D5031

SIL 3 Switch/Proximity Detector Repeater Transistor Out, DIN-Rail & Term. Board Models D5031S, D5031D

Characteristics:

General Description:

The single and dual channel Switch/Proximity Detector Repeater, D5031S and D5031D 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 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.
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 transistor and turns the fault LED on; when disabled the corresponding output transistor repeats the input line open or closed status as configured.

D5031D 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, transistor driving can be independently configured for each output.
In case of fault output, transistor driving can be programmed as normally closed (NC) or normally open (NO).

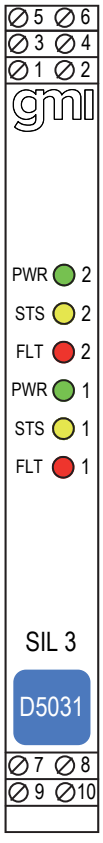
Mounting on standard DIN-Rail, with or without Power Bus, or on customized Termination Boards, in Safe Area / Non Hazardous Location or in Zone 2 / Class I, Division 2 or Class I, Zone 2.

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 = 2 / 10 years (≤10% / >10 % of total SIF).
- SIL 2 according to IEC 61508:2010 Ed. 2 for Tproof = 20 years (≤10% of total SIF).
- PFDavg (1 year) 4.91 E-05, SFF 91.29 %, with independent channel configuration.
  PFDavg (1 year) 4.95 E-05, SFF 93.77 %, with D5031D used as duplicator (both channels) or as fault indicator (only 1st ch.).
  PFDavg (1 year) 4.55 E-05, SFF 94.23 %, with D5031D used as fault indicator (only 2nd ch.).
- 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, NO/NC transistor driving 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, UL & C-UL, FM, FMC, INMETRO, EAC-EX, UKR TR n. 898, NEPSI, TÜV Certifications.
- TÜV Functional Safety Certification.
- Type Approval Certificate DNV and KR for maritime applications.
- High Density, two 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.

Ordering Information:

Model:	D5031	
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 @ 24 V: 22 mA for 2 channels D5031D,
12 mA for 1 channel D5031S with short circuit input and transistor closed, typical.
Power dissipation: 0.53 W for 2 channels D5031D, 0.30 W for 1 channel D5031S with 24 V supply voltage, short circuit input and transistor closed, typical.

Isolation (Test Voltage):

I.S. In/Out 2.5 KV; I.S. In/Supply 2.5 KV; I.S. In/ I.S In 500 V;
Out/Supply 500 V; Out /Out 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
(when enabled both faults de-energize channel transistor with single channel unit D5031S or de-energize channel transistor with D5031D used as dual channel unit or actuate the fault transistor out with D5031D 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 optocoupled open-collector transistor.
Open-collector rating: 100 mA at 35 Vdc (≤ 1.5 V voltage drop).
Leakage current: ≤ 50 µA at 35 Vdc.
Response time: ≤ 100 µs.
Frequency response: 5 KHz maximum.

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 – 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 / INMETRO / NEPSI: Ex nA [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I,
UL: NI / I / 2 / ABCD / T4, AIS / I, II, III / 1 / ABCDEFG, AEx nA [ia Ga] IIC T4 Gc
C-UL: NI / I / 2 / ABCD / T4, AIS / I, II, III / 1 / ABCDEFG, Ex nA [ia Ga] IIC T4 Gc
FM: NI-AIS / I / 2 / ABCD /T4, AIS / I,II,III / 1 / ABCDEFG, I / 2 / AEx nA [ia] / IIC /T4
FMC: NI-AIS / I / 2 / ABCD /T4, AIS / I,II,III / 1 / ABCDEFG, I / 2 / Ex nA [ia] / IIC /T4
EAC-EX: 2ExnA[ia]IICT4 X
UKR TR n. 898: 2ExnAiaIICT4 X, ExiaI X
associated apparatus and non-sparking electrical equipment.
Uo/Voc = 10.5 V, Io/Isc = 22 mA, Po/Po = 56 mW at terminals 7-8, 9-10.
Um = 250 Vrms, -40 °C ≤ Ta ≤ 70 °C.
Approvals:
BVS 10 ATEX E 113 X conforms to EN60079-0, EN60079-11, EN60079-15.
IECEx BVS 10.0072 X conforms to IEC60079-0, IEC60079-11, IEC60079-15.
INMETRO DNV 13.0109 X conforms to ABNT NBR IEC60079-0, ABNT NBR IEC60079-11, ABNT NBR IEC60079-15, ABNT NBR IEC60079-26.
UL & C-UL E222308 conforms to UL913, UL 60079-0, UL60079-11, UL60079-15, ANSI/ISA 12.12.01 for UL and CSA-C22.2 No.157-92, CSA-E60079-0, CSA-E60079-11, CSA-C22.2 No. 213 and CSA-E60079-15 for C-UL.
FM 3046304 and FMC 3046304C conforms to Class 3600, 3610, 3810, 3611, ANSI/ISA-60079-0, ANSI/ISA-60079-11, ANSI/ISA-60079-15, C22.2 No.142, C22.2 No.157, C22.2 No.213, C22.2 No. 60079-0, C22.2 No. 60079-11, C22.2 No. 60079-15.
C-IT.ME92.B.00206 conforms to GOST 30852.0, 30852.10, 30852.14.
СЦ 16.0036 X conforms to ДСТУ 7113, ГОСТ 22782.5-78, ДСТУ IEC 60079-15.
GYJ14.1406X conforms to GB3836.1, GB3836.4; GB3836.8, GB3836.20.
TÜV Certificate No. C-IS-236198-04, SIL 2 / SIL 3 conforms to IEC61508:2010 Ed. 2.
TÜV 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-13625 and KR No. MIL20769-EL002 Certificates for maritime applications.

