TRS System

TRS-LED

External documentation

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Notes

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TABLE OF CONTENTS

CONTENTS **5**

1 DESCRIPTION **6**

2 TECHNICAL SPECIFICATIONS **8**

2.1 Output lines 8
2.2 Power supply 8
2.3 Mounting on DIN rails type EN50022 and EN50035 8
2.4 TRS-LED addressing 8
2.5 Connection to RS485/RS422 serial line 8
2.6 Managing the signalling LEDs 9
2.6.1 Red LED “ERROR” 9
2.6.2 Green LED “MCU_ON” 9
2.6.3 Green LED “POWER” 9

3 ELECTRICAL FEATURES **10**

4 LED STRIP CONSUMPTION **10**

5 CONNECTORS **11**

5.1 Weidmuller 1520160000 8-pin connector (J5, J6) 11
5.2 DB9 RS422/RS485 connector (CN31, CN32) 11
5.3 LED-EXTENDER connector 12

6 SWITCH **13**

6.1 SW1 13
6.1.1 Baudrate RS485/RS422 13
6.1.2 PurpleBus remote address 13
6.2 SW2 14
6.2.1 RS422 Configuration 14
6.2.2 RS485 Configuration 14

7 WIRING **15**

7.1 Direct connection to LEDs 15
7.2 Differential connection to LEDs via LED-EXTENDER 16

8 DIMENSIONS **17**

9 GPL LIBRARY **18**

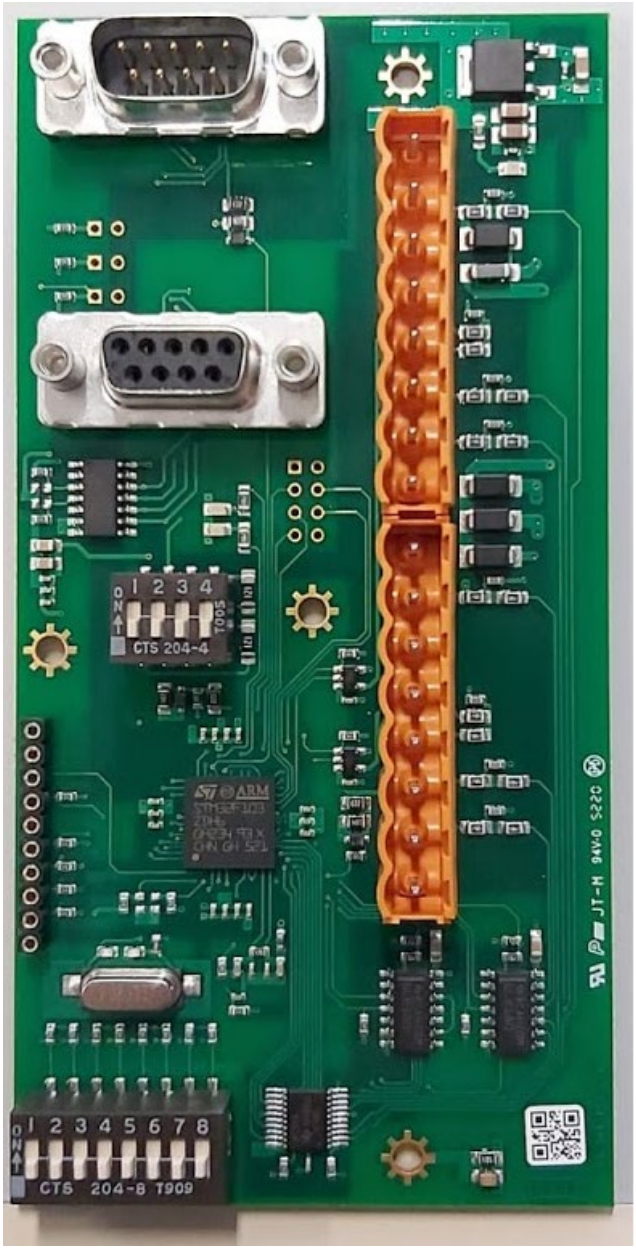
9.1 Diagnostics 18

REVISIONS

Revision number	Date	Protocol	List of changes and/or modified paragraphs
Rev. 0	03/02/2021		First release
Rev. 1	13/04/2023		LED-Extender description

CONTENTS

This document describes the TRS-LED remote module.



