



INSTRUCTION MANUAL

SIL 2 Load Cell/Strain Gauge Bridge Isolating Repeater, DIN-Rail and Power Bus Model D5263S



Characteristics

General Description:

The single channel DIN Rail Load Cell/Strain Gauge Bridge Isolating Repeater D5263S module is a unit suitable for applications requiring SIL 2 level (according to IEC 61508:2010) in safety related systems for high risk industries.

The unit acts as a transparent galvanic isolated interface installed between a weighing indicator in Safe Area and a load cell (or group of load cells) in Hazardous Area; it appears at the terminals of the indicator as a single load cell equivalent to the one in the field. It provides a fully floating power supply voltage with remote sensing capability to load cell located in Hazardous Area and repeats, while isolating, the mV signal output to drive a load in Safe Area depending on the host system reference voltage. Up to four 350 Ω load cells, or five 450 Ω load cells, or ten 1000 Ω load cells can be connected in parallel. The Voltage reference (Safe Area side) is set as an external supply.

Function:

1 channel I.S. input from strain gauge signals, provides 3 port isolation (input/output/supply) and repeats, as a transparent unit, the bridge signal output.

Signalling LED:

Power supply indication (green).

EMC:

Fully compliant with CE marking applicable requirements.

Technical Data

Supply:

24 Vdc nom (18 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.

Current consumption @ 24 V: 85 mA with four 350 Ω load cells connected, typical.

Power dissipation: 1.8 W with 24 V supply and four 350 Ω load cells connected typical.

Isolation (Test Voltage):

I.S. In / Out 1.5 KV; I.S. In / Supply 1.5 KV; Out / Supply 500 V.

Input:

up to four 350 Ω load cells in parallel or up to five 450 Ω load cells in parallel or up to ten 1000 Ω load cells in parallel.

A/D conversion time: 12.5 ms

Bridge supply voltage: 4.0 Vdc nominal.

Bridge output signal: 1 to 4 mV/V.

Line resistance compensation: ≤ 10 Ω .

Output:

Same as Input signal.

Output impedance: 500 Ω typical.

Excitation voltage: ≥ 4.0 V typical, ≤ 15 V maximum. Externally applied.

Transfer characteristic: linear based on mV input.

Response time: ≤ 100 ms (10 to 90 % step change).

Performance:

Ref. Conditions 24 V supply, 23 ± 1 °C ambient temperature.

Calibration accuracy after system calibration: $\leq \pm 0.003$ % of full scale of input range.

Linearity accuracy: $\leq \pm 0.002$ % of full scale of input range.

Supply voltage influence: $\leq \pm 0.002$ % of full scale for a min to max supply change.

Temperature influence: $\leq \pm 0.002$ % of full scale of input range for a 1 °C change.

Compatibility:

 CE mark compliant, conforms to Directives: 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 max 95 % non condensing, up to 55 °C.

Storage: temperature limits -45 to $+80$ °C.

Max altitude: 2000 m a.s.l.

Safety Description:



ATEX: II 3(1)G Ex ec [ia Ga] IIC T4 Gc, II (1)D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I

IECEX: Ex ec [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I

EAC-EX: 2Ex nA [ia Ga] IIC T4 Gc X, [Ex ia Da] IIIC, [Ex ia Ma] I

CCC: Ex ec [ia Ga] IIC T4 Gc; [Ex ia Ga] IIC; [Ex ia Da] IIIC

CML: Ex nA [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC

associated apparatus and non-sparking electrical equipment.

$U_0/V_{oc} = 7.2$ V, $I_0/I_{sc} = 177$ mA, $P_0/P_o = 471$ mW at terminals 13-14-15-16-17-18.

$U_m = 250$ Vrms, -40 °C $\leq T_a \leq 70$ °C.

Approvals:

TUV 15 ATEX 170897 X conforms to EN60079-0, EN60079-7, EN60079-11.

IECEX TUN 16.0005X conforms to IEC60079-0, IEC60079-7, IEC60079-11.

RU C-IT.EX01.B.00018/19 conforms to GOST 31610.0, GOST 31610.11, GOST 31610.15.

CCC 2020322316000978 conforms to GB/T 3836.1, GB/T 3836.3, GB/T 3834.4

CML 20JPN2136X for CML approval.

DNV No. TAA00001U0 and KR No. MIL20769-EL002 for maritime applications.

SIL 2 conforms to IEC61508:2010 Ed.2.

Mounting:

EN/IEC60715 TH 35 DIN-Rail, with or without Power Bus.

Weight: about 165 g.

Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm² (13 AWG).

Location: installation in Safe Area or Zone 2, Group IIC T4.

Protection class: IP 20.

