Operating manual

Evaluation Unit (M)AW_F_x

1 - 8 Channel, PCM

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Disclaimer Documentation

The texts and examples were prepared with care. Mistakes can not be excluded. The enterprise Manner Sensortelemetrie will assume no liability for missing or incorrect information and resulting consequences, neither judicial nor otherwise.

Modifications

The enterprise Manner Sensortelemetrie GmbH may change or upgrade hardware and software – or parts of them - as well as the provided documents (operation instructions, start-up instructions, spare parts lists) – or parts of them – without notification.

We would be pleased for suggestion for improvement and notes about mistakes.

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1 Safety

1.1 Definition of Warnings

DANGER!
Hint for possible dangerous situation. Ignoring the security terms may cause death or serious injury.

WARNING!
Hint for possible dangerous situation.

Ignoring the security terms may cause injury.

CAUTION!
Hint for possible damage of property, if the corresponding protective measure were disregarded.

Further information

1.2 General Warnings

The system startup has to be carried out by trained qualified personnel, who is able to evaluate the potential risks. All chapters of this instruction manual had to be read and fully understood before startup.

On non-observance it's not possible to assert a claim for the incurred losses from the manufacturer. Any changes to the system, except those described in the instruction manual and customer documentation, will invalidate any warranty.

DANGER!
Risk of Injury by Incorrect Installation
Incorrect installation can cause injury to persons directly while the installation or during the subsequent startup

Note the Mounting Hint (see chapter 4, installation instruction)

The system startup has to be carried out by instructed qualified personnel that's familiar with

- the professional handling of security relevant components,
- the valid regulations for operational safety und rules for accident prevention.

DANGER!
Risk of Injury by Unintentional Startup
Rotating or moving of parts by inadvertent startup of the machine can cause injury .

During all mounting, demounting or repairing the system has to be powered-off. Note the mounting instructions.

DANGER!

Risk of Injury by Movable Parts

While normal operation, as well as inadvertent loosening of parts of the telemetry system during operation, present persons may be injured if protective equipment is absent.

Check the safety function of the protective equipment particularly

- before each startup
- after each replacement of a component
- after a longer standstill
- after each defect

Independent thereof the safety function of the protective equipment must be checked in suitable time intervals as part of the maintenance work!

WARNING!

Risk of Burn Injury

While operation the sensor signal amplifier and the stator antenna may become warm.

Avoid contact.

CAUTION!

Risk of Property Damage

If the connectors disconnected / connected while the system is powered on the telemetry system as well as the connected devices can be damaged.

Plug connectors must not be disconnected / connected when the system is powered on.

2 Conventional Usage

Sensor telemetry systems are used for contact-free data and power transfer from passive and active sensors (e.g. on rotating shafts).

DANGER!

Risk of Subsequent Damages caused by Malfunctions

If the telemetry system is used for controlling or regulating functions it is not conceive for, subsequent damages up to injury to persons can be caused.

The delivered system has to be used exclusively used for the purpose for which it was ordered.

The operator must take care of his health and safety.

The operator of the equipment must prevent subsequent errors following faulty measuring results. This is particularly necessary if the telemetry system is used in controlling or regulating functions.

The customer, as the builder of a system with an integrated sensor telemetry system, is responsible for the correct and conform operation and also assumes the responsibility for ensuring that the system at start-up complies with all provisions of Directives 2014/53/EU and 2014/35/EU.

Scope of Delivery

A telemetry system normally contains:

- Evaluation unit
- Stator antenna
- Rotor antenna
- Sensor signal amplifier
- HF cable

For the detailed purchased parts package of the delivered telemetry system mind the corresponding shipping ticket.

3 Technical Data

3.1 Measuring System

Technical Data Telemetry System

Term	Value
HF frequency	13.56 MHz
Number of channels	1
Bandwidth	0 to 1 kHz (-3dB)
Linearity	<0.1%

General Measuring Configuration (Example)

