gmi technology for safety

D104*

SIL 3 - SIL 2 Digital Output Loop / Bus Powered DIN-Rail Models D1040Q, D1041Q, D1042Q, D1043Q

Characteristics:

General Description:
The D104* series are quad channel DIN Rail Digital Output Modules enabling a Safe Area contact, logic level or drive signal, to control a device in Hazardous Area, providing 3 port isolation (input/output/supply).
Typical applications includes driving signalling LED's, visual or audible alarms to alert a plant operator or driving a solenoid valve or other process control devices.
It can also be used as a controllable supply to power measuring or process control equipments in Hazardous Area.
Output channels can be paralleled if more power is required; 2 or 3 channels in parallel (depending on the model) are still suitable for Gas Group II C.
Four basic models meet a large number of applications: it is possible to obtain 16 different combinations of safety parameters and driving currents.

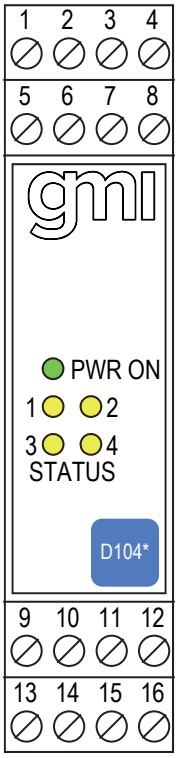
Function:
4 channels I.S. actuated indipendently or in parallel to operate Hazardous Area loads from contacts, logic levels or drive logics in Safe Area providing 3 port isolation (input/output/supply), loop or bus powered.

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

Field Configurability:
Contact / logic levels inputs, loop powered operating mode, configurable by external wiring.

EMC:
Fully compliant with CE marking applicable requirements.

Front Panel and Features:



- SIL 3 according to IEC 61508, IEC 61511 in Loop Powered mode for Lifetime = 10 years.
- SIL 2 according to IEC 61508, IEC 61511 in Bus Powered mode for Tproof = 2 / 5 years (10 / 20 % of total SIF).
- PFDavg (1 year) 0.00 E-00, SFF 100 % (Loop Powered mode).
- PFDavg (1 year) 3.64 E-04, SFF 80.12 % (Bus Powered mode).
- Output to Zone 0 (Zone 20), Division 1, installation in Zone 2, Division 2.
- Voltage input, contact, logic level, common positive or common negative, loop powered or bus powered.
- Flexible modular multiple output capability.
- Output short circuit proof and current limited.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4.
- ATEX, IECEx, UL & C-UL, FM & FM-C, Russian and Ukrainian Certifications.
- Type Approval Certificate DNV and KR for marine applications.
- High Reliability, SMD components.
- High Density, four channels per unit.
- 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:	D104*Q	
22 mA at 13.2 V (per channel)	0	
10 mA for LED driving (per channel)	1	
22 mA at 14.5 V (per channel)	2	
22 mA at 9.8 V (per channel)	3	
Power Bus enclosure		/B

Technical Data:

Supply:
24 Vdc nom (21.5 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.
Current consumption @ 24 V: 130 mA with four channels energized at nominal load, 150 mA with short circuit output (90 mA type D1041Q).
Power dissipation: 2.3 W (1.9 W type D1041Q) with 24 V supply voltage and four channels energized at nominal load.
Max. power consumption: at 30 V supply voltage and short circuit output, 4.0 W (2.4 W type D1041Q).

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

Input:
switch contact, logic level common positive or common negative or loop powered.
Trip voltage levels: OFF status ≤ 1.0 V, ON status ≥ 6.0 V (maximum 30 V).
Current consumption @ 24 V: 3 mA (≈ 10 KΩ input impedance).

Output:
D1040Q: 22 mA at 13.2 V per channel (20.5 V no load, 334 Ω series resistance).
D1041Q: 10 mA for LED driving per channel (20.5 V no load, 484 Ω series resistance).
D1042Q: 22 mA at 14.5 V per channel (20.5 V no load, 273 Ω series resistance).
D1043Q: 22 mA at 9.8 V per channel (20.5 V no load, 484 Ω series resistance).
Short circuit current: ≥ 24 mA per channel (26 mA typical), ≤ 15 mA per channel for D1041Q (13 mA typical).
Response time: 20 ms (power up in 600 ms typical in loop powered mode).

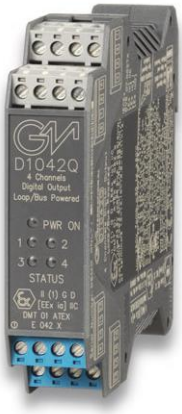
Compatibility:
CE mark compliant, conforms to 94/9/EC Atex Directive and to 2004/108/CE EMC Directive.