Mounting:

T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.
Weight: about 130 g D5031D, 110 g D5031S.
Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².
Location: installation in Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4 or Class I, Division 2, Group A,B,C,D, T4 or Class I, Zone 2, Group IIC, T4.
Protection class: IP 20.
Dimensions: Width 12.5 mm, Depth 123 mm, Height 120 mm.

Parameters Table:

Safety Description	Maximum External Parameters			
	Group Cenelec	Co/Ca (µF)	Lo/La (mH)	Lo/Ro (µH/Ω)
Terminals 7-8, 9-10	IIC	2.4	78.3	635.9
Uo/Voc = 10.5 V	IIB	16.8	313.4	2543.9
Io/Isc = 22 mA	IIA	75	626.9	5087.9
Po/Po = 56 mW	I	66	1028.6	8347.4
	IIIC	16.8	313.4	2543.9

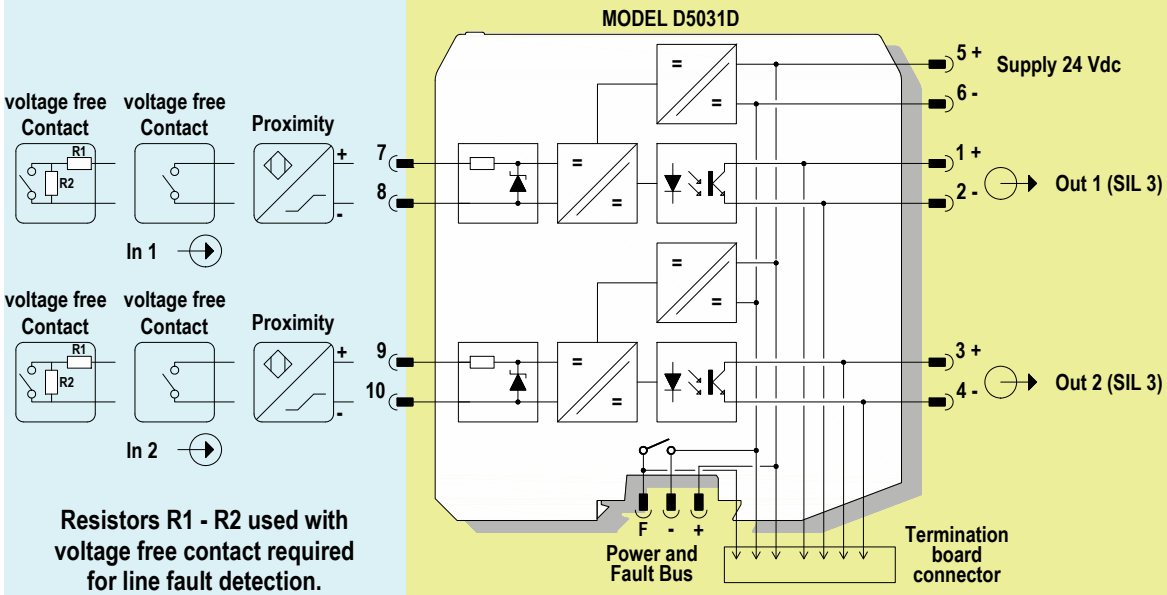
NOTE for USA and Canada:
IIC equal to Gas Groups A, B, C, D, E, F and G
IIB equal to Gas Groups C, D, E, F and G
IIA equal to Gas Groups D, E, F and G