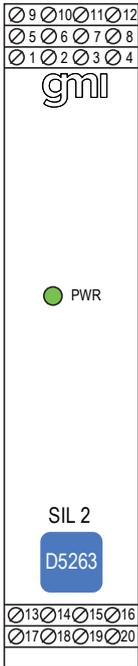
Dimensions: Width 22.5 mm, Depth 123 mm, Height 120 mm.

Ordering Information

Model: D5263S

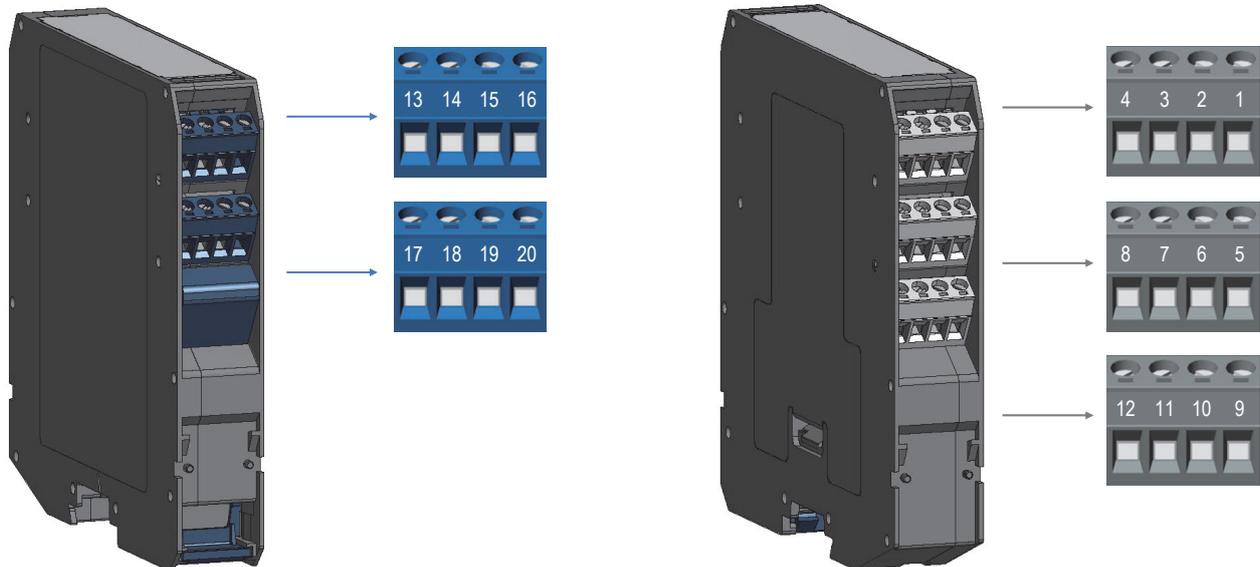
Power Bus and DIN-Rail accessories:
 Connector JDFT050
 Cover and fix MCHP196
 Terminal block male MOR017
 Terminal block female MOR022

Front Panel and Features



- Input from Zone 0 (Zone 20), installation in Zone 2.
- Strain Gauge Bridge Transparent Repeater.
- Up to four 350 Ω load cells in parallel or up to five 450 Ω load cells in parallel or up to ten 1000 Ω load cells in parallel.
- 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.
- ATEX, IECEx, EAC Ex, CCC, CML Certifications.
- Type Approval Certificate DNV and KR for maritime applications.
- High Reliability, SMD components.
- Simplified installation using standard DIN Rail and plug-in terminal blocks, with or without Power Bus.
- 250 Vrms (Um) max. voltage allowed to the instruments associated with the barrier.

Terminal block connections



HAZARDOUS AREA

13	+ Input Ch 1 EXC (Load cell)
14	+ Input Ch 1 Sense (Load cell)
15	- Input Ch 1 Sense (Load cell)
16	- Input Ch 1 EXC (Load cell)
17	+ Input Ch 1 IN (Load cell)
18	- Input Ch 1 IN (Load cell)
19	Not used
20	Not used

SAFE AREA

1	+ Output Ch 1 EXC (Weighting Indicator)
2	+ Output Ch 1 Sense (Weighting Indicator)
3	- Output Ch 1 Sense (Weighting Indicator)
4	- Output Ch 1 EXC (Weighting Indicator)
5	+ Output Ch 1 IN (Weighting Indicator)
6	- Output Ch 1 IN (Weighting Indicator)
7	Not used
8	Not used
9	+ Power Supply 24 Vdc
10	- Power Supply 24 Vdc
11	Not used
12	Not used

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 (U_i/V_{max} , I_i/I_{max} , P_i/P_i) are not exceeded by the safety parameters (U_o/V_{oc} , I_o/I_{sc} , P_o/P_o) of the D5263 series Associated 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 (C_o/C_a , L_o/L_a , L_o/R_o) given in the Associated Apparatus parameters for the effective group. See parameters indicated in the table below:

D5263 Terminals	D5263 Associated Apparatus Parameters	Must be	Hazardous Area/Hazardous Locations Device Parameters
13 - 14 - 15 - 16 - 17 - 18	$U_o / V_{oc} = 7.2 V$	\leq	U_i / V_{max}
13 - 14 - 15 - 16 - 17 - 18	$I_o / I_{sc} = 177 mA$	\leq	I_i / I_{max}
13 - 14 - 15 - 16 - 17 - 18	$P_o / P_o = 471 mW$	\leq	P_i / P_i

D5263 Terminals	D5263 Associated Apparatus Parameters Cenelec (US)	Must be	Hazardous Area/Hazardous Locations Device Parameters
13 - 14 - 15 - 16 - 17 - 18	$C_o / C_a = 0.3 \mu F$ $C_o / C_a = 1.5 \mu F$ $C_o / C_a = 2.2 \mu F$ $C_o / C_a = 2.8 \mu F$ $C_o / C_a = 1.5 \mu F$	\geq IIC (A,B) IIB (C) IIA (D) I IIIC (E, F, G)	$C_i / C_i \text{ device} + C \text{ cable}$
13 - 14 - 15 - 16 - 17 - 18	$L_o / L_a = 0.5 mH$ $L_o / L_a = 6.5 mH$ $L_o / L_a = 9.5 mH$ $L_o / L_a = 13 mH$ $L_o / L_a = 6.5 mH$	\geq IIC (A,B) IIB (C) IIA (D) I IIIC (E, F, G)	$L_i / L_i \text{ device} + L \text{ cable}$

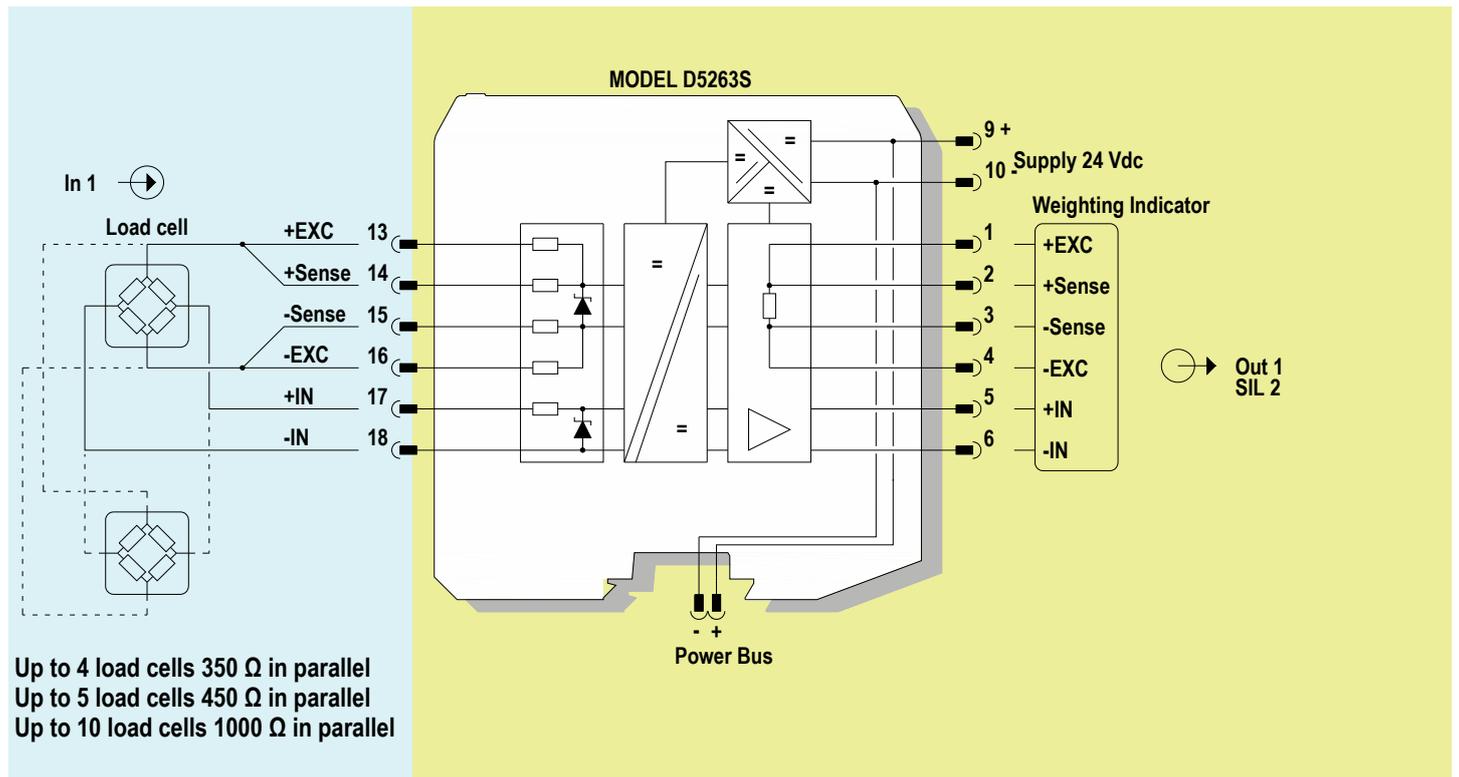
Characteristic: trapezoidal.

