

S
D

Power Bus and DIN-Rail accessories:
Connector JDF7049
Terminal block male MOR017

Cover and fix MCP196
Terminal block female MOR022

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<td>Terminals 7-8, 9-10</td>
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<td>Uo/Voc = 25.9 V</td>
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<td>Io/Isc = 92 mA</td>
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<tr>
<td>Po/Po = 594 mW</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>IIIIC</td>
</tr>
<tr>
<td>Terminals 8-11, 10-12</td>
<td>IIC</td>
</tr>
<tr>
<td>Uo/Voc = 1.1 V</td>
<td>IIB</td>
</tr>
<tr>
<td>Io/Isc = 56 mA</td>
<td>IIA</td>
</tr>
<tr>
<td>Po/Po = 16 mW</td>
<td>I</td>
</tr>
<tr>
<td>UI/Vmax = 30 V, li/limax = 128 mA</td>
<td>IIIIC</td>
</tr>
<tr>
<td>Ci = 0 nF, Li = 0 nH</td>
<td></td>
</tr>
</tbody>
</table>

**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:

**Group Cenelec**

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<td>I</td>
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<tr>
<td>UI/Vmax = 30 V, li/limax = 128 mA</td>
<td>IIIIC</td>
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<td>Ci = 0 nF, Li = 0 nH</td>
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</table>

**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

SAFELY 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

**MODEL D5014D**

**MODEL D5014S**
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

Safety Description

Terminals 7-10
Uo/Voc = 27 V
Io/Isc = 93 mA
Po/Po = 623 mW

<table>
<thead>
<tr>
<th>Group</th>
<th>Co/Ca (µF)</th>
<th>Lo/La (mH)</th>
<th>Lo/Ro (µH/Q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>0.090</td>
<td>3</td>
<td>57.0</td>
</tr>
<tr>
<td>IIB</td>
<td>0.705</td>
<td>16.6</td>
<td>228.3</td>
</tr>
<tr>
<td>IIA</td>
<td>2.330</td>
<td>33.2</td>
<td>456.6</td>
</tr>
<tr>
<td>I</td>
<td>3.750</td>
<td>54.5</td>
<td>749.1</td>
</tr>
<tr>
<td>IIIC</td>
<td>0.705</td>
<td>16.6</td>
<td>228.3</td>
</tr>
</tbody>
</table>

Connections for Duplication of 2 wires Transmitter Input

Restrictions 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 (Vtx) is 14 V at 20 mA input
Safety parameters must be changed in: Uo/Voc = 27 V, Io/Isc = 93 mA, Po/Po = 623 mW
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

Safety Description

Terminals 8-12
Uo/Voc = 2.2 V
Io/Isc = 56 mA
Po/Po = 31 mW

Group | Co/Ca (µF) | Lo/La (mH) | Lo/Lo (µH/Ω)
--- | --- | --- | ---
IIC | 100 | 11.3 | 1163.6
IIB | 1000 | 45.3 | 4654.5
IIA | 1000 | 90.7 | 9309
I | 1000 | 151.1 | 15272.7
IIIC | 1000 | 45.3 | 4654.5

Connections for Duplication of Active Input Signals

Restrictions on specifications for external powered Transmitter:

Voltage drop ≤ 1.0 V
Safety parameters must be changed in: Uo/Voc = 2.2 V, Io/Isc = 56 mA, Po/Po = 31 mW
**SIL 3 Switch/Proximity Detector Repeater, Relay Output DIN-Rail Models D5030S, D5030D**

**Characteristics:**

**General Description:**
The single and dual channel Switch/Proximity Detector Repeater, D5030S and D5030D module is a unit suitable for applications requiring SIL 3 level (according to IEC 61508:2010 Ed. 2) in safety related systems for high risk industries.

