INSTRUCTION & SAFETY MANUAL

SIL 3 Digital Output Driver
NE Loads Loop Powered
DIN-Rail Model D1048S

Characteristics

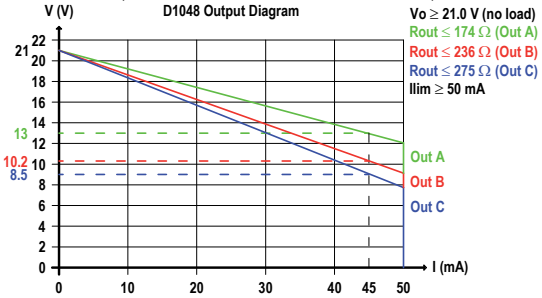
General Description: The single channel DIN-Rail Loop Powered Digital Output Isolator, D1048S, is suitable for driving solenoid valves, visual or audible alarms to alert a plant operator, or other process control devices in Hazardous Area from a driving signal in Safe Area. It can also be used as a controllable supply to power measuring or process control equipment. Its use is allowed in applications requiring up to SIL 3 level (according to IEC 61508:2010 Ed. 2) in safety related systems for high risk industries.
The Safety PLC or DCS driving signal powers the field device through the D1048S, which provides isolation and is capable of monitoring the conditions of the line.
Short and open circuit diagnostic monitoring, dip-switch selectable and active when input power is present, provides LED indication and NC transistor output signaling.
When fault is detected output is de-energized until normal condition is restored. Line short and open output circuit fault detection is also reflected on the PLC / DCS input circuit providing less than 10 mA consumption.
An override input, dip-switch selectable, is provided to permit a safety system to override the control signal. When enabled, a low input voltage always de-energizes the field device regardless of the input signal.
Three basic output circuits are selectable, with different safety parameters, to interface the majority of devices on the market. The selection among the three output characteristics is obtained by connecting the field device to a different terminal block.

Function: 1 channel I.S. digital output to operate Hazardous Area normally energized loads from PLC or DCS drive logics in Safe Area, providing 3 port isolation (input/output/fault).
Signalling LEDs: Output status (yellow), fault condition (red).
Field Configurability: Line Fault Detection enable or disable and Override Control Input enable or disable.
EMC: Fully compliant with CE marking applicable requirements.
Functional Safety Management certification: G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.

FSM SIL 3

Technical Data

Loop Input: loop powered control signal.
Loop Supply: 24 Vdc nom (20 to 30 Vdc) reverse polarity protected, 2 A time lag fuse internally protected. Supplies also diagnostic monitoring control circuit.
Current consumption @ 24 V: 65 mA with 45 mA output typical in normal operation, ≤ 10 mA when fault circuit enabled and fault condition detected.
Power dissipation: 1.1 W with 24 V supply, output energized at 45 mA nominal load.
Max. power consumption: at 30 V supply voltage, 1.8 W.
Override Input: override control signal de-energizes output when enabled by dip-switch.
Override range: 24 Vdc nom (20 to 30 Vdc) to disable (field device controlled by input), 0 to 5 Vdc to de-energize field device, reverse polarity protected.
Current consumption @ 24 V: 5 mA.
Isolation (Test Voltage): I.S. Out/In 1.5 KV; I.S. Out/Override 1.5 KV; I.S. Out/Fault 1.5 KV; In/Fault 500 V; In/Override 500 V; Fault/Override 500 V.
Output:
45 mA at 13.0 V (21.0 V no load, 174 Ω series resistance) at terminals 13-16 Out A.
45 mA at 10.2 V (21.0 V no load, 236 Ω series resistance) at terminals 14-16 Out B.
45 mA at 8.5 V (21.0 V no load, 275 Ω series resistance) at terminals 15-16 Out C.