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:
II (1) G [Ex ia Ga] IIC, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I, II 3G Ex nA II T4, [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I associated electrical apparatus.
D1040Q single channel parameters:
Uo/Voc = 23.6 V, Io/Isc = 72 mA, Po/Po = 424 mW at terminals 13-14,15-16,9-10,11-12.
D1041Q single channel parameters:
Uo/Voc = 23.6 V, Io/Isc = 49.6 mA, Po/Po = 292 mW at terminals 13-14,15-16,9-10,11-12.
D1042Q single channel parameters:
Uo/Voc = 23.6 V, Io/Isc = 88.2 mA, Po/Po = 519 mW at terminals 13-14,15-16,9-10,11-12.
D1043Q single channel parameters:
Uo/Voc = 23.6 V, Io/Isc = 49.6 mA, Po/Po = 292 mW at terminals 13-14,15-16,9-10,11-12.
For channels in parallel see Safety Parameters tables
Um = 250 Vrms, -20 °C ≤ Ta ≤ 60 °C.
Approvals:
DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN61241-11, EN50303, IECEx BVS 07.0027X conforms to IEC60079-0, IEC60079-11, IEC60079-26, IEC61241-11,
IMQ 09 ATEX 013 X conforms to EN60079-0, EN60079-15,
UL & C-UL E222308 conforms to UL913 (Div.1), UL 60079-0 (General, All Zones), UL60079-11 (Intrinsic Safety "i" Zones 0 & 1), UL60079-15 ("n" Zone 2), ANSI/ISA 12.12.01 (Div.2) for UL and CSA-C22.2 No.157-92 (Div.1), CSA-E60079-0 (General, All Zones), CSA-E60079-11 (Intrinsic Safety "i" Zones 0 & 1), CSA-C22.2 No. 213-M1987 (Div. 2) and CSA-E60079-15 ("n" Zone 2) for C-UL, refer to control drawing ISM0133 for complete UL and C-UL safety and installation instructions,
FM & FM-C No. 3024643, 3029921C, conforms to Class 3600, 3610, 3611, 3810, ANSI/ISA 12.12.02, ANSI/ISA 60079-0, ANSI/ISA 60079-11 and C22.2 No.142, C22.2 No.157, C22.2 No.213, E60079-0, E60079-11, E60079-15,
Russia according to GOST 12.2.007.0-75, R 51330.0-99, R 51330.10-99 [Exia] IIC X,
Ukraine according to GOST 12.2.007.0,22782.0,22782.5 Exia IIC X,
EXIDA Report No. GM04/10-26 R002, SIL 2 / SIL 3 according to IEC 61508, IEC 61511.
Please refer to Functional Safety Manual for SIL applications.
DNV and KR Type Approval Certificate for marine applications.

Mounting:
T35 DIN Rail according to EN50022.
Weight: about 130 g.
Connection: by polarized plug-in disconnect screw terminal blocks to accomodate terminations up to 2.5 mm².
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.

Images:



Parameters Table:

Safety Description	Maximum External Parameters			
D1040Q	Group Cenelec	Co/Ca (µF)	Lo/La (mH)	Lo/Ro (µH/Ω)
Terminals 13-14, 15-16				
9-10, 11-12		Single channel		
Uo/Voc = 23.6 V	IIC	0.13	6.8	83.9
Io/Isc = 72 mA	IIB	0.97	27.4	335.9
Po/Po = 424 mW	IIA	3.50	54.8	671.9
		Two channels in parallel		
Uo/Voc = 23.6 V	IIC	0.13	1.7	41.9
Io/Isc = 144 mA	IIB	0.97	6.8	167.9
Po/Po = 847 mW	IIA	3.50	13.7	335.9
		Three channels in parallel		
Uo/Voc = 23.6 V				
Io/Isc = 216 mA	IIB	0.97	3.0	111.9
Po/Po = 1271 mW	IIA	3.50	6.0	223.9
		Four channels in parallel		
Uo/Voc = 23.6 V				
Io/Isc = 288 mA	IIB	0.97	1.7	83.9
Po/Po = 1674 mW	IIA	3.50	3.4	167.9

Safety Description	Maximum External Parameters			
D1042Q	Group Cenelec	Co/Ca (µF)	Lo/La (mH)	Lo/Ro (µH/Ω)
Terminals 13-14, 15-16				
9-10, 11-12		Single channel		
Uo/Voc = 23.6 V	IIC	0.13	4.5	68.6
Io/Isc = 88.2 mA	IIB	0.97	18.2	274.4
Po/Po = 519 mW	IIA	3.50	36.5	548.9
		Two channels in parallel		
Uo/Voc = 23.6 V	IIC	0.13	1.1	34.3
Io/Isc = 176.4 mA	IIB	0.97	4.5	137.2
Po/Po = 1038 mW	IIA	3.50	9.1	274.4
		Three channels in parallel		
Uo/Voc = 23.6 V				
Io/Isc = 264.6 mA	IIB	0.97	2.0	91.4
Po/Po = 1556 mW	IIA	3.50	4.0	182.9
		Four channels in parallel		
Uo/Voc = 23.6 V				
Io/Isc = 352.8 mA	IIB	0.97	1.1	68.6
Po/Po = 1674 mW	IIA	3.50	2.2	137.2

