



INSTRUCTION MANUAL

VIBRATING WIRE WATER LEVEL SENSOR

Model NIVOLIC WL

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This product should be installed and operated only by qualified personnel. Its misuse is potentially dangerous. The Company makes no warranty as to the information furnished in this manual and assumes no liability for damages resulting from the installation or use of this product. The information herein is subject to change without notification.

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1 PRODUCT

1.1 INTRODUCTION

The NIVOLIC WL vibrating wire hydraulic level sensor is designed to detect changes of elevation of water levels. It consists of reservoir in which a mass is suspended to a vibrating wire transducer. Changes in elevation of the water level in the reservoir modify the buoyancy force acting on the mass, thus modifying the resonant frequency of the vibration wire.

1.2 DESCRIPTION

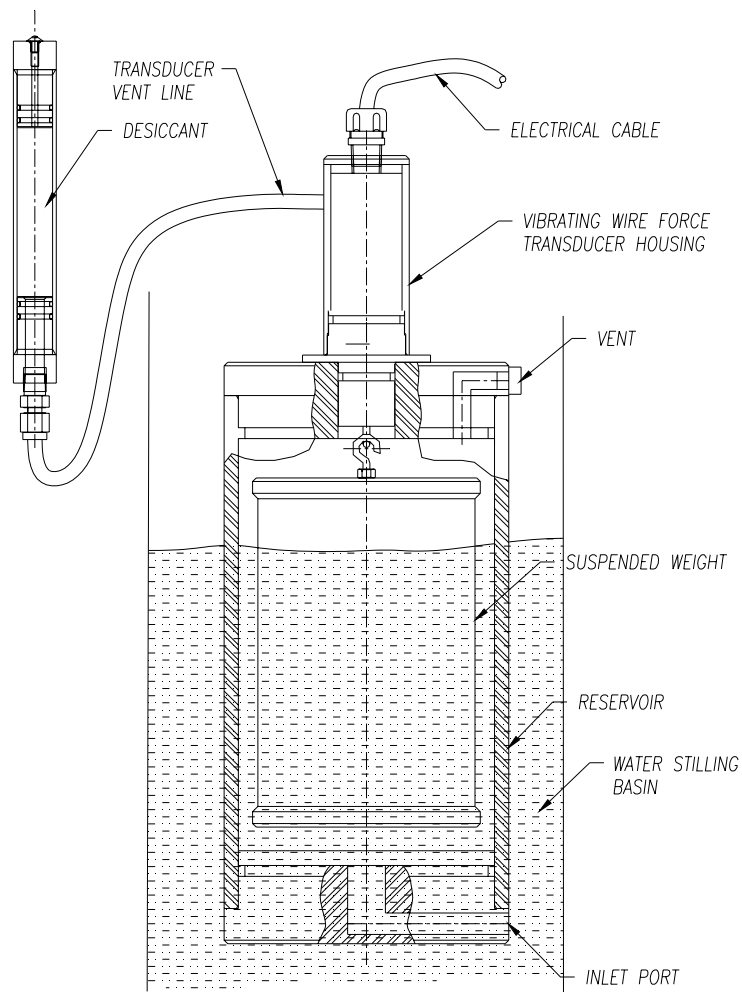


Figure 1: Schematic representation of the NIVOLIC WL

2 INSTALLATION

Upon reception of the NIVOLIC WL, the user will notice that the mass and the top cover are packed separately. They have to be put back in place inside of the NIVOLIC WL prior installation. To do so, the user must attach the mass to the top cover very cautiously. The mass should not be pulled or pushed when attaching it to the cover; when the mass is attached to the cover, the latter may be slide in the acrylic tube and screwed on it. Do not screw too tightly the cover; this could result in cracking the tube. **The user must be careful while suspending the mass to prevent damaging the vibrating wire transducer. This one has a limited capacity and can be destroyed by rough or careless handling.**

The NIVOLIC WL should be installed in a manner that the water level coincides with the middle of the suspended mass. This configuration enables the NIVOLIC WL to monitor water level fluctuations around its mid-range. Alternatively, the NIVOLIC WL may be installed in a way that the water level coincides with the base of the suspended mass. This configuration will allow the NIVOLIC WL to monitor only a raise of the water level on the full range of the instrument.

A desiccant tube is connected to the vent line of the NIVOLIC WL. When it turns from blue to pink, it means that it has absorbed its maximum capacity of humidity, which means that it must be changed to ensure good protection of the sensor.

Technical support is available from the manufacturer.

3 CALIBRATION DATA AND READINGS

3.1 CALIBRATION

All sensors are individually calibrated and delivered with their specific calibration factor on a calibration data sheet.

