Your Global Automation Partner

TURCK

TX500 -SERIES
HMI

Operating Instructions

Table of contents

1 About this document

This manual describes the setup, the functions and use of the product and helps you to operate the product for its intended use. Read these instructions carefully prior to using the product. This will prevent the risk of personal injury and damage to property. Keep these instructions safely during the service life of the product. If the product is passed on, pass on these instructions as well.
This operating instruction describes the main features of the Turck TX500 operator panels. The manual refers to the following models:

- TX504E HMI with TFT color 4,3" widescreen touch display
- TX507(E) HMI with TFT color 7" widescreen touch display
- TX510 HMI with TFT color 10.4" touch display
- TX513 HMI with TFT color 13.3" widescreen touch display

1.1 Target groups

This document is written for specially trained personnel and must be read carefully by anyone who is charged with the mounting, commissioning, operation, maintenance, disassembly or disposal of the device.

1.2 Explanation of symbols used

The following symbols are used in this manual:

DANGER!
DANGER indicates an immediately dangerous situation, with high risk, the death or severe injury, if not avoided.

WARNING!
WARNING indicates a potentially dangerous situation with medium risk, the death or severe injury, if not avoided.

ATTENTION!
ATTENTION indicates a situation that may lead to property damage, if it is not avoided.

NOTE
In NOTES you find tips, recommendations and important information. The notes facilitate work, provide more information on specific actions and help to avoid overtime by not following the correct procedure.

CALL TO ACTION
➤ This symbol identifies steps that the user has to perform.

RESULTS OF ACTION
➥ This symbol identifies relevant results of steps.

1.3 Other documents

You will find the following supporting documentation in addition to this document online at **www.turck.com**:

- Data sheet
- Installation guide
- CAD data
- Getting started manuals

1.4 Feedback on this manual

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to **techdoc@turck.com**.

2 Product overview

The TX500 series HMI products combine state-of-the-art features and top performance with an outstanding design. They are the ideal choice for all demanding HMI applications including factory and building automation.

The TX500 HMI panels have been designed to run the CODESYS PLC and Target Visu.

- CODESYS PLC runtime
- CODESYS Target Visu runtime
- PROFINET controller
- EtherNet/IP™ scanner
- Modbus TCP master/slave
- Modbus RTU master/slave
- 1 × serial interfaces RS232/RS485/RS422
- 2 × RJ45 Ethernet port
- 2 × USB Host port, 1 × for TX504E
- 1 × SD card slot
- Extendable with optional plug-in modules

2.1 Product identification

The product may be identified through a type plate attached to the back. You will have to know the type of unit you are using for correct usage of the information contained in the guide.
An example of this type plate is shown in the figure below:

TX507E-P3CV01	type designation
6828103	product ident-no.
07/16	month/year of production
09994847559	serial number
041802A19901157	version ID of the product

2.2 Type code

TX 5 07 – P3 CV 01

TX Product Series

- **Product series**
  - **TX** Turck HMI/PLC

5 Series

- **Series**
  - **5** TX500 series

04 Screen Size

- **Screen size**
  - **04** 4.3"
  - **07** 7"
  - **10** 10.4"
  - **13** 13.3"

E Processor – **00** PLC **XX** Display

- **Processor**
  - **E** 600 MHz (ECO)
  - **blank** 1 GHz
- **PLC**
  - **00** Without PLC functionality
  - **P3** CODESYS V3 PLC runtime
- **Display**
  - **XX** Without visualization functionality
  - **CV** CODESYS V3 TargetVisu Runtime

NN Communication

- **Communication**
  - **NN** Without communication
  - **01** PROFINET Master
    EtherNet/IP™ Scanner
    Modbus TCP Master/Slave
    Modbus RTU Master/Slave

3 Standards and approvals

The products have been designed for use in an industrial environment in compliance with the 2014/30/EU directive.
The products have been designed in compliance with:

- EN 61000-6-4/ EN 61000-6-2
- EN 61000-4-2 to -4-6, EN 61000-4-8
- EN 55011, Class A
- EN 60945

ATTENTION!
Operation in residential and commercial areas
Electromagnetic disturbances!
➤ In case of the operation of the devices in residential and commercial areas, observe the measurement values according to IEC-61000-6-3.

The products are in compliance with the Restrictions on Certain Hazardous Substances (RoHS) Directive 2011/65/EU.

In compliance with the above regulations the products are CE marked.

4 Technical data

4.1 Technical specifications HMI

	TX504E	TX507/TX507E	TX510	TX513
Touch screen technology	resistive			
Display/backlight	TFT Color / LED			
Colors	64 K			
Resolution	480 × 272	800 × 480	800 × 600	1280 × 800
Diagonal (inches)	4,3″	7″	10.4″	13.3″
Format	16:9	16:9	4:3	16:9
Dimming	yes			
User memory flash	128 MB	256 MB/128 MB	256 MB	256 MB
SD card slot	yes, 1 ×			
Recipe memory	Yes. Flash memory storage, limited only by available memory			
Serial Port	DB9 female, software configurable, for RS232, RS485, RS422			
Ethernet port	2 × RJ45, 10/100 Mbit, with integrated switch			
USB Host port	1 × USB 2.0/1.1	1 × USB 2.0, 1× USB 2.0/1.1	1 × USB 2.0, 1× USB 2.0/1.1	1 × USB 2.0, 1× USB 2.0/1.1
Expansion slot	1 × for optional plug-in modules	2 × for optional plug-in modules		
Back-up battery	3 V, 50 mAh Lithium, rechargeable, not replaceable, type VL2330			
Real Time Clock	yes			
Operational voltage	10 to 32 VDC			
Current rating (at 24 VDC)	0.4 A	0.65 A	1 A	1.2 A

	TX504E	TX507/TX507E	TX510	TX513
Weight	1 kg	1 kg	2.1 kg	2.8 kg
Fuse	automatic			
Hardware clock	Clock/Calendar with back-up battery			
Accuracy RTC (at 25°C)	< 100 ppm			

NOTE
For applications requiring compliance with EN 61131-2 and specifically in reference to 10 ms voltage dips, the minimum power supply voltage is 18 VDC.

