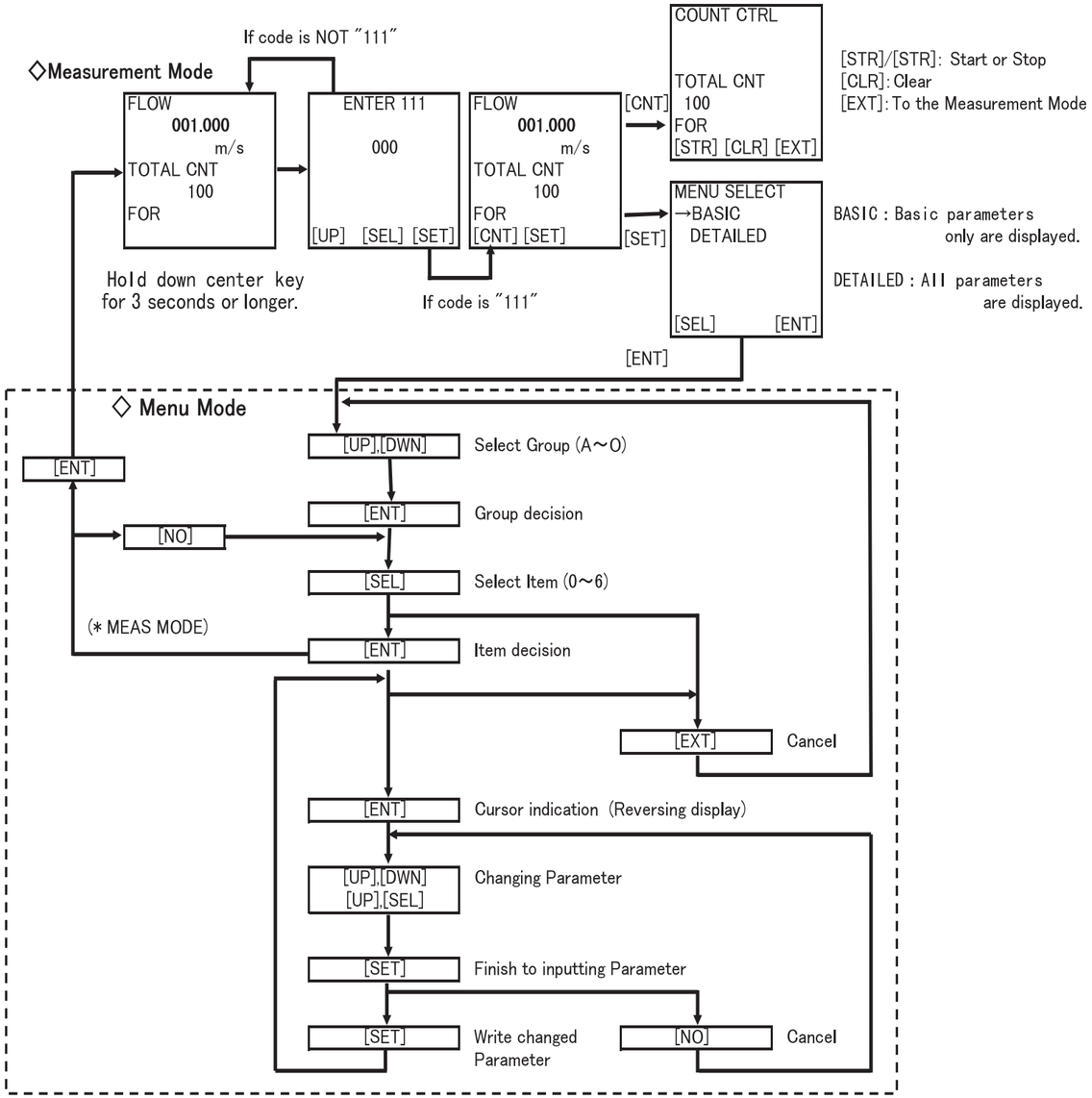
TOSHIBA
Leading Innovation

Electromagnetic Flowmeter LF600 Series Operation Guide

●Setting Parameters Flow●



●Setting Menu●

		Items	Screen Display	Setting or selecting value	
A	0	Measurement Mode	MEAS MODE		
	1	Exicitation Current	EX CURRENT	0,0000A ～ 0,2400A (0,0001A each)	*1
	2	Meter size	METER SIZE	0.1 ～ 24 inch , 2.5mm ～ 600mm	*1
	3	Exicitation Frequency	EX FREQ	6, 12, 24 Hz	
	4	Flow Direction	FLOW DIRCTN	NORMAL , SWITCH	
	5	Password	PASSWORD	000 ～ 999 (1 each)	
	6	Communication Address	ADDR SET (*2)	000 ～ 126 (1 each)	
B	0	Measurement Mode	MEAS MODE		
	1	Main Display	MAIN DSP	•First Unit : Volume, Others %, m3, l, ml, bbl, gal, m/s, ft/s, COUNT, RANGE, pt, qt, CUSTOM, GRAPH (*4) •Second Unit : Time unit /s, /min, /h, /d	*3 *4
	2	Sub Display	SUB DSP	•Third unit : Flow direction code B (Automatic selection bi-directionflow) F (Fixed forward flow), R (Fixed reverse flow) D (Difference)	
	3	Custom Coefficient	CUSTOM DATA	0 ～ 99999999	
	4	Custom Unit	CUSTOM UNIT	7 Characters	
	5	LCD Density Adjustment	LCD ADJUST	1(Light) ～ 5 (Dark)	
	6	Swich Position	SW POSITION	TOP, BOTTOM, LEFT, RIGHT	
C	0	Measurement Mode	MEAS MODE		
	1	Range Type	RANGE TYPE	SINGLE, 4F－0R, 2F－2R, EXT 2F－0R, EXT 2F－2R	*5
	2	Range 1	RANGE1	•Volume unit m3, l, ml, gal, bbl, pt, qt •Time unit /s, /min, /h, /d •Velocity unit m/s, ft/s	
	3	Range 2	RANGE2		
	4	Range 3	RANGE3		
	5	Range 4	RANGE4		
	6	Range Hysteresis	RANGE HYS	0.0 ～ 25.0 % (0.1% each)	
D	0	Measurement Mode	MEAS MODE		
	1	Damping Constant	DAMPING	00.0, 00.5, 01.0 ～ 60.0 s	
	2	Low Cutoff	LOW CUT	0.0 ～ 10.0 % (0.1% each)	
	3	4-20mA Alam Output	ALM mA SET	UNDER 3.0mA, 4.0mA, HOLD , OVER 24.0mA	*6
	4	Display Low Cutoff	DSP LOW CUT	ON, OFF	
	5	Output Low Limit	LOW LIMIT	4.0mA, 3.2mA, 2.4mA	
E	0	Measurement Mode	MEAS MODE		
	1	Zero Adjustment	ZERO ADJUST	Hold down the [SET] key	
F	0	Measurement Mode	MEAS MODE		
	1	DO1 Function	DO1 FUNCTN	NO USE, HIGH ALM, HH ALM, LOW ALM, LL ALM RNG SIG 1, RNG SIG 2, PRESET, CONV ALM EMPTY ALM, PULSE OUT, PULSE FRD, PULSE REV	*7
	2	DO2 Function	DO2 FUNCTN (*2)		
