INSTRUCTION MANUAL

SIL 2 Digital Output Driver, NE Loads, Loop Powered DIN-Rail and Termination Board, Model D5240T

gmi technology for safety

Characteristics

General Description: The triple channel Bus Powered Digital Output Isolator, D5240T, is suitable for driving solenoid valves, visual or audible alarms to alert a plant operator, or other process control devices in Hazardous Area from driving signals 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 2 level (according to IEC 61508:2010 Ed.2) in safety related systems for high risk industries. Configuration is programmable from PC by the GM Pocket Portable Adapter PPC5092 via USB serial line and SWC5090 Configurator software. The Safety PLC or DCS driving signals control the field devices through D5240T, which provides isolation. Three basic output circuits are selectable, with different safety parameters, to interfacethe majority of devices on the market. The selection among the three output characteristics is obtained by connecting the field device to different terminals.
Mounting on standard DIN-Rail, with or without Power Bus, or on customized Termination Boards, in Safe Area or in Zone 2.

Technical Data

Supply:
24 Vdc nom (21.5 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp, 2 A time lag fuse internally protected.
Current consumption @ 24 V: 200 mA with 35 mA typical in normal operation.
Power dissipation: 3.3 W with 24 V supply, output energized at 35 mA nominal load.
Isolation (Test Voltage): I.S. Out/In 1.5 KV; I.S. Out/Supply 1.5 KV; Out/Modbus 1.5 KV; In/Supply 500 V, In/In 500 V, In/Modbus 500V.
Control Input:
logic level reverse polarity protected.
Trip voltage levels: OFF status ≤ 5.0 V, ON status ≥ 18.0 V (maximum 30 V).
Current consumption @ 24 V: 5 mA.
Output:
See next page for detailed output diagrams and characteristics.
Short circuit current:
≥ 35 mA (40 mA typical) for single output configuration.
≥ 70 mA (80 mA typical) for 2 ch. in parallel output configuration
≥ 105 mA (120 mA typical) for 3 ch. in parallel output configuration
Response time: ≤ 50 ms.
Frequency response: 10 Hz
Modbus Output: Modbus RTU protocol up to 115.200 baud on Bus connector.
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: Ex nA [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I,
associated apparatus and non-sparking electrical equipment.
See safety parameters at next page.
Um = 250 Vrms, -40 °C ≤ Ta ≤ 70 °C.
Approvals :
BVS 14 ATEX E 159 X conforms to EN60079-0, EN60079-11, EN60079-15.
IECEx BVS 14.0111X conforms to IEC60079-0, IEC60079-11, IEC60079-15.
SIL 2 conforms to IEC61508:2010 Ed.2 (pending).
TÜV Certificate No. C-IS-236198-09, SIL 3 Functional Safety Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.
DNV Type Approval Certificate 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.
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 installation.
Protection class: IP 20.
Dimensions: Width 22.5 mm, Depth 123 mm, Height 120 mm.

Ordering Information

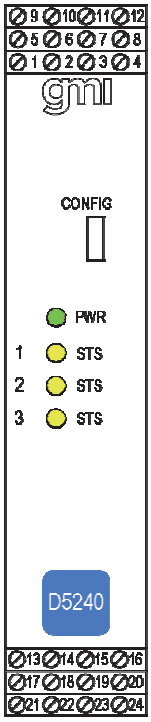
Model:	D5240	
3 channels		T

Power Bus and DIN-Rail accessories:

Connector JDFT050	Cover and fix MCHP196
Terminal block male MOR017	Terminal block female MOR022

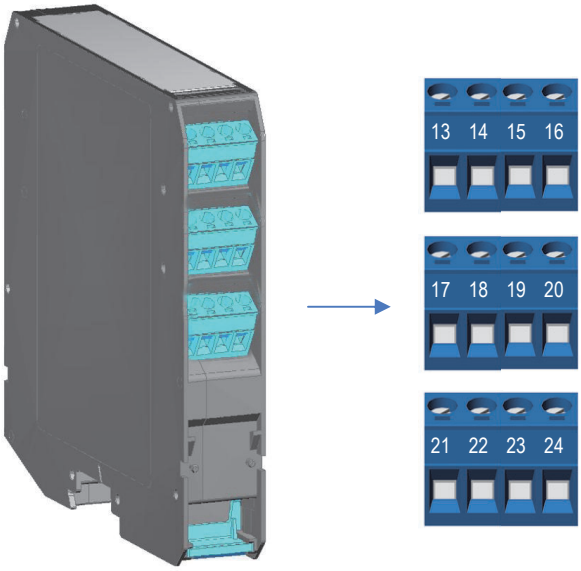
Operating parameters are programmable from PC by the GM Pocket Portable Adapter PPC5092 via USB serial line and SWC5090 Configurator software.

