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# WIRELESS MONITORING OF GAS SPRINGS IN THE TOOL WIRELESS PRESSURE MONITORING 2.1



MEMBER OF THE LÄPPLE GROUP





# WIRELESS PRESSURE MONITORING 2.1 (WPM)

## **WIRELESS MONITORING OF GAS SPRINGS VIA BLUETOOTH LE 4.0**

THE CORE REQUIREMENTS OF PRESS PLANTS ARE: AUTOMATION AND ZERO-ERROR MANUFACTURING. THE FIBRO WIRELESS PRESSURE MONITORING SYSTEM 2.1 (WPM), MONITORS GAS SPRINGS IN ALL AREAS, IN WHICH CABLE- OR HOSE CONNECTED SENSORS REACH THEIR TECHNICAL LIMITATIONS, OR ARE SIMPLY UNECONOMICAL.

The WPM system monitors the pressure and temperature in gas springs. It consists of a data part (optional) and sensors which transmit their data wirelessly to a WPM repeater integrated into the company network. Custom software analyses the data and initializes the necessary process control and preemptive maintenance steps accordingly.

FIBRO, with the WPM system for the fourth industrial revolution,

provides a product and technology that supports concepts of intelligent processes and networked machines/tools.

### **ADVANTAGES**

- Around-the-clock monitoring and documentation
- Early warning signalling prevents the production of unacceptable parts
- Preemptive wear detection and targeted troubleshooting
- Prevention of downtime and secondary failures
- Minimization of leakage points
- Streamlined construction and assembly
- Reduced maintenance and repair costs thanks to needs-optimised maintenance intervals

### **COMPONENTS OF THE WPM SYSTEM**

- Sensors in the tool
- Data part (optional)
- WPM Repeater
- Fieldbus coupler (optional)
- WPM Cloud Software
- WPM app (optional)

# WIRELESS PRESSURE MONITORING 2.1 (WPM) FOR INDUSTRY 4.0 (IOT) METHOD OF OPERATION



## DETERMINE VALUES VIA BLUETOOTH

Sensors in the tool transmit the pressure and temperature values in the gas springs wirelessly.



## MANAGE DATA

When using the WPM app, the data part manages the data of the tool sensors (optional).



## COLLECT AND TRANSFER DATA

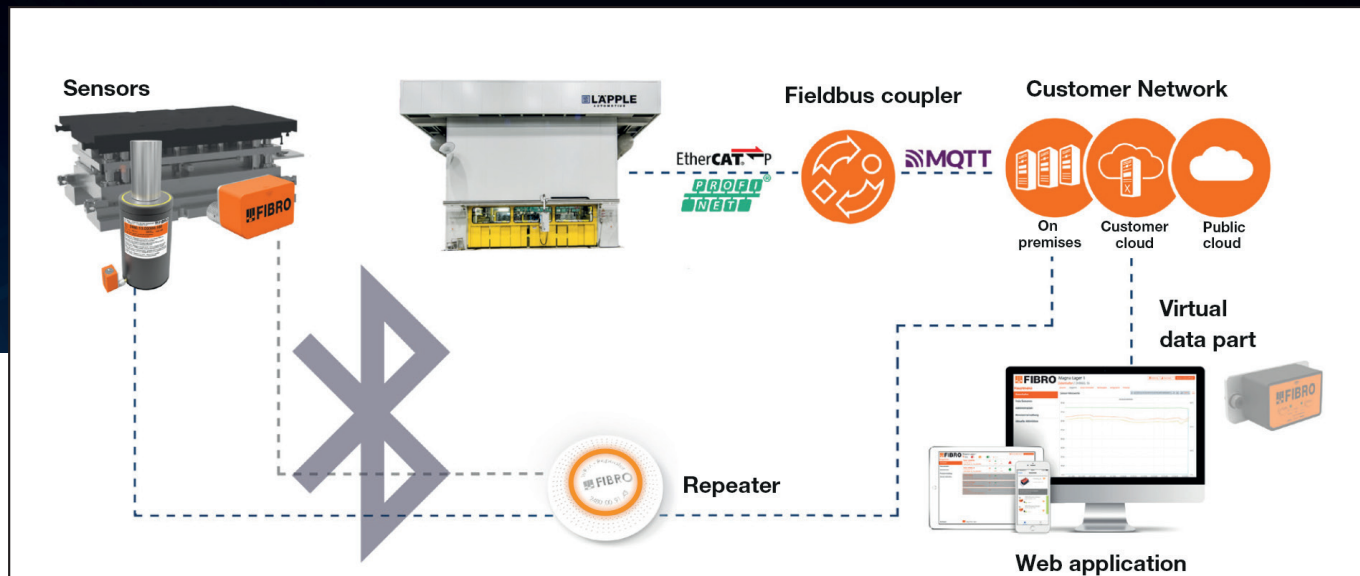
The FIBRO WPM repeater receives the data from the sensors and passes it on to the WPM cloud software. It establishes communication in all areas where you want to monitor your tools.

## COMMUNICATION FOR CONTROL

The fieldbus coupler acts as an interface between the WPM cloud software and the system control of a power press or press line. It translates the MQTT protocol into an EtherCat or ProfiNet protocol and thus enables error-free communication within your systems.



subject to alterations

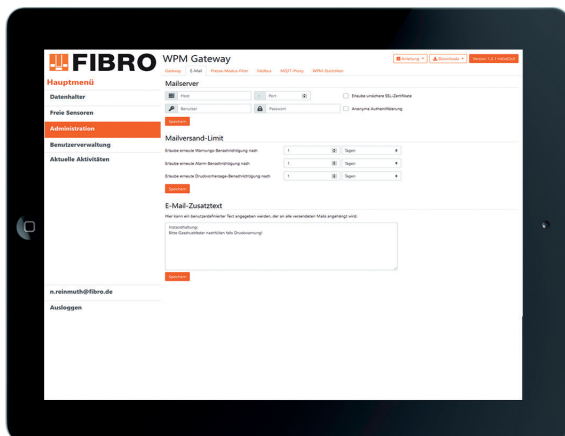


### WEB-BASED SOFTWARE FOR SETTING UP AND EVALUATING THE SENSORS

The WPM system monitors the gas springs for error-free production before and during the use of the tool in the press.

