HIRSCHMANN
A BELDEN BRAND

iFLEX TRS 10

CAN Transceiver for wireless sensors

Contents

User manual

Issue B - 08/2011

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VERSION OVERVIEW

Issue	Date	Description	Editor
A	2010-06-29	Translation of German original issue A (2010-06-29)	Konopka
B	2011-08-08	Made changes requested by HAC – Chambersburg ECN 11-169	Gase

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INTRODUCTION

About this manual

This manual is a component of the equipment or system supplied by Hirschmann Automation and Control GmbH. Keep this manual in a safe place and ensure that it is available to all users.

Liability disclaimer

The contents of this manual are subject to change. Hirschmann Automation and Control GmbH does not provide any guarantee for this material, including the associated guarantee regarding marketability and suitability for certain intended purposes. Hirschmann Automation and Control GmbH accepts no liability for errors in the contents of the manual or for direct or indirect damage in connection with the provision and use of the manual.

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Trademarks

The rendition of common names, trade names, trademarks etc. in this documentation should not be construed to mean that such names, even without special identification, are free in the sense of trademark and trademark protection legislation and hence usable by anyone.

Use for the intended purpose

This device / system is intended exclusively for the tasks described in this manual. Any other use shall be construed as being inappropriate. The manufacturer accepts no liability for damage caused by inappropriate or impermissible use. This device / system may only be used if it is in perfect technical condition.

Qualification of the operating personnel

Only appropriately qualified personnel may work with this device / system, i.e. persons:

- who are familiar with the operation or installation and commissioning
- who know the current regulations used to prevent accidents

Notification Symbols

Dangers and other important notices are marked as follows in this user manual:

WARNING

Warning of direct threat of personal injury and damage to property.

Provides instructions on precautions to avoid danger.

CAUTION

Warning of dangerous situations. Also warns of damage to property.

Provides instructions on precautions to avoid danger.

IMPORTANT

Warning of a possibly damaging situation for the product.

Provides instructions for avoiding the possibly damaging situation.

NOTE

Usage instructions and information

HINT

Supplementary comments and recommendations for the user

1 Safety instructions

In order to avoid possible personal injuries and damage to property when using this device, it is essential to observe the following safety instructions:

CAUTION

Danger of electrical short-circuits.

Switch off all systems before commencing with the installation work!

IMPORTANT

Damage to the device can occur due to the penetration of water and dirt.

Never clean the device with a high pressure cleaner!
Have damage to the decorative foil repaired professionally without delay!

IMPORTANT

Damage to the device can occur if it is connected to an unsuitable power supply.

The device may only be connected to a DC voltage source of 10 V to 30 V!

IMPORTANT

Impairment of the system function or breaching of radio transmission regulations by the use of components or extensions is not approved by the manufacturer.

Only use components or extensions that are approved by the manufacturer.

IMPORTANT

There is a possible impairment of the radio link/range when they are in direct proximity to antenna systems with a high HF transmission power.

The device must not be used in the direct proximity of radar systems or transmitters (e.g. radio, TV, mobile telephone etc.) or close to power supply systems.

1.1 EU conformity declaration

Hirschmann Automation and Control GmbH
Niederlassung Ettlingen
Hertzstraße 32-34
D-67275 Ettlingen, Germany

erklärt in alleiniger Verantwortung, dass das Produkt
declares in sole responsibility, that the product

iFLEX TRS10 Funkmodul (Empfänger, 2,4 GHZ)

iFLEX TRS10, 608013

(Bezeichnung, Typ oder Modell, Erzeugnisnummer
Type, reference number)

gemäß dem Gesetz über Funkanlagen und Telekommunikations-einrichtungen (FTEG) und der Richtlinie 1999/5/EG (R&TTE)

in accordance with the Radio und Telecommunication Terminal Equipment Act (FTEG) and Directive 1999/5/EC (R&TTE)

Funkanlage / Radio Equipment **Klasse / Class 1**
Geräteklasse / Radio equipment

bei bestimmungsgemäßer Verwendung den grundlegenden Anforderungen des § 3 und den übrigen einschlägigen Bestimmungen des FTEG (Artikel 3 der R&TTE) entspricht.
complies with the essential requirements of §3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive), when used for its intended purpose.

