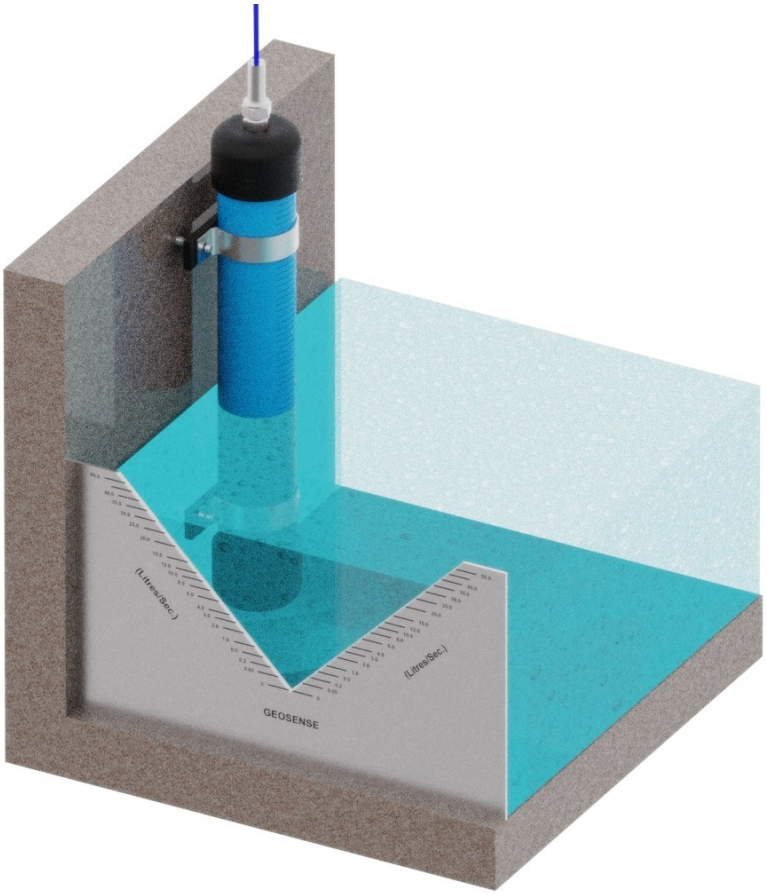
INSTRUCTION MANUAL

VW WEIR MONITOR
VWM-2000



GEOSENSE

UK CA CE

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1. VERSION CONTROL

Version	Date	Author	Approved	Issued
V1.0	Aug 2026	TB	TC	GC

2. INTRODUCTION

This manual is intended for all users of **Geosense® Vibrating Wire Weir Monitors** manufactured by Geosense and provides information on their installation, operation and maintenance.



It is VITAL that personnel responsible for the installation and use of the Weir Monitors READ and UNDERSTAND the manual, prior to working with the equipment.



2.1. General Description

The **Geosense® Vibrating Wire Weir Monitor** is a precision instrument designed for measuring water level to a very high accuracy.

The **Geosense® Vibrating Wire Weir Monitor (VWM-2000)** utilises a vented vibrating wire force transducer in combination with a cylindrical mass suspended from it to monitor water levels.

The vibrating wire force transducer is vented to atmosphere so that any atmospheric changes are automatically compensated.

Both are contained within a PVC slotted pipe which can be located within the weir channel or tank as necessary, and the vent tube is terminated within a moisture trap. Periodic change of the desiccant in the moisture trap is required.

The cylindrical mass is partially suspended in the water level being monitored and as the water level changes the force on the transducer by the cylinder alters which in turn alters the tension of the vibrating wire.

As with all vibrating wire sensors the output is frequency and therefore not affected by changes of cable resistance so that extremely long cable lengths are possible. Typical installation in combination with a V-notch weir are shown in Figure 1 below.

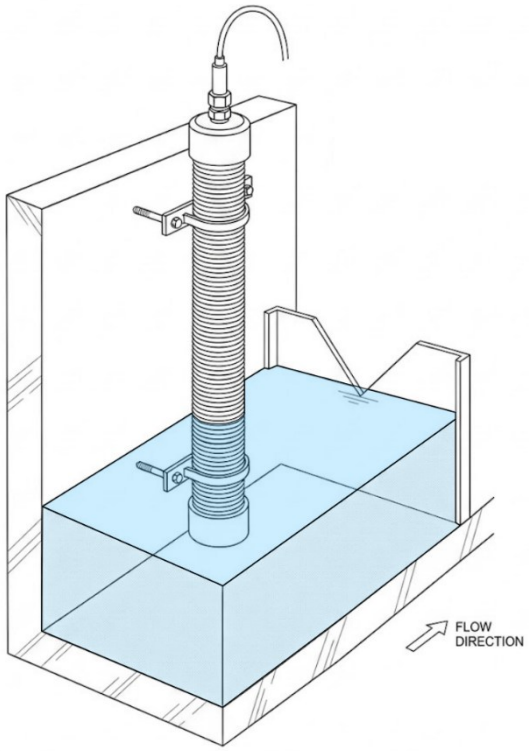


Figure 1: Schematic of a traditional layout of a weir monitor in combination with a V-notch plate for flow measurement in a channel.

