D5014

SIL 3 Repeater Power Supply Hart, DIN-Rail and Termination Board, Models D5014S, D5014D

Characteristics:

General Description:

The single and dual channel Repeater Power Supply, D5014S and D5014D module is a high integrity analog input interface suitable for applications requiring SIL 3 level (according to IEC 61508:2010 Ed.2) in safety related systems for high risk industries.
Provides a fully floating dc supply for energizing conventional 2 wires 4-20 mA, active or passive, 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 transmitters.

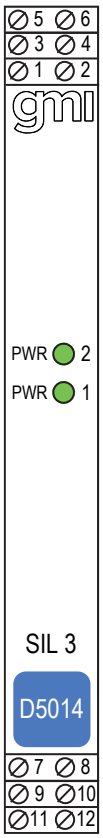
Mounting on standard DIN-Rail, with or without Power Bus, or on customized Termination Boards, in Safe Area / Non Hazardous Location or in Zone 2 / Class I, Division 2 or Class I, Zone 2.

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 = 1 / 10 yrs (≤10% / >10 % of total SIF).
- SIL 2 according to IEC 61508:2010 Ed.2 for Tproof = 15 / 20 yrs (≤10% / >10 % of total SIF).
- PFDavg (1 year) 6.69 E-05, SFF 90.47 %.
- Systematic capability SIL 3.
- 2 fully independent channels.
- Input from Zone 0 (Zone 20) / Division 1, installation in Zone 2 / Division 2
- 4-20 mA Input / Output Signal Active-Passive / Source-Sink
- Hart compatible.
- Input and Output short circuit proof.
- High Accuracy.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety systems.
- In-field programmability by DIP Switch.
- ATEX, IECEx, UL & C-UL, FM, FMC, INMETRO, EAC-EX, UKR TR n. 898, 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:	D5014	
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: 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):
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:
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 frequency band, 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 Ω 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: ≤ 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).

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: ≤ ± 0.02 % 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:
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, Exia I X
associated apparatus and non-sparking electrical equipment.
Uo/Voc = 25.9 V, Io/Isc = 92 mA, Po/Po = 594 mW at terminals 7-8, 9-10.
Uo/Voc = 1.1 V, Io/Isc = 56 mA, Po/Po = 16 mW at terminals 8-11, 10-12.
Ui/Vmax = 30 V, Ii/Imax = 128 mA, Ci = 0 nF, Li = 0 nH at terminals 8-11, 10-12.
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.
TC21005 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 155 g D5014D, 130 g D5014S.
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 Uo/Voc = 25.9 V Io/Isc = 92 mA Po/Po = 594 mW	IIC IIB IIA I IIIC	0.10 0.77 2.63 4.02 0.77	3 16.8 33.7 55.2 16.8	59.9 239.7 479.4 786.6 239.7
Terminals 8-11, 10-12 Uo/Voc = 1.1 V Io/Isc = 56 mA Po/Po = 16 mW Ui/Vmax = 30 V, Ii/Imax = 128 mA Ci = 0 nF, Li = 0 nH	IIC IIB IIA I IIIC	100 1000 1000 1000 1000	11.3 45.3 90.7 151.1 45.3	2327.2 9309 18618.1 30545.4 9309

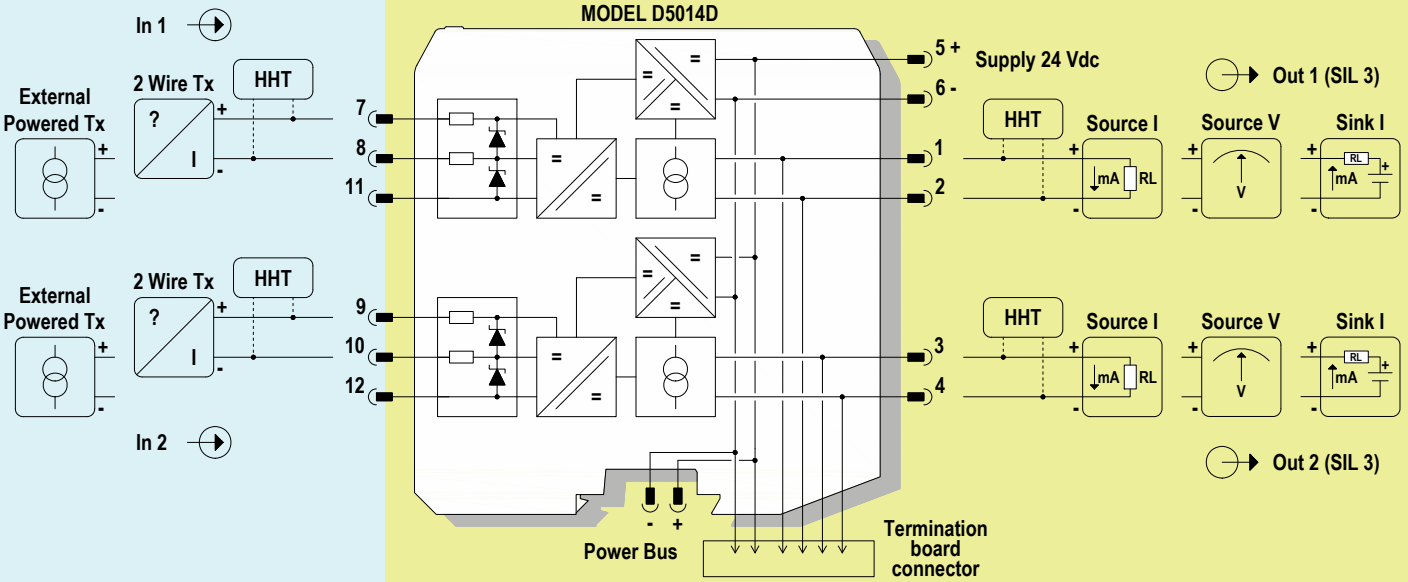
NOTE for USA and Canada:
IIC equal to Gas Groups A, B, C, D, E, F and G
IIB equal to Gas Groups C, D, E, F and G
IIA equal to Gas Groups D, E, F and G

