SIL 2 Powered Isolating Driver Hart, DIN-Rail and Termination Board, Models D5020S, D5020D

D5020

Characteristics:

General Description:

The single and dual channel Isolating Driver, D5020S and D5020D module is a high integrity analog output interface suitable for applications requiring SIL 2 level (according to IEC 61508:2010 Ed. 2) in safety related systems for high risk industries.
It isolates and transfers a 4-20 mA signal from a controller located in Safe Area to a load up to 700 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.
The circuit allows bi-directional communication signals, for Hart positioner.
In the 4-20 mA input range, a field open or short circuit, reflects a high impedance to the control device circuit and actuates (de-energizes) the channel fault output transistor and actuates (energizes) the cumulative fault output available on Power Bus connector.
A fault output signal for each channel is available when mounted on customized Termination Board. In addition the single channel D5020S provides open collector transistor output on terminal blocks.
Short circuit fault detection can be enabled (two different levels can be selected) or disabled via DIP-Switch programming.

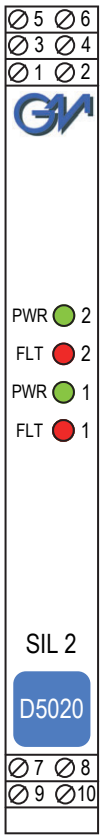
Mounting on standard DIN-Rail, with or without Power Bus, or on customized Termination Boards, in Safe Area / Non Hazardous Location or in Zone 2 / Class I, Division 2 or Class I, Zone 2.

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 2 according to IEC 61508:2010 Ed. 2 for Tproof = 10 / 20 yrs (10 / 20 % of total SIF).
- SIL 1 according to IEC 61508:2010 Ed. 2 for Tproof = 20 yrs (10% or more of total SIF).
- PFDavg (1 year) 9.33 E-05, SFF 86.65 %.
- Systematic capability SIL 3
- 2 fully independent channels.
- Output to Zone 0 (Zone 20) / Division 1, installation in Zone 2 / Division 2.
- 4-20 mA Input, Output Signal.
- Hart compatible.
- Field open and short circuit detection and signaling for each channel and cumulative.
- High Accuracy.
- 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, FMC, INMETRO, EAC-EX, NEPSI, TIIS, 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:	D5020	
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: 70 mA for 2 channels D5020D,
35 mA for 1 channel D5020S with 20 mA output on 500 Ω load.
Power dissipation: 1.3 W for 2 channels D5020D, 0.65 W for 1 channel D5020S with 24 V supply voltage and 20 mA output on 500 Ω load.

Isolation (Test Voltage):
I.S. Out/In 2.5 KV; I.S. Out/Supply 2.5 KV; I.S. Out/Fault 2.5 KV; I.S. Out/I.S. Out 500 V; In/Supply 500 V; In/In 500 V; Fault/In 500 V; Fault/Supply 500V; Fault/Fault 500 V.

Input:
4 to 20 mA with ≤ 2.5 V voltage drop, reverse polarity protected in normal operation, ≥ 5 KΩ impedance (≈ 2 mA sinking from 10 to 30 Vdc) when fault condition detected.

Output:
4 to 20 mA, on max. 700 Ω load.
Response time: 25 ms (0 to 100 % step change).
Output ripple: ≤ 20 mVrms on 250 Ω communication load on 0.5 to 2.5 KHz band.
Frequency response: 0.5 to 2.5 KHz bidirectional within 3 dB (Hart protocol).

Fault detection:
field device and wiring open circuit or short circuit detection;
short circuit detection can be disabled via dip-switch.
Short output detection: load resistance < 50 Ω or < 100 Ω dip-switch selectable (≈ 2 mA forcing to detect fault).
Open output detection: load resistance > (21 V / Loop current) - 300 Ω (for example, if Loop current = 20 mA: load resistance > (21 V / 20 mA) - 300 Ω = 750 Ω).
Fault signaling: voltage free NE SPST optocoupled open-collector transistor (output de-energized in fault condition) available when mounted on Termination Board for model D5020D; for model D5020S in addition to Termination Board connection, also available on Safe Area side Terminal Block.
Open-collector rating: 100 mA at 35 Vdc (≤ 1.5 V voltage drop).
Leakage current: ≤ 50 µA at 35 Vdc.
Response time: ≤ 30 ms.

Performance:
Ref. Conditions 24 V supply, 250 Ω load, 23 ± 1 °C ambient temperature.
Calibration accuracy: ≤ ± 0.1 % of full scale.
Linearity error: ≤ ± 0.1 % of full scale.
Supply voltage influence: ≤ ± 0.02 % of full scale for a min to max supply change.
Load influence: ≤ ± 0.1 % 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:
CE mark compliant, conforms to Directives:
94/9/EC Atex, 2004/108/CE EMC, 2006/95/EC 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
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.
associated apparatus and non-sparking electrical equipment.
Uo/Voc = 25.9 V, Io/Isc = 93 mA, Po/Po = 595 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, EN60079-26, EN50303,
IECEx BVS 10.0072 X conforms to IEC60079-0, IEC60079-11, IEC60079-15, IEC60079-26.
INMETRO DNV 13.0109 X conforms to ABNT NBR IEC60079-0, ABNT NBR IEC60079-11, ABNT NBR IEC60079-15, ABNT NBR IEC60079-26.
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.
GYJ14.1406X conforms to GB3836.1, GB3836.4; GB3836.8, GB3836.20.
TC21009 for TIIS approval.
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 145 g D5020D, 130 g D5020S.
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	0.10	2	59.7
Uo/Voc = 25.9 V	IIB	0.77	16.7	239.0
Io/Isc = 93 mA	IIA	2.63	33.5	478.1
Po/Po = 595 mW	I	4.02	54.9	784.5
	IIIC	0.77	16.7	239.0