1 DESCRIPTION

This document outlines the technical specifications of the TRS-LED receiver.

The TRS-LED device is a remote receiver unit for a RS422/RS485 bus.
The device can receive commands through the RS422/RS485 interface and manage up to 1000 LEDs per channel.
The commands exchanged via the RS422/RS485 interface are compliant with TPA PurpleBus* protocol, very similar in essence to MODBUS.
As for RS485/RS422 interface, the available speeds are 19.2 kbps, 38.4 kbps, 57.6 kbps, and 115.2 kbps.

The board can control up to 2 LED strip channels, with maximum 5 metres of strips or 1000 LEDs per channel.
The LED strip must comply with the WS2812B protocol.
The strips can be powered through TRS-LED at 15 A maximum per channel; when this limit is exceeded, it is necessary to directly wire the power supply on the LED strips.

The device can be used in two configurations:

- By directly connecting the LEDs to the board, if it is possible to place them at a distance of less than 20 cm.
- By using a differential serial transmission between TRS-LED and the LED strip by means of the LED-EXTENDER device, if the LEDs have to be placed at a distance of more than 20 cm. If this configuration is used, it is necessary to activate the TRS-LED differential outputs with the specific command of “PURPLE.slib” library.

As for all TRS modules, the TRS-LED module dimensions are compatible with the TRS format.
It is mounted on DIN rail, type EN50022 and EN50035.

*The PurpleBus protocol was developed by TPA Srl.

For further information, please contact TPA Srl.

2 TECHNICAL SPECIFICATIONS

Some technical aspects of the TRS-LED, based on the features of the device described in the previous chapter, are outlined below.

2.1 Output lines

There are two output lines, which can be configured as single-ended or double-ended outputs.
The configuration of the output type is managed by the software through PurpleBus commands.
The two outputs are used to control the LED strips.
The output signal is compliant with the WS2812B protocol (0-5 V logic serial signal).
The signal speed is 2.5 MHz and the voltage is 5 V.
The output lines are supplied on two separate terminals.

2.2 Power supply

TRS-LED is powered at +5 V direct voltage through an 8-pin connector (Windmilled type 1520160000 – see pin-out of CN1 or CN2 connector).
The maximum consumption of the board logic is 150 mA, while each LED channel can reach a maximum consumption of 15 A.

2.3 Mounting on DIN rails type EN50022 and EN50035

TRS-LED must be mounted on a DIN rail type EN50022 or EN50035 with the rear spring coupling. To attach and detach, use a flat-blade screwdriver to move the coupling tab back, in order to retract it and allow it to hook or unhook the rail.
Warning! The metal coupling to the DIN rail is electrically connected to the ground of the TRS-LED electrical circuit: the ground connection **MUST** be supplied through this coupling (i.e., the DIN rail must be grounded).

2.4 TRS-LED addressing

It is possible to control up to 15 remote devices via the PurpleBus BUS.
Each of these remote devices must have an address that allows the system to uniquely recognize one remote device from another.
To assign a software address to a TRS-LED, we need to act on the SW1 DIP switch on the front panel.

2.5 Connection to RS485/RS422 serial line

It is possible to connect to the line via one of the two DB9 connectors.
If the RS485 interface is used, it is necessary to turn off the SW2 switches 1 and 2, otherwise, if the RS422 interface is used, it is necessary to turn on the SW2 switches 1 and 2.
If the device is the last in the chain of devices connected to the RS485 interface, it is necessary to turn off switch 4 of SW2 in order to insert a termination.
If the device is the last in the chain of devices connected to the RS422 interface, it is necessary to turn off switches 3 and 4 of SW2 to insert the terminations.