The unit can be configured for switch or proximity detector (EN60947-5-6, NAMUR), NO or NC and for NE or NO SPST (D5030D) or SPDT (D5030S) relay output contact. Each channel enables a Safe Area load to be controlled by a switch, or a proximity detector, located in Hazardous Area.

Fault detection circuit (DIP switch configurable) is available for both proximity sensor and switch equipped with end of line resistors. In case of fault, when enabled it de-energizes the corresponding output relay and turns the fault LED on; when disabled the corresponding output relay repeats the input line open or closed status as configured.

D5030D is programmable via dip switches as single input and two independent outputs. Out 2 can be programmed for output duplicating Out 1 or Fault detection Out. In case of duplication, relay actuation can be independently configured for each output. In case of fault output, relay actuation can be programmed as normally energized or normally de-energized.

Mounting on standard DIN-Rail, with or without Power Bus, in Safe Area / Non Hazardous Location or in Zone 2 / Class I, Division 2 or Class I, Zone 2.

**Front Panel and Features:**
- SIL 3 according to IEC 61508:2010 Ed. 2 for Tprov = 2 / 4 years (10 / 20 % of total SIF), considering 100 mA max contact current.
- SIL 2 according to IEC 61508:2010 Ed. 2 for Tprov = 5 / 11 years (10 / 20 % of total SIF), considering 4 A max contact current.
- PFDefault (1 year) 4.92 E-05, SFF 90.06 %, considering 100 mA max contact current.
- PFDefault (1 year) 1.72 E-04, SFF 78.55 %, considering 4 A max contact current.
- Systematic capability SIL 3
  - 2 fully independent channels.
  - Input from Zone 0 (Zone 20) / Division 1, installation in Zone 2 / Division 2.
  - NO / NC switch/proximity Detector Input, NE / IND relay actuation mode.
- Field open and short circuit detection.
- Three port isolation, Input / Output / Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety system.
- In-field programmability by DIP Switch.
- ATEX, IECEx, FM, INMETRO, GOST, TÜV Certifications.
- Three port isolation, Input / Output / Supply.
- SIL 3
  - D5030
    - Type Approval Certificate DNV for marine applications.
    - High Density, two channels per unit.
    - Simplified installation using standard DIN-Rail and plug-in terminal blocks, with or without Power Bus.
    - 250 Vrms (Um) max. voltage allowed to the instruments associated with the barrier.

**Ordering Information:**
- **Model:** D5030
  - 1 channel: S
  - 2 channels: D
- **Power Bus and DIN-Rail accessories:**
  - Connector JDFT049
  - Cover and fix MCHP196
  - Terminal block male MOR017
  - Terminal block female MOR022

**Technical Data:**

**Supply:**
- 24 Vdc nom (18 to 30 Vdc) reverse polarity protected.
- ripple within voltage limits ≤ 5 Vpp, 2 A time lag fuse internally protected.

**Current consumption** at 24 V: 35 mA for 2 channels D5030D, 16 mA for 1 channel D5030S with short circuit input and relay energized, typical.

**Power dissipation:** 0.85 W for 2 channels D5030D, 0.45 W for 1 channel D5030S with 24 V supply voltage, short circuit input and relay energized, typical.

**Isolation (Test Voltage):**
- I.S. In / Out 2.5 kV; I.S. In / Out 5 kV; I.S. In / Out 500 V;
- Out / Supply 2.5 kV; Out / Out 2.5 kV.

**Input switching current levels:**
- On ≥ 2.1 mA (1.9 to 6.2 mA range), OFF ≤ 2.1 mA (0.4 to 1.3 mA range).
- switch current = 1.65 mA ± 0.2 mA hysteretic.

**Fault current levels:**
- open fault ≤ 0.2 mA, short fault ≥ 0.6 mA
- (when enabled both faults de-energize channel relay with single channel unit D5030S or de-energize channel relay with D5030D used as dual channel unit or actuate the fault relay out with D5030D used as fault signaling unit).

