SIL 3 Digital Output Driver, NE Loads Bus Powered, DIN-Rail Model D1049S

D1049

Characteristics:

General Description:
The single channel DIN-Rail Bus Powered Digital Output Isolator, D1049S, 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 controls the field device through the D1049S, which provides isolation and is capable of monitoring the conditions of the line.
Short and open circuit diagnostic monitoring, dip-switch selectable, operates irrespective of the output condition and provides LED indication and NC transistor output signaling.
When fault is detected output is de-energized until normal condition is restored.
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 contacts, logic levels or driven logics in Safe Area.
It provides 3 port isolation (input/output/supply).

Signalling LEDs:
Power supply indication (green), outputs status (yellow), fault condition (red).

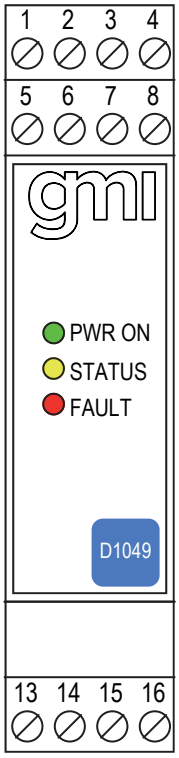
Field Configurability:
Line Fault Detection enable or disable and Override Control Input enable or disable.

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

Front Panel and Features:



- SIL 3 according to IEC 61508:2010 Ed. 2 for Tproof = 12 / 20 yrs (≤10% / >10 % of total SIF).
- PFDavg (1 year) 8.32 E-06, SFF 98.90 %.
- SIL 3 Systematic capability.
- Output to Zone 0 (Zone 20), Division 1, installation in Zone 2, Division 2.
- Bus powered for NE loads.
- Short and open circuit line diagnostic monitoring with LED, transistor output.
- Output short circuit proof and current limited.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1.
- In-field programmability by DIP Switch.
- ATEX, IECEx, 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.

Ordering Information:

Model:	D1049S
Power Bus enclosure	/B

Power Bus and DIN-Rail accessories:

DIN rail anchor MCHP065	DIN rail stopper MOR016
Terminal block male MOR017	Terminal block female MOR022

Technical Data:

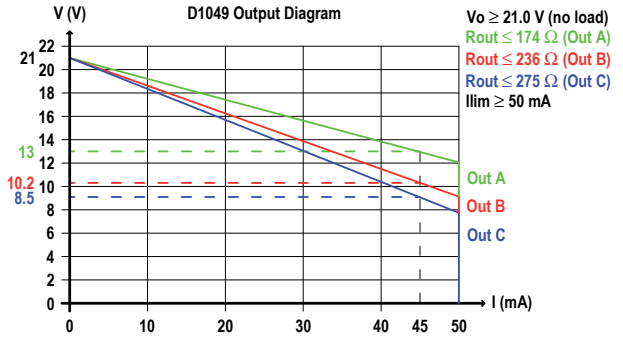
Supply: 24 Vdc nom (20 to 30 Vdc) reverse polarity protected,
ripple within voltage limits ≤ 5 Vpp, 2 A time lag fuse internally protected.
Current consumption @ 24 V: 65 mA with 45 mA output typical in normal operation.
Power dissipation: 1.1 W with 24 V supply, output energized at 45 mA nominal load.
Max. power consumption: at 30 V supply voltage, 1.8 W.

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

Control Input: switch contact, logic level reverse polarity protected.
Trip voltage levels: OFF status ≤ 5.0 V, ON status ≥ 20.0 V (maximum 30 V).
Current consumption @ 24 V: 5 mA.

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.

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: ≤ 10 ms.
Frequency response: 50 Hz

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).
Open-collector rating: 100 mA at 35 Vdc (≤ 1.5 V voltage drop).
Leakage current: ≤ 50 µA at 35 Vdc.
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 % non condensing, up to 35 °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,
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 accomodate terminations up to 2.5 mm^2.
Location: Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4, Class I, Division 2, Groups A, B, C, D Temperature Code T4 and Class I, Zone 2, Group IIC, IIB, IIA T4 installation.
Protection class: IP 20.
Dimensions: Width 22.5 mm, Depth 99 mm, Height 114.5 mm.