2.6 Managing the signalling LEDs

2.6.1 Red LED “ERROR”

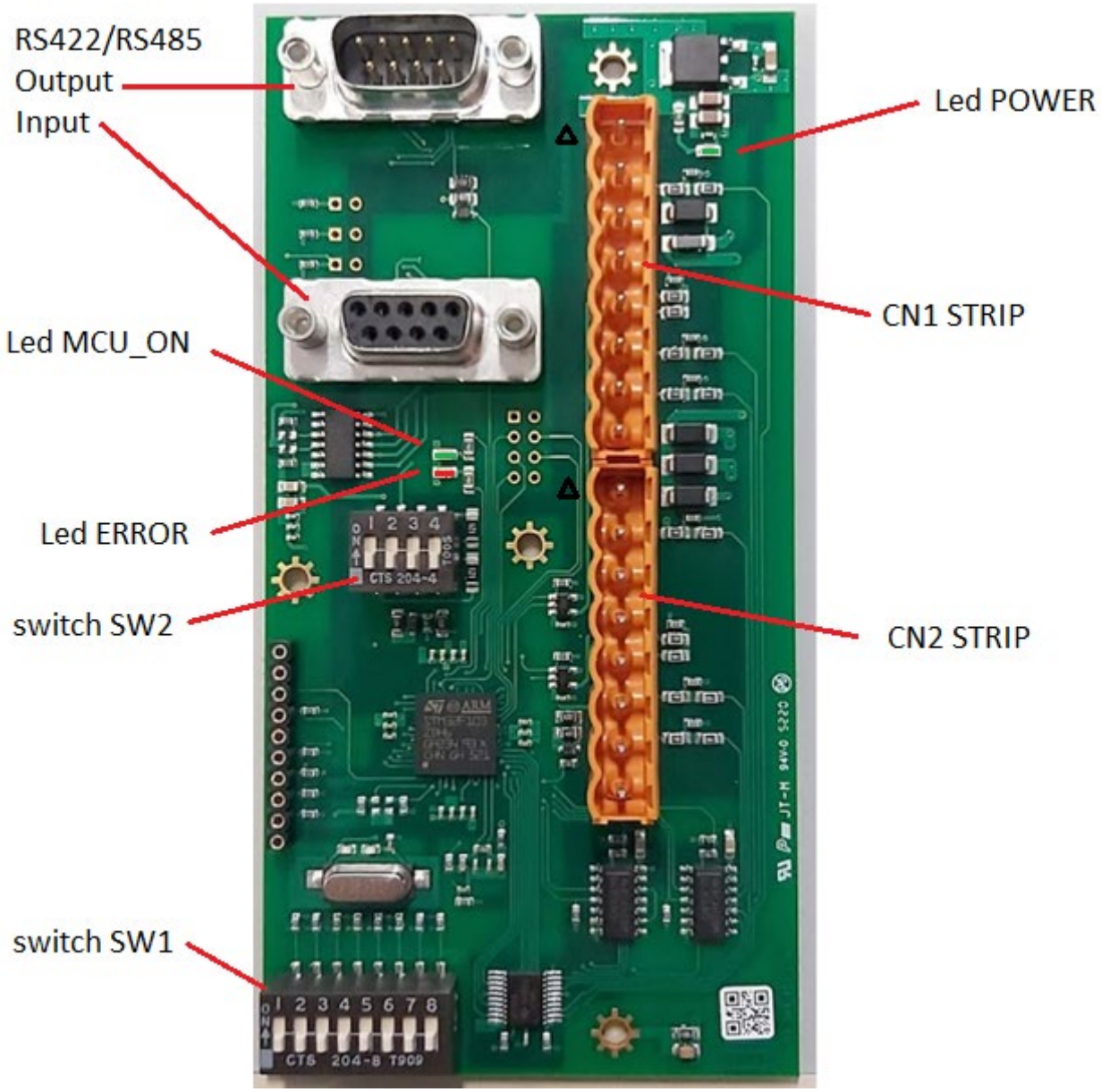
It suggests that the microcontroller is in an error status.

2.6.2 Green LED “MCU_ON”

It suggests that the microcontroller is programmed and active.