If the cable parameters are unknown, the following values may be used: capacitance 200 pF per meter (60 pF per foot), inductance 1 μH per meter (0.20 μH per foot).

Function Diagram

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4



Warning

D5263 series is an isolated Intrinsically Safe Associated Apparatus installed into standard EN/IEC60715 TH 35 DIN-Rail located in Safe Area or Zone 2, Group IIC, Temperature T4 Hazardous Area within the specified operating temperature limits $T_{amb} -40$ to $+70$ °C, and connected to equipment with a maximum limit for power supply U_m of 250 Vrms or Vdc. Not to be connected to control equipment that uses or generates more than 250 Vrms or Vdc with respect to earth ground.

D5263 series 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 plug or unplug the terminal blocks when installed in Hazardous Area or unless 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 the area is known to be non-hazardous.

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 D5263 series strain gauge bridge isolating repeater acts as transparent galvanic isolated interface between weighing indicator in Safe Area/Non Hazardous Locations and a load cell (or group of n load cells) installed in Hazardous Area/Hazardous Locations.

It provides a fully floating power supply voltage with remote sensing capability to strain gauge bridge and repeats the corresponding output signal.

Remote sensing wires (terminals "14" +Sense and "15" -Sense) must be always connected to force lines (terminals "13" +Exc and "16" -Exc) for proper operation of the unit, in case of 4 wires cell connect the sensing lines near to the cell connections to minimize the power supply voltage compensation error.

The mV input signal is isolated and repeated to Safe Area/Non Hazardous Locations to drive a weighing indicator.

The unit appears at the terminals of the indicator as a single load cell equivalent to the one installed in the field area.

The mV output signal is proportional to the reference voltage of the host system.

A "POWER ON" green led lits when input power is present.

Installation

D5263 series is a Load Cell/Strain Gauge Bridge Isolating Repeater housed in a plastic enclosure suitable for installation on EN/IEC60715 TH 35 DIN-Rail, with or without Power Bus.

D5263 series can be mounted with any orientation over the entire ambient temperature range.

Electrical connections 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)**. Connect only one individual conductor per each clamping point, use conductors up to 2.5 mm² (13 AWG) and a torque value of 0.5-0.6 Nm. Use only cables that are suitable for a temperature of at least 85°C. The wiring cables have to be proportionate in base to the current and the length of the cable.

On the section "Function Diagram" and enclosure side a block diagram identifies all connections.

Identify the function and location of each connection terminal using the wiring diagram in the corresponding section, for example:

Connect a 24 Vdc power supply voltage between terminals "9" (positive pole) and "10" (negative pole).

Connect positive output at terminal "5" and negative output at "6".

Connect host reference voltage at terminal "1" positive and terminal "4" negative.

If host system has remote voltage sensing capability, connect sensing wire at terminal "2" positive and terminal "3" negative.

Connect strain gauge bridge voltage supply at terminal "13" positive and terminal "16" negative.

Connect strain gauge bridge voltage sensing supply at terminal "14" positive and terminal "15" negative.

If strain gauge bridge has no internal voltage sensing capability always connect terminal "14" to terminal "13" and terminal "16" to terminal "15";

for better performance connect the wire at the end of the line near the load cells.

Connect strain gauge bridge output signal at terminal "17" positive and terminal "18" negative.

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. Isolation in accordance with EN/IEC 60079-11 clause 6.3.13 is provided between non-intrinsically safe circuits and intrinsically safe circuits.

The enclosure provides, according to EN60529, an IP20 minimum degree of protection (or similar to NEMA Standard 250 type 1). The equipment shall only be used in an area of at least pollution degree 2, as defined in IEC 60664-1. When installed in EU Zone 2, the unit shall be installed in an enclosure that provides a minimum ingress protection of IP54 in accordance with IEC 60079-0. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application.

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 D5263 series 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 modification must be avoided.

D5263 series must be connected to SELV or PELV supplies.

All circuits connected to D5263 series must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

Start-up

Before powering the unit check that all wires are properly connected, particularly supply conductors and their polarity, input and output wires, 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.

Before turning power on, field load cell must be connected to the module. Then, turn power on, the "power on" green led must be lit, the unit repeats the load cell condition, check with the weighing indicator the proper value reading.