### WPM CLOUD SOFTWARE

The WPM cloud software manages and controls your tools centrally and across locations. Installed on your server, you can create different plants or even different production areas such as press shop, maintenance workshop, warehouse or tool shop.



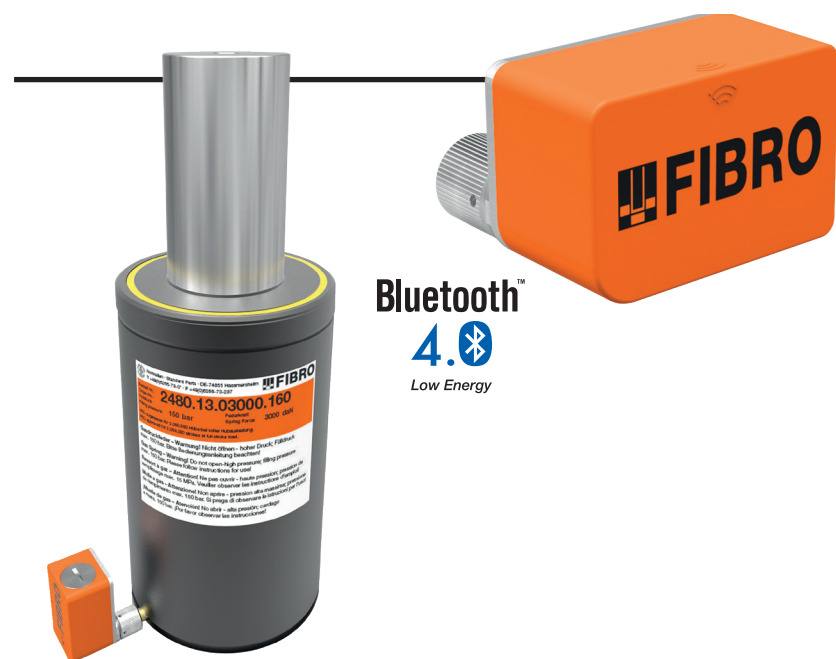
### MOBILE APP

The WPM app is used to display the status conditions (pressure and temperature). It is available for download in the App Store, Google Play and on the FIBRO website.



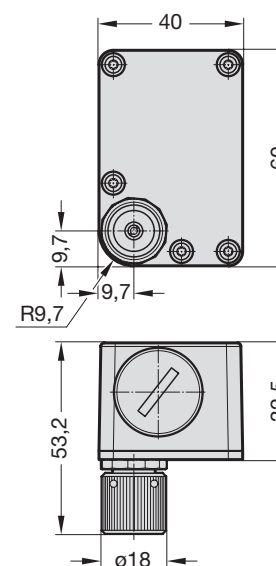
www.fibro.com

# WIRELESS PRESSURE MONITORING 2.1 (WPM) SENSOR, BATTERY



2480.00.91.10.01

Order number for sensor



## DESCRIPTION

The sensor is battery operated and thus wireless.

In operating mode, the sensor cyclically transmits data via Bluetooth LE 4.0 to the WPM repeater or the mobile WPM app.

The mechanical construction is designed according to the requirements of the press (shock- and vibration-resistant).

The data transmission during the programming of the sensor is encrypted.

The following data are queried:

- Limit values for pressure and temperature
- Part number (tool number)
- Part ID
- Sensor ID
- Position in the tool
- Various cycle times
- Battery status
- Transmission power

## TECHNICAL SPECIFICATIONS

- Housing: plastic
- Base plate: Aluminium
- Minimes connection: Steel galvanised M12.65 x 1.5 FEM
- Pressure measuring range: 0 – 500 bar relative
- Precision:  $\pm 2$  bar
- Temperature measuring range: 0 °C to 85 °C
- Battery: Lithium Li-SoC12 2 / 3 A 3.6 V
- Signal transmission: Bluetooth LE 4.0
- Protection type: IP65 sealed with adhesive and screwed
- Operating temperature range: 0 °C to 80 °C

## 2480.00.91.10.00.1

Order number for battery reorder

(Battery is included with the sensor.)

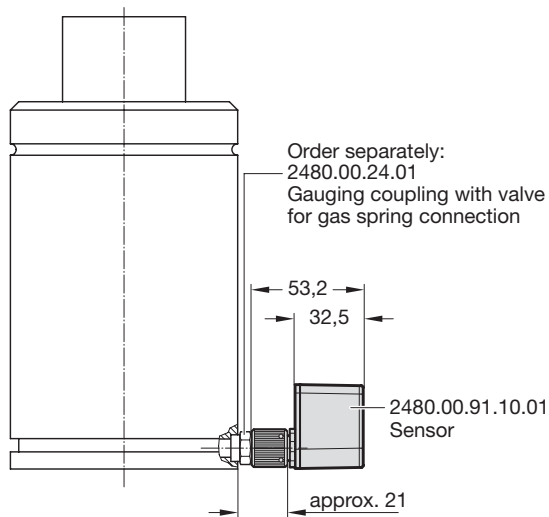
Battery capacity 3 – 4 years for “normal” tool use