	3	DI Function	DI FUNCTN (*2)	NO USE, CNT STA/STP, CNT RES/STA RANGE SW, ZERO ADJ, FIXED OUT	
	4	DO1 Active Status	DO1 ALM STS	NORMAL OPEN, NORMAL CLSE	*8
	5	DO2 Active Status	DO2 ALM STS (*2)		
	6	DI Detective Level	DI DET LV (*2)	H LEVEL, L LEVEL	*9
G	0	Measurement Mode	MEAS MODE		
	1	Counting Rate	COUNT RATE	Units : m3, l, ml, bbl, gal, pt, qt Value : within the range 3.6 ～ 36000000 pulse/h (0.001 ～ 10,000 pps)	
	2	Pulse Mode	PLS MODE	AUTO, MANUAL	
	3	Pulse Width	PLS WIDTH	0.3 ～ 500.0ms (0.1ms each) or Less than half of the pulse rate for 100% flow rate output	
H	0	Measurement Mode	MEAS MODE		
	1	Preset Count	PRESET CNT	0 ～ 99999999 count (1 count each)	
	2	Preset Function	PRESET FNC	HOLD, 50ms PULSE, 500ms PULSE	*10
I	0	Measurement Mode	MEAS MODE		
	1	High Alarm Set	H ALM SET	ON, OFF	
	2	High Alarm Value	H ALM VAL	－10 ～ 110 %	
	3	Low Alarm Set	L ALM SET	ON, OFF	
	4	Low Alarm Value	L ALM VAL	－10 ～ 110 %	
J	0	Measurement Mode	MEAS MODE		
	1	High High Alarm Set	HH ALM SET	ON, OFF	
	2	High High Alarm Value	HH ALM VAL	－10 ～ 110 %	
	3	Low Low Alarm Set	LL ALM SET	ON, OFF	
	4	Low Low Alarm Value	LL ALM VAL	－10 ～ 110 %	
K	0	Measurement Mode	MEAS MODE		
	1	Empty Pipe Alarm	EMPTY ALM	OFF, NORMAL, SENSITIVE, SENSITIVE-H	*11
	2	Self-diagnosis function	SELF CHECK	ON, OFF	
	3	Alarm Output Preset	ALM PRESET	WITHOUT EMP, WITH EMP	
L	0	Measurement Mode	MEAS MODE		
	1	Rate-of-change Limit	LIMIT RATE	0.0 ～ 30.0 % (0.1% each)	
	2	Control Limit Time	LIMIT TIME	00 ～ 20 s (1s each)	
M	0	Measurement Mode	MEAS MODE		
	1	Fixed-value Output	FIXED OUT	ON, OFF	*12
	2	Fixed-current Output	FICED CURR	2.4 ～ 24.0 mA (0.1mA each)	
	3	Fixed-pulse Output	FIXED PULSE	0 ～ 10000 pps (1pps each)	
N	0	Measurement Mode	MEAS MODE		
	1	Manual Zero	MANUAL ZERO	±10% of 10m/s-maximum range (0.1% each)	*13
O	0	Measurement Mode	MEAS MODE		
	1	0% Flow Rate Calibration	FLOW CAL 0	[ENT] switch (Keep pushing more than 2 seconds.)	
	2	50% Flow Rate Calibration	FLOW CAL 50	None (Display)	
	3	100% Flow Rate Calibration	FLOW CAL 100	[ENT] switch (Keep pushing more than 2 seconds.)	
	4	Checking the Excitation Current Value	EX CURR DSP	None (Display)	