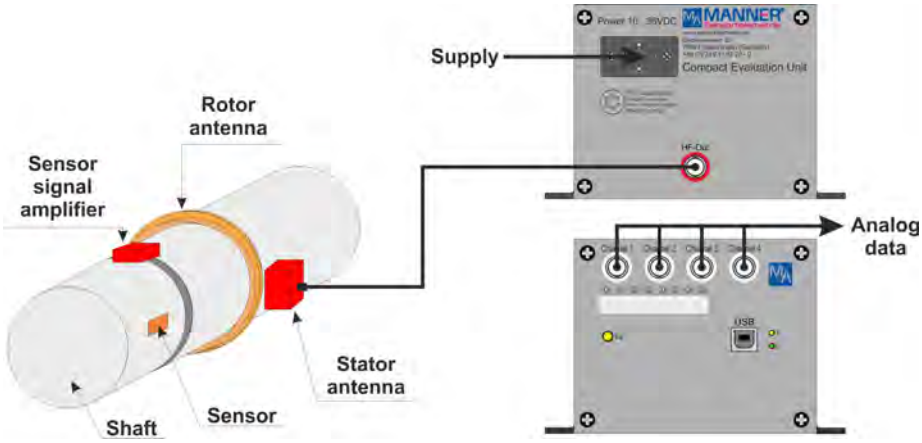


Fig. 1: General measuring configuration

Block Diagram

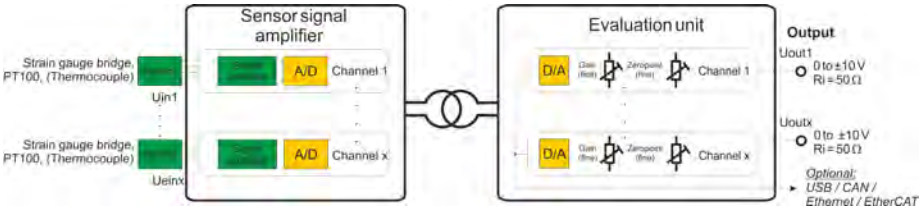


Fig. 2: Block diagram

Energy and Data Flow *(RMC optional)*

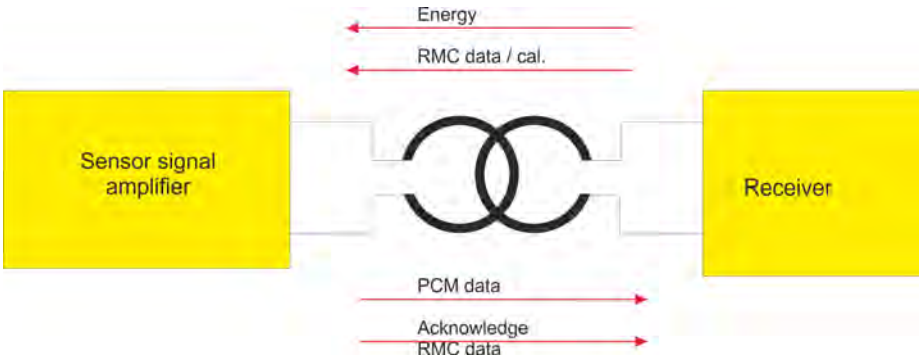


Fig. 3: Energy and data flow

3.2 Evaluation Unit

Technical Data Evaluation Unit

Term	Value
Evaluation unit type	**(M)AW_F_x_PCM16**
Supply voltage evaluation unit	10 to 36 V DC
Maximum current drain	1.1 A
HF power	3 W *(optional: 5 W)*
HF frequency	13.56 MHz
Channel sample rate	6.62 kS/s *(optional: 100 S/s, 4 kS/s)*
Number of channels	1 - 8
Output voltage [U_{out}]	0 to ±10 V, R_i = 50 Ω
Protection class	20
Temperature range	-10 to +70°C

