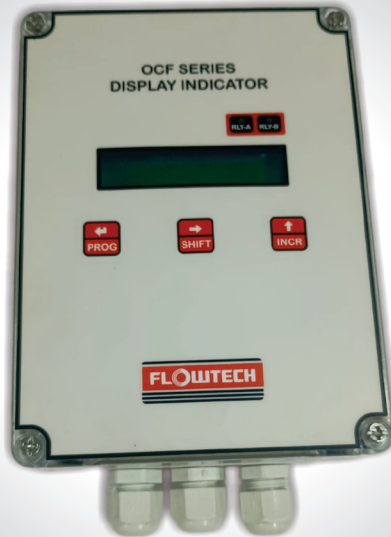


FLOWTECH



MODEL : OCF

OPEN CHANNEL LEVEL / DIFFERENCE & FLOW INDICATOR

**INSTALLATION, OPERATION &
MAINTENANCE MANUAL**

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INTRODUCTION

The OCF indicator accepts two 4–20 mA inputs for ultrasonic/level transmitters and supports Level, Differential, and Flow modes on a 16x2 LCD with three front-panel keys for configuration and operation. Outputs include a 4–20 mA analog retransmission, two relay contacts with LED indicators, and RS-485 Modbus RTU communications for SCADA integration.

FRONT PANEL

Three keys provide all interaction: SHIFT (cycle windows/digits), INCR (scroll/increment), and ENTER (select/confirm) as used throughout setup and calibration screens. Relay A and Relay B status LEDs reflect the real-time coil state, aiding commissioning and alarm verification.

TERMINALS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
90-265VAC		+	-	+	-	-	+	-	-	+	-	N.O.	COM	N.C.	N.O.	COM	N.C.	A(TX-)	B(TX+)
AC SUPPLY		DC SUPPLY		ULTS1:4-20mA			ULTS2:4-20mA			4-20mA O/P			RELAY-A			RELAY-B		RS-485	

OPERATING MODES

- Level: shows Channel-1 level and distance with selected units and display decimals.
- Differential: shows Level-1 minus Level-2 and Distance-1 minus Distance-2; SHIFT cycles levels, distances, or both differences.
- Flow: computes open-channel flow from configured geometry and displays rate and total; SHIFT toggles between flow/total and level/distance.

QUICK START

Apply power and wait for splash/model screens to enter RUN mode, then verify live readings or annunciations before commissioning. Use SHIFT to change windows in Differential or Flow mode and ENTER to access setup after entering the master code if enabled.

SECURITY ACCESS

Protected setup requires the master code; defaults are retained in FRAM and can be changed in Security settings (default 1000 in the reference manual format). After EXIT, programming is re-locked and requires the code to re-enter protected menus.

PROGRAMMING AND SETUP

Use INCR to scroll lists, ENTER to select, and SHIFT to back or switch sub-choices where prompted; parameters are stored persistently and restored at boot.

Setup flows in stages: Sensor setup, Flow setup, Damping/Decimals, Relays, Analog Output, Security, Communications, Reset Totalizer, and Exit.

USER SETTINGS TABLE

Section	Menu item	Options / Range	Factory Default	Notes
Operating mode	Mode	Level, Differential, Flow	Flow	Determines home screens and windows; SHIFT cycles windows within mode.
Flow type	Primary device	Flume, Weir	Flume	Selects flume/weir geometry menus.
Flume type	Flume subtype	General Parshall, Custom Parshall	General Parshall	General uses width; Custom uses width, factor, exponent.
Weir type	Weir subtype	V-notch, Trapezoidal, Bottom-step	-	V-notch adds angle; trapezoidal adds width and angle; bottom-step adds width.
Ratometer base	Time unit	/s, /m, /h, /d	"/s"	Indicated with rate and used for totalizer increments.
Volume unit	Total/rate unit	m ³ , L, ft ³ , GAL	m ³	Affects flow/total displays and Modbus values.
Length unit	Measure unit	mm, cm, m	m	Scales level/distance via internal length factor.
Decimals	Level/distance	0-3 (typical)	3	Controls LCD formatting for level/distance.
Decimals	Rate	0-3	1	Rollover protection clamps excessive values by format.
Smoothing	Normalization factor	1-15 (typical)	10	Defines measurable head for CH-1.
Sensor-1	Range	Numeric (Engg. units)	5.000	Total rolls over to zero at digit limit by format.
Sensor-1	Blind (near field)	0 to ≤ Range/10	0.300	Validated against 10% of range.
Sensor-1	Head (datum)	0 to ≤ Range	5.000	Reference height for CH-1 level.