**Input equivalent source:** 8 V 1 KΩ typical (8 V no load, 8 mA short circuit).

**Output:**
- voltage free SPST (D5030D) or SPDT (D5030S) relay contact.
- Contact material: Ag Alloy (Cd free), gold plated.
- Contact rating: 4 A, 250 Vac 1000 VA, 4 A, 250 Vdc 120 W (resistive load).
- Min. switching current 1 mA.
- DC Load breaking capacity:
**Parameters Table:**

<table>
<thead>
<tr>
<th>Safety Description</th>
<th>Maximum External Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group Cenelec</td>
</tr>
<tr>
<td>Terminals 7-8, 9-10</td>
<td>IIC</td>
</tr>
<tr>
<td>Uo/Voc = 10.5 V</td>
<td>IIB</td>
</tr>
<tr>
<td>Io/Isc = 22 mA</td>
<td>IIA</td>
</tr>
<tr>
<td>Po/Po = 56 mW</td>
<td>IIIC</td>
</tr>
</tbody>
</table>

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

**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

Resistors R1 - R2 used with voltage free contact required for line fault detection.

Relay contact shown in de-energized position. Terminals 1-2 and 3-4 open.
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

Terminals 9-10 must be shorted to set module as Duplicator or Fault Out

Resistors R1 - R2 used with voltage free contact required for line fault detection.

Internal Dip switches programmable
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

Resistors R1 - R2 used with
voltage free contact required
for line fault detection.
Characteristics:

General Description:
The Switch/Proximity Detector Repeater type D5231E is a unit with eight independent channels suitable for applications requiring SIL 2 level (according to IEC 61508) in safety related systems for high risk industries.

The unit can be configured for switch or proximity detector (EN60947-5-6 NAMUR), NO or NC input and for NO or NC floating solid-state relay (photo-MOS) isolated output compatible with logic circuits. Configuration is programmable from PC by the GM Pocket Portable Adapter PPC5092 via USB serial line and SWC5090 Configurator software.

Each channel enables a Safe Area load to be controlled by a switch, or a proximity detector, located in Hazardous Area.

Fault detection circuit (configurable by PC) is available for all proximity sensors and switches equipped with end of line resistors. In case of fault, when enabled it de-energizes the corresponding solid-state relay (photo-MOS) and turns the fault red LED on; when disabled the corresponding solid-state relay (photo-MOS) repeats the input line open or closed status as configured.

D5231E has eight inputs and eight independent outputs.

Modbus RTU RS-485 output is available on Bus connector.

D5231 has eight inputs and eight independent outputs.

Input switching current levels:
ON ≥ 2.1 mA (1.9 to 6.2 mA range), OFF ≤ 1.2 mA (0.4 to 1.3 mA range), switch current ≥ 1.65 mA ± 0.2 mA hysteresis.

Fault current levels: open fault ≤ 0.2 mA, short fault ≥ 6.8 mA.

Input equivalent source: 8 V 1 kΩ (typical 8 V no load, 8 mA short circuit).

Output:
- voltage free SPST optocoupled open-collector transistor (solid-state relay, photo-MOS).
- Open-collector rating: 100 mA at 35 V (≤ 1.0 V voltage drop).
- Leakage current: ≤ 10 μA at 35 V.
- Response time: 500 μs.
- Frequency response: 500 Hz maximum.

Modbus Output: Modbus RTU protocol up to 115.200 baud on Bus connector.

Compatibility:

Environmental conditions:
- Operating: temperature limits – 40 to + 70 °C, relative humidity 95 %, up to 55 °C.
- Storage: temperature limits – 45 to + 80 °C.

Safety Description:
- ATEX: II 3(1) G Ex nA [ia Ga] IIC T4 Gc, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I
- IECEx: Ex nA [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I,
- associated apparatus and non-sparking electrical equipment.
- Uo/Voc = 250 Vmrs, -40 °C ≤ Ta ≤ 70 °C.
- Approvals: ATEX conforms to EN60079-0, EN60079-15, EN60079-16, IECEx conforms to IEC60079-0, IEC60079-15, IEC60079-26, SIL 2 conforms to IEC61508.

