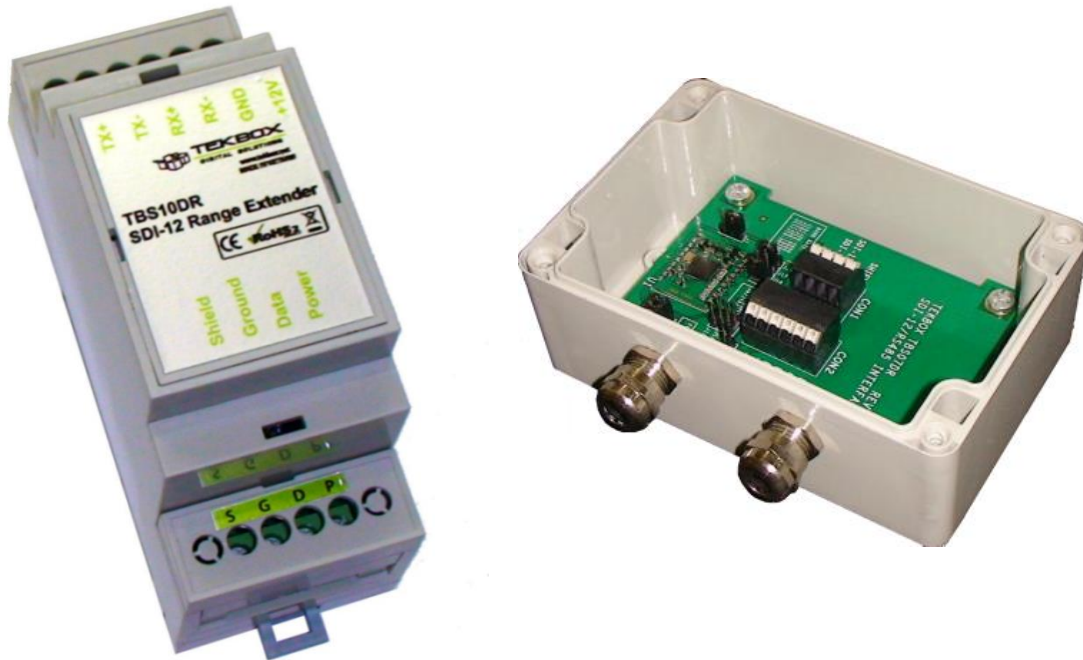


SDI-12 range extender

The TBS10DR range extender is a SDI-12 to RS485 converter device which works together with the TBS07 RS485 to SDI-12 interface. It transparently, bidirectionally forwards SDI-12 commands and SDI-12 measurement responses. The TBS10DR connects to the SDI-12 interface of a data logger or telemetry unit on one end and to one or more TBS07DR on the other end which are connected to SDI-12 sensors. The SDI-12 range extender is designed for sensor networks spread across a large area or covering larger distances than specified for SDI-12 cable links.



Features

- SDI-12 range extender
- Transfer Mode
- Plug and play
- No driver required
- Baud Rate: 9600, 19200, 38400 Baud
- Half- and Full duplex
- 6V ... 15V supply voltage
- Low power consumption
- TBS10DR: Screw terminal blocks
- TBS10: spring loaded Weidmueller terminal blocks

- DIN-rail housing or IP67 Fibox housing
- Operating Temperature Range:
- 40°C ... + 85°C

Target Applications

- SDI-12 sensor networks

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SDI-12 Range Extender

1 Introduction

SDI-12 is a standard for interfacing data recorders with microprocessor-based sensors. SDI-12 stands for serial/digital interface at 1200 baud. It can connect multiple sensors with a single data recorder on one cable. It supports up to 60 meter cable between a sensor and a data logger.

The SDI-12 standard is prepared by

**SDI-12 Support Group
(Technical Committee)
165 East 500 South
River Heights, Utah
435-752-4200
435-752-1691 (FAX)
<http://www.sdi-12.org>**

The latest standard is version V1.3 and dates from July 18th, 2005. The standard is available on the web site of the SDI-12 Support Group.

The TBS10 DR is a plug and play solution for extending the range of SDI-12 networks.

- SDI-12 to RS485 range extender
- Transfer Mode
- Plug and play
- No driver required
- Baud rate: 38400, 19200, 9600, user configurable
- Half- or full duplex, user configurable
- Termination, user configurable
- 6 to 15V supply voltage
- Current consumption: 1.2mA when idle; 6.5mA during SDI-12 communication
- DIN-Rail housing
- Operating Temperature Range: - 40°C ... + 85°C