Sensor-1	Tank height	0 to $\leq$ Range	5.000	Zero plane for CH-1 level.
Sensor-2	Range	Numeric (eng. units)	5.000	Defines measurable head for CH-2.
Sensor-2	Blind (near field)	0 to $\leq$ Range/10	0.300	Validated against 10% of range.
Sensor-2	Head (datum)	0 to $\leq$ Range	5.000	Reference height for CH-2 level.
Sensor-2	Tank height	0 to $\leq$ Range	5.000	Zero plane for CH-2 level.
Flow geometry	Channel width	Numeric (m or ft)	User set	Required for flumes and some weirs.
Flow geometry	V-notch angle	20–100° (typical)	User set	Used to compute notch factor.
Flow factor	Meter factor	Numeric multiplier	User set	Overall scaling for rate and total.
Flow exponent	Custom Parshall	Numeric exponent	User set	Used only in Custom Parshall.
Relays	Relay A parameter	Select source (e.g., flow/level)	Flow	Assigns the governing variable for Relay A.
Relays	Relay A setpoint	Numeric (engg. units)	User set	Trip setpoint for Relay A with LED.
Relays	Relay B parameter	Select source (e.g., flow/level)	Flow	Assigns the governing variable for Relay B.
Relays	Relay B setpoint	Numeric (engg. units)	User set	Trip setpoint for Relay B with LED.
Analog output	Parameter select	Select source (e.g., flow/level /difference)	Index 1	Assigns retransmission variable.
Analog output	Out low limit	Process value at 4 mA	User set	Set via 4 mA calibration screen.
Analog output	Out high limit	Process value at 20mA	User set	Set via 20 mA calibration and linearity.
Security	Run-mode reset	Enable, Disable	Enable	Allows front-panel total reset in RUN.
Security	Lock code	0000–9999	1000 (Factory)	Needed to enter protected menus.
Communications	Modbus device ID	1–250	1	Stored in non-volatile memory.
Communications	Baud rate	9600, 19200, 38400, 57600, 115200	9600	
Communications	Data/Parity/Stop	8N1, 8N2, 801, 802, 8E1, 8E2	8N1	Modbus RTU framing as per spec.

SENSOR SETUP

Choose instrument Mode (Level, Diff, Flow), then set Range, Blind, Head for each channel and Tank heights with validation to prevent out-of-range entries.

Sensor orientation “4 mA at full/empty” is set in Sensor Type to ensure distance and level are derived correctly from loop current input.

FLOW CONFIGURATION

Select Flow Type (Flume/Weir), then choose the subtype and enter geometry values such as width and notch angle, plus optional meter factor and exponent for Custom Parshall.

Volume units and ratemeter time base set how rate and total are displayed and aggregated.

DAMPING AND DECIMALS

Normalization/damping controls smoothing and responsiveness for noisy level signals; higher values stabilize readings but slow updates.

Select decimals for level/distance, rate, and total; enforces limit-based rollover to keep values within the selected digit capacity.

The flow rate can be displayed with 7 digits and totaliser in 9 digits.

RELAYS

Configure Relay A and B parameters and setpoints in engineering units; individual relay LEDs are present to indicate the state for Relays as on-panel indication.

DISPLAY MESSAGES (in Run Time)

Annunciations include LOOP BROKEN (open loop/low current), OVER RANGE (electrical under-range mapped to over-range display) and OVER FLOW (below minimum threshold near 4 mA by orientation).

These flags help differentiate wiring, scaling, and span issues during commissioning.

TOTALIZER BEHAVIOUR

The totalizer is maintained in RAM and periodically committed to FRAM under RTC timing for persistence across power cycles.

Rollover to zero occurs when the selected decimal format's digit capacity is exceeded, maintaining consistent on-screen formatting.

COMMUNICATIONS

RS-485 Modbus RTU uses selectable 9600–115200 baud and 8N1/8N2/8O1/8O2/8E1/8E2 framing; device ID and framing are saved in non-volatile memory.

Standard exception handling is implemented for invalid function, address, or quantity per the Modbus application protocol.

MODBUS REGISTER MAP

Address	Function	Parameter	Words	Format	Notes
40100	03	Rate	2	Float MSB-first	Holding register for instantaneous rate.
40500	03	Total	2	Float MSB-first	Holding register for total.
30001	04	Value 1	2	Float MSB-first	Mode dependent: Flow=Rate, Level=Level-CH1, Diff=Level-Diff.
30003	04	Reserved	2	Float MSB-first	Always 0 in this firmware build.
30005	04	Value 2	2	Float MSB-first	Mode dependent: Flow=Total, Level=Distance-CH1, Diff=Distance-Diff.

MAINTENANCE TIPS

- Tune normalization to the loop noise level and process dynamics, then set decimals to maintain readability without flicker.
- Run the analog output linearity routine during commissioning and after wiring changes to confirm scaling before enabling relay logic.