Mounting:
T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Boards.

Weight: about 145 g.
Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².

Location: Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4 installation.

Protection class: IP 20.
Dimensions: Width 22.5 mm, Depth 123 mm, Height 120 mm.

Front Panel and Features:
- SIL 2 according to IEC 61508 for Tproof = 5 yrs (10 / 20 % of total SIF).
- 8 fully independent channels
- Input from Zone 0 (Zone 20), installation in Zone 2.
- NO/NC switch/proximity Detector Input, NO/NC solid-state output relay.
- Field open and short circuit detection.
- High Accuracy, µP controlled A/D converter.
- Three port isolation, Input/Output/Supply.
- Modbus RTU RS-485 Output.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety system.
- Fully programmable operating parameters.
- Any input can be assigned to any number of outputs. Logical output functions available.
- ATEX, IECEx Certifications.
- High Density, eight channels per unit.
- Simplified installation using standard DIN-Rail and plug-in terminal blocks, with or without power Bus, or customized Termination Boards.
- 250 Vrms (Um) max. voltage allowed to the instruments associated with the barrier.

Technical Data:

Supply:
- 24 Vdc nom (18 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp, 2 A time lag fuse internally protected.
- Current consumption @ 24 V: 75 mA for 8 channels with short circuit input and solid-state relay (photo-MOS) closed, typical.
- Power dissipation: 1.8 W with 24 V supply voltage, for 8 channels with short circuit input and solid-state relay (photo-MOS) closed, typical.
- Isolation (Test Voltage):
  - I.S. In/Out 1.5 kV, I.S. In/Supply 1.5 kV, Out/Supply 500 V.

Input switching current levels:
- ON ≥ 2.1 mA (1.9 to 6.2 mA range), OFF ≤ 1.2 mA (0.4 to 1.3 mA range), switch current ≥ 1.65 mA ± 0.2 mA hysteresis.
- Fault current levels: open fault ≤ 0.2 mA, short fault ≥ 6.8 mA.
- Input equivalent source: 8 V 1 kΩ (typical 8 V no load, 8 mA short circuit).

Output:
- voltage free SPST optocoupled open-collector transistor (solid-state relay, photo-MOS).
- Open-collector rating: 100 mA at 35 V (≤ 1.0 V voltage drop).
- Leakage current: ≤ 10 μA at 35 V.
- Response time: 500 μs.
- Frequency response: 500 Hz maximum.

Modbus Output: Modbus RTU protocol up to 115.200 baud on Bus connector.

Compatibility:

Environmental conditions:
- Operating: temperature limits – 40 to + 70 °C, relative humidity 95 %, up to 55 °C.
- Storage: temperature limits – 45 to + 80 °C.

Safety Description:
- ATEX: II 3(1) G Ex nA [ia Ga] IIC T4 Gc, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I
- IECEx: Ex nA [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I,
- associated apparatus and non-sparking electrical equipment.
- Uo/Voc = 250 Vmrs, -40 °C ≤ Ta ≤ 70 °C.
- Approvals: ATEX conforms to EN60079-0, EN60079-15, EN60079-26, IECEx conforms to IEC60079-0, IEC60079-15, IEC60079-26, SIL 2 conforms to IEC61508.

Mounting:
T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.

Weight: about 145 g.
Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².

Location: Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4 installation.

Protection class: IP 20.
Dimensions: Width 22.5 mm, Depth 123 mm, Height 120 mm.