Gesundheit und Sicherheit gemäß § 3 (1) 1. (Artikel 3 (1) a))
Health and safety requirements pursuant to § 3 (1) 1. (Article 3 (1) a))

Angewendete harmonisierte Normen
Harmonised standards applied

EN 60950-1:2006

(Titel und/oder Nummer der Normen oder normativen Dokumente
Title, number of issue of standards)

Schutzanforderungen in Bezug auf die elektromagnetische Verträglichkeit § 3 (1) 2. (Artikel 3 (1) b))
Protection requirements concerning electromagnetic compatibility § 3 (1) 2. (Article 3 (1) b))

Maßnahmen zur effizienten Nutzung des Funkfrequenzspektrums
Measures for the efficient use of the radio frequency spectrum

Luftschnittstelle bei Funkanlagen gemäß § 3 (2) (Artikel 3 (2))
Air interface of the radio systems pursuant to § 3 (2) (Article 3 (2))

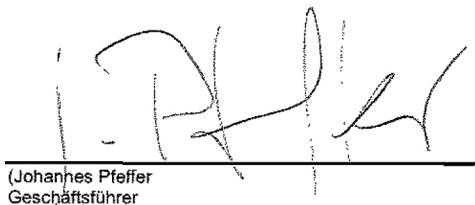
Angewendete harmonisierte Normen
Harmonised standards applied

ETSI EN 300 328:2006 V1.7.1

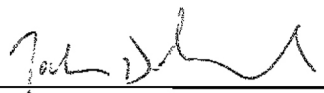
ETSI EN 301 489-1:2008 V1.8.1

ETSI EN 301 489-17:2008 V1.3.2

(Titel und/oder Nummer der Normen oder normativen Dokumente
Title, number of issue of standards)



(Johannes Pfeffer
Geschäftsführer
General Manager)



(i. V. Jochen Dolezal
Leiter Forschung und Entwicklung
Director Research & Development)

Ettlingen, den 04.12.2009

(Ort und Datum
Issue place and date)

2 Product description

2.1 General

The **iFLEX TRS 10** is a transceiver for the use of wireless sensors from the Hirschmann **xSENS-xxx-W1** family to a CAN bus.

How many sensors can be connected?

Up to 4 wireless sensors can be connected wirelessly to a single **iFLEX TRS 10**. The number of wireless sensors can be extended, as required, by using several transceivers.

Which wireless sensors can be used?

All sensors from the **xSENS-xxx-W1** family from Hirschmann's extensive range of wireless sensors can be used.
(the article numbers given on the right refer to the sensors including accessories)

Application	***Product designation***	***Article no. (set)***
Load measurement	**fSENS KMD-006-W1** (up to 6 ton) Art. no. 605792 *alternatively also* ***fSENS KMD-020-W1*** *(up to 20 ton)* Art. no. 606345 	
Angle measurement	**gSENS WGF-W1** (0 to 90°) Art. no. 608016 e.g. for boom angle measurement *alternatively also* ***gSENS WGS-W1*** *(-15 to +15°)* Art. no. 608185 for inclination measurement 	
Wind measurement	**iSENS WSS-W1** 	608179
Stroke end monitoring	**iSENS HES-W1** Art. no. 608015 	608180

Table 1 *Overview of xSENS-W1 wireless sensors*

2.2 Product features

The **iFLEX TRS 10** has the following features:

- Connects up to four wireless radio sensors with the CAN bus (expandable)
- Simple setup of the wireless sensors via CAN bus
- Automatic diagnostic function
- CANopen slave in accordance with CiA DS-301/401
- Transmission rate adjustable from 125 kbps to 1 Mbps
- Battery monitoring for the connected wireless sensors
- Protection class IP65, suitable for outdoor use
- Operating temperature -40 to +85 °C
- Voltage supply 10 to 30 V DC

2.3 Use for the intended purpose

The **iFLEX TRS 10** is a transceiver used for the transmission of wireless sensor data to a CAN bus using the CANopen protocol. Since impairment of the radio communication/range can occur, the device must not be used in close proximity to antenna systems with a high HF transmission power (e.g. radar / radio / TV / mobile telephone) or in close proximity to power supply systems.

2.4 Scope of supply

The scope of supply of the **iFLEX TRS 10** with accessories (art. no. 608178) consists of the following parts:

- **iFLEX TRS 10**
- Magnetic base antenna with 4 m connecting cable or short antenna
- CAN T-piece M12
- CAN connection cable, 0.6 m, with prefabricated plug connectors at both ends
- User manual

