



# WTX700 Series Operating Manual

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#### 1 Introduction

#### 1.1 Safety information

#### General information

This manual contains information that must be observed in the interest of your own safety and to avoid damage to assets. This information is supported by symbols which are used in this manual as follows.

Please read this manual before commissioning the device. Keep the manual in a place accessible to all users at all times. If difficulties occur during commissioning, please refrain from carrying out any manipulations that could jeopardize your warranty rights.

#### Warning signs

<u> </u>	
<b>A</b>	CAUTION!
	This symbol in combination with the signal word indicates that <b>damage to assets or data loss</b> will occur if suitable precautions are not taken.

Note signs

i	<b>TIP!</b> This symbol refers to <b>important information</b> about the product or its handling or additional use.
	<b>REFERENCE!</b> This symbol refers to <b>Further information</b> in other sections, chapters or manuals.

#### 1.2 Description

The head transmitter, WTX700 designed for industrial applications consists of the transmitter with integrated transmission unit and an antenna-battery case. The transmitter is designed for integration into the connection head. Integration into customer-specific connection heads is also possible. The antenna-battery case is installed on the connection head via a thread (M20 x 1.5).

The measured value is transmitted wireless by the receiver (WRX900), displayed on the LCD display and provided on the receiver via the RS485 interface as well as an analog output. The radio frequency within the ISM band (Industrial, Scientific and Medical Band) is 868.4 MHz. This frequency is almost insensitive to external interferences and allows transmission even in a rough industrial environment. When using the antenna wall holder with the 10 meter long cable for the receiver, the maximum open air range is 300 m.

A lithium battery 3.6 V, 2.2 Ah (size AA) is used for the transmitter power supply. Transmitter (probe) and receiver can be configured with the optional setup program (probe ID, transmission interval, measuring range and, if necessary, probe type). The configuration data can be archived and printed. Changed parameters can be overwritten again with the factory settings at any time. The connection between transmitter and PC is established via a PC interface (USB/TTL).

Configuration can be preset if stated at time of order.



#### 1.3 Block diagram



**TIP!** An active (4 to 20) mA loop can be monitored passing the current through a suitable resistor and sensing the mV drop.

#### 1.4 Dimensions

#### 1.4.1 Transmitter



# 1.4.2 Antenna-battery case



#### 1.5 Connection elements and connectors



(1) SMB antenna connector

 (antenna connection)
 (2) Voltage supply connector
 (battery connection)
 (3) Cable guide for antenna cable
 and voltage supply

(4) Probe connection

(1)

(6)

(5)

(5) Setup connector

(6) Fastening holes for installation in the connection head

(7) Voltage supply socket (battery connection)(8) SMB antenna socket (antenna connection)

(9) Seal

(10) Locknut

(11) Battery lid screw

#### 2 Identifying the instrument version

#### 2.1 Probe ID

#### Position

The factory set probe ID is stated on a sign fitted on top of the transmitter.

#### Probe ID

The probe ID is factory set. It must be entered and activated on the receiver to establish communication between the probe and receiver. The probe ID can be changed to customer specific requirements using the setup program. The user must ensure that probes with identical probe IDs are not used together.

#### 2.2 Order details

WTX700/SCH11	RADIO TX C/W SCH11A HEAD
WTX700/SCH4/B	RADIO TX C/W SCH4 B HEAD (Two side entries)
WTX700/SCH4/C	RADIO TX C/W SCH4 C HEAD (One side and one base entry)

#### 2.3 Accessories

Article	Sales article No.
Lithium battery 3.6 V, 2.2 Ah (size AA)	28-302-0036-01
PC interface with USB/TTL converter, adapter (socket connector) and adapter (pins)	WLESS/CNFG/KIT

#### 3 Probe preparation

#### 3.1 Fitting/exchanging the battery



#### **CAUTION!**

Ensure that soiling, moisture and vapors cannot enter the device. The device could be destroyed. When inserting/changing the lithium battery, ensure that the device is not exposed to soiling, moisture and vapors.