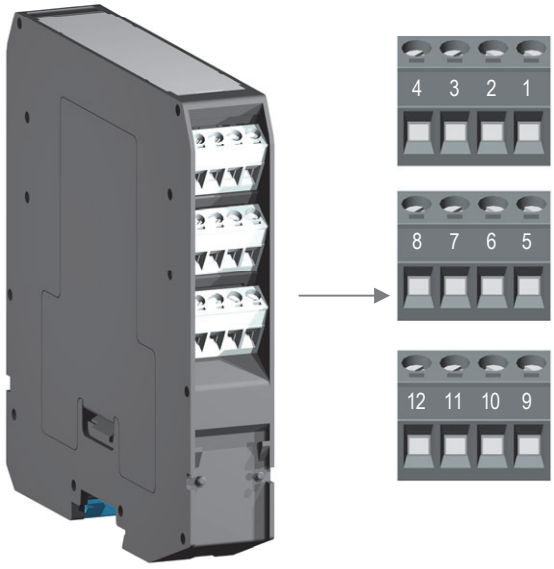
Front Panel and Features



- SIL 2 according to IEC 61508.
- Output to Zone 0 (Zone 20), installation in Zone 2.
- Bus powered for NE loads.
- Output short circuit proof and current limitation.
- Three port isolation, Input/Output/Supply.
- Modbus RTU RS-485
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety system.
- ATEX, IECEx, TÜV (pending) Certifications.
- TÜV Functional Safety Certification.
- Type Approval Certificate DNV and KR for maritime applications.
- 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.

Terminal block connections





HAZARDOUS AREA

13	+ Output , Ch 1 for Solenoid Valve
14	- Output A, Ch 1 for Solenoid Valve
15	- Output B, Ch 1 for Solenoid Valve
16	- Output C, Ch 1 for Solenoid Valve
17	+ Output, Ch 2 for Solenoid Valve
18	- Output A, Ch 2 for Solenoid Valve
19	- Output B, Ch 2 for Solenoid Valve
20	- Output C, Ch 2 for Solenoid Valve
21	+ Output, Ch 3 for Solenoid Valve
22	- Output A, Ch 3 for Solenoid Valve
23	- Output B, Ch 3 for Solenoid Valve
24	- Output C, Ch 3 for Solenoid Valve

SAFE AREA

1	+ Input Ch 1
2	- Input Ch 1
3	+ Input Ch 2
4	- Input Ch 2
5	+ Input Ch 3
6	- Input Ch 3
9	+ Power Supply 24 Vdc
10	- Power Supply 24 Vdc

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 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 D5240TAssociated 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 group. See parameters indicated in the table below:

D5240 Terminals		D5040 Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch.1 or Ch.2 or Ch.3	13-14 17-18 21-22	Uo / Voc = 25.2 V	≤	Ui / Vmax
Ch.1 or Ch.2 or Ch.3	13-15 17-19 21-23	Uo / Voc = 25.2 V		
Ch.1 or Ch.2 or Ch.3	13-16 17-20 21-24	Uo / Voc = 25.2 V		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 16//20 or 13//21 - 16-24 or 17//21 - 20//24	Uo / Voc = 25.2 V		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 15//19 or 13//21 - 15//23 or 17//21 - 19//23	Uo / Voc = 25.2 V		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 14//20 or 13//21 - 14//24 or 17//13 - 18//16 or 17//21 - 18//24 or 21//13 - 22//16 or 21//17 - 22-20	Uo / Voc = 25.2 V		
Ch.1//2//3	13//17//21 - 16//20//24	Uo / Voc = 25.2 V		
Ch.1//2//3	13//17//21 - 15//19//23	Uo / Voc = 25.2 V		
Ch.1//2//3	13//17//21 - 14//19//23 or 17//13//21 - 18//15//23 or 21//13//17 - 22//15//19	Uo / Voc = 25.2 V		
Ch.1//2//3	13//17//21 - 14//18//24 or 13//21//17 - 14//22//20 or 17//21//13 - 18//22//16	Uo / Voc = 25.2 V		
Ch.1//2//3	13//17//21 - 14//18//22	Uo / Voc = 25.2 V		
Ch.1 or Ch.2 or Ch.3	13-14 17-18 21-22	Io / Isc = 146 mA	≤	Ii/ Imax
Ch.1 or Ch.2 or Ch.3	13-15 17-19 21-23	Io / Isc = 108 mA		
Ch.1 or Ch.2 or Ch.3	13-16 17-20 21-24	Io / Isc = 93 mA		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 16//20 or 13//21 - 16-24 or 17//21 - 20//24	Io / Isc = 185 mA		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 15//19 or 13//21 - 15//23 or 17//21 - 19//23	Io / Isc = 216 mA		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 14//20 or 13//21 - 14//24 or 17//13 - 18//16 or 17//21 - 18//24 or 21//13 - 22//16 or 21//17 - 22-20	Io / Isc = 238 mA		
Ch.1//2//3	13//17//21 - 16//20//24	Io / Isc = 277 mA		
Ch.1//2//3	13//17//21 - 15//19//23	Io / Isc = 323 mA		
Ch.1//2//3	13//17//21 - 14//19//23 or 17//13//21 - 18//15//23 or 21//13//17 - 22//15//19	Io / Isc = 361 mA		
Ch.1//2//3	13//17//21 - 14//18//24 or 13//21//17 - 14//22//20 or 17//21//13 - 18//22//16	Io / Isc = 384 mA		
Ch.1//2//3	13//17//21 - 14//18//22	Io / Isc = 437 mA		