3.2 INITIAL READINGS

The initial readings at atmospheric pressure and ambient ground temperature are obtained on the site.

3.3 READOUT PROCEDURE

To take a reading, follow the instructions contained in the MB-6T instruction manual.

3.4 WATER LEVEL EQUATIONS (WITH THE MB-6T/6TL READOUT)

a) LINEAR readings

The MB-6T/6TL LINEAR or frequency readings are converted to water level using the equations below. They must be obtained with the GAUGE TYPE selector switch in the correct position on the MB-6T/6TL readout (position # 2).

The NIVOLIC WL is supplied with a temperature correction factor, which is used to correct the reading for significant variations in temperature.

To convert changes in LINEAR or frequency readings to changes in water level corrected for temperature changes, use the following equations:

SI units (kPa)

$$\Delta H = CF (L_1 - L_0) - CT (T_1 - T_0) \quad (1)$$

$$\Delta H = CK (F_1^2 - F_0^2) - CT (T_1 - T_0) \quad (2)$$

where:

- ΔH = Change in water level in mm
- CF = Calibration factor in mm per LINEAR unit
- L_0, L_1 = Initial (at installation) and current LINEAR readings
- CT = Temperature correction factor from Calibration Data Sheet in mm/°C
- F_0, F_1 = Initial (at installation) and current frequency readings

Example :

- CF = - 0.42862 mm/LINEAR unit
- L_0 = 3500 LINEAR units
- L_1 = 3400 LINEAR units
- CT = 0.2474 mm/°C
- T_0 = 10°C
- T_1 = 4.4°C
- ΔH = - 0.42862 (3400 - 3500) - 0.2474 (4.4 - 10)
- ΔH = 42.862 + 1.38544 = 44.3 mm

Imperial units (inch)

$$\Delta H = CF(L_1 - L_0) - CT(T_1 - T_0) \quad (3)$$

$$\Delta H = CK(F_1^2 - F_0^2) - CT(T_1 - T_0) \quad (4)$$

Where:

- ΔH = Change in water level in inch
- CF = Calibration factor in inch per LINEAR unit
- L_0, L_1 = Initial (at installation) and current LINEAR readings
- CT = Temperature correction factor from Calibration Data Sheet in inch/°F
- T_0, T_1 = Initial (at installation) and current temperature readings (°F)
- CK = Calibration factor in inch per Hz²
- F_0, F_1 = Initial (at installation) and current frequency readings

b) Frequency readings (F)

To convert Frequency readings into Linear units, the user must use the following equation:

$$L = K \left(\frac{F^2}{1000} \right) \quad (5)$$

where: L = LINEAR reading in LINEAR units
 K = Gage constant for all transducers = 1.0
 F = Reading in the frequency mode in Hz.

Example: $F = 1739$ Hz

$$L = \frac{1.0 \times 1739^2}{(1000)} = 3024.1 \text{ LINEAR units}$$

3.5 TEMPERATURE READING

To obtain a temperature reading, move the MB-6T(L) THERMISTOR selector to position B (3K).

Although the MB-6T(L) readout box gives directly the correct value of temperature (in °C and in °F) (with the thermistor selector on position B), temperature can be read with an ohmmeter.

To convert the resistance value into temperature reading, please refer to the instruction manual of the TH-T gage.

4 CONVERSION FACTORS

	To Convert From	To	Multiply By
LENGTH	Microns	Inches	3.94E-05
	Millimetres	Inches	0.0394
	Meters	Feet	3.2808
AREA	Square millimetres	Square inches	0.0016
	Square meters	Square feet	10.7643
VOLUME	Cubic centimetres	Cubic inches	0.06101
	Cubic meters	Cubic feet	35.3357
	Litres	U.S. gallon	0.26420
	Litres	Can-Br gallon	0.21997
MASS	Kilograms	Pounds	2.20459
	Kilograms	Short tons	0.00110
	Kilograms	Long tons	0.00098
FORCE	Newtons	Pounds-force	0.22482
	Newtons	Kilograms-force	0.10197
	Newtons	Kips	0.00023
PRESSURE AND STRESS	Kilopascals	Psi	0.14503
	Bars	Psi	14.4928
	Inches head of water*	Psi	0.03606
	Inches head of Hg	Psi	0.49116
	Pascal	Newton / square meter	1
	Kilopascals	Atmospheres	0.00987
	Kilopascals	Bars	0.01
Kilopascals	Meters head of water*	0.10197	
TEMPERATURE	Temp. in °F = (1.8 x Temp. in °C) + 32 Temp. in °C = (Temp. in °F - 32) / 1.8		

*at 4 °C

E6TabConv-990505

Table 1: Conversion factors