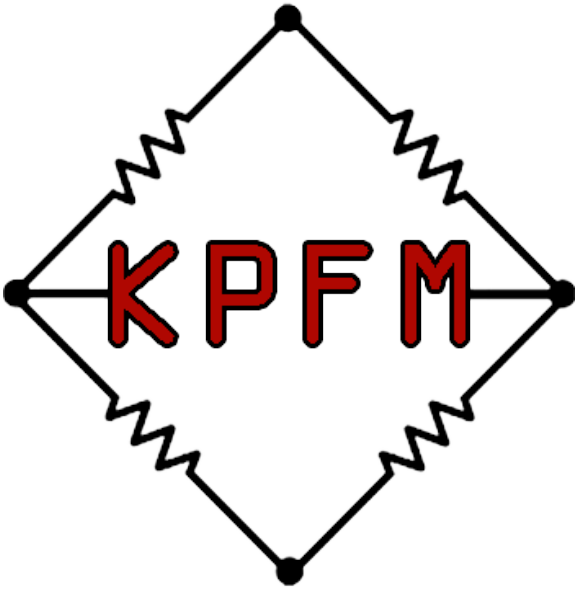


X2 & X4

PRESSURE GAUGE KITS

3000 series

USERS MANUAL

Updated 2024

Version 2.1

Operation and Maintenance Manual

Introduction

This series of gauges is designed for use on today's modern heavy equipment machinery. They are tough, water resistant, and easy to use. What makes these gauges better than conventional digital gauges is that they are wireless and can display pressure differentials as well as individual pressures.

The wireless function is accomplished with the use of a 915MHz RF module, which is powerful enough to be hundreds of meters away, even when the transmitter is locked in the pump compartment.

Safety Information

- Read all safety information before you use the Product.
- Carefully read all instructions.
- Do not alter the Product and use only as specified, or the protection supplied by the Product can be compromised.
- If the Product is exposed to over pressure or sudden physical shock (such as a drop), examine the Product for damage that can cause a safety concern. If necessary, return the Product to KPFM for evaluation.
- Always apply thread seal tape or liquid seal tape to the threads of the transducers and other fittings as required.
- Do not over torque the test port fittings. Check the fitting manufacture for the correct torque. Recommended torque for the transducers is 34 Nm or 25 ft lbs.

Hydraulic Pressure

- Fluids and gasses under pressure can cause serious injury or death.
- Use all appropriate PPE for the Fluids and pressures you are working with; including, but not limited to, gloves and safety glasses.
- Never connect or disconnect fittings under pressure.
- For directions on how to bleed down the pressure on component to be tested consult the appropriate manufactures manuals.
- Never check for Hydraulic leaks with your hands. High pressure can cut the skin or inject itself into the blood stream, causing injury or death.
- While the transducers are rated for 7,250 psi some test fittings are not. Check if the fittings you are using are appropriate for the pressures being tested.

Battery

- The battery door must be closed and secured before you using the Product.
- Replace the batteries when the low battery indicator shows to prevent unwanted shutdowns.
- To avoid leakage, remove the batteries if the unit is to be stored for extended periods of time or if stored in high temperature areas (over 50°C).
- Repair the Product before use if the battery leaks.
- Be sure that the battery polarity is correct to prevent battery leakage.

Component list

1. **Receiver/Display Unit**
2. **Transmitter Units**
3. **Pressure Transducers**
4. **Extension Cables**

1. Receiver/Display Unit

- The Receiver/Display unit receives pressures from the transmitter and displays them on a colour LCD screen.
- This unit also tracks the minimum, maximum, or will calculate the differential between the sets of readings (see button function section).
- The expected line of site range is about 100 meters.
- Each unit is paired with the transmitter that it was shipped with, and will not pick up the signals of other transmitters.
- The receiver will automatically shut down after 15 minutes if there is no connection to the transmitter or buttons pressed.

