

OPERATING INSTRUCTIONS

ETHERCAT WPM GATEWAY FIELDBUS

2480.00.91.40



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These instructions are valid for the product

2480.00.91.40

EtherCat WPM Gateway Fieldbus

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The instructions are intended only for the operator of the described Interface only and must therefore not be made available to uninvolved third parties - in particular to competitors.

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1 INTRODUCTION

Read through these instructions carefully before use and store them.

These instructions contain the following important information on the product:

- Proper use
- Safety
- Mounting
- Use
- Maintenance
- Disposal

Proper use also involves

- Reading these instructions
- Complying with the safety information they contain
- Complying with the applicable documents
- Complying with the maintenance requirements

Give these instructions to the user after mounting is complete, and give them to the new owner if the product is sold.

1.1 Intended use

- This product is intended only for industrial use in the territory of the European Union and in countries that have been recognised by standards and certificates of the European Union.



Country-specific restrictions may exist concerning communication via outside of the European Union.

- The WPM system is intended only for industrial use in machinery and plant technology.
- The product is a telecommunications product.
- The product may be used only in a technically flawless state, for its intended use, in compliance with the relevant provisions and with safety and potential dangers kept in mind.
- Detected disruptions, especially those which could impair safety, must be redressed immediately.

All forms of usage deviating from the one described in the section on proper use and in the relevant documentation is not proper and is thus prohibited.

- The distributing companies and manufacturers assume no liability for damage in the event of improper use.
- The manufacturer assumes no liability for equipment, its usage and consequences.
- The operator shall be the sole bearer of all risks associated with improper use.

1.2 Foreseeable misuse

Any use that does not comply with the intended use, is considered misuse of the product and is prohibited.

The product must not be stressed beyond its load limits.

The following instances, among others, are considered misuse:

- It is used for applications which the manufacturer has not explicitly approved. The statements contained in the safety notes in the relevant documentation must be observed!
- Construction changes that destroy the original state.
- Improper system programming or configuration. The operator bears sole responsibility and risks for using, programming and configuring the system.
- Usage in explosive atmospheres.
- Usage in explosive areas.
- Usage in medical areas.
- Usage in residential areas.
- Usage in applications that are relevant to security.
- Private use.

1.3 Scope of application

These instructions apply to the product with the description “EtherCatWPM Gateway” manufactured by FIBRO GMBH DE 74855 Hassmersheim.

If you do not have the proper instructions for your product, contact FIBRO GMBH DE 74855 Hassmersheim.

1.4 Disclaimer of liability

FIBRO GMBH guarantees the described function of the product as stated in advertising and product information.

Further product properties are not confirmed. FIBRO GMBH assumes no liability for efficiency and flawless functioning if the product is used for a purpose other than the one addressed in the chapter “Proper use”. Compensation for damage is generally precluded.

If this product is used in environments for which it is not suitable or which do not fulfil the technical standards, FIBRO GMBH shall not be held responsible for the consequences.

FIBRO GMBH assumes no liability for damage to facilities and systems near the product caused by a defect in the product or an error in these instructions.

FIBRO GMBH is not responsible for the violation of patents and/or the rights of third parties outside of the Federal Republic of Germany.

FIBRO GMBH is not responsible for damage caused by improper operation and failure to follow the instructions provided in this document.

FIBRO GMBH is not liable for lost profit and subsequent damage resulting from failure to comply with safety and warning notes.

The products from FIBRO GMBH are state of the art in science and technology.

FIBRO GMBH continually conducts studies of the products and the market in order to continually improve and further develop its products.

1.5 Purpose of the document

These instructions describe the operation of the product and contain important information on correct use.



Read these instructions before working on or with the product. The instructions contain important information for your personal safety. All persons who work on or with the product at some phase in the product's life must read and understand the instructions.

The instructions must be available at the location where the product is used and throughout its entire lifespan. They must be given to the new owner if the product is sold.

The safety notes in the individual chapters must be observed.

These instructions and the other applicable documents are not subject to an automatic change service.

We reserve the right to make changes to the data and figures mentioned in these instructions due to technical developments. FIBRO GMBH can supply the current issue.

1.6 Definitions

The following table lists terms and gives a short explanation for getting started.

Some terms are described in detail in the "Product description" chapter.

Term	Definition of terms
Users	Users are people who have been created in the system.
Operator	Person or organisation which uses the product or system responsibly.

Tab. 1-1 Definition of terms

1.7 Target group

These instructions are oriented towards persons who commission, configure, operate and maintain the product EtherCatWPM Gateway.

1.8 Autor's rights

The product EtherCatWPM Gateway and these instructions are protected by copyright. Reproduction without approval shall be prosecuted in court.

We reserve all rights to these instructions, including reproduction and/or copying in all imaginable forms, e.g. by photocopying, printing, copying to any data media whatsoever and in translated form.

These instructions may be reprinted only with written approval from FIBRO GMBH.

The technical state at the time of the delivery of the product EtherCatWPM Gateway and the associated instructions shall be decisive if no other information is provided.

We reserve the right to make technical changes without giving special notice. Earlier instructions shall lose their validity. The general sales and delivery conditions of FIBRO GMBH apply.

The products, names and logos mentioned serve informational purposes only and may be trademarks of the respective owner. This shall require no special indication.

2 SAFETY

2.1 Safety instructions

These instructions contain safety notices intended to draw attention to possible dangers that should be observed to prevent injury.

The pertinent text describes

- the type of danger
- the source of danger
- the options for preventing injuries
- the consequences in case of non-observance of the warning notices

The safety instructions are emphasised by a colour signal bar with warning triangle and signal word.

The signal bars have the following meaning:

 **DANGER!**

A safety notice on a red signal bar with the signal word DANGER designates a hazard with a high risk level which, if not avoided, will result in death or severe injury.

 **WARNING!**

A safety notice on an orange signal bar with the signal word WARNING designates a hazard with a medium risk level which, if not avoided, might result in death or severe injury.

 **CAUTION!**

A safety notice on a yellow signal bar with the signal word CAUTION designates a hazard with a low risk level which, if not avoided, could result in minor or moderate injury.

2.2 General instructions

In addition to the safety notices, these instructions contain information that must be observed to prevent property damage.

The pertinent text describes

- the possible reason for property damage
- the possibilities for preventing property damage

Notices of possible property damage are emphasised by a blue signal bar and the signal word *ATTENTION*.