2.1.1. System Components

The unit consists of the following component parts (Figure 2):

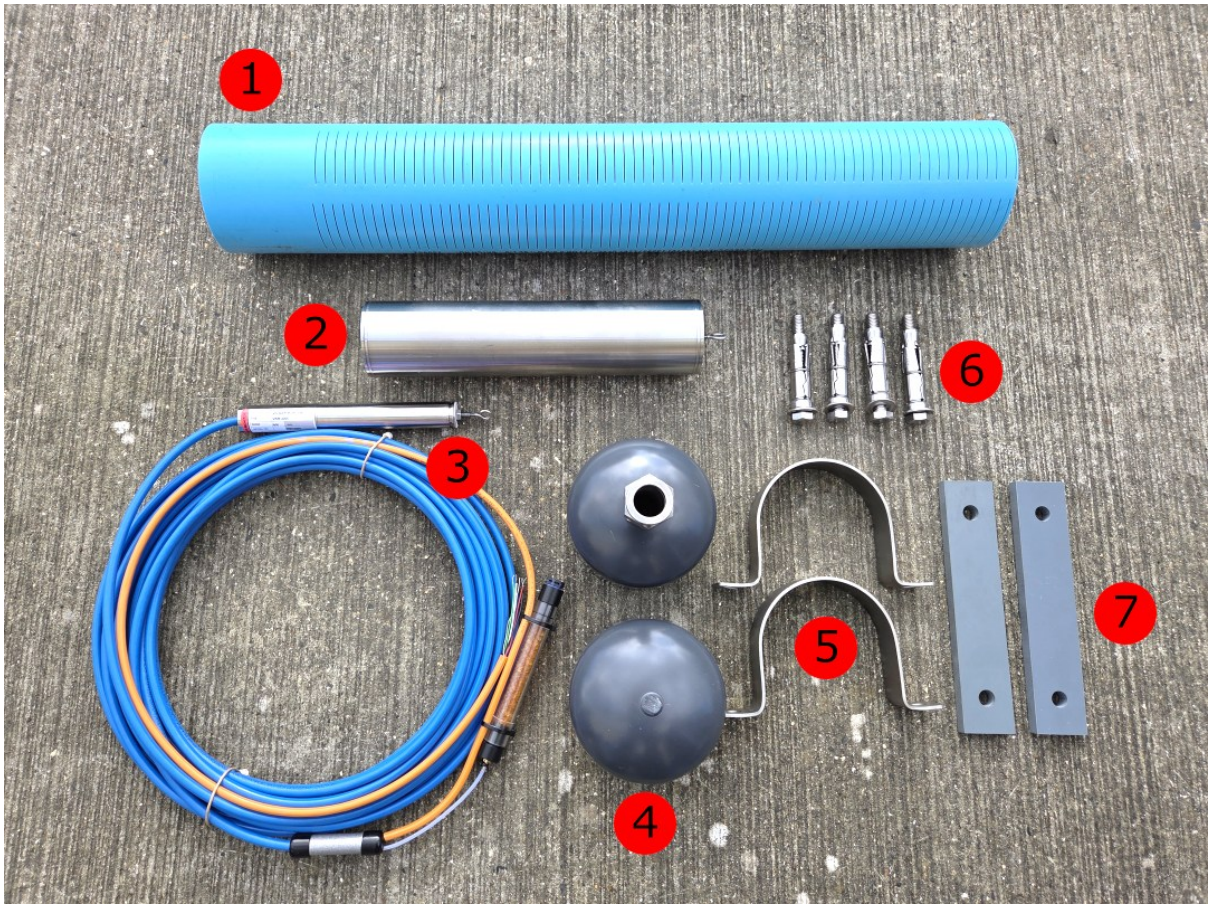


Figure 2: Components of the weir monitor

1) Slotted pipe (often referred to as a stilling well) to allow water to fill the inner space whilst minimising turbulent flow.

2) Displacement mass.

3) VW force transducer with attached cable and vent tube.

4) Top and bottom covers for the slotted pipe.

5) Brackets for securing slotted pipe to wall of the channel.

6) Expanding bolts.

7) Saddle mounts to stand slotted pipe off channel wall.

2.2. Theory of Operation

The force transducer consists of a tensioned steel wire anchored at both ends into flanges. The wire is enclosed in a stainless-steel tube.

Electromagnetic coils are located within the body close to the axis of the wire. When a brief voltage excitation, or swept frequency excitation is applied to the coils, a magnetic field is induced causing the wire to oscillate at its resonant frequency. The wire continues to oscillate for a short period through the 'field' of the permanent magnet, thus generating an alternating current (sinusoidal) output. The frequency of this current output is detected and processed by a vibrating wire readout unit, or by a data logger equipped with a vibrating wire interface, where it can be converted into Engineering units of mm.

Forces within the transducer are altered by the amount of force that is being exerted from the suspended mass which causes the length of the transducer to change. This causes a change in the tension of the wire within the transducer. It is the tension in the wire that produces the value that can be converted to engineering units.

A change in length of the wire changes the tension of the wire which results in a change in resonant frequency of oscillation of the wire. The change in the square of frequency of oscillation is directly proportional to the change in strain in the structural element.

For further information see section 10.

3. VARIANTS

There are two main variants of the VWM-2000, these are listed below.

- 300mm displacement mass
- 600mm displacement mass

Mounting hardware will change slightly between the two variants to accommodate the difference in length between the models.

4. WIRING CONFIGURATIONS

Geosense® Vibrating Wire Weir Monitors with standard cable options all follow the same uniform colour code for simplicity.

In some cases, custom armoured or multi-point cable may differ in colour coding. If this is the case, the calibration sheet will contain the bespoke colour coding for the cable to enable the user to correctly wire the sensors to any datalogger required.

Table 1: Wiring configurations

Wire Function	Colour	Sensor Output
VW+	Red	Frequency
VW-	Black	
Thermistor +	Green	Resistance
Thermistor -	White	
Shield	Bare metal wire	N/A

5. CONFORMITY

CE

EU Declaration of Conformity

We

Geosense Ltd
Nova House, Rougham Industrial Estate, Bury St Edmunds, IP30 9ND, United Kingdom

declare under our sole responsibility that the product:

Equipment description: Vibrating Wire Weir Monitor

Model Numbers(s):
VWM-2000

to which this declaration relates are in conformity with all the essential requirements of the Restriction on the use of certain Hazardous Substances **2011/65/EU**

The following harmonised standards have been applied with respect to this product:

EN IEC 63000:2018

Authorised Person

Tim Clegg
Director

Date: 13/05/2024
Location: Bury St Edmunds, UK.