Short circuit current: ≥ 50 mA (55 mA typical).
Response time: 75 ms.
Fault detection: field device and wiring open circuit or short circuit detection dip-switch selectable. When fault is detected output is de-energized until normal condition is restored.
Short output detection: load resistance ≤ 50 Ω (≈ 2 mA forcing to detect fault).
Open output detection: load resistance > 10 KΩ.
Fault signalling: voltage free NE SPST optocoupled open-collector transistor (output de-energized in fault condition and when input power not present).
Open-collector rating: 100 mA at 35 Vdc (≤ 1.5 V voltage drop).
Leakage current: ≤ 50 µA at 35 Vdc.
Loop input consumption: ≤ 10 mA when fault detected.
Response time: ≤ 5 ms.
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 90 %.
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 / INMETRO: Ex nA [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I,
FM: NI / I / 2 / ABCD / T4, NI / I / 2 / IIC / T4, AIS / I, II, III / 1 / ABCDEFG, AEx [ia] IIC
FMC: NI / I / 2 / ABCD / T4, NI / I / 2 / IIC / T4, AIS / I, II, III / 1 / ABCDEFG, Ex [ia] IIC
EAC-EX: 2Ex nA [ia Ga] IIC T4 Gc X, [Ex ia Da] IIIC X, [Ex ia Ma] I X
UKR TR n. 898: 2ExnAiaIICT4 X, Exial X
associated apparatus and non-sparking electrical equipment.
Uo/Voc = 24.8 V, Io/Isc = 147 mA, Po/Po = 907 mW at terminals 13-16 Out A.
Uo/Voc = 24.8 V, Io/Isc = 108 mA, Po/Po = 667 mW at terminals 14-16 Out B.
Uo/Voc = 24.8 V, Io/Isc = 93 mA, Po/Po = 571 mW at terminals 15-16 Out C.
Um = 250 Vrms, -20 °C ≤ Ta ≤ 60 °C.
Approvals:
DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-15, EN60079-26,
IECEx BVS 07.0027X conforms to IEC60079-0, IEC60079-11, IEC60079-15, IEC60079-26,
INMETRO DNV 13.0108 X conforms to ABNT NBR IEC60079-0, ABNT NBR IEC60079-11, ABNT NBR IEC60079-15, ABNT NBR IEC60079-26.
FM & FM-C No. 3024643, 3029921C, conforms to Class 3600, 3610, 3611, 3810,
ANSI/ISA 12.12.02, ANSI/ISA 60079-0, and C22.2 No.142, C22.2 No.157, C22.2 No.213, E60079-0, E60079-11, E60079-15.
C-IT.MH04.B.00306 conforms to GOST R IEC 60079-0,GOST R IEC 60079-11, GOST R IEC 60079-15.
СЦ 16.0034 X conforms to ДСТУ 7113, ГОСТ 22782.5-78, ДСТУ IEC 60079-15.
TUV Certificate No. C-IS-236198-04, SIL 3 conforms to IEC61508:2010 Ed. 2.
TUV Certificate No. C-IS-236198-09, SIL 3 Functional Safety Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.
DNV No.A-13778 Certificates for maritime applications.

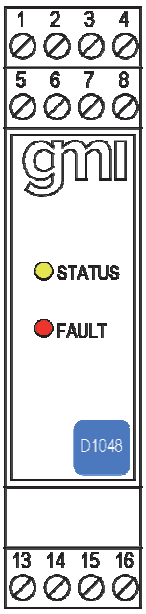
Mounting: T35 DIN Rail according to EN50022.
Weight: about 135 g.
Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².
Location: Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4, Class I, Division 2, Groups A, B, C, D Temperature Code T4 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.

Ordering information

Model: D1048S

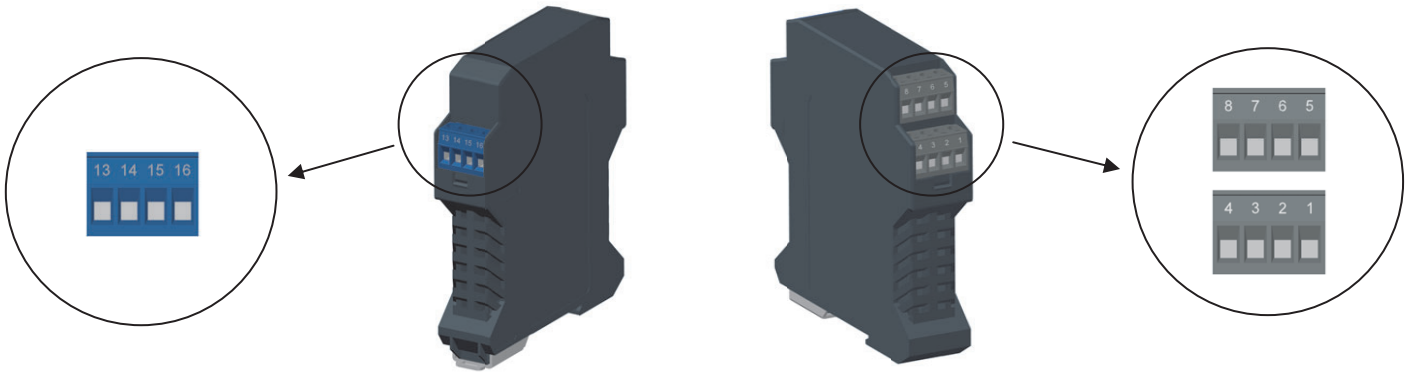
DIN-Rail accessories:
DIN rail stopper MOR016

Front Panel and Features



- SIL 3 according to IEC 61508:2010 Ed. 2 for lifetime = 20 years.
- PFDavg (1 year) 0.00 E+00, SFF 100 %.
- SIL 3 Systematic capability
- Output to Zone 0 (Zone 20), Division 1, installation in Zone 2, Division 2.
- Loop powered for NE loads.
- Short and open circuit line diagnostic monitoring with LED, transistor output and current level on input.
- Output short circuit proof and current limited.
- Three port isolation, Input/Output/Fault.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1.
- In-field programmability by DIP Switch.
- ATEX, IECEx, FM & FM-C, INMETRO, EAC-EX, UKR TR n. 898, TÜV Certifications
- TÜV Functional Safety Certification.
- Type Approval Certificate DNV for maritime applications.
- High Reliability, SMD components.
- Simplified installation using standard DIN Rail and plug-in terminal blocks.
- 250 Vrms (Um) max. voltage allowed to the instruments associated with the barrier.