Scale Drawing Evaluation Unit

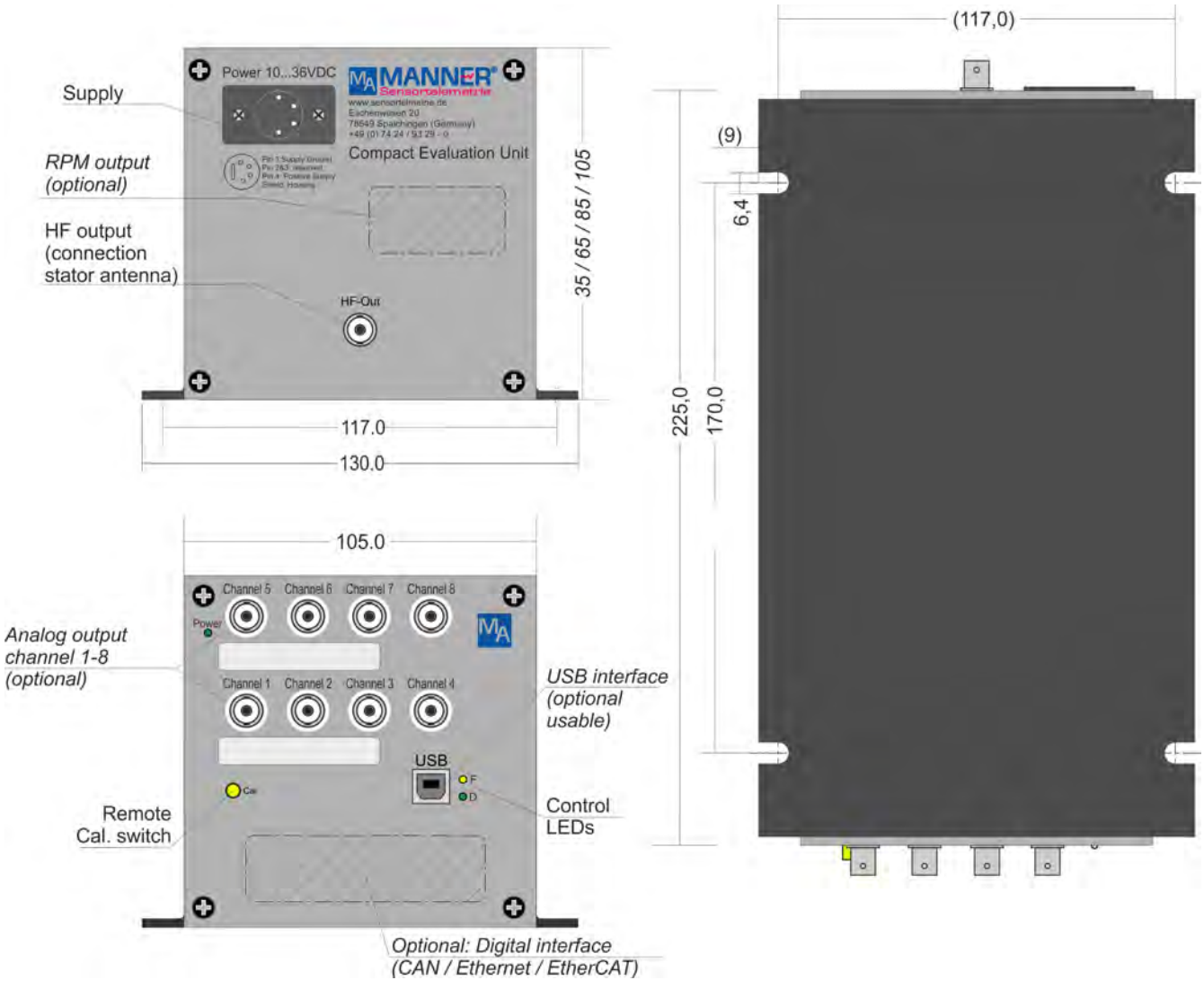
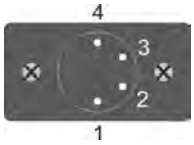


Fig. 4: Evaluation unit (M)AW_F_x_PCM16

Control LEDs

	o.k.	no signal	Power low	CRC error
green LED (Signal indicator)	on	off	flashing	off
yellow LED (Error indicator)	off	on	off	on

Pin Assignment DC Supply



Pin	Assignment
1	GND
2	nc
3	nc
4	10 to 36 V DC

4 Mounting / Starting

4.1 Coupling / Installation

Antenna Coupling

DANGER!

Risk of Faulty Measuring Data and Resulting Subsequent Errors, up to Injury to Persons

Damaging, modifications or disturbance of the coaxial cable(s) may falsify the measuring results and optionally cause subsequent errors according to operation purpose.

Do not buckle the coaxial cable!

Do not modify the coaxial cable!

Do not keep data cable and the coaxial cable together with energy- / high-power current cables!

The connectors of the HF energy and / or HF data coaxial cable must not have connection to the grounding of the machine!

Permissible bending radii for coaxial cables:

- RG58 → R_B = 25 mm
- RG400 → R_B = 30 mm static / 50 mm dynamic
- RG178 → R_B = 15 mm
- RG213 → R_B = 50 mm
- RG316 → R_B = 15 mm

The bending radii of the used coaxial cables must not be undercut

CAUTION!

Damaging of Antenna System

Contact between rotor antenna and stator antenna while operating may cause mechanical damages of the antennas

The stator antenna must not touch the rotor antenna.

The stator antenna must be mounted directly opposite to the rotor antenna

The stator antenna must be mounted in the middle of the moving range of the rotor antenna