TABLE 1										
STANDARD DIMENSIONS OFTHE PARSHALL FLUMES FOR VARIOUS THROAT WIDTH (W)										
Throat width	A Cm	B Cm	C Cm	D Cm	E Cm	F Cm	G Cm	K Cm	N Cm	X Cm
3"	31.1	45.7	17.8	25.9	45.7	15.2	30.5	2.5	5.7	2.5
6"	41.5	61	39.4	39.7	61	30.5	61.0	7.6	11.4	5.1
9"	58.8	86.4	50.2	57.5	76.3	30.5	76.2	7.6	11.4	5.1
1 ft	91.5	134.4	61.0	84.5	91.5	61.0	91.5	7.6	22.9	5.1
1.5 ft	96.6	142.0	76.2	102.6	91.5	61.0	91.5	7.6	22.9	5.1
2 ft	101.7	149.6	91.5	120.6	91.5	61.0	91.5	7.6	22.9	5.1
3 ft	111.8	164.5	122.0	157.3	91.5	61.0	91.5	7.6	22.9	5.1
4 ft	122.0	179.5	152.5	193.8	91.5	61.0	91.5	7.6	22.9	5.1
SOURCE : WALMI PUBLICATION NO 36 "FLOW MEASUREMENT IN IRRIGATION CANALS "										
PLEASE REFER FIG BELOW FOR DIMENSIONS										

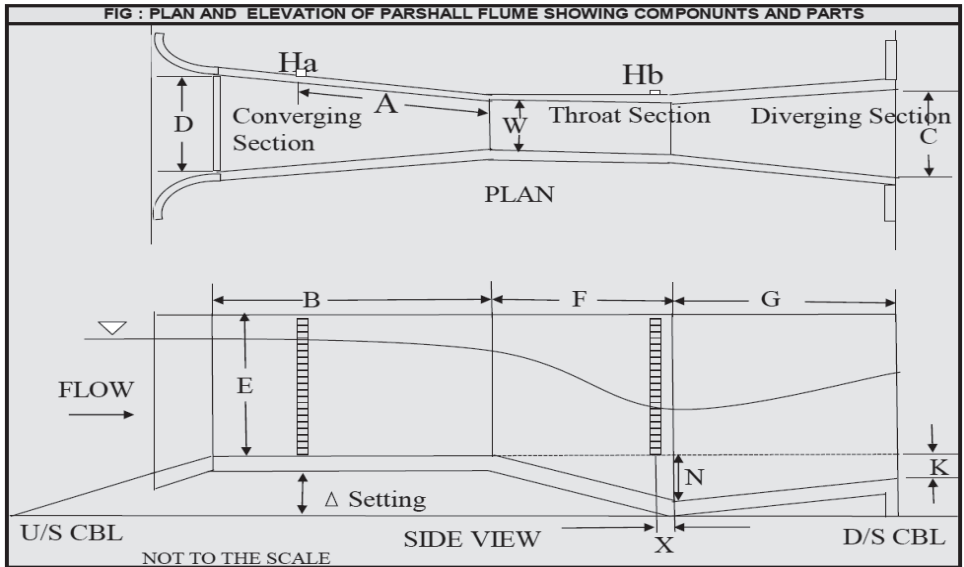


TABLE 2

DISCHARGE CHARACTERISTICS OF PARSHALL FLUMES

THROAT WIDTH IN INCH/FEET	DISCHARGE RANGE		FREE FLOW DISCHARGE EQUATION $Q=KH_a^U$		FREE FLOW SUBMERGENCE LIMIT
	MINIMUM (LPS)	MAXIMUM (LPS)	K	U	
3"	0.77	32.1	0.1771	1.55	0.5
6"	1.50	111	0.3812 a	1.58	0.60
9"	2.50	251	0.5354 a	1.53	0.60
1'	3.32	457	0.6909	1.522	0.7
1'6"	4.8	695	1.056	1.538	0.7
2'	12.01	937	1.428 a	1.55	0.70
3'	17.06	1427	2.184 a	1.566	0.70
4'	35.8	1923	2.953 a	1.578	0.70

SOURCE : WALMI PUBLICATION NO 36 "FLOW MEASUREMENT IN IRRIGATION CANALS "

