FLOW METER

Design, Installation, Operation and Maintenance Guide
FLW Series

AQUIFY

Rev. A / 25.06.08

CAUTION

Read the manual in its entirety. This manual contains essential information about the installation, operations, maintenance, and safe use of this product. Equipment must be installed and serviced by a qualified technician. Improper installation can void the warranty and cause bodily injury. All weights and dimensions are approximate. All dimensions are in inches; all weights are in pounds.

For all questions, please contact Aquify Systems or a certified Aquify Systems Support Agent.

****NOTE:**** Although every effort has been made to ensure that this manual provides up-to-date information, please note that Aquify Systems PMF-FRP Series specifications are subject to change without notice. Aquify shall not be liable for the accuracy of any information provided by third party technical support personnel, or any damage caused, directly or indirectly, by acts taken or omissions made by you because of such technical support.

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INTRODUCTION

The Aquify flowmeter utilizes a calorimetric method to measure fluid flow velocity. It features a stainless-steel probe inserted into the center of a water-filled pipe. At the tip of the probe are two RTD (Resistance Temperature Detector) sensors—one for measuring the actual temperature and one as a reference. The probe is actively heated, and as water flows past it, the moving fluid draws heat away. The resulting temperature change is used to determine the heat transfer rate, which directly correlates to the water's velocity.

Thermal flowmeters like this are often preferred over other types because they have no moving parts, enhancing durability and reliability.Pulse Cycle

GENERAL OVERVIEW

Pipe Sizing and Configuration Chart

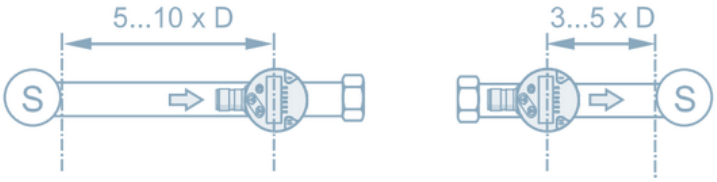
PIPE SCH80								
SKU	Pipe Size NPS [in]	Pipe Dia ID [in]	Max Flow Rate [gpm]	Influent Side		Effluent Side		Installation Depth [in] ***from pipe tip of probe*
				Min [ft-in]	Rec [ft-in]	Min [ft-in]	Rec [ft-in]	
FLW-MTR-A	1	.09	21	0 – 5	0 – 9	0 – 3	0 – 5	$^{3}/_{4}$
	1.5	1.5	53	0 – 7	1 – 3	0 – 4	0 – 7	$^{3}/_{4}$
	2	1.9	88	0 – 10	1 – 7	0 – 6	0 – 10	$^{3}/_{4}$
	3	2.9	198	1 – 2	2 – 5	0 – 9	1 – 2	$^{7}/_{8}$
	4	3.8	346	1 – 7	3 – 2	0 – 11	1 – 7	1
	6	5.7	786	2 – 5	4 – 9	1 – 5	2 – 5	$1^{1}/_{8}$
	8	7.6	1380	3 – 2	6 – 4	1 – 11	3 – 2	$1^{1}/_{2}$
FLW-MTR-B	10	9.5	2173	3 – 11	7 – 11	2 – 4	3 – 11	$1^{7}/_{8}$
	12	11.3	3076	4 – 8	9 – 5	2 – 10	4 – 8	$2^{1}/_{8}$
	14	12.4	3714	5 – 2	10 – 4	3 – 1	5 – 2	$2^{3}/_{8}$
	16	14.2	4871	5 – 11	11 – 10	3 – 7	5 – 11	$2^{5}/_{8}$

Installation and Mounting

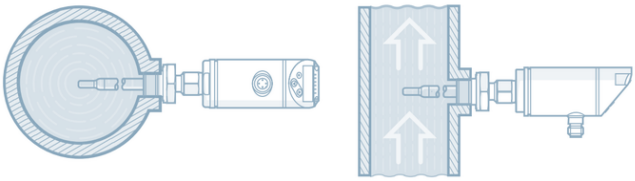
PARTS LIST		
SKU	**Part No.**	**Description**
FLW-MTR-A	7730-0001	Flow Meter Probe
	3000-0D00	Compression Fitting
	7290-0002	Cable
FLW-MTR-B	7730-0001	Flow Meter Probe
	3000-0D00	Compression Fitting
	7290-0002	Cable

Mounting Location

Choose an installation location where the water flow is as close to laminar as possible. Turbulent flow caused by nearby fittings can lead to inaccurate readings. Consult the *Pipe Sizing and Configuration Chart* for specific requirements regarding straight pipe lengths on both the inlet and outlet sides of the flow meter.