4.2 Environmental conditions/protection class

Environmental conditions		
Operating temperature (surrounding air temperature)	0 to +50°C	EN 60068-2-14
Storage temperature	-20 to +70°C	EN 60068-2-14
Operating and storage humidity	5 to 85 % RH non-condensing	EN 60068-2-30
Vibrations	5 to 9 Hz, 7 mm_{p-p}	EN 60068-2-6
Shock	9 to 150 Hz, 1 g, ± 50 g, 11 ms, 3 pulses per axis	EN 60068-2-27
Protection class		
Front panel	IP66	EN 60529

NOTE
The front face of the unit, installed in a solid panel, has been tested using conditions equivalent to the standards shown in the "Environmental conditions". Even though the level of resistance of the unit is equivalent to these standards, oils that should have no effect on the TX500 can possibly harm the unit. This can occur in areas where either vaporized oils are present, or where low viscosity cutting oil are allowed to adhere to the unit for long periods of time. If the front face protection sheet on the TX500 is peeled off or damaged, this may lead to the ingress of oil into the unit and separate protection measures are suggested.
If the installation gasket is used for a long period of time, or if the unit and its gasket are removed from the mounting plate, the original level of the protection cannot be guaranteed.

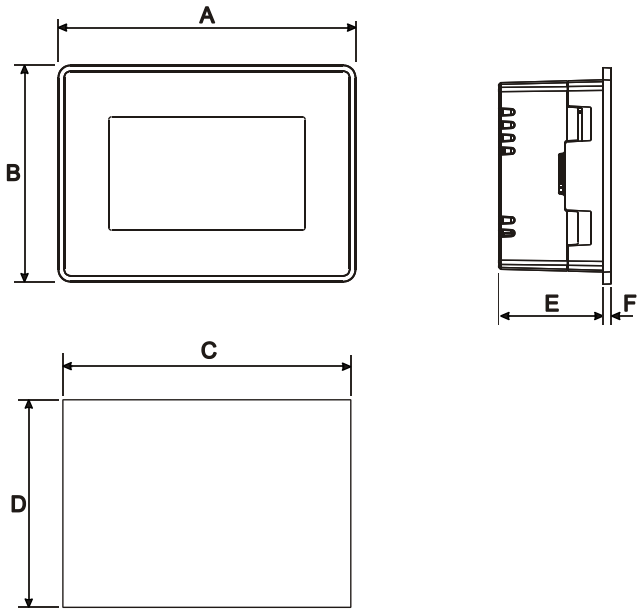
4.3 Electromagnetic Compatibility (EMC)/durability

Electromagnetic Compatibility (EMC)		
Radiated disturbance test	Class A	EN 55011
Electrostatic discharge immunity test	8 kV (air electrostatic discharge)	EN 61000-4-2
Radiated, radio-frequency, electromagnetic field immunity test	80 MHz …1 GHz, 10 V/m 1,4 GHz … 2 GHz, 3 V/m 2 GHz … 2.7 GHz, 1 V/m	EN 61000-4-3
Burst immunity test	± 2 kV DC power port ± 1 kV signal line	EN 61000-4-4
Surge immunity test	± 0,5 kV DC power port (line to earth) ± 0,5 kV DC power port (line to line) ± 1 kV signal line (line to earth)	EN 61000-4-5

Immunity to conducted disturbances inducted by radiofrequency field	0.15 ÷ 80 MHz, 10 V	EN 61000-4-6
Voltage dips, short interruptions and voltage variations immunity test	Port: AC mains; Level: 100% duration: 1 cycle and 250 cycles (50 Hz); 40% duration: 10 cycles (50 Hz); 70% duration: 25 cycles (50 Hz); Phase: 0°-180°	
Test executed on the 230 VAC side of the power supply		EN 61000-4-11
Durability information		
Backlight service life (LED type)	40.000 hours or more (Time of continuos operation until the brightness of the backlight reaches 50 % of the rated value when the surrounding air temperature is 25 °C) Extended use in environments where the surrounding air temperature is 40 °C or higher may degrade backlight quality/reliability/durability.	
Front foil (without directly exposure to sunlight or UV ray)	10 years if the surrounding air temperature is 25 °C	
UV Resistance	Indoor applications: After 300 hours cycled humidity in QUV accelerated weathering, some yellowing and brittleness may be present. Contact for 1/2 hour at 21 °C: no visible effect: Acetone, Butyl Cellosolve, Cyclohexanone, Ethyl Acetate, Hexane, Isopropyl Alcohol, Methyl Ethyl Ketone (MEK) , Methylene Chloride, Toluene, Xylene Contact for 24 hours at 49 °C: no visible effect: coffee, ketchup, lemon juice, mustard (slight yellow stain), tea, tomato juice!	
Touch screen reliability	> 1 million operations	