# WIRELESS PRESSURE MONITORING 2.1 (WPM) SENSOR, GAUGING COUPLING, FILLING ADAPTER

## MOUNTING EXAMPLE

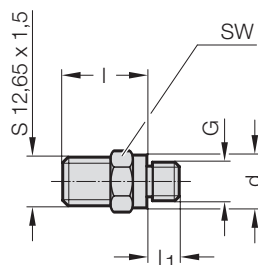
Sensor connection to gas spring



## 2480.00.24.01/02

- Measuring coupling 2480.00.24.01 with valve for connection to gas spring
- Measuring coupling 2480.00.24.02 with valve for connection to control fitting

## 2480.00.24.0x.



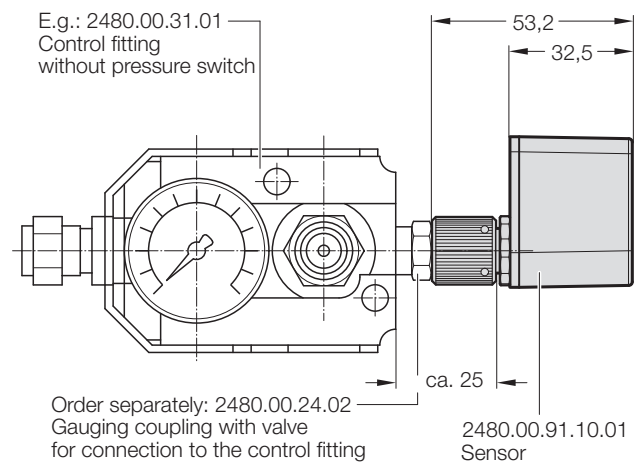
Order No.	G	d	SW	l	l <sub>1</sub>
2480.00.24.01	G 1/8	14	14	22	8
2480.00.24.02	G 1/4	19	19	21	10

SW = Width across flats

subject to alterations

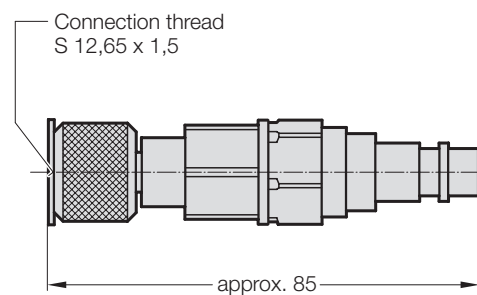
## MOUNTING EXAMPLE

Sensor connection to control fitting



## 2480.00.90.00.10

Filling adapter for minimess connection



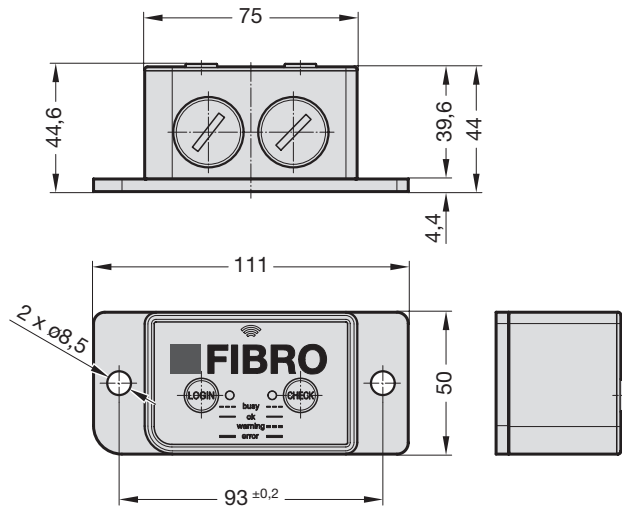
# WIRELESS PRESSURE MONITORING 2.1 (WPM) DATA PART, BATTERY



Bluetooth™  
4.0  
Low Energy

2480.00.91.30

Order number for data part



## DESCRIPTION

A data part is installed in the tool when using the WPM app. It stores all the tool data, as well as a list of all sensors that are found on the tool.

Up to 128 sensors can theoretically be managed in one tool.

Via the CHECK button, the Data part can perform a quick tool scan (sensor condition such as pressure, battery and reception) with all the pressure sensors in the simplest manner.

The data part receives the connection with the Mobile WPM app and transmits its tool data.

## NOTE

The tool data can be managed as a "virtual" data storage device in the cloud software. As a result, the data storage device 2480.00.91.30 is not mandatory for the cloud application.

## TECHNICAL SPECIFICATIONS

- Housing: plastic
- Base plate: Aluminium
- Battery compartment cover: Aluminium
- Signal transmission: Bluetooth LE 4.0
- Protection type: IP65 sealed with adhesive and screwed
- Operating temperature: 0 °C to 60 °C

## ADVANTAGES

- Wireless pressure monitoring
- Tool data are always available on the tool
- Data evaluation by gateway, PC (WPM software) or both possible in parallel
- Quick access to sensor data via short Bluetooth LE 4.0 cycle times
- Fast tool check by pressing a button on the data part with optical evaluation.

2480.00.91.10.00.1

Order number for battery reorder

(2 batteries are included with the Data part.)