NOTICE

Notices for the prevention of property damage are not related to possible injuries.



Furthermore, these instructions contain general information on use.

General information on use and tips for certain applications are emphasised with a blue information symbol.

3 PRODUCT DESCRIPTION

3.1 Components and properties

The product EtherCatWPM Gateway is part of the WPM pressure monitoring system. A component specially developed for monitoring and registering FIBRO WPM pressure sensors located inside or outside of a registered pressing tool.

The product EtherCatWPM Gateway records status information from WPM pressure sensors and the WPM data holder using the Bluetooth LE 4.0 standard in the FIBRO usage data protocol.

Additionally, the WPM pressure sensor, the WPM data holder and the WPM configuration software work together with the product EtherCatWPM Gateway.

3.2 Accessories

No additional accessories are planned for the WPM Gateway.

M12 line connectors from various industrial line manufacturers are required for operation.

4 ASSEMBLY

The WPM Gateway is mounted on the press or in the immediate vicinity of the press or pressing tool using a holder and at an easily visible, mechanically protected location.

Four M6 screws are used to attach it. The screw must be effectively secured against unintentional loosening.

The WPM Gateway should be mounted so it is aligned horizontally and so the LED displays can be seen easily.

The radio's send direction is always indicated symbolically on the upper side (with the label "FIBRO") of the WPM Gateway.

Cabling should go down and to the side. Use an angled M12 plug connector.

A large area around the radio send direction (labelled on the surface) must be kept free.

It should be possible to directly view the pressing tool without any hindrances. You must ensure without fail that there is no direct metallic reflection surface opposite the radio antenna.

The distance between the pressing tool (distance from the WPM Gateway to the WPM data holder and the WPM pressure sensor) should not exceed 5 metres.

4.1 Constructive requirements

Ample space must be kept free around the WPM Gateway with the exception of the side where it is attached.

The area of the WPM Gateway labelled with a radio symbol must not be near metallic surfaces and must not come into direct contact with them.

For operation with radio technology, the data holder must be mounted so that the line of sight to the corresponding WPM Gateway is unimpeded.

There must be a drain for liquids. The area around the WPM Gateway must not be flooded with operating materials.

5 COMMISSIONING

5.1 Preliminary conditions

The FIBRO gas springs are filled with nominal pressure.

The FIBRO gas springs in the pressing tool are equipped with FIBRO WPM pressure sensors.

The pressing tool is equipped with a WPM data holder.

WPM data sensors and WPM data holders are equipped with lithium metal batteries.

Pressing tools with WPM pressure sensors and WPM data holders are properly configured using

WPM configuration software.

5.2 Electrical connection

NOTICE

Electrical connection by specialist staff

Specialist training required.

System knowledge required.

- ▶ The WPM Gateway is not functioning.
- ▶ Fault in the system.
- ▶ System and tool damaged.

NOTICE

Electrical fuse

Install line protection to protect the device .

- ▶ Destruction of device in the event of overload.
- ▶ Destruction in the event of an error.

5.2.1 Digital inlets

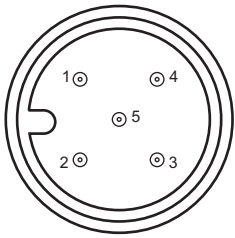
The WPM Gateway has 4 digital inlets.

24V DC nominal voltage.

Digital inlets are galvanically isolated from the device power supply.

Recommended connection:

- Line
- M12 socket
- 5-pole, A-coded
- Maximum line length: 30 metres



X72 plug	M12 pin, 5-pole, A-coded	Digital inlets	Function
Pin 1	D0_IN	+24V Digital inlet 0	Key switch for release Pairing initiated by the WPM data holder. High is active.
Pin 2	D1_IN	+24V Digital inlet 1	Filter selection bit 0
Pin 3	D2_IN	+24V Digital inlet 2	Filter selection bit 1
Pin 4	D3_IN	+24V Digital inlet 3	Do not assign
Pin 5	0V_DIN	Reference potential for digital inlets 0-3	Reference potential, galvanically isolated

NOTICE

Electrical fuse

Install line protection to protect the device .

- ▶ Destruction of device in the event of overload.
- ▶ Destruction in the event of an error.

5.2.2 Digital outlets

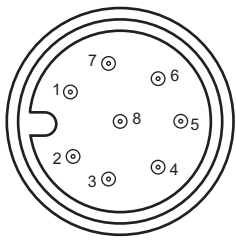
The WPM Gateway has 4 digital outlets.

24V DC nominal voltage.

Digital outlets are galvanically isolated from the device supply.

Recommended connection:

- Line
- M12 socket
- 8-pole, A-coded
- Maximum line length: 30 metres



X71 plug	M12 pin, 8-pole, A-coded	Digital outlets	Function
Pin 1	D0_OUT	+24V, 0.5A Digital outlet 0	External signal light is green, status is ok. High is active.
Pin 2	D1_OUT	+24V, 0.5A Digital outlet 1	External signal light is orange, status is warning. High is active.
Pin 3	D2_OUT	+24V, 0.5A Digital outlet 2	External signal light is red, status is error. High is active.
Pin 4	D3_OUT	+24V, 0.5A Digital outlet 3	External signal light is blue, Pairing status activity. High is active.
Pin 5	NC	NC	Do not assign
Pin 6	NC	NC	Do not assign
Pin 7	+24V_DOUT	Supply for digital outlets 0-3	Supply, galvanically isolated
Pin 8	0V_DOUT	Reference potential for digital outlets 0-3	Reference potential, galvanically isolated

NOTICE

Electrical fuse

Install line protection to protect the device .

- ▶ Destruction of device in the event of overload.
- ▶ Destruction in the event of an error.

5.2.3 Relays

The WPM Gateway has 3 potential-free relays.

2 of them have switchovers

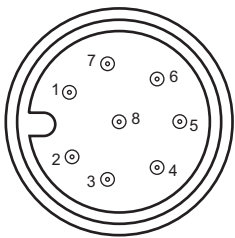
1 of them has N/O contact

24V DC nominal voltage.

Relay contacts are galvanically isolated from all signals.