Terminal block connections



HAZARDOUS AREA	
13	+ Output A for Solenoid Valve
14	+ Output B for Solenoid Valve
15	+ Output C for Solenoid Valve
16	- Output for Solenoid Valve

SAFE AREA	
1	+ Output Transistor Fault
2	- Output Transistor Fault
3	Not used
4	Not used
5	+ Input for Control
6	- Input for Control
7	+ Input for Override
8	- Input for Override

Parameters Table

In the system safety analysis, always check the Hazardous Area/Hazardous Locations devices to conform with the related system documentation, if the device is Intrinsically Safe check its suitability for the Hazardous Area/Hazardous Locations and gas group encountered and that its maximum allowable voltage, current, power (Ui/Vmax, Ii/Imax, Pi/Pi) are not exceeded by the safety parameters (Uo/Voc, Io/Isc, Po/Po) of the D1048 Associated Apparatus connected to it. Also consider the maximum operating temperature of the field device, check that added connecting cable and field device capacitance and inductance do not exceed the limits (Co/Ca, Lo/La, Lo/Ro) given in the Associated Apparatus parameters for the effective gas group. See parameters on enclosure side and the ones indicated in the table below:

D1048 Terminals		D1048 Associated Apparatus Parameters		Must be	Hazardous Area/ Hazardous Locations Device Parameters
Out A	13 - 16	Uo / Voc = 24.9 V		≤	Ui / Vmax
Out B	14 - 16				
Out C	15 - 16				
Out A	13 - 16	Io / Isc = 147 mA		≤	Ii/ Imax
Out B	14 - 16	Io / Isc = 1110mA			
Out C	15 - 16	Io / Isc = 93 mA			
Out A	13 - 16	Po / Po = 907 mW		≤	Pi / Pi
Out B	14 - 16	Po / Po = 681 mW			
Out C	15 - 16	Po / Po = 571 mW			

D1048 Terminals		D1048 Associated Apparatus Parameters		Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Out A	13 - 16	Co / Ca = 112 nF	(IIC-A, B)	≥	Ci / Ci device + C cable
Out B	14 - 16	Co / Ca = 850 nF	(IIB-C)		
Out C	15 - 16	Co / Ca = 3.01 µF	(IIA-D)		
		Co / Ca = 4.35µF	(I)		
		Co / Ca = 0.86 µF	(IIIC)		
Out A	13 - 16	Lo / La = 1.65 mH	(IIC-A, B)	≥	Li / Li device + L cable
		Lo / La = 6.63 mH	(IIB-C)		
		Lo / La = 13.2 mH	(IIA-D)		
		Lo / La = 21.78 mH	(I)		
		Lo / La = 6.63 mH	(IIIC)		
Out B	14 - 16	Lo / La = 2.9 mH	(IIC-A, B)		
		Lo / La = 11.8 mH	(IIB-C)		
		Lo / La = 23.6 mH	(IIA-D)		
		Lo / La = 40.36 mH	(I)		
		Lo / La = 12.3 mH	(IIIC)		
Out C	15 - 16	Lo / La = 4.19 mH	(IIB-C)		
		Lo / La = 16.79 mH	(IIC-A, B)		
		Lo / La = 33.58 mH	(IIA-D)		
		Lo / La = 55.09 mH	(I)		
		Lo / La = 16.7 mH	(IIIC)		
Out A	13 - 16	Lo / Ro = 39.2 µH/Ω	(IIC-A, B)	≥	Li / Ri device and L cable / R cable
		Lo / Ro = 156.8 µH/Ω	(IIB-C)		
		Lo / Ro = 313.6 µH/Ω	(IIA-D)		
		Lo / Ro = 514.6 µH/Ω	(I)		
		Lo / Ro = 156.8 µH/Ω	(IIIC)		
Out B	14 - 16	Lo / Ro = 52.2 µH/Ω	(IIC-A, B)		
		Lo / Ro = 208.9 µH/Ω	(IIB-C)		
		Lo / Ro = 417.8 µH/Ω	(IIA-D)		
		Lo / Ro = 700.6 µH/Ω	(I)		
		Lo / Ro = 213.5 µH/Ω	(IIIC)		
Out C	15 - 16	Lo / Ro = 62.3 µH/Ω	(IIC-A, B)		
		Lo / Ro = 249.4 µH/Ω	(IIB-C)		
		Lo / Ro = 498.9 µH/Ω	(IIA-D)		
		Lo / Ro = 818.5 µH/Ω	(I)		
		Lo / Ro = 249.4 µH/Ω	(IIIC)		