Battery capacity 3 – 4 years for "normal" tool use

—

8

subject to alterations

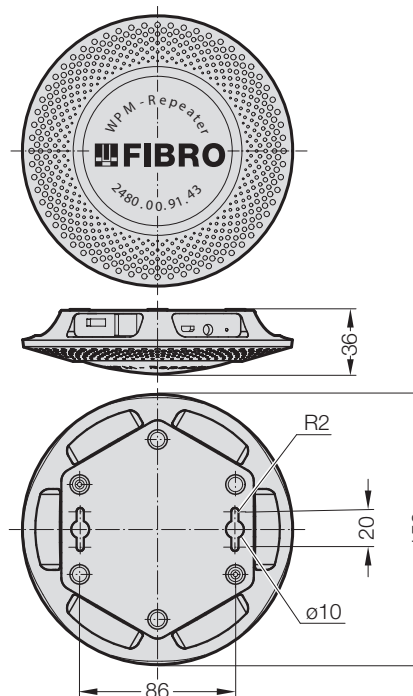


# WIRELESS PRESSURE MONITORING 2.1 (WPM) REPEATER

2480.00.91.43



Order number for Repeater



## DESCRIPTION

The FIBRO WPM-Repeater 2480.00.91.43 establishes the communication with the sensors as well as the data storage device (optional) in which the tools are to be monitored.

The FIBRO WPM Repeater 2480.00.91.43 is a Bluetooth Low Energy (BLE) to WiFi connector. It collects the data from the WPM sensors and WPM storage devices and then sends it via MQTT protocol over WiFi or Ethernet to the WPM Cloud software 2480.00.91.53, which is installed on a local server or remote cloud server.

The FIBRO WPM Repeater is equipped on the top with a coloured light ring for status indications. It can be fastened by means of the screw mounts on the backside.

Mounting screws and a drill jig are included.

The mounting of the repeater should be vertically. Wall mounting is therefore preferable to ceiling mounting.

## NOTE

The WPM Repeater 2480.00.91.43 can only be operated in conjunction with the WPM Cloud Software 2480.00.91.53!

## TECHNICAL SPECIFICATIONS

- Housing: Plastic, white
- Dimension:  $\varnothing 150$  mm x 36 mm
- Weight: 180 g
- Operating temperature range:  $-25^{\circ}\text{C}$  up to  $65^{\circ}\text{C}$
- Air humidity: max. 95% non-condensing
- Power supply: DC 5V
- with Micro USB: 330 mA
- Frequency band: 2,4 GHz
- Range: 25 - 50 m (Free field)

## SUPPLIED COMPONENTS

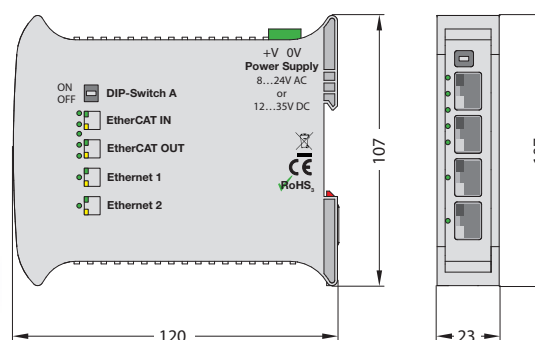
WPM Repeater, 1x Micro-USB cable, power supply, mounting screws with jig

# WIRELESS PRESSURE MONITORING 2.1 (WPM) **FIELDBUS COUPLER ETHERCAT**



**2480.00.91.44.1**

Order number for EtherCAT fieldbus coupler



## DESCRIPTION

By integrating the fieldbus coupler, EtherCAT 2480.00.91.44.1, the WPM Cloud application 2480.00.91.53. can be connected to the power press control (EtherCAT). The EtherCAT fieldbus coupler 2480.00.91.44.1 enables EtherCAT communication with the WPM system, connecting an EtherCAT master (e.g. a Beckhoff PLC, OMRON PLC, etc.) to the WPM cloud application 2480.00.91.53. The communication from network coupler to WPM-Cloud (MQTT) can be encrypted with TLS/SSL, which ensures a SECURE communication.

## SYSTEM REQUIREMENTS

One fieldbus coupler is required for each power press control. The fieldbus coupler is connected to the WPM Cloud application via Ethernet (port 1883). Additional ports are required for configuration (80/443).

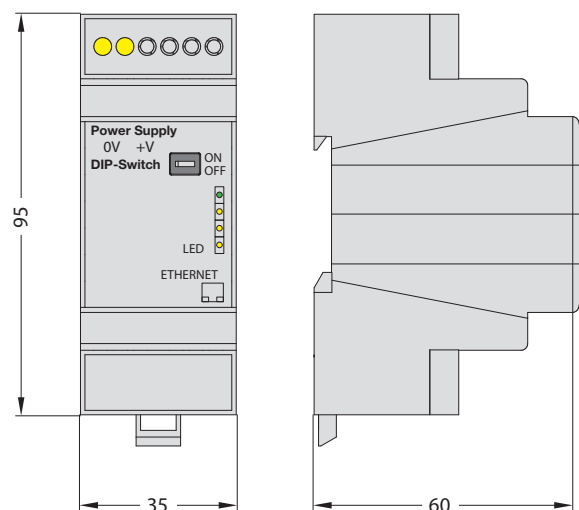
## TECHNICAL SPECIFICATIONS

Housing: plastic PVC  
 Connections: 4xEtherNET  
 EtherNET protocol: MQTT  
 EtherCAT protocol: EtherCAT Slave  
 Data rate MQTT: 10/100 Base-T Autosensing  
 Data rate EtherCAT: 10/100 Base-T Autosensing  
 MQTT Connector: RJ45  
 EtherCAT Connector: RJ45  
 Power connection: 2way 5mm terminal block  
 Power supply: 8..24V AC; 12..35V DC  
 Operating temperature range: -40°C/+85°C  
 Dimensions (LxWxH): 120x23x107  
 Weight: approx. 200g  
 Fastening: DIN rail

# WIRELESS PRESSURE MONITORING 2.1 (WPM) **FIELDBUS COUPLER PROFINET**

**2480.00.91.44.2**

Order number for PROFINET fieldbus coupler



## DESCRIPTION

By integrating the fieldbus coupler, PROFINET 2480.00.91.44.2, the WPM Cloud application 2480.00.91.53. can be connected to the power press control (PROFINET). The PROFINET 2480.00.91.44.2 fieldbus coupler enables PROFINET communication with the WPM system, connecting a PROFINET master (e.g. SIEMENS PLC, Supervisory PLC, etc.) with the WPM cloud application 2480.00.91.53. The communication from network coupler to WPM-Cloud (MQTT) can be encrypted with TLS/SSL, which ensures a SECURE communication.