D5240 Terminals		D5040 Associated Apparatus arameters	Must be	Hazardous Area/Hazardous Locations Device Parameters
Ch.1 or Ch.2 or Ch.3	13-14 17-18 21-22	Po / Po = 916 mW	≤	Pi / Pi
Ch.1 or Ch.2 or Ch.3	13-15 17-19 21-23	Po / Po = 676 mW		
Ch.1 or Ch.2 or Ch.3	13-16 17-20 21-24	Po / Po = 580 mW		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 16//20 or 13//21 - 16-24 or 17//21 - 20//24	Po / Po = 1160 mW		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 15//19 or 13//21 - 15//23 or 17//21 - 19//23	Po / Po = 1352 mW		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 14//20 or 13//21 - 14//24 or 17//13 - 18//16 or 17//21 - 18//24 or 21//13 - 22//16 or 21//17 - 22-20	Po / Po = 1496 mW		
Ch.1//2//3	13//17//21 - 16//20//24	Po / Po = 1740 mW		
Ch.1//2//3	13//17//21 - 15//19//23	Po / Po = 2028 mW		
Ch.1//2//3	13//17//21 - 14//19//23 or 17//13//21 - 18//15//23 or 21//13//17 - 22//15//19	Po / Po = 2138 mW		
Ch.1//2//3	13//17//21 - 14//18//24 or 13//21//17 - 14//22//20 or 17//21//13 - 18//22//16	Po / Po = 2138 mW		
Ch.1//2//3	13//17//21 - 14//18//22	Po / Po = 2138 mW		

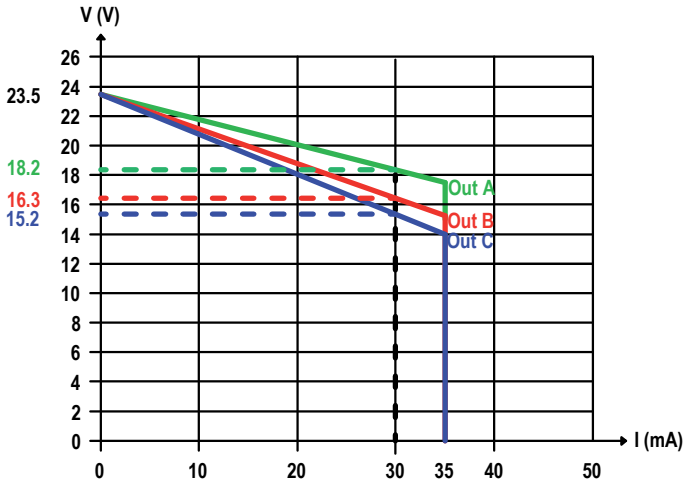
D5240 Terminals		D5040 Associated Apparatus arameters		Must be	Hazardous Area/Hazardous Locations Device Parameters
Ch.1 or Ch.2 or Ch.3	13-14 17-18 21-22	IIC IIB IIA I IIIC	Co / Ca = 0.096 nF Co / Ca = 0.809 nF Co / Ca = 2.889 nF Co / Ca = 4.789 nF Co / Ca = 0.809 nF	≥	Ci / Ci device + C cable
Ch.1 or Ch.2 or Ch.3	13-15 17-19 21-23	IIC IIB IIA I IIIC	Co / Ca = 0.096 nF Co / Ca = 0.809 nF Co / Ca = 2.889 nF Co / Ca = 4.789 nF Co / Ca = 0.809 nF		
Ch.1 or Ch.2 or Ch.3	13-16 17-20 21-24	IIC IIB IIA I IIIC	Co / Ca = 0.096 nF Co / Ca = 0.809 nF Co / Ca = 2.889 nF Co / Ca = 4.789 nF Co / Ca = 0.809 nF		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 16//20 or 13//21 - 16-24 or 17//21 - 20//24	IIB IIA I IIIC	Co / Ca = 0.798 nF Co / Ca = 2.878 nF Co / Ca = 4.778 nF Co / Ca = 0.798 nF		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 15//19 or 13//21 - 15//23 or 17//21 - 19//23	IIB IIA I IIIC	Co / Ca = 0.798 nF Co / Ca = 2.878 nF Co / Ca = 4.778 nF Co / Ca = 0.798 nF		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 14//20 or 13//21 - 14//24 or 17//13 - 18//16 or 17//21 - 18//24 or 21//13 - 22//16 or 21//17 - 22-20	IIB IIA I IIIC	Co / Ca = 0.798 nF Co / Ca = 2.878 nF Co / Ca = 4.778 nF Co / Ca = 0.798 nF		
Ch.1//2//3	13//17//21 - 16//20//24	IIB IIA I IIIC	Co / Ca = 0.787 nF Co / Ca = 2.867 nF Co / Ca = 4.767 nF Co / Ca = 0.787 nF		
Ch.1//2//3	13//17//21 - 15//19//23	IIB IIA I IIIC	Co / Ca = 0.787 nF Co / Ca = 2.867 nF Co / Ca = 4.767 nF Co / Ca = 0.787 nF		
Ch.1//2//3	13//17//21 - 14//19//23 or 17//13//21 - 18//15//23 or 21//13//17 - 22//15//19	IIA I IIIC	Co / Ca = 2.867 nF Co / Ca = 4.767 nF Co / Ca = 0.787 nF		
Ch.1//2//3	13//17//21 - 14//18//24 or 13//21//17 - 14//22//20 or 17//21//13 - 18//22//16	IIA I IIIC	Co / Ca = 2.867 nF Co / Ca = 4.767 nF Co / Ca = 0.787 nF		
Ch.1//2//3	13//17//21 - 14//18//22	IIA I	Co / Ca = 2.867 nF Co / Ca = 4.767 nF		