Recommended connection:

- Line
- M12 socket
- 8-pole, A-coded
- Maximum line length: 30 metres



X70 plug	M12 pin 8-pole, A-coded	Digital outlets - relay contacts	Function
Pin 1	REL_RUN_IN	Two-way switch relay 1	+24V supply
Pin 2	REL_RUN_OUT	N/O contact relay 1	WPM Gateway ready for operation, a tool is connected. High is active.
Pin 3	REL_WARN_IN	Two-way switch relay 2	+24V supply
Pin 4	NREL_WARN_OUT	NC relay 2	Tool has no warning
Pin 5	REL_WARN_OUT	N/O contact relay 2	Tool has a warning. High is active.
Pin 6	REL_ERR_IN	Two-way switch relay 3	+24V supply
Pin 7	NREL_ERR_OUT	NC relay 3	Tool has no error.
Pin 8	REL_ERR_OUT	N/O contact relay 3	Tool has an error. Sensor has alarm Sensor timeout according to factory settings (default 600 seconds) exceeded Sensor pairing, no sensor available High is active.

NOTICE

Electrical fuse

Install line protection to protect the device .

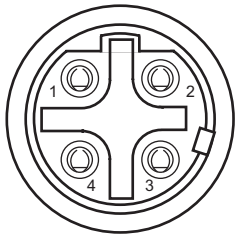
- ▶ Destruction of device in the event of overload.
- ▶ Destruction in the event of an error.

5.2.4 EtherCAT Fieldbus

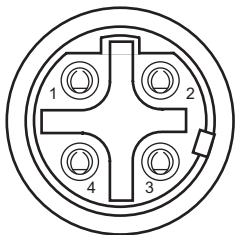
The WPM Gateway has two EtherCAT connections (IN and OUT) and can therefore be completely integrated into an EtherCAT Fieldbus system.

Recommended connection:

- EtherCat or Profinet line, shielded
- M12 pin
- 4-pole, D-coded
- Maximum line length: 30 metres



X32.0 plug	M12 socket 4-pole, D-coded	Ethernet fieldbus, EtherCAT inlet	Function
Pin 1	100BTTX+	EtherCAT Transmit +	Ethernet transmission line away from the Gateway
Pin 2	100BTRX+	EtherCAT Receive +	Ethernet receiving line to the Gateway
Pin 3	100BTTX-	EtherCAT Transmit -	Ethernet transmission line away from the Gateway
Pin 4	100BTRX-	EtherCAT Receive -	Ethernet receiving line to the Gateway



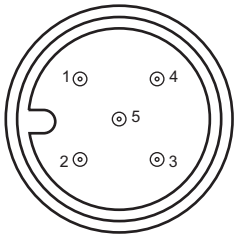
X32.1 plug	M12 socket 4-pole, D-coded	Ethernet fieldbus, EtherCAT outlet	Function
Pin 1	100BTTX+	EtherCAT Transmit +	Ethernet transmission line away from the Gateway
Pin 2	100BTRX+	EtherCAT Receive +	Ethernet receiving line to the Gateway
Pin 3	100BTTX-	EtherCAT Transmit -	Ethernet transmission line away from the Gateway
Pin 4	100BTRX-	EtherCAT Receive -	Ethernet receiving line to the Gateway

5.2.5 Voltage supply

The nominal voltage supply is +24V DC +/- 20%.

Recommended connection:

- Line
- M12 socket
- 5-pole, A-coded
- Maximum line length: 30 metres



X01 plug	M12 pin 4-pole, A-coded	Voltage supply	Function
Pin 1	+24V	+24V DC +/- 20% supply	Voltage supply
Pin 2	+24V	+24V DC +/- 20% supply	Voltage supply
Pin 3	0V	0V supply	Reference potential
Pin 4	0V	0V supply	Reference potential

NOTICE

Electrical fuse

Install line protection to protect the device .

- ▶ Destruction of device in the event of overload.
- ▶ Destruction in the event of an error.

5.2.6 Deactivated - USB device BT LE 4.0 Interface

The USB interface works only in connection with the WPM configuration software as an alternative to a FIBRO USB Bluetooth LE stick.

The USB interface is only available for FIBRO Service for debugging purposes.

X28 plug	4-pole, pin, M8	USB device	Function
Pin 1	USB_5V	Inlet. USB host Detection	Detecting a connected PC
Pin 2	USB_DM	USB signal is negative	USB data signal
Pin 3	USB_DP	USB signal is positive	USB data signal
Pin 4	USB_GND	USB GND	Reference potential, galvanically connected

5.2.7 Ethernet interface

The Ethernet interface has no function and should not be connected!

6 OPERATION

6.1 LED displays on the device

On the WPM Gateway itself, several LEDs display the operating statuses of the device and the interfaces.

LED	Function	Description
Power	Status for internal voltage supply	The LED shines green if the supply voltage is correctly applied and the internal voltage regulators are functioning correctly.
CPU	Boot status	The LED shines green if the CPU is properly started. The LED shines red if the internal initialisation of the Bluetooth module has failed.
Bluetooth	Bluetooth communication status	The LED blinks green if there is no communication with FIBRO devices (WPM pressure sensors or WPM data holders). Blinks for 30 seconds after power-on, no pairing is possible at this time. The LED shines green if there is communication between the CPU and Bluetooth.
Gateway	Pairing status	LED off if there is no pairing. LED shines green steadily if the WPM Gateway is connected to a pressing tool and a sensor. LED blinks red if a pairing process is activated using the key switch and can be started using the login button on a data holder. LED blinks red-green-red after the data holder has been detected and as long as not all sensors have been detected. LED blinks red-green-red if a sensor is not received during active pairing and a > 600s timeout has expired. Blinking ends when the sensor is received. LED blinks red-green-red when pairing has failed and no sensor has been detected for more than 600 seconds.
ETC RUN	EtherCAT status	The LED shines green if the EtherCAT is properly initialised and is running
ETC in/out	Link status	The LED shines green if an EtherCat partner is properly connected with the respective connection.

6.2 Configuration operation

By default, the WPM Gateway does not need additional software configuration.

The EtherCAT communication and data are configured via PLC.

An EtherCAT XML file (device description file) is available for this purpose.

6.2.1 Filter configuration

A total of 3 filter groups with 4 filter functions each are stored in the WPM gateway.

Different filters affect warnings and alarms, filters count or monitor time.

3 filter groups are pre-set by FIBRO and can be selected with digital inlets D1_IN and D2_In.

