

Characteristics:

General Description: the single channel Power Supply Repeater and Trip Amplifier D5254S provides a fully floating dc supply to energize conventional 2 wires 4-20 mA transmitters located in Hazardous Area; it also accepts 0/4-20 mA current input signals, as well as ± 12 V voltage inputs (also suitable for 0/1-5 V and 0/2-10 V signals) from Hazardous Area. The module repeats/converts (in linear or square root scale) the input as on current signal, in a floating circuit to drive a Safe Area load, suitable for applications requiring SIL 2 (according to IEC 61508:2010) in safety related systems for high risk industries. The output signal can be in direct or reverse form.

Two independent Alarm Trip Amplifiers are also provided. Each alarm energizes or de-energizes an SPDT relay for low, high, window or fault repeater alarm functions. The two alarm relays trip points are settable over the entire input signal range.

An optional alarm acknowledgement input is also provided.

Function: 1 I.S. channel analog input for 2 wires loop powered or separately powered Smart transmitters or Current or Voltage signals, provides 3 port isolation (input/output/supply) and current (source or sink mode) output signal.

In addition, it provides two SPDT relay alarm contacts with adjustable alarm trip point. The out-of-range (burnout) fault is repeated to the bus.

Configurability: totally software configurable (no jumpers or switches), by PC via USB with PPC5092 Adapter and related configurator software or by RS485 Modbus output, in order to choose: mA or V input signal, linear or reverse output signal, alarm trip point, low, high, window or fault repeater alarm mode, hysteresis, delay time.

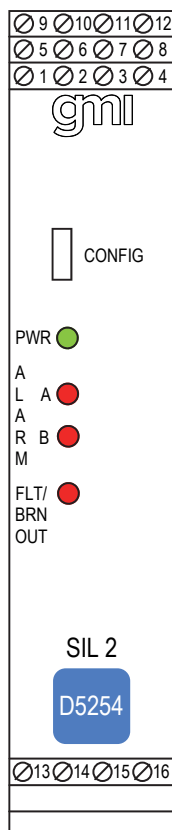
Mounting on standard DIN-Rail, with or without Power Bus, or on customized Termination Boards, in Safe Area or in Zone 2.

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



Front Panel and Features:



- SIL 2 according to IEC 61508:2010 (Route 2H) with Tproof = 10 / 20 years ($\leq 10\%$ / $> 10\%$ of total SIF), PFDavg(1year) 9.38E-05, DC 88.58%, SFF 93.56% for input current & analog current source/sink output.
- SIL 2 according to IEC 61508:2010 (Route 2H) with Tproof = 5 / 20 years ($\leq 10\%$ / $> 10\%$ of total SIF), PFDavg(1year) 1.87E-04, DC 70.96%, SFF 87.46% for input current & single alarm trip amplifier with relay output.
- SIL 2 according to IEC 61508:2010 (Route 2H) with Tproof = 20 years ($\leq 10\%$ of total SIF), PFDavg(1year) 4.87E-05, DC 90.47%, SFF 96.06% for input current & 1oo2 architecture of alarm trip amplifiers with relay outputs.
- SC 3: Systematic Capability SIL 3.
- Input from Zone 0 (Zone 20), installation in Zone 2.
- Current Input signal: 4-20 mA loop or 0/4-20 mA externally powered. Voltage Input signal: ± 12 V.
- Source/Sink Current Output signal: 0/4-20 mA linear or reverse.
- Input and Output short circuit protection.
- Modbus RTU RS-485 Output.
- Out-of-range (burnout) fault detection.
- High Accuracy, μ P controlled A/D converter.
- Three port isolation, Input / Output / Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety systems.
- ATEX, IECEx Certifications.
- TÜV Certification and TÜV Functional Safety Certification.
- Fully programmable operating parameters.
- High Density: 1 channel, 2 trips with alarm relays.
- Optional alarm acknowledgement input.
- Simplified installation using standard DIN-Rail and plug-in terminal blocks, with or without power Bus, or customized Termination Boards.

Ordering Information:

Model: D5254S

Operating parameters are programmable by PC via USB with PPC5092 Adapter and related configurator software.

Power Bus and DIN-Rail accessories:

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

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: 110 mA max. with 20 mA input/output and alarm relays energized.

Power dissipation: 2.3 W max. at 24 V supply, 20 mA input/output and alarm relays energized.

Isolation (Test Voltage): I.S. Input / all Outputs 1.5 KV; I.S. Input / Supply 1.5 KV; I.S. Input / Ack 1.5 KV; Analog Output / Alarm Outputs 1.5 KV;

Analog Output / Supply 500 V; Analog Output / Ack 500 V; Alarm Outputs / Supply 1.5 KV; Supply / Ack 500 V, Alarm Output / AlarmOutput 1.5 KV.

Input: 0/4 to 20 mA (separately powered input, voltage drop ≤ 0.5 V) or 4 to 20 mA (2 wires Tx current limited at ≈ 25 mA), or voltage input ± 12 V.

Integration time: 100 ms. **Input range:** 0 / +25 mA for current, ± 12 V for voltage.

Resolution / Visualization: 1 μ A for current; 1 mV (± 12 V range).

Transmitter line voltage: 15.5 V typical at 20 mA with max. 20 mV ripple, 15.0 V minimum.

Acknowledgement 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: 10 mA max.

Fault: Out-of-range (burnout) fault detection can be enabled or disabled. Analog output can be programmed to detect fault condition with downscale or highscale forcing.

Alarms can be programmed to detect fault condition. Fault conditions are also signalled via Power Bus or Termination Board and by a red LED on the front panel.