Prior to installation ensure that the pipe is completely full of water. The presence of air bubbles or voids can result in measurement errors. To prevent air entrapment, it is recommended to install air bleed valves in the system.



Horizontal Pipes: Mount from the side of the pipe.

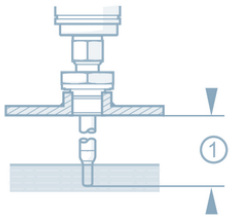
Vertical Pipes: Mount on a rising pipe.

Compression Fitting Install

- Mark the pipe location to be installed.
- Drill a hole using a 7/16” drill bit.
- Tap the hole using a 1/4“NPT tap.
- Apply PFTE Plumbers tape to the compression fitting threads.
- Install the compression fitting to the hole. Tighten the fitting slowly.

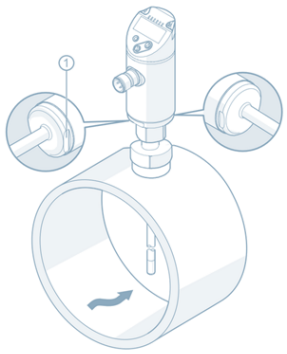
Flow Meter Install

The flowmeter is installed in the compression fitting and should be installed into the pipe at the depth listed in the *Pipe Sizing and Configuration Chart.*



Alignment

To achieve the optimal measuring accuracy, mount the sensor in a way that the flow direction goes from the larger key surface to the smaller key surface.



Electrical Installation and Wiring

Power Requirements

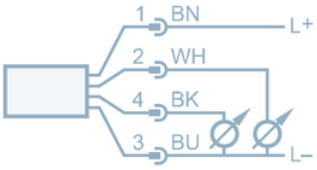
Supply device power from an isolated transformer with a secondary fuse as shown below.

SUPPLY VOLTAGE	FUSE RATING
18 – 20 V_{rms}	5 A*mp*
20 – 30 V_{rms}	100 / V A*mp*

The device shall be connected only by using a listed CYJV/7 or R/C CYJV2/8 cord in respect of Condition of Acceptability, having suitable ratings.

Electrical Connections

BK: black
BN: brown
BU: blue
WH: white



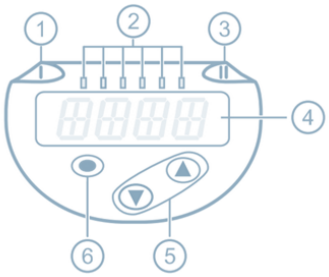
Pin 1: L+
Pin 3: L-
Pin 4: Analog signal output (Temperature)
Pin 2: Analog signal output (Flow)

A **22-foot cable** is supplied with the flow meter. The cable may be extended by a qualified electrician. Shielded cable is recommended to maintain signal integrity.