2. Transmitters Unit

- Each transmitter will read the pressures from 2 transducer at the same time and send the values to the receiver.
- Readings are taken every half second, converted to psi, and transmitted.
- The connecting cables are RF shielded and use a standard 4 pin M12 connector.
- The Transmitter will shut down after 40 minutes if there has been no signal from the receiver.

3. Transducers

- The standard transducers that are used are rated for 7,250 psi. Low pressure transducers are available and are -14.7 to 250 psi.
- Each gauge has been calibrated to the transducers shipped with it.
- If other transducers are used then we cannot guarantee the accuracy.
- The pressure chamber is made of 17 - 4PH stainless steel.
- Do not use these gauges on liquids or gasses that may react with this metal.
- Connectors used are M12 connectors.

4. Extension Cables

- Cables are made up of 4 element shielded wire.
- The cables are capable of withstanding cold temperatures and continuous flexing.
- Connectors used are M12 connectors.

Storage Cases

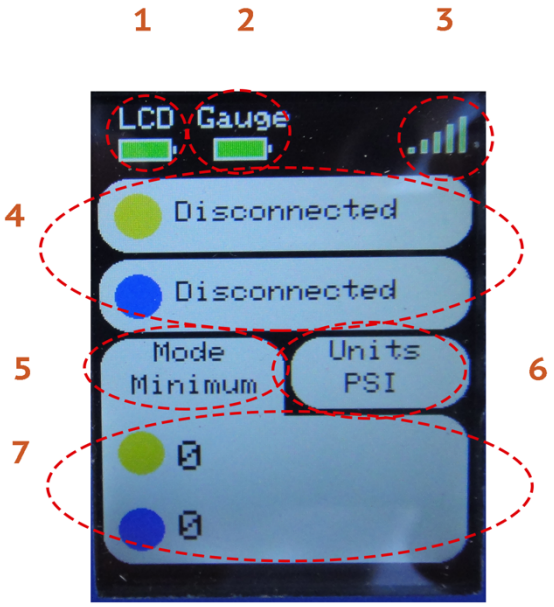
- Storage cases are provided to ensure the kit is field ready when it arrives.
- Smaller cases for the transducer are also provided to keep the oil that may be on the transducers away from the electronics.

Operation

Display

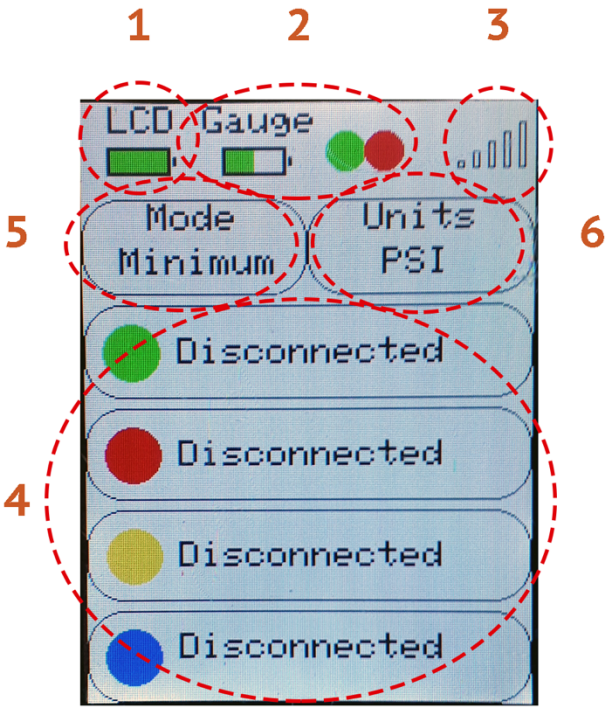
Display Button Functions:

- **Power:** Turns the unit power on or off. Hold for 2 seconds to power off.
- **Unit:** Changes the unit that the values are displayed in. The standard available units are psi, kg/cm2, kPa, Mpa and bar.
- **Zero:** Sets all values to zero and resets the Minimum and Maximum values as well.
- **Backlight:** Changes the backlight on the LCD screen between High, Medium and Low.
- **Mode:** Switches between Minimum, Maximum and Differential Modes.