D1_IN =LOW and D2_IN=LOW are used to switch off the filter, the selection of filters 1 to 3 are binary:

D2_IN== 0; D1_IN == 0: No filter

D2_IN== 0; D1_IN == 1: Filter 1 selection

D2_IN== 1; D1_IN == 0: Filter 2 selection

D2_IN== 1; D1_IN == 1: Filter 3 selection

In a complex monitoring process of complex mechanical and pneumatic sequences, interactions can occur in the process causing warnings to be sent due to very brief pressure undercuts, for example. Setting the filter prevents a machine stop caused by a brief warning.

Depending on the transmission rate and the machine cycle, it can be beneficial to select the counting affect or the time monitoring effect.

Please ask your FIBRO service operator for the correct selection of settings.

FIBRO has made effective basic settings which are suitable for the majority of applications.

If you would like special settings, your FIBRO service consultant can optimise your filters on-site.

6.2.2 Pairing start monitoring

By default, the WPM Gateway will start monitoring from the first time a sensor is received. If a previously missing sensor is still not received after 600 seconds, this is signalled by error messages on the connected lamps.

Your FIBRO service consultant can change these monitoring criteria. The time window of 600 seconds can be set to fit your needs, as can the start monitoring function.

If complete evaluation of all sensors is required at the beginning of the process, this criteria can be set. A variable number of monitored start sensors is not possible – there are two options:

- Monitoring from the first sensor until all others are received or
- Monitoring start not until all sensors have been received

6.3 Normal operating modes

The WPM Gateway has four operating modes:

- Simple digital I/O operation for systems without EtherCAT,
- Pairing with tools
- Fieldbus operation for complete integration into system control
- The option of using WPM configuration software to access the radio interface directly
 - This function is currently deactivated

6.3.1 Timeouts

- Data holder
 - The data holder has a time window of 60 seconds until confirmation. If pairing does not take place between the data holder and gateway within 60 seconds, it is terminated.
- Sensor
 - Each received sensor is monitored immediately after the pairing request. If a sensor does not respond for more than 600 seconds, an alarm is set. The remaining sensors continue to be monitored. However, differentiated evaluation is limited by the dominating alarm.
- SleepTimer
 - Sensors are set to a SleepTimer of 2 hours when activated. If a sensor is not reactivated within 2 hours, it goes into sleep mode.
- Refresh interval
 - Reactivation happens every 30 minutes. During reactivation, the sensors do not send data.
- Pairing request after termination
 - If the gateway still does not receive a sensor for 600 seconds after the request, the pairing request is not terminated.

6.3.2 Normal digital I/O operation

For digital IO operation, there are 4 digital inlets, 4 digital outlets and 3 relays available.

6.3.2.1 Status information at digital outlets

Outlet signal	Status	Description
D0_OUT Signal light is green, status is ok.	On	All statuses of all connected WPM pressure sensors are ok
	Blinking	If D3_OUT is blinking: During active tool monitoring, at least one monitored sensor did not receive any information for a period exceeding 600 seconds
	Off	At least one sensor has an warning or alarm. Pairing is not yet complete.
D1_OUT Signal light is orange, status is warning.	On	At least one connected WPM pressure sensor or WPM data holder has a warning
D2_OUT Signal light is red, status is error.	On	At least one connected WPM pressure sensor or WPM data holder has an alarm. At least one sensor was not received for more than 600 seconds.
D3_OUT Signal light is blue, Pairing	On	Connection successfully completed, tool monitoring is active.
	Blinking quickly	The gateway creates a connection with the pressing tool.
	Blinking slowly	The gateway scans all WPM components connected to it If D0_OUT is blinking: During active tool monitoring, at least one monitored sensor did not receive any information for a period exceeding 600 seconds.

6.3.2.2 Status information at the relay outlets

Outlet signal	Function	Description
REL_RUN_IN	Two-way switch relay 1 +24V	Supply for switching contact relay 1
REL_RUN_OUT	Contact Ready for operation	Closed: WPM Gateway is ready for operation, a tool is connected. Open: WPM Gateway is not ready for operation, or no tool is connected.
REL_WARN_IN	Two-way switch relay 2 +24V	Supply for switch relay 2
NREL_WARN_OUT	NC/warning	Closed: WPM system, no warning detected
REL_WARN_OUT	N/O contact warning	Closed: WPM system warning detected
REL_ERR_IN	Two-way switch relay 2 +24V	Supply for switch relay 3
NREL_ERR_OUT	NC relay 3	Closed: WPM system, no alarm detected
REL_ERR_OUT	N/O contact relay 3	Closed: WPM system alarm detected Sensor has alarm Sensor timeout > 600 seconds exceeded

6.3.3 Pairing of the WPM data holder and WPM Gateway

In normal operation, a WPM Gateway monitors exactly one configured pressing tool.

This pressing tool must be made known to the WPM Gateway.

If a WPM System is equipped with a WPM Gateway, the login button on the WPM data holder serves as manual confirmation of manual pairing.

Inlets for controlling the pairing:

X72 plug	5-pole, pin, M12, A	Digital inlets	Function
Pin 1	D0_IN	+24V, Digital inlet 0	Key switch for release Pairing initiated by the WPM data holder. High is active.
Pin 2	D1_IN	+24V, Digital inlet 1	Filter selection bit 0
Pin 3	D2_IN	+24V, Digital inlet 2	Filter selection bit 1
Pin 4	D3_IN	+24V, Digital inlet 3	Do not assign
Pin 5	0V_DIN	Reference potential for digital inlets 0-3	Reference potential, galvanically isolated

The digital inlet D0_IN switches the WPM Gateway to pairing mode. In this operating mode, the WPM Gateway waits for the confirmation of a WPM data holder, which is triggered by pressing the login button. The digital outlet D3_OUT makes a connected display blink.

The pairing procedure is as follows:

1. Static activation of the inlet D0_IN for pairing mode on the WPM Gateway.
2. The "Login" button on the WPM data holder is actuated.
 - a) A pressing tool (WPM data holder) pairing confirmation is sent to the WPM Gateway.
3. If the WPM Gateway has received the confirmation signal, the WPM Gateway sends a confirmation to the WPM data holder.

The green LED on the WPM data holder shines briefly.
4. If the WPM Gateway does not send a confirmation to the WPM Data Holder within 60 seconds, the WPM data holder terminates the pairing procedure.

The red LED on the WPM data holder shines steadily.
5. The WPM Gateway searches for all associated WPM pressure sensors in parallel and activates them.

During this procedure, the Gateway LED blinks red-green-red.