2.6.3 Green LED “POWER”

It suggests that the microcontroller power supply is present.



3 ELECTRICAL FEATURES

Parameter	Min	Typ	Max	Unit
Vdc supply voltage	4.5	5	5.5	V
TRS-LED current			150	mA
2 m LED strip current with 100% maximum intensity			15	A
Single-ended signal	0		Vdc	V
Differential signal	0		+ Vdc	V

4 LED STRIP CONSUMPTION

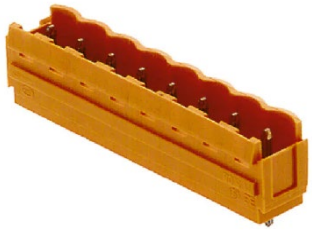
The maximum intensity of LEDs can be limited to 5%, 10%, or 20% by “PURPLE.slib” library.
The LED strip current consumption per metre is:

- 0.7 A with maximum intensity at 10% and with all RGB colours active.
- 1.5 A with maximum intensity at 20% and with all RGB colours active.

5 CONNECTORS

5.1 Weidmuller 1520160000 8-pin connector (J5, J6)

The corresponding female connector is: Weidmuller 1527010000.

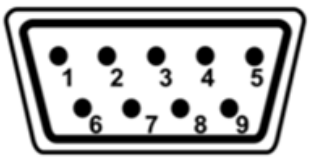


PIN	CN1-STRIP	CN2-STRIP	Function	Notes
1	+5 V LED Input	+5 V LED Input	LED power supply – input	Max 15 A
2	+5 V Logic	+5 V Logic	Logic power supply (#)	Optional
3	0 V	0 V	0 V – input	Max 15 A
4	0 V	0 V	0 V – output	Max 15 A
5	NC	NC	Not connected	
6	SERIAL_D –	SERIAL_D –	LED-EXTENDER negative differential Serial Output	
7	SINGLE SERIAL OUTPUT / SERIAL D+	SINGLE SERIAL OUTPUT / SERIAL D+	LED strip Serial Output / LED-EXTENDER positive differential Serial Output	
8	5 V LED Output	5 V LED Output	LED power supply - output	Max 15 A

(#) supplying +5 V on pin1, the logic is also powered.

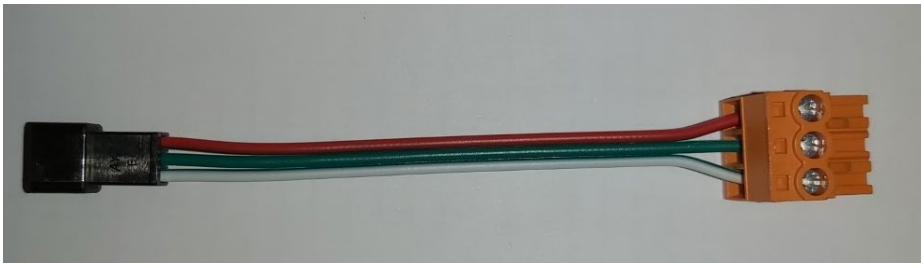
5.2 DB9 RS422/RS485 connector (CN31, CN32)

There are 2 DB9 connectors (Female = IN, Male = OUT).



PIN	RS485	RS422
1	DATA-	RX-
2	DATA+	RX+
3	NC	TX+
4	NC	TX-
5	GND	GND
6	NC	NC
7	NC	NC
8	NC	NC
9	NC	NC

5.3 LED-EXTENDER connector



PIN	Colour	FUNCTION
1	Red	+5 V
2	Green	Signal
3	White	0 V

6 SWITCH

Through the switches on the device, it is possible to change the following parameters:

- Baudrate RS422/RS485.
- PurpleBus remote address.
- RS422 or RS485 communication.
- Last remote unit connected on the RS482/RS485 line.

6.1 SW1

Switch	Function
1	Speed_bit1
2	Speed_bit0
3	Reserved = OFF
4	Reserved = OFF
5	Address_bit3
6	Address_bit2
7	Address_bit1
8	Address_bit0

6.1.1 Baudrate RS485/RS422

Baudrate RS422/RS485	Speed_bit1	Speed_bit0
19.2 kb/s.	OFF	OFF
38.4 kb/s.	OFF	ON
57.6 kb/s.	ON	OFF
115.2 kb/s.	ON	ON

6.1.2 PurpleBus remote address

The address of the PurpleBus remote unit is 8-bit, and consists of:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	SW1.5	SW1.6	SW1.7	SW1.8

Address set-up via Switch:

Address	Switch 5	Switch 6	Switch 7	Switch 8
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	ON	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
15	ON	ON	ON	ON

6.2 SW2

Switch	Function
1	RX- connected with TX-
2	RX+ connected with TX+
3	TX termination resistor
4	RX termination resistor

6.2.1 RS422 Configuration

SW2 switch	Switch status
1	OFF
2	OFF
3	ON if last remote unit, otherwise OFF
4	ON if last remote unit, otherwise OFF

6.2.2 RS485 Configuration

SW2 switch	Switch status
1	ON
2	ON
3	OFF
4	ON if last remote unit, otherwise OFF

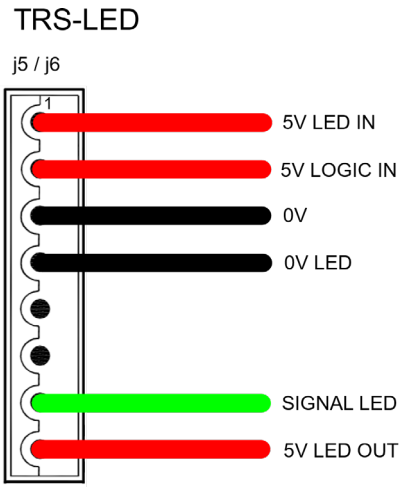
7 WIRING

It is possible to wire the device so that it can be used in two different configurations:

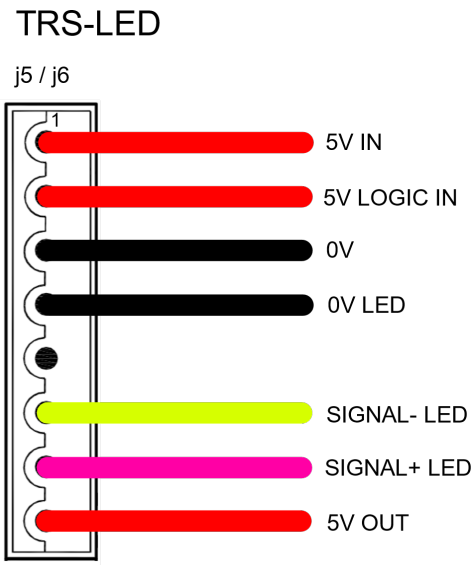
- By directly connecting the LEDs to the board, if it is possible to place them at a distance of less than 20 cm.
- By using a differential serial transmission between TRS-LED and the LED strip by means of the LED-EXTENDER device, if the LEDs have to be placed at a distance of more than 20 cm.

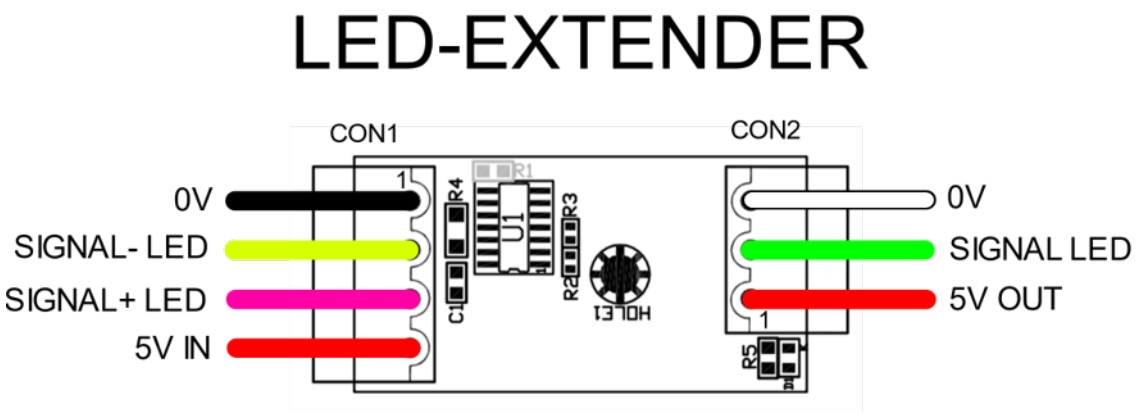
As far as power cables are concerned, using at least AWG12 cables that can support 15 A is recommended.
As for differential data transmission cables, using a twisted and shielded cable is recommended. The screen can be connected on at least one side either to ground or to negative (not both).

7.1 Direct connection to LEDs



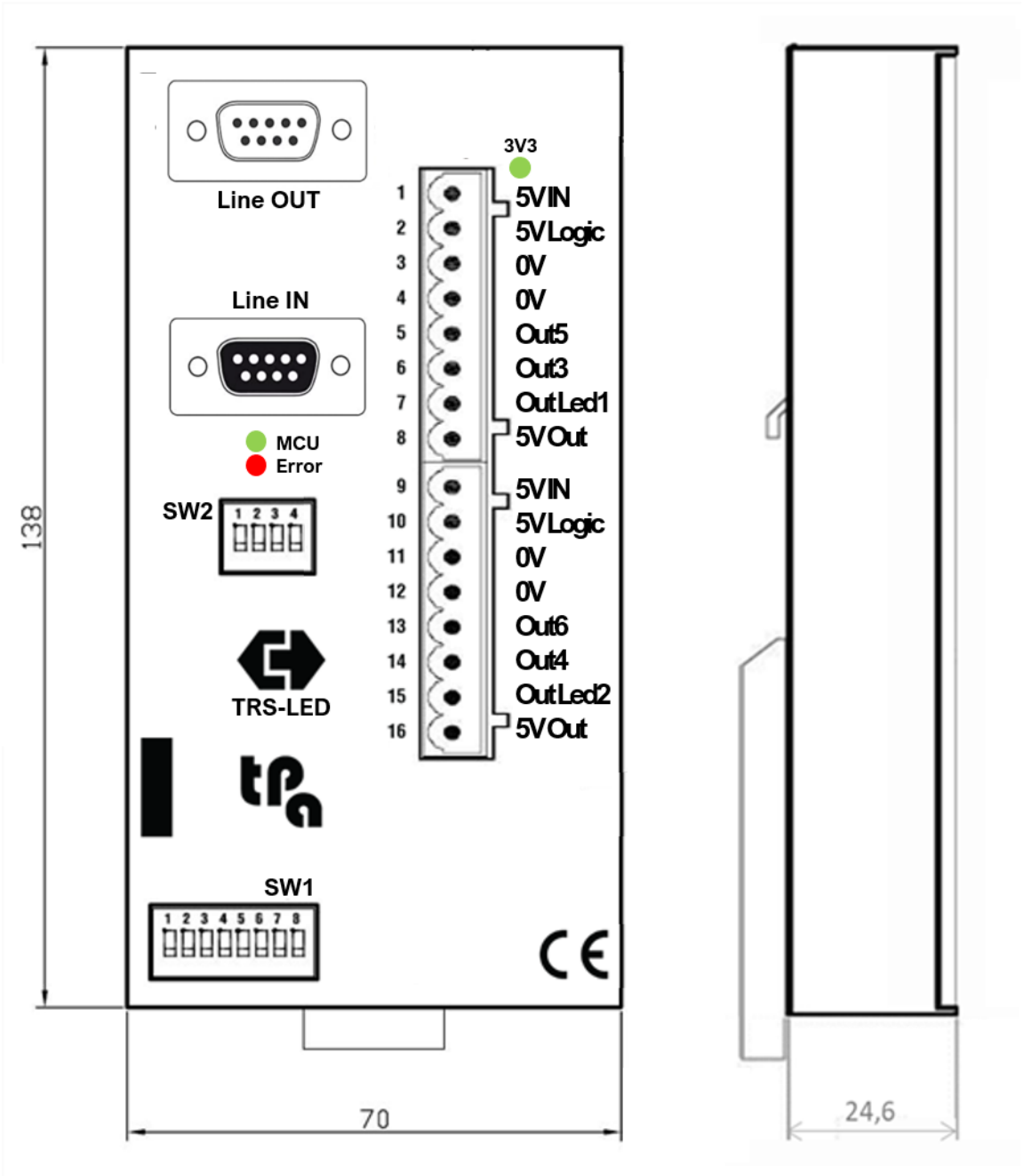
7.2 Differential connection to LEDs via LED-EXTENDER





8 DIMENSIONS

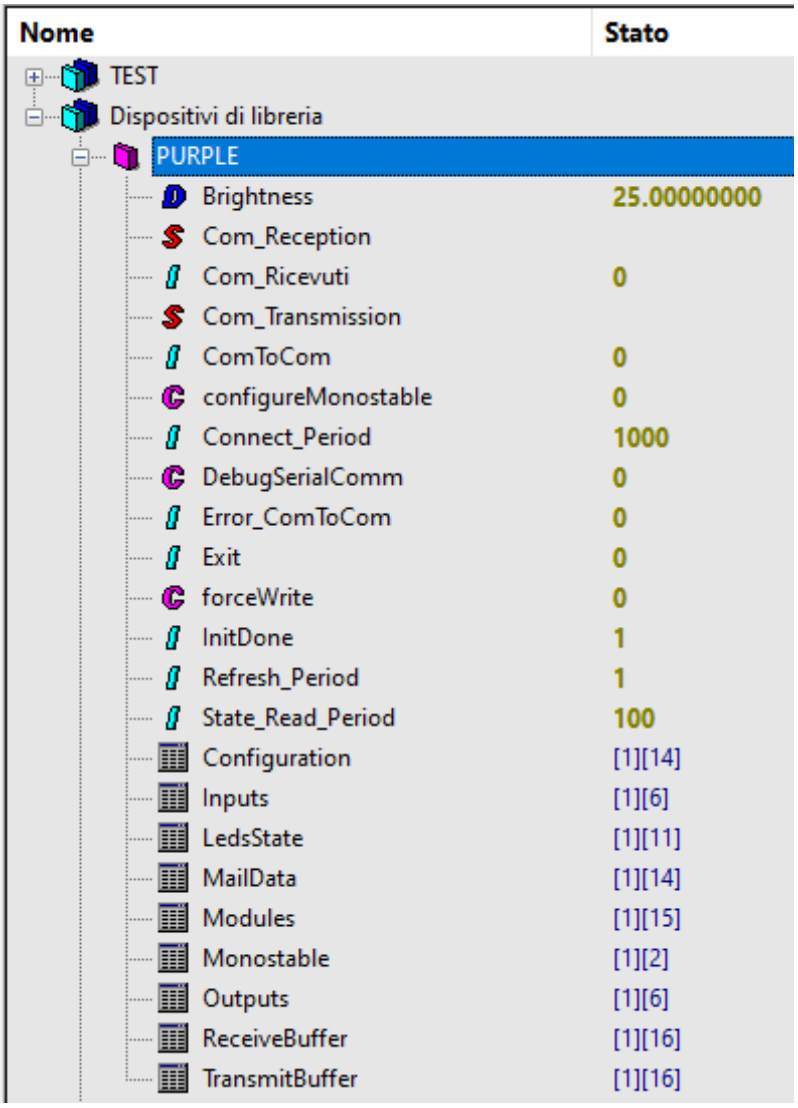
The device dimensions are 140 mm x 70 mm x 25 mm.



9 GPL LIBRARY

For further information, please refer to the documentation on “PURPLE.slib” library.

9.1 Diagnostics



Inserting the GPL library, this is how it looks in Albatros Diagnostics menu.

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