3 INCH FLUME

H (m)	Q (m ³ /s)	Q (L/s)
0.04	0.001206	1.21
0.05	0.001705	1.71
0.06	0.002262	2.26
0.07	0.002872	2.87
0.08	0.003533	3.53
0.09	0.004240	4.24
0.10	0.004993	4.99
0.11	0.005788	5.79
0.12	0.006623	6.62
0.13	0.007498	7.50
0.14	0.008411	8.41
0.15	0.009360	9.36
0.16	0.010345	10.34
0.17	0.011364	11.36
0.18	0.012417	12.42
0.19	0.013502	13.50
0.20	0.014619	14.62
0.21	0.015768	15.77
0.22	0.016947	16.95
0.23	0.018156	18.16
0.24	0.019394	19.39

6 INCH PARSHALL FLUME

H (m)	Q (m³/s)	Q (L/s)
0.04	0.002357	2.36
0.05	0.003354	3.35
0.06	0.004474	4.47
0.07	0.005707	5.71
0.08	0.007048	7.05
0.09	0.008489	8.49
0.10	0.010027	10.03
0.11	0.011657	11.66
0.12	0.013374	13.37
0.13	0.015177	15.18
0.14	0.017063	17.06
0.15	0.019028	19.03
0.16	0.021071	21.07
0.17	0.023189	23.19
0.18	0.025380	25.38
0.19	0.027644	27.64
0.20	0.029978	29.98
0.21	0.032380	32.38
0.22	0.034849	34.85
0.23	0.037385	37.39
0.24	0.039985	39.99
0.25	0.042649	42.65
0.26	0.045376	45.38
0.27	0.048164	48.16
0.28	0.051013	51.01
0.29	0.053921	53.92
0.30	0.056888	56.89

H (m)	Q (m³/s)	Q (L/s)
0.31	0.059913	59.91
0.32	0.062995	62.99
0.33	0.066133	66.13
0.34	0.069327	69.33
0.35	0.072576	72.58
0.36	0.075880	75.88
0.37	0.079237	79.24
0.38	0.082647	82.65
0.39	0.086109	86.11
0.40	0.089624	89.62
0.41	0.093189	93.19
0.42	0.096806	96.81
0.43	0.100473	100.47
0.44	0.104189	104.19
0.45	0.107955	107.96

12 INCH FLUME TABLE

H (m)	Q (m³/s)	Q (L/s)
0.0305	0.003408	3.41
0.0405	0.005248	5.25
0.0505	0.007342	7.34
0.0605	0.009666	9.67
0.0705	0.012200	12.20
0.0805	0.014929	14.93
0.0905	0.017842	17.84
0.1005	0.020927	20.93
0.1105	0.024178	24.18
0.1205	0.027585	27.59
0.1305	0.031144	31.14
0.1405	0.034848	34.85
0.1505	0.038692	38.69
0.1605	0.042673	42.67
0.1705	0.046784	46.78
0.1805	0.051024	51.02
0.1905	0.055388	55.39
0.2005	0.059873	59.87
0.2105	0.064477	64.48
0.2205	0.069196	69.20
0.2305	0.074029	74.03
0.2405	0.078972	78.97
0.2505	0.084023	84.02
0.2605	0.089181	89.18
0.2705	0.094444	94.44
0.2805	0.099809	99.81
0.2905	0.105275	105.27
0.3005	0.110839	110.84
0.3105	0.116502	116.50
0.3205	0.122260	122.26
0.3305	0.128113	128.11
0.3405	0.134059	134.06
0.3505	0.140097	140.10
0.3605	0.146226	146.23
0.3705	0.152444	152.44
0.3805	0.158750	158.75
0.3905	0.165144	165.14

H (m)	Q (m³/s)	Q (L/s)
0.4005	0.171623	171.62
0.4105	0.178188	178.19
0.4205	0.184836	184.84
0.4305	0.191568	191.57
0.4405	0.198381	198.38
0.4505	0.205276	205.28
0.4605	0.212251	212.25
0.4705	0.219306	219.31
0.4805	0.226440	226.44
0.4905	0.233651	233.65
0.5005	0.240940	240.94
0.5105	0.248305	248.30
0.5205	0.255745	255.75
0.5305	0.263261	263.26
0.5405	0.270851	270.85
0.5505	0.278515	278.51
0.5605	0.286251	286.25
0.5705	0.294060	294.06
0.5805	0.301941	301.94
0.5905	0.309893	309.89
0.6005	0.317916	317.92
0.6105	0.326008	326.01
0.6205	0.334171	334.17
0.6305	0.342402	342.40
0.6405	0.350701	350.70
0.6505	0.359069	359.07
0.6605	0.367504	367.50
0.6705	0.376005	376.01
0.6805	0.384574	384.57
0.6905	0.393208	393.21
0.7005	0.401908	401.91
0.7105	0.410673	410.67
0.7205	0.419502	419.50
0.7305	0.428396	428.40
0.7405	0.437353	437.35
0.7505	0.446374	446.37
0.7605	0.455458	455.46



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