

## Characteristics:

### General Description:

The Switch/Proximity Detector Repeater type D5231E is a unit with eight independent channels suitable for applications requiring SIL 2 level (according to IEC 61511) in safety related systems for high risk industries.

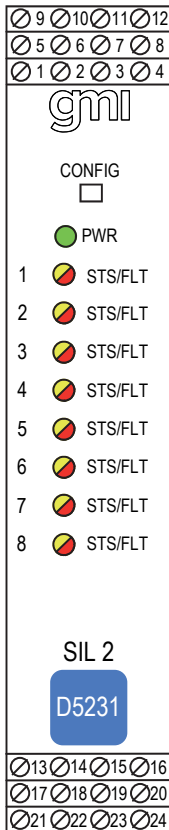
The unit can be configured for switch or proximity detector (EN60947-5-6 NAMUR), NO or NC input and for NO or NC floating solid-state relay (photo-MOS) isolated output compatible with logic circuits. Configuration is programmable from PC by the GM Pocket Portable Adapter PPC5092 via USB serial line and SWC5090 Configurator software. Each channel enables a Safe Area load to be controlled by a switch, or a proximity detector, located in Hazardous Area.

Fault detection circuit (configurable by PC) is available for all proximity sensors and switches equipped with end of line resistors. In case of fault, when enabled it de-energizes the corresponding solid-state relay (photo-MOS) and turns the fault red LED on; when disabled the corresponding solid-state relay (photo-MOS) repeats the input line open or closed status as configured.

D5231E has eight inputs and eight independent outputs.  
Modbus RTU RS-485 output is available on Bus connector.

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.

## Front Panel and Features:



- SIL 2 according to IEC 61511 for T<sub>proof</sub> = 3 / 10 yrs (≤10% / >10 % of total SIF), SFF 73.90%, PFDavg (1 year) 2.96 E-04.
- 8 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 solid-state output relay .
- Field open and short circuit detection.
- High Accuracy, μP controlled A/D converter.
- Three port isolation, Input/Output/Supply.
- Modbus RTU RS-485 Output.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety system.
- Fully programmable operating parameters.
- Any input can be assigned to any number of outputs. Logical output functions available.
- ATEX, IECEx, FM, FMC, INMETRO, EAC-EX, UKR TR n. 898, NEPSI, TÜV Certifications.
- Type Approval Certificate DNV and KR for maritime applications.
- High Density, eight 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.

## 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:** 75 mA for 8 channels with short circuit input and solid-state relay (photo-MOS) closed, typical.  
**Power dissipation:** 1.8 W with 24 V supply voltage, for 8 channels with short circuit input and solid-state relay (photo-MOS) closed, typical.

### Isolation (Test Voltage):

I.S. In/Out 1.5 KV; I.S. In/Supply 1.5 KV; Out/Supply 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.

**Input equivalent source:** 8 V 1 KΩ typical (8 V no load, 8 mA short circuit).

### Output:

voltage free SPST optocoupled open-collector transistor (solid-state relay, photo-MOS).

**Open-collector rating:** 100 mA at 35 V (≤ 1.0 V voltage drop).

**Leakage current:** ≤ 10 μA at 35 V.

**Response time:** 500 μs.

**Frequency response:** 500 Hz maximum.

**Modbus Output:** Modbus RTU protocol up to 115.200 baud on Bus connector.

### 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,  
**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:** 2Ex nA [ia Ga] IIC T4 Gc X, [Ex ia Da] IIIC, [Ex ia Ma] I.

**UKR TR n. 898:** 2ExnAiaIICT4 X, Exial X associated apparatus and non-sparking electrical equipment.  
 Uo/Voc = 11.2 V, Io/Isc = 12 mA, Po/Po = 34 mW at terminals 21-13, 21-14, 22-15, 22-16, 23-17, 23-18, 24-19, 24-20.  
 Um = 250 Vrms, -40 °C ≤ Ta ≤ 70 °C.

### Approvals:

BVS 12 ATEX E 122 X conforms to EN60079-0, EN60079-11, EN60079-15, EN60079-26, EN50303.  
 IECEx BVS 12.0090 X conforms to IEC60079-0, IEC60079-11, IEC60079-15.  
 INMETRO DNV 13.0106 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.  
 CLQ 16.0036 X conforms to DCTY 7113, GOCT 22782.5-78, DCTY IEC 60079-15.  
 GYJ14.1406X conforms to GB3836.1, GB3836.4; GB3836.8, GB3836.20.  
 TÜV Certificate No. C-IS-236198-02, SIL 2 conforms to IEC61511.  
 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 175 g.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**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 22.5 mm, Depth 123 mm, Height 120 mm.

## Ordering Information:

Model:	D5231	Power Bus and DIN-Rail accessories: Connector JDFT050
8 channels	E	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.