2.5 View of device

Figure 1: *View of the iFLEX TRS 10*

2.6 Dimensions

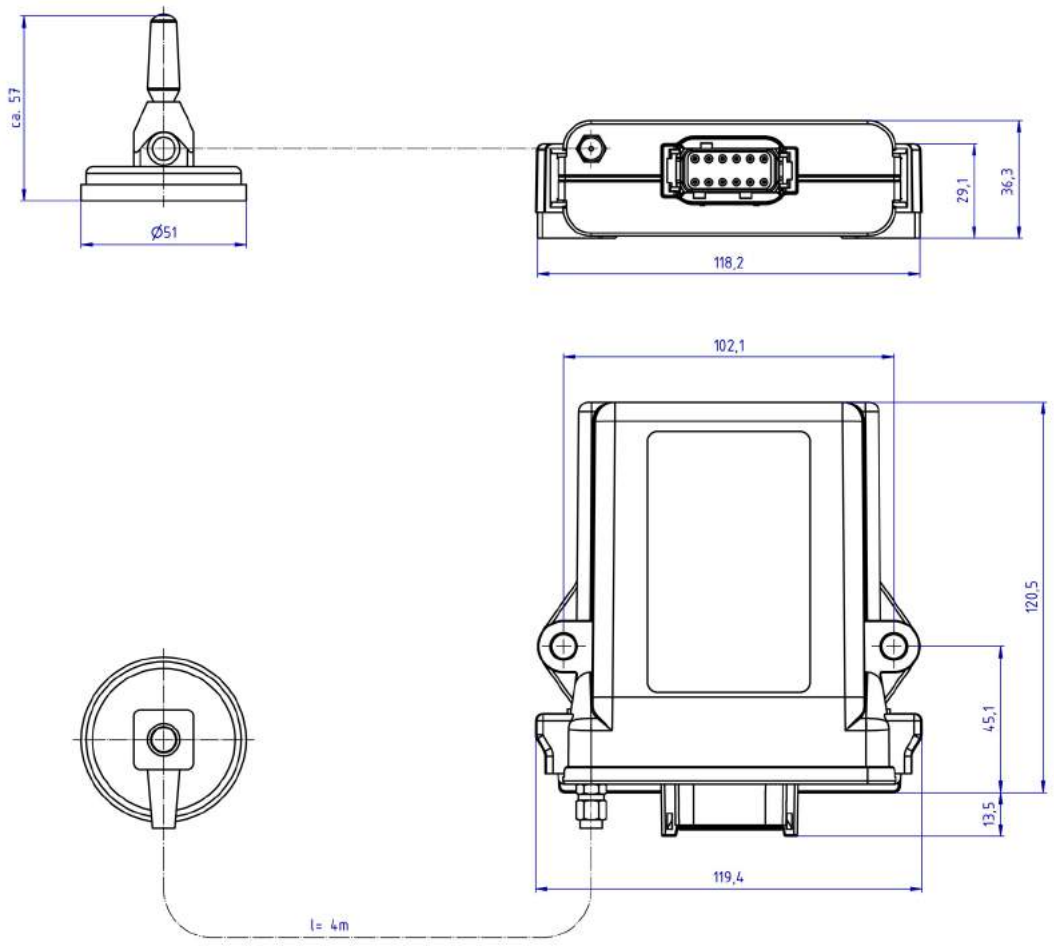


Figure 2: *Dimensions of the iFLEX TRS 10 (with magnetic base antenna)*

3 Installation

3.1 Mounting the components

The **iFLEX TRS 10** is supplied complete with all necessary mounting parts. Mounting can therefore be performed simply and quickly. For mounting the wireless sensors, please refer to the instructions provided with the respective sensor.

3.1.1 iFLEX TRS 10

The **iFLEX TRS 10** must be mounted in a suitable place on a sufficiently firm surface with the connections at the bottom.

The distance between the holes in the housing is 102 mm.

3.1.2 Short Antenna

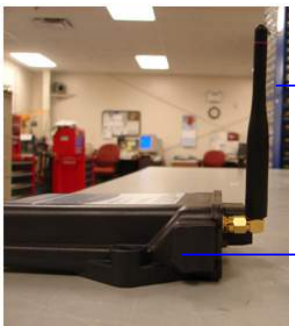


Figure 3: *Short, direct connection antenna*

3.1.3 Magnetic base antenna

Figure 4: *Magnetic base antenna (art. no.536023) with mounted radiator*

Preparation of the antenna

Screw the antenna radiator hand tight onto the thread on the TRS 10 or on the top side of the antenna base until you feel a stop. (Remove the protective cap from the thread if necessary).

How do I mount the antenna?

If applicable, the antenna has a magnetic base plate and adheres securely to all ferromagnetic surfaces.

NOTE

Optimal ranges are achieved if the antenna is aligned in accordance with the alignment of the wireless sensor antennas and can radiate as freely as possible.

Niches or recesses are therefore less suitable as mounting locations!

How should the cable be laid?

Please follow the instructions below for laying the antenna cable (if applicable):

IMPORTANT

The antenna cable can be damaged if it is squeezed or kinked.