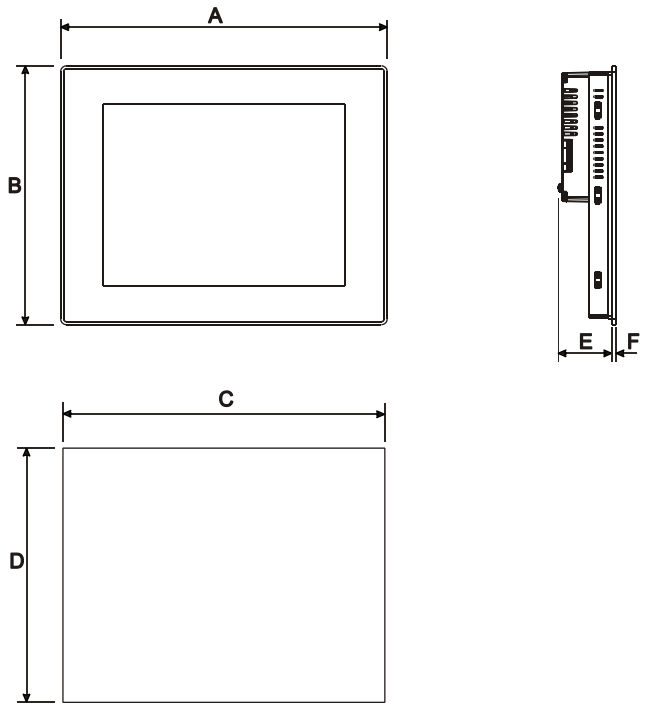
4.4 Dimensions

4.4.1 TX504E



Model	A	B	C	D	E	F
TX504E	149 mm/5.86″	109 mm/4.29″	136 mm/5.35″	96 mm/3.78″	56 mm/2.40″	4 mm/0.16″

4.4.2 TX507(E)/TX510/TX513



Model	A	B	C	D	E	F
TX507/TX507E	187 mm/7.36″	147 mm/5.79″	176 mm/6.90″	136 mm/5.35″	47 mm/1.85″	4 mm/0.16″
TX510	287 mm/11.3″	232 mm/9.13″	276 mm/10.86″	221 mm/8.70″	56 mm/2.20″	4 mm/0.16″
TX513	336 mm/13.22″	267 mm/10.51″	326 mm/12.83″	256 mm/10.07″	56 mm/2.20″	4 mm/0.16″

5 Installation

5.1 Installation environment

The equipment is not intended for continuous exposure to direct sunlight.
This might accelerate the aging process of the front panel film.

The equipment is not intended for installation in contact with corrosive chemical compounds.
Check the resistance of the front panel film to a specific compound before installation.

Do not use tools of any kind (screwdrivers, etc.) to operate the touch screen of the panel.

In order to meet the front panel protection classifications, proper installation procedure must be followed:

- The borders of the cutout must be flat
- Screw up each fixing screw until the bezel corner get in contact with the panel.
- The cut-out for the panel must be of the dimensions indicated in this manual.
- The IP66 is guaranteed only under the following conditions:
  - Max. deviation from the plane surface to the cut-out: ≤ 0.5 mm
  - Thickness of the case on which the equipment is mounted: 1,5 mm to 6 mm
  - Max. surface roughness where the gasket is applied: ≤ 120 µm

5.1.1 Applying the gasket

The gasket should be applied on the rear of the frame.

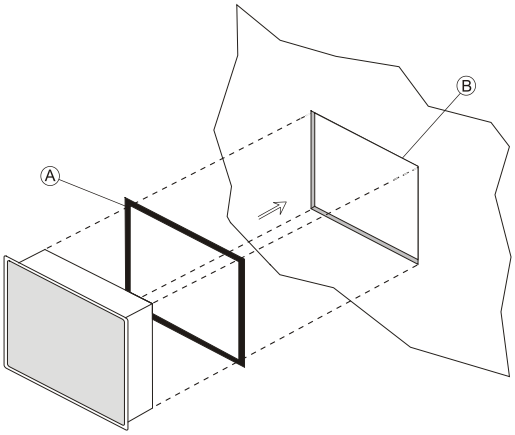


Fig. 1: TX504E/TX507(E)
A = gasket
B = installation cut-out

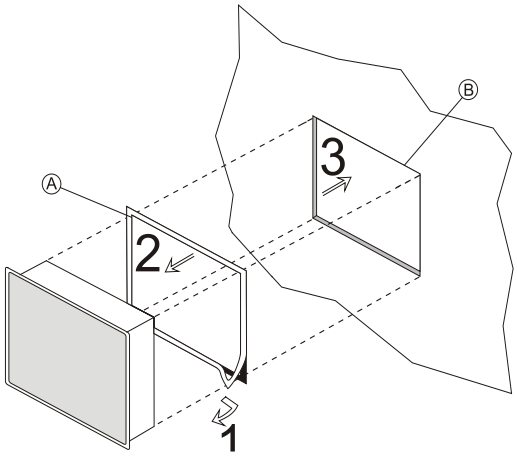
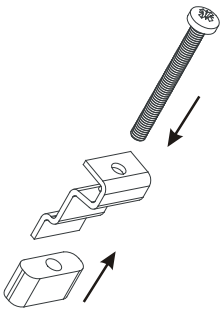
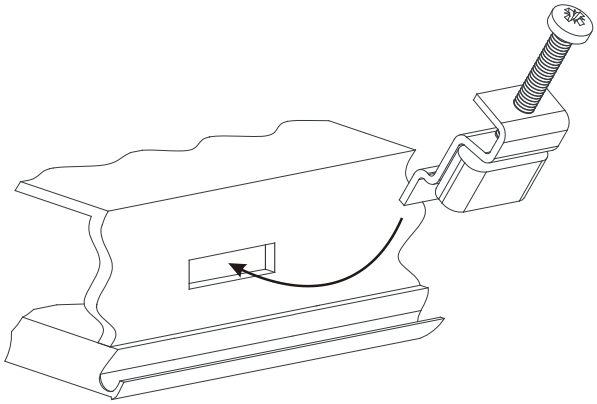