Safety Description	Maximum External Parameters			
D1041Q	Group Cenelec	Co/Ca (µF)	Lo/La (mH)	Lo/Ro (µH/Ω)
Terminals 13-14, 15-16				
9-10, 11-12		Single channel		
Uo/Voc = 23.6 V	IIC	0.13	14.2	121.9
Io/Isc = 49.6 mA	IIB	0.97	57.0	487.6
Po/Po = 292 mW	IIA	3.50	114.0	975.3
		Two channels in parallel		
Uo/Voc = 23.6 V	IIC	0.13	3.6	60.9
Io/Isc = 99.2 mA	IIB	0.97	14.4	243.8
Po/Po = 584 mW	IIA	3.50	28.9	487.6
		Three channels in parallel		
Uo/Voc = 23.6 V	IIC	0.13	1.6	40.6
Io/Isc = 148.8 mA	IIB	0.97	6.4	162.5
Po/Po = 875 mW	IIA	3.50	12.8	325.0
		Four channels in parallel		
Uo/Voc = 23.6 V				
Io/Isc = 198.4 mA	IIB	0.97	3.6	121.9
Po/Po = 1167 mW	IIA	3.50	7.2	243.8

Safety Description	Maximum External Parameters			
D1043Q	Group Cenelec	Co/Ca (µF)	Lo/La (mH)	Lo/Ro (µH/Ω)
Terminals 13-14, 15-16				
9-10, 11-12		Single channel		
Uo/Voc = 23.6 V	IIC	0.13	14.2	121.9
Io/Isc = 49.6 mA	IIB	0.97	57.0	487.6
Po/Po = 292 mW	IIA	3.50	114.0	975.3
		Two channels in parallel		
Uo/Voc = 23.6 V	IIC	0.13	3.6	60.9
Io/Isc = 99.2 mA	IIB	0.97	14.4	243.8
Po/Po = 584 mW	IIA	3.50	28.9	487.6
		Three channels in parallel		
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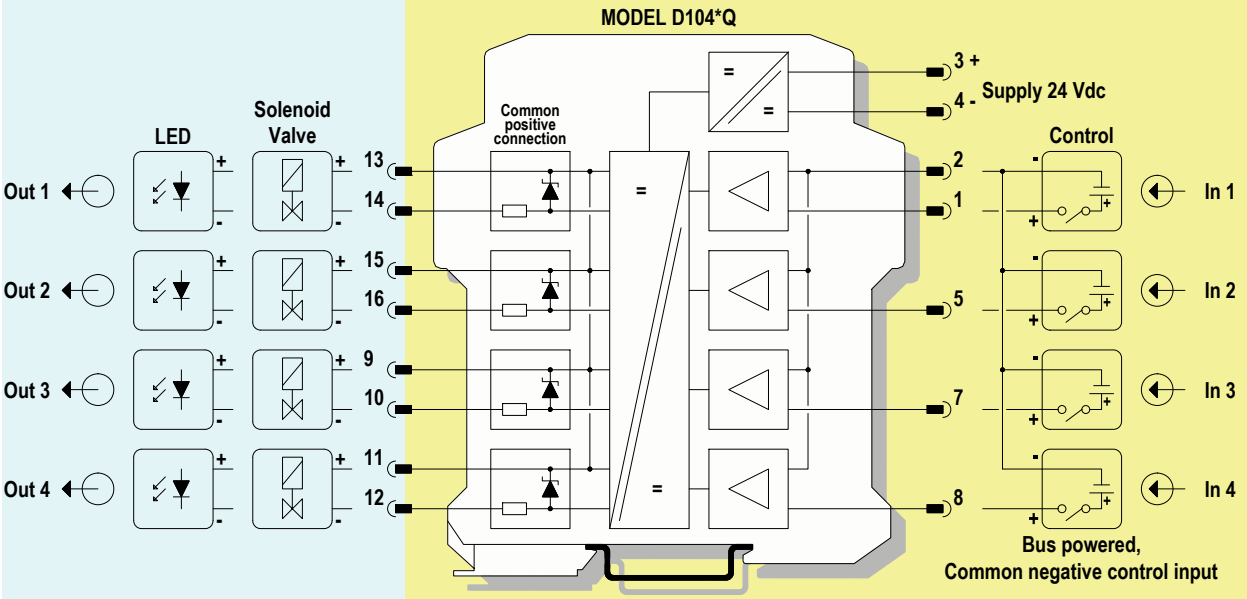
Po/Po = 875 mW	IIA	3.50	12.8	325.0
		Four channels in parallel		
Uo/Voc = 23.6 V				
Io/Isc = 198.4 mA	IIB	0.97	3.6	121.9
Po/Po = 1167 mW	IIA	3.50	7.2	243.8

