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# Geophysical Transmitter

## TXM-22 / TXB-07

# Safety and Installation Instructions

Version 1.0



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# 1 General

This installation information serves the purpose of safe use of the TXM-22/TXB-07 geophysical transmitter. It contains safety notes which must be complied with. Further information can be found in these manuals:

- **Product Manual “TXM-22 / TXB-07”:** Description of the technical specification and device functionality as well as notes of the installation, operation and maintenance of the geophysical transmitter TXM-22 and the transmitter controller TXB-07.
- **Product Manual “ADU-07(e)”:** Description of the technical specification and device functionality as well as notes of the installation, operation and maintenance of the geophysical data logger ADU-07(e).
- **Product Manual MFS-06e:** Description of the technical specification and device functionality as well as notes of the installation, operation and maintenance of induction coil MFS-06e.
- **Product Manual MFS-07e:** Description of the technical specification and device functionality as well as notes of the installation, operation and maintenance of induction coil MFS-07e.
- **Product manual SHFT-02:** Description of the technical specification and device functionality as well as notes of the installation, operation and maintenance of induction coil triple SHFT-02.

These manuals are delivered along with the corresponding instrument or can be ordered from Metronix.

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## 2 Safety Notes for TXM-22 and TXB-07

### 2.1 Used Symbols



#### **Information.**

These notes give detailed information for the correct handling of the system.



#### **Caution!**

Note the Safety Instructions! If the safety instructions are not noted personal injury and property damage can occur..



#### **DANGER!**

Nonobservance may result in **property damages** and in **personal injuries**.



#### **Caution! Dangerous voltages.**

The safety note indicates a possible perilous voltage.

### 2.2 General Notes

In the case of damage resulting from non-compliance of the safety notes in this manual Metronix Meßgeräte und Elektronik GmbH will not assume any liability.

Sound and safe operation of the power stage TXM-22 and the controller TXB-07 require proper and professional transportation, storage, assembly and installation as well as proper operation and maintenance. Only trained and qualified personnel may handle electric devices:

#### **TRAINED AND QUALIFIED PERSONNEL**

in the sense of this product manual or the safety notes on the product itself are persons who are sufficiently familiar with the project planning, setup, assembly, commissioning and

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operation of the product as well as all warnings and precautions as per the instructions in this manual and who are sufficiently qualified in their field of expertise:

- Education and instruction of standard specifications and accident prevention regulations, which are necessary in application, and authorisation to switch devices/systems on and off and to ground them as per standards of safety engineering and to effectively label them as per the job demands.
- Education and instruction as per standards of safety engineering regarding the maintenance and the use of adequate safety equipment.
- First aid training

The following notes must be read prior to the initial operation of the system to prevent injuries and/or property damages:



These safety notes must be complied with at all times.



Do not try to install or commission the TXM-22 before carefully reading all safety notes contained in this document. These safety instructions and all other user notes must be read prior to any work with the TXM-22.



In case you do not have any user manual for the TXM-22, please contact your sales representative. Immediately demand these documents to be sent to the person responsible for the safe operation of the TXM-22 / TXB-07.



If you sell, rent and/or otherwise make this device available to others, these safety and installation notes must also be included.



The user must not open the TXM-22 /TXB-07 for safety and warranty reasons.



Professional control personal is a prerequisite for sound functioning of the TXM-22 / TXB-07!

## 2.3 Danger resulting from misuse



### **DANGER!**

Inappropriate handling of the TXM-22 / TXB-07 transmitter and non-compliance of the warnings as well as inappropriate intervention in the safety features may result in property damage, personal injuries, electric shock or in extreme cases even death.



### **DANGER!**

High electrical voltages and high load currents!  
Danger to life or serious personal injury from electrical shock!



### **DANGER!**

High electrical voltage caused by wrong connections!  
Danger to life or serious personal injury from electrical shock!



### **DANGER!**

Surfaces of device housing may be hot!  
Risk of injury! Risk of burning!



## 2.4 Safety notes

### 2.4.1 General safety notes



If the lid is opened, the TXM-22 corresponds to IP20 class of protection as well as pollution level 1. Make sure that the environment corresponds to this class of protection and pollution level. With the lids closed it corresponds to IP65 class of protection.