D5240 Terminals		D5040 Associated Apparatus arameters		Must be	Hazardous Area/Hazardous Locations Device Parameters
Ch.1 or Ch.2 or Ch.3	13-14 17-18 21-22	IIC IIB IIA I IIIC	Lo / La = 1.67 mH Lo / La = 6.71 mH Lo / La = 13.42 mH Lo / La = 22.01 mH Lo / La = 6.71 mH	≥	Li / Li device + L cable
Ch.1 or Ch.2 or Ch.3	13-15 17-19 21-23	IIC IIB IIA I IIIC	Lo / La = 3.07 mH Lo / La = 12.30 mH Lo / La = 24.61 mH Lo / La = 40.37 mH Lo / La = 12.30 mH		
Ch.1 or Ch.2 or Ch.3	13-16 17-20 21-24	IIC IIB IIA I IIIC	Lo / La = 4.18 mH Lo / La = 16.72 mH Lo / La = 33.45 mH Lo / La = 54.88 mH Lo / La = 16.72 mH		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 16//20 or 13//21 - 16-24 or 17//21 - 20//24	IIB IIA I IIIC	Lo / La = 4.18 mH Lo / La = 8.36 mH Lo / La = 13.72 mH Lo / La = 4.18 mH		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 15//19 or 13//21 - 15//23 or 17//21 - 19//23	IIB IIA I IIIC	Lo / La = 3.07 mH Lo / La = 6.15 mH Lo / La = 10.09 mH Lo / La = 3.07 mH		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 14//20 or 13//21 - 14//24 or 17//13 - 18//16 or 17//21 - 18//24 or 21//13 - 22//16 or 21//17 - 22-20	IIB IIA I IIIC	Lo / La = 2.51 mH Lo / La = 5.03 mH Lo / La = 8.25 mH Lo / La = 2.51 mH		
Ch.1//2//3	13//17//21 - 16//20//24	IIB IIA I IIIC	Lo / La = 1.85 mH Lo / La = 3.71 mH Lo / La = 6.09 mH Lo / La = 1.85 mH		
Ch.1//2//3	13//17//21 - 15//19//23	IIB IIA I IIIC	Lo / La = 1.36 mH Lo / La = 2.73 mH Lo / La = 4.48 mH Lo / La = 1.36 mH		
Ch.1//2//3	13//17//21 - 14//19//23 or 17//13//21 - 18//15//23 or 21//13//17 - 22//15//19	IIA I IIIC	Lo / La = 2.18 mH Lo / La = 3.58 mH Lo / La = 1.09 mH		
Ch.1//2//3	13//17//21 - 14//18//24 or 13//21//17 - 14//22//20 or 17//21//13 - 18//22//16	IIA I IIIC	Lo / La = 1.93 mH Lo / La = 3.17 mH Lo / La = 0.96 mH		
Ch.1//2//3	13//17//21 - 14//18//22	IIA I	Lo / La = 1.49 mH Lo / La = 2.44 mH		

