

# USER MANUAL

## MI 411 Free & Total Chlorine and pH Meter



Dear Customer,  
Thank you for choosing a Milwaukee product. This manual will provide you with the necessary information for the correct use of the instrument. Please read it carefully before using the meter. This instrument is in compliance with  directives.

### **SPECIFICATIONS:**

#### **Free & Total Chlorine**

**Range** 0.00 to 5.00 mg/L Cl<sub>2</sub>  
**Resolution** 0.01 mg/L (0.00-3.50 mg/L);  
0.10 mg/L (above 3.50 mg/L)  
**Precision Method** ±0.06 mg/L @ 1.50 mg/L  
Adaptation of the USEPA method 330.5 and Standard Method 4500-Cl G.

#### **pH**

**Range** 6.5 to 8.0 pH  
**Resolution** 0.1 pH  
**Precision Method** ±0.1 pH @ 7.2 pH  
Adaptation of the phenol red method.

#### **Other**

**Light Source** Tungsten lamp  
**Light Detector** Silicon Photocell and 525 nm narrow band interference filter

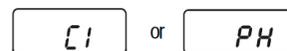
**Environment** 0 to 50°C (32 to 122°F);  
100% RH max.

**Battery Type** 1 x 9 volt  
**Auto-Shut off** After 10' of non-use  
**Dimensions** 192 x 104 x 52 mm  
(7.5 x 4.1 x 2")  
**Weight** 380 g

### **CHANGE PARAMETER**

To change parameter between

Free & Total Chlorine and pH, press and hold for 3 seconds, the ZERO key. The selected parameter will be displayed as "Cl" (chlorine) or "PH" on the display.



### **MEASUREMENT PROCEDURE:**

- 1• Turn the meter on by pressing ON/OFF. The last selected parameter is displayed on the Liquid Crystal Display ("Cl" or "PH").
- 2• Choose the parameter that you want to measure.
- 3• Fill the cuvet with 10 mL of unreacted sample, up to the mark, and replace the cap.
- 4• Place the cuvet into the

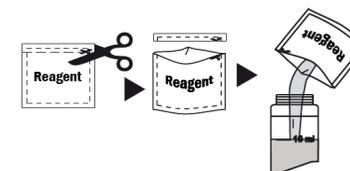


holder and ensure that the notch on the cap is positioned securely into the groove.

- 5• Press ZERO and "SIP" will blink on the display.
- 6• After a few seconds the display will show "-0.0-". The meter is now zeroed and ready for measurement.



- 7• Remove the cuvet. Open it.
- 8• Add the content of one packet of reagent.



Use

MI526-100 for free chlorine or  
MI524-100 for total chlorine

- 9• Replace the cap and swirl gently for 20 seconds. Reinsert the cuvet into the holder and ensure that the notch on the cap is positioned securely into the groove.



- 10• Wait 1 minute for free chlorine or 2,5 minutes for total chlorine and press READ. In both cases “SIP” will blink during measurement.
- 11• The instrument directly displays concentration in mg/L of free or total chlorine.

**Interferences:**

- Bromine (positive error)
- Chlorine dioxide (positive error)
- Iodine (positive error)
- Oxidized Manganese (positive error)
- Chromium (positive error)
- Ozone (positive error)

For pH measurement

- 12• Fill a cuvet with 10 mL of unreacted sample up to the mark.
- 13• Add 5 drops of pH-0 reagent. Replace the cap and shake gently.
- 14• Insert the cuvet into the holder and ensure that the notch of the cap is positioned securely into the groove.
- 15• Press READ and “SIP” will blink during measurement.
- 16• The instrument directly display the pH value.

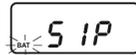


GUIDE TO DISPLAY CODES:

This prompt appears for 1 second each time the instrument is turned on.



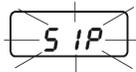
Sampling In Progress. Flashing “SIP” prompt appears each time the meter is performing a measurement.



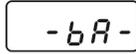
“-0.0-”, the meter is in a zeroed state and measurement can be performed.



The blinking “BAT” indicates that the battery voltage is getting low and the battery needs to be replaced.



“-bA-”, the battery is dead and must be replaced. Once this indication is displayed, the meter will lock up. Change the battery and restart the meter.



“Conf”, the meter has lost its configuration. Contact your dealer or Milwaukee Instruments.



ERROR MESSAGES

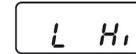
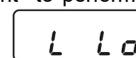
**On zero reading**

- Blinking “-0.0-” indicates that the zeroing procedure failed due to a low signal-to-noise ratio. In this case press ZERO again.
- “no L”, the instrument



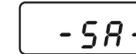
cannot adjust the light level. Please check that the sample does not contain any debris.

- “L Lo”, there is not enough light to perform a measurement. Please check the preparation of the zero cuvet.
- “L Hi”, there is too much light to perform a measurement. Please check the preparation of the zero cuvet.



**On sample reading**

- “-SA-”, there is too much light for the sample measurement. Please check if the right sample cuvet is inserted.
- “Inv”, the sample and the zero cuvet are inverted.
- “ZEro”, a zero reading was not taken. Follow the instruction in the measurement procedure for zeroing the meter.
- Under range. A blinking “0.00” indicates that the sample absorbs less light than the zero reference. Check the procedure and make sure you use the same cuvet for reference (zero) and measurement.
- A flashing value of the maximum concentration indicates an over range condition. The concentration of the sample is beyond the programmed range: dilute the sample and re-run the test.



**BATTERY REPLACEMENT**

Battery replacement must only take place in a non-hazardous environment. Simply rotate the battery cover on the back of the meter. Detach the battery from the terminals and attach a fresh 9V battery while paying attention to the correct polarity. Insert the battery and replace the cover.



ACCESSORIES:

- MI526-100 for free chlorine (100 tests)
- MI524-100 for total chlorine (100 tests)
- MI509-100 pH reagent (100 tests)
- MI511-100 Free & Total Chlorine and pH reagent set (100 tests)
- MI0001 Glass cuvetts (2 pcs)
- MI0002 Caps for cuvetts (2 pcs)
- MI0003 Stoppers for cuvetts (2 pcs)
- MI0004 Tissue for wiping cuvetts (4 pcs)
- MI0005 9V battery (1 pc)

WARRANTY

*This instrument is warranted against defects in materials and manufacturing for a period of two years from the date of purchase.*

*If during this period the repair or replacement of parts is required, where the damage is not due to negligence or erroneous operation by the user, please return the meter to either distributor or our office in the original packing and the repair will be free of charge.*

*Damages due to accidents, misuse, tampering or lack of prescribed maintenance are not covered.*