Only use replacements parts and accessories approved by the manufacturer.



The devices must be connected to the mains supply as per EN regulations, so that they can be cut off the mains supply by means of corresponding separation devices (e.g. main switch, contactor, power switch).



The TXM-22 may be protected using an AC/DC sensitive 300mA fault current protection switch (RCD = Residual Current protective Device) in connection with an isolation transformer.



Gold contacts or contacts with a high contact pressure should be used to switch the control contacts.



The safety rules and regulations of the country in which the device will be operated must be complied with.



The environment conditions defined in the product documentation must be kept. Safety-critical applications are not allowed, unless specifically approved by the manufacturer.



The compliance with the EMC limits required by national regulations is the responsibility of the operator of the system.



The technical data and the connection and installation conditions for the TXM-22 are to be found in this product manual and must be met.

#### **DANGER!**



The general setup and safety regulations for work on power installations (e.g. DIN, VDE, EN, IEC or other national and international regulations) must be complied with.

Non-compliance may result in death, personal injury or serious property damages.



Without claiming completeness, the following regulations and others or standards apply:

- |          |   |
|----------|---|
| VDE 0100 | Regulations for the installation of high voltage (up to 1000 V) devices |
| EN 50178 | Electronic equipment for use in power installations                     |

## 2.4.2 Safety notes for assembly and maintenance

The appropriate DIN, VDE, EN and IEC regulations as well as all national and local safety regulations and rules for the prevention of accidents apply for the assembly and maintenance of the system. The plant engineer or the operator is responsible for compliance with these regulations:



The TXM-22 must only be operated, maintained and/or repaired by personnel trained and qualified for working on or with electrical devices.

Prevention of accidents, injuries and/or damages:



Render the electrical equipment voltage-free using the main switch and protect it from being switched on again until the DC bus circuit is discharged, in the case of:

- Maintenance and repair work
- Cleaning
- long machine shutdowns



Prior to carrying out maintenance work make sure that the power supply has been turned off completely.



Be careful during the assembly. During the assembly and also later during operation of the TXM-22, make sure to prevent drill chips, metal dust or assembly parts (screws, nuts, cable sections) from falling into the device.



Carry out work in the machine area only, if all AC and DC supplies are switched off. Switched off output stages or controller enablings are no suitable means of locking. In the case of a malfunction the TXM-22 may accidentally be put into action.



Electronic devices are never fail-safe. It is the user's responsibility, in the case an electrical device fails, to make sure the system is transferred into a secure state.

### 2.4.3 Protection against contact with electrical parts

This section only concerns devices and TXM-22 components carrying voltages exceeding 50 V. Contact with parts carrying voltages of more than 50 V can be dangerous for people and may cause electrical shock. During operation of electrical devices some parts of these devices will inevitably carry dangerous voltages.



#### **DANGER!**

High electrical voltage!

Danger to life, danger due to electrical shock or serious personal injury!

The appropriate DIN, VDE, EN and IEC regulations as well as all national and local safety regulations and rules for the prevention of accidents apply for the assembly and maintenance of the system. The survey supervisor or the operator is responsible for compliance with these regulations:



Always connect the ground conductor of the electrical equipment and devices securely to the mains supply. Due to the integrated line filter the leakage current exceeds 3.5 mA!



Always use an isolation transformer between power source and TXM-22.



Comply with the minimum copper cross-section for the ground conductor over its entire length as per EN60617!



Prior to the initial operation, even for short measuring or testing purposes, always connect the ground conductor of all electrical devices as per the terminal diagram or connect it to the ground wire. Otherwise the housing may carry high voltages which can cause electrical shock.



Do not touch electrical connections of the components when switched on.



Prior to accessing electrical parts carrying voltages exceeding 50 Volts, disconnect the device from the mains or power supply. Protect it from being switched on again.

## 2.4.4 Protection against electrical shock by means of protective extra-low voltage (PELV)

All connections and terminals with voltages between 5 and 50 Volts at the servo drive controller are protective extra-low voltage, which are designed safe from contact in correspondence with the following standards:

International: IEC 60364-4-41

European countries within the EU: EN 50178/1998, section 5.2.8.1.