Parameters Table:

Safety Description	Maximum External Parameters			
	Group Cenelec	Co/Ca (µF)	Lo/La (mH)	Lo/Ro (µH/Ω)
Terminals 13-16			Out A	
Uo/Voc = 24.9 V	IIC	0.112	1.65	39.2
Io/Isc = 147 mA	IIB	0.85	6.63	156.8
Po/Po = 907 mW	IIA	3.01	13.2	313.6
	I	4.35	21.78	514.6
	IIIC	0.86	6.63	156.8
Terminals 14-16			Out B	
Uo/Voc = 24.9 V	IIC	0.112	2.9	52.2
Io/Isc = 110 mA	IIB	0.85	11.8	208.9
Po/Po = 681 mW	IIA	3.01	23.6	417.8
	I	4.35	40.36	700.6
	IIIC	0.86	12.3	213.5
Terminals 15-16			Out C	
Uo/Voc = 24.9 V	IIC	0.112	4.19	62.3
Io/Isc = 93 mA	IIB	0.85	16.7	249.4
Po/Po = 571 mW	IIA	3.01	33.5	498.9
	I	4.35	55.09	818.5
	IIIC	0.86	16.7	249.4

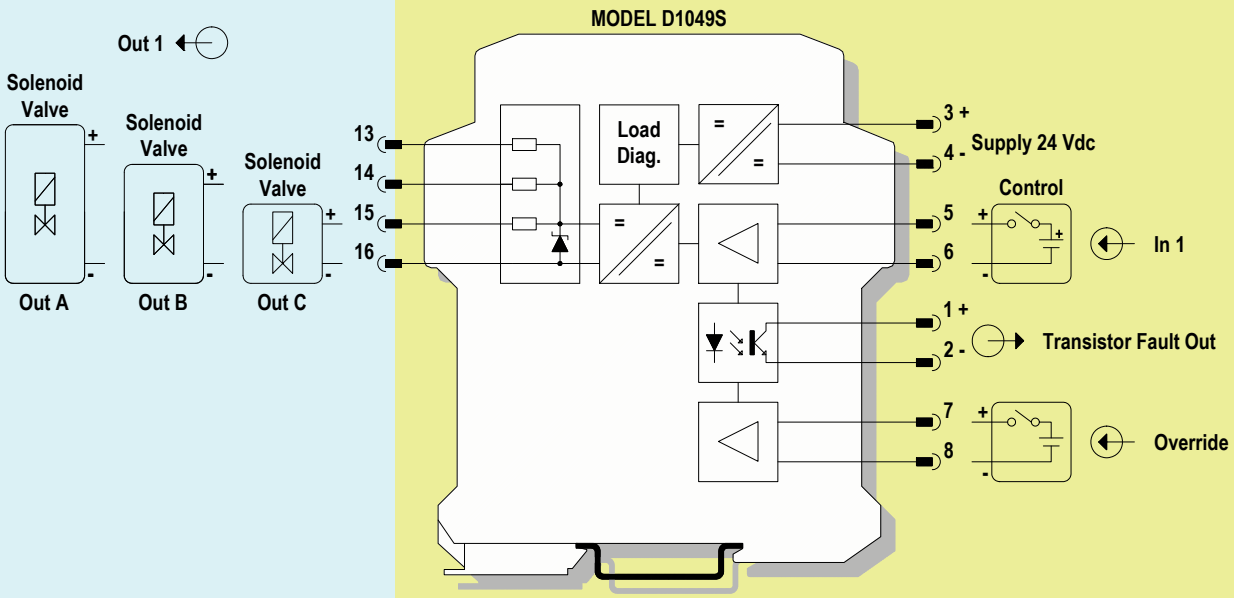
NOTE for USA and Canada:
IIC equal to Gas Groups A, B, C, D, E, F and G
IIB equal to Gas Groups C, D, E, F and G
IIA equal to Gas Groups D, E, F and G

Image:

Function Diagram:

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC,
HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D,
CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1,
CLASS I, ZONE 0, GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4,
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,
GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4



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