Therefore, lay the antenna cable in such a way that it is neither squeezed nor laid around sharp edges!

IMPORTANT

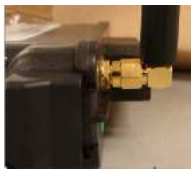
The function of the antenna and hence the whole system can be impaired if a mismatching antenna radiator is used.

Always use the antenna radiator contained in the scope of supply!

Where is the antenna connected?

After laying the cable, connect the coaxial connector of the antenna to the antenna socket on the underside of the **iFLEX TRS 10** or connect the antenna directly to the base of the **TRS 10**. Screw the connector on hand tight.





3.2 Electrical connection

Connection of the device to an existing CAN bus is simple thanks to the fully prefabricated connecting cable (length 0.6 m) included in the scope of supply. The CAN T-piece included in the scope of supply can also be used for this if necessary.

CAUTION

Danger of electrical short-circuits.

Switch off all systems before commencing with the installation work!

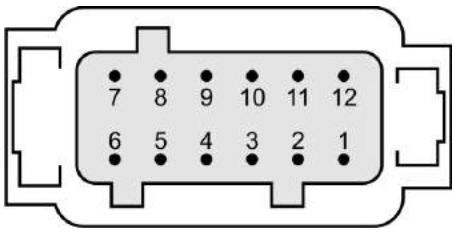
IMPORTANT

Damage to the device if connected to an unsuitable power supply.

The device may only be connected to a DC voltage source of 10 V to 30 V!

3.2.1 Wiring of the central connector

Please refer to the following illustration for the pin configuration of the connector on the underside of the **iFLEX TRS 10**:



Pin 1 +VDC (10 …30 V)
Pin 2 GND
Pin 11 CAN L
Pin 12 CAN H

Figure 5: *Pin configuration of the central connector*

3.2.2 Wiring of the connecting cable

Please refer to the following illustration for the wiring of the connecting cable (article no. 536025):

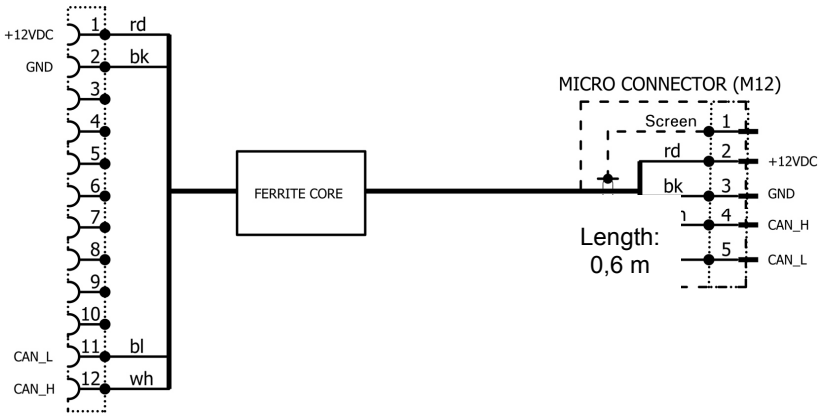


Figure 6: *Wiring of the CAN connecting cable*

4 Commissioning

At least one functional wireless sensor must be available in order to commission and operate the system.

A guide to commissioning the **iFLEX TRS 10** and connecting the wireless sensors is provided below.

4.1 Adding a Wireless Sensor

1. First, open the battery compartment of the wireless sensor after undoing the 4 screws and remove the batteries as shown in Figure 7.

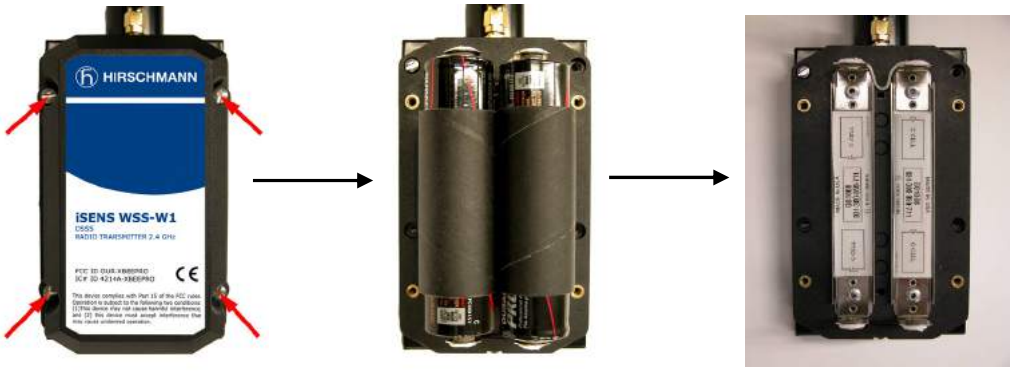


Figure 7: Steps for Removing Batteries

2. Next, remove the cover of the TRS 10 by pushing in the two tabs located on each side of the casing, as pictured below in Figure 8.