Fig. 2: TX510/TX513
A = gasket
B = installation cut-out

5.2 Mounting of the HMI

➤ Place the fixing brackets as follows:



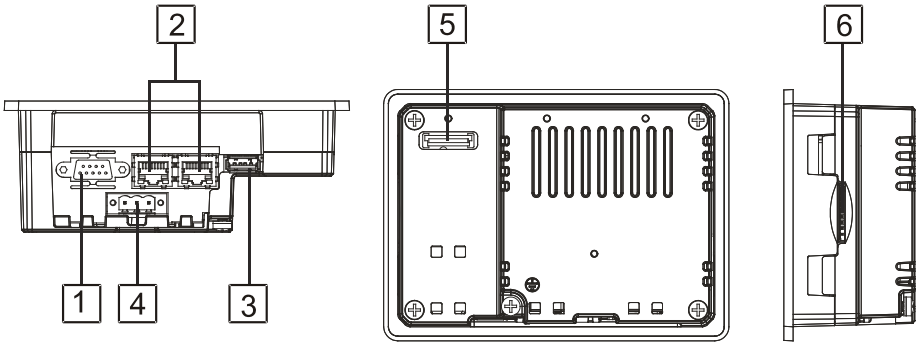


➤ Screw each fixing screw until the bezel corners get in contact with the HMI.

NOTE
The mounting material is part of the scope of delivery and can be ordered as spare part, see „15 Appendix: Accessories“ on page 22.

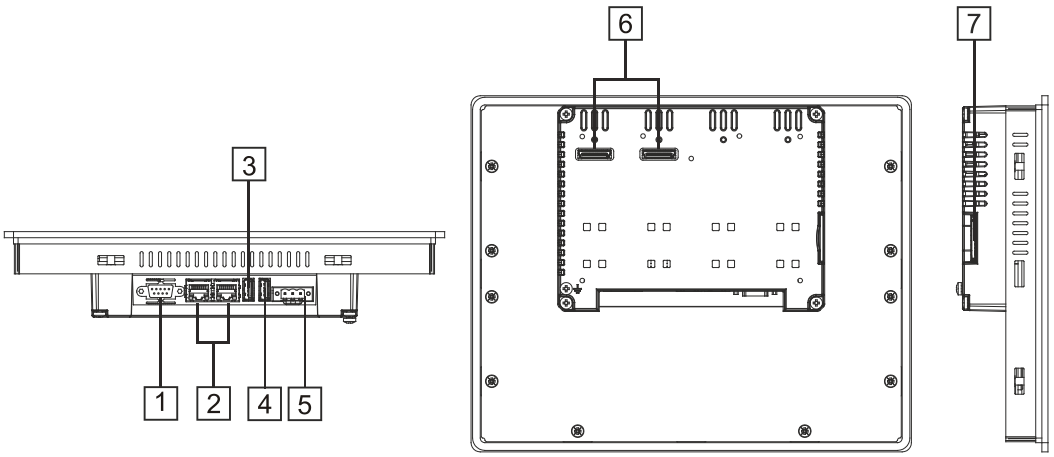
6 Electrical connectors

6.1 TX504E



Port	Description
1	Serial port
2	2 x RJ45 Ethernet port 10/100 Mbit/s
3	USB Port (version 2.0 - 1.1)
4	Power supply
5	Expansion slot for plug-in modules
6	SD card slot

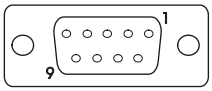
6.2 TX507(E)/TX510/TX513



Port	Description
1	Serial port
2	2 x RJ45 Ethernet port 10/100 Mbit/s
3	USB port (version 2.0 and 1.1)
4	USB port (version 2.0 only)
5	Power supply
6	2 × Expansion slot for plug-in modules
7	SD card slot

6.3 Serial port

The serial port is used to communicate with a PLC or with another type of device.
It can be used as RS232-, RS422- or RS485-interface and is configurable via CODESYS.
In CODSYS, the serial port on the TX500 is referred to as COM1.



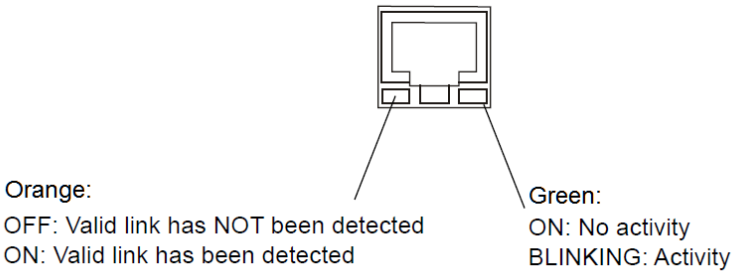
Pin	RS232	RS485	RS422
1	GND	GND	GND
2	n.c.	n.c.	n.c.
3	TxD	A	Tx -
4	RxD		Rx -
5	n.c.	n.c.	n.c.
6	+5 VDC output	+5 VDC output	+5 VDC output
7	CTS	B	Rx +
8	RTS		Tx +
9	n.c.	n.c.	n.c.