A lamp connected to the outlet D3_Out blinks until all configured devices have been recognised.
6. If the WPM Gateway does not find all the WPM pressure sensors configured for the WPM data holder, pairing is continued.

D3_out blinks slowly and signals that pairing is not yet complete. The pairing process can take longer due to the 60 second timeout per sensor.

7. The WPM Gateway then monitors the tool from a connected sensor. If pairing fails (after "Number of sensors" x 60 seconds, no sensor is found), the Gateway LED blinks red-green-red, but does not interrupt pairing. Pairing is continued until a sensor is detected.
8. d (default configuration). No status is displayed on the connected lamps.
9. After successful pairing, the WPM Gateway then monitors the pressing tool assigned to the selected WPM data holder.
The Gateway LED shines green steadily.
A lamp connected to the outlet D3_Out shines steadily.
The corresponding statuses of the sensors are evaluated.
10. The gateway now monitors the WPM pressure sensors assigned to the WPM data holder.
 - a) If at least one connected WPM pressure sensor issues a warning, the outlet D1_OUT is activated, and REL_WARN_OUT is closed at the same time.
 - b) If at least one connected WPM pressure sensor issues an alarm, the outlet D2_OUT is activated, and REL_ERR_OUT is closed at the same time.
11. If a signal is not received cyclically within 600 seconds when a WPM pressure sensor is being monitored, D3_out starts to blink slowly together with D0_out. Monitoring is continued and the REL_ERR_OUT relay outlet is closed.
12. If the WPM pressure sensor is then received again, D3_out and D0_out shine steadily depending on the tool status, the REL_ERR_OUT relay output is reopened.
13. After manual pairing is completed, D0_IN is reset and is therefore again ready for a new pairing at a later time (see 1.).

6.3.4 Operation with EtherCAT Fieldbus

Operation with an EtherCAT Fieldbus requires a superordinate EtherCAT Master, such as a PLC.

An XLM device description file for the PM Gateway is available for configuring the EtherCAT Master.

These instructions do not address how to configure a PLC or a fieldbus; that information is part of the respective PLC or fieldbus master description. Every PLC has its own procedure.

NOTICE

Changing the PLC configuration of unknown systems

Systems are specifically configured. The following can happen in the event of an error:

- ▶ The system stands idle.
- ▶ The system may work incorrectly.
- ▶ The system is damaged.
- ▶ The PLC programme is damaged.

6.3.4.1 EtherCAT filter functions

The predefined filters are changed using EtherCAT.

6.3.4.2 EtherCAT XML ESI file, description file for devices

The XML file addresses which inlets, outlets and data formats are available on the EtherCAT Fieldbus.

The screenshot shows a software interface for configuring an EtherCAT device. On the left is a tree view of the device's data structure, and on the right is a table of the device's data points.

Name	Online	Type	Size	> Addr...	In/Out
Tool State	0	UINT	2.0	39.0	Input
Number Of Tools	2	UINT	2.0	41.0	Input
Number Of Sens...	2	UINT	2.0	43.0	Input
Active Tool	0	UINT	2.0	45.0	Input
Active Sensor	0	UINT	2.0	47.0	Input
Monitored Tool	0	UINT	2.0	49.0	Input
Command	0x00	BYTE	1.0	51.0	Input
State	0x00	BYTE	1.0	52.0	Input
Battery	0	UINT	2.0	53.0	Input
Serial Number	0	UDINT	4.0	55.0	Input
RSSI	0x00	BYTE	1.0	59.0	Input
Name	00 00 00 00 00 00 0...	ARRAY [0....	10.0	60.0	Input
Sensors	0x00	BYTE	1.0	70.0	Input
State	0x00	BYTE	1.0	71.0	Input
Pressure	0	UINT	2.0	72.0	Input
Temperature	0	UINT	2.0	74.0	Input
Battery	0	UINT	2.0	76.0	Input
Serial Number	0	UDINT	4.0	78.0	Input
RSSI	0x00	BYTE	1.0	82.0	Input
Digital In / Relais	0	USINT	1.0	83.0	Input
WcState	1	BIT	0.1	1522.1	Input
InputToggle	0	BIT	0.1	1524.1	Input
State	257	UINT	2.0	1548.0	Input
AdsAddr	169.254.181.8.3.1:1...	AMSADDR	8.0	1550.0	Input
Active Tool	0	UINT	2.0	39.0	Output
Active Sensor	0	UINT	2.0	41.0	Output
Command	0x00	BYTE	1.0	43.0	Output

TXPDO1 information

Tool State

Bit	Meaning
0 (0x01)	Warning message
1 (0x02)	Alarm message
2 (0x04)	At least one sensor malfunctioned during the tool monitoring (no Bluetooth message received for 120 seconds)
4 (0x10)	Active pairing process
5 (0x20)	Pairing completed (tool monitoring is active)
All others	--

Number Of Tools

Number of WPM data holders received via Bluetooth.

Number Of Sensors

Number of WPM pressure sensors received via Bluetooth.

Active Tool

Confirmation of which WPM data holder transferred the data to 'TXPDO2 Tool Data'.

If 'Active Tool' = 0, the data from all WPM pressure sensors received via Bluetooth can be read.

Active Sensor

Confirmation of which WPM data sensor transferred the data to 'TXPDO3 Sensor Data'.

Monitored Tool

Index of the WPM data holder which was used to perform a pairing or which WPM data holder is currently being monitored.

Command

Confirmation of the command performed.

TXPDO2 Tool Data

Actual values of the currently selected WPM data holder.

These values relate to the index of the selected WPM data holder displayed in 'Active Tool' TxPDO1. If 'Active Tool' in TxPDO1 is 0, the data are invalid.

State

Device status

Bit	Meaning
0 (0x01)	--
1 (0x02)	--
2 (0x04)	Battery warning
3 (0x08)	--
4 (0x10)	--
5 (0x20)	Bit for PC measurement, PC has switched to ACTIVE
6 (0x40)	Bit ACTIVE mode
7 (0x60)	Bit for LOCK

Battery

Voltage of the battery in mV

Serial Number

Serial number of the WPM data holder

RSSI

Signal strength of the Bluetooth signal in percent

Name

Abbreviated name of the WPM data holder

Sensors

Number of WPM pressure sensors assigned to the WPM data holder.

TXPDO3 Sensor Data

Actual values of the currently selected WPM pressure sensor

These values relate to the index of the selected WPM pressure sensor displayed in 'Active Sensor' TxPDO1.