DoC-05001-CE

UK Declaration of Conformity

Geosense Ltd
Nova House, Rougham Industrial Estate, Bury St Edmunds, IP30 9ND, United Kingdom

This declaration is issued under the sole responsibility of the manufacturer:

Equipment description: Vibrating Wire Weir Monitor

Model Numbers(s):
VWM-2000

The object of the declaration described above is in conformity with the following statutory requirements:

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations	SI 2012 No. 3032

References to designated standards/specifications in relation to which conformity is declared:

EN IEC 63000:2018

Signed for and on behalf of Geosense Ltd

Tim Clegg
Director

Date: 13/05/2024
Location: Bury St Edmunds, UK.

DoC-05001-UKCA

6. MARKINGS

Geosense® VWM-2000 series instruments are labelled with the following information:

- Manufacturers name & contact details
- Product type
- Model
- Serial number
- CE mark / UKCA mark

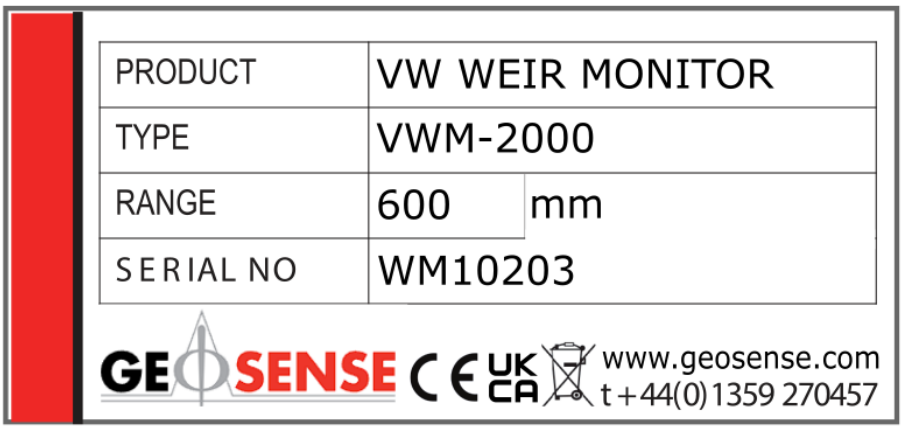


Figure 3: VWM-2000 Identification Label

The transducer & mass are a matched pair; care must be taken especially with multiple installations that the serial number on the transducer matches the serial number on the mass.

7. DELIVERY

This section should be read by all users of equipment manufactured by **Geosense®.**

7.1. Packaging

Geosense® VWM-2000's are packed for transportation to site. Packaging is suitably robust to allow normal handling by transportation companies. Inappropriate handling techniques may cause damage to the packaging and the enclosed equipment. The packaging should be carefully inspected upon delivery and any damage **MUST** be reported to both the transportation company and **Geosense®**.

Once the shipment has been checked it is recommended that **Geosense® VWM-2000**'s remain in their original packaging for storage or transportation.

Cable should be handled with care. Do not allow it to be damaged by sharp edges, rocks for example, and do not exert force on the cable as this my damage the interim conductors and render the installation useless.

7.2. Handling

Whilst they are a robust devices, **Geosense® VWM-2000** series systems are precision measuring instruments. They and their associated equipment should always be handled with care during transportation, storage and installation.

Once the shipment has been inspected (see 7.3), it is recommended that equipment remains in its original packaging for storage or onward transportation.

7.3. Inspection / Functionality Check Readings

It is important to check all the equipment in the shipment as soon as possible after taking delivery and well before installation is to be carried out. Check that all the components detailed on the documents are included in the shipment. Check that the equipment has not been physically damaged.

All **Geosense® VWM-2000** instruments carry a unique identification serial number which is located on the cable connection block or on the side of the cell (dependent on model).

Geosense® VWM-2000 instruments are supplied with individual calibration sheets that include their serial numbers, and these are shipped with the equipment. Calibration sheets should be kept safe and secure for future reference. See section 8.

7.4. Storage

All **Geosense® VWM-2000** instruments and associated equipment should be stored in an environment that is protected from direct sunlight.

It is also recommended that cables be stored in a dry environment to prevent moisture migrating along inside them in the unlikely event of prolonged submersion of exposed conductors. The cables should also be protected from rodents and traffic.

No other special requirements are needed for medium or long-term storage although temperature limits should be considered when storing or transporting associated components, such as readout equipment.

8. CALIBRATION

All **Geosense® VWM-2000** instruments are supplied with a calibration sheet like the example below:

GEOSENSE QUALITY FORM
FORM No G/QTF/183
ISS. 1
DATE : MAY 26
SIG. GC

VW Weir Monitor Calibration Sheet

Model :	VWM 2000
Sensor Serial Number:	WM 10202
Mass Serial Number:	WMM 1001
Date:	21/07/2026
Temp °C:	20.5
Range (mm):	300.0

Applied Load (kg)	Equivalent mm H_2O	Readings (Digits)			Change	Error % FSO	
		1st Cycle	2nd Cycle	Average		Linear	Polynomial
0.6	154.8	6245.4	6246.7	6246.0			
0.9	232.1	7968.0	7970.7	7969.4	1723.3	0.11%	0.02%
1.2	309.5	9675.9	9677.0	9676.5	1707.1	0.17%	-0.01%
1.5	386.9	11373.1	11373.8	11373.4	1697.0	0.08%	-0.01%
1.8	464.3	13059.4	13060.0	13059.7	1686.2	-0.17%	0.01%

THE EQUIPMENT USED IN THE CALIBRATION OF THE PRODUCT DETAILED ABOVE IS TRACEABLE TO NATIONAL/INTERNATIONAL STANDARDS

Factory reading with cylindrical mass hanging in air : 12048.7

Cylinder Dimensions (mm)

	1	2	3
Top	70.24	70.22	70.29
Middle	70.32	70.21	70.30
Bottom	70.32	70.23	70.20

Average Diameter (mm): 70.26
Volume Factor (K): 257.93

CALIBRATION FACTORS

Linear factor (M)
mm/digit
-0.045432944

Polynomial Factors	
A	-9.43371E-08
B	-0.043611796
C	

Note: Digits are $Hz^2 \times 10^{-3}$ units.