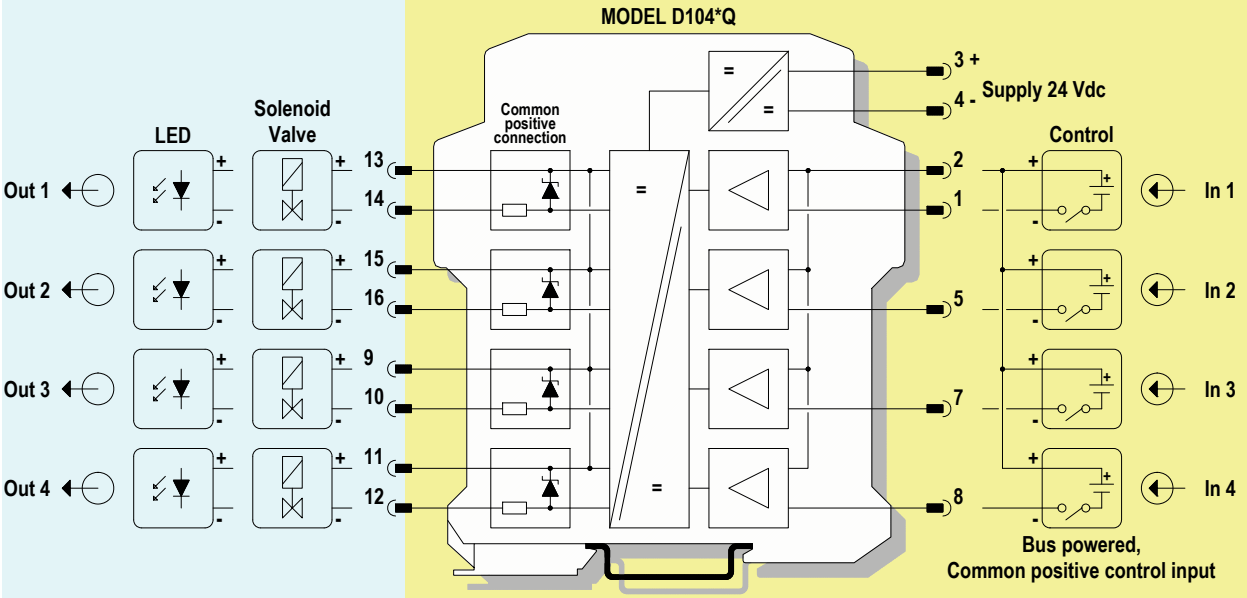
NOTE for USA and Canada:
IIC equal to Gas Groups A, B, C, D, E, F and G
IIB equal to Gas Groups C, D, E, F and G
IIA equal to Gas Groups D, E, F and G

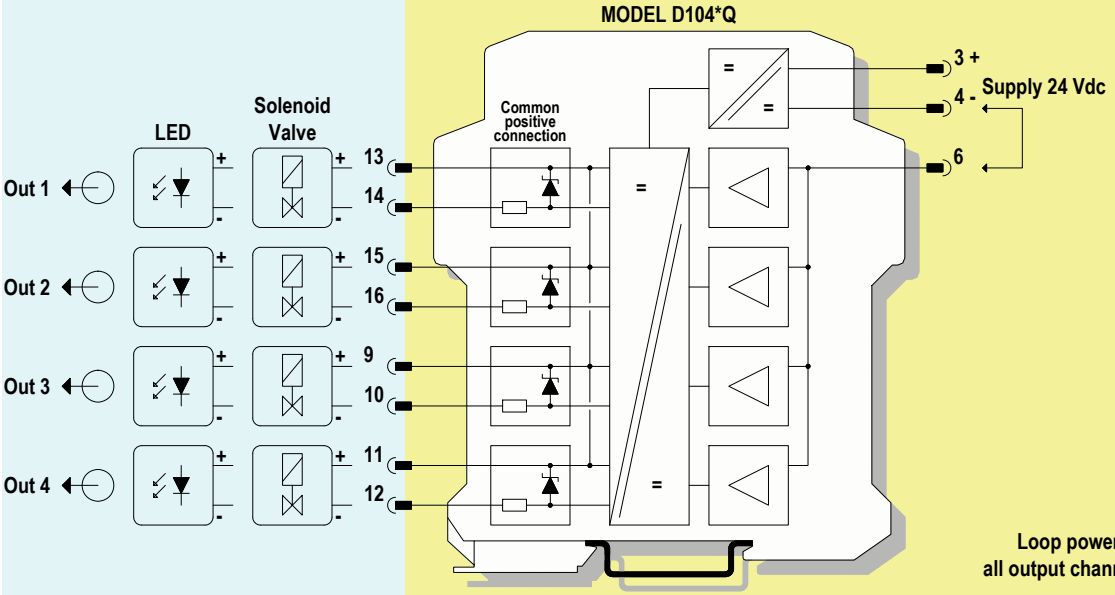
Function Diagram:

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



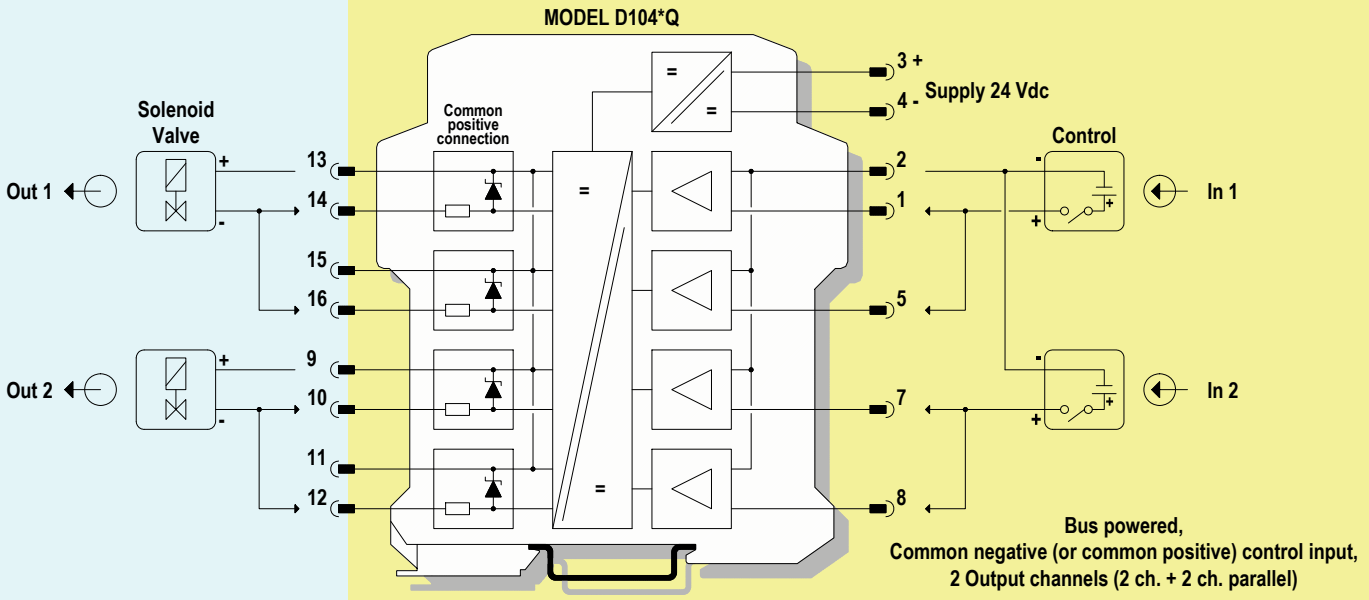




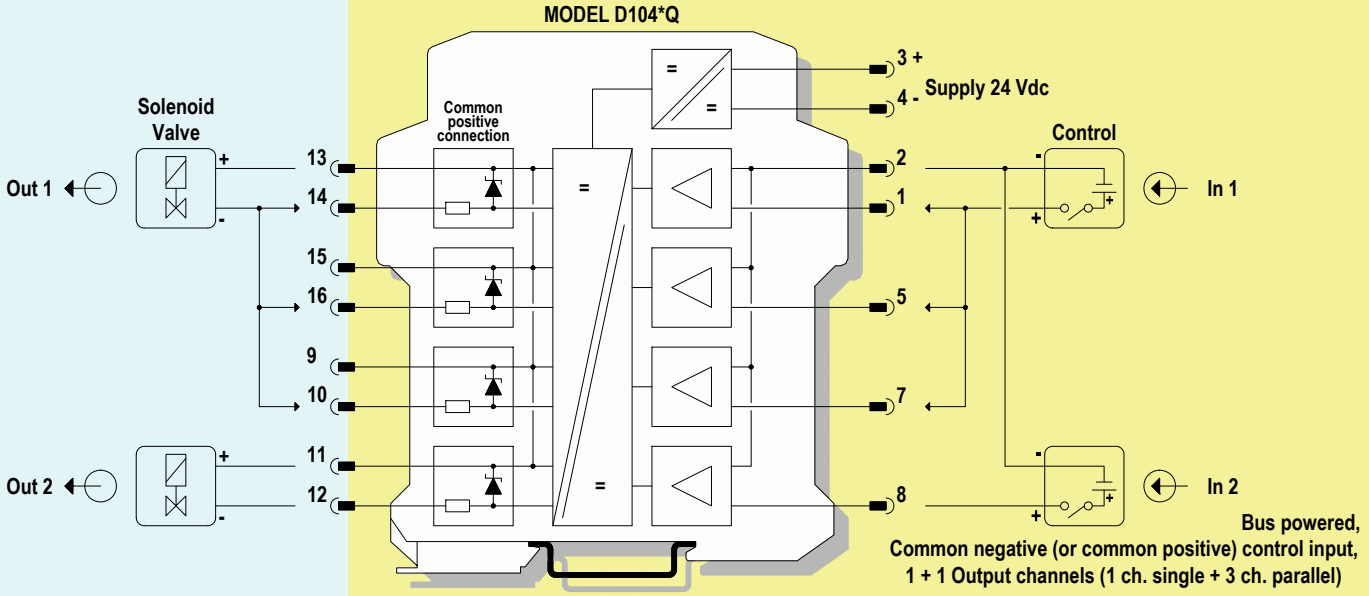
Function Diagram:

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

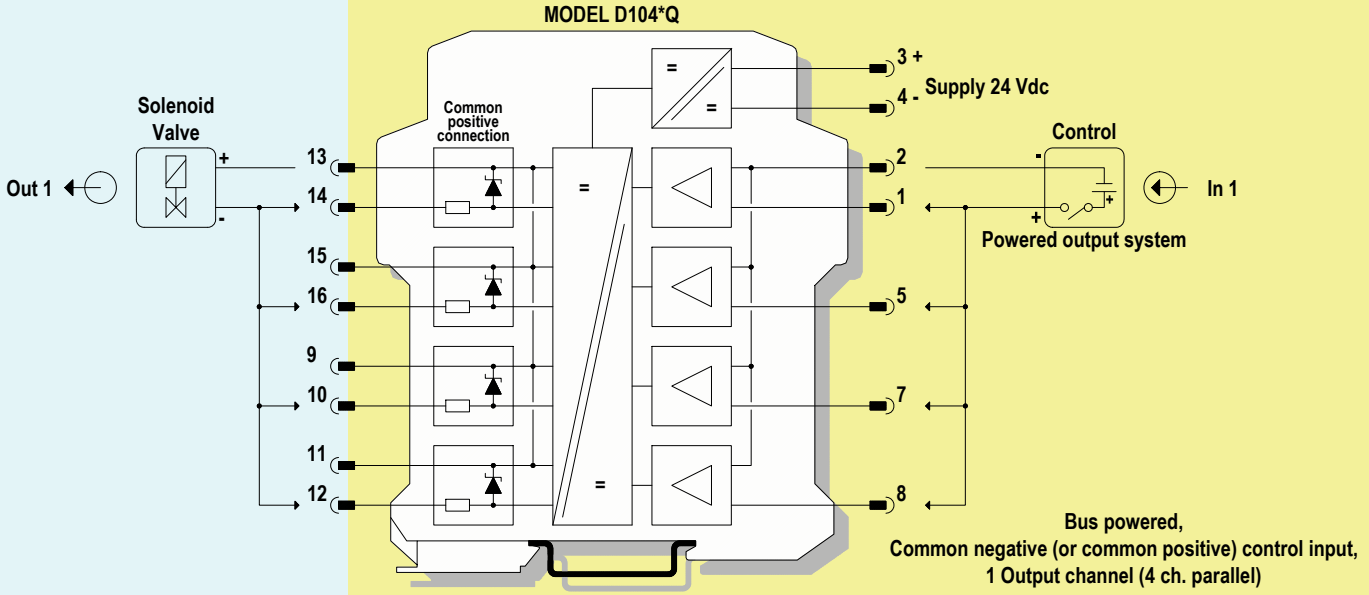
SAFE AREA, ZONE 2 GROUP IIC T4,
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,
GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4



Bus powered,
Common negative (or common positive) control input,
2 Output channels (2 ch. + 2 ch. parallel)