## SYSTEM REQUIREMENTS

One fieldbus coupler is required for each power press control. The fieldbus coupler is connected to the WPM Cloud application via EtherNet (port 1883). Additional ports are required for configuration (80/443).

## TECHNICAL SPECIFICATIONS

- Housing: plastic PVC
- Connections: 1xEtherNET
- EtherNET protocol: MQTT
- PROFINET protocol: PROFINET Slave
- Data rate MQTT: 10/100 Base-T Autosensing
- Data rate EtherCAT: 10/100 Base-T Autosensing
- MQTT Connector: RJ45
- PROFINET Connector: RJ45
- Power connection: 2way 5mm terminal block
- Power supply: 8..24V AC; 12..35V DC
- Operating temperature range: -40°C/+85°C
- Dimensions (LxWxH): 36x60x95
- Weight: approx. 200g
- Fastening: DIN rail

# WIRELESS PRESSURE MONITORING 2.1 (WPM) WPM CLOUD SOFTWARE

THE WPM 2.1, LIKE ITS PREDECESSOR, WIRELESSLY MONITORS THE PRESSURE AND TEMPERATURE OF YOUR FIBRO GAS SPRINGS IN THEIR INSTALLED STATE. SENSORS WITHIN THE TOOL SEND DATA VIA BLUETOOTH TO THE REPEATER. THE REPEATER THEN TRANSMITS THIS DATA WIRELESSLY OR VIA LAN TO THE CLOUD-BASED SOFTWARE INSTALLED ON THE COMPANY SERVER. THE SPECIALLY DEVELOPED SOFTWARE ANALYZES THIS DATA AND TRIGGERS APPROPRIATE ACTIONS.

## DESCRIPTION

The enhanced version 2.1 offers additional features that bring your production a big step closer to Industry 4.0:

The cloud-based solution makes it possible to monitor multiple tools at the same time – even across locations and sites. The Bluetooth range is therefore no longer a limiting factor.

Installing the Cloud on your internal company server reliably implements the absolute security of your sensible data.

Most accurate analyses of collected data allow an even more precise process control and an optimized preventive maintenance.

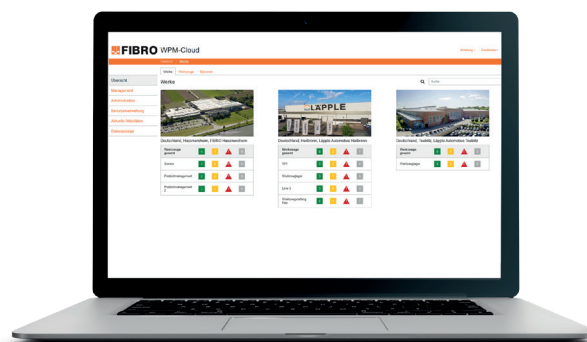
The future performance of the system can be enhanced by the option to add modular extensions with additional sensors.

An easy and intuitively user interface simplifies the operation, configuration and maintenance of the system and thereby helps prevent errors.

Additional functions such as the assignment of specific gas springs for simplified display of obtained values make the system even more user-friendly. The ordering of spare parts is thereby also possible automatically via our online store.

**2480.00.91.53.**

Order number for the WPM Cloud software



## SYSTEM REQUIREMENTS

The software requires a Linux base system with Docker installed. A WPM server must meet the following requirements:

- Working memory: at least 4GB, recommended 8GB
- Hard disk space: at least 64GB
- Processor: No special requirements
- Operating system: Ubuntu 20.04 (other distributions are possible, but without support)
- Docker version 20.10.8 or higher
- Internet access via port 443 must be provided at least for the installation
- A network connection between the server, the WPM gateways (network couplers) and WPM Repeaters must be possible via port 8883

## THE WPM CLOUD SOFTWARE IS OFFERED ON A LICENSE MODEL:

2480.00.91.53.005 - 5 licenses

2480.00.91.53.010 - 10 licenses

2480.00.91.53.025 - 25 licenses

2480.00.91.53.100 - Unlimited licenses

One license is required per WPM Repeater or network coupler. This allows for optimal tailoring to your monitoring requirements.

# WIRELESS PRESSURE MONITORING 2.1 (WPM) YOUR ADDED VALUES



**ADVANTAGES:**

- Setup and configuration of the tool sensors and the data part
- Trend detection and data analysis of the pressure and temperature gradients
- Proactive mailing functions to the user
- Option for integration into the press control system (as well as Beckhoff PLC and the Siemens PLC)
- Platform-independent web interface
- On Premise Integration into the company network locally at the customer's site
- Customer Cloud Integration
- Interface to the system network/company network via: EtherCat, Profinet, OPC-UA, Ethernet/WLAN/LAN, MQTT

**PROACTIVE MAILING FUNCTIONS**

**STORAGE FOR SENSOR DATA**

**CLOUD INTEGRATION  
OPTION**

**CROSS-PLATFORM**

**CROSS-MANUFACTURER  
SYSTEM INTEGRATION**

**STANDALONE  
COMMUNICATION**

**TREND DETECTION /  
DATA ANALYSIS**

**REMOTE ACCESS**

# WIRELESS PRESSURE MONITORING 2.1 (WPM) CLOUD USER INTERFACE, IOT

## SIMPLE CONFIGURATION OF THE SYSTEM

Setting and display of actual and setpoint values for pressure and temperature of the sensors in the tool via web-based user interface.

