



INSTRUCTION MANUAL

SIL 3 Digital Output Driver, NE Loads,
Bus Powered DIN Rail and
Termination Board, Model D6049S



Characteristics

General Description: The single channel Bus Powered Digital Output Isolator, D6049S, is suitable for driving solenoid valves, visual or audible alarms to alert a plant operator, or other process control devices from a driving signal. 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 3 level (according to IEC 61508:2010 Ed. 2) in safety related systems for high risk industries. The Safety PLC or DCS driving signal controls the field device through the D6049S, which provides isolation and is capable of monitoring the conditions of the line. Short and open circuit diagnostic monitoring, dip-switch selectable, operates irrespective of the channel condition and provides LED indication and NC transistor output signaling. When fault is detected output is de-energized until normal condition is restored. An override input, dip-switch selectable, is provided to permit a safety system to override the control signal. When enabled, a low input voltage always de-energizes the field device regardless of the input signal. Three basic output circuits are selectable, with different 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 terminal block. Mounting on standard DIN-Rail, with or without Power Bus, or on customized Termination Boards.

Functional Safety Management certification:

G.M. International is certified by TÜV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



Technical Data

Supply: 24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp, 2 A time lag fuse internally protected.

Current consumption @ 24 V: 65 mA with 45 mA output typical in normal operation.

Power dissipation: 1.1 W with 24 V supply, output energized at 45 mA nominal load.

Isolation (Test Voltage): Out/In 2.5 kV; Out/Supply 2.5 kV; Out/Fault-Override 2.5 kV; In/Supply 500 V; In/Fault-Override 500 V; Supply/Fault-Override 500 V.

Control input: switch contact, logic level reverse polarity protected.

Trip voltage levels: OFF status ≤ 5.0 V, ON status ≥ 20.0 V (maximum 30 V).

Current consumption @ 24 V: 15 mA max.

Override input: override control signal de-energizes output when enabled by dip-switch.

Override range: 24 Vdc nom (20 to 30 Vdc) to disable (field device controlled by input), 0 to 5 Vdc to de-energize field device, reverse polarity protected.

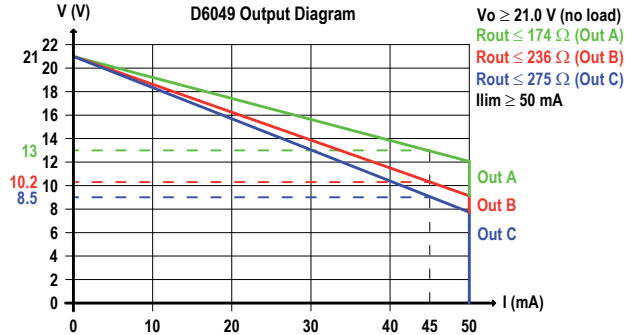
Current consumption @ 24 V: 15 mA max.

Output: 45 mA at 13.0 V (21.0 V no load, 174 Ω series resistance) at terminals 7-10 Out A.

45 mA at 10.2 V (21.0 V no load, 236 Ω series resistance) at terminals 8-10 Out B.

45 mA at 8.5 V (21.0 V no load, 275 Ω series resistance) at terminals 9-10 Out C.

Short circuit current: ≥ 50 mA (55 mA typical).



Response time: ≤ 30 ms (for direct input-output transfer); ≤ 75 ms (for inverted input-output transfer)

Frequency response: 50 Hz

Fault detection: field device and wiring open circuit or short circuit detection dip-switch selectable. When fault is detected output is de-energized until normal condition is restored.

Short output detection: load resistance $\leq 50 \Omega$ (≈ 2 mA forcing to detect fault).

Open output detection: load resistance > 10 k Ω .

Fault signalling: voltage free NE SPST optocoupled open-collector transistor (output de-energized in fault condition).

Open-collector rating: 100 mA at 35 Vdc (≤ 1.5 V voltage drop).

Leakage current: $\leq 50 \mu$ A at 35 Vdc.

Response time: ≤ 75 ms.

Compatibility:



CE mark compliant, conforms to Directive: 2014/30/EU EMC, 2014/35/EU LVD, 2011/65/EU RoHS.