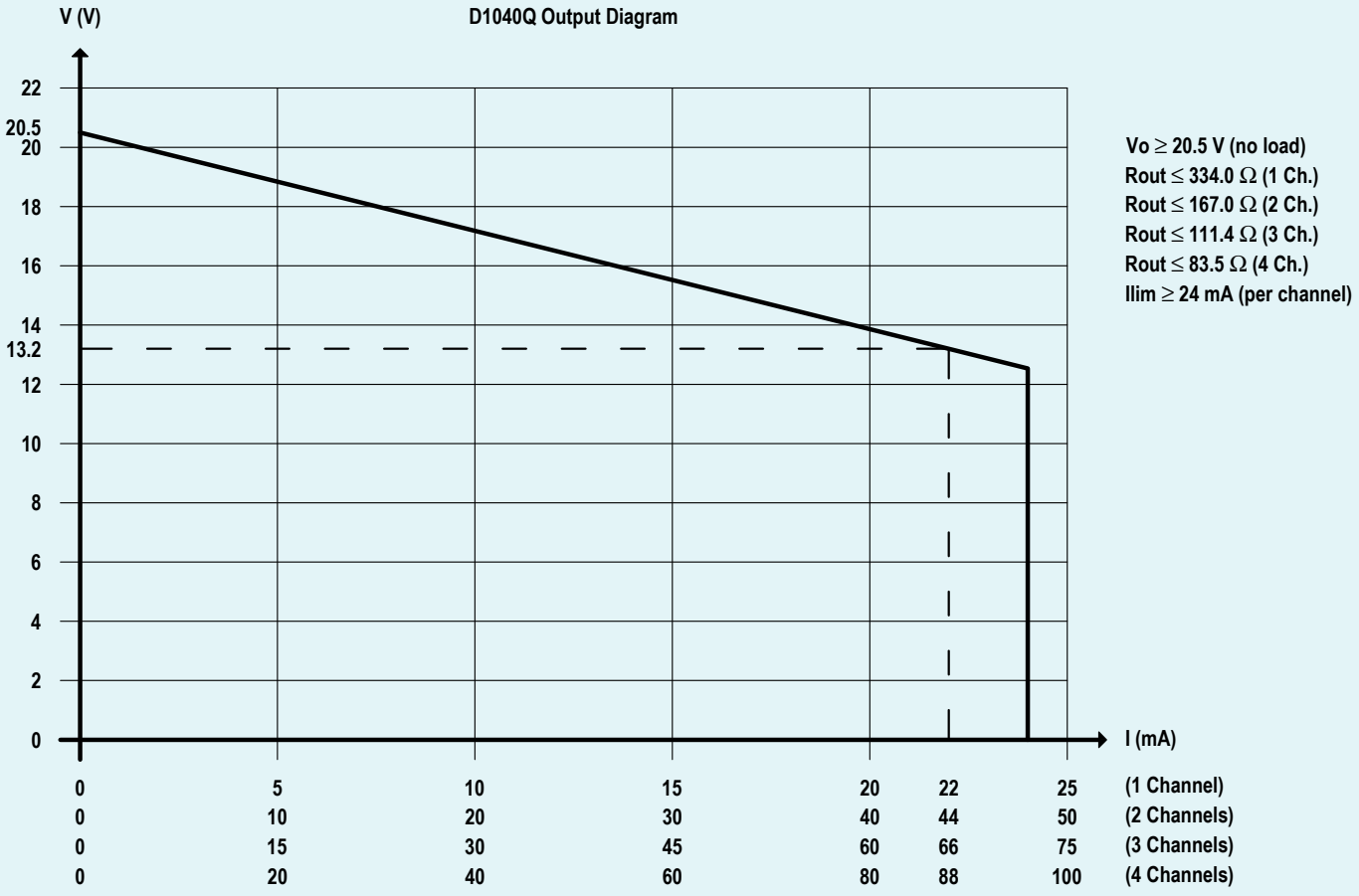
Bus powered,
Common negative (or common positive) control input,
1 + 1 Output channels (1 ch. single + 3 ch. parallel)



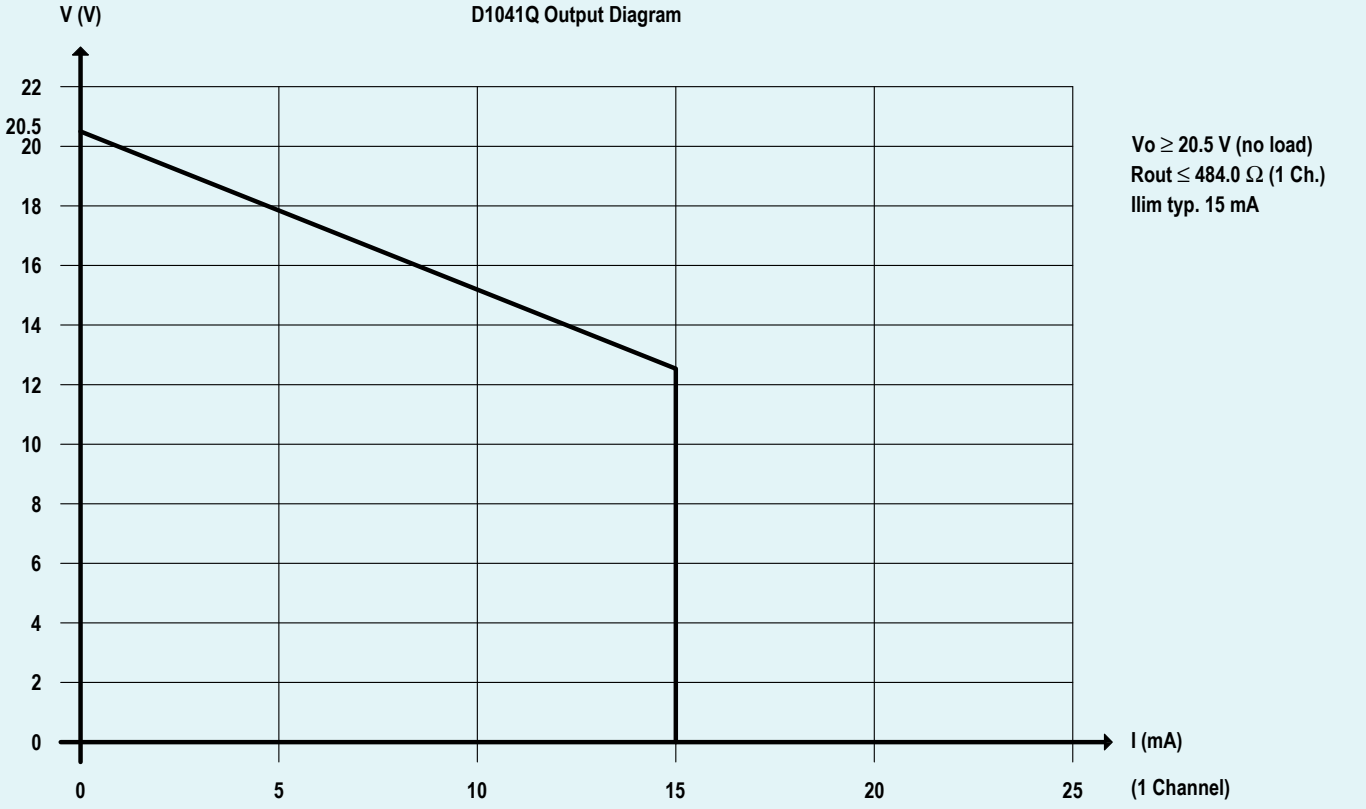
Bus powered,
Common negative (or common positive) control input,
1 Output channel (4 ch. parallel)