### **DANGER!**

High electrical voltages due to wrong connections!

Danger to life, risk of injury due to electrical shock!

Only devices and electrical components and wires with a protective extra low voltage (PELV) may be connected to connectors and terminals with voltages between 0 to 50 Volts.

Only connect voltages and circuits with protection against dangerous voltages. Such protection may be achieved by means of isolation transformers, safe opto-couplers or battery operation.

## 2.4.5 Protection against contact with hot parts



### **DANGER!**

Housing surfaces may be hot!

Risk of injury! Risk of burning!



Do not touch housing surfaces in the vicinity of heat sources! Danger of burning!



Before accessing devices let them cool down for 10 minutes after switching them off.



Touching hot parts of the equipment such as the housing, which contain heat sinks and resistors, may cause burns!

## 2.4.6 Protection during handling and assembly

Handling and assembly of certain parts and components in an unsuitable manner may under adverse conditions cause injuries.



**DANGER!**

Risk of injury due to improper handling!

Personal injury due to pinching, shearing, cutting, crushing!

The following general safety notes apply:



Comply with the general setup and safety regulations on handling and assembly.



Use suitable assembly and transportation devices.



Prevent incarcerations and contusions by means of suitable protective measures.



Use suitable tools only. If specified, use special tools.



Use lifting devices and tools appropriately.



If necessary, use suitable protective equipment (e.g. goggles, protective footwear, protective gloves).

## 3 Technical Data

### 3.1 Technical Data of TXM-22

<b>Frequency range</b>	1024 sec to 8,192 Hz
<b>Power Input</b>	motor generator 40kVA, 3x400V AC +/-10%, 3-phase, 50..60Hz, mating connector type
<b>Power Output</b>	3 lines (phases) , mating connector Intercontec Type SSTA002MR16480001000
<b>Output Current</b>	max. +/-40A continuously
<b>Output Voltage</b>	+/- 560V nominal
<b>Load</b>	grounded dipoles or horizontal loop
<b>Load resistance range</b>	5 Ohm to 10000 Ohm
<b>Transmitter signal wave forms</b>	Predefined (sine, square wave, triangle, saw-tooth) or user defined arbitrary wave forms such as PRBS signals with a max. number of 2,048 set-points. For frequencies higher than 512 Hz square wave is available only.
<b>System control</b>	via cable by transmitter controller TXB-07
<b>Test facilities</b>	Automatic power up self-test of all important system functions
<b>Case</b>	ruggedized, water protected aluminium case
<b>Weight</b>	ca. 35kg
<b>External dimensions</b>	480mm x 514mm x 354mm
<b>Operating temperature range</b>	0°C to + 40°C up to 50°C with 2.5% / °C derating
<b>Storage temperature range</b>	-20 to 70°C
<b>Humidity</b>	Relative humidity up to 90%, not bedewing

## 3.2 Technical Data of TXB-07

<b>Interconnection cable to TXM-22</b>	19-pole, 5m, galvanically decoupled
<b>System Control</b>	by external laptop or by pre-programmed USB-Stick
<b>Signal Waveforms</b>	predefined waveforms or freely programmable by user up to 512Hz
<b>Ratio for current measurement channels</b>	25mV/A
<b>Number of measurement channels</b>	3
<b>A/D conversion of current measurement channels</b>	24 Bit (data rate max. 65,536 samples/sec)
<b>System computer</b>	32 bit low-power embedded controller with Linux operating system
<b>Storage media</b>	Internal Compact Flash-disk 4Gbyte or higher, USB-Stick or external USB mass storage device
<b>Test facilities</b>	Automatic power up self-test of all important system functions
<b>Network connection</b>	stand. twisted pair Cat5 or higher with RJ45 plugs Wireless-LAN →GSM Modem (option)
<b>Synchronization</b>	GPS synchronized clock , 30ns rms accuracy of 1pps signal, Station position is also determined and stored
<b>Status Display</b>	2 lines with 16 alpha numeric characters for display of status information
<b>Case</b>	ruggedized, waterprotected plastic case
<b>Weight</b>	6.6kg
<b>External dimensions</b>	406*330*174mm <sup>3</sup>
<b>Power Input</b>	9V..15V DC, usually powered by TXM-22
<b>Operating temperature range</b>	-30°C to + 60°C
<b>Storage Temperature range</b>	-30°C to 70°C
<b>Humidity</b>	Relative humidity up to 90%, not bedewing

## 4 Installation and Safety Instructions

The TXM-22 is designed to be used as geophysical transmitter. These instructions will only explain the proper installation procedure. Please carefully follow these instructions in order to avoid personal or third person injury.