: Entering value
: Selecting value
: Entering and selecting value

*1 This value is factory adjusted when shipped.

*2 These functions are option.

*3 In case of choosing COUNT or RANGE
COUN : displays totalized flow counts (8 digits) without a unit.
RANGE : displays the range number (1 to 4)

*4 Only sub displey

*5

Range type	Description
1 : SINGLE	Single range
2 : 4F－0R	Unidirectional flw , automatic selection of multiple ranges
3 : 2F－2R	Bidirectional flows , automatic selestion of multiple ranges
4 : EXT. 2F－0R	Unidirectional flows , multiple ranges selected by exterminal single
5 : EXT. 2F－2R	Bidirectional flows , multiple ranges selected by exterminal single

*6

4-20mA Alarm Output	Output Status
0 : UNDER 3.0mA	Under 3mA output
1 : 4.0mA	4mA output
2 : HOLD	Measured data hold
3 : OVER 24.0mA	Over 24mA output

*7

DO1,DO2 items	Digital output function
0 : NO USE	Not used
1 : HIGH ALM	High limit alarm output
2 : HH ALM	High high limit alarm output
3 : LOW ALM	Low limit alarm output
4 : LL ALM	Low low limit alarm output
5 : RNG SIG 1	Multi－range output No.1
6 : RNG SIG 2	Multi－range output No.2
7 : PRESET	Preset point output
8 : CONV ALM	Converter failure alarm output
9 : EMPTY ALM	Empty pipe alarm output
10 : PULSE OUT	Pulse output (bidirectional flow)
11 : PULSE FRD	Pulse output (fixed forward flow)
12 : PULSE REV	Pulse output (fixed reverse flow)

*8

DO1/DO2 Active Status	Alarm－output Status
0 : NORMAL CLOSE	Normal close
1 : NORMAL OPEN	Normal open

*9

DI Detective Level	Detective Level
0 : L LEVEL	L level
1 : H LEVEL	H level

*10

Preset Function	Output Status
0 : HOLD	Output Status Level Hold
1 : 50ms PULSE	Pulse out (pulse width 50ms)
2 : 500ms PULSE	Pulse out (pulse width 500ms)

*11

Empty Pipe Alarm	Setting and Degective Level
0 : OFF	Not used
1 : NORMAL	Used and Ditective level low
2 : SENSITIVE	Used and Ditective level middle
2 : SENSITIVE-H	Used and Ditective level high

*12 When this function is set to ON , the conditions are follwing.

Items	Conditions
Current output	User－set current output
Pulse output	Pulse output with a user－set counting rate
Digital outputs	Previous status is retained (excluding pulse output).
Data indicating	Instaneous flow rates and flow velocity (no totalization).