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

For installations in which both the Ci and Li of the Intrinsically Safe apparatus exceed 1 % of the Co and Lo parameters of the Associated Apparatus (excluding the cable), then 50 % of Co and Lo parameters are applicable and shall not be exceeded (50 % of the Co and Lo become the limits which must include the cable such that Ci device + C cable ≤ 50 % of Co and Li device + L cable ≤ 50 % of Lo).

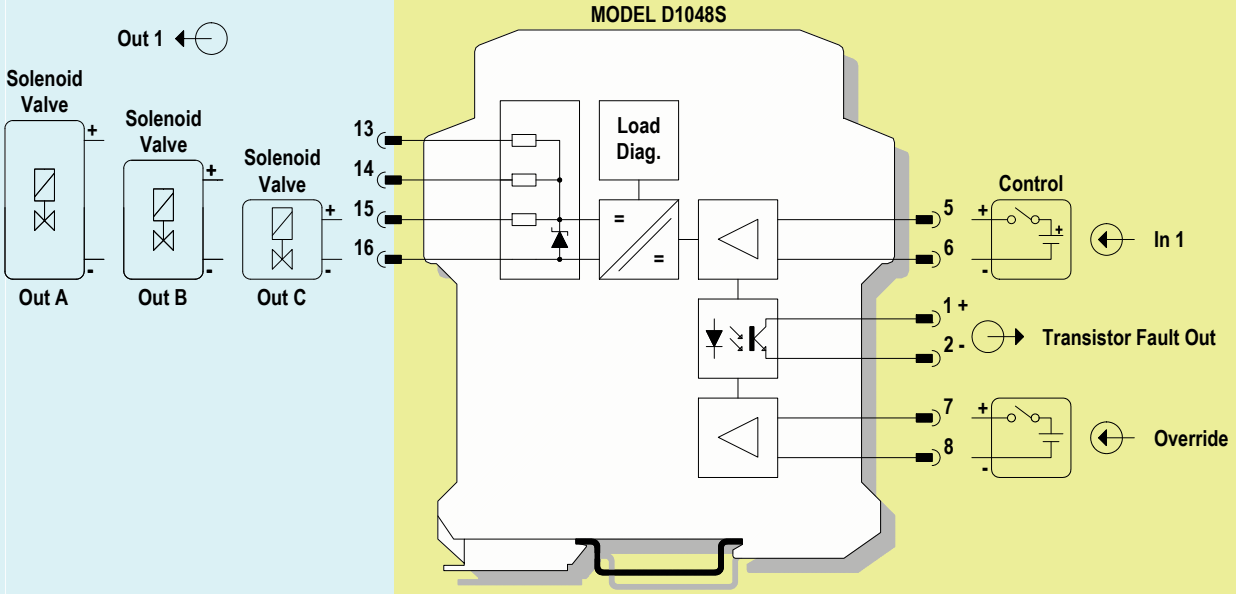
If the cable parameters are unknown, the following value may be used: Capacitance 60pF per foot (180pF per meter), inductance 0.20µH per foot (0.60µH per meter).

The Intrinsic Safety Entity Concept allows the interconnection of Intrinsically Safe devices approved with entity parameters not specifically examined in combination as a system when the above conditions are respected.

For Division 1 and Zone 0 installations, the configuration of Intrinsically Safe Equipment must be FM approved under Entity Concept (or third party approved);
for Division 2 installations, the configuration of Intrinsically Safe Equipment must be FM approved under non-incendive field wiring or Entity Concept (or third party approved).