Ordering Information:

<table>
<thead>
<tr>
<th>Model: D5231</th>
<th>Power Bus and DIN-Rail accessories: Connector JDFT050</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 channels</td>
<td>Cover and fix MCHP196 Terminal block male MOR017</td>
</tr>
<tr>
<td></td>
<td>Terminal block female MOR022</td>
</tr>
</tbody>
</table>

Operating parameters are programmable from the PC by the GM Pocket Portable Adapter PPC5092 via USB serial line and SWC5090 Configurator software.
Parameters Table:

<table>
<thead>
<tr>
<th>Safety Description</th>
<th>Maximum External Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group Cenelec</td>
</tr>
<tr>
<td>Terminals 21-13, 21-14, 22-15, 22-16, 23-17, 23-18, 24-19, 24-20</td>
<td>IIC</td>
</tr>
<tr>
<td>Uo/Voc = 11.2 V</td>
<td>IIB</td>
</tr>
<tr>
<td>Io/Isc = 12 mA</td>
<td>IIA</td>
</tr>
<tr>
<td>Po/Po = 34 mW</td>
<td>IaD</td>
</tr>
</tbody>
</table>

Image:

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4

Function Diagram:

MODEL D5231E

Resistors R1 - R2 used with voltage free contact required for line fault detection.
Configurating and Monitoring via Software:

**Configuration**

Configuration parameters can be read and written from the module or from saved file. It is also possible to reset the module configuration to factory default settings. A report sheet containing complete configuration can be printed.

**Inputs 1 to 8:**

- **Sensor Type:** Proximity
- **Voltage free contact**

Note: To enable line diagnostic on Voltage free contacts, configure sensor as “Proximity” and follow instructions in Section “Operation” of Manual ISM0172.

**Tags 1 to 8:**

16 alphanumerical characters.

**Outputs 1 to 8:**

- **Source:**
  - Input 1: Output represents Input 1,
  - Input 2: Output represents Input 2,
  - Input 3: Output represents Input 3,
  - Input 4: Output represents Input 4,
  - Input 5: Output represents Input 5,
  - Input 6: Output represents Input 6,
  - Input 7: Output represents Input 7,
  - Input 8: Output represents Input 8.

- **Logical function:** Output represents AND/OR function of selected inputs.

**Contact:**

- Normal condition of output contact:
  - NC: Normally Closed,
  - NO: Normally Open.

**In case of fault:**

- Output behaviour when Input fault is detected
  - Ignore: Ignore,
  - Go On: Switch to ON status (Open when NC, Closed when NO),
  - Go Off: Switch to OFF status (Closed when NC, Open when NO).

**Fault repeater:**

- Output represents Input Fault status

**Logical Function:** visible only when selected in “Output source”

- Select 2 or more (up to 8) Inputs to connect logically.

  - AND: Output represents AND logical function of selected Inputs,
    - NO: On AND On = Close; On AND Off = Open; Off AND Off = Open
    - NC: On AND On = Open; On AND Off = Close; Off AND Off = Close
  - OR: Output represents OR logical function of selected Inputs
    - NO: On OR On = Close; On OR Off = Close; Off OR Off = Open
    - NC: On OR On = Open; On OR Off = Open; Off OR Off = Close

**Monitor**

Allows the real-time monitoring of every Input and Output status.

**Input Status:**

- The status of each input is shown
  - Open circuit fault (only for Proximity Inputs),
  - Off,
  - On,
  - Short circuit fault (only for Proximity Inputs).

**Output Status:**

- The status of each output contact is shown
  - Open,
  - Closed.

**Data Logger**

The status of all Inputs and all Outputs is acquired at constant chosen intervals and saved to user selected file in Comma Separated Value format (.csv).

**Parameters Setup:**

- **Days:** Number of days to acquire.
- **Hours:** Number of hours to acquire.
- **Minutes:** Number of minutes to acquire.
- **Scan rate:** Frequency interval for acquisitions.

**General Notes:**

- SWC5090 Software can be downloaded for free at www.gmintsrl.com
- PPC5092 Adapter is needed to interface PC to DS231E module.
- The PC supplies the module via USB, therefore operating power supply (24 Vdc) is not strictly needed when configuring the module.