If 'Active Sensor' in TxPDO1 is 0, the data are invalid.

State

Device status

Bit	Meaning
0 (0x01)	Pressure warning
1 (0x02)	Temperature warning
2 (0x04)	Battery warning
3 (0x08)	Pressure alarm
4 (0x10)	Temperature alarm
5 (0x20)	WPMconfig measurement
6 (0x40)	ACTIVE mode (nonsleep)
7 (0x60)	LOCK

Pressure

Last measured pressure value of the WPM pressure sensor in bar

Temperature

Last measured temperature of the WPM pressure sensor in °C

Battery

Last measured battery voltage of the WPM pressure sensor in mV

Serial Number

Serial number of the WPM pressure sensor.

RSSI

Signal strength of the Bluetooth signal in percent

TXPDO5 digital in / relay

Status of the digital inlets or the relays, states of the WPM Gateway (activated == high)

Bit	Meaning
0 (0x01)	Digital inlet D0_IN
1 (0x02)	Digital inlet D1_IN
2 (0x04)	Digital inlet D2_IN
3 (0x08)	Digital inlet D3_IN
4 (0x10)	REL_RUN_OUT
5 (0x20)	REL_WARN_OUT
6 (0x40)	REL_ERR_OUT
7 (0x80)	--

RxPDO1 Activate

Active Tool

Index of the WPM data holder whose data should be displayed in TxPDO2 or the index of the WPM data holder to be monitored (pairing).

Active Sensor

Index of the WPM pressure sensor whose data should be displayed in TxPDO3

If the index in 'Active Sensor' is set, the data of the WPM pressure sensors assigned to the WPM data holder can be read.

If 'Active Tool' in TxPDO1 is 0, 'Active Sensor' can be used to read the data from all the WPM pressure sensors received via Bluetooth.

Command

Sends a command to the WPM Gateway

The following commands are defined:

Command	Meaning
0	Confirmation of the last command
1	Perform pairing (activate tool monitoring)
74	Activate test mode
75	End test mode

6.3.4.3 EtherCAT multiplexing selection of WPM data holders and WPM pressure sensors

A fieldbus is used to quickly transfer dynamic process data.

To maintain the real-time capabilities during short transfer cycles, only the real-time data that are absolutely necessary should be transferred.

In the WPM system, the information of the selected pressing tool to be monitored are considered "necessary data".

If there are several pressing tools in the reception range, they are locally kept in a list in the WPM Gateway so they can be called up.

The number of tools in the list is transferred in the EtherCAT process map. The EtherCAT Master uses a type of addressing procedure (multiplexing) to tell the WPM Gateway which element (number) from the list is required next.

The same multiplex procedure is also used for selecting WPM pressure sensors in the tool monitored.

If the PLC programme is used to monitor a WPM pressure sensor other than the current one, its desired number is transferred from the list to the WPM Gateway. The WPM Gateway sends the desired information to the EtherCAT Master as a response.

This way, the EtherCAT Master cyclically collects all the data and creates its own local list in the PLC, which can then be easily visualised as needed. If pressing tools are removed from the list in the WPM Gateway (no reception), the list is reconstructed by the WPM Gateway. The local copy is adapted by cyclically addressing and reading out the list via the PLC.

Filters and forms of sorting are used for the local list in the PLC.

6.3.4.4 Reading the data of a WPM pressure sensor

The number of the WPM pressure sensors assigned to the WPM data holder is displayed in 'Sensors' (TxPDO2).

So the data of one of these WPM pressure sensors can be read, the index of the WPM pressure sensor is written in 'Active Sensor' (RxPDO1). If a valid index was specified, the Gateway acknowledges the index in 'Active Sensor' (TxPDO1). The data of the selected sensor can now be read in 'Sensor Data' (TxPDO3).



If the number of sensors is 5, a value of 1 to 5 can be specified as the index.

6.3.4.5 Reading the data of a WPM data holder

In 'Number of Tools' (TXPDO1), the number of detected WPM data holders is displayed.

The index of the WPM data holder is written in 'Active Sensor' (RXPDO1) so the data of one of these WPM pressure sensors can be read. If a valid index was specified, the WPM Gateway acknowledges the index in 'Active Tool' (TXPDO1). The data of the selected WPM data holder can now be read in 'Tool Data' (TXPDO2).



If the number of detected data holders is 5, a value of 1 to 5 can be specified as the index.

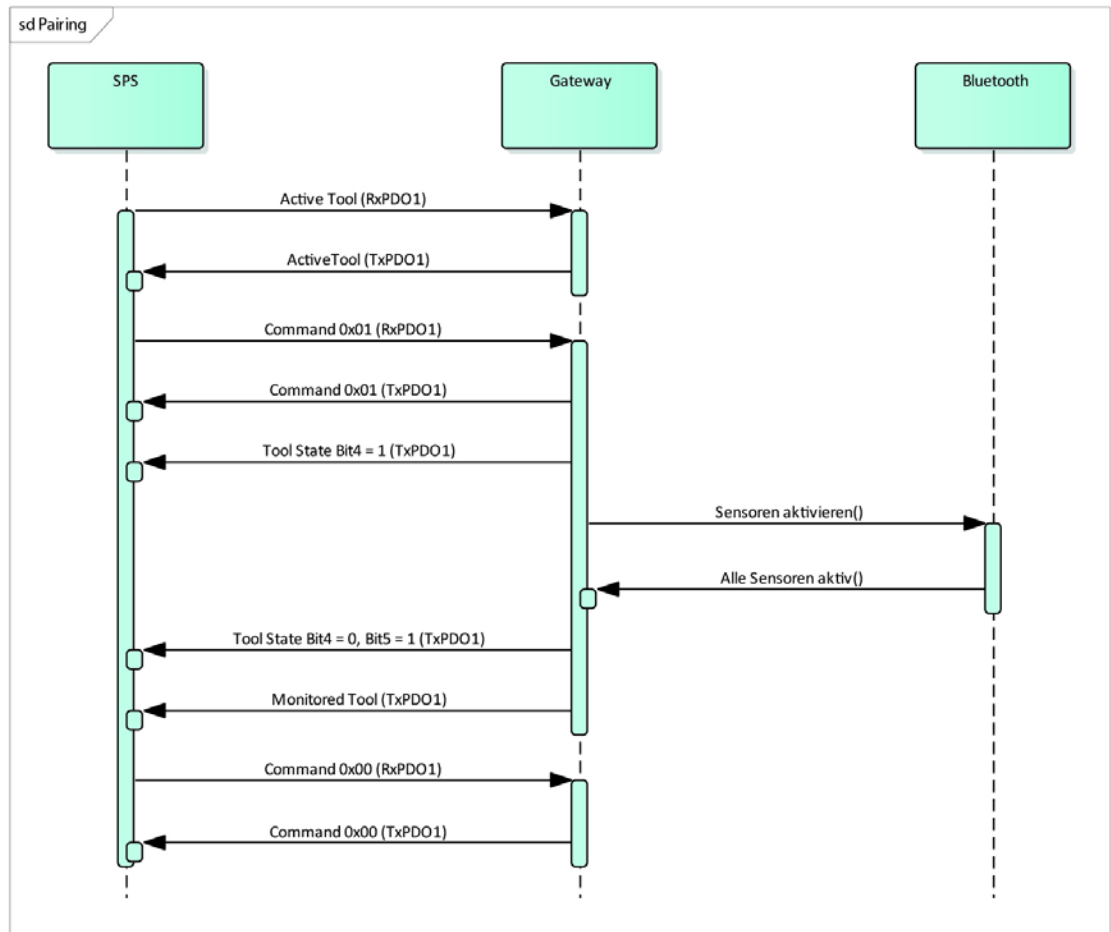
6.3.4.6 Pairing of a WPM data holder, activate tool monitoring