NOTE
In case of using the interface as RS485-interface, pin 3 and 4 as well as pin 7 and 8 have to be bridged externally.

The communication cable must be chosen for the type of device being connected.

6.4 Ethernet ports

The Ethernet ports have two status indicators. Please see description in figure.



6.5 SD Card Slot

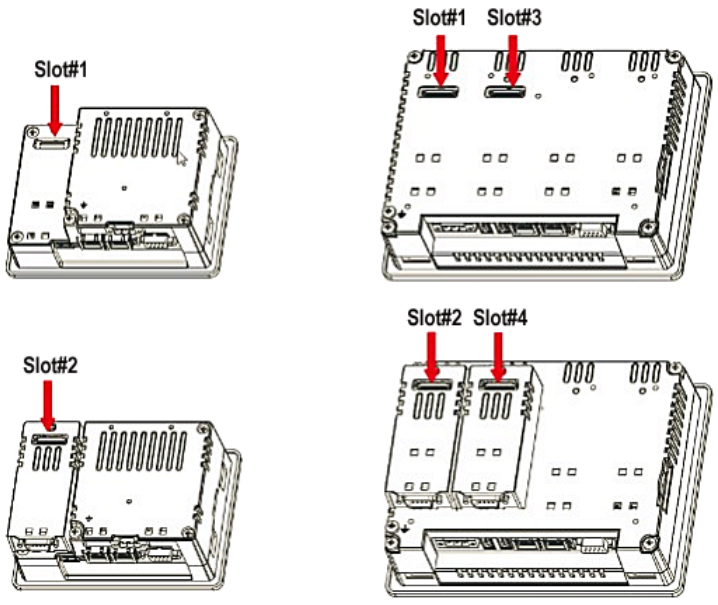
	Specification
Supported types	SD, SDHC
Format	FAT, FAT32
Max. size	Limited by the FAT32 specification ≤ 4 GB for one single file ≤ 32 GB in total

6.6 USB Port

	Allowed formatting
Format	FAT, FAT32
Max. size	Limited by the FAT32 specification ≤ 4 GB for one single file ≤ 32 GB in total

7 Optional plug-in modules

Several optional plug-in modules can be used with the TX500 panels. Multiple module configurations are possible.



Slot#2 and Slot#4 are available only if the plug-in module has the "bus extension connector".

Each slot carries two communication channels:
- 1 CAN interface
- 1 I/O interface

NOTE
It is not possible to stack two modules that are using the same type of interface.

The following table shows, which plug-in module and how many plug-in modules can be used at which HMI:

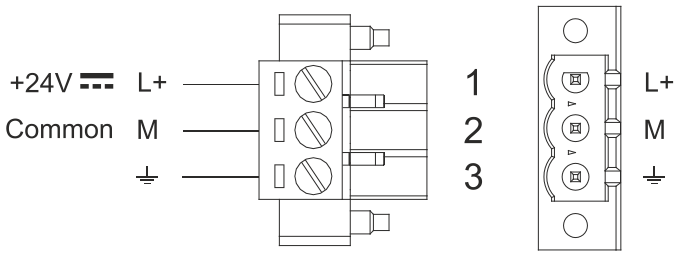
Module	Application	Max Modules	Interface Type	Bus Extension connector
TX-CAN	CAN	– 1 for TX5xxE – 2 for TX5xx	CAN	Y
TX-IO-XX03	Multifunction I/O	– 1 (for TX504E: only in combination with TX-CAN)	I/O	N
TX-IO-DX06	Compact I/O	– 1 for TX504E – 2 for TX5xx(E)	I/O	N

Max modules refers to max number of modules can be plugged into the HMI (all slots),
If you are planning to use two TX-CAN (CAN interface) you will obtain following slot# association:

- a module plugged into slot#1 or into slot#2 has to be configured in CODESYS as network 0,
- a module plugged into slot#3 or into slot#4 has to be configured in CODESYS as network 1.

8 Power supply, grounding and shielding

The power supply terminal block is shown in the figure below.

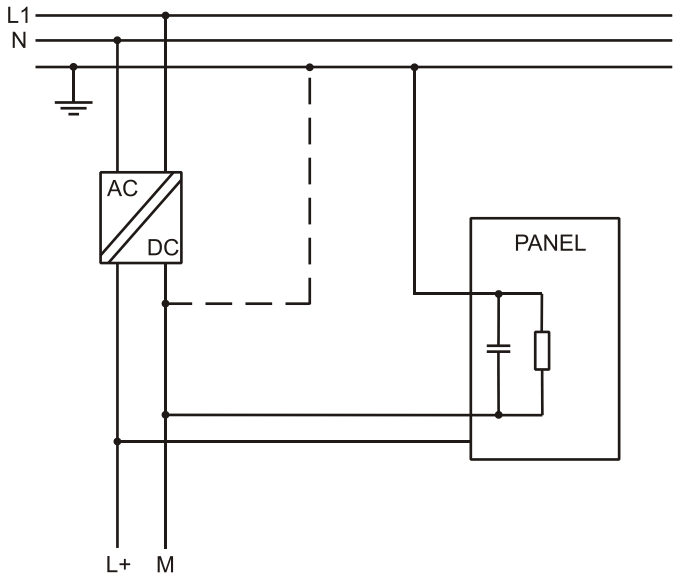


NOTE
Ensure that the power supply has enough power capacity for the operation of the equipment.