Output Diagram:

D1040Q OUTPUT DIAGRAM

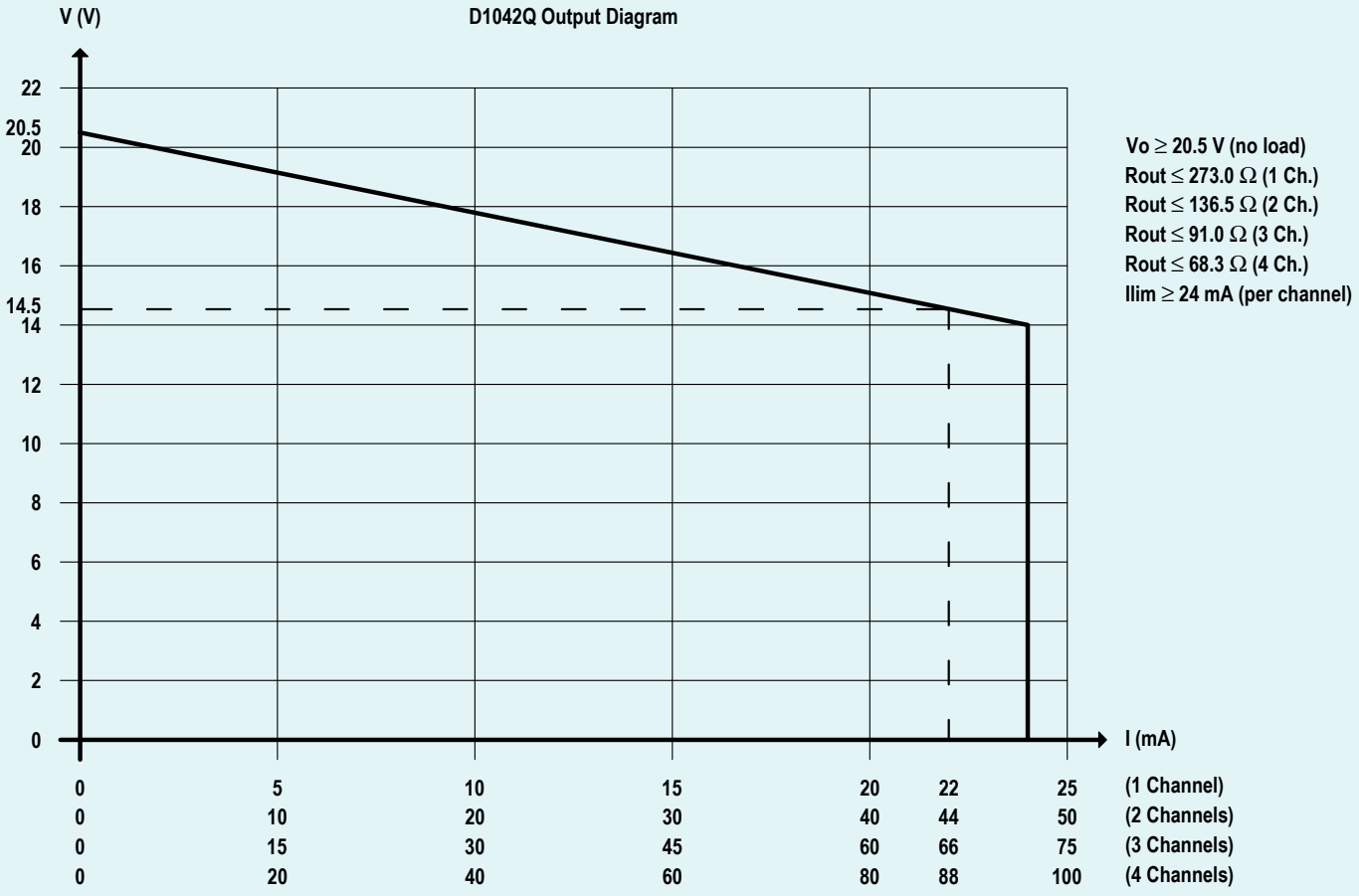


D1041Q OUTPUT DIAGRAM



Output Diagram:

D1042Q OUTPUT DIAGRAM



D1043Q OUTPUT DIAGRAM