OPERATING INSTRUCTIONS
ETHERCAT WPM GATEWAY FIELDBUS

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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

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 Target group

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

1.7 Copyright

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

This manual contains safety informations, which are intended to draw your attention to possible hazards and which should be heeded in order to avoid injury.

The associated text describes
• the type of hazard
• the source of the hazard
• the options for avoiding injury
• the possible consequences if the warning notice is not heeded

Safety informations are highlighted using a colored signal bar with a 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 view the pressing tool without hindrances.

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

<table>
<thead>
<tr>
<th>X72 plug</th>
<th>M12 pin, 5-pole, A-coded</th>
<th>Digital inlets</th>
<th>Function</th>
</tr>
</thead>
</table>
| Pin 1    | D0_IN                    | +24V          | Digital inlet 0  
High is active.  
Pairing initiated by the WPM data holder. |
| Pin 2    | D1_IN                    | +24V          | Digital inlet 1  
Do not assign |
| Pin 3    | D2_IN                    | +24V          | Digital inlet 2  
Do not assign |
| Pin 4    | D3_IN                    | +24V          | Digital inlet 3  
Do not assign |
| Pin 5    | 0V_DIN                   |                | 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

<table>
<thead>
<tr>
<th>X71 plug</th>
<th>M12 pin, 8-pole, A-coded</th>
<th>Digital outlets</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>D0_OUT</td>
<td>+24V, 0.5A</td>
<td>Digital outlet 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal light is green, status is ok. High is active.</td>
<td></td>
</tr>
<tr>
<td>Pin 2</td>
<td>D1_OUT</td>
<td>+24V, 0.5A</td>
<td>Digital outlet 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal light is orange, status is warning. High is active.</td>
<td></td>
</tr>
<tr>
<td>Pin 3</td>
<td>D2_OUT</td>
<td>+24V, 0.5A</td>
<td>Digital outlet 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal light is red, status is error. High is active.</td>
<td></td>
</tr>
<tr>
<td>Pin 4</td>
<td>D3_OUT</td>
<td>+24V, 0.5A</td>
<td>Digital outlet 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal light is blue, Pairing is taking place. High is active.</td>
<td></td>
</tr>
<tr>
<td>Pin 5</td>
<td>NC</td>
<td>NC</td>
<td>Do not assign</td>
</tr>
<tr>
<td>Pin 6</td>
<td>NC</td>
<td>NC</td>
<td>Do not assign</td>
</tr>
<tr>
<td>Pin 7</td>
<td>+24V_DOUT</td>
<td>Supply for digital outlets 0-3</td>
<td>Supply, galvanically isolated</td>
</tr>
<tr>
<td>Pin 8</td>
<td>0V_DOUT</td>
<td>Reference potential for digital outlets 0-3</td>
<td>Reference potential, galvanically isolated</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>X70 plug</th>
<th>M12 pin 8-pole, A-coded</th>
<th>Digital outlets - relay contacts</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>REL_RUN_IN</td>
<td>Two-way switch relay 1</td>
<td>+24V supply</td>
</tr>
<tr>
<td>Pin 2</td>
<td>REL_RUN_OUT</td>
<td>N/O contact relay 1</td>
<td>WPM Gateway ready for operation, a tool is connected. High is active.</td>
</tr>
<tr>
<td>Pin 3</td>
<td>REL_WARN_IN</td>
<td>Two-way switch relay 2</td>
<td>+24V supply</td>
</tr>
<tr>
<td>Pin 4</td>
<td>NREL_WARN_OUT</td>
<td>NC relay 2</td>
<td>Tool has no warning</td>
</tr>
<tr>
<td>Pin 5</td>
<td>REL_WARN_OUT</td>
<td>N/O contact relay 2</td>
<td>Tool has a warning. High is active.</td>
</tr>
<tr>
<td>Pin 6</td>
<td>REL_ERR_IN</td>
<td>Two-way switch relay 3</td>
<td>+24V supply</td>
</tr>
<tr>
<td>Pin 7</td>
<td>NREL_ERR_OUT</td>
<td>NC relay 3</td>
<td>Tool has no error.</td>
</tr>
<tr>
<td>Pin 8</td>
<td>REL_ERR_OUT</td>
<td>N/O contact relay 3</td>
<td>Tool has an error. High is active.</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>X32.0 plug</th>