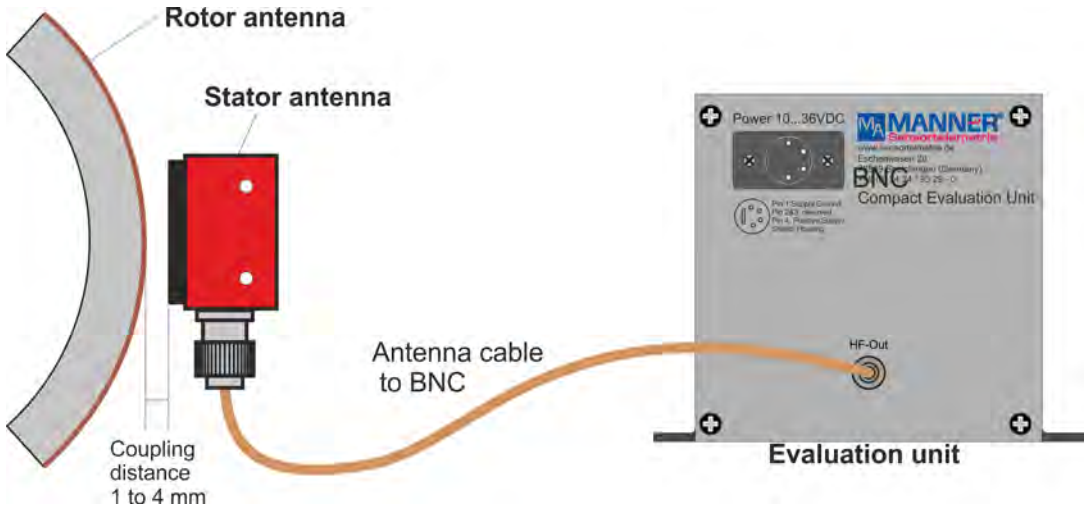


Fig. 5: Coupling

Starting

DANGER!

Risk of Injury

Incorrect installation can cause injury to persons directly while the installation or during the subsequent startup

Follow mandatory the rules for accident prevention!

1. Mount the rotorring with sensor signal amplifier
2. Place the stator antenna correct to the rotor antenna
3. Connect stator antenna with the evaluation unit
4. Switch the evaluation system on

Optional: Connection Digital Output

5. Connect the evaluation unit to the computer via a digital interface (USB / CAN / Ethernet / EtherCAT®).

   On initial starting proceed the software installation

Optional: Fine Adjustment of Analog Outputs

6. Release measuring position completely
7. Adjust the output signal to 0.000 V by turning the screw '0' .
8. Load the measuring position with nominal load or set the cal. signal permanently
9. Set the output signal to +10.000 V by adjusting the screw 'G' and measuring the 'analog signal output' or set to the calibration value indicated in the calibration protocol.
10. Release the measuring point completely or remove the cal. signal
11. Check the output signal to zero. Repeat step 6 to 11, if necessary

5 Options

Optionally available

- Analog data outputs (1 - 8 channels)
- Digital interfaces (USB / CAN / Ethernet / EtherCAT®)
- Remote Control
- RPM detection

If you have any questions regarding customer-specific solutions, please contact our sales department.

6 Software Interface for 1-4 Channel Systems V2.8.300

Software optional

The complexity of the software, any additional interfaces (CAN / Ethernet / EtherCAT®) and the necessary settings depend on the respective system.

Together with the customer-specific system, an adapted documentation is provided.

Requirements

Windows 7, Windows 10 (German, English Version) - 32 Bit / 64 Bit

1 GHz processor or higher, depending on the data throughput of the system during recording.

1 GByteRAM, 500 MByte free hard disc space

Net Framework 3.5

6.1 Installation of the USB Driver - Installation steps for Windows 7 / 10

For other Windows versions the messages may be different.

1. Connect the USB interface of the telemetry systems to the PC

2. The USB interface is recognized by the PC:

Fig. 6

3. Mark 'NO connection to Windows Update'

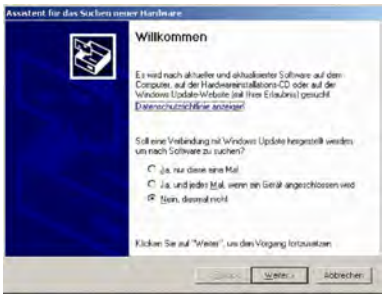


Fig. 7

4. Mark 'Install the software NOT automatically'

Fig. 8

Fig. 9

5. Enter the path and the name of the driver (e.g: from the CD)

6. Repeat step 3 to 5, thus two instances of the driver were installed

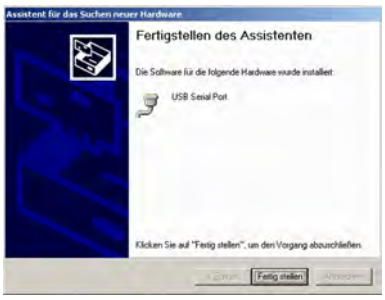


Fig. 10

7. *[Get ready]*

⇨ The installation of the driver is now finished. The device can now be used with the Manner Interface Software. For using more devices repeat the installation steps.

If there are troubles with the installation of the driver e.g. incompatibility with other devices which also use the USB converter of FTDI Chip, the already installed driver can be removed from the driver path with the program 'FTDIUNIN.EXE'. Then restart the installation.

6.2 Installation of the Software

1. Select path of the installation software with the Windows Explorer and start program **`SETUP.EXE`** (e.g. **`D:\TelemetryinterfaceV2.x.xxx\Telemetryinterface_Vx.x.xxx_32Bit`**, or rather **`...\Telemetryinterface_Vx.x.xxx_64Bit`** on the installation CD in **drive D:**) and follow the instructions.