Environmental conditions:

Operating: temperature limits -40 to $+70$ $^{\circ}$ C, relative humidity 95 %, up to 55 $^{\circ}$ C.

Storage: temperature limits -45 to $+80$ $^{\circ}$ C.

Approvals:



TUV Certificate No. C-IS-722134640-01, SIL 3 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.

Weight: about 130 g.

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

Protection class: IP 20.

Dimensions: Width 12.5 mm, Depth 123 mm, Height 120 mm.

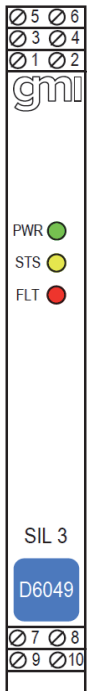
Ordering information

Model: D6049S

Power Bus and DIN-Rail accessories:
Connector JDFT049
Terminal block male MOR017

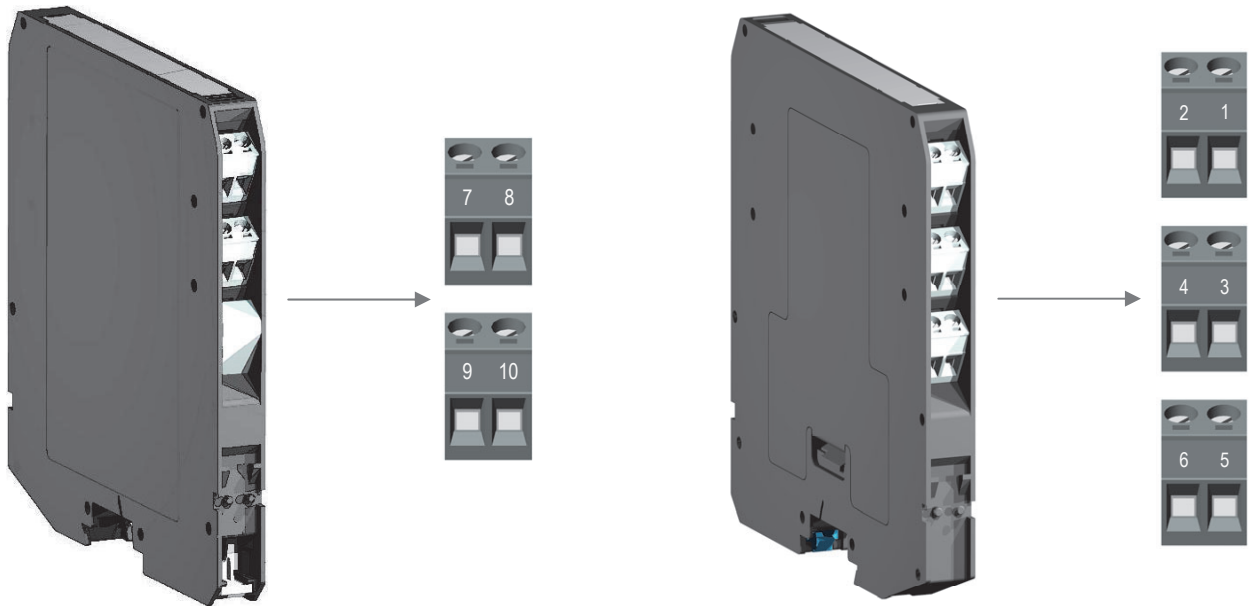
Cover and fix MCHP196
Terminal block female MOR022

Front Panel and Features



- SIL 3 according to IEC 61508:2010 Ed. 2 for Tproof = 12 / 20 yrs ($\leq 10\%$ / $> 10\%$ of total SIF).
- PFDavg (1 year) 8.32 E-06, SFF 98.91 %.
- SIL 3 Systematic capability
- Bus powered for NE loads.
- Short and open circuit line diagnostic monitoring with LED, transistor output.
- Output short circuit proof and current limited.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety system.
- In-field programmability by DIP Switch.
- TÜV Certification.
- TÜV Functional Safety Certification.
- Simplified installation using standard DIN-Rail and plug-in terminal blocks, with or without Power Bus, or customized Termination Boards.