**Parameters Table:**

Safety Description	Maximum External Parameters			
	Group Cenelec	Co/Ca (µF)	Lo/La (mH)	Lo/Ro (µH/Ω)
Terminals 21-13, 21-14, 22-15, 22-16, 23-17, 23-18, 24-19, 24-20	IIC	1.84	246	1070
	IIB	12.6	987	4280
Uo/Voc = 11.2 V	IIA	54	1900	8550
Io/Isc = 12 mA	I	58	3200	14030
Po/Po = 34 mW	IIIC	12.6	987	4280

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

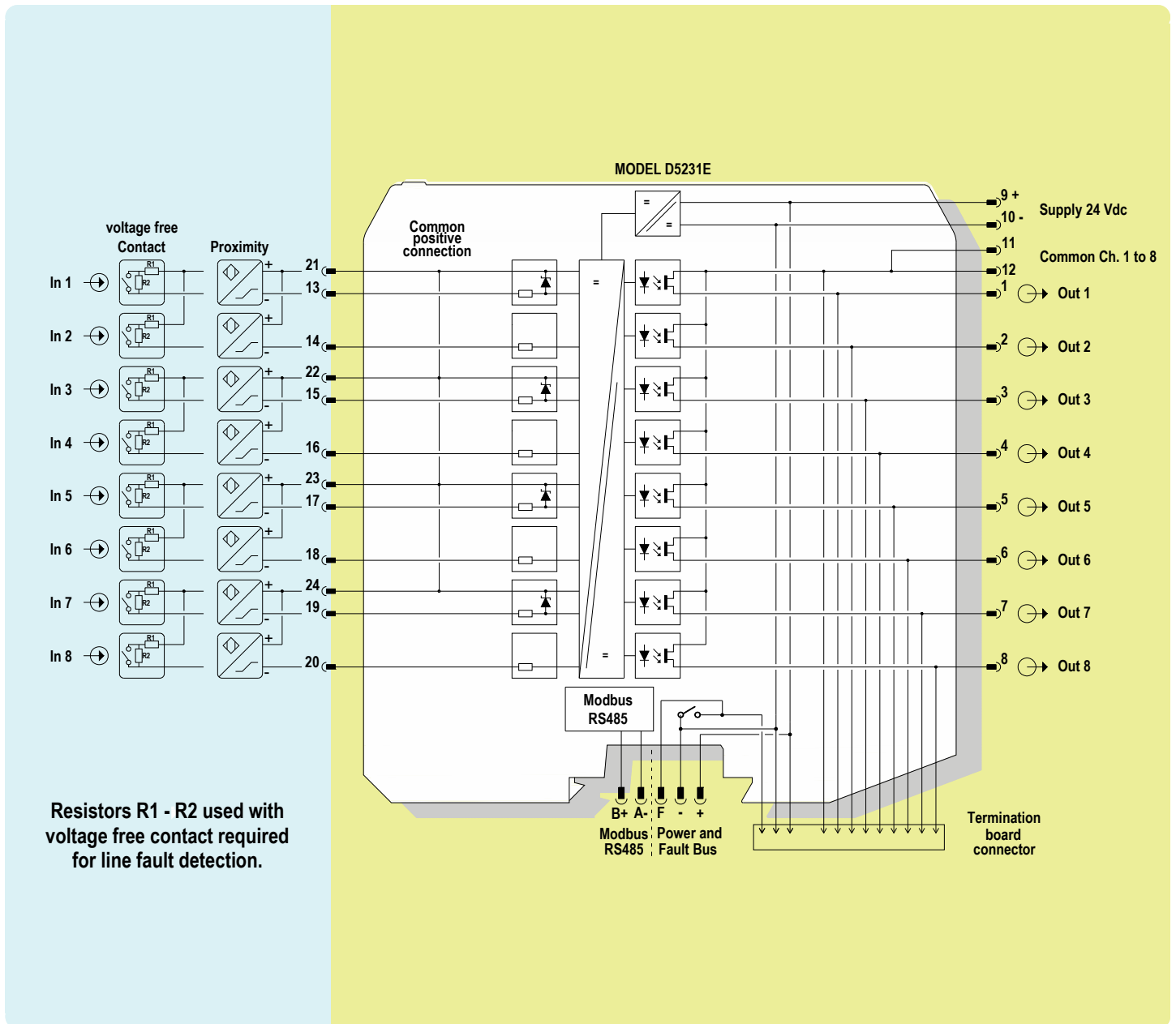
**Image:**



**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



## Configuring and Monitoring via Software:

### 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.

### INPUTS 1 to 8:

#### Sensor Type:

- Proximity
- Voltage free contact

Note: To enable line diagnostic on Voltage free contacts, configure sensor as "Proximity" and follow instructions in Section "Operation" of Manual ISM0172.

### TAGS 1 to 8:

16 alphanumerical characters.

### OUTPUTS 1 to 8:

#### Source:

- Input 1      Output represents Input 1,
- Input 2      Output represents Input 2,
- Input 3      Output represents Input 3,
- Input 4      Output represents Input 4,
- Input 5      Output represents Input 5,
- Input 6      Output represents Input 6,
- Input 7      Output represents Input 7,
- Input 8      Output represents Input 8,
- Logical function      Output represents AND/OR function of selected inputs.

**Contact:** normal condition of output contact when input is open

- Open (for SIL applications)
- Closed

**In case of fault:** Output behaviour when Input fault is detected.

- Ignore      Ignore,
- Open (for SIL applications)
- Closed

**Fault repeater:** Output represents Input Fault status

**Logical Function:** visible only when selected in "Output source"

Select 2 or more (up to 8) Inputs to connect logically.

- AND      Output represents AND logical function of selected Inputs,  
- NO: On AND On = Close; On AND Off = Open; Off AND Off = Open  
- NC: On AND On = Open; On AND Off = Close; Off AND Off = Close
- OR      Output represents OR logical function of selected Inputs  
- NO: On OR On = Close; On OR Off = Close; Off OR Off = Open  
- NC: On OR On = Open; On OR Off = Open; Off OR Off = Close

### MONITOR

Allows the real-time monitoring of every Input and Output status.

Note that configuration is disabled when Monitoring is active.

### INPUT STATUS:

The status of each input is shown

- Open circuit      Open circuit fault (\*),
- Off      Off,
- On      On,
- Short circuit      Short circuit fault (\*).

(\* Only available for Proximity Inputs or Voltage free contacts with line fault detection resistances mounted as shown in "Functional diagram".

### OUTPUT STATUS:

The status of each output contact is shown

- Open
- Closed

### DATA LOGGER

The status of all Inputs and all Outputs is acquired at constant chosen intervals and

saved to user selected file in Comma Separated Value format (.csv).

Note that configuration is disabled when Data Logger is active.

### PARAMETERS SETUP:

**Days:** Number of days to acquire.

**Hours:** Number of hours to acquire.

**Minutes:** Number of minutes to acquire.

**Scan rate [s]:** Frequency interval for acquisitions.

### General Notes:

SWC5090 Software can be downloaded for free at [www.gmintsr.com](http://www.gmintsr.com)

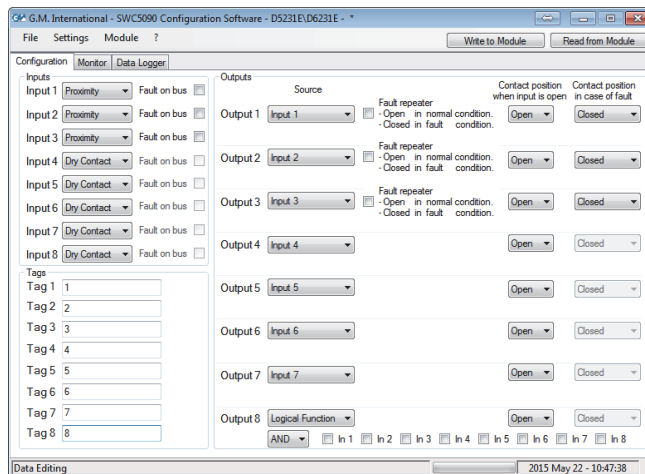
PPC5092 Adapter is needed to interface PC to D5231E module.

The PC supplies the module via USB, therefore operating power supply (24 Vdc) is not strictly needed when configuring the module.

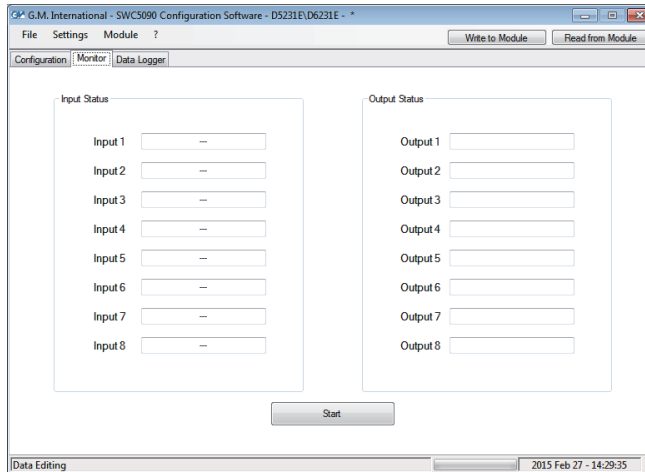
## Screenshots:



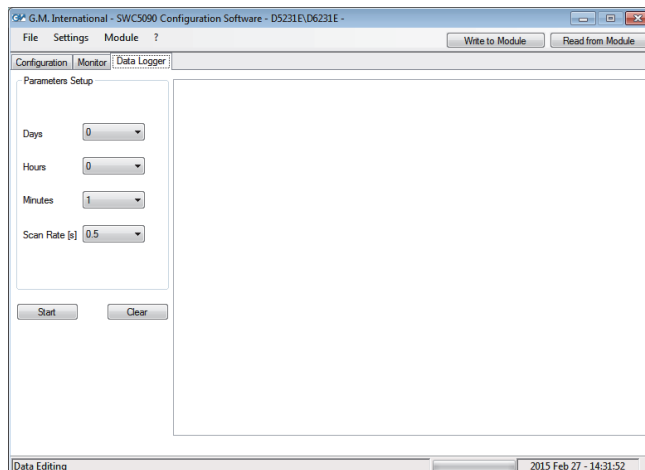
SWC5090 Software and PPC5092 USB Adapter



Input / Output configuration



Input / Output status real-time monitor



Real-time data logging to file