If required, please install also Net Framework 3.5 you can obtain this from Microsoft over internet (**Netframework 3.5 redistributable x86**)

2. The program can now be started either with a link item at the desktop or with *[Start] -> [Program] -> [TelemetryInterfaceV2.x]*

6.3 Installation of the additional Data Viewer Software for MDF Files

PVIEW (optional with data acquisition)

On the enclosed data storage (USB stick or CD) there is also a free data viewer from Stiegele Datensysteme GmbH (*http://www.stiegele-systems.de*). The software shows the content of the MDF file that is recorded while the measuring period.

1. Select path of the additional software with the Windows Explorer and start program `SETUP.EXE`

(e.g. `D:\PVIEW\setup.exe` on the installation CD in drive D:)

2. Select language and continue the installation.

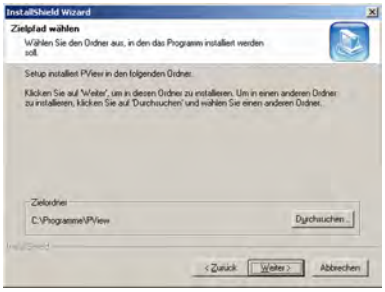


Fig. 11

3. Set path to `C:\Programme\PVIEW`. In this case the Interface_USB software of Manner and the PVIEW software are directly linked together

4. Perform the further installation steps and complete installation

At systems with limited user rights, the software will output an error, however, the software will work correct.

Screenshots are from a German Windows System.

6.4 Setting up the Interface-Software

Configuration

When using the software for the first time the hardware must be configured select *[menu]* -> *[Setup]* -> *[Hardware configuration]* to configure

Not all functions are available in every hardware configuration.

Please select main-menu

`Setup` -> `Hardware-Configuration`

Selection of the right configuration for the Device and the Interface - see attached configuration sheet

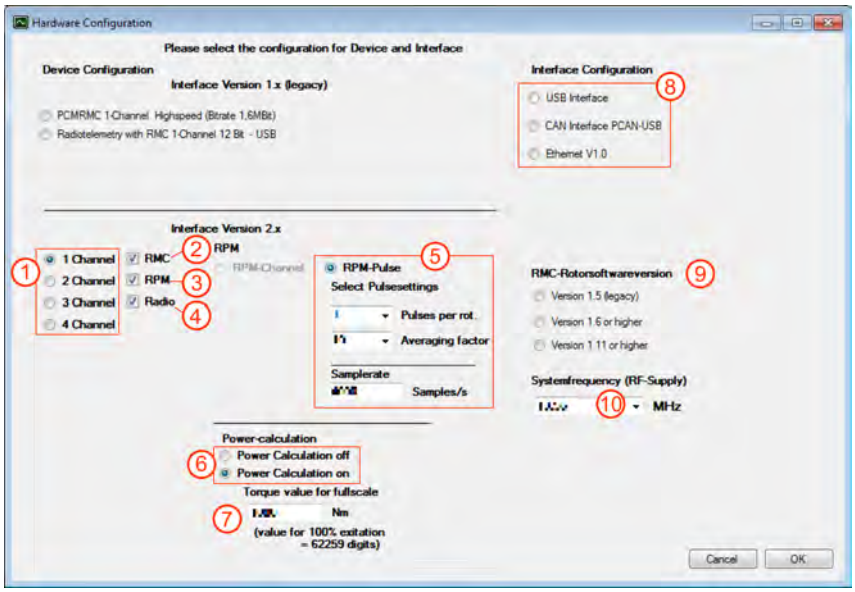


Fig. 12

	Description	Setting for the delivered system
1	Number of channels	1
2	Selection RMC - only for systems with Remote Control	yes
3	Selection RPM - only for systems with RPM acquisition	no

	Description	Setting for the delivered system
4	Selection Radio - only for systems with radio transmission	no
5	RPM-Pulse	--
	Optional: Setting of RPM parameters	
	Pulses per rotation	--
	Averaging factor	--
	Sample rate (samples/s)	--
6	**Optional:** Choice calculation on / off	--
7	**Optional** (if calculation is on): Value for "Torque value for fullscale"	--
8	Choice of the used interface.	USB
9	RMC Rotorsoftwareversion	1.6 or higher
10	Input system frequency	13,56 MHz

Authorisation Level

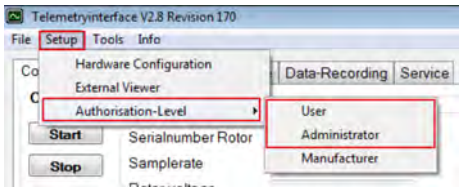


Fig. 13

[Menu] -> [Setup] -> [Authorisation Level]

With this settings, it is possible to set different modes for the pc-software. The settings are still present at next start of the software.

User (no password required)

Settings for normal operation mode. With this setting, no permanent modifications on the measurement system are possible.