The unit must always be grounded to earth. Grounding helps to limit the effects of noise due to electromagnetic interference on the control system.

The earth connection will have to be done using the grounding screw located near the power supply terminal block. The screw for the ground connection is marked with an engraved ground symbol. Also connect terminal 3 on the power supply terminal block to ground.

The power supply circuit may be floating or grounded. In the latter case, connect to ground the power source common as shown in figure (see below) with a dashed line.
When using the floating power scheme, note that the device internally connects the power common to ground with a 1 MΩ resistor in parallel with a 4,7 nF capacitor.
The power supply must have double or reinforced insulation.
The suggested wiring for the power supply is shown below.



All the electronic devices in the control system must be properly grounded.
Grounding must be performed according to applicable regulations.

NOTE
The power connector is part of the scope of delivery and can be ordered as spare part, see „15 Appendix: Accessories“ on page 22.

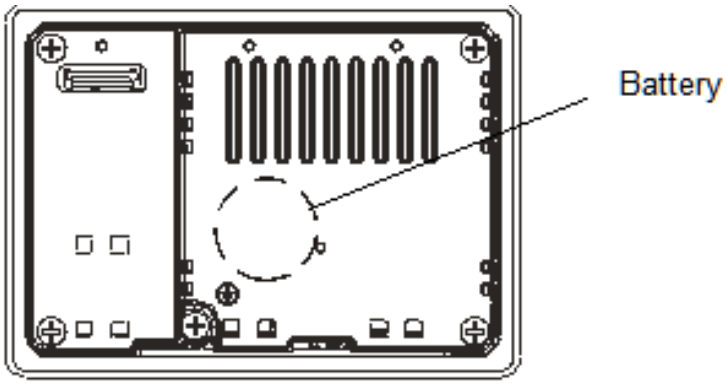
9 Battery

These devices are equipped with rechargeable Lithium battery, not user-replaceable.
The following information is maintained by the battery:
- Hardware real-time clock (date and time)

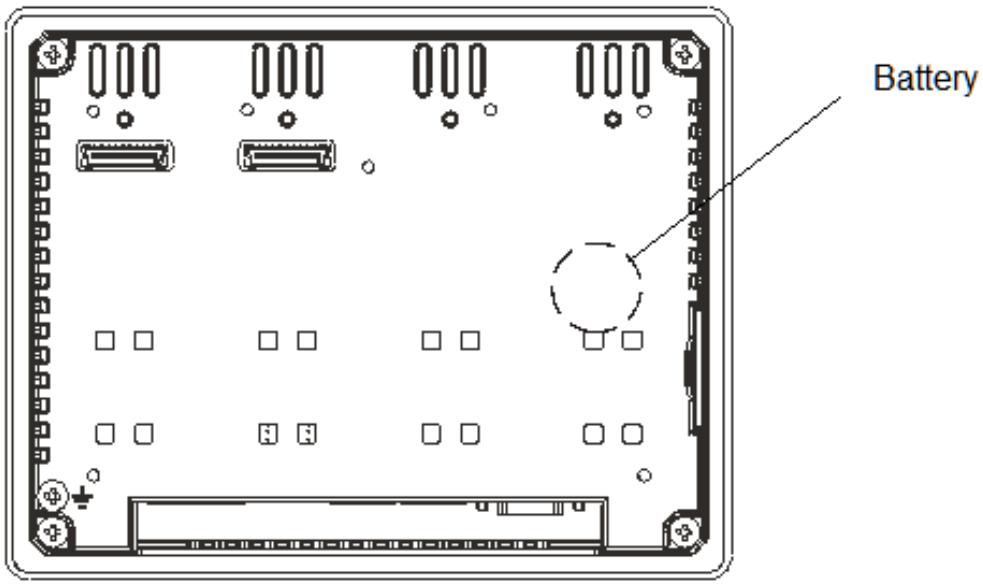
Charge:
At first installation the battery must be charged for 48 hours.
When the battery is fully charged, it ensures a period of 3 months of data back-up at 25 °C.

NOTE
Dispose of batteries according to local regulations.

- TX504E



- TX507(E)/TX510/TX513



10 Cleaning faceplates

The equipment must be cleaned only with a soft cloth and neutral soap product. Do not use solvents.