2 Application

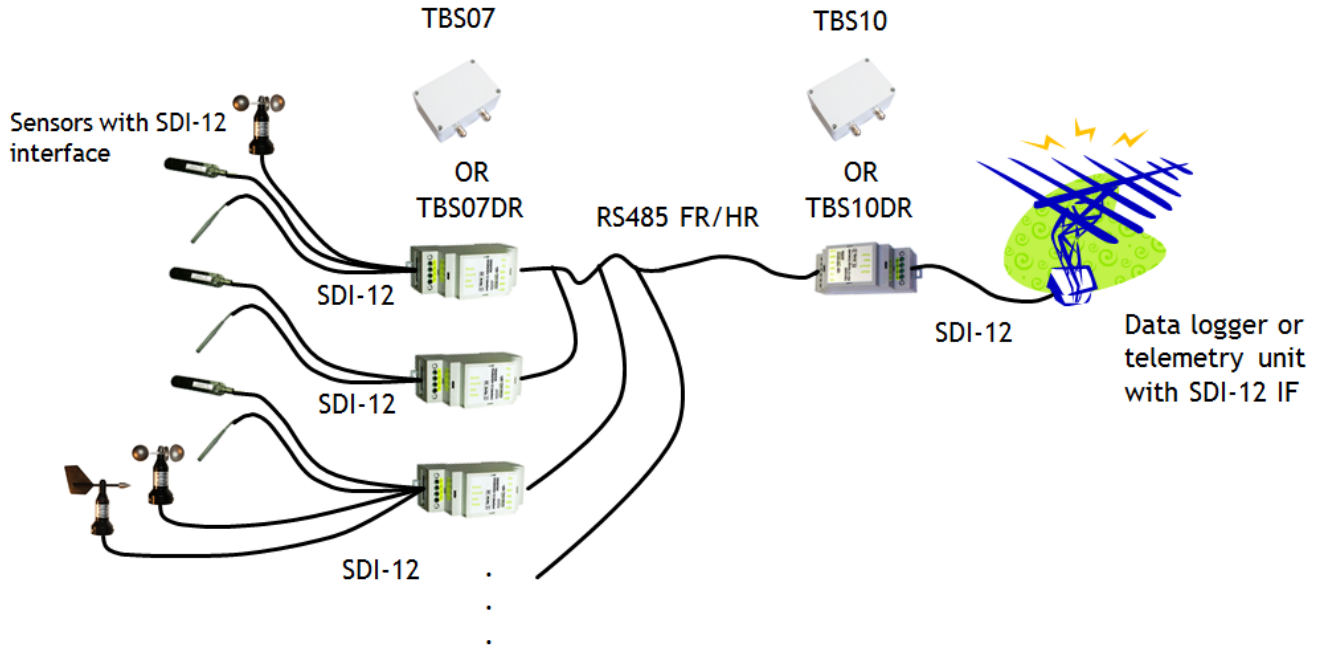


Figure 1 – TBS10DR Application, standard setup for SDI-12 sensor networks with extended range

3 Configuration

The TBS10-DR is factory configured to full duplex, 19200 Baud and no termination.

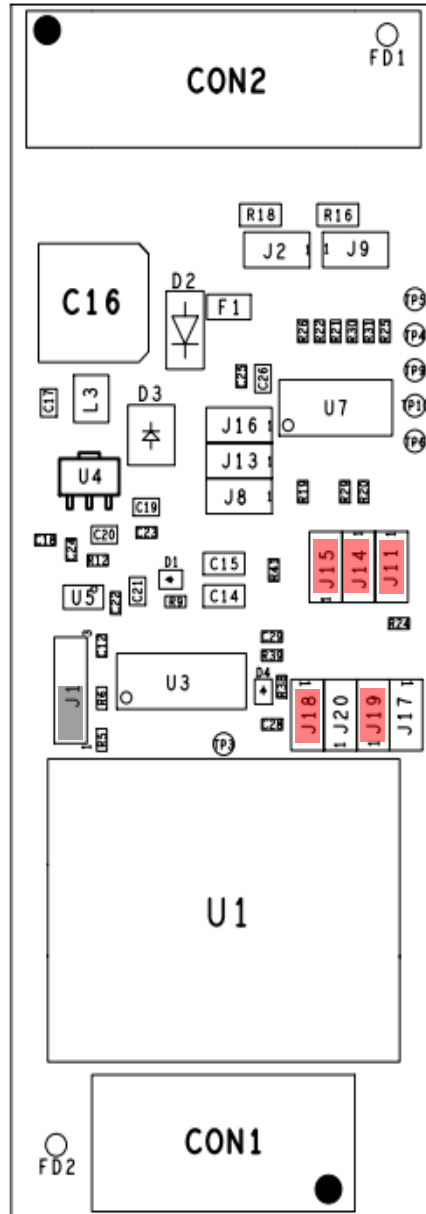


Figure 2 –default jumper settings

In order to change the settings, remove the bottom of the DIN-rail housing to get access to the PCBA. Refer to the tables below to change baud rate, termination or duplex mode.

SDI-12 Range Extender

BAUD RATE	
9600 Baud	set jumpers J17, J20
19200 Baud	set jumpers J19, J18
38400 Baud	set jumpers J19, J20

The default Baud rate is 19200 Baud. 9600 Baud is the minimum data rate maintaining the timing requirements of the SDI-12 standard.

