

Specifications of parameters for multi-parametric probes WMP4 e WMP6

	Range	Accuracy	Resolution
LEVEL	0.000/20.000 m	+/- 0.025 m	0.002 m
LEVEL	0.00/350.00 m	+/- 0.35 m	0.035 m
LEVEL vented	0.000/20.000 m	+/- 0.010 m	0.002 m
TEMPERATURE	-5.00/55.00 °C	+/- 0.15 °C	0.005 °C
CONDUCTIVITY	0.000/6.000 mS	+/- 0.25 % of reading	0.0006 mS
	0.000/60.000 mS	+/- 0.25 % of reading	0.006 mS
pH	-2.000/+16.000 pH	+/- 0.250 pH	0.002 pH
REDOX	-1000.0/+1000.0 mV	+/- 25.0 mV	0.1 mV
D. OXYGEN	0.000/20.000 ppm	+/- 0.100 ppm	0.001 ppm
TURBIDITY	0.0/4000.0 NTU	+/- 5 % of read. or 0.5 NTU whichever greater	0.1 NTU

Note: For turbidity the measure method is: Nephelometric

ACCURACY (READING ACCURACY) of ELECTROCHEMICAL INSTRUMENTS

Premise

The electrochemical analyzers of physical quantities for the control and the quality monitoring of the natural waters and in industrial process in general, are almost always composed of two distinct parts:

- electrochemical sensor in contact with the media to be measured
- electronic display unit - transmission - regulation

In order to be able to define and quantify a "precision", not only the specific accuracy of the individual components must be taken into account, but also their conditions of use and maintenance, with particular reference to the sensors that are certainly the most critical elements of the whole system, as we will see here ahead.

Electronic resolution

This feature, sometimes confused with the actual accuracy, defines the ability of the electronic unit and its display or of the only "blind" transmitter to "solve" the measured data.

Almost always coincides with "+/- 1 digit" that is, for example, +/- 0.01 pH or +/- 0.01 ppm etc. etc. depending on the reading scale in question.

Electronic Accuracy

This data is quite meaningless, it is often not declared precisely because it is almost always better than that of the respective electrochemical sensors (in our case the Datalogger gas 24 bit of inputs accuracy): they will therefore be the electrodes, the pornographic cells, toroidal sensors, etc. to determine and influence the total accuracy of the measurements performed.

Conditions of use and calibration

Probes are manufactured under controlled calibration process and methods called "standard solutions" (example , pH, Conductivity, Redox) or on "Comparison methods" such as laboratory analysis, portable photometers (example, dissolved oxygen, the residual chlorine, etc.)

Generally, when the "standards" are used (example, the pH or Redox solutions) at the end of a correct calibration operation, the whole sensor-instrument unit achieves the same precision as declared for the "standard solution".

However, this data can become worse soon, depending on various and well-known external factors, such as the dirty, the electrodes deterioration, the modification of their characteristics over time, etc. As it is

known, even one of the most qualified "accurate" analyzers can provide very poor accuracy if mishandled, not properly used, with poor maintenance, too sporadic calibrations, etc..

Influence of Temperature Variations

This parameter, if not considered, can negatively affect the overall accuracy of the system: it must be taken into account both when selecting the Analyzers and during the actual calibration operations, referring to the instructions of the Manufacturer on the Instruction Manuals.

Conclusions

As far as our instrumentation is concerned, it can be established that they are able to provide measurements with an accuracy better than +/- 1% of the respective full scale, provided that they are used correctly, with calibrations performed frequently according to the type of process and to the type/quality of sensor used, operating at known temperature range.

PROBES WITHOUT COMPENSATION TUBE (model WMP6-DL and WMP6p):

HOW to MAKE THE COMPENSATION WITH ATMOSPHERIC PRESSURE

L_r = real level in cm

L_m = measured level from probe in cm

P₀ = Zero pressure value in hPa

P_{atm} = Atmospheric pressure value in hPa

standard air 1 hPa = 1.013cm and 1cm = 0.98hPa

In factory the probe is closed with a zero pressure (P₀) that can be easily calculated maintaining the probe in air (corresponding at the hydrometric zero value) and taking note of the measure in cm L_m in out-coming from the probe (it is enough to do this only one time, just before to put the probe into the water):

Zero pressure calculation:

$$P_0 \text{ [hPa]} = (P_{atm} * 1.013 + L_m[\text{cm}]) / 1.013$$

At this point, if the atmospheric pressure measurement is available (local barometer for example), it is possible to self-correct the measurement of the probe by returning it to the real measurement in the following way:

Level correction with atmospheric pressure:

$$L_r [\text{cm}] = (P_{\text{atm}} - P_0) * 1.013 + L_m [\text{cm}]$$

Offset correction without compensating the probe (operation not necessary if the probe is compensated according to the procedure described above):

If the correction is not possible or not necessary, it is always necessary to make at least the zero for this type of probe (probe without automatic compensation) before immersing it in water.

It is sufficient to read the measurement of the probe in the air, in the campaign plan place of installation and consider it as **Offset** to be removed (if positive) or add (if negative) to the value measured by the probe according to:

$$L_v = L_m \pm \text{Offset}$$