<th>M12 socket 4-pole, D-coded</th>
<th>Ethernet fieldbus, EtherCAT inlet</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>100BTTX+</td>
<td>EtherCAT Transmit +</td>
<td>Ethernet transmission line away from the Gateway</td>
</tr>
<tr>
<td>Pin 2</td>
<td>100BTRX+</td>
<td>EtherCAT Receive +</td>
<td>Ethernet receiving line to the Gateway</td>
</tr>
<tr>
<td>Pin 3</td>
<td>100BTTX-</td>
<td>EtherCAT Transmit -</td>
<td>Ethernet transmission line away from the Gateway</td>
</tr>
<tr>
<td>Pin 4</td>
<td>100BTRX-</td>
<td>EtherCAT Receive -</td>
<td>Ethernet receiving line to the Gateway</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>X32.1 plug</th>
<th>M12 socket 4-pole, D-coded</th>
<th>Ethernet fieldbus, EtherCAT outlet</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>100BTTX+</td>
<td>EtherCAT Transmit +</td>
<td>Ethernet transmission line away from the Gateway</td>
</tr>
<tr>
<td>Pin 2</td>
<td>100BTRX+</td>
<td>EtherCAT Receive +</td>
<td>Ethernet receiving line to the Gateway</td>
</tr>
<tr>
<td>Pin 3</td>
<td>100BTTX-</td>
<td>EtherCAT Transmit -</td>
<td>Ethernet transmission line away from the Gateway</td>
</tr>
<tr>
<td>Pin 4</td>
<td>100BTRX-</td>
<td>EtherCAT Receive -</td>
<td>Ethernet receiving line to the Gateway</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>X01 plug</th>
<th>M12 pin 4-pole, A-coded</th>
<th>Voltage supply</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>+24V</td>
<td>+24V DC +/- 20% supply</td>
<td>Voltage supply</td>
</tr>
<tr>
<td>Pin 2</td>
<td>+24V</td>
<td>+24V DC +/- 20% supply</td>
<td>Voltage supply</td>
</tr>
<tr>
<td>Pin 3</td>
<td>0V</td>
<td>0V supply</td>
<td>Reference potential</td>
</tr>
<tr>
<td>Pin 4</td>
<td>0V</td>
<td>0V supply</td>
<td>Reference potential</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>X28 plug</th>
<th>4-pole, pin, M8</th>
<th>USB device</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>USB_5V</td>
<td>Inlet. USB host Detection</td>
<td>Detecting a connected PC</td>
</tr>
<tr>
<td>Pin 2</td>
<td>USB_DM</td>
<td>USB signal is neg-</td>
<td>USB data signal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ative</td>
<td></td>
</tr>
<tr>
<td>Pin 3</td>
<td>USB_DP</td>
<td>USB signal is posi-</td>
<td>USB data signal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tive</td>
<td></td>
</tr>
<tr>
<td>Pin 4</td>
<td>USB_GND</td>
<td>USB GND</td>
<td>Reference potential, galvanically connected</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Status for internal voltage supply</td>
<td>The LED shines green if the supply voltage is correctly applied and the internal voltage regulators work correctly.</td>
</tr>
<tr>
<td>CPU</td>
<td>Boot status</td>
<td>The LED shines green if the CPU is properly started. The LED shines red if the internal initialisation of the Bluetooth module has failed.</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>Bluetooth communication status</td>
<td>The LED blinks green if there is no communication with FIBRO devices (WPM pressure sensors or WPM data holders). The LED shines green if there is communication between the CPU and Bluetooth.</td>
</tr>
<tr>
<td>Gateway</td>
<td>Pairing status</td>
<td>LED is out if there is no pairing. The LED blinks green if the pairing process is active. The LED shines green steadily if the WPM Gateway is connected to a pressing tool. The LED blinks red if a pairing procedure can be started using the “login button” on a data holder.</td>
</tr>
<tr>
<td>ETC RUN</td>
<td>EtherCAT status</td>
<td>The LED shines green if the EtherCAT is properly initialised and is running.</td>
</tr>
<tr>
<td>ETC in/out</td>
<td>Link status</td>
<td>The LED shines green if an EtherCat partner is properly connected with the respective connection.</td>
</tr>
</tbody>
</table>
6.2 Configuration operation

The WPM Gateway does not need external configuration. The EtherCAT communication and data are configured via PLC. An EtherCAT XML file (device description file) is available for this purpose.