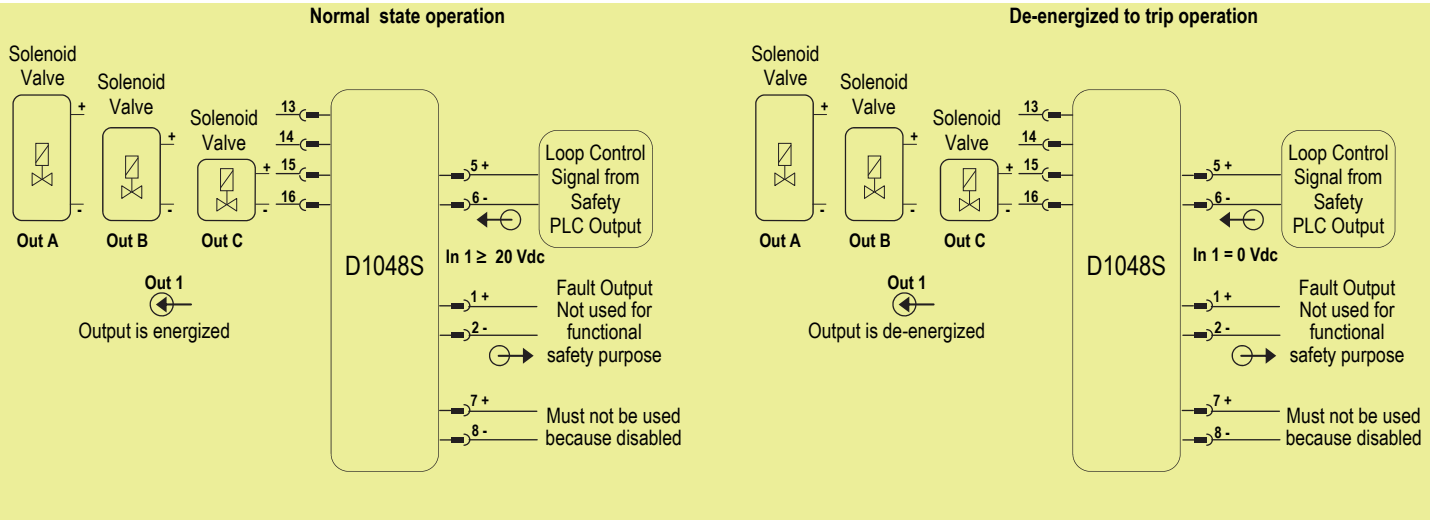
Function Diagram

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



Use only one output at a time (Out A or Out B or Out C)

Application of D1048S for NE load



Description:

The D1048S is a single channel digital output drivers, loop powered for NE (Normally Energized) loads. The Safety PLC or DCS driving/control signals power the field devices through the single channel digital output driver D1048S (1 intrinsic safety channel, Loop Powered), which provides the electrical isolation between Input and Output. The presence of the input loop signal is also indicated by a yellow LED on the front panel.

In order to interface the majority of field devices available on the market, two basic output circuits with different safety parameters (outputs A, B and C) are provided for channel.

The selection among the three output characteristics is obtained by connecting the field devices to a different couple of terminal blocks.

The field line and load fault detection is enabled and the override input is disabled, setting the internal DIP-switches in the following modes:

SW1 Dip-switch position	1	2	3	4
ON / OFF state	ON	-	-	-

SW2 Dip-switch position	1	2	3	4
ON / OFF state	-	-	-	OFF

Loop Control signals from Safety PLC Output is applied to Pins 5 - 6.

The Output NE loads are connected to Pins 13 - 16 or 14 - 16 or 15 - 16.

The following table describes the state (de-energized or energized) of each output when its control signalis in the High or Low state:

Operation	Input Signal State Pins 5 - 6	Output State Pins 13-16 (Out A) or 14-16 (Out B) or 15-16 (Out C)
Normal	High (20 to 30 Vdc)	Energized
Trip	Low (0 Vdc)	De-energized (as safe state condition)

Safety Function and Failure behavior:

D1048S is considered to be operating in Low Demand mode, as a Type A module, having Hardware Fault Tolerance (HFT) = 0.

The failure behaviour of D1048S for NE loads is described by the following definitions:

- □ Fail-Safe State: it is defined as the output being de-energized;
- □ Fail Safe: failure mode that causes the module / (sub)system to go to the defined fail-safe state without a demand from the process;
- □ Fail Dangerous: failure mode that does not respond to a demand from the process (i.e. being unable to go to the defined fail-safe state), so that the output remains energized;
- □ Fail "No Effect": failure mode of a component that plays a part in implementing the safety function but that is neither a safe failure nor a dangerous failure. When calculating the SFF, this failure mode is not taken into account.
- □ Fail "Not part": failure mode of a component that is not part of the safety function but part of the circuit diagram and is listed for completeness. When calculating the SFF, this failure mode is not taken into account.

Since the loop powered module is directly supplied by the digital output of a Safety PLC, if the safety PLC imposes a shutdown state of this module, there is no additional power supply which can keep the D1048S output energized in case of an internal fault. Therefore, all internal faults have either "no effect" on the safety function or lead to the safe state, according to the Safety Function definitions.

Failure rate data: taken from Siemens Standard SN29500.