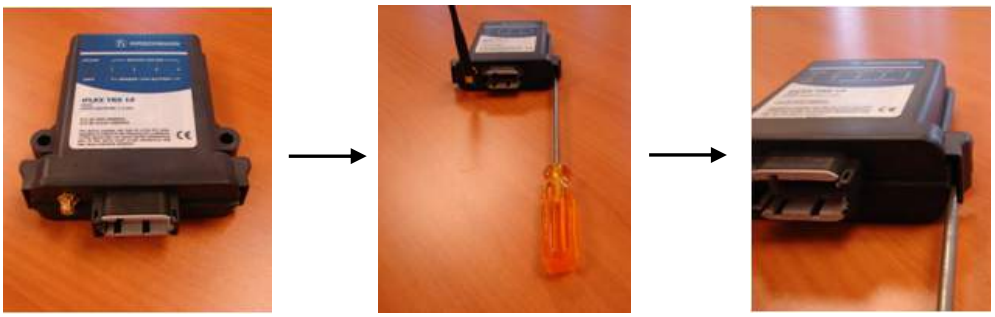


Figure 8: Steps for Removing TRS 10 Cover

3. After Removing the outer cover, supply power to TRS 10 by either using your Deutsch connector wired to your 10 to 30 volt power supply or use a DC power supply to provide 10 to 30 volts to pin 1 and ground to pin 2 of the connector. Refer to Figure 5 for the pin layout of the connector.

4. Verify power is being supplied to the TRS 10 by checking to see if the “Power” Led is lit as seen in Figure 9.

Figure 9: “Power” LED as indicated by the red light

5. Next, push and hold the red button located in the upper, left-hand corner of the TRS 10 board (Figure 10). Continue holding the button down for approximately 5 seconds until the green LED, which corresponds to position 1 of the “Sensor Online” row located on the cover, begins to blink slowly.

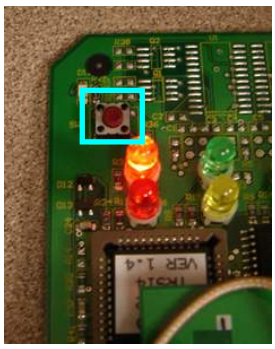


Figure 10: Red push button on TRS 10 board

6. Replace the batteries in the wireless sensor that you are trying to connect, following the correct polarity. First, you will see the yellow LED located on the bottom of the sensor turn on and stay lit for approximately 3 to 5 seconds. After the yellow LED on the sensor changes to a short blink every 5 seconds, verify that the green LED in the “Sensor Online” row, position 1 is now consistently lit and no longer flashing. If this is true, then your wireless sensor has successfully connected to the TRS 10.

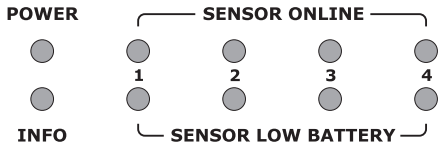
7. To connect another wireless sensor, move to the next unoccupied position that corresponds to the “Sensor Online” row located on the cover of the TRS 10, by holding down the same red button previously used step 5. Follow steps 4 to 6 as a guide if needed.

8. When all of your sensors have been connected to the TRS 10, replace each cover of the wireless sensors my tightening the four screws. As well, reattach the cover of the TRS 10 making sure the two clips that were pushed in during the removal process have now snapped back into place. It is critical that all screws be properly tightened and the TRS 10 cover be fitted back to its original position in order to maintain weather resistant capabilities.

Note: If a sensor does not successfully connect, remove its batteries, wait 15 seconds and then follow steps 4 through 6.

4.2 Status LEDs

There are 10 LEDs on the front panel of the device, which indicate the status of various operating conditions.