Administrator

In this mode, modifications on the measurement system are possible (e.g. changing amplification over RMC) The password for this mode is "*RMC2000*"

6.5 Using the Interface Software

Configuration

Only for RMC systems.

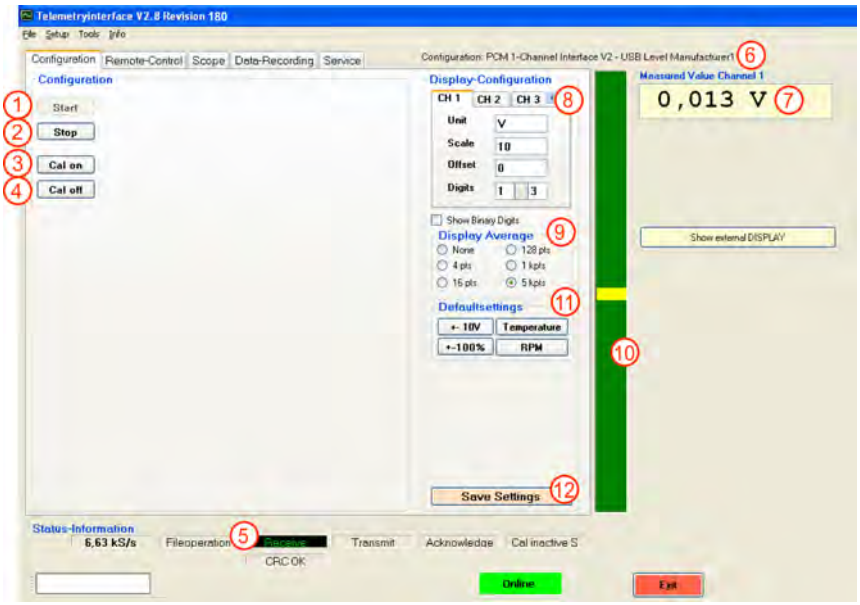


Fig. 14

1	Start display data
2	Stop display data
3	Remote calibration on
4	Remote calibration off
5	Communication display: Receive / Transmit / Acknowledge additionally Low-Power (in radio applications) While data transmission to the rotor CRC errors can briefly be shown. This is not relevant to the function. If the transfer fails, a separate dialog box will be displayed.
6	Display of the selected hardware configuration
7	Display of the measured value channel 1
8	Display settings: Unit, Scale, Offset
9	Average: Number of values used for averaging of the displayed analog value
10	Bar diagram of the analog output value
11	Uses predefined settings for the display configuration
12	Save: Saves the display settings