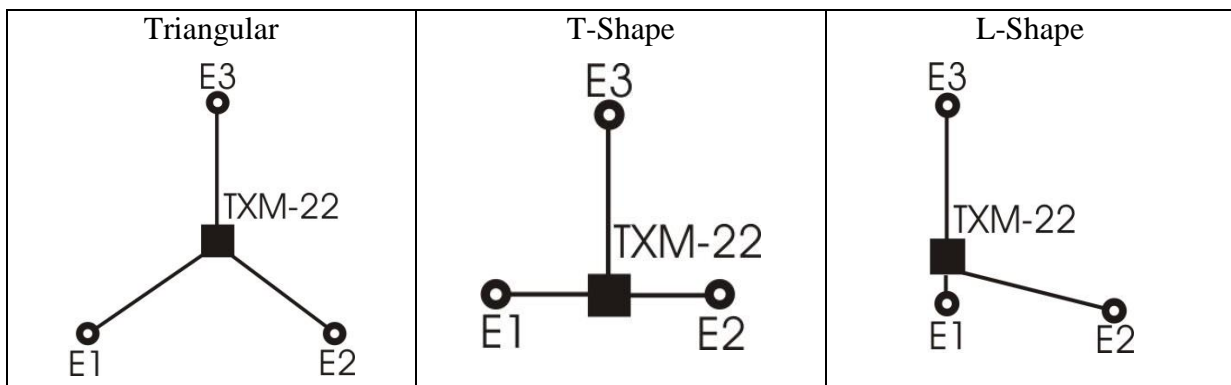


### **DANGER!**

During the installation procedure the power source such as motor generator must be switched off and the transmitter TXM-22 must not be powered!!

### 4.1 Electrodes

If you have reached the transmitter site first you need to find the correct place for the electrodes. Three transmitter electrodes have to be installed. Different configurations are possible:



### **DANGER!**

You must never install an electrode with a distance to the transmitter TXM-22 closer than 50 m because a high step voltage may occur otherwise and could cause electrical shock.

The typical distance between the electrodes is 100m to 1000 m.



- Ram in the electrode sticks or use iron sheets in pits.
- Connect the electrode cable to the electrode. Cable cross section must be minimum 6 mm<sup>2</sup>
- Lay out the cables between transmitter TXM-22 and the 3 electrodes
- Connect the cable ends with the TXM-22 Electrode outputs E1, E2, E3