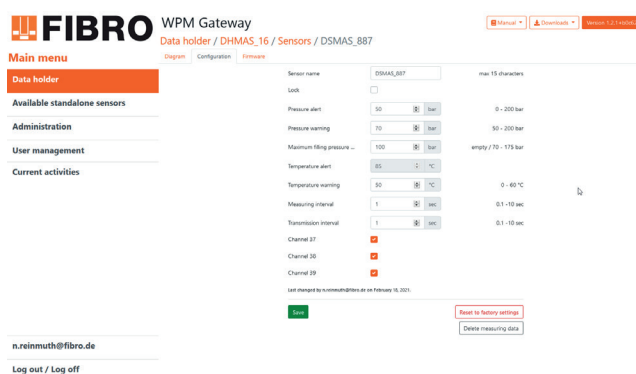
## PRODUCE ERROR-FREE

Before and during the use of tools in the press, the WPM monitors the level of pressure of all gas springs. The system reports issues before the production of unacceptable parts can occur. Adjustable warning and alarm value limits.

Via trend detection and data analysis, the user is informed by email when the set limit values are not reached.

## POSITION AND STATUS CONTROL OF THE GAS SPRING SENSORS IN THE TOOL

System locates defective spring in case of malfunction.





### TARGETED MAINTENANCE

Temperature monitoring can detect wear and tear even before a pressure drop in the spring. This significantly reduces the effort required for upkeep and maintenance compared to rigid intervals.

### STREAMLINED CONSTRUCTION AND ASSEMBLY

Tool manufacturers only need to consider the position of sensors and springs. No need to install tube lines during assembly which means leakages are a thing of the past.

### DOCUMENTATION OF THE PROCESS CONTROL (PRESSURE / TIME DIAGRAM)

Pressure and temperature data are acquired and recorded throughout the entire production process, but also, for example, in the warehouse or during maintenance.



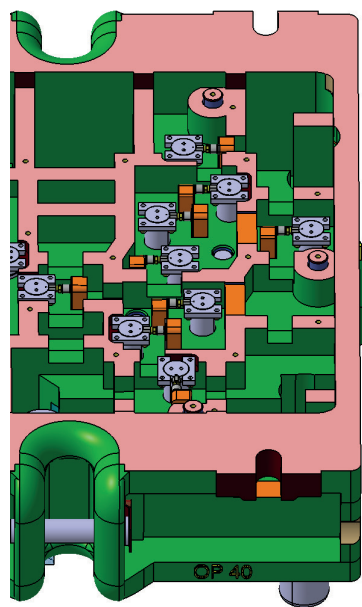
# WIRELESS PRESSURE MONITORING 2.1 (WPM) EXAMPLE APPLICATION AND INSTALLATION

## INSTALLATION OF SENSORS

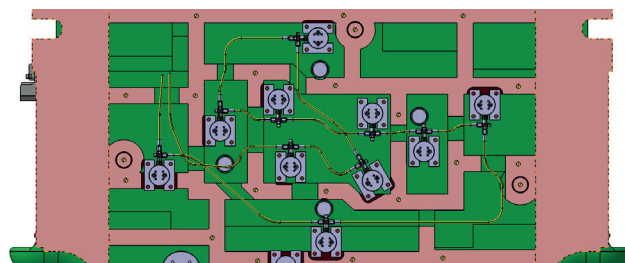
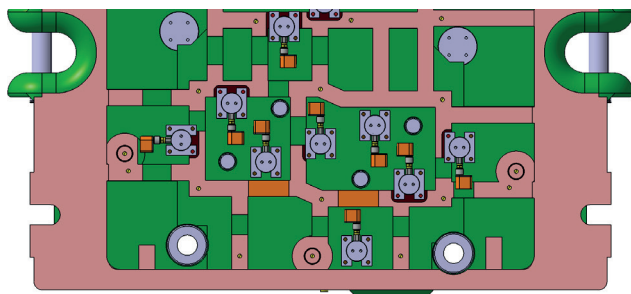
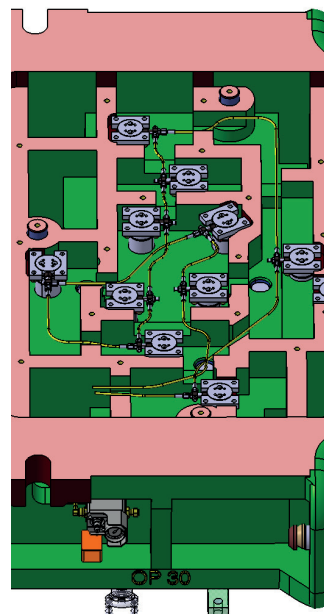
The sensors should ideally be connected directly to the gas pressure spring by means of the G1/8 Minimes coupling. Alternatively, they can be attached to a control panel (hose or manifold system). When attaching to a control panel, temperature monitoring of individual gas springs is not possible.