Failure rate table:

Failure category	Failure rates (FIT)
λ_{dd} = Total Dangerous Detected failures	0.00
λ_{du} = Total Dangerous Undetected failures	0.00
λ_{sd} = Total Safe Detected failures	0.00
λ_{su} = Total Safe Undetected failures	141.45
$\lambda_{tot\ safe}$ = Total Failure Rate (Safety Function) = $\lambda_{dd} + \lambda_{du} + \lambda_{sd} + \lambda_{su}$	**141.45**
MTBF (safety function, single channel) = (1 / $\lambda_{tot\ safe}$) + MTTR (8 hours)	**807 years**
$\lambda_{no\ effect}$ = "No effect" failures	216.45
$\lambda_{not\ part}$ = "Not Part" failures	33.70
$\lambda_{tot\ device}$ = Total Failure Rate (Device) = $\lambda_{tot\ safe} + \lambda_{no\ effect} + \lambda_{not\ part}$	**391.60**
MTBF (device, single channel) = (1 / $\lambda_{tot\ device}$) + MTTR (8 hours)	**291 years**
PFDavg (TI = 1 year) = ½ λ_{du} * 8760 h	**0.00E+00**

Failure rates table according to IEC 61508:2010 Ed.2 :

λ_{sd}	λ_{su}	λ_{dd}	λ_{du}	SFF
0.00 FIT	141.45 FIT	0.00 FIT	0.00 FIT	100%

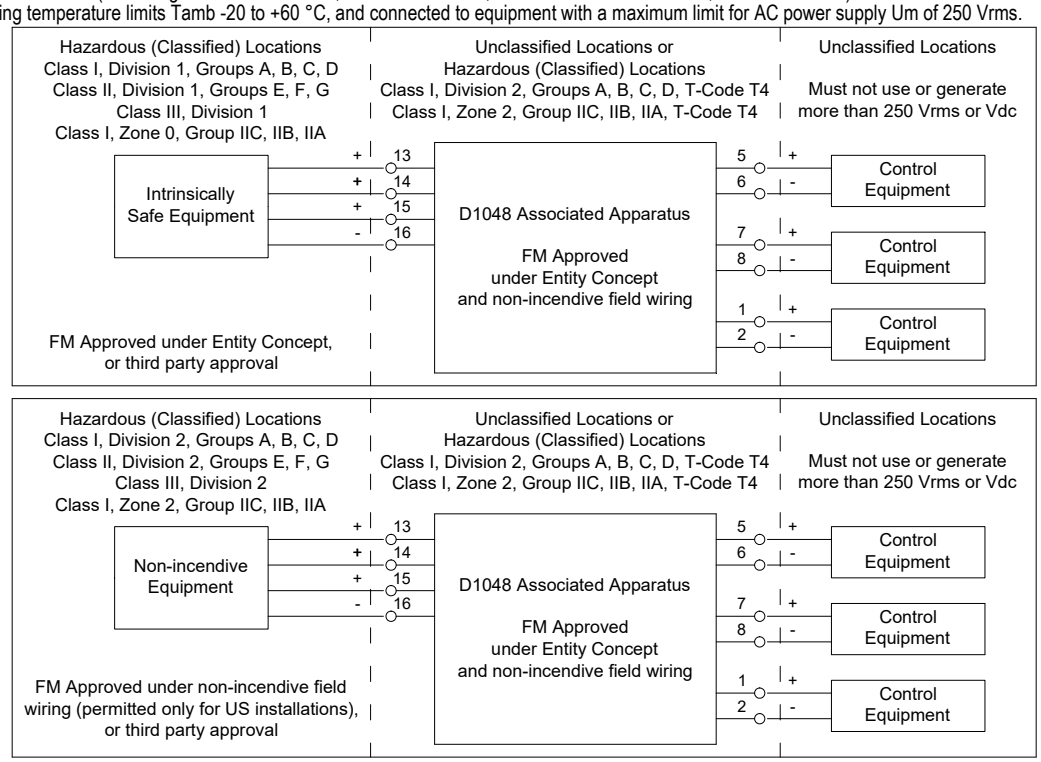
Therefore, the D5048S module have **SIL 3** level for **lifetime of 20 years**.

Systematic capability is SIL 3.

Since no dangerous undetected failures have been noted during the FMEDA analysis, there is no need to perform a proof test to reveal dangerous faults which cannot be otherwise detected.

Warning

D1048 is an isolated Intrinsically Safe Associated Apparatus installed into standard EN50022 T35 DIN Rail located in Safe Area/Non Hazardous Locations or Zone 2, Group IIC, Temperature Classification T4, Class I, Division 2, Groups A, B, C, D, Temperature Code T4 and Class I, Zone 2, Group IIC, IIB, IIA Temperature Code T4 Hazardous Area/Hazardous Locations (according to EN/IEC60079-15, FM Class No. 3611, CSA-C22.2 No. 213-M1987, CSA-E60079-15) within the specified operating temperature limits Tamb -20 to +60 °C, and connected to equipment with a maximum limit for AC power supply Um of 250 Vrms.