Flow Meter Parameter

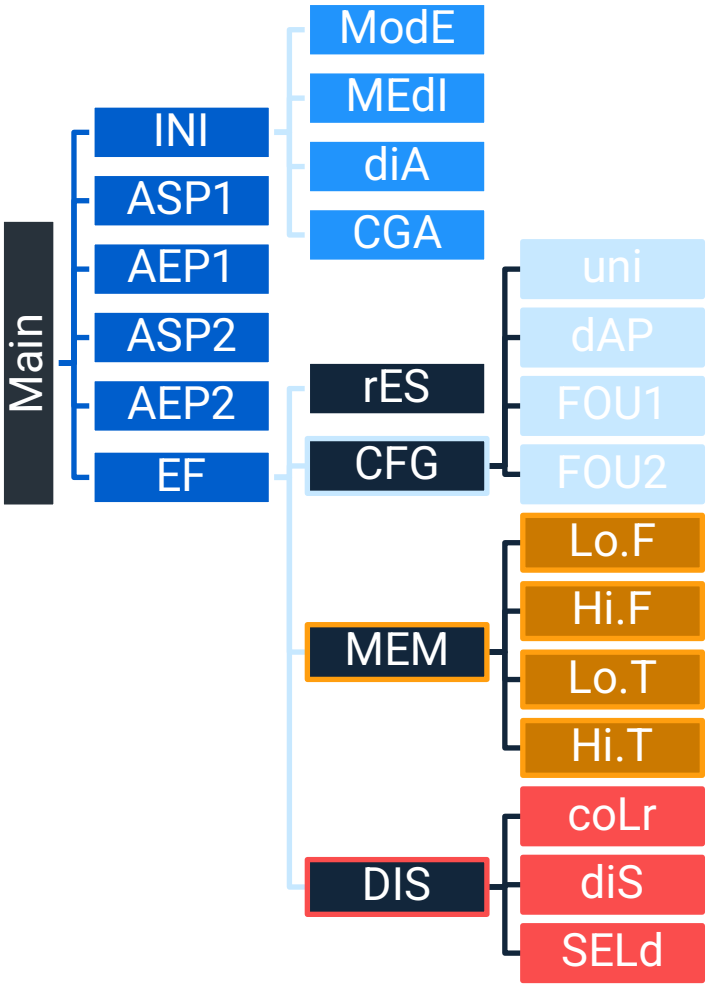
Configuration

Display and Buttons



1 Indicator LED
2 Process value LED (Ft/sec, GPM, CFM, °F, 10^3)
3 Indicator LED
4 Display
5 Navigation Buttons
6 Enter / Menu

Menu Map



Quick Setup

In most cases, the flowmeter can be setup in only a few steps with no calibration required. Advanced calibration may be required if high accuracy is necessary.

Configure the Operating Parameters

These parameters are used to configure the flowmeter for the pipe size and flow medium.

Parameter	Description	Recommended Set Value
ModE	Operation Mode for flow measurement	LIQU
MEdI	Medium selection	H20
diA	Diameter of pipe	Refer to *Pipe Sizing and Configuration Chart* and set the diameter to the value listed.

Set the Units for Flow Measurement

Parameter	Description	Recommended Set Value
Uni	Flow unit	GPM

Configure the Control Scaling Values

These values set the scaling of the 4…20 mA signal that will be communicated to the controller.

Parameter	Description	Recommended Set Value
ASP1	Temperature Value at 5 mA	Expected Min Temperature x 0.70 (°F)
AEP1	Temperature Value at 20 mA	Expected Max Temperature x 1.30 (°F)
ASP2	Flow Value at 5 mA	0 (GPM)
AEP2	Flow Value at 20 mA	Expected Max Flow x 1.30 (GPM)

Configure the Fault Functions

The flowmeter can be configured to send an out-of-range signal when an error occurs.

Parameter	Description	Recommended Set Value
FOU1	Output 1 fault behavior	ON
FOU2	Output 2 fault behavior	ON

Locking the Controls

It is recommended to lock the controls after initial setup so that parameters cannot be modified accidentally.

To lock, press the Up and Down navigation buttons simultaneously for 10 seconds.

[LOC] is displayed.

To unlock, press the Up and Down navigation buttons simultaneously for 10 seconds.

[uLOC] is displayed.

Advanced Setup Features

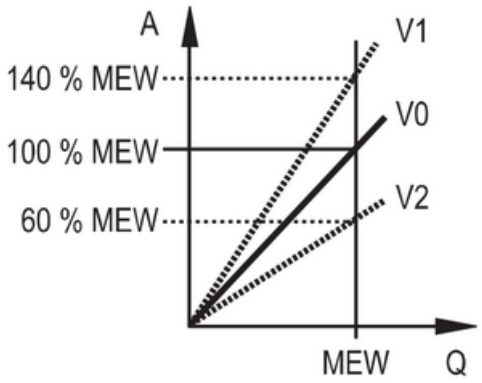
These advanced features are used to improve the accuracy of the signal in special use cases.

Measured Value Damping

The damping time enables to set after how many seconds the output signal has reached 63% of the final value if the flow value changes suddenly. The set damping time stabilizes the outputs and the display. The signals [UL] and [OL] are defined under consideration of the damping time.