X2 Kit Receiver Display:

- Battery level indicator for receiver unit
- Battery level indicator for transmitter unit
- Signal strength indicator
- Current readings
- Mode indicator area
- Current unit display
- Min/Max or differential display area



X4 Kit Receiver Display:

- Battery level indicator for the receiver unit
- Battery level indicator for the transmitter unit
- Signal strength indicator
- Current readings
- Mode indicator area
- Current unit display

Transmitter:

Transmitter LEDs:

- The Power button is LED back lit and comes on about 1 second after the button is pressed. This indicates that the CPU has started up and is working properly.
- The Transmit and Receive LEDs will flash once for each packet sent or received.

Set up and use

- When connecting and disconnecting components always depressurize the system first.
- Connect the transducers to the desired test points on the machine.
- Connect the transmitters to the matching transducer colour. Use the extension cables if required to reach the desired test points. Connectors on the cables and transducers are an M12 type. Align the index marks and insert the plug to the receptacle, then tighten the threaded collar lightly by hand.
- Turn on the power to the transmitter or transmitters.
- Turn on the power to the receiver.
- After the start up is done (about 3 seconds) the reading should be displayed.
- Zero the reading if required (see Button Function section).
- Start the machine and operate as required by the machine manufacturer for testing.
- All parts are calibrated to their kits and may not work properly or be accurate if swapped with parts from other kits.

Maintenance

Cleaning

- While the units have been designed to be tough and water resistant the best practice is to clean them with a damp rag and mild soap as required.
- If harsher chemicals are required test their compatibility in a small area first.
- Do not expose to water or cleaners when the battery compartment is open. The battery compartment is not sealed from the electronics on the inside.
- Allow the components to dry completely before returning them to the storage cases.

Storage

- Store in a dry place in the cases provided.
- Unit should be stored at temperatures between -30°C and +40°C.
- Storing at high or low temperatures will affect the batteries. Check with the manufacture of the batteries for their recommendations.
- If stored for long periods of time the batteries should be removed.

Changing batteries

- Only change the batteries in a clean and dry environment. The inside of the battery compartment is not sealed off from the electronics.
- Turn the unit over and remove the two screws visible on the small cover.
- Remove the old batteries by lifting up on one end. Use a pick if necessary.
- Install the new batteries as per the diagram etched into the battery compartment.
- This procedure is the same for both the transmitter units and the receiver; however, the transmitters use 3 AAA batteries and the receiver uses 3 AA batteries.

Calibration requirements

- These gauges are subject to drift over time as are all gauges.
- The maximum expected drift is +-0.25% per year.
- The frequency for re-calibration varies with the application and the user's requirements.
- KPFM's preference is to have the gauges re-calibrated every three years.
- NIST traceable testing and setup can be done on request for an additional charge.

Gauge Specifications

Micro-controllers

- Atmel ATMega328P
- Max. Operating Freq. (MHz): 20 MHz
- 16 bit, 4 channel analog to digital convertor

RF module

- Hope RFM69HCW
- RF output: 100 mW power output at 915 MHz
- Sample rate: 7 readings every 1/2 second

LCD

- TFT colour display: 320 x 240 resolution
- Transducers: 0 - 7,250 psi +-.25%
- Battery life: about 13 Hrs at 20°C

Transducers

- ±0.25% Accuracy
- -40°C to +125°C Operating temperature
- Temperature compensated -20°C to +85°C
- 17 - 4PH Stainless steel diaphragm and housing

Size

- Receiver 210 x 100 x 32mm
- Transmitter 147 x 89 x 24mm

Weight

- Receiver 285g
- Transmitter 210g
- Total kit weight including fittings and batteries for the
    - X2 Kit is 3.6kg
    - X4 Kit is 5.5KG

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