#### CAUTION!

The probe does not function, if the poles are incorrectly connected. The battery and the probe electronics could be damaged. Ensure that the poles are correctly connected.



#### CAUTION!

Incorrect batteries put safety at risk. The device could be destroyed when using incorrect batteries. Only use the lithium battery available as accessories.

Power supply of the probe is provided by the included 3.6 V, 2.2 Ah lithium battery inserted in the antenna-battery case ready for use. Battery service life depends on the set transmission interval and the ambient temperature: approx. 1 year with the factory-set values (transmission interval 15 s) and room temperature.

If the battery was removed or must be replaced, proceed as follows:



#### Step Activity

- 1 Undo the battery lid screw (A) on the antenna-battery case and open the case lid (B).
- 2 Press on the battery in the area of the minus pole (D) to remove the battery (C).
- When inserting a battery, always insert the minus pole (D) side first followed by the plus pole (E).
- 4 Close the case lid (B) again and ensure the correct seal position.
- 5 Retighten the battery lid screw (A).

#### 3.2 Battery service life

The battery service life, depending on the transmission interval (2 s, 15 s, 30 s, 90 s) and the ambient temperature, are shown in the following figure.



#### 3.3 Disposal of lithium batteries

Please dispose of all batteries according to the national regulations. Insulate the contacts of lithium batteries not completely discharged. Disposal of batteries together with domestic waste is expressively prohibited. Batteries can be deposited at communal waste collection points or the local retailers.

#### 4 Probe range

#### 4.1 General information about radio transmission

#### See Receiver handbook for information Part No: D2519\_01

#### **5** Installation

# 5.1 Information about fastening, securing and arrangement

i	<b>TIP!</b> Install the antenna-battery case vertically to the top and, if possible, with free view to the receiver antenna.

i	TIP! Never cover or coat the antenna-battery case with metallic objects. Otherwise, the probe range is impaired.	

	TIP!
Ť	For optimum probe function ensure a minimum spacing of 200 mm between the probes.

# 5.4 Aligning the antenna

The recommended and unfavorable antenna alignment possibilities are shown in the following figure. The best possible reception is ensured when the recommended alignment possibilities are used.

Recommended installation: Connection head vertical and antenna-battery case vertical to the top
Recommended installation: Connection head horizontal and antenna-battery case vertical to the top
Recommended installation: Connection head horizontal and antenna-battery case vertical to the top
Unfavourable installation: Never install the antenna-battery case horizontally.
Unfavourable installation: Never install the antenna-battery case horizontally.

#### 6 Electrical connection

#### 6.1 Safety information

- The electrical connection must only be carried out by qualified personnel.
- When installing and operating the transmitter ensure that no electro-static charging can take place.
- The transmitter is not suitable for installation and application in explosion endangered areas.
- Never expose the transmitter to magnetic or electrical fields (e.g. caused by transformers, walkie-talkies or electro-static discharge).
- An electrical connection deviating from the connection diagram can destroy the transmitter.



(1) SMB antenna connector
(antenna connection)
(2) Voltage supply connector
(battery connection)
(2) Cable guide for antenna cab

(3) Cable guide for antenna cable and voltage supply (9)

- (4) Probe connection
- (5) Setup connector
- (6) Fastening holes for installation

in the connection head

- (7) Voltage supply socket (battery connection)(8) SMB antenna socket (antenna connection)
- (9) Seal
- (10) Locknut
- (11) Battery lid screw

# 6.3 Connection diagram

# 6.3.1 Voltage supply

Connection	Connector	Terminals	Symbol and terminal designation
Lithium battery, DC 3.6 V	2		+ -

# 6.3.2 Analog inputs

Connection	Connector	Terminals	Symbol and terminal designation
Thermocouple	4	2 and 3	+ O 2 - O 3
RTD temperature probe 2- wire circuit	4	1 and 3	
RTD temperature probe 3- wire circuit	4	1 to 3	

Potentiometer 2-wire circuit	4	1 and 3	
Potentiometer 3-wire circuit	4	1 to 3	
			+O 1
Voltage (0 to 50) mV	4	2 and 3	- <b></b> O 3