If a WPM data holder is supposed to be automatically monitored by the WPM Gateway, a pairing with the required WPM data holder must be carried out. The following steps must be performed for this purpose:

- Selecting the WPM data holder by sending the index of the WPM data holder in 'Active Tool' (RXPDO1).
- WPM Gateway acknowledges the index in TxPDO1
- Sending '1' in 'Command' (RXPDO1) to the WPM Gateway
- WPM Gateway acknowledges the command in TxPDO1
- WPM Gateway sets bit 4 in 'Tool State' (TxPDO1) (active pairing process)
- The WPM Gateway activates all the WPM pressure sensors assigned to the WPM data holder (sleep mode ended) via Bluetooth. Among other things, the time for activation depends on the number of assigned WPM pressure sensors, the WPM pressure sensor programming, the WPM data holder programming and the reception strength of the Bluetooth signal. It can last from several seconds to several minutes.
- After successful activation, the gateway deletes bit 4 in 'Tool State' (TxPDO1) and activates bit 5 in 'Tool State' (TxPDO1) (pairing process completed, tool monitoring active).
- The WPM Gateway acknowledges the index of the monitored WPM data holder in 'Monitored Tool' (TxPDO1)
- Sending '0' in 'Command' (RXPDO1) to the WPM Gateway to complete the pairing process
- WPM Gateway acknowledges the command in TxPDO1

The WPM Gateway now monitors the selected tool on its own. If one of the WPM sensors reports a warning or an alarm, the respective bit is activated in 'Tool State' (TxPDO1).

If the WPM Gateway could not successfully complete the pairing process, bit 1 (alarm) is activated in 'Tool State' TxPDO1. In this case as well, the pairing must be completed by sending '0' from 'Command' (RXPDO1).



6.3.4.7 Cancelling the initiated WPM data holder pairing, deactivating tool monitoring

Should the pairing with a WPM data holder, as well as the automatic monitoring via the gateway, be terminated, the following steps must be performed:

- Sending from index '0' in 'Active Tool' (RxPDO1)
- Gateway acknowledges the index in TxPDO1
- Sending '1' in 'Command' (RxPDO1) to the Gateway
- Gateway acknowledges the command in TxPDO1
- Gateway sets bit 4 in TxPDO1 (active pairing process)
- The gateway uses Bluetooth to deactivate all the WPM pressure sensors assigned to the WPM data holder (sets them back to sleep mode).
- After successful deactivation, the gateway deletes bit 4 in TxPDO1 (pairing completed, tool monitoring deactivated).
- The gateway sets the index of the monitored WPM data holder in 'Monitored Tool' (TxPDO1) to 0
- Sending '0' in Command (RxPDO1) to the gateway to complete the pairing process
- Gateway acknowledges the command in TxPDO1

6.3.4.8 Test mode (only for installers, service or commissioning)

In test mode, the digital outlets D0_OUT, D1_OUT, D2_OUT, D3_OUT; the relays REL_RUN, REL_ERR and REL_WARN; and the CPU, Bluetooth and Gateway LEDs can be actuated.

To actuate the individual signals, 'Active Sensor' (RxPDO1) is used in test mode.

To activate test mode, 'Command' (RxPDO1) must be used to send the special command 74. The WPM Gateway acknowledges the command with 74 in 'Command' (TxPDO1). After receiving the acknowledgement, the command 0 must be sent via 'Command' (RxPDO1).

'Active Sensor' (RxPDO1) can be used to actuate the individual signals.

Bit	Signal
0 (0x0001)	REL_RUN
1 (0x0002)	REL_ERROR
2 (0x0004)	REL_WARN
3 (0x0008)	--
4 (0x0010)	D0_OUT
5 (0x0020)	D1_OUT
6 (0x0040)	D2_OUT
7 (0x0080)	D3_OUT
8 (0x0100)	Gateway LED is green
9 (0x0200)	Reserve LED is orange
10 (0x0400)	Gateway LED is red
11 (0x0800)	CPU LED is green
12 (0x1000)	COU LED is green
13 (0x2000)	Bluetooth LED is green
14 (0x4000)	Bluetooth LED is red
15 (0x8000)	--

6.3.5 (deactivated) USB communication with BT LE module

Only for diagnostics

From version FFB001 01.06.03, the USB interface is used for service diagnostics and must not be connected by the user.

In the WPM Gateway, the same Bluetooth LE chip set is used as in the FIBRO USB radio stick.

The FIBRO WPM USB radio stick works with a virtual serial interface and a corresponding drive.

The WPM Gateway USB interface works according to the same virtual serial interface principle. The WPM configuration software installs its own USB drive suitable for the WPM Gateway.

The function of the WPM Gateway USB interface is analogous to the FIBRO radio stick and works with the WPM configuration software with no restrictions, provided there is a suitable license file in the gateway.

Please observe the WPM configuration software operating instructions when using it.

No actions and no configurations are performed for the WPM Gateway using the USB interface.