Terminal block connections



7 + Output A for Solenoid Valve

8 + Output B for Solenoid Valve

9 + Output C for Solenoid Valve

10 - Output for Solenoid Valve

1 + Control Input

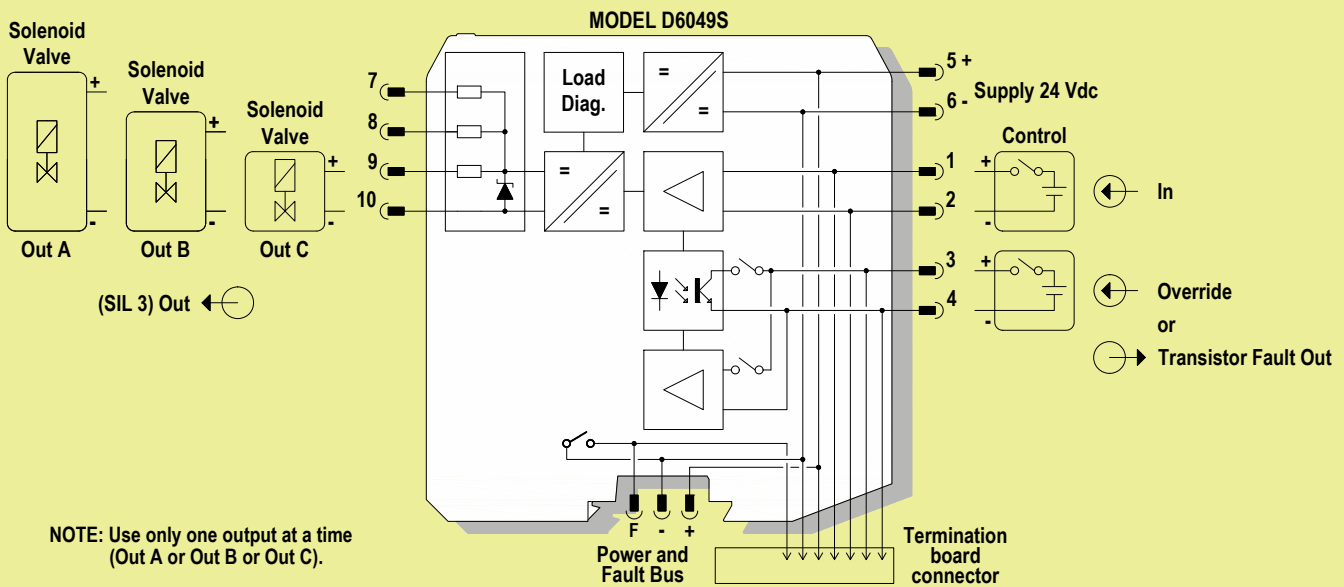
2 - Control Input

3 + Transistor Fault Output or + Input Override

4 - Transistor Fault Output or - Input Override

5 + Power Supply 24 Vdc

6 - Power Supply 24 Vdc



NOTE: Use only one output at a time (Out A or Out B or Out C).

Terminals 3-4 dip-switch selectable for fault output signaling or override control

Warning

D6049S must be installed, operated and maintained only by qualified personnel, in accordance to the relevant national/international installation standards. 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 single channel Bus Powered Digital Output Isolator, D6049S, is suitable for driving solenoid valves, visual or audible alarms to alert a plant operator, or other process control devices from a driving signal. 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 3 level (according to IEC 61508) in safety related systems for high risk industries. The Safety PLC or DCS driving signal controls the field device through the D6049S, which provides isolation and is capable of monitoring the conditions of the line. Short and open circuit diagnostic monitoring, dip-switch selectable, operates irrespective of the output condition and provides LED indication and NC transistor output signaling. When fault is detected output is de-energized until normal condition is restored. An override input, dip-switch selectable, is provided to permit a safety system to override the control signal. When enabled, a low input voltage always de-energizes the field device regardless of the input signal. Three basic output circuits are selectable, with different 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 terminal block. Presence of supply, status of output, as well as integrity or fault condition of device and connecting line are displayed by signaling LEDs (green for power, yellow for status, red for fault).