11 Getting started

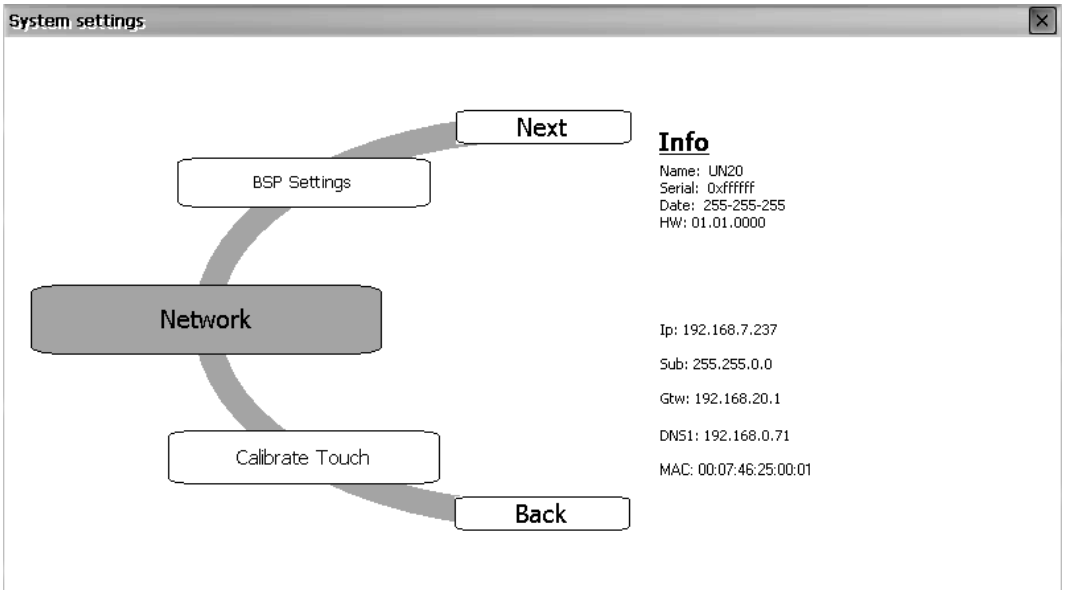
The PLC and Visualization functionalities of the TX500 HMI series must be programmed with the CODESYS development tool which can be downloaded from www.turck.com.

CODESYS is an IEC 61131 based programming software that must be properly installed on a computer running Microsoft Windows.

Please refer to the additional Getting Started Documents available on www.turck.com.

12 System settings

TX500 HMI products have a system settings tool to allow configuration of system options. The user interface of System Settings tool is based on a rotating menu. Use navigation buttons Next/Back to scroll through the available options.



The active item is highlighted on the left side. The info pane on the right side shows relevant information, when applicable. Touch the active item to start the associated function.

System Settings has two modes of operation:

Mode	Description
Standard Mode	Standard settings, only accessible if no CODESYS TargetVisu is running on the HMI
Advanced Mode ("Tap-Tap-Mode")	Advanced settings (including the standard settings), also accessible if a CODESYS TargetVisu is running on the HMI

12.1 Access of system settings in Standard Mode

ATTENTION!
System modification during operation
Undefined machine states due to device restart or loss of functionality!
➤ Do not modify the system/network settings during operation.
➤ Always set the machine to stop and disconnect the HMI from the machine when modifying the system settings.

Status	Description
Factory default status	Press "System Setting" button on the HMI screen
If CODESYS TargetVisu is running on the HMI	It is not possible to access the Standard Mode , if necessary use the Advanced mode ("Tap-Tap-Mode"), see „12.2 Access of system settings in Advanced Mode ("Tap-Tap-Mode")" on page 20.

12.2 Access of system settings in Advanced Mode ("Tap-Tap-Mode")

ATTENTION!
System modification during operation
Undefined machine states due to device restart or loss of functionality!
➤ Do not modify the system/network settings during operation.
➤ Always stop the machine and disconnect the HMI when modifying the system settings.

Status	Description
If no CODESYS TargetVisu is running on the HMI	Press the "System Settings" Button on the HMI screen to enter the System Settings in Standard Mode. Select the "restart" option and there choose the "Configuration OS" option. Press "okay" to restart the panel in the System Setting in Advanced Mode ("Tap-Tap-Mode").
If a CODESYS TargetVisu is running on the HMI or the HMI is not responsive	If a CODESYS TargetVisu is running on the HMI or the HMI is not responsive, use the so-called "tap-tap" procedure. This procedure consists in tapping the surface of the touchscreen during the device power-up phase. Tapping frequency must be high (2 Hz or more). Start tapping the touchscreen as soon as power has been applied to the device. When the sequence has been recognized, the system shows the message: "Tap Tap detected, Going to Config Mode" on the screen.

12.3 Options in Standard Mode

Standard Mode includes options for basic settings of the device.

Setting	Description
Calibrate Touch	Calibrate the touchscreen interface.
Plug-in list	Show if optional plug-in modules are installed.
Network	Configure IP Address of Ethernet interface.
BSP settings	Show the soft- and hardware versions, check the operating hours for the device and for the display backlight, manage the buzzer and the battery LED behavior.
Time	Change the device date and time, including time zone, Daylight Saving Time and (S)NTP Server
Regional Settings	Customize Windows Regional Settings, such as date format
Display settings	Configure automatic backlight turnoff, adjust brightness and change display orientation
Close	Close System Settings
Restart	Restart the device. "Main OS" option restarts as per default, "Configuration OS" option restart panel directly into System Settings in System Mode

12.4 Options in Advanced Mode (“Tap-Tap-Mode”)

Advanced Mode (“Tap-Tap-Mode”) is the complete interface of the System Settings tool where all functions are available, in addition to the options available in “Standard Mode”.