Linear calculation [mm] = M * (Current Reading - Site Zero Reading)

Polynomial calculation [mm] = A * (Reading)^2 + B * (Reading) + C

C = −A * (Site Zero Reading^2) − B * (Site Zero Reading)

THIS IS AN ELECTRONIC CERTIFICATE AND IS VALID WITHOUT A SIGNATURE

9. INSTALLATION

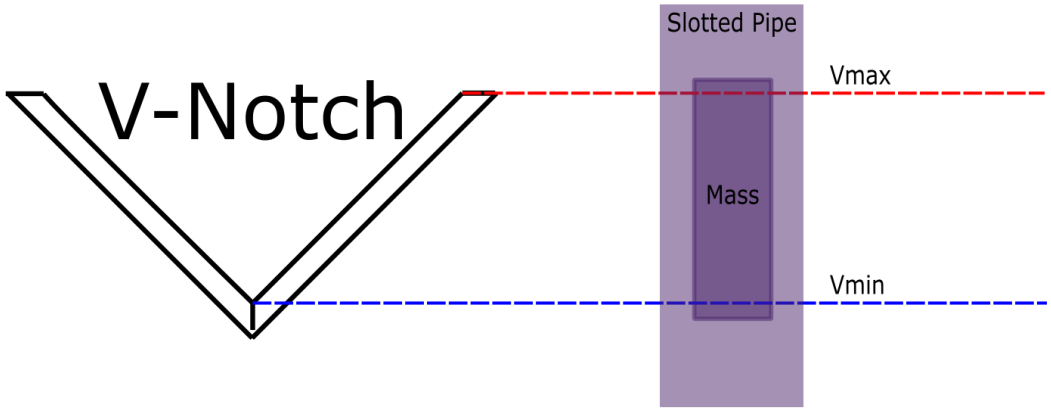
The following sections describe a typical installation for **Geosense® VWM-2000 Weir Monitors.**

It is VITAL that all personnel responsible for the use of VWM-2000 Instruments READ and UNDERSTAND this manual, prior to working with the equipment

It is VITAL to check all the equipment in the shipment soon after taking delivery and well before installation is to be carried out. Check that all components that are detailed on the shipping documents are included.

STEP 1 Measure the position that the slotted pipe and mass will be mounted.

The bottom of the mass should be a **minimum** of 1cm lower than the bottom of the V-notch (Vmin).



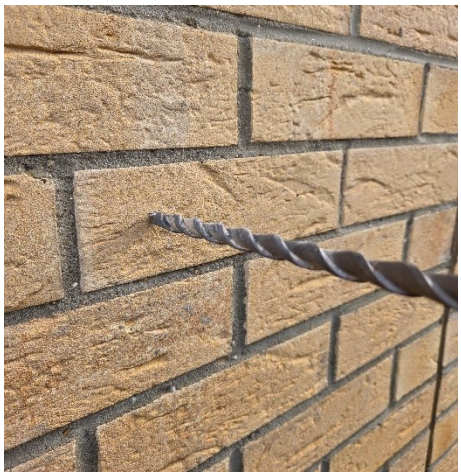
STEP 2 Use the saddle brackets to mark the bolt holes onto the wall of the channel where the VWM-2000 is to be mounted.

Ensure they are level and that the top mount perfectly aligns with the bottom mount.

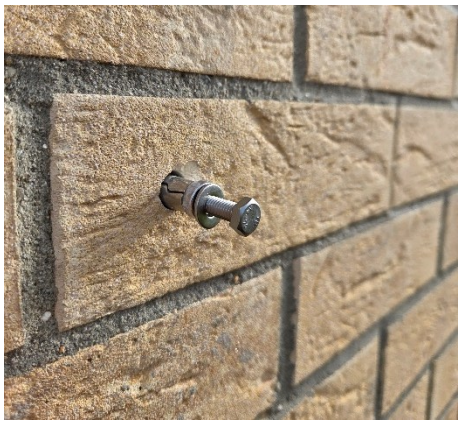
The slotted pipe must be mounted vertically to ensure proper operation and not fowl the displacement mass.



STEP 3 Drill the appropriate size holes for the type of bolts to be used.



STEP 4 Insert the anchors into the drilled hole, using the bolt half wound in to assist.



STEP 5 Place the saddle bracket over the bolt, then the clamp over the top of the slotted pipe and tighten the bolts at each side evenly to hole the pipe in place.

Repeat for the bottom mount.



STEP 6 Ensure the pipe is vertical in both axes.

A non-vertical pipe may cause issues with the functionality of the sensor.



STEP 7 Before installation of the sensor and displacement mass into the slotted pipe, it is recommended to perform a function check.

The sensor is shipped with a centralising spacer. This needs to be carefully removed.

Gently slide out the spacer with one hand whilst firmly holding the body of the sensor in the other hand.



DO NOT ROTATE THE HOOK.

IT IS NOT DESIGNED TO SPIN AND FORCING IT TO ROTATE MAY DAMAGE THE SENSOR.

STEP 8 Holding the sensor, gently hang the mass onto the hook, and carefully allow the mass to hang.



STEP 9 Once suspended, holding the sensor as still as possible, take a few readings from the sensor, monitoring it for stability.

A reading of within 100 digits (B) of the calibrated value for the factory reading with cylindrical mass hanging in air shown on the calibration certificate.

Movement of your hand when holding will impact the stability of the readings.



STEP 10 After the readings have been taken and the functionality confirmed, remove the mass gently from the sensor.

STEP 11 Slide the sensor, hook first into the top of the compression gland on the top cap.



STEP 12 When the sensor hook protrudes from the base of the cap, and the sticker is still fully visible at the top, tighten the compression gland to clamp the sensor body in place.



