1.0 Notes

For proper flow measurements, the OCTAVE’s measuring tube should be completely full at all times. Non-wetted sensors show loss of signal. Though this will not cause damage to the meter, it will, however, not measure flow and display zero.

- Flow direction: The OCTAVE is a bidirectional flow meter. Note the indicating arrow on the OCTAVE’s display for forward and backward flows.
- In case of direct sunlight exposure, it is recommended to keep the lid closed, though no direct damage will occur with the lid open.
- Do not expose the OCTAVE to excessive vibration. To avoid vibration, support the pipeline on both side of the meter
- Ambient working temperature: -25 to +55°C.
- Water working temperature: 0.1 to +50°C.
- To avoid measuring errors due to air in the flow tube, observe the following precautions:
  - Since air collects at the highest point of the system, installation of the flowmeter should be at the lowest point.
  - Always install control valves downstream of the meter in order to avoid cavitation.
  - Never install the meter on a pump suction side in order to avoid cavitation.

2.0 Start-up

✓ Check that the meter has been installed correctly.
✓ Check that the flow rate and volume units are correctly preprogrammed on the display.
✓ Check that the output module is correctly attached.

3.0 Digital Display

Flow direction
Flow rate units
Accumulator mode
Communication mode
System error
Water temperature
Output mode
Volume units
Pulse resolution
Low battery alert
### 4.0 Mechanical Data

- **Maximum Working Pressure**: 16 bar
- **Liquid Temperature**: 0.1 up to 50 º C
- **Precision Class**: ISO 4064 rev.2005, Accuracy class 2
- **Configuration**: Compact - The display is built in to the unit
- **Power Source**: 2 D size Li-battery: up to 15 years life time
- **Environmental Protection**: IP 68, Ambient operation temp. -25°C up to +55°C
- **Volume Display Options**: 1. Net (Forward less reverse) 2. Forward only 3. Reverse only 4. Forward & reverse alternating
- **Data Logger**: Volumes and alarms data (48KB)
- **Connections**: 1½-2” threaded: with couplings to NPT/ BSP 2”-12” flanged: flanges according to ISO, BS 10 and ANSI 150
- **Severity levels**: Mechanical class M1 Electromagnetic environment class E1
- **Pressure Loss**: ΔP 0.16 bar

### Outputs

**Analog Output**
The Analog Output shows the currently measured flow rate. The Analog Output is a 4 - 20 mA current loop (the end user must supply power to the unit). The Analog Output is programmable for forward and reverse flow (see Operation Manual for more details). The 20mA point is programmable per customer request (To any flow lower than the max flow of the meter).

**Digital (pulse) Output**
The Digital (pulse) Output is an open drain transistor output that provides pulse per quantity with these options:
1. Two scaled forward, reverse or net mode pulses
2. One scaled forward, reverse or net mode pulse and one alarm frequency output
3. Measuring units of the output can be programmed different than displayed units
   Pulse resolution will be shown on the display for each pulse separately

**Dry Contact Output**
The Dry Contact Output is a dual relay output that provides pulse per quantity with these options:
1. Two scaled forward, reverse or net mode pulses
2. Measuring units of the output can be programmed different than displayed units
   Pulse resolution will be shown on the display for each pulse separately
   Onsite power supply of 12-24 VDC is needed.

**Encoder Output**
The Encoder Output is a serial communication collector utilizing UI1203 or UI1204 communication protocol. (Sensus protocol)
   Pulse output included.

**Modbus Protocol Output**
The Modbus Protocol Output has the following available functions:
1. Alarms (battery, empty pipe)
2. AMR serial number
3. Real Time Clock (RTC)
4. Volume units
5. Flow rate units
6. Current flow
7. Flow direction
8. Forward and reverse volumes
9. Flow and volume resolution

### Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Octave</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal size (mm)</strong></td>
<td>40 Threaded</td>
</tr>
<tr>
<td>(inch)</td>
<td>1½ Threaded</td>
</tr>
<tr>
<td><strong>L – Length without couplings (mm)</strong></td>
<td>300</td>
</tr>
<tr>
<td><strong>W – Width (mm)</strong></td>
<td>113</td>
</tr>
<tr>
<td><strong>H – Height (mm)</strong></td>
<td>155</td>
</tr>
<tr>
<td><strong>H – Height (mm)</strong></td>
<td>35</td>
</tr>
<tr>
<td><strong>Weight (kg) - cast iron body</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>Weight (kg) - polymer body</strong></td>
<td>1.4</td>
</tr>
</tbody>
</table>
5.0 Mechanical Installation

5.1 Handling the Flow Meter

Important handling information:
- Do not lift the Octave by the electronic housing.
- Do not carry the Octave by its lid.
- Do not place the Octave on the electronic housing.
- When handling the Octave, avoid hard blows, jolts or impacts.