Installation

D6049S is a Digital Output Driver housed in a plastic enclosure suitable for installation on T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board. D6049S 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.

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 on the corresponding section, as an example:

Connect 24 Vdc power supply positive at terminal "5" and negative at terminal "6".

Connect positive input at terminal "1" and negative input at "2".

Connect positive transistor fault output or positive input override at terminal "3" and negative at "4".

Connect positive output A for solenoid valve at terminal "7" and negative at "10" or output B at terminal "8" and negative at "10" or output C at terminal "9" and negative at "10".

Connect SPST fault output transistors checking the load rating to be within the maximum rating (100 mA at 35 Vdc (≤ 1.5 V voltage drop)).

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.

Any penetration of cleaning liquid must be avoided to prevent damage to the unit. Any unauthorized card modification must be avoided.

According to EN61010, D6049S must be connected to SELV or SELV-E supplies.

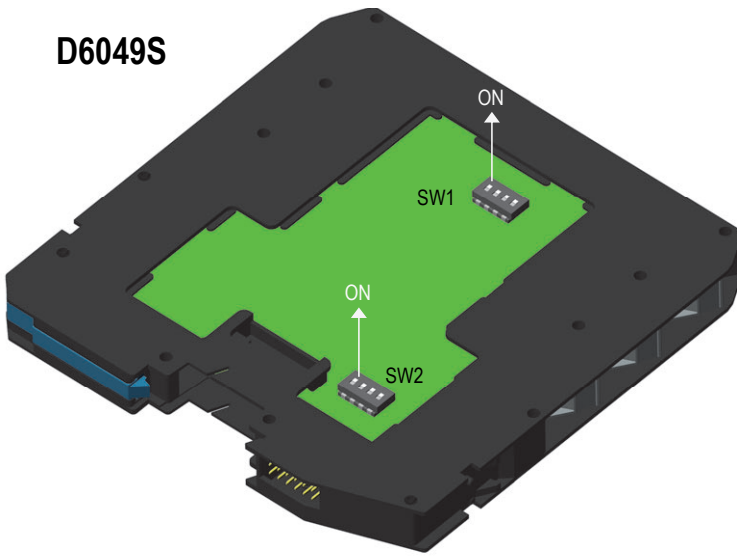
Start-up

Before powering the unit check that all wires are properly connected, particularly supply conductors and their polarity, input and output wires. Check conductors for exposed wires that could touch each other causing dangerous unwanted shorts. Turn on power, the "power on" green led must be lit, status led must be in accordance with condition of the input line. If possible close and open input line checking the corresponding status and fault LEDs condition as well as output to be correct.

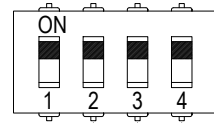
Configuration

A configuration DIP switches are located on component side of pcb. These switches allows the configuration of input/output relationship, override input and fault detection functions.

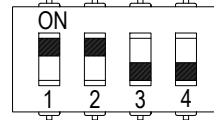
D6049S



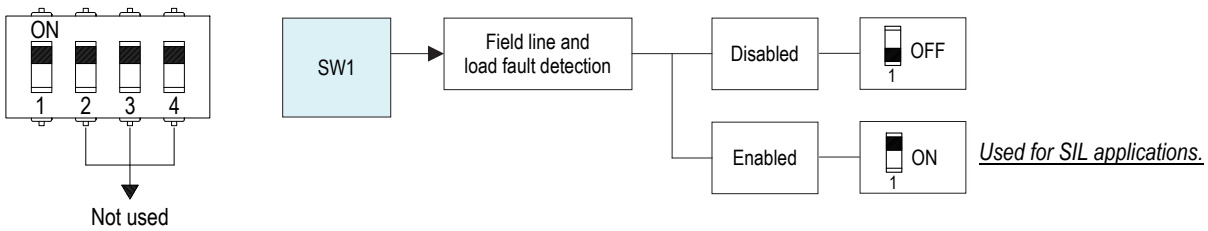
SW1 factory settings
All DIP-switches are ON



SW2 factory settings
DIP-switches 1-2 are ON
and 3-4 are OFF



SW1 dip switch configuration



SW2 dip switch configuration