# 6.3.3 Output

Connection	Connector	Terminals	Symbol and terminal designation
Antenna connector	1		

#### 6.3.4 Interface

Connection	Connector	Terminals	Symbol and terminal designation
Setup	5		000

#### 7 Setup program

#### 7.1 General information about the setup program

The setup program serves to configure probes and receivers by means of a PC. The configuration data can be archived and printed. Configurable parameters are:

- Probe ID
- Transmission interval
- Configuration of the probe used

The factory settings are:

- Probe ID consecutively
- Transmission interval (15 s)
- Probe setting as per order specifications

(Example: Pt100 in 3-wire circuit, (-200 to +600) °C. The connection between probe and PC is established via a PC interface (USB/TTL converter).

M 902930 (Unicode) - [Setup1.216 - a					
	) Bie Edit Soreen Datatransfer Tools Window Info				
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□     30230       □     ⇒       □     >	File info header:     File info header:     Fardware:     Channels:     Channels:     Channels:     Channels:     Limit 1:     Limit 2:     Hysteresis:     Scaling start     Officit     Filet rime constant     Decimal place:     Radio threaut     Alarm type 1:     Alarm type 1	130 50.00 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00			
Setup1.216					
Brouth read					
	be ID Decimal place Value	Min. Max. RF channel quality Battery	1		
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	16 Auto decimal place ▼ 21.748 °C Ink Auto decimal place ▼	2.8722 °C 55.193 °C 100 % OK			
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			User: Specialist NUM		

#### 7.2 Hardware and software prerequisites

The following hardware and software prerequisites must be fulfilled for operation and the software installation:

#### Minimum configuration

Intel Pentium III<sup>1</sup> or higher Microsoft Windows 2000 or XP<sup>2</sup> 256 MB central memory CD drive a free USB port 120 MB free hard-disk storage capacity

#### **Recommended configuration**

Intel Pentium 4<sup>2</sup> Microsoft Windows XP 512 MB central memory

#### Information about Windows 2000 or XP

If several users are managed on the computer, ensure that the user is logged in, who will work with the program later. Ensure that the user has administrator rights while installing the software. Once installation is completed, the rights can be restricted again.

# In the event of non-observance of this information, correct and complete installation cannot be guaranteed!

<sup>1</sup> Intel and Pentium are registered trademarks of the Intel Corporation. <sup>2</sup> Microsoft and Windows are registered trademarks of the Microsoft Corporation.

#### 7.3 Establishing the connection between PC and probe

The connection between probe and PC is established via a PC interface USB/TTL converter and adapter (socket).

i	TIP! Permanent interface operation! The PC interface USB/TTL converter is only designed for a time- limited interface connection. Please ensure that the interface connection is disconnected and the probe correctly closed once the setup data transfer is completed.

	TIP! Malfunctions can occur, if the connection between battery and transmitter is disconnected while the setup connector is still connected. Do not disconnect the battery from the transmitter as long as the setup connector is still connected.
--	---

TIP! Low battery! A low battery can lead to interface problems and result in an incorrect configuration or data loss. Please ensure that the battery used for the connection between PC and probe never reaches the "Low battery" status.
---





For the setup via the USB/TTL converter, establish the following connections:

Step	Activity
1	Insert the USB connector of the USB cable into the laptop/PC.
2	Insert the USB cable into the connector of the USB/TTL converter .
3	Connect the RJ-45 connector of the modular line to the RJ-45 socket of the USB/TTL converter.
4	Connect the 4-pin adapter socket to the adapter of modular line .
5	Connect the adapter socket, 4-pin, to the probe interface .



## TIP!

For probe configuration, ensure that the probe is connected to the voltage supply of the antennabattery case.

#### 7.4 Probe configuration

This chapter explains the configuration of a probe via the setup program. Prerequisite being that the probe and the PC are connected via an interface.

#### 7.4.1 Establishing communication

A differentiation is made between two different way of proceeding when establishing the communication between probe and setup program:

- Establish the communication with "Device settings assistant". This is the case when the setup program is used for the first time (list of devices empty).
- Establish the communication without "Device settings assistant". This is the case when the receiver/probe and setup program have already communicated (list of devices with entries).