DUPLEX MODE	
FULL DUPLEX	set jumpers J14, J15, J11
HALF DUPLEX	set jumpers J16, J13, J8

For half duplex operation connect TX+ and TX- of the TBS07 with TX+ and TX- of the TBS10

Termination	
120 OHM RX Termination	set jumper J9
120 OHM TX Termination	set jumper J2

4 Functional Description

4.1 Overview

The SDI-12 standard defines a set of commands to configure sensors and to initiate measurements. Upon receiving specific commands, the sensor may carry out internal tasks, respond with information on conversion time or send measurement data.

SDI-12 commands typically are ASCII strings generated by the data recorder/controller firmware. The TBS10 DR transparently forwards SDI-12 commands in one direction and SDI-12 response into the other direction, maintaining the timing requirements of the SDI-12 standard. Furthermore the TBS10 DR handles breaks, marks and all other details of the SDI-12 protocol.

4.2 Interface with data logger or telemetry unit

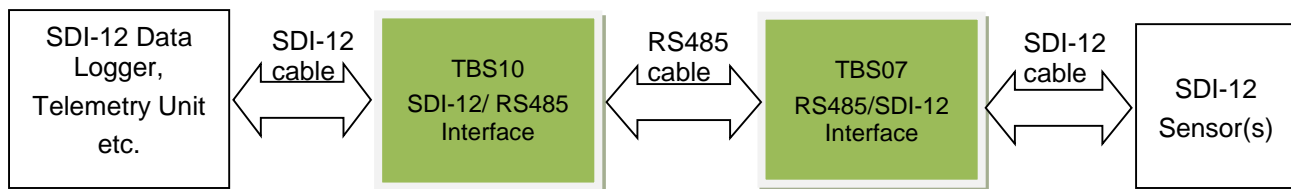


Figure 3 – TBS10 basic application setup

SDI-12 Range Extender

The setup requires a data logger or telemetry unit with an SDI-12 interface, a TBS10 range extender, a TBS07 RS485/SDI-12 interface and SDI-12 sensors. The link – TBS10, RS485 cable, TBS07 can be treated like a SDI-12 cable, however with the difference that the RS485 cable can bridge a significant longer distance than a SDI-12 cable. Multiple TBS07 can be connected to the RS485 cable, however every sensor in the entire network must have its own, unique SDI-12 address.

5 Hardware Description

5.1 Connections overview

RS485 Side, from left to right:

- TX+ output
- TX- output
- RX+ input
- RX- input
- Ground
- 12V supply output



SDI-12 Side, from left to right:

- Cable shield
- Ground
- SDI-12 Data line
- SDI-12 Supply voltage

Figure 4 –Connections

SDI-12 Range Extender

5.2 Connections

TBS10 DR supports RS485 with 38200, 19200, 9600 Baud.

Factory default is 19200 Baud, full duplex, no termination.

Other communication settings:

- 8 Bits
- No Parity
- 1 Stop Bit
- No Handshake

4 Pin terminal block:

CON1 – SDI-12 Interface

Shield: connect to the shield of the SDI-12 cable or leave it unconnected

Ground: connect to the GND wire of the SDI-12 cable

SDI-12 data: connect to the data wire of the SDI-12 cable

SDI-12 Power: connect to the positive supply voltage wire of the SDI-12 cable; the SDI-12 supply voltage also connects to the +12V output terminal at the RS485 side

6 Pin terminal block:

CON2 – Power supply & RS485 interface

Full Duplex

TX+, connect to RX+ of the TBS07

TX-, connect to RX- of the TBS07

RX+, connect to TX+ of the TBS07

RX-, connect to RX- of the TBS07

Half Duplex

TX+, connect to TX+ of the TBS07

TX-, connect to TX- of the TBS07

Ground: connect to the GND of supply for TBS10 DR

+12V: supply output for the TBS07 and its connected sensors. Depending on the length and resistance of the installed cable, and on the current consumption and minimum voltage requirements of the connected sensors, it needs to be ensured that the voltage drop is not too high. If a sufficiently high supply voltage cannot be guaranteed, a separate supply of the TBS07 should be considered.

Shield and grounds are internally connected together

SDI-12 Range Extender

5.3 Power Supply

The TBS10 converter can operate from a single 6V -15V supply connected to the SDI-12 Power terminal. The SDI-12 supply voltage also connects to the +12V output terminal at the RS485 side.

The +12V terminal at the RS485 side is a supply output for the TBS07 and its connected sensors. Depending on the length and resistance of the installed cable, and on the current consumption and minimum voltage requirements of the connected sensors, it needs to be ensured that the voltage drop is not too high. If a sufficiently high supply voltage cannot be guaranteed, a separate supply of the TBS07 should be considered.

6 Ordering Information

Part Number	Description
TBS10	SDI-12 range extender, IP67 Fibox housing
TBS10 DR	SDI-12 range extender, DIN-Rail housing

7 History

Version	Date	Author	Changes
V1.0	7.3.2014	Mayerhofer	Creation
V1.1	22.1.2015	Mayerhofer	Corrected half duplex connectivity