The meaning of the signals can be taken from the table:

LED:	off	lights	flashes slowly	flashes rapidly
POWER	No supply voltage present	Supply voltage is present		
INFO		Sensor reports an alarm (e.g. hoist limit switch) or link to the indicated sensor is lost	During the system diagnosis	
SENSOR ONLINE 1 2 3 4	No sensor registered to this channel	Sensor registered to this channel and ready for operation		Radio link to the sensor on this channel interrupted
1 2 3 4 SENSOR LOW BATTERY		Batteries of the wireless sensor on this channel are almost exhausted! (Capacity less than 6.5%) **Replace the batteries soon!**		

***Table 2** Overview of status LED*

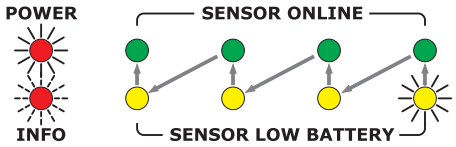
4.3 Troubleshooting

How is the device switched on?

After wiring the **iFLEX TRS 10**, the device switches itself on as soon as a supply voltage is present on the CAN bus. After switching on, the system begins with a self-diagnostic routine.

How long does the self-diagnosis take?

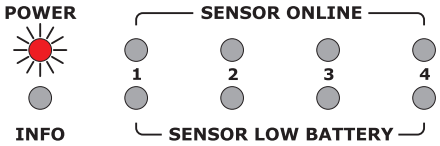
The self-diagnosis takes approx. 5 seconds. During these tests the LEDs light up successively with a **test pattern**:



LED key: off: lights: flashes slowly: flashes rapidly:

How can I tell whether the device is working correctly?

If no wireless sensors have been registered and saved yet, only the '**Power'** LED should be lit after completion of the self-diagnosis:



If wireless sensors have already been registered and saved, the **'Sensor Online'** LED of the corresponding channel lights up, indicating that the radio link has been established.

What does it mean when a 'Low Battery' LED lights up?

If a '**Low Battery**' LED lights up, this means that the battery set in the respective wireless sensor is exhausted (remaining capacity < 6.5%) and must be replaced as soon as possible.

What does it mean when a 'Sensor Online' LED flashes rapidly?

If a '**Sensor Online**' LED flashes rapidly after conclusion of the self-diagnosis, this means that the radio link to the sensor on the indicated channel has been interrupted.

NOTE

If the link to a wireless sensor is interrupted, rectify the fault first before putting the system into operation.

5 Service and maintenance

The **iFLEX TRS 10** contains no serviceable parts and may therefore not be opened. The fuse inside the device is self-resetting and therefore does not need to be exchanged. If you notice malfunctions or differences between actual and displayed measured values, you should switch the device off and have it checked and, if necessary, repaired immediately by an authorised Hirschmann service partner.

Clean the surface of the equipment occasionally with a damp cloth using a mild cleaning agent. However, you should never use abrasive or alcohol-based cleaning agents, as these can damage the housing or the front foil! The device must not be treated with a high pressure cleaner or similarly aggressive methods under any circumstances!

IMPORTANT

Damage to the device due to the penetration of water and dirt.

Never clean the device with a high pressure cleaner!
Have damage to the decorative foil repaired professionally without delay!

Keep the contact area of the device plug and the antenna connector clean and occasionally check that the connections are tight.

Occasionally check the connecting cable and antenna cable as well as the antenna itself. If parts are damaged, these must be repaired properly or replaced immediately.

6 Technical data

Article designation	iFLEX TRS 10
Article number	608178 (complete with accessories, see scope of supply)
Operating voltage	10 - 30 V DC
Fuse	Self-resetting internal fuse, 500 mA
Transmission frequency	2.45 GHz, ISM band, registration/licence-free IEEE 802.15.4 standard, DSSS /OQPSK modulated Class 1 radio system in accordance with FTEG and 1999/5/EU (R&TTE)
Antenna	2.4 GHz, with magnetic base and screwed on antenna radiator, 4m connecting cable, RP-SMA plug
Range	approx. 300 m (depending upon environmental conditions)
CAN interface	ISO 11898, high-speed CAN, standard identifier (11-bit)
CAN protocol	CANopen slave CiA DS-301/DS401
Data rate	125 kbit/s (standard), 250 kbit/s, 500 kbit/s, 750 kbit/s, 1 Mbit/s
Node ID	Standard: 31_{dec} / $1F_{hex}$ (configurable)
CE conformity	ETSI EN 300 328 ETSI EN 301 489-1 ETSI EN 300 489-17 EN 60950-1
FCC conformity	FCC 47 CFR Part 15, Radio Frequency Devices, Subpart B
Control elements	none
Displays	10 status LEDs for signalling various operating conditions
Electrical connection	Central connector (German) 12-pole (on underside of device)
Antenna connection	RP-SMA, coaxial (on the underside of the device)
Dimensions	H 134 mm x W 118,2 mm x D 36,3 mm
Weight	0.262 kg (device only)
Distance between mounting holes	102,1 mm
Operating temperature range	-40 °C to +85 °C
Storage temperature range	-50 °C to +85 °C
Protection class	IP 65
Scope of supply	iFLEX TRS 10 with accessories: - Magnetic base antenna with 4 m connecting cable - Antenna radiator 2.4 GHz - Connecting cable, 0.6 m, fully prefabricated - T-piece for CAN bus - User manual