Oscilloscope - optional

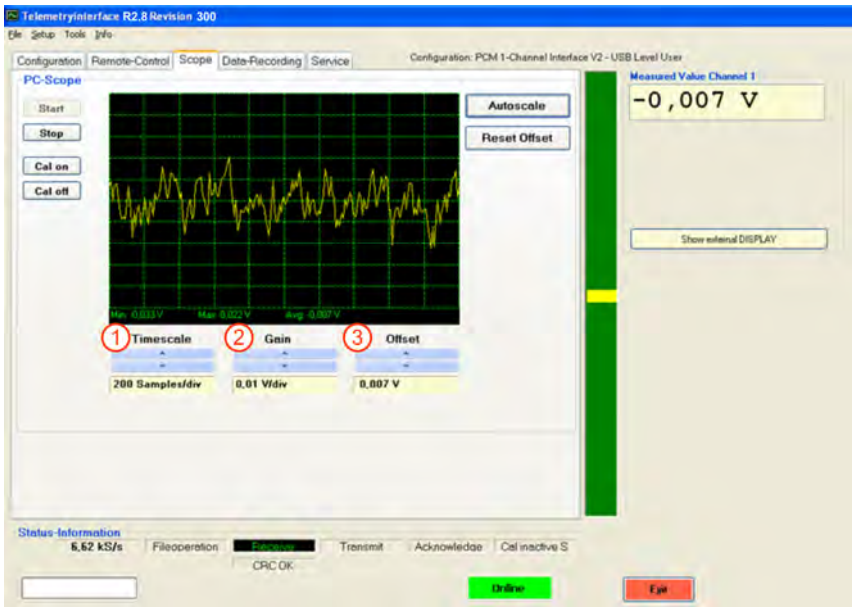


Fig. 15

1	Setting time base
2	Setting gain
3	Setting offset

Data recording - optional

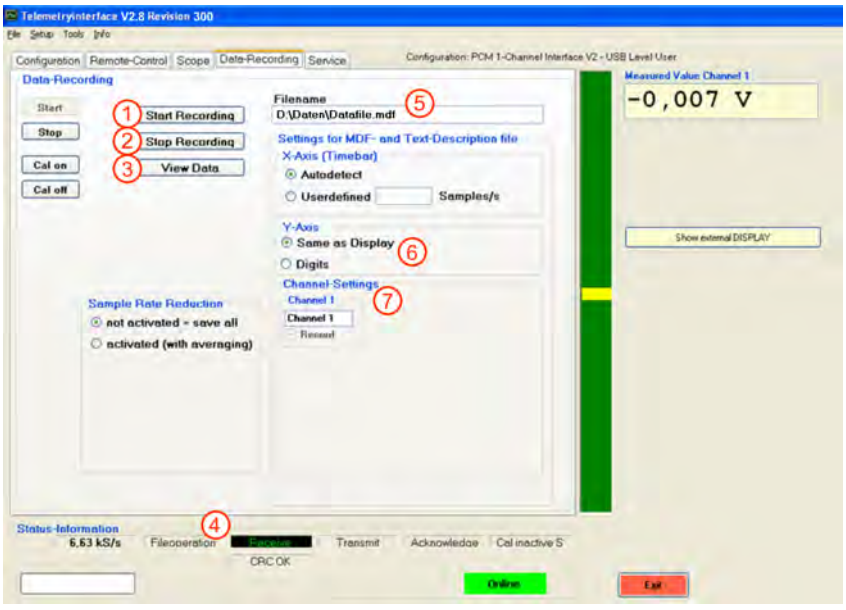


Fig. 16

1	Start recording into a file
2	Stop recording into a file
3	Show data with additional external viewer PVIEW - if installed
4	Display file operation activity

5	Input field for path and file name
6	Additional information, which is saved in the description files
7	Option for RPM-systems save calculated rpm or save rpm-pulses to datafile On menue setup, there is the possibility to activate an averaging for the calculated rpm. For option 'Calculated RPM' take care of the correct setting at configuration (sample rate).

NOTICE!
No other program must be active at the PC while recording data into a file. This can effect a loss of data.

Service

Enables the possibility for re-calibration of the analog output - available for rmc systems

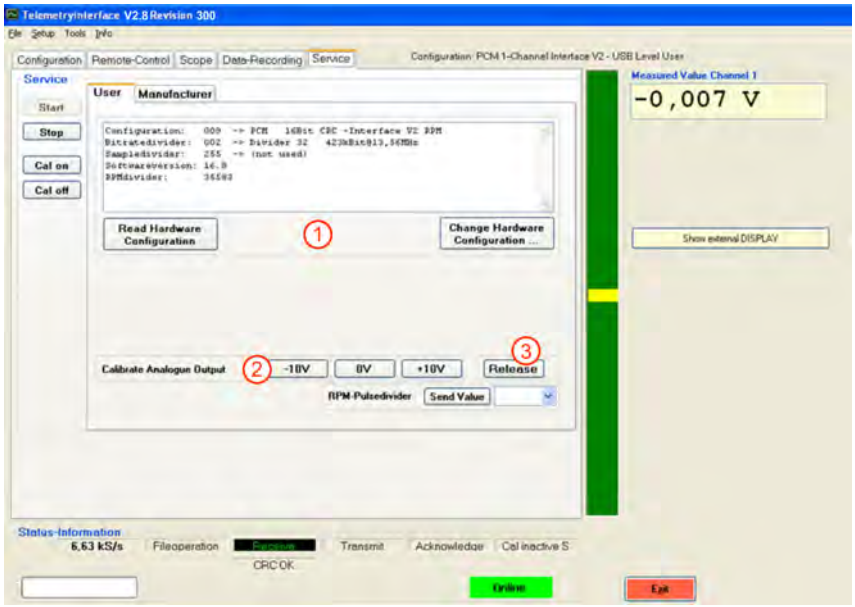


Fig. 17

1	Option to change the hardware configuration of the interface according to instructions of the manufacturer.
2	This mode simulates a constant value from the rotor. This option enables the check and possibility for re-calibration of the analog output voltage
3	Switches back to measurement mode