Connection of sensors directly to gas pressure springs



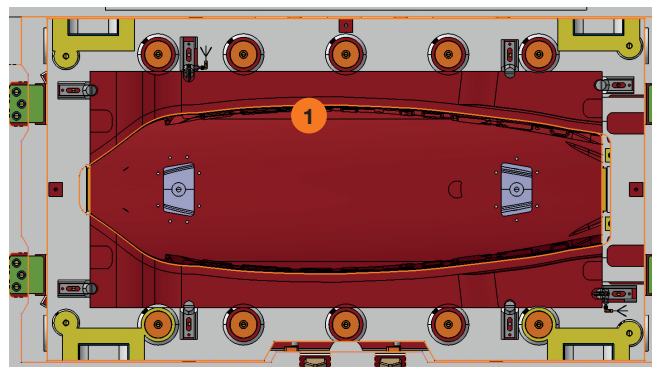
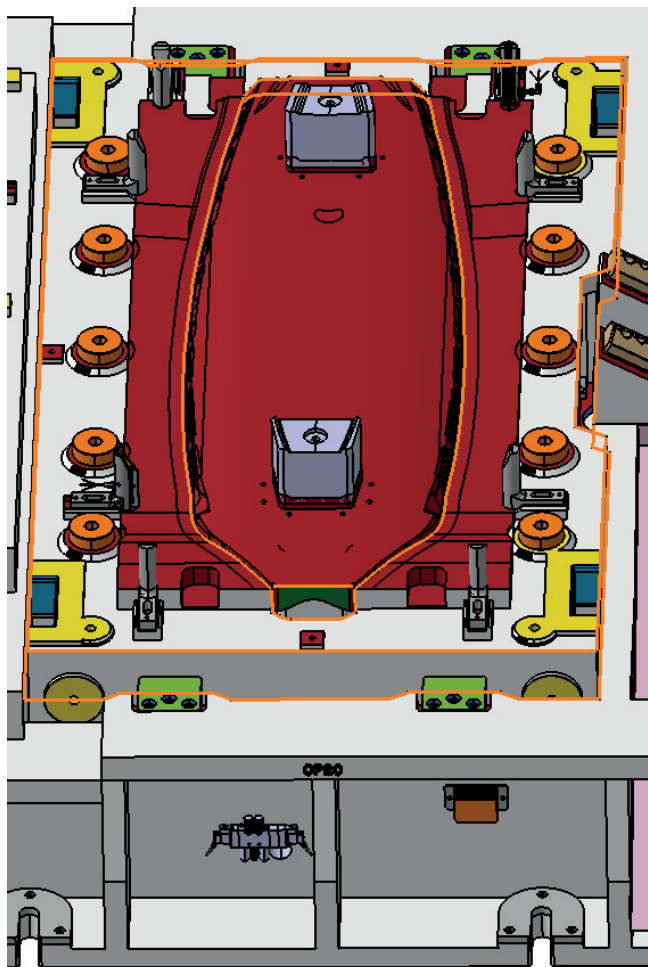
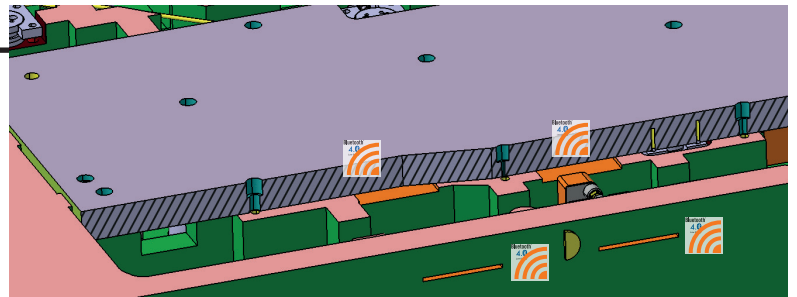
Attachment of sensor to control fitting for monitoring the composite system



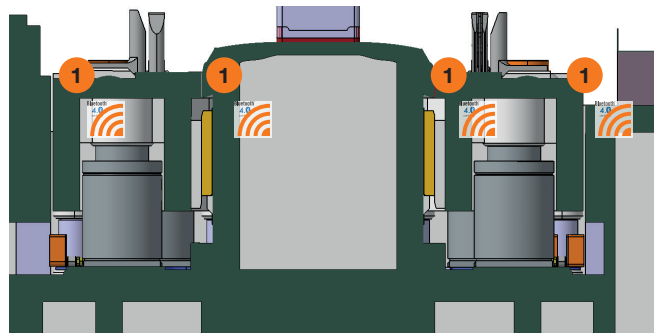




Caution: To avoid impairment of the radio transmission, there must be sufficient openings in the tool near sensors. Slotted openings with a minimum length of 50 mm are recommended. The width is freely selectable (> 0.2mm).



1) Slotted openings for radio transmission



# WIRELESS PRESSURE MONITORING 2.1 (WPM) EXAMPLE APPLICATION AND INSTALLATION

## INSTALLATION OF DATA PART (OPTIONAL)

A data part can be installed on any tool (e.g. for using the mobile WPM app). It stores all the tool-specific data, as well as a list of all sensors that are found on the tool. Up to 128 sensors can be managed in one tool.

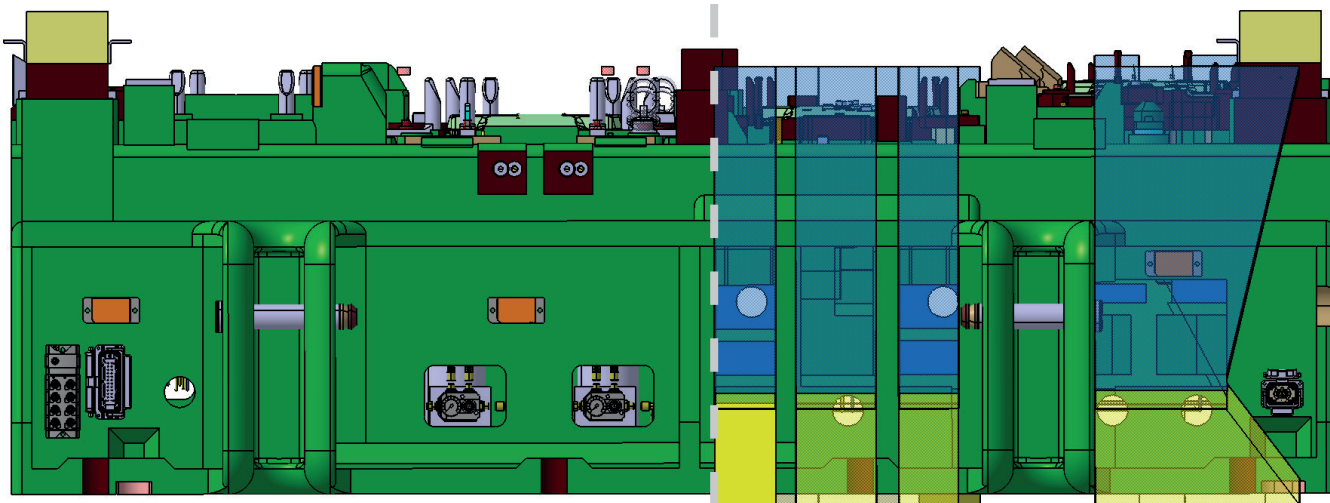
The attachment of the data part should ideally take place in the UT. The data part must be freely accessible to be able to press the query button (Check button) and tool change-over button (LOGIN button).