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 Normal digital I/O operation

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

6.3.1.1 Status information at digital outlets

<table>
<thead>
<tr>
<th>Outlet signal</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D0_OUT</td>
<td>On</td>
<td>All statuses of all connected WPM pressure sensors are in order</td>
</tr>
<tr>
<td></td>
<td>Blinking</td>
<td>During active tool monitoring, at least one monitored sensor did not receive any information for a period exceeding 120 seconds</td>
</tr>
<tr>
<td>D1_OUT</td>
<td>On</td>
<td>At least one connected WPM pressure sensor or WPM data holder has a warning</td>
</tr>
<tr>
<td>D2_OUT</td>
<td>On</td>
<td>At least one connected WPM pressure sensor or WPM data holder has an alarm</td>
</tr>
<tr>
<td>D3_OUT</td>
<td>On</td>
<td>Connection successfully completed, tool monitoring is active.</td>
</tr>
<tr>
<td></td>
<td>Blinking (1)</td>
<td>The gateway creates a connection with the pressing tool and scans all the WPM components connected to it</td>
</tr>
<tr>
<td></td>
<td>Blinking (2)</td>
<td>If D0_OUT is blinking: During active tool monitoring, at least one monitored sensor did not receive any information for a period exceeding 120 seconds</td>
</tr>
</tbody>
</table>
### 6.3.1.2 Status information at the relay outlets

<table>
<thead>
<tr>
<th>Outlet signal</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>REL_RUN_IN</td>
<td>Two-way switch relay 1</td>
<td>Supply for switching contact relay 1</td>
</tr>
<tr>
<td>REL_RUN_OUT</td>
<td>N/O contact</td>
<td>Operational readiness</td>
</tr>
<tr>
<td></td>
<td>+24V</td>
<td>Closed: WPM Gateway is ready for operation, and a tool is connected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Open: WPM Gateway is not ready for operation, or no tool is connected.</td>
</tr>
<tr>
<td>REL_WARN_IN</td>
<td>Two-way switch relay 2</td>
<td>Supply for switch relay 2</td>
</tr>
<tr>
<td></td>
<td>+24V</td>
<td>Closed: WPM system, no warning detected</td>
</tr>
<tr>
<td>NREL_WARN_OUT</td>
<td>N/O contact warning</td>
<td>Closed: WPM system warning detected</td>
</tr>
<tr>
<td>REL_WARN_OUT</td>
<td>Two-way switch relay 2</td>
<td>Supply for switch relay 3</td>
</tr>
<tr>
<td></td>
<td>+24V</td>
<td>Closed: WPM system, no alarm detected</td>
</tr>
<tr>
<td>NREL_ERR_OUT</td>
<td>NC relay 3</td>
<td>Closed: WPM system, no alarm detected</td>
</tr>
<tr>
<td>REL_ERR_OUT</td>
<td>N/O contact relay 3</td>
<td>Closed: WPM system alarm detected</td>
</tr>
</tbody>
</table>
6.3.2 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 for the manual pairing.

Inlets for controlling the pairing:

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

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 the button “Login” being pressed. The digital outlet D3_OUT makes a connected display blink.
The pairing procedure is as follows:

1. Activation of the D0_IN inlet for pairing mode on the WPM Gateway.
   a) If a pairing has already been carried out, this pairing is cancelled
      Gateway LED blinks green
   b) If the gateway is ready for a new pairing, the gateway LED blinks red
      A lamp connected to the outlet D3_Out blinks.

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 con-
   firmation to the WPM data holder.
   The green LED on the WPM data holder shines steadily.

4. If the WPM Gateway does not send a confirmation to the
   WPM data holder within 120 seconds, the WPM data holder terminates the pairing proce-
   dure.
   The red LED on the WPM data holder shines steadily.

5. The WPM Gateway searches for all associated WPM pressure sensors in parallel and acti-
   vates them.
   During this procedure, the gateway LED shines green.
   A lamp connected to the outlet D3_Out blinks until all configured devices have been rec-
   ognised.

6. If the WPM Gateway does not find all the WPM pressure sensors configured
   for the WPM data holder, the pairing is terminated.
   The Gateway LED shines red steadily,
   D3_out is set to 0
   The relay outlet REL_ERR_OUT is closed.

7. 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

8. 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.
   c) If, a signal is not received cyclically within 120 seconds when a WPM pressure sensor
      is monitored, the pairing is terminated,
      the gateway LED shines red steadily, D3_Out is set to 0 and the relay outlet REL_ERM-
      R_OUT is closed

9. After the manual pairing is completed, D0_IN is reset again and is therefore once again
   ready for a new pairing at a later time (see 1.).
6.3.3 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.