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

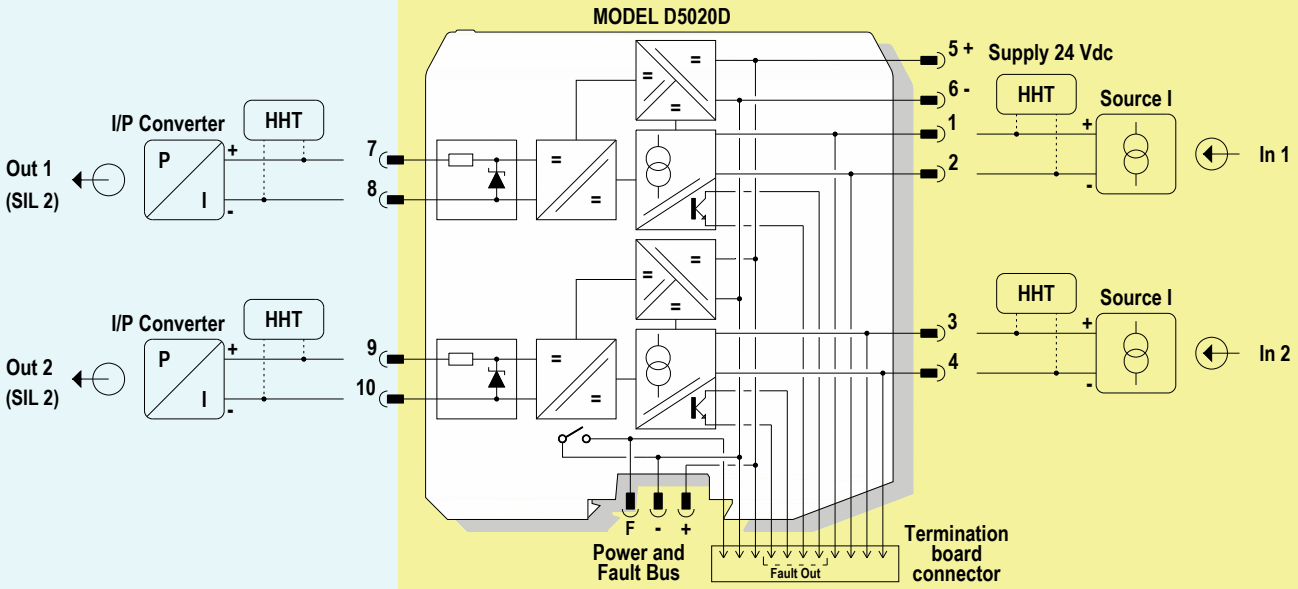
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Function Diagram:

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

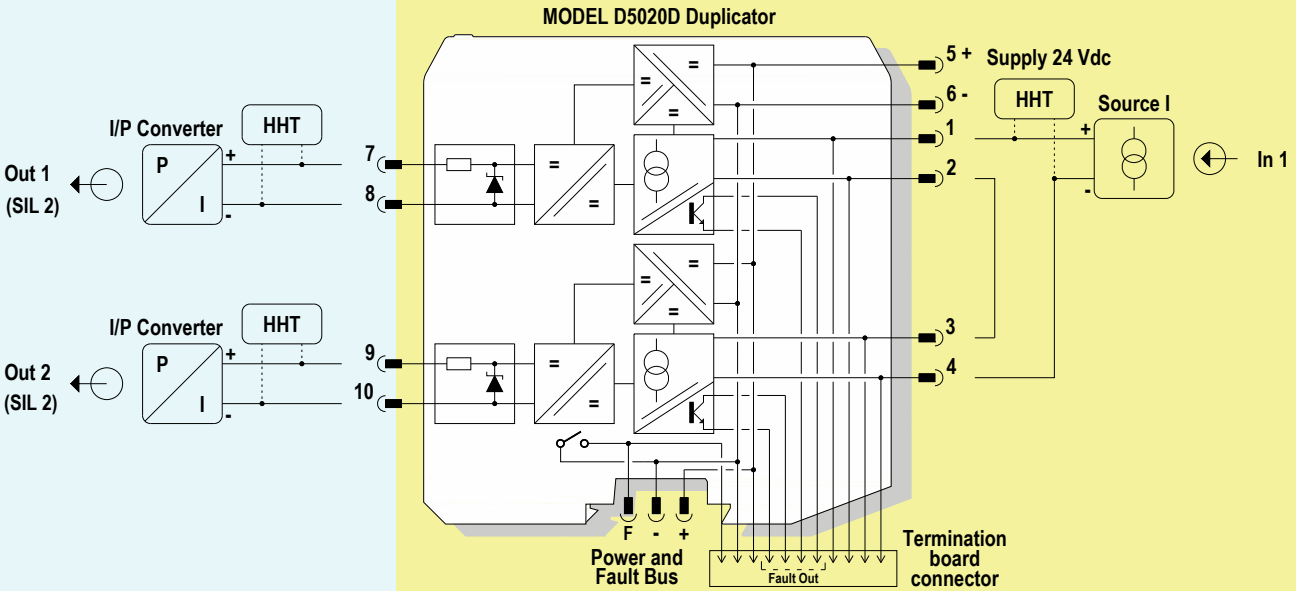
SAFE AREA, ZONE 2 GROUP IIC T4,
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,
GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4



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



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