#### 7.4.2 Reading current probe parameters

How to	proceed:
--------	----------

Step	Activity
1	In the "File" menu select the "New" function. The "Device assistant" starts.
2	Confirm the "User-defined setting" by pressing the "Continue" button.
3	Select the "Frequency band" and confirm with "Continue".
4	Select the receiver variant and confirm by pressing "Continue".
5	Exit the overview of the selected settings by pressing "Finish". The current settings are displayed in the setup program.
6	Select the desired probe from the navigation tree by clicking with the left mouse key.
7	In the "Data transfer" menu select the "Data transfer from device" function.
8	Exit the inquiry "Save file" by selecting "Skip". The current probe parameters are downloaded to the setup program.

# 7.4.3 Editing probe parameters

# How to proceed:

Step	Activity
1	Select the probe to be edited from the navigation tree by double clicking with the left mouse key. The "Probe configuration" is opened.
2	Edit the desired parameters.
3	Confirm editing with "OK".
4	Save the parameters in the "File" menu with the "Save" function.

# 7.4.4 Transmitting new parameters to the probe

#### How to proceed:

Step	Activity
1	In the "Data transfer" menu select the "Data transfer to device" function. The current parameters are transmitted to the probe
2	Finish the communication between setup program and probe in the "Data transfer" menu using the "Disconnect connection" function.

#### 7.5 ParametersOverview

Parameters	Factory setting	Value range/Selection
Probe ID	Numeric various	1 99999
Transmission interval	15 s	1 3600 s
Transmission frequency	868.4 MHz	<b>868.4</b> MHz Display only, cannot be edited!
Probe type	RTD temperature probe	Potentiometer, voltage, thermocouple, <b>RTD temperature probe</b>
Sensor	Pt100	depending on the probe type, Pt100 DIN EN 60751 -200 +600 °C
Connection type	3-wire circuit	3-wire circuit, 2-wire circuit
Lead resistance	0 Ohm	(0 to 22) Ohm Only with 2-wire circuit!
Resistance RP	10000 Ohm	(5 to <b>10000</b> ) Ohm Only for potentiometer probe type!
Resistance R0	0 Ohm	( <b>0</b> to 4000) Ohm Only for potentiometer probe type!
TAG number		10-digit number, freely selectable
Information text		10-digit number, freely selectable
Installation date	current date	any date



#### TIP!

At a transmission interval of > 15 s, the probe transmits a socalled link telegram (after a set-up transmission), i. e. the telegrams are transmitted at the factory-set interval of 15 s for a period of 30 minutes, and only then at the set transmission interval.



#### TIP!

Once the setup connector is connected, the probe automatically transmits telegrams at a transmission interval of 1 s to ensure that changes can be immediately detected by the receiver. After the setup connector is removed, the telegrams are transmitted again at the set transmission interval.

#### Term definition

#### Probe ID

The probe ID is an unmistakable ID with max. 5 characters which is recognized by the receiver. The ID can be individually changed, for example, to achieve a better overview of a system. Ensure that an ID is not used simultanously by two probes within the reception range to avoid malfunctions.

#### Transmission interval

This parameter is used to define the time intervals used to transmit data to a receiver. The setting of the "Transmission interval" parameter affects the battery service life. For this reason, act with caution and do not only consider the transmission quality when selecting the interval.

#### **Transmission frequency**

The transmission frequency defines the frequency band used to transmit data to a receiver. The transmission frequency is defined at 868.4 MHz for Europe because special regulations are defined concerning transmission interval and transmission capacity for the ISM band (Industrial, Scientific and Medical Band).