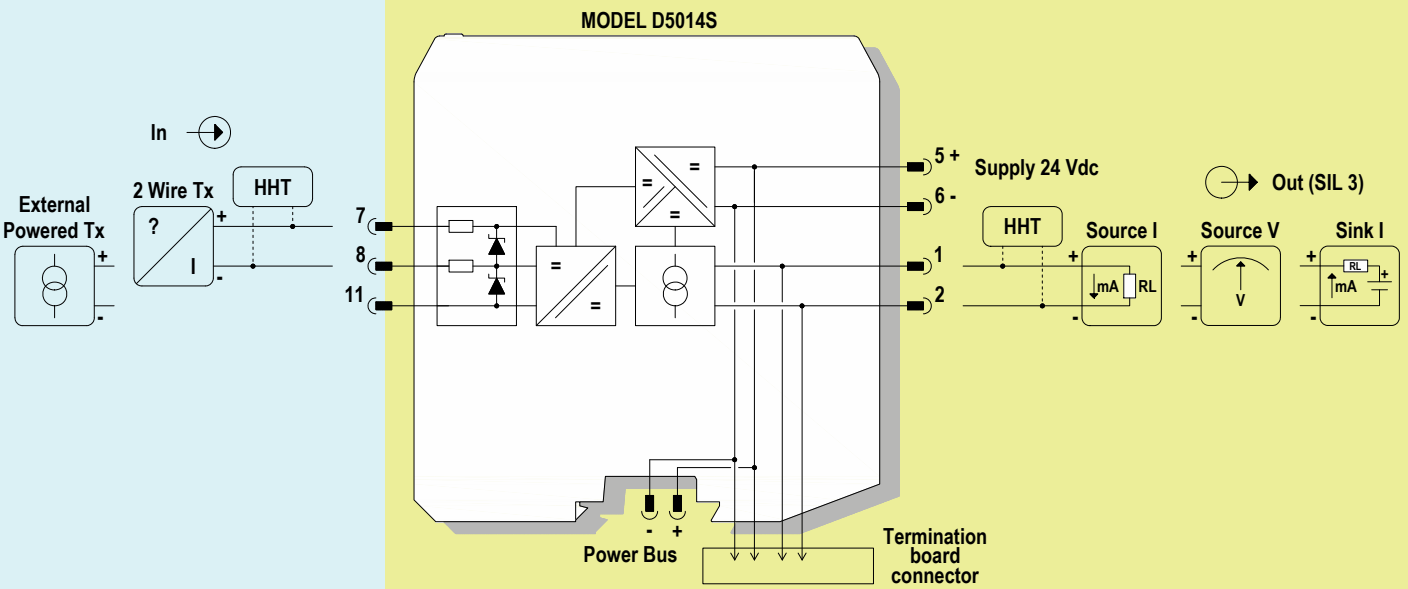
Image:

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





Function Diagram:

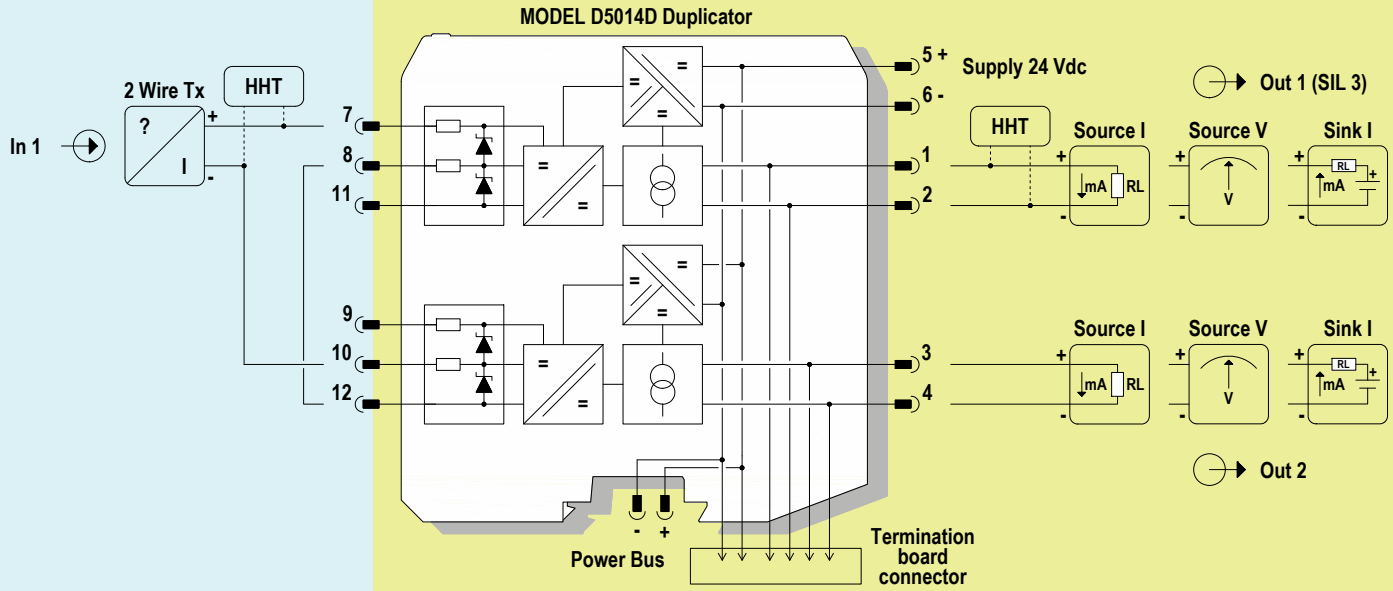
HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC,
HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D,
CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1,
CLASS I, ZONE 0, GROUP IIC

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

Group Cenelec	Co/Ca (µF)	Lo/La (mH)	Lo/Ro (µH/Ω)
IIC	0.090	3	57.0
IIB	0.705	16.6	228.3
IIA	2.330	33.2	456.6
I	3.750	54.5	749.1
IIIC	0.705	16.6	228.3



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:

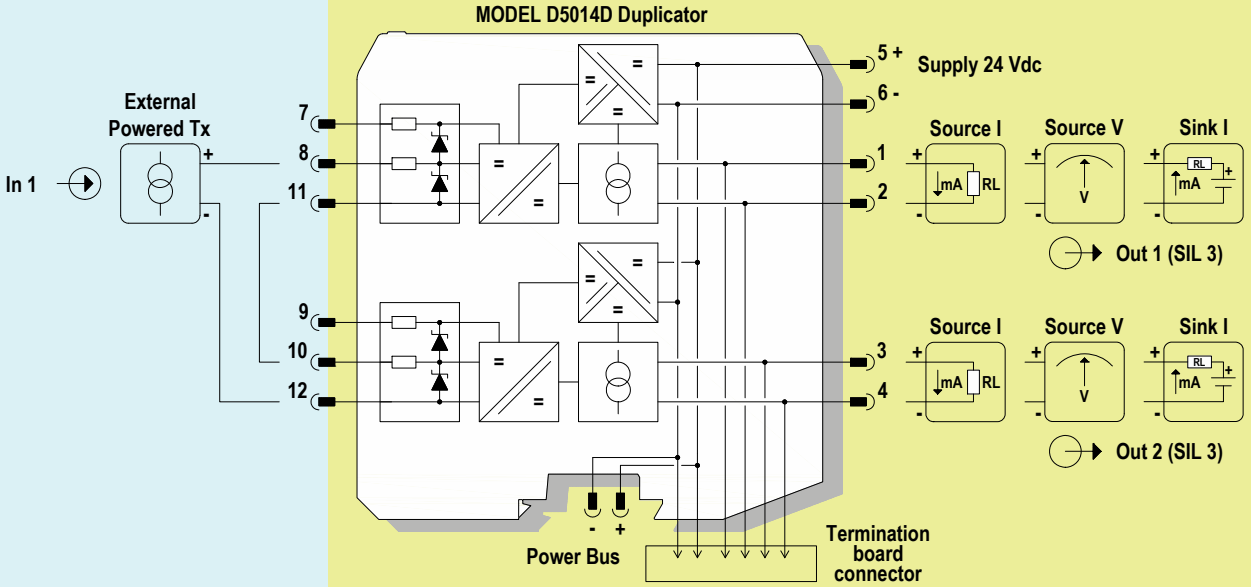
HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC,
HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D,
CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1,
CLASS I, ZONE 0, GROUP IIC

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 Cenelec	Co/Ca (µF)	Lo/La (mH)	Lo/Ro (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