

## **MODEL 9054 SERIES FLOW MONITOR**

### **With Totalization**

#### **A. DESCRIPTION**

The **ARJAY** Model 9054-OCF RF Flow Control Systems are based on a micro-controller to monitor the level changes of materials (liquids and solids) in open channels of various configurations and use. Control and monitoring is provided through an LCD display, 4 alarm relay contacts, and a 4-20 mA output; all of which are standard with the unit. Calibration does not require an empty and full channel. A selection of two level points on the probe are required for automatic calibration. The flow is determined by a linearization of the signal according to the flume, weir, etc.

#### **B. OPERATION**

There are basically 3 distinct operations of the level/flow system.

1. The Capacitance Probe inserted into the channel provides a means to detect capacitance through level changes. A proper ground reference is extremely important to the operation of the unit. Probes typically have a concentric shield to accommodate this.
2. The Pulse Card Model PMC-9054, which is installed in the head of the probe. The circuit translates the capacitance of the probe into a frequency pulse which can then be transmitted to the remote controller. Take care during the installation of this card to insure there are no wires shorting out the card. Again, grounding is important. Be sure both mounting screws are securely fastened.
3. The Remote Controller, Model 9054-OCF, receives the frequency pulse signal and performs the necessary operations to provide an output to its' calibrated level and flow. This level and flow is displayed on the unit in both level and linear flow.

#### **C. PROBES**

**ARJAY** probes are provided in a many styles for a variety of applications involving liquids. Usually insulated rod types probes are used. Proximity probes can be provided to detect level without contacting the monitored material.

**VERTICAL PROBE MOUNTING:** A vertically mounted probe should be installed so that the desired control points occur along the length of the probe. The zero and span settings can be adjusted to include the full length or just a small section of the probe. The probe requires a metal reference ground such as the sides of the tank or channel, a reference rod, or a concentric shield around the probe. The reference ground must be parallel to the probe to provide a linear signal. Probes for flow use must be located in accordance with the flume, weir, etc. specifications of the manufacturer.

#### **D. PROBE INSTALLATION**

Screw the probe into the 3/4" NPT opening (standard probes) or 1" NPT opening (heavy duty probes). Concentric shields are welded to a 2" NPT fitting for your process connection. Use wrench on lower hex only. Take care in installing probe. The insulation of the probe is important to the function of the instrument. **CAUTION:** The probe fittings are sealed at the factory to provide a compression type with Teflon ferrules assembled by applying torque between two sections. The fittings are sealed at the factory to provide a compression seal capable of withstanding high pressures. Once opened, they cannot be reassembled without new ferrules.

## E. ELECTRONIC INSTALLATION

Examine the instrument for possible shipping damage. **IMPORTANT:** If for any reason it is determined that parts should be returned to the factory, please notify the nearest **ARJAY** Sales Representative prior to shipping.

Choose the mounting location in accordance with good instrument practice. Extremes of ambient temperature and vibration should be avoided. (See specification).

1. Install the pulse card (PMC Circuit) into the probe head, making sure both legs are grounded to the body. Connect the probe lead, supplied on the probe end, to the terminal marked "P".
2. Using a twisted pair of wires or shielded cable, connect the + & - terminals on the pulse card (located in the probe head) to the terminals marked + & - in the remote level monitor.
3. Use No. 16 gauge shielded wire for these connections. The maximum length of this wire is one mile.
4. Use shielded wire only, connecting the shield to terminal - at the Model 9054-OCF controller only.
5. Connect the capacitance probe per wiring diagram #93004500 included with this manual.
6. Power on the instrument.
7. The display will flash "**ERROR: NO XMTR SIGNAL**" momentarily then read "**FLOW INFORMATION**". The unit is now ready for calibration. If the unit display continues to read "**ERROR: NO XMTR SIGNAL**" check all field wiring connections for faults.

## F. MODEL 9054-OCF FUNCTION PARAMETERS CALIBRATION

**IMPORTANT NOTE:** If at any time you wish to escape the program you are entering, press **DISPLAY**. Also, in the programming mode, there will be a delayed response for the display to acknowledge your entry. **BE PATIENT!**

The Model 9054-OCF is programmed to the specific pulse card used on the probe. This is to optimize the accuracy of the unit. Three numbers are required. These numbers are included on the specification sheet at the back of this manual, and on the side of the pulse card terminal block. The numbers listed are for the pulse card shipped with the controller from the factory. Entry verification is required or re-entry if a different pulse card is used.