## 8.1 Technical data

# 8.1.1 Analog inputs

# Thermocouples

Designation	Standard	Measuring range	Measuring accuracy
Fe-CuNi L	DIN 43710	(-200 to 900) °C	± 0.1 %
Fe-CuNi J	DIN EN 60584	(-210 to 1200) °C	± 0.1 % from -100 °C
Cu-CuNi U	DIN 43710	(-200 to 600) °C	± 0.1 % from -100 °C
Cu-CuNi T	DIN EN 60584	(-270 to 400) °C	± 0.1 % from -150 °C
NiCr-Ni K	DIN EN 60584	(-270 to 1372) °C	± 0.1 % from -80 °C
NiCr-CuNi E	DIN EN 60584	(-270 to 1000) °C	± 0.1 % from -80 °C
NiCrSi-NiSi N	DIN EN 60584	(-270 to 1300) °C	± 0.1 % from -80 °C
Pt10Rh-Pt S	DIN EN 60584	(-50 to 1768) °C	± 0.15 % from 20 °C
Pt13Rh-Pt R	DIN EN 60584	(-50 to 1768) °C	± 0.15 % from 50 °C
Pt30Rh-Pt6Rh B	DIN EN 60584	(0 to 1820) °C	± 0.15 % from 400 °C
W5Re-W26Re C		(0 to 2320) °C	± 0.15 %
W3Re-W25Re D		(0 to 2495) °C	± 0.25 %
W3Re-W26Re		(0 to 2400) °C	± 0.15 %
Chromel-Copel		(-200 to 800) °C	± 0.1 % from -80 °C
Chromel-Alumel		(-200 to 1372) °C	± 0.1 % from -80 °C
PLII (Platinel II)		(0 to 1395) °C	± 0.15 %
MoRe5-MoRe41		(0 to 2000) °C	± 0.2 %
Cold junction		Pt1000 internal	
Cold junction accuracy		± 1 °C	

# RTD temperature probe

Designation	Standard	Measuring range	Measuring accuracy
Pt100 (TK value = 3.85 × 10 <sup>-3</sup> 1/K)	DIN EN 60751	(-100 to 200) °C (-200 to 600) °C	± 0.1 °C ± 0.2 °C
Pt500 (TK value = 3.85 × 10 <sup>-3</sup> 1/K)	DIN EN 60751	(-100 to 200) °C (-200 to 600) °C	± 0.1 °C ± 0.2 °C
Pt1000 (TK value = 3.85 × 10 <sup>-3</sup> 1/K)	DIN EN 60751	(-100 to 200) °C (-200 to 600) °C	± 0.1 °C ± 0.2 °C
Ni 100 (TK value = 6.18 × 10 <sup>-3</sup> 1/K)	DIN 43760	(-60 to 250) °C	± 0.2 °C
Ni 500 (TK value = 6.18 × 10 <sup>-3</sup> 1/K)	DIN 43760	(-60 to 150) °C	± 0.2 °C
Ni 1000 (TK value = 6.18 × 10 <sup>-3</sup> 1/K)	DIN 43760	(-60 to 150) °C	± 0.2 °C
Pt100 (TK value = 3.917 × 10 <sup>-3</sup> 1/K)	JIS 1604	(-100 to 200) °C (-200 to 600) °C	± 0.1 °C ± 0.2 °C
Pt50 (TK value = 3.91 × 10 <sup>-3</sup> 1/K)	ST RGW 1057 1985	(-200 to 600) °C	± 0.2 °C
Pt100 (TK value = 3.91 × 10 <sup>-3</sup> 1/K)	GOST 665194 A.1	(-100 to 200) °C (-200 to 600) °C	± 0.1 °C ± 0.2 °C
Cu50 (TK value = 4.26 × 10 <sup>-3</sup> 1/K)	GOST 665194 A.4	(-50 to +200) °C	± 0.2 °C
Cu100 (TK value = 4.26 × 10 <sup>-3</sup> 1/K)	GOST 665194 A.4	(-50 to 200) °C	± 0.2 °C
Connection type	2-wire or 3-w	vire circuit	
Sensor lead resistance 2- wire circuit 3-wire circuit Probe current	Measuring resistance + $\leq 22 \Omega$ total line resistance 11 $\Omega$ per line < 0.5 mA		
Lead compensation	Not required for 3-wire circuit (max. admissible 11 $\Omega$ per line). Can be configured on the probe with 2-wire circuit ( $\leq 22 \Omega$ ).		