As long as the WPM configuration software populates the radio interface, the WPM Gateway does not function. The WPM Gateway does not monitor any tools.

NOTICE

USB interface uses a the BT LE radio chip

The WPM configuration software interrupts WPM.

Gateway function

- ▶ No tool monitoring.
- ▶ No tool paired.
- ▶ No WPM sensor data on the fieldbus.
- ▶ PLC programme receives no valid WPM sensor data.

NOTICE

USB interface without licensing

USB BTLE interface without function.

- ▶ No license file for WPM Gateway.
- ▶ No communication with WPconfig.
- ▶ Special function required.

7 MAINTENANCE

The product EtherCatWPM Gateway requires no maintenance.

The real-time clock battery must be replaced in the event of storage exceeding 3 years and without voltage supply. For this, specialist staff must open the device and change the battery.

The battery does not need to be changed within the normal life span during normal operation when voltage is supplied.

7.1 Changing the battery

7.1.1 Lithium metal battery real-time clock

The battery must be changed if the device is stored for longer than 3 years without voltage supply.

NOTICE

Maintenance with lithium metal battery

Lithium is a hazardous material. There is a risk of fire.

- ▶ Do not create a short circuit.
- ▶ Do not mechanically damage the battery.
- ▶ Do not recharge the battery.

NOTICE

Electric voltage

Perform work on the device only when there is no voltage.

- ▶ Destruction of electronics.
- ▶ Risk of short circuit.
- ▶ Damage to connected devices.

NOTICE

Open electronics

ESD guidelines must be complied with.

- ▶ Destruction via static discharge.
- ▶ Dirt on the circuit board can lead to defects.

- 1) Open the device by opening the screws on the bottom side.
- 2) Pull the battery's plug.
- 3) Remove the affixed battery.
- 4) Affix a new battery with the same construction (remove the protective foil in advance).
- 5) Plug in the plug.
- 6) Close the device again and mind the seal.

8 DISPOSAL

The product is an industrial product and is reclaimed through the old industrial device disposal system.

8.1 Disposing of the battery

NOTICE

Dispose of the battery properly

The battery consists of lithium metal cells. Lithium is a valuable raw material and a hazardous material. Improper disposal may cause environmental damage and may be prosecuted.

- ▶ The battery must be removed from the device.
 - ▶ The battery must be disposed of according to the pertinent, customary national and regional laws and guidelines.
 - ▶ The local regulations on proper waste recovery or removal must be complied with.
-

9 TECHNICAL DATA

Voltage supply:	+24V DC +/-20%
Power consumption:	0.2A @ +24V DC
Temperature range:	0°C to +55°C
Protection class:	IP65, screwed together with seal
Size:	54 mm x 108 mm x 180 mm
Weight:	0.7 kg
Plastic housing:	PA6
Flange plate:	Aluminium
Display:	Status LED
Radio technology:	Bluetooth LE 4.0 2.4GHz
Fieldbus:	EtherCAT
Digital outlets:	+24V DC +/-20%, max. 0.5A per outlet
Digital inlets:	+24V +/-20%
Relays:	+24V DC +/-20%, max. 0.5A per switch
Scope of application:	This product is intended only for industrial use in the territory of the European Union and in countries that have been recognised by standards and certificates of the European Union. USA and Canada

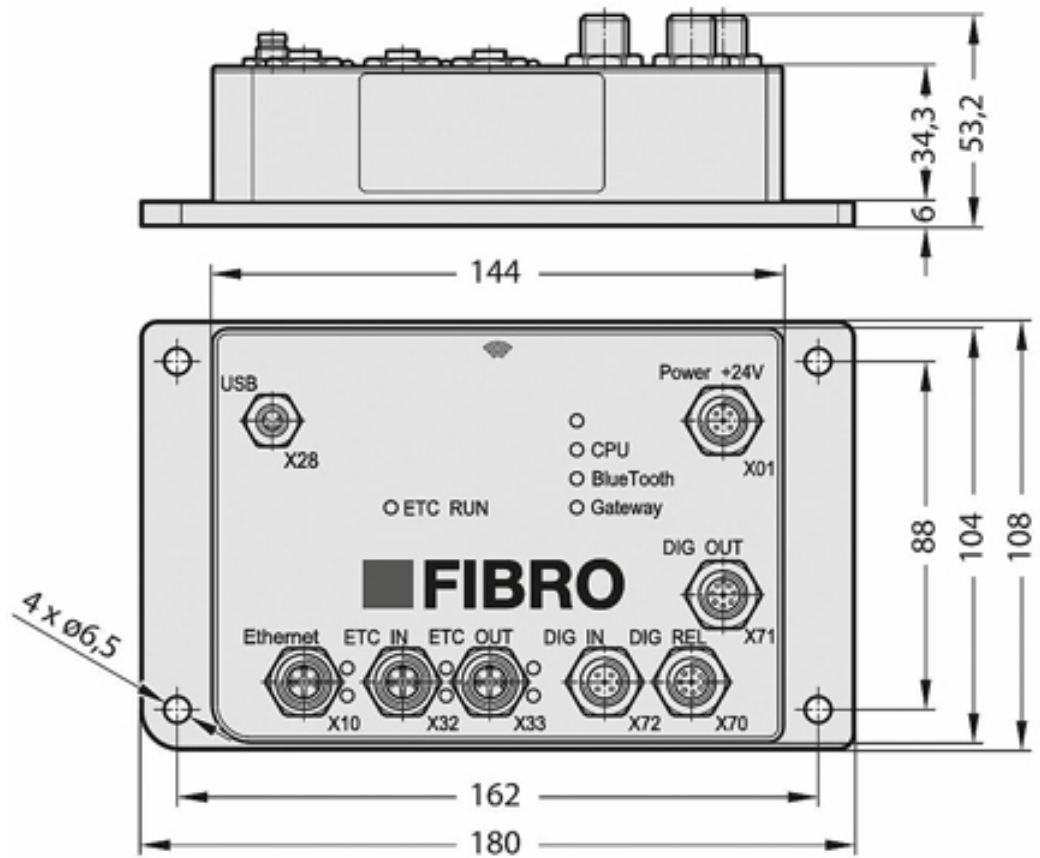
Contains a real-time clock backup battery with lithium

9.1 Type plate

Device labeling EU USA Canada



9.2 Technical drawing



10 INDEXES

10.1 Third-party products

The product contains no components from third-party companies.

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