5.2 Installation: Location and Position

Recommended installation

Conditional installation

Wrong installation

The Following Examples are Arad’s Recommendations For Achieving Top Performance

- When installing the Octave downstream of any hydraulic component (valve, pump) the recommended installation requirements are no less than the drawings recommendations.
- For upstream & downstream straight pipes please use as much as installation site will allow (the longer the better).
- When installing Pressure Breaker after the meter - the pipe length should be at least 2 pipe diameter (the longer the better).
6.0 Polymeric Octave Installation - General Instructions

Please follow the general instructions for water meters (Check Valve, upstream & downstream and system flushing on new installations).

Existing and new installations:

1. It is recommended that the meter will NOT be installed in the middle of the system, so the meter will not suffer from the load of all the installed fixtures.

2. It is recommended that at least one side of meter will be connected to a PVC (or plastic) pipe.

3. Please make sure that the end connections are parallel and inline to each other.

4. When using standard tail piece, please use rubber gaskets only (not fiberglass)! After adding the gaskets the gap between the end connection and the meter should not exceed 1mm.

   Please unscrew the end connection in order to keep the recommended distance.
   • Please do not use force in order to close the gap.
   • Please don’t do any welding while the meter is connected to the pipe.
5. If it is not possible to use plastic connections on one side of the meter, please consider the use of our flexible couplings. These couplings were especially developed for the polymeric Octave meters. You will need to use this coupling only on one side of the meter - please install the coupling on the outlet, if possible - as described in the below pictures.

6. Please start to tighten the end connections by hand. Final tightening will be with no more than 100Nm torque.

7. Please don’t do any welding while the meter is connected to the pipe.

8. In case it is not possible to use plastic end connections (at least on one side), please support the meter as shown in the drawing below.
7.0 Electrical Outputs

The OCTAVE has several outputs options.
1. Dual pulse output for volumes
2. Dry Contact output for volume
3. Analog output (4-20mA) for flow

7.1.1 Pulse V5.2 Output Module Specification

Pulse types:
1. Open Drain (N-channel FET transistor output) that allows current loading of 200mA, and up to 35volt
2. Dry contact
3. SSR

Outputs Diagram

Cables
Warning - Signal connection polarity is mandatory!

<table>
<thead>
<tr>
<th>Wire</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Cable</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>Pulse Out#1</td>
</tr>
<tr>
<td>Green</td>
<td>Pulse Out#2</td>
</tr>
<tr>
<td>Black</td>
<td>GND</td>
</tr>
<tr>
<td>Open</td>
<td>Open Ground / Shield</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wire</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Cable</td>
<td></td>
</tr>
<tr>
<td>Ring Terminal</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Output Characteristics

<table>
<thead>
<tr>
<th>Outputs Type</th>
<th>Open Drain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Length - supplied</td>
<td>1.5/5 [meter]</td>
</tr>
<tr>
<td>Maximum Cable Length*</td>
<td>500 [meter]</td>
</tr>
<tr>
<td>Maximum Applied Voltage</td>
<td>35 [Vdc]</td>
</tr>
</tbody>
</table>

* The maximum Cable length depends on: Cable type, controller and electrical noise level. Cable Teldoor PN 8005003101 or similar
7.1.2 Dry Contact V1.1 Module Specification

Outputs Diagram

Cables

<table>
<thead>
<tr>
<th>WireFunction</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Cable</td>
<td>Red + Orange Out#1</td>
</tr>
<tr>
<td></td>
<td>Black + Brown Out#2</td>
</tr>
<tr>
<td>Short Cable</td>
<td>Red 5-35V +</td>
</tr>
<tr>
<td></td>
<td>Black 5-35V -</td>
</tr>
<tr>
<td></td>
<td>Yellow Earth</td>
</tr>
</tbody>
</table>

* Signal connection polarity is mandatory!