1. Press **FUNCTION**. The display will read "**FUNCTION**", press 1 to configure the pulse card to the transmitter. The display will read "**XMTR CONFIG**". Press 2 for manual inputs or verification. If the "**A**" value is the same as the value verified on the specification sheet and the pulse card, press **ENTER**. If the value is different than the value of the pulse card, enter the new digits (i.e. 2.500) (the \* key is the decimal point) press **ENTER**. **NOTE:** If a digit is entered wrong, press **DISPLAY** to go back one digit.
2. The display will now ask for the "**K**" value. If the "**K**" value is the same as the value verified on the specification sheet and pulse card, press **ENTER**. If the value is different than the value of the pulse card, enter the new digits (i.e. 2800). Press **ENTER**.
3. The display will now ask for the "**C**" value. If the "**C**" value is the same as the value verified on the specification sheet, press **ENTER**. If the value is different than the value of the pulse card, enter the new digits (i.e. 50.5). Press **ENTER**. The display will now read "**FUNCTION**". Press **DISPLAY** to return to the **LEVEL** display.

## G. PROCESS CALIBRATION

1. You must select the primary device to be used. Press **FUNCTION**. From the menu, Press 4 for **PRIM DEV** (primary device). From the table below select the primary device to be entered (0 to 23). Key in the number and press **ENTER**. The display will confirm your selection. Press 1 to confirm or 2 to select another. the display will now read **FUNCTION**.

Selection #	Device Type
0	V-NOTCH 22
1	V-NOTCH 30
2	V-NOTCH 45
3	V-NOTCH 60
4	V-NOTCH 90
5	PARSHALL 2
6	PARSHALL 3
7	PARSHALL 6
8	PARSHALL 9
9	PARSHALL 12
10	PARSHALL 18
11	PARSHALL 24
12	PARSHALL 36
13	PARSHALL 48
14	PARSHALL 60
15	RECTANGULAR CONTRACTED
16	RECTANGULAR SUPPRESSED
17	CIPOLLETTI
18	PALMER-BOWLUS 6
19	PALMER-BOWLUS 8
20	PALMER-BOWLUS 10
21	PALMER-BOWLUS 12
22	PALMER-BOWLUS 15
23	PALMER-BOWLUS 18

2. To select your desired display units, Press 3 for **SETTINGS**. The display will read "**SETTINGS**". Press 4 for **UNITS**. From the menu, press the number corresponding to your desired units (i.e. 2 = MGD). NOTE: 1 and 2 are US gallons, 6 is imperial gallons. The display will now read "**SETTINGS**".
3. Press **CONTROL**. The display will read "**CONTROL SETTINGS**".
4. Press 1. The display will read "**ALARM SETTINGS**".
5. Verify the relays are disabled by the word "**OFF**" in the lower right corner of the display. If the display reads "**ON**", press 4. The display should now read "**OFF**".
6. Press **CALIB** to now calibrate the unit. The display will read "**FLOW CALIBRATION**". Two points of level are required for calibration. The level distance between two points should be at least 5% to provide greatest accuracy.

7. Press 1 for **AUTO** calibration. Enter the level of material in the channel in inches of the total level. The \* key is the decimal point. **NOTE:** If a digit is entered wrong, press **DISPLAY** to go back one digit. There are 5 digits to enter including the decimal point. For greater accuracy it is suggested to enter the values to the nearest 1/100 of a per cent (i.e. 31.04). After the level is entered, press **ENTER**.
8. The display will now ask for a second point. The level in the channel must now be altered up or down at least 5%. Once this is complete, enter the level of material in the channel in inches (i.e. 72.06). After the level is entered, press **ENTER**. The display will now read "**FLOW CALIBRATION**". Press **DISPLAY**.
9. The display will now read the level in inches and flow rate (i.e. gpm). Process calibration is now complete.

## H. CONTROL CALIBRATION

**IMPORTANT NOTE:** The relay values must be entered in **US GPM ONLY**. If you will be displaying in another unit, convert your desired alarm points to US GPM now. This will not affect the Flowrate display or totalization.

<b>ALARM SETPOINTS</b>			
<b>FOR FUTURE REFERENCE, WRITE YOUR CONVERSIONS HERE.</b>			
		<b>CHOSEN UNITS FOR DISPLAY =</b>	<b>CONVERTED TO US GPM FOR CALIBRATION PURPOSES</b>
<b>RELAY 1 TOTALIZED PULSE (IE. 50GAL/PULSE)</b>			
<b>RELAY 2 FLOWRATE (IE 100 GPM)</b>	<b>ON</b>		
	<b>OFF</b>		
<b>RELAY 3 FLOWRATE (IE. 150 GPM)</b>	<b>ON</b>		
	<b>OFF</b>		
<b>RELAY 4 FLOWRATE (IE. 200 GPM)</b>	<b>ON</b>		
	<b>OFF</b>		

1. Press **CONTROL**. The display will read “**CONTROL SETTINGS**”
2. Press 1 to select alarm settings for relay activation or press 2 to determine the zero and span values for the 4-20 mA output.

## ALARM SETTINGS

3. If you pressed 1 the display will read “**ALARM SETTINGS**”. To set values press 1. For relay 1 enter the value at which you want the relay to pulse (i.e. 50 gallons/pulse). Press enter. Relays 2, 3, and 4 will activate when the flow reaches a determined flowrate (i.e. 100 gpm). To set relay 2, enter the value at which you want the relay to activate. Press enter. Now enter the value at which you want the relay to de-activate (note: choosing a value slightly lower than the activation level will reduce relay chatter due to turbulent flows). Press enter. Repeat procedure for relays 3 and 4.
4. Press 2 to enter a time delay on the relay activation. This will suppress the relay switching until the unit has been engaged in an alarm condition for the prescribed time. Enter time in seconds (0-99) (i.e. 35), press **ENTER**. This will eliminate nuisance alarms due to turbulence.
5. Press 3 to enable the relays. The display will read ON in the lower right corner. This activates the relay operation for use with remote alarms and devices. (To disable the relays for maintenance or calibration press 4.) Press **CONTROL**. The display will read “**CONTROL SETTINGS**”.

## ZERO AND SPAN VALUES

**IMPORTANT NOTE:** The output values must be entered in **US GPM ONLY**. If you will be displaying in another unit, convert your desired alarm points to US GPM now. This will not affect the Flowrate display totalization.

$$4 \text{ mA} = \underline{\quad} = \underline{\quad} \text{ USGPM}, 20 \text{ mA} = \underline{\quad} = \underline{\quad} \text{ USGPM}$$

6. The 4-20 mA output signal may be offset from the 0-100% flow operation (i.e. 4 mA = 10 gpm, 20 mA = 123 gpm). To set the 4-20 mA output values press 2. The display will read “**SET 4-20 mA OUT**”. Enter the desired value for 4 mA output (zero) (i.e. 010.5). Press **ENTER**. Enter the desired value for the 20 mA output (span) (i.e. 090.5). Press **ENTER**. The display will now read “**CONTROL SETTINGS**”. Most applications for flow will use 4 mA = 0 gpm and 20 mA = the maximum flowrate.
7. Control calibration is now complete. Press **DISPLAY**. The unit will read “**FLOW INFORMATION**”.

## I. TOTALIZATION

1. The unit will totalize flow as long as a flowrate input exists. To reset to “0”, press the CALIB key. Press 3 for ClrAcc (Clear Accumulation). The display will ask you to confirm that you want to reset the totalizer. If yes, press **ENTER**., then press **DISPLAY**. If no, press **DISPLAY** directly.

## J. DIAGNOSTICS

The **ARJAY** Flow Monitor will provide default functions and raw data if required.

1. Access Raw Data, press **FUNCTION**. The display will read “**FUNCTION**”. Press 2 for diagnostics. The display will provide the transmitter frequency being sent from the probe and the capacitance value of the probe.

2. Signal Output for Remote Device Calibration Follow Step J1 above. Under **DIAGNOSTICS**, press 1 to force the unit to provide an output of 4 mA. Press 2 to force the unit to provide an output of 20 mA. The unit will automatically reset the output to Operating Mode when **DISPLAY** is entered.
3. Display Dampening Turbulent flows may cause erratic or “bouncy” readings. To smooth the reading, the signal can be filtered. Press **FUNCTION** and then press 2 for **FILTER**. The signal can be dampened from 0 - 99 seconds. Enter the desired value and press **ENTER**. Then press **DISPLAY**.
4. Disable Relays To disable the relays to work on remote control devices, press **CONTROL**. Now press 1, for **ALARM SETTINGS**. Press 4. The lower right corner of the display will now read “**OFF**”. The relays are now disabled. To reactivate the relays, Press 3 to make lower right corner read “**ON**”. Now press **DISPLAY** to return to the main display.