Non-incendive field wiring is not recognized by the Canadian Electrical Code, installation is permitted in the US only. For installation of the unit in a Class I, Division 2 or Class I, Zone 2 location, the wiring between the control equipment and the D1048 associated apparatus shall be accomplished via conduit connections or another acceptable Division 2, Zone 2 wiring method according to the NEC and the CEC. Not to be connected to control equipment that uses or generates more than 250 Vrms or Vdc with respect to earth ground.
D1048 must be installed, operated and maintained only by qualified personnel, in accordance to the relevant national/international installation standards (e.g. IEC/EN60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines), BS 5345 Pt4, VDE 165, ANSI/ISA RP12.06.01 Installation of Intrinsically Safe System for Hazardous (Classified) Locations, National Electrical Code NEC ANSI/NFPA 70 Section 504 and 505, Canadian Electrical Code CEC) following the established installation rules, particular care shall be given to segregation and clear identification of I.S. conductors from non I.S. ones.
De-energize power source (turn off power supply voltage) before plug or unplug the terminal blocks when installed in Hazardous Area/Hazardous Locations or unless area is known to be nonhazardous.
Warning: substitution of components may impair Intrinsic Safety and suitability for Division 2, Zone 2.
Explosion Hazard: to prevent ignition of flammable or combustible atmospheres, disconnect power before servicing or unless area is known to be nonhazardous.
Failure to properly installation or use of the equipment may risk to damage the unit or severe personal injury.
The unit cannot be repaired by the end user and must be returned to the manufacturer or his authorized representative. Any unauthorized modification must be avoided.

Operation

The single channel DIN-Rail Loop Powered Digital Output Isolator, D1048S, is suitable for driving solenoid valves, visual or audible alarms to alert a plant operator, or other process control devices in Hazardous Area from a driving signal in Safe Area. It can also be used as a controllable supply to power measuring or process control equipment.
Its use is allowed in applications requiring up to SIL 3 level (according to IEC 61508) in safety related systems for high risk industries. The Safety PLC or DCS driving signal powers the field device through the D1048S, which provides isolation and is capable of monitoring the conditions of the line. Short and open circuit diagnostic monitoring, dip-switch selectable and active when input power is present, provides LED indication and NC transistor output signaling. When fault is detected output is de-energized until normal condition is restored. Line short and open output circuit fault detection is also reflected on the PLC / DCS input circuit providing less than 10 mA consumption. An override input, dip-switch selectable, is provided to permit a safety system to override the control signal. When enabled, a low input voltage always de-energizes the field device regardless of the input signal. Three basic output circuits are selectable, with different safety parameters, to interface the majority of devices on the market. The selection among the three output characteristics is obtained by connecting the field device to a different terminal block. Presence of output, as well as integrity or fault condition of device and connecting line are displayed by signaling LEDs (yellow for status, red for fault).

Installation

D1048 is a digital output isolator housed in a plastic enclosure suitable for installation on T35 DIN Rail according to EN50022.
D1048 unit can be mounted with any orientation over the entire ambient temperature range, see section “Installation in Cabinet” and "Installation of Electronic Equipments in Cabinet" Instruction Manual D1000 series for detailed instructions.
Electrical connection of conductors up to 2.5 mm² are accommodated by polarized plug-in removable screw terminal blocks which can be plugged in/out into a powered unit without suffering or causing any damage **(for Zone 2 or Division 2 installations check the area to be nonhazardous before servicing).**
The wiring cables have to be proportionate in base to the current and the length of the cable.
On the section “Function Diagram” and enclosure side a block diagram identifies all connections and configuration DIP switches.
Identify the function and location of each connection terminal using the wiring diagram on the corresponding section, as an example:
Connect control input signal positive at terminal “5” and negative at terminal “6”.
Connect fault open collector transistor output positive at terminal “1” and negative at terminal “2”.
Connect override input at terminal “7” positive and at terminal “8” negative.
Connect positive output at terminal “13” and negative output at “16” using “Out A” diagram or positive output at terminal “14” and negative at terminal “16” using “Out B” diagram or positive output at terminal “15” and negative at “16” using “Out C” diagram.
NOTE: use only one output at a time, Out A or Out B or Out C not contemporary.
Intrinsically Safe conductors must be identified and segregated from non I.S. and wired in accordance to the relevant national/international installation standards (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines), BS 5345 Pt4, VDE 165, ANSI/ISA RP12.06.01 Installation of Intrinsically Safe System for Hazardous (Classified) Locations, National Electrical Code NEC ANSI/NFPA 70 Section 504 and 505, Canadian Electrical Code CEC), make sure that conductors are well isolated from each other and do not produce any unintentional connection.
Connect SPST output transistors checking the load rating to be within the maximum rating (100 mA, 35 Vdc resistive load).
The enclosure provides, according to EN60529, an IP20 minimum degree of mechanical protection (or similar to NEMA Standard 250 type 1) for indoor installation, outdoor installation requires an additional enclosure with higher degree of protection (i.e. IP54 to IP65 or NEMA type 12-13) consistent with the effective operating environment of the specific installation.
Units must be protected against dirt, dust, extreme mechanical (e.g. vibration, impact and shock) and thermal stress, and casual contacts.
If enclosure needs to be cleaned use only a cloth lightly moistened by a mixture of detergent in water.
Electrostatic Hazard: to avoid electrostatic hazard, the enclosure of D1048 must be cleaned only with a damp or antistatic cloth.
Any penetration of cleaning liquid must be avoided to prevent damage to the unit. Any unauthorized card modification must be avoided.