#### Potentiometer

Designation	Measuring range	Measuring accuracy
Potentiometer	< 400 Ω ≥ 400 Ω to ≤ 4000 Ω > 4000 Ω to ≤ 10000 Ω	± 400 mΩ ± 4 Ω ± 10 Ω
Connection type	2-wire or 3-wire circuit	
Sensor lead resistance 2-wire circuit 3-wire circuit	$\leq$ 22 $\Omega \leq$ 11 $\Omega$ per line	

# Voltage

Designation	Measuring range	Measuring accuracy
Voltage	(0 to 50) mV	± 0.1 %

# 8.1.2 Output (radio transmission)

Probe ID	max. 5-digit ID, factory-set, can be configured customer-specific
Transmission interval	adjustable from 1 to 3600 s (ex-factory 15 s)
Transmission frequency	ISM band 868.4 MHz (Europe)
Transmission capacity	+10 dBm
Open air range	Max. 300 m when using the antenna wall holder of the receiver and 10 m long antenna cable. When installing the antenna directly onto the receiver, a reduced range of approx. 40% must be taken into account.
Output signal Thermocouple RTD temperature probe Potentiometer Voltage	Voltage (mV) Resistance (Ω) Percent (%) and resistance (Ω) Voltage (mV)
Configuration	with setup program
Configurable parameters	Probe ID (max. 5-digit ID) and transmission interval

### 8.1.3 Electrical data

Voltage supply Lithium battery Size	Rated voltage: 3.6 V, rated capacity: 2.2 Ah AA
Operating life	approx. 1 year with the factory-set values (transmission interval = 15 s) and at room temperature(fast transmission interval and high or low ambient temperature reduce the battery operating life)
Battery change	only use the lithium battery available as accessories

# 8.1.4 Environmental influences

#### Transmitter in the head with antenna-battery case

Ambient temperature range	(-30 to +85) °C
Storage temperature range / storage humidity	(-40 to +85) °C / rel. humidity ≤ 95 %
Temperature coefficient <sup>a</sup>	
Thermocouple	≤ ± 0.005 % / °C deviation 22 °C plus accuracy of the cold junction
RTD temperature probe	$\leq$ ± 0.005 % / °C deviation from 22 °C
Potentiometer	$\leq$ ± 0.01 % / °C deviation from 22 °C
Voltage	$\leq$ ± 0.005 % / °C deviation from 22 °C
Climate class	10 cycles at 10 °C / 80 °C, as per IEC 68-2-30,
	rel. humidity 95 %, during operation
Admissible mechanical shock resistance	10 g / 6 ms, as per DIN IEC 68-2.29
Electromagnetic compatibility (EMC)	as per DIN EN 61326-1 Class B Industrial requirements
Interference emission	ETSI EN 300 220-1 (V 2.3.1) and ETSI
Interference immunity	EN 300 220-2 (V 2.3.1)
Radio frequency spectrum	

<sup>a</sup> All accuracy values in % refer to the maximum measuring range.

#### 8.1.5 Case

#### Transmitter

Туре	Plastic case to be installed in connection head
Material	Polycarbonate
Flammability class	UL 94 V2
Dimensions	
Diameter	44 mm
Height with/without	31 mm / 27 mm
connectors	
Protection type	IP65, when installed (with suitable head, form B)
Connections	
Sensor	3-pole connection terminal RM 5 mm, conductor cross-section 1.5 mm <sup>2</sup>
Antenna	SMB connector
Voltage supply	2-pole multi-pin connector RM 2.54 mm
Setup	4-pin connector
Weight	approx. 35 g

#### Antenna-battery case

Туре	Plastic case with M20x1.5 thread for connection head
Material	Polyetherimide
Flammability class	UL 94 HB or UL 94 V-0
Dimensions	
Diameter	30 mm
Height	115 mm
Protection type	IP65, as per DIN EN 60529
Connection	
Antenna	SMB inlet, 50 $\Omega$
Battery connection	2-pole connector RM 2.54 mm
Operating position	preferably vertical (optimum alignment to the receiver antenna)
Weight (including battery)	approx. 80 g



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