Setting	Description
Format Flash	Allows to format the internal flash disc of the device. The CODESYS project, the CODESYS runtime and the system settings will be deleted! After this action it is necessary to reinstall the CODESYS runtime to be able to download a CODESYS project again.
Restore Factory Settings	Restore the HMI to factory settings with a choice of the parts to be deleted. Can be used as alternative to Format Flash. Options available are: – “Uninstall HMI”: Removes the CODESYS Runtime and application. After this action it is necessary to reinstall the CODESYS runtime to be able to download a CODESYS project again. – “Clear system settings”: Resets the system parameters like IP Address, date/time, etc. to the factory default. – “Clear Controller Application”: Removes the CODESYS application.
Resize Image Area	Function is reserved to authorized technical personnel
Download Configuration OS	Update the Configuration OS module of BSP
Download Main OS	Update the Main OS module of BSP
Download Splash Image	Replace the splash screen image displayed by the device at power-up; the image must be supplied in the appropriate binary format. We recommend changing the splash screen image with the software tool TX VisuPro.
Download OS Partition	Functions reserved to authorized technical personnel
Download Data Partition	
Download Disk Image	
Download Bootloader	Update the Bootloader module of BSP
Upload Bootloader	Functions reserved to authorized technical personnel
Upload Configuration OS	
Upload Main OS	
Upload Splash Image	Copy to an USB memory or SD card the current splash screen image in binary format
Upload OS Partition	Functions reserved to authorized technical personnel
Upload Data Partition	
Upload Disk-Image	Copy to an USB memory or SD card the content of whole flash disk in binary format
Not for E-type, only for TX507, TX510 and TX513 the Advanced Mode includes also:	
Download Main FPGA	Update the Main FPGA module of BSP
Download Safe FPGA	Update the Safe FPGA module of BSP
Download System Supervisor	Update the System Supervisor module of BSP
Upload Main FPGA	Functions reserved to authorized technical personnel
Upload Safe FPGA	
Upload System Supervisor	

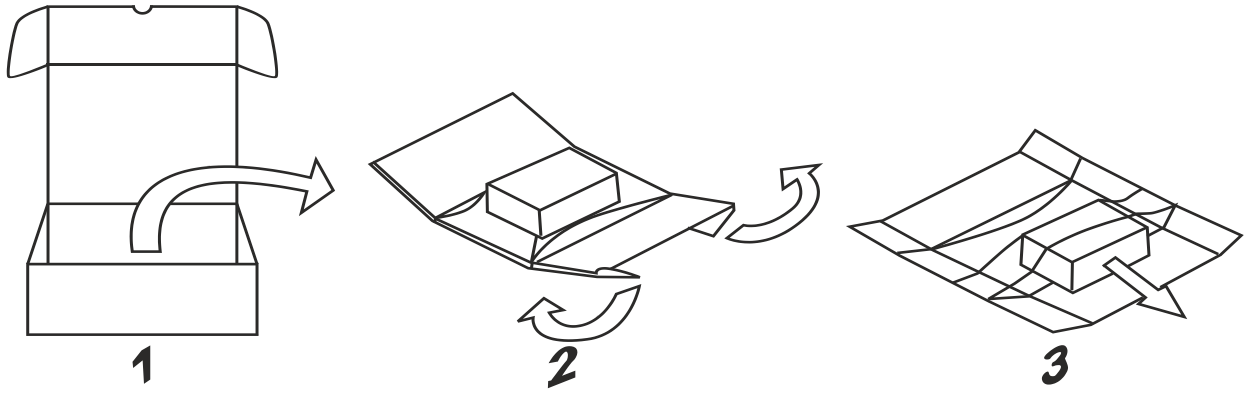
13 LED indicator on front panel

The LED in the front of the HMI can be controlled by the CODESYS Program using the Library TX_MiscCommands which is included inside the TX500 CODESYS Package.

If the LED is not controlled out of CODESYS the standard behavior is:

Color	Status	Meaning
Green	ON	Normal Operation
Red	ON	Low Battery or Hardware fault

14 Unpacking and packing instructions



To repack the unit, please follow the instructions backwards.

15 Appendix: Accessories

15.1 Plug-in extension modules

Ident no.	Type	Description
6828210	TX-CAN	1 × CAN interface
6828203	TX-IO-DX06	8 × digital inputs, 24 VDC, pnp 6 × digital outputs, 24 VDC, 0.5 A, pnp 1 × relay output, NO
6828201	TX-IO-XX03	20 × digital inputs, 24 VDC, pnp 12 × digital outputs, 24 VDC, 0.5 A, pnp 8 × analog inputs, U, I, RTD, TC 4 × analog outputs, U, I

15.2 Mounting material incl power supply connector

Ident no.	Type	Description
6828220	TX-Mount-07	Mounting material for TX504E and TX507(E): 1 × power supply connector 4 × fixing brackets
6828221	TX-Mount-10	Mounting material for TX510: 1 × power supply connector 10 × fixing brackets

Ident no.	Type	Description
6828222	TX-Mount-13	Mounting material for TX513: 1 × power supply connector 14 × fixing brackets

15.3 USB-/SD-accessory

Ident no.	Type	Description
6828025	SD CARD 2GB	SD card, 2GB
6827348	USB 2.0 Industrial Memory Stick	1GB , industrial USB stick
6827389	USB 2.0 EXTENSION 5M	USB 2.0 extension cable, male (A) to female (A), 5 meters
6827390	USB 2.0 EXTENSION ACTIVE 5M	USB 2.0 extension cable, male (A) to female (A), with active repeater, 5 meters

NOTE
Further accessories like field bus nodes, bus and supply cables, junction boxes, power supplies etc. can be found on www.turck.com.

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