Tool for strain gauge calculation

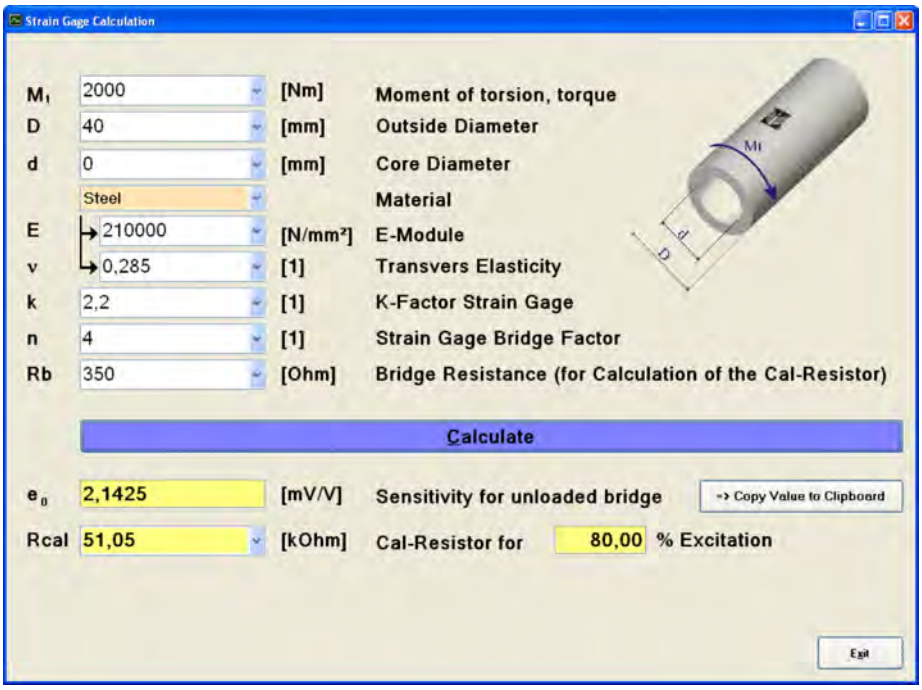


Fig. 18

Select *[Main-Menu] ->[Tools] ->[Strain Gauge Calculation Torsion]*

With this tool it is possible to calculate the sensitivity of a strain gauge for torsion measuring.

Additionally the shunt resistor for the calibration-function is calculated.

Please refer to the technical data of the strain gauge and the used material for the different coefficients.

6.6 Data file format (Option Data Acquisition)

Data Format

The data are recorded in a binary format. The file has the ending '.DAT'. The data can be imported in every analyzing software, which can handle with binary data.

Additionally there are generated two description files:

- MDF-description-file: This file is used to describe the structure of the binary file. The description file is necessary for the data viewing software PVIEW from Stiegele Datensysteme GmbH.
- Text-description-file: Description information in plane text

Format of the Binary File (.DAT)

Definition: LB= Low Byte, HB=High-Byte

First the Low-Byte and then the High-Byte of a channel is recorded.

The range of a 12 and 16 bit system is from 0 to 65535

For 12 bit-systems, the lowest 4 bits are set to 0

Table 1: Assignment to the analog values:

Excitation 100%	correspond to analog output +10 V	digital value 62259 for 16 bit system
Excitation 0%	correspond to analog output 0 V	digital value 32768 for 16 digital value
Excitation -100%	correspond to analog output - 10 V	digital value 3277 for 16 digital value

Excitation [%] = (Digital-Value - 32768) / 294.91 for 16 Bit-Systems

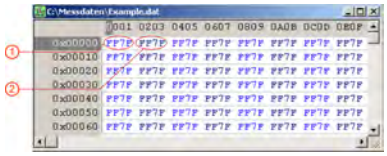
Values, which exceed this range are not within the measuring range.

The time between two measuring values in the .DAT-file corresponds to the reciprocal value of the sample rate of the system (see page technical data)

A optional calculated power-value is saved as 4-Byte float.

6.7 Data File-Structure (Option Data Acquisition)

Structure of the Binary File with extension .DAT: Sample file shown with a Hex Viewer



1	First measuring value FF=Low Byte 7F=High Byte
2	Second measured value

Fig. 19

Structure of the Text Description File with extension .txt

Structure shown for a system with two channels

```
[Data-Description File]
Version:              1.0
Binary-Filename:      dataset1.dat
Time of Record:       24.01.2008 17:15:39
Samples per Frame:    2
Bytes per Sample      4
Samplerate  [1/s]     6511,48

[Channeldescription]
Channelnumber:        1
Name:                 Ch1
Label:                Channel 1
Unit:                 V
Factor:               0,000339086500966397
Constant:             -11,1111964636669
Dataformat:           4

Channelnumber:        2
Name:                 Ch2-RPM
Label:                RPM
Unit:                 1/s
Factor:               1
Constant:             0
Dataformat:           4
```

1	Factor and offset constant to calculate the physical value from the binary value Example: Binary Value 62259 * (0,00033908..)+ (-11,1111..) = 10 V [Unit] Data format: 4 for 2-Byte Integer, 9 for 4-Byte Floating-point

Fig. 20

7 Maintenance

The systems of Manner Sensortelemetrie are low-maintenance.

DANGER!

Risk of Injury Caused by Defects on System Built-Up

Particularly loose or damaged parts may endanger present persons

Carry out the maintenance regularly and assiduously.

Within a periodical repeating maintenance following operations have to be done:

- Clean the antenna system, vacuuming of dust deposit
- Check the antenna system for scrub marks or mechanical damages
- Check the fastening of the stator antenna for a fix seat and tighten of the screwed fastenings where necessary.
- Check the plug connections and cables

Document the completed annual maintenance

8 Contact

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