



Calibrating the 20 Series and Model U-10 Multiparameter Meters **AUTO Calibration Procedure**

AUTO Calibration Procedure

1. Fill the calibration beaker to the marked line on the calibration cup with pH 4 buffer solution (Horiba 100-4).
2. Immerse the sensor into the beaker and allow the sensors to stabilize in the solution for approximately one minute. For the 20 Series meters press the "CAL" key. For the U-10, press the "MODE" key to highlight AUTO.
3. For the 20 Series "AUTO" and "CAL" are displayed at the top of the screen. "MAINT" is displayed on the U-10.
4. For both models, press the "ENT" key. The 20 Series meter will display DATA IN flashing. Do not remove the sensor from the solution until it stops flashing. You will also view each parameter flashing as the auto calibration is taking place. The parameter flashing stops as each parameter is calibrated. If one of the parameters continues to flash for 3 minutes, an error code will appear. A manual calibration should be performed for that parameter. END will be displayed on the U-10 once the calibration is complete. A manual calibration should be performed for the U-10 parameter that continues to flash as well.
5. For the 20 Series, press the "MEAS" key to return to the main screen and measure samples. Press the "MODE" key on the U-10 until pH is highlighted to return to the measurement mode. "MEAS" will be displayed in the measurement mode for the U-10.

MANUAL Calibration Procedure

You will press the "CAL" key for the 20 Series. For the U-10, you will press the "MODE" key. Pay attention to the display on the 20 Series meters to confirm that either MAN ZERO or MAN SPAN are displayed while you are performing the zero and span calibrations. Check the U-10 screen, either ZERO or SPAN are highlighted while performing these calibrations. Zero and span calibration solutions are offered by Horiba or you may use any vendor's solutions (prepare your standards; procedures provided in the manual calibration section of the manual). If you are using other vendor's solutions, be sure to enter the standard value printed on the label. Chemicals required to prepare calibration solutions yourself are offered by scientific catalog companies like Cole Parmer and Fisher Scientific.

Temperature Calibration:

1. For both instruments, scroll to highlight the temperature parameter. Press "CAL" (U-20) or "MODE" (U-10) 3 times to get into SPAN calibration. Immerse the sensor in water. Use a NIST traceable thermometer to determine the known temperature.
2. Use the "UP/DOWN" arrow keys to set the value at the known temperature and press the "ENT" key. Wait for TEMP to stop flashing.

Conductivity Calibration: Zero calibration is performed in air, span calibrations can be performed for 1-3 calibrations points using conductivity standards.

1. Highlight COND while in the measurement mode. Press the "CAL" key or "MODE" key twice to get into zero calibration mode. The sensor should be in air (no solution required). Use the "UP/DOWN" keys to adjust the value to zero and press the "ENT" key. Wait for flashing to stop.
2. Press the "CAL" key or "MODE" key once to get into the span calibration mode. Immerse the sensor in the conductivity calibration solution and allow approximately one minute to stabilize. Both instruments allow for 1-3 span calibration points. If your sample measurements vary drastically, calibrate all 3 ranges. If your samples are similar in value, pick a standard with a value that is close to your sample values. Use the "UP/DOWN" keys to display the standard value and press the "ENT" key. Wait for DATA IN or COND display to stop flashing.

(Horiba Conductivity Solutions 500ml volume: (Range 3 0.718 mS/cm p/n 201045-5), (Range 2 6.67 mS/cm p/n 201045-6), (Range 1 58.7 mS/cm p/n 201045-7))

Perform the pH calibration, turbidity calibration and dissolved oxygen zero and span calibrations in the same manner as the conductivity calibration. Always allow some time for the sensors to stabilize in the calibration solution before inputting data using the "ENT" key.

pH Calibration: zero calibration is performed using pH 7 buffer solution, span calibration is performed using either pH 4 or pH 9 buffer solutions

(Horiba pH solutions 500ml volume: pH 6.86 p/n 350624, pH 4.01 p/n 350623 (the 100-4 auto calibration solution), pH 9.18 p/n 362172)

Turbidity Calibration: zero calibration is performed using distilled water or pH 4 buffer, span calibration is performed with a span calibration solution that is best for your application. Ex: sample is always 5 NTU, calibrate at zero and span with 10 NTU standard solution or sample is always 400 NTU, calibrate the span with an 800 NTU standard

(Horiba Turbidity solutions 500ml volume: 100 NTU p/n 201045-3, 800 NTU p/n 201045-4)

Dissolved Oxygen Calibration: Zero calibration is performed using a sodium sulfite solution, span calibration is performed in air saturated water (if not available, span in air)

When performing the span calibration in air saturated water: shut-off the air bubbling through the water, allow readings to stabilize before pressing the "ENT" key

(Horiba Dissolved Oxygen chemical: part number 201045-2. This is a bottle with 25 grams of sodium sulfite in a graduated bottle. The user must fill the bottle with distilled water and mix to use for zero calibrations. This solution has a limited shelf life after water has been added to the sodium sulfite)

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There are two types of calibrations, an "AUTO" calibration and a "MANUAL" calibration. For routine operation, the AUTO calibration will provide sufficient accuracy. The MANUAL calibration should be performed when a higher degree of accuracy is required or if calibration error codes are appearing on the display. If MANUAL calibrations are being performed on the 20 Series instruments when error codes appear, it is advisable to delete the calibration data prior to calibration. This is accomplished by highlighting the measurement parameter and pressing the "CAL" and "SET" keys simultaneously.

	Auto Cal Value	What happens when "Auto Cal" is performed after manual two point calibration	Recommendation
pH	4.01 pH	2 point calibrations are possible with the U-20 and U-10. When manual calibrations are performed with pH4 (span) and pH7 (zero), "Auto Cal" will "update" the pH4 calibration. When manual calibrations are performed with pH9 (span) and PH7 (zero) for high pH sample measurement, "Auto Cal" will delete pH9 calibration and over write with pH4 calibration. In both cases, manual calibration for pH7 remains.	When you know the sample is Alkaline (pH>7), do not perform Auto Cal after your pH7 and pH9 manual calibration.
Conductivity	0.449 S/m <i>Will vary slightly due to the temperature of the solution</i>	The mid-range span value of manual conductivity calibration is 0.667 S/m. Auto-cal will over write this mid-range span value with 0.449 S/m. It will also automatically calculate the deviation against the previous calibration from the mid-range and adjust the lowest span calibration (71.8 mS/m) and highest (5.87 S/m) ranges. Manual calibration for zero will remain the same.	"Auto Cal" will reflect the calibration at the mid-range value. The user should understand that better accuracy can be obtained with a manual calibration using a standard solution with value close to the expected sample value.
Turbidity	0 NTU	It will over write the zero calibration from the manual calibration. Span calibration will remain the same.	For both manual and "Auto-Cal" make sure the containers for the standards are clean and are free of contamination. When the standard is contaminated it will affect the lower turbidity value.
DO	8.52 mg/L	It will over write the span calibration from the manual calibration from 8.11 to 8.52. Zero calibration remains.	
Depth	0 m	It will over write the 0m.	