7 Appendix

7.1 Object listing table

Index	Sub Index	Default Value	Comment
0x1000	0x00 RO4		Part Number
0x1001	0x00 RO1	0	Error Register
0x1002	0x00 RO4	0	Status Register
0x1008	0x00 RO4		Text for part type
0x1009	0x00 RO4		BOM revision
0x100A	0x00 RO4		Software Revision
0x1010	0x00 RO1	1	Number of sub-indexes
	0x01 RW4	3	CAN save object – write “save” here to save changes made via CAN bus to EEPROM
0x1017	0x00 RW2	0x01F4	Heartbeat time in ms. Setting to 0 will disable the heartbeat
0x1018	0x00 RO1	4	Number of sub-indexes
	0x01 RO4	0x0000008F	Vendor ID
	0x02 RO4	0xF0000001	Module Type
	0x03 RO4	0x00000001	Revision Number
	0x04 RO4	0x00000001	Serial Number (changes for each unit)
0x1200	0x00 RO1	2	Number of sub-indexes
	0x01 RO2	0x600+NodeID	CAN ID to receive SDO messages (61F h)
	0x02 RO2	0x580+NodeID	CAN ID to transmit SDO messages (59F h)
0x1800	0x00 RO1	5	PDO1 (transmit)
	0x01 RO2	0x180+NodeID	COB-ID used by PDO1 (19F h)
	0x02 RO1	0x03	transmission type
	0x05 RO2	500	event timer
0x1801	0x00 RO1	5	PDO2 (transmit)
	0x01 RO2	0x280+NodeID	COB-ID used by PDO2 (29F h)
	0x02 RO1	0x03	transmission type
	0x05 RO2	200	event timer
0x1802	0x00 RO1	5	PDO3 (transmit)
	0x01 RO2	0x380+NodeID	COB-ID used by PDO3 (39F h)
	0x02 RO1	0x03	transmission type
	0x05 RO2	200	event timer
0x1A00	0x00 RO4	3	Number of channels in 1st TPDO
	0x01 RO4	0x6100 01 10	1st object = 1st 16 bit digital input (A2B)
	0x02 RO4	0x6100 02 10	2nd object = 2nd 16 bit digital input = f(Hz)
	0x03 RO4	0x6100 03 10	3rd object = 3rd 16 bit digital input = T(ms)
0x1A01	0x00 RO1	4	Number of channels in 2ND TPDO
	0x01 RO4	0x6401 01 10	1st object = 1st analog input, 16 bit resolution
	0x02 RO4	0x6401 02 10	2nd object = 2nd analog input, 16 bit resolution
	0x03 RO4	0x6401 03 10	3rd object = 3rd analog input, 16 bit resolution
	0x04 RO4	0x6401 04 10	4th object = 4th analog input, 16 bit resolution

