



Digital Input/Output Module (DIO)

MODULE FUNCTIONS

The Trainnet® Digital Input/Output Module (DIO) provides a standard interface for digital input and output signals. The Trainnet® DIO receives the digital signals via its input channels and makes them available to the train computer's CPU Module. The Trainnet® DIO receives instructions from the train computer's CPU Module and sends digital signals to the sub-systems accordingly via its output channels. Separate channels are provided for frequency measurements (can be used for tachometer inputs).

The Trainnet® Digital Input/Output Module can be used as a part of a Trainnet® TCMS, VCU or Event Recorder. Alternatively, the Trainnet® DIO can be fitted in the Trainnet® Remote I/O Module (RIOM).

KEY FEATURES

The Trainnet® DIO has 24 input channels and 8 channels which can be used either as input channels or output channels. With DIO2908B and DIO2378A up to four outputs can be connected in parallel to increase output current. Additionally, DI-

O2378A has 2 frequency input channels, whereas DIO1823A has 2 high speed input channels.

One special feature of the DIO module is to support the UIC-556 sleep mode. The DIO can remain active with WTB modules, and provide local inauguration and battery voltage monitoring.

The module also provides emergency output short circuit protection: if the output current exceeds its maximum value, the short circuit protection shuts down the output. The status of the short circuit protection is available to the train computer's CPU module. If the communication between the train computer's CPU and the module fails, the module's output channel goes to a state defined in the application software (emergency output), which can be individually set for each single channel.

The module's own 32-bit embedded processor implements diagnostics functions and reports to the train computer's CPU module if it suspects that the input values cannot be

trusted. Each input channel has a common test circuit, which is used for real-time diagnostics of the channel. This test is carried out during power-on and repeated during normal operation. The input and output states, and their configuration parameters (wetting current, threshold levels) are accessible by the train computer's CPU module.

Two separate group voltages with common ground allow split behind two circuit breakers, or having a mixed voltage system. Input and Input/Output channels are split evenly between group voltage 1 and 2. Please note that the groups are not isolated from each other.

SIL-2 CERTIFIED

The module development is based on the railway standards EN 50126, EN 50128 and EN 50129 that are in accordance with safety integrity level SIL 2. A non-SIL version of the module is also available.

SIL-2

- EN 50126
- EN 50128
- EN 50129
- EN 50155
- EN 45545



TECHNICAL SPECIFICATIONS

Dimensions (W x H x D): 4 TE x 3 U x 160 mm

Weight: 140 g (DIO1823A: 179 g)

Input Power: 5 V DC \pm 5% (500 mA max., 200 mA typ.)

Temperature Range (operational)
-40 °C...+70 °C

MTBF (40 °C ambient temperature)

2 520 000 h (DIO1823A)

2 360 000 h (DIO2378A)

1 350 000 h (DIO2908B) (SIL 2)

I/O Connector: DIN41612-F48 (at front)

Host Interface: RS 485

Input-only Channels: 24

Input/Output Channels: 8

Frequency Input Channels: 2 (DIO2378A)

High Speed Input Channels: 2 (DIO1823A)

Frequency/High Speed Input Range: 0...32 kHz, resolution 1 Hz

Battery Voltage Monitor: Yes, one or two (UIC-556)

Temperature Measurement: Yes, local CPU

Input type: Current sink

Output Type: High side (FET) from battery voltage

Voltage Drop: Max. 2 V

Input/Output Voltage Range

16.8...137.5 VDC (1 sec 14...154 VDC)

Threshold levels: Software selectable (both, positive and negative) (either V or % V_b)

Wetting Current

0 ... 20 mA, Software selectable (DIO1823A)

0 ... 23 mA, Programmable (DIO2378A)

20 mA (DIO2908B)

Output Current: 1.0 A Continuous