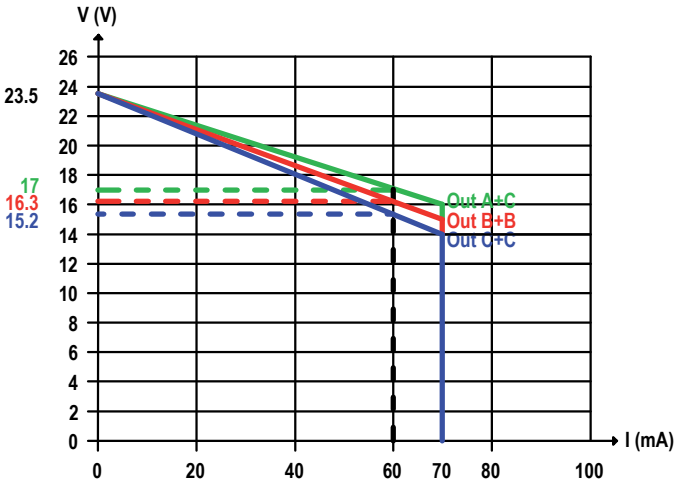
D5240 Terminals		D5040 Associated Apparatus arameters		Must be	Hazardous Area/Hazardous Locations Device Parameters
Ch.1 or Ch.2 or Ch.3	13-14 17-18 21-22	IIC IIB IIA I IIIC	Lo / Ro = 38.8 µH/Ω Lo / Ro = 155.3 µH/Ω Lo / Ro = 310.7 µH/Ω Lo / Ro = 509.8 µH/Ω Lo / Ro = 155.3 µH/Ω	≥	Li / Ri device and L cable / R cable
Ch.1 or Ch.2 or Ch.3	13-15 17-19 21-23	IIC IIB IIA I IIIC	Lo / Ro = 52.6 µH/Ω Lo / Ro = 210.4 µH/Ω Lo / Ro = 420.8 µH/Ω Lo / Ro = 690.3 µH/Ω Lo / Ro = 210.4 µH/Ω		
Ch.1 or Ch.2 or Ch.3	13-16 17-20 21-24	IIC IIB IIA I IIIC	Lo / Ro = 61.3 µH/Ω Lo / Ro = 245.3 µH/Ω Lo / Ro = 490.6 µH/Ω Lo / Ro = 804.9 µH/Ω Lo / Ro = 245.3 µH/Ω		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 16//20 or 13//21 - 16-24 or 17//21 - 20//24	IIB IIA I IIIC	Lo / Ro = 122.6 µH/Ω Lo / Ro = 245.3 µH/Ω Lo / Ro = 402.4 µH/Ω Lo / Ro = 122.6 µH/Ω		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 15//19 or 13//21 - 15//23 or 17//21 - 19//23	IIB IIA I IIIC	Lo / Ro = 105.2 µH/Ω Lo / Ro = 210.4 µH/Ω Lo / Ro = 345.1 µH/Ω Lo / Ro = 105.2 µH/Ω		
Ch.1//2 or Ch. 1//3 or Ch. 2//3	13//17 - 14//20 or 13//21 - 14//24 or 17//13 - 18//16 or 17//21 - 18//24 or 21//13 - 22//16 or 21//17 - 22-20	IIB IIA I IIIC	Lo / Ro = 95.1 µH/Ω Lo / Ro = 190.2 µH/Ω Lo / Ro = 312.1 µH/Ω Lo / Ro = 95.1 µH/Ω		
Ch.1//2//3	13//17//21 - 16//20//24	IIB IIA I IIIC	Lo / Ro = 81.7 µH/Ω Lo / Ro = 163.5 µH/Ω Lo / Ro = 268.3 µH/Ω Lo / Ro = 81.7 µH/Ω		
Ch.1//2//3	13//17//21 - 15//19//23	IIB IIA I IIIC	Lo / Ro = 70.1 µH/Ω Lo / Ro = 140.2 µH/Ω Lo / Ro = 230.1 µH/Ω Lo / Ro = 70.1 µH/Ω		
Ch.1//2//3	13//17//21 - 14//19//23 or 17//13//21 - 18//15//23 or 21//13//17 - 22//15//19	IIA I IIIC	Lo / Ro = 125.4 µH/Ω Lo / Ro = 205.8 µH/Ω Lo / Ro = 62.7 µH/Ω		
Ch.1//2//3	13//17//21 - 14//18//24 or 13//21//17 - 14//22//20 or 17//21//13 - 18//22//16	IIA I IIIC	Lo / Ro = 118 µH/Ω Lo / Ro = 193.6 µH/Ω Lo / Ro = 59 µH/Ω		
Ch.1//2//3	13//17//21 - 14//18//22	IIA I	Lo / Ro = 103.5 µH/Ω Lo / Ro = 169.9 µH/Ω		

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 values may be used: Capacitance 180pF per meter (60pF per foot), Inductance 0.60µH per meter (0.20µH per foot).

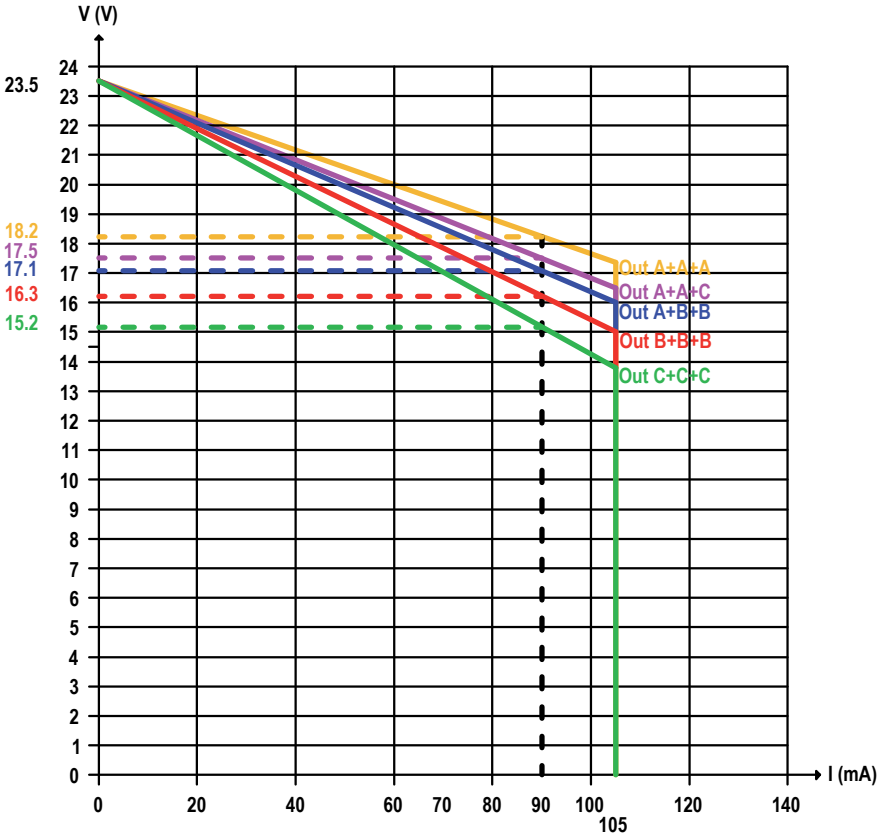
Output Diagram:



Vo ≥ 23.5 V (no load)
Ilim ≥ 35 mA
Rout ≤176.3 Ω (Out A)
Rout ≤238.7 Ω (Out B)
Rout ≤278.3 Ω (Out C)



Vo ≥ 23.5 V (no load)
Ilim ≥ 70 mA
Rout ≤108.0 Ω (Out A+C)
Rout ≤119.4 Ω (Out B+B)
Rout ≤139.2 Ω (Out C+C)

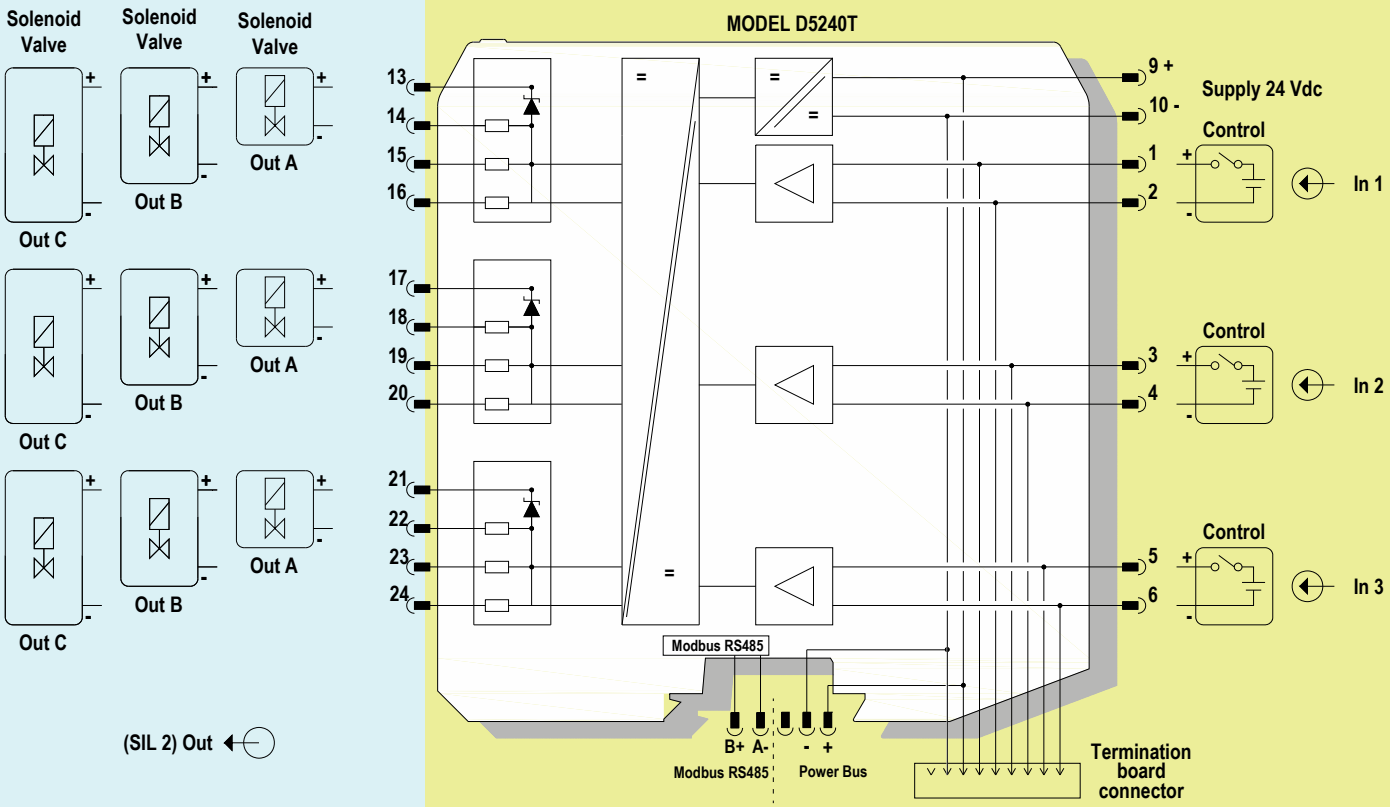


Vo ≥ 23.5 V (no load)
Ilim ≥105 mA
Rout ≤ 58.8 Ω (Out A+A+A)
Rout ≤ 67 Ω (Out A+A+C)
Rout ≤ 71.2 Ω (Out A+B+B)
Rout ≤79.6 Ω (Out B+B+B)
Rout ≤92.8 Ω (Out C+C+C)

Function Diagram

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4



Warning

D5240T is isolated Intrinsically Safe Associated Apparatus installed into standard EN50022 T35 DIN-Rail located in Safe Area or Zone 2, Group IIC, Temperature T4, Hazardous Area (according to EN/IEC60079-15) within the specified operating temperature limits Tamb –40 to +70 °C, and connected to equipment with a maximum limit for AC power supply Um of 250 Vrms.
Not to be connected to control equipment that uses or generates more than 250 Vrms or Vdc with respect to earth ground.
D5240T must be installed, operated and maintained only by qualified personnel, in accordance with 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)), following the established installation rules, particular care must 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 plugging or unplugging the terminal blocks when installed in Hazardous Area or unless the area is known to be nonhazardous.
Warning: substitution of components may impair Intrinsic Safety and suitability for 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 triple channel Loop Powered Digital Output Isolator, D5240T, is suitable for driving solenoid valves, visual or audible alarms to alert a plant operator, or other process control devices in Hazardous Area from driving signal in Safe Area. The presence of the input signal is also indicated by a yellow LED (one for each channel).
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 2 level (according to IEC 61508) in safety related systems for high risk industries. The Safety PLC or DCS driving signals power the field device through the D5240T, which provides isolation.
Three basic output circuits for each channel 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 couple of terminal blocks.