STEP 13 Carefully attached the displacement mass to the hook at the base of the sensor.



STEP 14 Guide the displacement mass into the slotted pipe.



STEP 15 Firmly push the cap down so it fully seats onto the slotted pipe.





It is recommended at this stage to take another check reading of the sensor to ensure no damage has been done during previous steps.

STEP 16 Apply solvent plastic weld paste to the base cap, on the inner face for the entire circumference

(ensure type is appropriate for the type of plastic that the tube and cap are made from)



STEP 17 Push the base cap onto the slotted pipe and allow the solvent to cure before allowing water to flow down the channel.



STEP 18 The installation of the VWM-2000 onto the channel wall is now complete



Before you can get meaningful data on the water level, you will need to take a zero reading from the sensor, which is a simple process, but an important step. Please refer to section 12.1 for more information.

10. DATA HANDLING

The function of an instrument is to provide useful and reliable data. Accurate recording and handling of the data is essential if it is to be of any value.

10.1. Monitoring the Weir Monitor Readings

Geosense® Vibrating Wire Weir Monitors include both force and temperature sensors.

10.1.1. Portable Readouts

Geosense® offer a range of readout and data logging options. Specific operation manuals are supplied with each readout device.

Below is a brief, step-by-step procedure for use with the **Geosense® VWR1** portable readout.

STEP 1 Connect the signal cable from the sensor to the readout following the wiring colour code. Conductor colours may vary depending on the extension cable used. Commonly, these are:

Colour	Function	VWR1 Output
Red	VW +	Frequency (Hz) (Digits)
Black	VW -	
Green	Temp +	Resistance (Ohms) (Temperature)
White	Temp -	



Whilst it is not critical that the polarity be observed for most Vibrating Wire instruments, a better signal may be obtained if the correct polarity is adopted. Since the temperature sensor is a Thermistor, its connection polarity is not important.

STEP 2 Power on the unit by holding the power button. Set the range for the sensor using the “RANGE” button, or if unsure, set the range to “A” which is Auto mode.

STEP 3 Once on, press the “ACQ” button to take a single reading. Holding the button down will set the unit to take continuous readings.

STEP 4 The readings from the sensor will be shown on the screen. The units can be changed by pressing the two bottom buttons ("**B/Hz**" and "**°C/Ω**")



10.2. Data Loggers

A number of data loggers are available to automatically excite, interrogate and record the readings from Vibrating Wire instruments. These include the GeoLogger Linx, WISOS 480 and MESHNET, and equipment manufactured by Campbell Scientific Ltd.

11. DATA REDUCTION - UNITS

11.1. Overview

The tension of a sensor wire can be measured by detecting the frequency at which it naturally vibrates. The following is a description of the units commonly used by the instrumentation industry.

11.2. Frequency Units (Hz)

If the wire is 'excited' electronically the frequency at which it vibrates can be measured. The units used to express frequency are Hertz (Hz).

The disadvantage of these units is that there is no 'linear' conversion from 'change in Hertz' to 'change in wire tension'.

11.3. Linear Digits (B)

In order to overcome the problem of a linear conversion described above, the frequency value can be squared, thereby rendering it linear, but quite large. To reduce its size, it is often divided by 1000. The expression $Hz^2/1000$ (or $Hz^2 \times 10^{-3}$) is the most commonly adopted as a 'linear' digital output.

$$Digits\ [B] = Frequency\ [Hz]^2 \div 1000$$

11.4. Period Units (P)

Some readout devices utilise the 'counter' function available in many common integrated circuits.

Period Units represent the time taken for the wire to vibrate over one full oscillation, expressed in seconds. Due to the very small size of the number generated, most equipment manufacturers display the unit multiplied by either 1000 (10^3) or 10000000 (10^7).

The relationship between Period units and Frequency units is expressed as

$$Period\ [P] = 1 \div Frequency\ [Hz]$$

Period units are convenient to measure, but do not have a linear relationship to the 'change in wire tension'.

11.5. Calibration Factor

Each VW Weir Monitor is supplied with a Calibration certificate to enable conversion from the raw data (in the units described above) into engineering units such as millimetres.

The value of the calibration factor will vary depending on the engineering units into which the raw data is to be converted.

Readings from VW sensors are typically in a form that is a function of frequency rather than in units of millimetres.

To convert the frequency readings to units of millimetres, a calibration factor must be applied to the recorded values. For Weir Monitors, the calibration factors are unique to each unit.

12. DATA REDUCTION - FORMULAE

12.1. Zero Reading

In order to calculate the height of the water in the channel using the **Geosense® Vibrating Wire Weir Monitor** it is necessary to take the zero reading (H_0).

R_0 = value in digits when water is at the **H_{min}** vertex of the V-notch

The easiest method to achieve this is to flood the area upstream of the V-notch plate and allow excess water to drain over the V-notch until the flow stops.

When taking the H_0 reading, the water upstream of the V-notch plate should be free of turbulence.