Index	Sub Index	Default Value	Comment
0x1A02	0x00 RO1	4	Number of channels in 3RD TPDO
	0x01 RO4	0x2A00 01 08	1st object = 1st battery level & type, 8 bit resolution
	0x02 RO4	0x2A00 02 08	2nd object =2nd battery level & type,8 bit resolution
	0x03 RO4	0x2A00 03 08	3rd object =3rd battery level & type, 8 bit resolution
	0x04 RO4	0x2A00 04 08	4th object =4th battery level & type, 8 bit resolution
0x2000	0x00 RO4	0x12345678	Serial number lo
0x2001	0x00 RO4	0x13572468	Serial number hi
0x2007	0x00 RW1	0x1F	Node ID, 1 – 127 allowed (default 1F h)
0x2008	0x00 RW1	0x04	4=125 kbit/s (default) 5=250 kbit/s 6=500 kbit/s 7=800 kbit/s 8=1Mbit/s
0x2A00	0x00 RO1	0x04	Number of battery levels
	0x01 RO1	0x00	Battery level for channel 1 0x0 to 0xF 0x00 = 6.5% Replace Batteries 0x01 = 13.0% … 0x0F = New Battery in sensor (2 minutes only)
	0x02 RO1	0x00	Battery level for channel 2
	0x03 RO1	0x00	Battery level for channel 3
	0x04 RO1	0x00	Battery level for channel 4
0x2A01	0x00 RW1	0x00	Installation Menu Status
0x2A02	0x00 RO1	0x04	Number of possible sensors
	0x01 RW2	0xFF	Sensor ID for channel 1 (0x0000 - 0xFFFE)
	0x02 RW2	0xFF	Sensor ID for channel 2
	0x03 RW2	0xFF	Sensor ID for channel 3
	0x04 RW2	0xFF	Sensor ID for channel 4
0x2A03	0x00 RO1	0x04	Number of possible sensors
	0x01 RW1	0xFF	Sensor type for channel 1 0x00 = Loadcell fSENS KMD-xxx-W1 0x20 = (Linerider) 0x60 = Windspeed Sensor iSENS WSS-W1 0x40 = Angle Sensor gSENS WGF/WGS-W1 0x80 = A2B switch iSENS HES-W1 0xFF = No sensor installed
	0x02 RW1	0xFF	Sensor type for channel 2
	0x03 RW1	0xFF	Sensor type for channel 3
	0x04 RW1	0xFF	Sensor type for channel 4
0x6100	0x00 RO1	0x03	Number of sub-indexes
	0x01 RO2	0x0004	A2B Status: LSByte contains bitwise data 0x00F2 = A2B OK 0x0004 = Alarm (switch tripped, comm. lost)
	0x02 RO2	0x0000	Anemometer frequency in Hz – Higher = Faster Not Implemented
	0x03 RO2	0xFFFF	Anemometer period in ms – Higher = Slower Not Implemented
0x6401	0x00 RO1	4	Number of analog inputs
	0x01 RO2	Analog value	1st analog channel
	0x02 RO2	Analog value	2nd analog channel
	0x03 RO2	Analog value	3rd analog channel
	0x04 RO2	Analog value	4th analog channel

7.2 Wiring of the adaptor cable for PCAN-USB

The wiring of the adaptor cable from the CAN connecting cable to the PCAN-USB plug can be taken from the diagram below:

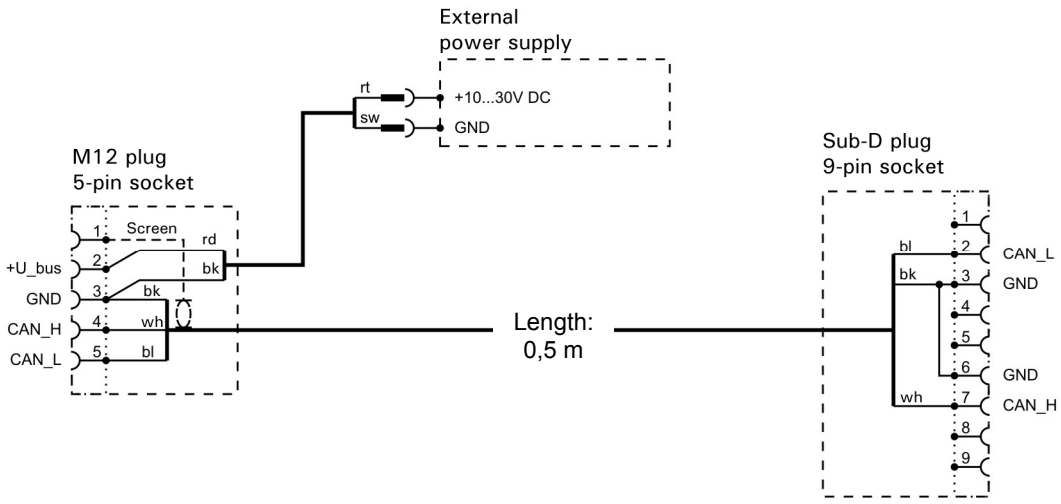


Figure 11: *Wiring of the adaptor cable for PCAN-USB*

7.3 List of tables and illustrations

Appendix

Feedback

What is your opinion about this manual? We always try to describe the products fully in our manuals, as well as providing important background knowledge to ensure trouble-free operation.

We take the task of continuous improvement and reduction of errors very seriously. Your comments and suggestions help us to increase the quality and level of information for this document.

Your assessment of this manual:

	excellent	good	satisfactory	so-so	poor
Accuracy	O	O	O	O	O
Readability	O	O	O	O	O
Ccomprehensibility	O	O	O	O	O
Examples	O	O	O	O	O
Structure / Layout	O	O	O	O	O
Completeness	O	O	O	O	O
Illustrations / Images	O	O	O	O	O
Drawings, Diagrams	O	O	O	O	O
Tables	O	O	O	O	O

Did you discover errors in this manual?

If so, in which section number or which part of the manual?

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Feedback

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  Documentation
  Hertzstr. 32-34
  76275 Ettlingen / Germany

Thank you !

Notes