Installation

D5240T is Digital Output Driver housed in a plastic enclosure suitable for installation on T35 DIN-Rail according to EN50022, or on customized Termination Board.
D5240T unit can be mounted with any orientation over the entire ambient temperature range.
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 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.
In the section “Function Diagram” and enclosure side, a block diagram identifies all connections.
Identify the function and location of each on the connection terminal using the wiring diagram on the corresponding section, as an example:
Connect positive input at terminal “5” and negative input at “6” (or “7” and “8” for channel 2, or or “11” and “12” for channel 3).
Connect positive output A for solenoid valve to terminal “13” and negative at “14” (or “17” and “18” for channel 2 or “21” and “22” for channel 3).
Connect positive output B to terminal “13” and negative to “15” (or “17” and “19” for channel 2 or “21” and “23” for channel 3).
Connect positive output C to terminal “13” and negative to “16” (or “17” and “20” for channel 2 or “21” and “24” for channel 3).

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)), make sure that conductors are well isolated from each other and do not produce any unintentional connection.
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 D5240T 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 and verify their polarity, 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. The status yellow LED must be in accordance with the condition of the corresponding input line.

Configuration parameters:

CONFIGURATION

Configuration parameters can be read and written from the module or from saved file.
It is also possible to reset the module configuration to factory default settings.
A report sheet containing complete configuration can be printed.

TAG:

Identification of the specific operating loop of the module.

EXTERNAL INPUTS STATUS:

Status of each Input channel is indicated in the related field.

OUTPUTS CONFIGURATION:

Each Output can be configured to be driven by an independent Input, or by its opposite.
D5240T Input can be Hardware (via Terminal blocks) and/or Software (via Modbus).
Both types can be used to drive the Output.

HARDWARE INPUT:

Output 1 to 3:

- ☐ Input 1 Output represents Input 1,
- ☐ Input 2 Output represents Input 2,
- ☐ Input 3 Output represents Input 3,
- ☐ Not Input 1 Output represents Not Input 1,
- ☐ Not Input 2 Output represents Not Input 2,
- ☐ Not Input 3 Output represents Not Input 3,

DATA LOGGER

The SWC5090 can monitor and record data from the module at constant configurable time intervals.
By changing the parameters, the user can decide the duration of the recording period and the frequency of readings.
After pressing "Start" button, the SWC5090 will prompt for a filename where the values will be stored in .CSV format.
Note that while the module is being recorded, Configuration screens are disabled, while Monitoring remains active.

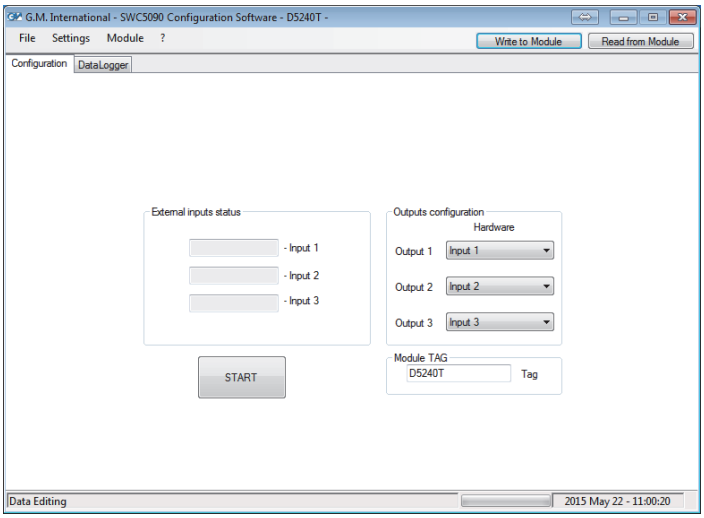
PARAMETERS SETUP:

Days: Number of days to acquire.
Hours: Number of hours to acquire.
Minutes: Number of minutes to acquire.
Scan rate: Frequency interval for acquisitions.

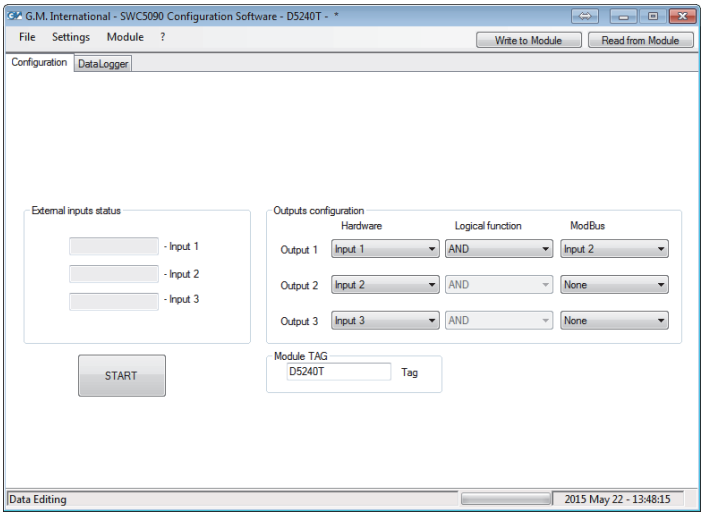
General Notes:

SWC5090 Software can be downloaded for free at www.gmintsrl.com
PPC5092 Adapter is needed to interface PC to D5240T module.
The PC supplies the module via USB, therefore operating power supply (24 Vdc) is not strictly needed when configuring the module.
Each channel has completely independent configurations.
See ISM0154 Manual for advanced option and details on SWC5090 software.