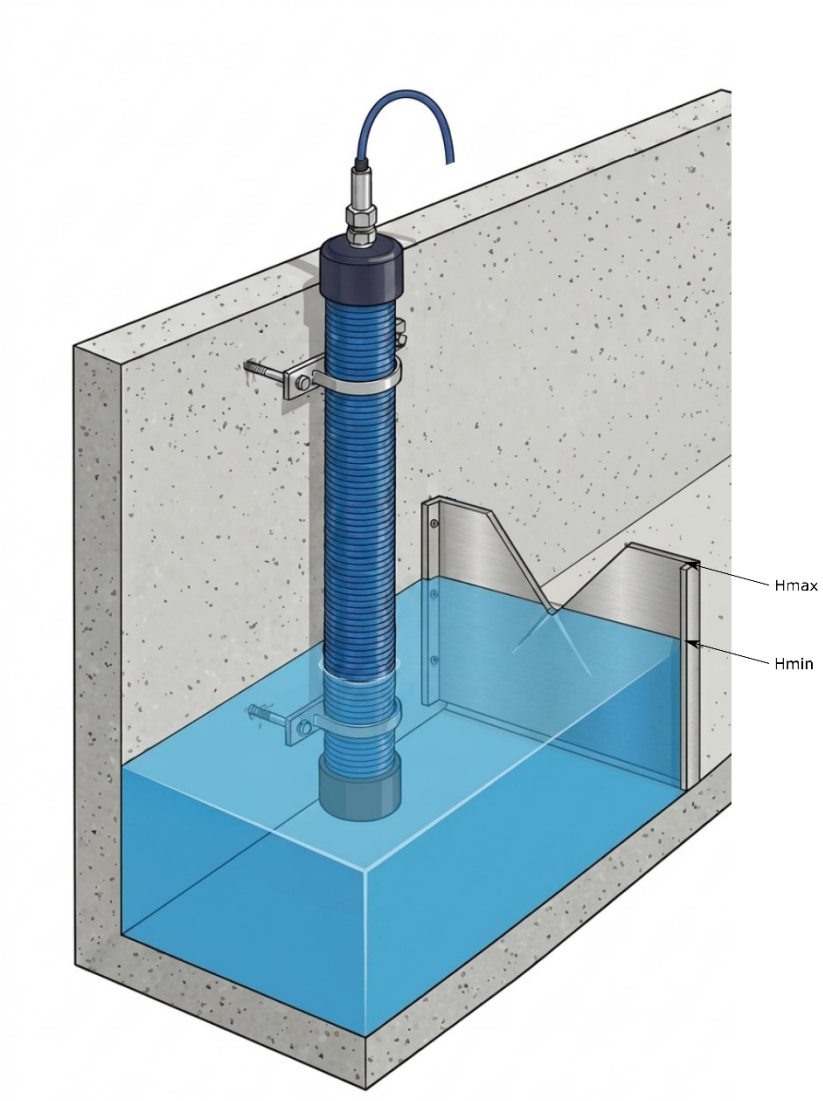


Figure 4: V-notch channel with water allowed to drain down to H_{min} position, allowing for R_0 value to be recorded.

12.2. Linear Calculation

A linear calculation can be used to calculate the change in water height in the weir from site zero reading using the current averaged readings; however, this comes with a slight drop in accuracy over the polynomial formula, which is stated on the calibration sheet, though for most applications, this accuracy is still sufficient.

$$[millimetres] = M \times (R_1 - R_0)$$

M = Linear factor [mm/digit]
R_1 = Current reading in digits [B]
R_0 = Site zero reading in digits [B]

12.3. Polynomial Calculation

For the polynomial calculation, the readings are averaged, and a regression is done with applied force versus the averaged readings to get the weir monitor constants.

The constants are used in the polynomial formula below for calculating the current height of water in millimetres.

$$[millimetres] = A \times (R_1)^2 + B \times (R_1) + C$$

A = Constant from calibration sheet
B = Constant from calibration sheet
C = User calculated value
R_1 = Current reading in digits [B]

The constant of C shown on the calibration sheet (section 8) needs to be calculated by the user using the following formula:

$$C = -A \times (R_0)^2 - B \times (R_0)$$

A = Constant from calibration sheet of required units
B = Constant from calibration sheet of required units
C = Calculated constant from zero reading
R_0 = Site zero reading in digits [B]

12.4. Check Equations

The following equation is presented as a check for the user to validate their calculations. Use the variables and constants provided in Table 2 and check your calculations against the results in Table 3, Table 4 and Table 5.

Table 2: Provided values for variables and constants for the purpose of checking equations only

Constant/Variable	Value	Units	Source
M	-4.54329440E-02	mm/digit	Calibration Certificate
R_1	11373.40	digits (B)	Current reading
R_0	13059.70	digits (B)	Site zero reading
A	-9.43370653E-08	millimetres factor	Calibration Certificate
B	-4.36117958E-02	millimetres factor	Calibration Certificate

Table 3: Check results for linear pressure calculation

Resultant	Value	Units	Source
Linear	76.61357347	millimetres	User calculated

Table 4: check results for polynomial C constant

Resultant	Value	Units	Source
Polynomial C	585.64669986	millimetres factor	User calculated

Table 5: Check results for polynomial pressure calculation

Resultant	Value	Units	Source
Polynomial	77.42940330	millimetres	User calculated

12.5. Temperature (Thermistor)

The majority of VW sensors carry an onboard thermistor (3KΩ at 25°C) for accurate temperature measurement. The raw output of this sensor is a resistance, normally measured in ohms (Ω).

$$T = \left(\frac{1}{A + B \times (ln\, R) + C \times (ln\, R)^3}\right) - 273.15$$

A = 1.4051E-03
B = 2.3690E-04
C = 1.0190E-07
T = Temperature in Celsius
R = Resistance (ohms)

Please note that the majority of Geosense loggers will do this calculation for the user and automatically present the output as a temperature expressed in Celsius.

12.5.1. Resistance vs. Temperature

Table 6: 3K Resistance to Temperature Lookup Table (Celsius)

Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp
201.1K	-50	**16.60K**	-10	**2417**	30	**525.4**	70	**153.2**	110
187.3K	-49	**15.72K**	-9	**2317**	31	**507.8**	71	**149.0**	111
174.5K	-48	**14.90K**	-8	**2221**	32	**490.9**	72	**145.0**	112
162.7K	-47	**14.12K**	-7	**2130**	33	**474.7**	73	**141.1**	113
151.7K	-46	**13.39K**	-6	**2042**	34	**459.0**	74	**137.2**	114
141.6K	-45	**12.70K**	-5	**1959**	35	**444.0**	75	**133.6**	115
132.2K	-44	**12.05K**	-4	**1880**	36	**429.5**	76	**130.0**	116
123.5K	-43	**11.44K**	-3	**1805**	37	**415.6**	77	**126.5**	117
115.4K	-42	**10.86K**	-2	**1733**	38	**402.2**	78	**123.2**	118
107.9K	-41	**10.31K**	-1	**1664**	39	**389.3**	79	**119.9**	119
101.0K	-40	**9796**	0	**1598**	40	**376.9**	80	**116.8**	120
94.48K	-39	**9310**	1	**1535**	41	**364.9**	81	**113.8**	121
88.46K	-38	**8851**	2	**1475**	42	**353.4**	82	**110.8**	122
82.87K	-37	**8417**	3	**1418**	43	**342.2**	83	**107.9**	123
77.66K	-36	**8006**	4	**1363**	44	**331.5**	84	**105.2**	124
72.81K	-35	**7618**	5	**1310**	45	**321.2**	85	**102.5**	125
68.30K	-34	**7252**	6	**1260**	46	**311.3**	86	**99.9**	126
64.09K	-33	**6905**	7	**1212**	47	**301.7**	87	**97.3**	127
60.17K	-32	**6576**	8	**1167**	48	**292.4**	88	**94.9**	128
56.51K	-31	**6265**	9	**1123**	49	**283.5**	89	**92.5**	129
53.10K	-30	**5971**	10	**1081**	50	**274.9**	90	**90.2**	130
49.91K	-29	**5692**	11	**1040**	51	**266.6**	91	**87.9**	131
46.94K	-28	**5427**	12	**1002**	52	**258.6**	92	**85.7**	132
44.16K	-27	**5177**	13	**965.0**	53	**250.9**	93	**83.6**	133
41.56K	-26	**4939**	14	**929.6**	54	**243.4**	94	**81.6**	134
39.13K	-25	**4714**	15	**895.8**	55	**236.2**	95	**79.6**	135
36.86K	-24	**4500**	16	**863.3**	56	**229.3**	96	**77.6**	136
34.73K	-23	**4297**	17	**832.2**	57	**222.6**	97	**75.8**	137
32.74K	-22	**4105**	18	**802.3**	58	**216.1**	98	**73.9**	138
30.87K	-21	**3922**	19	**773.7**	59	**209.8**	99	**72.2**	139
29.13K	-20	**3748**	20	**746.3**	60	**203.8**	100	**70.4**	140
27.49K	-19	**3583**	21	**719.9**	61	**197.9**	101	**68.8**	141
25.95K	-18	**3426**	22	**694.7**	62	**192.2**	102	**67.1**	142
24.51K	-17	**3277**	23	**670.4**	63	**186.8**	103	**65.5**	143
23.16K	-16	**3135**	24	**647.1**	64	**181.5**	104	**64.0**	144
21.89K	-15	**3000**	25	**624.7**	65	**176.4**	105	**62.5**	145
20.70K	-14	**2872**	26	**603.3**	66	**171.4**	106	**61.1**	146
19.58K	-13	**2750**	27	**582.6**	67	**166.7**	107	**59.6**	147
18.52K	-12	**2633**	28	**562.8**	68	**162.0**	108	**58.3**	148
17.53K	-11	**2523**	29	**543.7**	69	**157.6**	109	**56.8**	149

13. BAROMETRIC PRESSURE CONSIDERATIONS

The **Geosense® Vibrating Wire Weir Monitor** is a vented sensor, meaning the internals of the sensor are vented to atmosphere, meaning the sensor is physically barometrically compensated. There is therefore no need for the user to apply any subsequent correction.

14. MAINTENANCE

Geosense® Vibrating Wire Weir Monitors are basically maintenance free device for most applications, but the following should be considered during the service life:

- Keep the cable connection cap on when Readout not connected
- Avoid any impacts or significant vibration which can damage internal sensors
- Keep cables away from physical damage
- Keep cable ends waterproof
- Replacement of silica desiccant in vent tube pod
- Removal of fouling from stilling well (leaves/algae etc.)