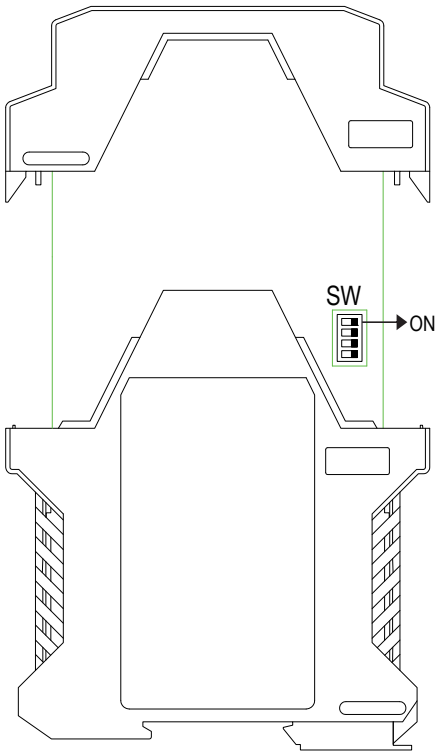
Start-up

Before powering the unit check that all wires are properly connected, particularly supply conductors and their polarity, input and output wires, also check that Intrinsically Safe conductors and cable trays are segregated (no direct contacts with other non I.S. conductors) and identified either by color coding, preferably blue, or by marking.
Check conductors for exposed wires that could touch each other causing dangerous unwanted shorts.
Activate the control signal, the "status" yellow led must be lit, fault led must be in accordance with condition of the corresponding output line.
If possible change the status of driving signal and connection line one at time checking the corresponding status and fault leds condition as well as output to be correct.

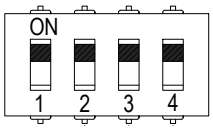
Configuration

Configuration DIP switches are located on component side of pcb. These switches allows the configuration of override input and fault detection functions.

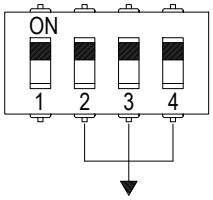
Side B Panel View

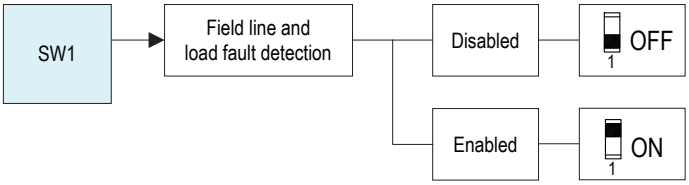


SW1 factory settings
All DIP-switches are ON



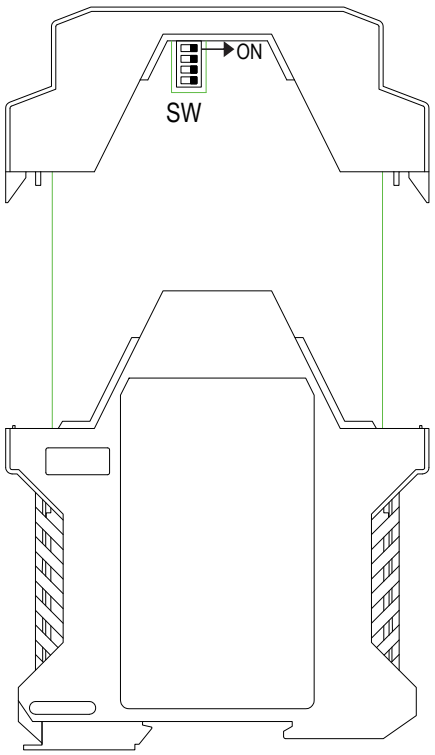
SW1 dip switch configuration



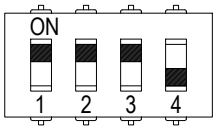


Used for SIL applications.

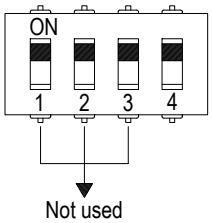
Side A Panel View



SW2 factory settings
DIP-switches 1-2-3 are ON and 4 is OFF



SW2 dip switch configuration



Used for SIL applications.