Possible installation position for data part



No free accessibility to the data part





## INSTALLATION OF WPM REPEATER

The WPM repeater collects the data from the sensors and data storage devices and forwards it to the WPM cloud software via WIFI or Ethernet. The software evaluates the data and initiates appropriate measures such as warning messages or power press stops.

In order to warranty continuous monitoring, the sensor signals must have good reception.

The repeater should, therefore, be placed so that there is a good wireless connection to the sensors in the tool.



The reception range of the repeater is between 25–50 m. The mounting of the repeater should be vertically. Wall mounting is therefore preferable to ceiling mounting. A power supply and possibly a network connection are required.

The best wireless coverage is achieved via a diagonally offset arrangement.

For monitoring the power press and for programming of the sensors, the repeater should be placed in the immediate vicinity of the tool (5–10 m).

### NOTE:

**Installation in the control equipment cabinet is not possible due to the shielding of the metal box!  
Do not mount the repeater inside the power press (not protected against splash water)!**





# DISTRIBUTORS

## Germany

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### PLZ 10000-19000

#### Außendienst Andreas Otto

Immenweg 3  
16356 Ahrensfelde OT Eiche  
M +49 170 739 00 64  
a.otto@fibro.de

### PLZ 20000-29000, 49000

#### Walter Ruff GmbH

Heerenholz 9  
28307 Bremen  
T +49 421 438 78-0  
F +49 421 438 78-22  
mail@praeziruff.de  
www.praeziruff.de

### PLZ 30000-31000, 37000-39000

#### Außendienst Stephan Hoffmann

Unter den Linden 22  
38667 Bad Harzburg  
M +49 171 971 90 05  
s.hoffmann@fibro.de

### PLZ 32000-34000, 48000-49000

#### Außendienst Partick Klee

Am Holleracker 1a  
35232 Dautphetal  
M +49 170 576 00 09  
p.klee@fibro.de

### PLZ 35000-36000, 57000, 60000-61000, 65000

#### Außendienst Ralf Feldmann

Wiesenstraße 23b  
58339 Breckerfeld  
M +49 151 12 59 01 59  
r.feldmann@fibro.de

### PLZ 42000, 44000-46000, 58000-59000

#### Außendienst Lars Jahncke

Flockertsberg 17  
42653 Solingen  
M +49 170 7637125  
l.jahncke@fibro.de

### PLZ 40000-42000, 47000, 50000-53000

#### Außendienst Hartwig Hennemann

Staubenthaler Höhe 79  
42369 Wuppertal  
M +49 175 29 659 30  
h.hennemann@fibro.de

### PLZ 63000-64000, 67000-69000, 76000-77000

#### Außendienst Markus Rössl

Johann-Strauß-Straße 16/1  
74906 Bad Rappenau  
M +49 160 97 25 23 93  
m.roessl@fibro.de

### PLZ 70000-73000, 88000-89000

#### Außendienst Meric Üven

Esslinger Straße 76  
70736 Fellbach  
M +49 170 5411416  
m.ueven@fibro.de

### PLZ 71000, 74000-75000, 97000

#### Außendienst Matthias Ehrenfried

Steigerwaldstraße 25  
74172 Neckarsulm  
M +49 171 864 95 52  
m.ehrenfried@fibro.de

### PLZ 72000, 77000-79000, 88000

#### Außendienst Matthias Jörg

In der Krautbündt 44  
77656 Offenburg-Zunsweier  
M +49 151 21 28 25 00  
m.joerg@fibro.de

### PLZ 80000-89000

#### Jugard + Künstner GmbH

Beta-Straße 10e  
85774 Unterföhring  
T +49 89 546 15 60  
F +49 89 580 27 96  
info@jk.de  
www.jugard-kuenstner.de

### PLZ 90000-97000

#### Jugard + Künstner GmbH

Weidentalstraße 45  
90518 Altdorf bei Nürnberg  
T +49 9187 936 69-0  
F +49 9187 936 69-90  
info@jk.de  
www.jugard-kuenstner.de

### PLZ 01000-09000, 98000-99000

#### Held Werkzeugmaschinen und Präzisionswerkzeug GmbH & Co.KG

Fasaneninsel 1  
07548 Gera  
T +49 365 824 91 0  
F +49 365 824 91 11  
info@held-wzm.de  
www.held-wzm.de

## International

### AR **ARCINCO Industrial Ltda.**

Rua Oneda, 935 - Planalto  
CEP 09895-280 - São Bernardo do  
Campo - SP  
T +55-11-3463.8855  
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Snezienkova 10228/12  
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M +421 905 32 94 56  
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