6.3.3.1 EtherCAT XML ESI file, description file for devices

The XML file addresses which inlets, outlets and data formats are available on the EtherCAT Fieldbus.
**TXPDO1 information**

**Tool State**

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

**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

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (0x01)</td>
<td>--</td>
</tr>
<tr>
<td>1 (0x02)</td>
<td>--</td>
</tr>
<tr>
<td>2 (0x04)</td>
<td>Battery warning</td>
</tr>
<tr>
<td>3 (0x08)</td>
<td>--</td>
</tr>
<tr>
<td>4 (0x10)</td>
<td>--</td>
</tr>
<tr>
<td>5 (0x20)</td>
<td>Bit for PC measurement, PC has switched to ACTIVE</td>
</tr>
<tr>
<td>6 (0x40)</td>
<td>Bit ACTIVE mode</td>
</tr>
<tr>
<td>7 (0x60)</td>
<td>Bit for LOCK</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (0x01)</td>
<td>Pressure warning</td>
</tr>
<tr>
<td>1 (0x02)</td>
<td>Temperature warning</td>
</tr>
<tr>
<td>2 (0x04)</td>
<td>Battery warning</td>
</tr>
<tr>
<td>3 (0x08)</td>
<td>Pressure alarm</td>
</tr>
<tr>
<td>4 (0x10)</td>
<td>Temperature alarm</td>
</tr>
<tr>
<td>5 (0x20)</td>
<td>WPMconfig measurement</td>
</tr>
<tr>
<td>6 (0x40)</td>
<td>ACTIVE mode (nonsleep)</td>
</tr>
<tr>
<td>7 (0x60)</td>
<td>LOCK</td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (0x01)</td>
<td>Digital inlet D0_IN</td>
</tr>
<tr>
<td>1 (0x02)</td>
<td>Digital inlet D1_IN</td>
</tr>
<tr>
<td>2 (0x04)</td>
<td>Digital inlet D2_IN</td>
</tr>
<tr>
<td>3 (0x08)</td>
<td>Digital inlet D3_IN</td>
</tr>
<tr>
<td>4 (0x10)</td>
<td>REL_RUN_OUT</td>
</tr>
<tr>
<td>5 (0x20)</td>
<td>REL_WARN_OUT</td>
</tr>
<tr>
<td>6 (0x40)</td>
<td>REL_ERR_OUT</td>
</tr>
<tr>
<td>7 (0x80)</td>
<td>--</td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<tr>
<th>Command</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Confirmation of the last command</td>
</tr>
<tr>
<td>1</td>
<td>Perform pairing (activate tool monitoring)</td>
</tr>
<tr>
<td>74</td>
<td>Activate test mode</td>
</tr>
<tr>
<td>75</td>
<td>End test mode</td>
</tr>
</tbody>
</table>
6.3.3.2 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.

6.3.3.3 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’ (RxDPO1). 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.

6.3.3.4 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’ (RxDPO1) 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.
### 6.3.3.5 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).
6.3.3.6 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
6.3.3.7 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.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (0x0001)</td>
<td>REL_RUN</td>
</tr>
<tr>
<td>1 (0x0002)</td>
<td>REL_ERROR</td>
</tr>
<tr>
<td>2 (0x0004)</td>
<td>REL_WARN</td>
</tr>
<tr>
<td>3 (0x0008)</td>
<td>--</td>
</tr>
<tr>
<td>4 (0x0010)</td>
<td>D0_OUT</td>
</tr>
<tr>
<td>5 (0x0020)</td>
<td>D1_OUT</td>
</tr>
<tr>
<td>6 (0x0040)</td>
<td>D2_OUT</td>
</tr>
<tr>
<td>7 (0x0080)</td>
<td>D3_OUT</td>
</tr>
<tr>
<td>8 (0x0100)</td>
<td>Gateway LED is green</td>
</tr>
<tr>
<td>9 (0x0200)</td>
<td>Reserve LED is orange</td>
</tr>
<tr>
<td>10 (0x0400)</td>
<td>Gateway LED is red</td>
</tr>
<tr>
<td>11 (0x0800)</td>
<td>CPU LED is green</td>
</tr>
<tr>
<td>12 (0x1000)</td>
<td>COU LED is green</td>
</tr>
<tr>
<td>13 (0x2000)</td>
<td>Bluetooth LED is green</td>
</tr>
<tr>
<td>14 (0x4000)</td>
<td>Bluetooth LED is red</td>
</tr>
<tr>
<td>15 (0x8000)</td>
<td>--</td>
</tr>
</tbody>
</table>
6.3.4 (deactivated) USB communication with BT LE module

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 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 no 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.

Contains a real-time clock backup battery with lithium

9.1 Type plate

![Type plate image]
9.2 Technical drawing
10 INDEXES

10.1 Third-party products

The product contains no components from third-party companies.
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11 APPENDIX

11.1 Personal notes

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