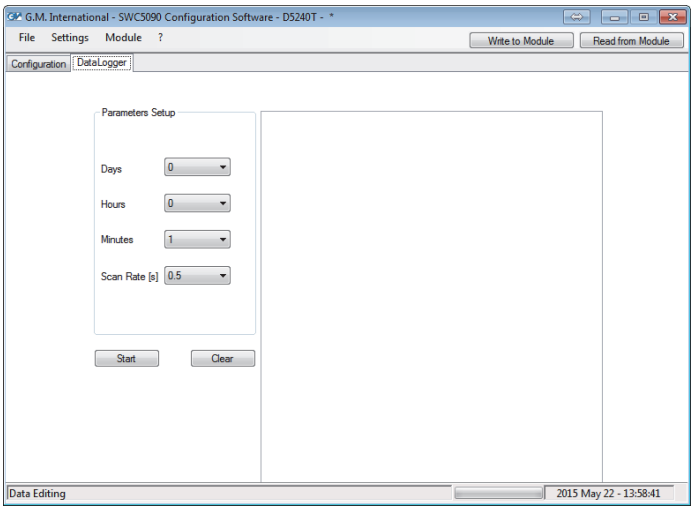
Screenshots:



D5240T configuration screen



D5240T Advanced configuration options



D5240T Data Logger screen

Supported Modbus parameters:

The unit can communicate via Modbus RTU RS-485 protocol. Below is a list of all available registers.

Addr.	Description	Notes	Type[5]
0	G.M. Factory Code	Identification Data	R
1	Instrument Code		
2	Option Code		
3	Hardware Release		
4	Software Release		
16	Modbus Address[1]	Communication Data	R/W
17	Modbus Baudrate[1]		
18	Modbus Format[1]		
82	Input status of all channels [1]	Input Data	R
96-99	Output 1 Source[2]	Output Configuration	R/W
100-103	Output 2 Source[2]		
104-107	Output 3 Source[2]		
464	Command execution[4]	Command	W
520	Virtual outputs	Output data	R
521	Modbus-controlled inputs	Input data	R/W
548-555	Tag[3]	Tags	R/W

The unit can communicate via Modbus RTU RS-485 protocol. Below is a list of all available registers.

(1) See command details on the right.
(2) Each Output can reflect the status of any Input.
In order to change Output Source fill Output Address range as shown below:

Input	Value
Hardware Input 1 (terminals +1,-2)	All addresses contain value: 43690
Hardware Input 2 (terminals +3,-4)	All addresses contain value: 52428
Hardware Input 3 (terminals +5,-6)	All addresses contain value: 61680
Not Hardware Input 1 (terminals +1,-2)	All addresses contain value: 21845
Not Hardware Input 2 (terminals +3,-4)	All addresses contain value: 13107
Not Hardware Input 3 (terminals +5,-6)	All addresses contain value: 15
Modbus control Input 1	All addresses contain value: 65280
Modbus control Input 2	All addresses contain value: 0, 65535, 0, 65535
Modbus control Input 3	All addresses contain value: 0, 0, 65535, 65535
Not Modbus control Input 1	All addresses contain value: 0, 255, 0, 255
Not Modbus control Input 2	All addresses contain value: 65535, 0, 65535, 0
Not Modbus control Input 3	All addresses contain value: 65535, 65535, 0, 0

(3) Tags are composed of 16 characters.
Each address contains 2 chars, starting from left.
(4) All configurations must be confirmed via Addr. 464, see details on the right.
(5) Parameter Type:
R = read only,
W = write only,
R/W = read and write.

Supported modbus functions:

Code	Name	Notes
03	read holding registers	reads a stream of words from memory
04	read input registers	reads a stream of words from memory
08	diagnostics: subcode 0	returns query data
06	write single register	writes a word in memory
16	write multiple registers	writes a stream of words in memory

Address 17: Supported ModBus Baudrates

Index	Baudrate
0	4800
1	9600
2	19200
3	38400
4	57600
5	115200

Address 18: Supported ModBus Formats

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Endianness 32 bit Data (0 = Little; 1 = Big)
Termination resistance (1 = enabled)
Supported Modbus Parity:
0 8 data bit, no parity, 1 stop bit
1 8 data bit, even parity, 1 stop bit
2 8 data bit, odd parity, 1 stop bit

Address 82: Hardware inputs

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

In3 In2 In1
(0 Low, 1 High)

Address 464: Commands

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

1 Save Input/Output Configuration
2 Save Modbus configuration
3 Save Tags

Address 520: Virtual outputs

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Out3 Out2 Out1
(0 Low, 1 High)

Address 521: Alarm Source

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

In3 In2 In1
(0 Low, 1 High)