Out-of-range: low and high separated trip point values are fully programmable.

Analog Output: Fully customizable 0/4 to 20 mA, on max. 300 Ω load source mode, current limited at 25 mA.

In sink mode, external voltage generator range is V min. 3.5 V at 0 Ω load and V max. 30 V. If generator voltage $V_g > 10$ V, a series resistance $\geq (V_g - 10)/0.024 \Omega$ is needed.

The maximum value of series resistance is $(V_g - 3.5)/0.024 \Omega$.

Resolution: 1 μ A. **Transfer characteristic:** linear or reverse.

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

Output ripple: ≤ 20 mVrms on 250 Ω .

Alarm: Trip point range: within rated limits of input sensor.

ON-OFF delay time: 0 to 1000 s, 100 ms step, separate setting.

Hysteresis: programmable over full measuring range.

Output: voltage free SPDT relay contacts (NO and NC).

Contact material: Ag Alloy (Cd free) or AgSnO₂.

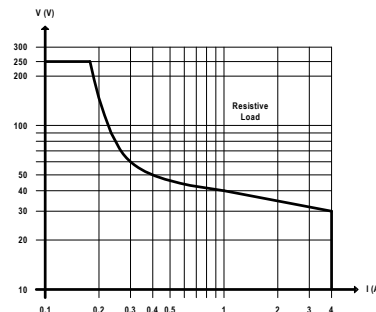
Contact rating: 4 A 250 Vac 1000 VA, 4 A 250 Vdc 120 W (resistive load).

Mechanical / Electrical life: $5 \times 10^6 / 3 \times 10^4$ operation, typical.

Bounce time NO / NC contact: 3 / 8 ms, typical.

Frequency response: 10 Hz maximum.

DC Load breaking capacity:



Modbus Output: for parameter configuration and fault indication. Modbus RTU protocol up to 115.2 Kbit/s with RS-485 connection on Power Bus connector.

Transmission cable length: ≤ 1000 m up to 115.2 Kbit/s.

Performance: Ref. Conditions 24 V supply, 250 Ω load, 23 ± 1 °C ambient temperature.

Input: Calibration and linearity accuracy: $\leq \pm 10$ μ A for current;

$\leq \pm 5$ mV (0-10 V range), for voltage. Temperature influence: $\leq \pm 0.005\%$ of input range for a 1°C change for current and voltage signals.

Analog: Calibration accuracy: $\leq \pm 0.05\%$ of full scale;

Output: Linearity error: $\leq \pm 0.05\%$ of full scale;

Supply voltage influence: $\leq \pm 0.02\%$ of full scale for min to max supply change;

Load influence: $\leq \pm 0.02\%$ of full scale for a 0 to 100% load resistance change;

Temperature influence: $\leq 0.005\%$ of output 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 95 %, up to 55 °C.

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

Safety Description:

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

IECEx: Ex nA nC [ia Ga] IIC T4 Gc, [Ex ia Da] IIC, [Ex ia Ma] I,

associated apparatus and non-sparking electrical equipment.

Uo/Voc = 26 V, Io/Isc = 91 mA, Po/Po = 588 mW at terminals 13-14

Uo/Voc = 1.1 V, Io/Isc = 56 mA, Po/Po = 16 mW at terminals 14-16

Uo/Voc = 1.1 V, Io/Isc = 0.012 mA, Po/Po = 0.004 mW at terminals 15-16

Ui/Vmax = 30 V at terminals 14-16 or 15-16,

Ii/Imax = 128 mA at terminals 14-16.

Ci = 2.1 nF, Li = 0 nH at terminals 13-14-15-16.

Um = 250 Vrms, -40 °C \leq Ta \leq 70 °C.

Approvals:

BVS 16 ATEX E 066 X conforms to EN60079-0, EN60079-11, EN60079-15.

IECEx BVS 16.0043X conforms to IEC60079-0, IEC60079-11, IEC60079-15.

TUV Certificate No. C-IS-722160171, SIL 2 conforms to IEC61508:2010 Ed.2.

TUV Certificate No. C-IS-236198-09, SIL 3 Functional Safety Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

Mounting: T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.

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

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

Protection class: IP 20.

Weight: about 120 g.

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

Parameters Table:

Safety Description	Maximum External Parameters			
	Group Cenelec	Co/Ca (μ F)	Lo/La (mH)	Lo/Ro (μ H/ Ω)
Terminals 13-14	IIC	0.096	4.34	N.A.
Uo/Voc = 26 V	IIB	0.767	17.36	242.2
Io/Isc = 91 mA	IIA	2.597	34.72	484.4
Po/Po = 588 mW	I	4.497	56.96	794.7
	IIIC	0.767	17.36	242.2
Terminals 14-16	IIC	1)	1)	1)
Uo/Voc = 1.1 V	IIB	1)	1)	1)
Io/Isc = 56 mA	IIA	1)	1)	1)
Po/Po = 16 mW	I	1)	1)	1)
Ui/Vmax= 30 V; li/lmax=128 mA	IIIC	1)	1)	1)
Ci = 2.1 nF, Li = 0 nH				
Terminals 15-16	IIC	1)	1)	1)
Uo/Voc = 1.1 V	IIB	1)	1)	1)
Io/Isc = 0.012 mA	IIA	1)	1)	1)
Po/Po = 0.004 mW	I	1)	1)	1)
Ui/Vmax= 30 V	IIIC	1)	1)	1)
Ci = 2.1 nF, Li = 0 nH				

1) Co, Lo and Lo/Ro parameters are determined by maximum allowed parameters of field device.

Image:



Function Diagram:

