

# TE485

Measuring converter for strain gauges

Communication via RS485



# TE485

## Catalogue sheet

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**Firmware change history**

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**7/2023 - firmware version 11**

- Added 3 mV/V bridge sensitivity - see complete list of sensitivities in Table 1.
- New option to set the measurement speed - optionally between 6.25 and 50 SPS.

## ABOUT THE DEVICE

The TE485 measurement converter can convert the value from force sensors (strain gauges) into a digital number, readable for example from a PC or other higher-level system.

Measurements in the TE485 are performed by a precision low-noise A/D converter. The output is a value of  $\pm 32767$  parts, but for a more thorough signal analysis it is also possible to read the value directly from the DAC.

*What is a strain gauge?* Strain gauges are used wherever forces need to be measured - for example, when measuring the weight of materials or even whole vehicles and larger units, or when analyzing the deformation of materials under load, etc.

### Application of strain gauges

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- Measurement of pressure, weight and deformation.
- Accurate weighing of vehicles including differential weighing to determine load weight.
- Weighing the material in the tank by accurately measuring the total weight of the tank.
- Determination and analysis of stresses on structural elements, components or even entire structures such as bridges, etc.
- Torque measurement.
- Deformation measurement in the aerospace industry.
- Analysis of the influence of temperature and pressure on the mechanical stability of materials.

### Features

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- One input for strain gauge (four-wire connection).
- Bridge sensitivity 2 to 50 mV/V selectable in several steps.
- $\Sigma\Delta$  A/D converter.
- Measuring range divided into  $\pm 32\,767$  parts.
- User-selectable measurement rate of 6.25 or 50 samples per second.
- Communication via RS485.
- Communication protocol Spinel or MODBUS RTU.
- Wix measurement software for displaying and storing values in a Windows environment.
- Power supply from an external 8 to 30 V supply.
- Industrial design with IP65 protection.

**WIRING**

**Measuring input**

The cables between the strain gauge and TE485 must be as short as possible. If possible, it is recommended to connect the original strain gauge cables directly to the TE485.

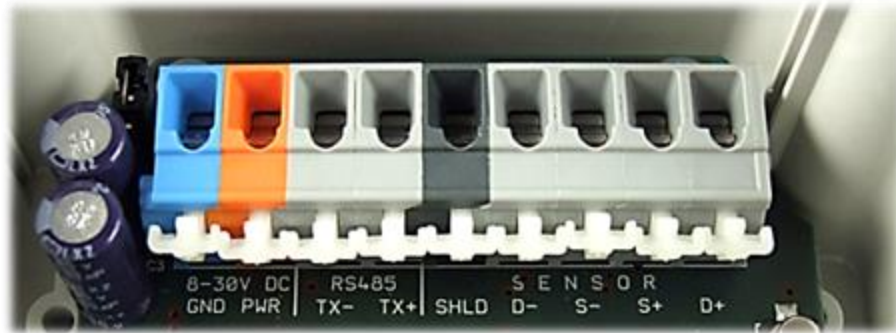


Fig. 1 - connection terminals in the device

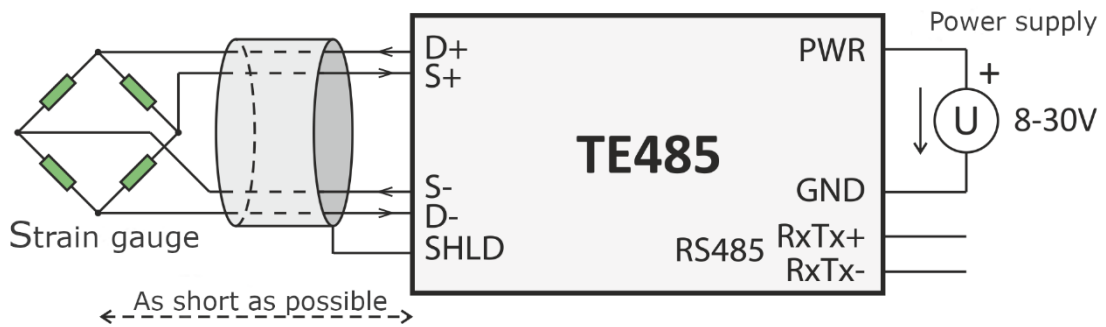


Fig. 2 - Example of connecting one strain gauge bridge

Multiple strain gauge bridges can be connected to the TE485, as shown in the following diagram.

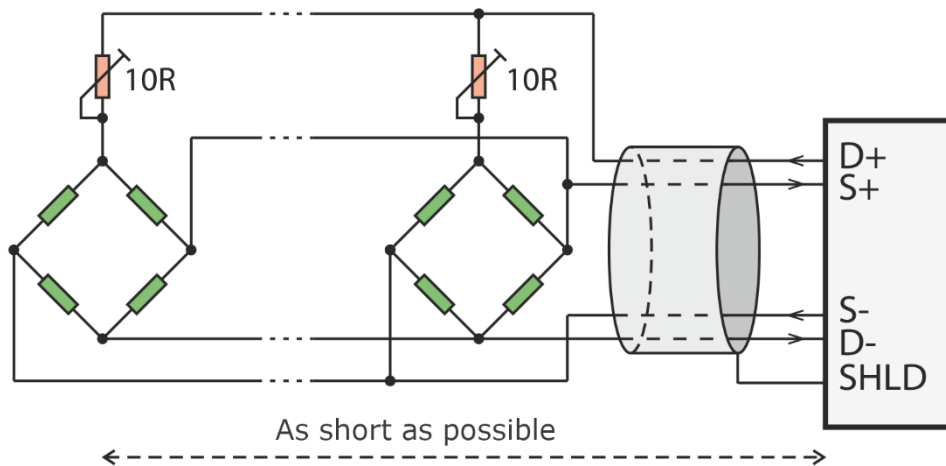


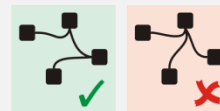
Fig. 3 - Example of connecting multiple strain gauge bridges

When connecting multiple bridges, only use types that can work in parallel. A maximum of 4 bridges can be connected to the TE485. The trim tabs on the bridges are used to compensate for the different constants of the individual strain gauges.

## RS485 communication line

Some basic recommendations for wiring the RS485 line:

- We recommend to use a common TP cable for computer networks (UTP, FTP or STP) and to use one twisted pair of this cable as the conductor for RS485.
- All devices on the line must be connected "from one to the other" and not into a "star" (see picture on the right). The maximum length of the line is 1.2 km.
- Terminations must be connected at the ends of the line. On the TE485 side, short-circuit the IMP jumper (to the left of the power supply GND).
- Connect any cable shielding at only one point on the line.



The RS485 differential line is used for communication, which is carried by two wires: RxTx+ (A) and RxTx- (B). Connect these wires to the same marked wires on the opposite device.

For connection to a PC it is possible to use standard RS485 converters. For example [SB485L](#) (USB connection), [GNOME485](#) (Ethernet connection) or [UC485](#) (RS232 connection).

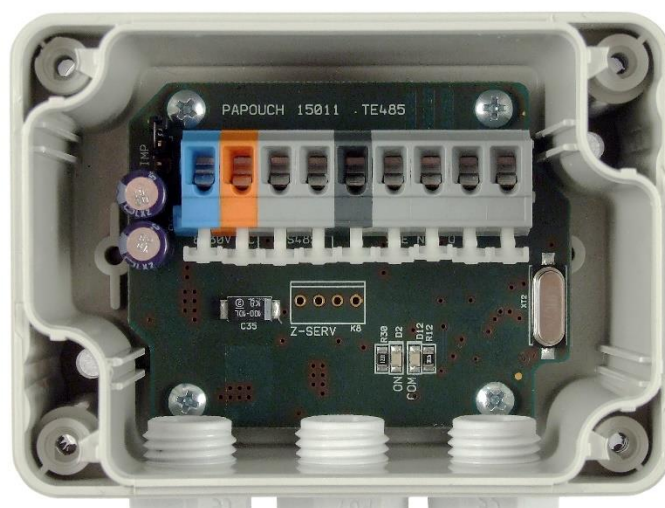
## Power

The device requires a supply voltage of 8 to 30 V DC for operation. The polarity is indicated by the color of the terminals (red is the positive pole). The device has built-in protection against polarity reversal and surge suppression on the power supply.

## INDICATIONS

Inside the device, on the electronics board, there are two indicator lights indicating operating conditions:

- **ON** (green): Lights up when the power supply is connected.
- **COM** (yellow): flashes after initialization after power on, and also when communicating on RS485.



## COMMUNICATION PROTOCOLS – SPINEL AND MODBUS

Complete descriptions of the Spinel and MODBUS RTU communication protocols, which TE485 communicate are available for download at [TE485 at papouch.com](#).

**TECHNICAL PARAMETERS****Analog input:**

Input type for ..... strain gauge, bipolar

Method of connection ..... four-wire

A/D converter .....  $\Sigma\Delta$ Min. resistance of strain gauge .... 50  $\Omega$ 

Tensiometer power supply ..... 5 V DC

Output resolution .....  $\pm 32,767$  parts

Total error ..... 1 part

Temperature drift<sup>0</sup> ..... .07 parts/ $^{\circ}\text{C}$ 

Nominal range [mV]	Maximum [mV]	Sensitivity [mV/V]
10 (default)	12,5	2
15	18,75	3
25	31,25	5
50	62,5	10

Table 1 - User-selectable ranges of bridges

Measurement speed ..... 6.25 SPS (default) or 50 SPS

**Control interface:**

Type ..... RS485

Communication speed ..... adjustable from 300 Bd to 115.2 kBd (default: 9.6 kBd)

Number of data bits ..... 8

Parity ..... none

Number of stop-bits ..... 1

Communication protocols ..... Spinel and MODBUS RTU

Default communication protocol ..... Spinel

Minimum delay before sending a response<sup>2</sup> ms<sup>1</sup>**Power supply:**

Supply voltage ..... DC 8 to 30 V

Polarity protection ..... yes

Pulse surge protection ..... yes

Current draw ..... Typ. 20 mA at 12 V

**Others:**

Connectors ..... Wago 255

<sup>1</sup> The delay is included because of waiting for the communication direction to be switched to RS485.

Working temperature ..... -20 °C to +70 °C  
Working humidity of electronics ..... max. 90% RH, non-condensing  
Ingress protection..... IP65  
Dimensions ..... 82 × 82 × 57 mm  
Weight..... 130 g

*Do not hesitate to contact us in case of further specific requirements for the TE485 module design and functions.*









# Papouch s.r.o.

Data transmission in industry, line and protocol conversions, RS232/485/422/USB/Ethernet/GPRS/WiFi, measurement modules, intelligent temperature sensors, I/O modules, and custom-made electronic applications.

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