Customer-Specific Calibration (CGA)

For higher accuracy, if an accurate reference flow is available then the flowmeter can be calibrated from this flow. The customer-specific calibration allows changing the gradient of the curve of measured values. It influences the display and the outputs.



A	Operating value for display and output signals
Q	Flow value
MEW	Final value of the measuring range
V0	Curve of measured values at factory setting
V1, V2	Curve of measured values after calibration

TROUBLESHOOTING

The unit has a self-diagnostic function to troubleshoot possible device issues. Refer to the chart below to aid in diagnostics. Contact Aquify Systems for all warranty concerns.

DISPLAY	TYPE	DESCRIPTION	FAULT CORRECTION
Err	Error	Unit Faulty Hardware Malfunction	Replace the unit
No Display	Error	Supply voltage is low Setting [diS] = OFF	Check the supply voltage Change [diS] = ON
PArA	Error	Parameter setting outside the valid range.	Check parameter setting.
Loc	Warning	Setting push buttons on the unit locked, parameter change rejected.	Unlock the unit to adjust parameters.
UL	Warning	Below the display range: Temperature value < -20% MEW	Check temperature range. Repeat low-flow adjustment
OL	Warning	Display range exceeded: Measured value > 120% of MEW	Check temperature range. Repeat low-flow adjustment
SC1	Warning	Short circuit OUT1 (Switching status LED for OUT1 flashing)	Check switching output OUT1 for short-circuit or excessive current.
SC2	Warning	Short Circuit OUT2 (Switching status LED for OUT2 flashing)	Check switching output OUT2 for short-circuit or excessive current.
SC	Warning	Short Circuit OUT1 and OUT2 (Switching status LED for OUT1 and OUT2 are flashing)	Check switching outputs OUT1 and OUT2 for short-circuit or excessive current.

MAINTENANCE

The sensor probe may become dirty or have scale build up because of use, especially is hard or dirty water. This build-up will decrease the accuracy of the flowmeter. Periodically remove the flow sensor and clean the probe with vinegar cleaning agent and a soft cloth to remove the build-up.

PARAMETER REFERENCE GUIDE

MAIN MENU		
INI	Initialization Menu	Opens the initialization menu.
ASP1	Analog start point for temperature (OUT1)	Temperature value at which the output signal is 4 mA.
AEP2	Analog end point for temperature (OUT1)	Temperature value at which the output signal is 20 mA.
ASP2	Analog start point for flow.	Flow value at which the output signal is 4 mA.
AEP2	Analog end point for flow.	Flow value at which the output signal is 20 mA.
EF	Extended functions.	Opens the lower menu levels.

INITIALIZATION MENU (INI)		
ModE	Operation Mode for flow measurement	LIQU = liquid measurement GAS = gas measurement
MEdI	Medium selection	H20 = water GLYC = glycerin mixture AIR = air
diA	Diameter of pipe	Set to the inner diameter of the pipe.
CGA	Measurement gradient.	Calibration of the measurement graph (gradient) in %. By default, this value is 100%.

EXTENDED FUNCTIONS MENU (EF)		
rES	Restore	Restores the unit to factory settings
CFG	Basic settings menu	Opens the basic settings menu
MEM	Min/max memory menu	Opens the min/max memory menu
DIS	Display menu	Opens the display settings menu.

BASIC SETTINGS MENU (CFG)		
Uni	Flow unit	
dAP	Flow damping value	
FOU1 FOU2	Output 1 fault behavior Output 2 fault behavior	On – Fault at 22 mA OFF – Fault at 3.5 mA OU – measured value correspondence

MIN/MAX MEMORY MENU (MEM)	
Lo.F	Minimum value in memory for flow.
Hi.F	Maximum value in memory for flow.
Lo.T	Minimum value in memory for temperature.
Hi.T	Maximum value in memory for temperature.

DISPLAY SETTINGS MENU (DIS)		
coLr	Color configuration	rEd - red display GrEN - green display
diS	Update display refresh rate and display orientation	D1 - 50 ms refresh rate D2 - 200 ms refresh rate D3 - 600 ms refresh rate. RD1. RD2. RD3 – Rotation of display by 180 deg.
SELd	Standard display value	Flow or medium temperature.

Aquify Systems
10550 Plano Rd.
Dallas, Texas 75238
1.833.386.2782
www.aquifysystems.com