Output Characteristics

<table>
<thead>
<tr>
<th>Outputs Type</th>
<th>Dry Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Length - supplied</td>
<td>1.5/5 [meter]</td>
</tr>
<tr>
<td>Maximum Cable Length*</td>
<td>500 [meter]</td>
</tr>
<tr>
<td>Maximum Applied Voltage</td>
<td>35 [Vdc]</td>
</tr>
<tr>
<td>Switching Power max.</td>
<td>15 [Watt]</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>$10^{9}$ [Cycles]</td>
</tr>
</tbody>
</table>

* cable Teldoor PN 8005003101 or similar
7.1.3 SSR v1.0 Module Specification

**Outputs Diagram**

<table>
<thead>
<tr>
<th>Cables</th>
<th>Wire</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Cable</td>
<td>Red + Orange</td>
<td>Out#1</td>
</tr>
<tr>
<td></td>
<td>Black + Brown</td>
<td>Out#2</td>
</tr>
<tr>
<td>Short Cable</td>
<td>Red</td>
<td>5-35V +</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>5-35V -</td>
</tr>
<tr>
<td></td>
<td>Yellow</td>
<td>Earth</td>
</tr>
</tbody>
</table>

* Signal connection polarity is mandatory!

**Output Characteristics**

<table>
<thead>
<tr>
<th>Outputs Type</th>
<th>Dry Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Resistance max.</td>
<td>25 [Ω]</td>
</tr>
<tr>
<td>Output current max.</td>
<td>120 [mA]</td>
</tr>
<tr>
<td>Output Voltage max.</td>
<td>±400 [V]</td>
</tr>
<tr>
<td>Supply Voltage 3-35 Vdc</td>
<td>5-35 [Vdc]</td>
</tr>
<tr>
<td>Cable Length - supplied</td>
<td>1.5 [meter]</td>
</tr>
<tr>
<td>Maximum Cable Length*</td>
<td>500 [meter]</td>
</tr>
</tbody>
</table>

* cable Teldoor PN 8005003101 or similar
7.1.4 4-20mA Module (Analog)

- The current output is a passive 4-20mA.
- 4mA is always “0” (zero) flow and the 20mA is factory programmable according to the customer requirements. (If the customer did not specify, the 20mA will be the maximum flow rate).

Outputs Diagram

Cables
Signal connection polarity is mandatory!

<table>
<thead>
<tr>
<th>Wire</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Cable</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>current loop +</td>
</tr>
<tr>
<td>Black</td>
<td>current loop -</td>
</tr>
<tr>
<td>Open</td>
<td>GROUND / SHIELD</td>
</tr>
<tr>
<td>Short Cable</td>
<td></td>
</tr>
<tr>
<td>Ring Terminal</td>
<td>GROUND</td>
</tr>
</tbody>
</table>

Output Characteristics

<table>
<thead>
<tr>
<th>Outputs Type</th>
<th>4-20mA current output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplied Cable Length</td>
<td>1.5/5 [meter]</td>
</tr>
<tr>
<td>Maximum Cable Length</td>
<td>500 [meter]</td>
</tr>
<tr>
<td>Loop supply voltage</td>
<td>12 - 24 [Vdc]</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>25 [M] typ</td>
</tr>
</tbody>
</table>

* cable Teldoor PN 8005003101 or similar
8.0 Module Replacement / Mounting Manual

1. Properly dry the area of the connector.

2. Remove seal cover from the screw using tool with sharp edge.
3. Remove the screws using Allen key 3mm.
4. Remove the module/cover.
5. Properly dry again the area of the connector.
6. Make sure the module o-ring is in position.
   If not, Insert new o-ring into the module. The o-ring must be lubricated (silicone grease)

7. Attach module to the connector.

8. Tight both screws by hand only, using Allen key 3 mm to achieve symmetric o-ring pressure,
   then apply the torque 2 N*m with torque wrench.

9. Insert seal cover onto the screw.
9.0 GND Mounting Manual

1. Insert M5 screw to ring terminal lug

2. Insert flat washer on top of ring terminal lug

3. Insert serrated washer on flat washer

4. Attach to the fork terminal lug and tight

5. Insert flat washer and serrated washer on the bolt.
Use the correct washers according to bolt size (M16 or M20 respectively) Insert the bolt to the hole on the pipe’s flange. (Do not install on meter’s flange).

6. Slide the fork terminal lug between the flat washer and serrated washer

7. Add serrated washer on the other side of the bolt (On meter’s flange side)

8. Add flat washer on the serrated washer

9. Add nut and tight. Make sure fork terminal lug is in position.
9.1 Special Parts

Set for ring terminal lug.

- Fork terminal lug
- Flat washer
- M5 screw
- Serrated washer

Set for connecting fork terminal lug to pipe.

- M16 or M20 bolt. Not included in kit
- Flat washer M16&M20 (2 units each size). Included in kit
- Serrated washer M16&M20 (2 units each size). Included in kit
- M16 or M20 nut. Not included in kit