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



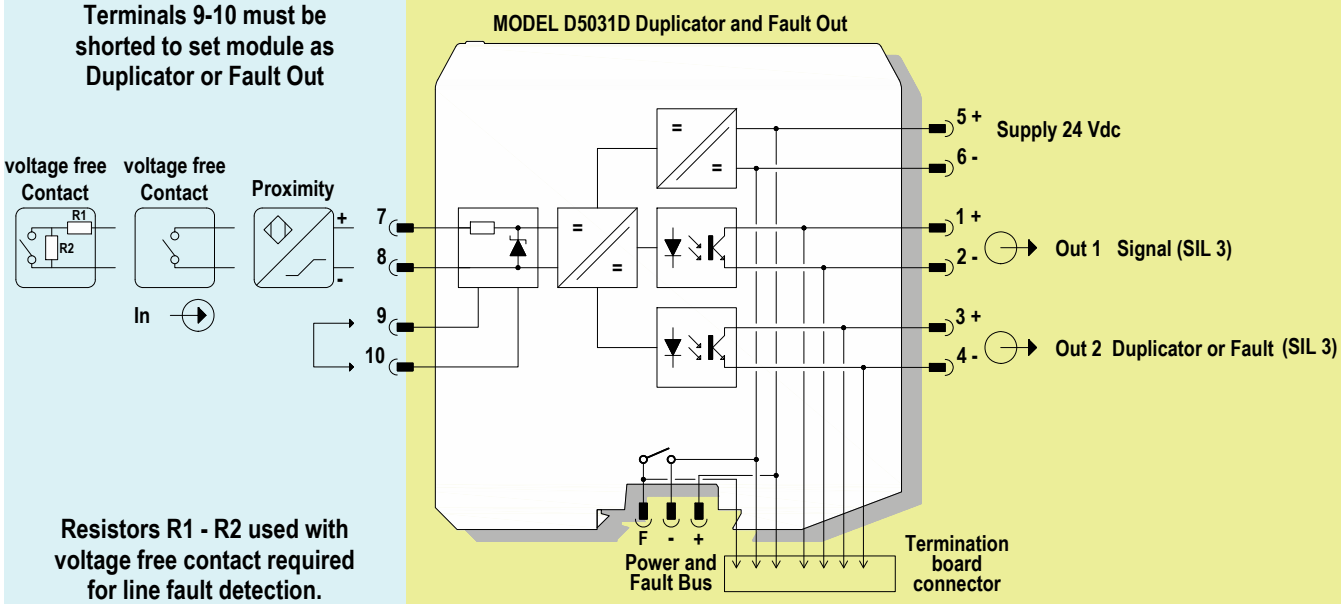
Resistors R1 - R2 used with voltage free contact required for line fault detection.

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 T4SAFE 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



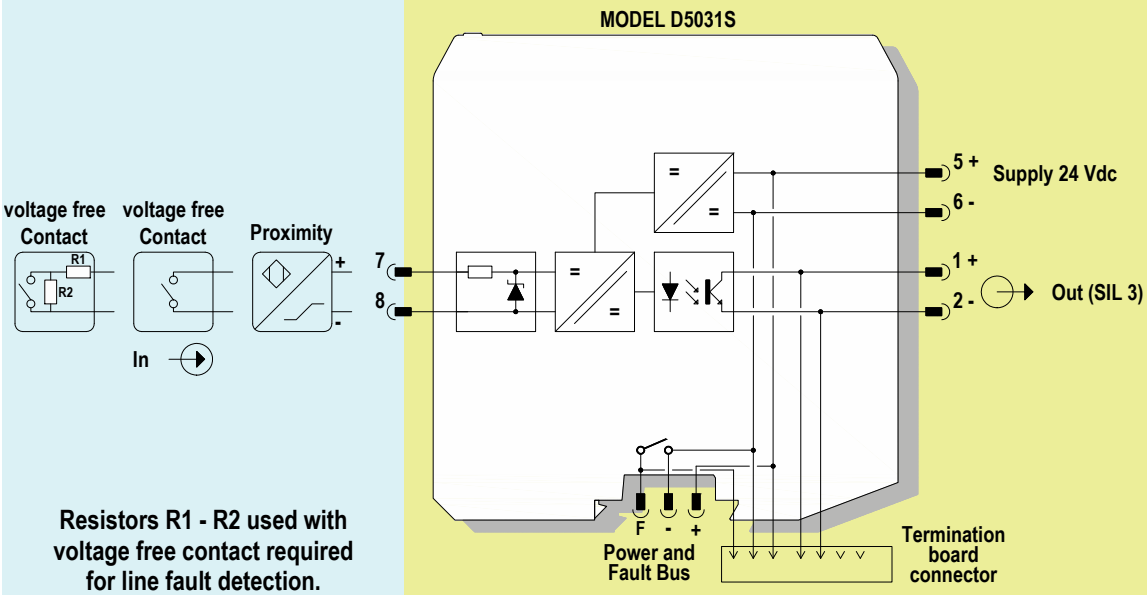
Resistors R1 - R2 used with voltage free contact required for line fault detection.

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.