**Caution! Dangerous voltages.**



**Protect the electrodes from being touched by suitable isolation measures.**



**Electrode cables which cross a pathway or road must be protected against touch by cars or persons.**

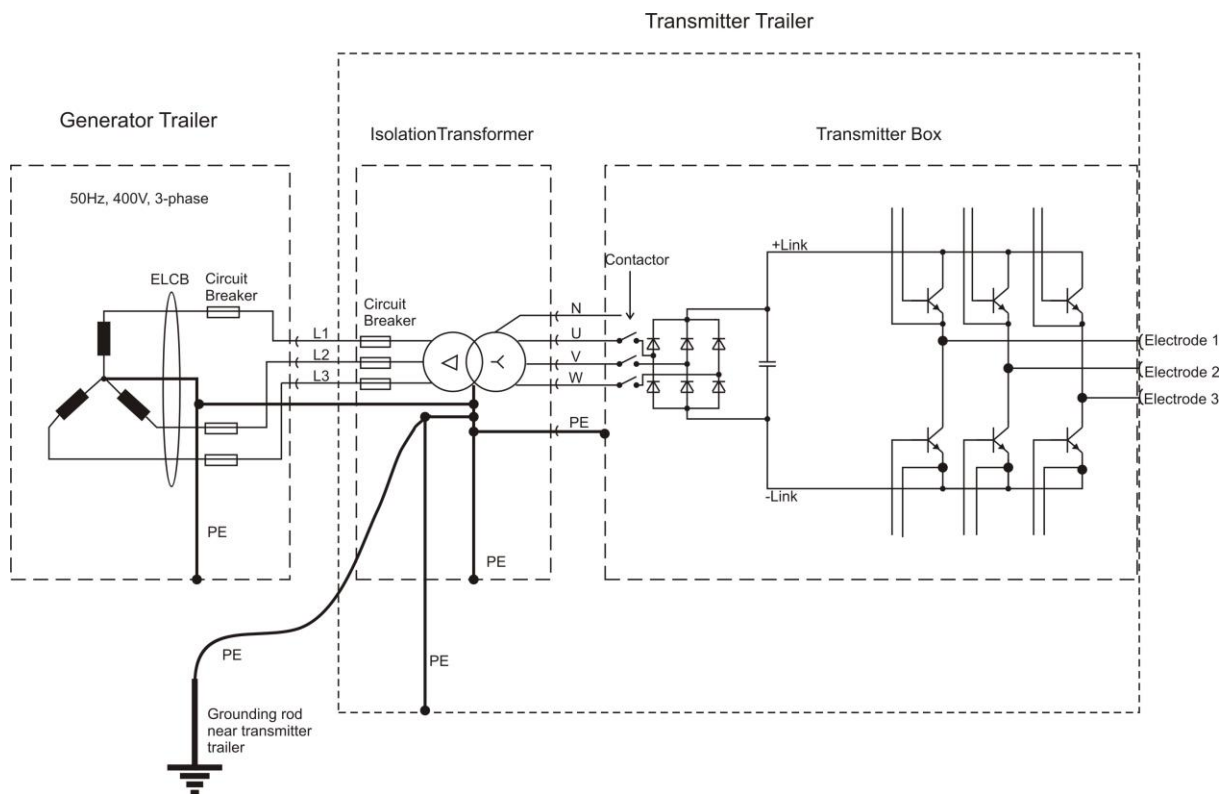
## 4.2 TXM-22 and TXB-07 installation

A detailed description is given in the product manual TXM-22 / TXB-07 (see chapter 1). This is only a short summary:

- Connect the controller cable to TXM-22 and TXB-07.
- Connect the power cable coming from the isolation transformer to the TXM-22.
- Make sure that the electrode cables have been connected correctly.
- Connect the GPS antenna to the TXB-07.
- Connect the LAN cable to the laptop or use the wireless LAN option.
- You may connect the external WLAN antenna or you can use the internal one if the distance to the laptop is not too far.

## 4.3 Proper Grounding

A proper grounding is very important for your safety. The picture below shows a block diagram of the correct grounding of the system. The central grounding rod should be located close to the transmitter / generator. The grounding rod must have a good contact to the soil.



**The use of a suitable isolation transformer is mandatory for a proper grounding and your safety!!**

#### 4.4 Starting the Instrument



##### **DANGER!**

Before you start the motor generator and the instrument you must ensure yourself that nobody is working on the electrode lines and no one can touch the electrodes and cables. This must be arranged by safety guards who have the electrodes and cabling in view. Radio communication between the transmitter operator and the guards must be available all time the transmitter is operated.

- Make sure that the TXM-22 shutdown button is in its off position (pressed down) and the generators main power switch is switched off.
- Make sure that the emergence shut down button on the TXB-07 is pressed down.

- Start the motor generator and wait until it has warmed up and is running with its nominal voltage and frequency.
- Connect the power cable of the isolation transformer to the motor generator's power outlet.
- Switch on the main power switch of the generator.
- Pull the power switch of the TXM-22 and press the start button.
- Wait until the TXB-07 has booted up and finalized its self test.
- Provide a LAN or WLAN connection between laptop and TXB-07 and start the control software.

If everything works fine you will see the user interface and the transmitter can be operated.

You now can program/start a transmission. Pull the start/stop button on the TXB-07 to enable the power outputs.



Please refer to the product manual of TXM-22 and TXB-07 for a detailed description.