15. TROUBLESHOOTING

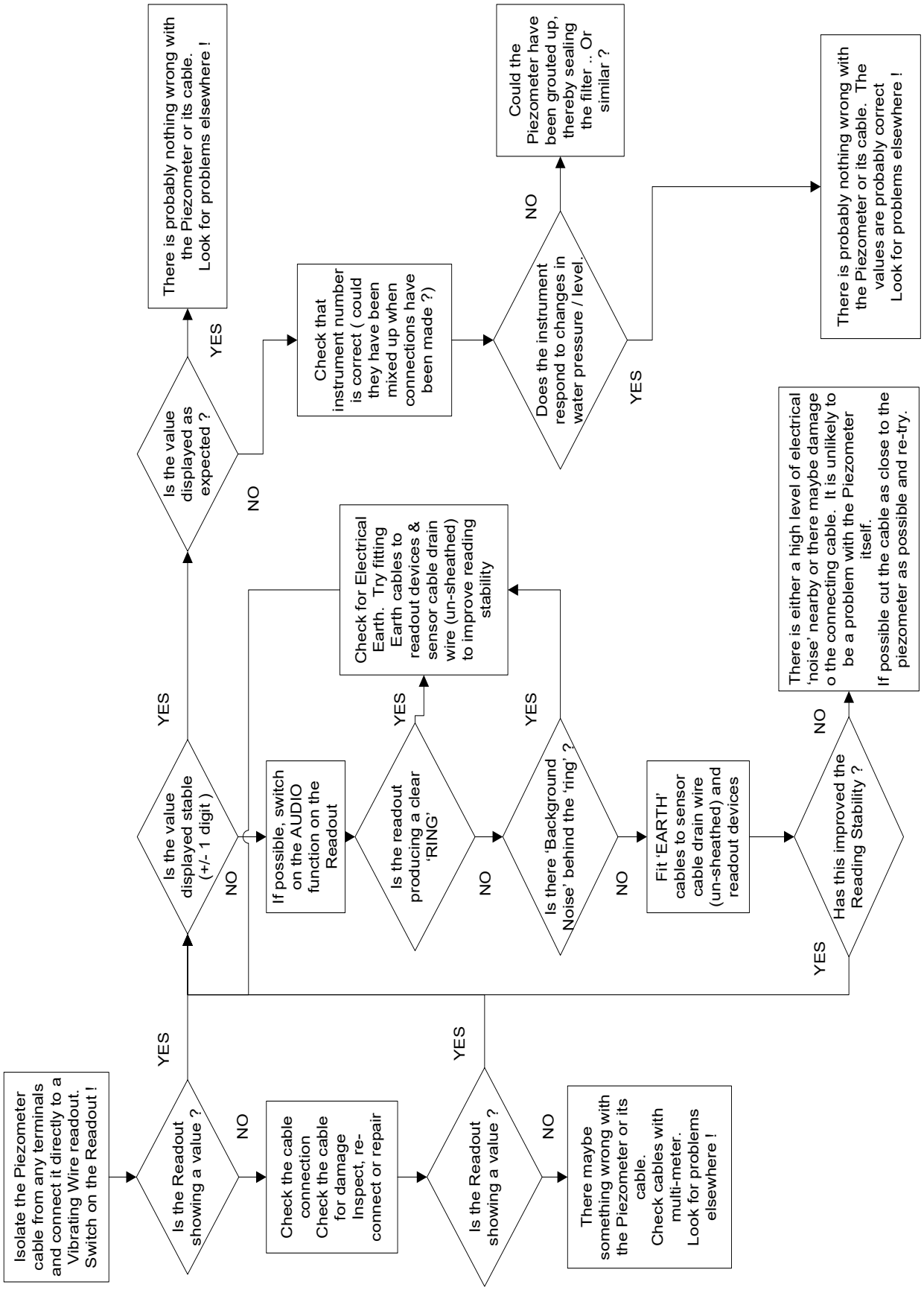
15.1. Unstable Readings

Readings can become unstable due to external influences or problems with the Readout. If unstable readings are experienced check the following:

Table 7: Troubleshooting symptoms, causes and remedy

Symptom	Possible cause	Possible remedy
Unstable readings	Electrical interference from Heavy or generating equipment Loose connections	Remove equipment Ground all cables Check connections
	Low Readout battery	Charge or replace battery
No signal	Cable damage	Check resistance of each cable core
Spikes in data	Turbulent water flow or still well/tube is off from vertical	Reduce turbulence and ensure displacement mass does not touch inside of tube

15.2. Troubleshooting Workflow



16. SPARE PARTS

Please contact **Geosense®** if spare parts are required.

17. RETURN OF GOODS

17.1. Returns Procedure

If goods are to be returned for either service/repair or warranty, please fill in the information via the website https://www.geosense.co.uk/returns/ where a **Returns Authorisation Number** together with a **Returns Form** will be automatically generated and sent to you via email.

The **Returns Form** should be sent together with the returned goods.

17.1.1. Chargeable Service or Repairs

Inspection & Estimate
It is the policy of **Geosense®** that an estimate is provided to the customer prior to any repair being carried out. A set fee for inspecting the equipment and providing an estimate is also chargeable.

A valid purchase order (credit customer) or advance payment for the inspection fee(s) is required before inspection can take place. In the event of a warrantable claim being accepted, the value will be credited back to the customer's account (credit customer) or refunded (pre-payment customer).

17.1.1. Warranty Claim

(See Limited Warranty Conditions)
This covers defects which arise as a result of a failure in design or manufacturing. It is a condition of the warranty that the **VWM-2000** must be handled and used in accordance with the manufacturer's instructions and has not been subjected to misuse.

In order to make a warranty claim tick the warranty claim box under **REASON FOR RETURN** on the website and return the goods as above. You will then be contacted and informed whether your warranty claim is valid.

17.2. Packaging and Carriage

All used goods shipped to the factory **must** be sealed inside a clean plastic bag and packed in a suitable carton. If the original packaging is not available, **Geosense®** should be contacted for advice. **Geosense®** will not be responsible for damage resulting from inadequate returns packaging or contamination, under any circumstances.

17.3. Transport & Storage

All goods should be adequately packaged to prevent damage in transit or intermediate storage.

18. LIMITED WARRANTY

The manufacturer, (**Geosense Ltd)**, warrants the **VWM** manufactured by it, under normal use and service, to be free from defects in material and workmanship under the following terms and conditions:

Sufficient site data has been provided to **Geosense®** by the purchaser as regards the nature of the installation to allow **Geosense®** to select the correct type and range of **VWM** and other component parts.

The **VWM** equipment shall be installed in accordance with the manufacturer's recommendations.

The equipment is warranted for **2 years** from the date of shipment from the manufacturer to the purchaser.

The warranty is limited to replacement of part or parts which are determined to be defective upon inspection at the factory. Shipment of defective part or parts to the factory shall be at the expense of the Purchaser. Return shipment of repaired/replaced part or parts covered by this warranty shall be at the expense of the Manufacturer.

Unauthorised alteration and/or repair by anyone which, causes failure of the unit or associated components, will void this **LIMITED WARRANTY** in its entirety.

The Purchaser warrants through the purchase of the **VWM** equipment that he is familiar with the equipment and its proper use. In no event shall the manufacturer be liable for any injury, loss or damage, direct or consequential, special, incidental, indirect or punitive, arising out of the use of or inability to use the equipment sold to the Purchaser by the Manufacturer.

The Purchaser assumes all risks and liability whatsoever in connection with the **VWM** equipment from the time of delivery to Purchaser



HEAD OFFICE

Nova House
Rougham Industrial Estate
Rougham, Bury St Edmunds
Suffolk IP30 9ND
England

+44 (0)1359 270457
sales@geosense.com
support@geosense.com

NORTH AMERICA OFFICE

15 West 38th Street
Suite 632
New York
NY 10018

+1 518-920-3483
sales@geosense.com
support@geosense.com

www.geosense.com