*13 (1) In case of the zero adjustment (Menu No.E1),Zero offset is automatically cleared to Zero.
(2) Calculate the zero offset value with the follwing equation:
Zero offset value (%) = [(Actual flow rate) － (LF600 measured value)]
(Sample)

Measured condition	Flow rate	% in measured span
Actual flow rate obtained from other instrument	10.0 m3/min	50%
LF600 measured value	10.5 m3/min	52.5%
Zero offset	－	－2.5%

If zero offset is set to －2.5% , LF600 will output 50.0% flow rate instead of 52.5%

●Factory default standard value table●

Code	Item	Default value		Changed value
		SI unit	English unit	
A3	Exicitation Frequency	Value (*1)	Value (*1)	
A4	Flow Direction	NORMAL	NORMAL	
A5	Password	000	000	
B1	Main Display	m^3/h	gal/min	
B2	Sub Display	m^3	COUNT B	
B3	Custom Data	0	0	
B4	Custom Unit	Blank	Blank	
B5	LCD Density Adjustment	3	3	
B6	Swich Position	BOTTOM	BOTTOM	
C1	Range Type	SINGLE	SINGLE	
C2	Range 1	Value	Value (*2)	
D1	Damping Constant	1 sec	5 sec	
D2	Low Cutoff	1%	1%	
D3	4-20mA Alam Output	4mA	4mA	
D4	Display Low Cutoff	OFF	OFF	
D5	Output Low Limit	4mA	4mA	
F1	DO1 Function	PULSE OUT	PULSE OUT	
F2	DO2 Function	NO USE	EMPTY (*4)	
F3	DI Function	CNT RES/STR	CNT RES/STR (*4)	
F4	DO1 Active Status	NORMAL OPEN	NORMAL OPEN	
F5	DO2 Active Status	NORMAL OPEN	NORMAL OPEN	
F6	DI Detective Level	H Level	H Level	
G1	Counting Rate	Value (*3)	Value (*3)	
G2	Pulse Mode	AUTO	AUTO	
H1	Preset Count	0	0	
H2	Preset Function	HOLD	HOLD	
I1,I2	High Alarm Set/Value	OFF 0.0%	OFF 0.0%	
I3,I4	Low Alarm Set/Value	OFF 0.0%	OFF 0.0%	
J1,J2	High High Alarm Set/Value	OFF 0.0%	OFF 0.0%	
J3,J4	Low Low Alarm Set/Value	OFF 0.0%	OFF 0.0%	
K1	Empty Pipe Alarm	NORMAL	NORMAL	
K2	Self-disgnosis function	ON	ON	
K3	Alarm Output Preset	WITHOUT EMP	WITHOUT EMP	
L1	Rate-of-change Limit	0.0%	0.0%	
L2	Control Limit Time	0 sec	0 sec	

Meter Size		*1 Ex.Freq (Hz)	*2 Range 1				*3 Counting Rate	
mm	inch		m^3/h	m/s	gal/min	ft/s		
2.5	1/10"	24	0.05	2.829	0.5	21.084	1L	1 gal
4	1/6"	24	0.1	2.210	1.5	24.707	1L	1 gal
6	1/4"	24	0.2	1.965	4	29.283	1L	1 gal
15	1/2"	24	2	3.144	25	29.283	$0.01m^3$	1 gal
25	1"	24	6	3.395	75	31.625	$0.01m^3$	1 gal
32	1 1/4"	24	10	3.454	125	32.171	$0.01m^3$	1 gal
40	1 1/2"	24	15	3.316	175	28.826	$0.01m^3$	1 gal
50	2"	24	25	3.537	300	31.625	$0.1m^3$	10 gal
65	2 1/2"	24	40	3.348	475	29.629	$0.1m^3$	10 gal
80	3"	24	60	3.316	650	26.766	$0.1m^3$	10 gal
100	4"	24	100	3.537	1,000	26.354	$0.1m^3$	10 gal
125	5"	24	150	3.395	1,750	31.625	$0.1m^3$	10 gal
150	6"	24	200	3.144	2,500	29.283	$1m^3$	100 gal
200	8"	24	300	2.653	4,500	29.649	$1m^3$	100 gal
250	10"	12	600	3.395	7,000	29.517	$1m^3$	100 gal
300	12"	12	900	3.537	10,000	28.283	$1m^3$	100 gal
350	14"	12	1,200	3.465	12,000	25.817	$1m^3$	100 gal
400	16"	12	1,600	3.537	16,000	26.354	$1m^3$	100 gal
450	18"	12	2,500	4.366	20,000	26.029	$1m^3$	100 gal
500	20"	6	3,000	4.244	25,000	26.354	$1m^3$	100 gal
600	24"	6	4,000	3.930	40,000	29.283	$1m^3$	100 gal

*1, *2, *3 : Setting value in each size.
*4 : These function are option.

●ERROR/ALARM●

Error/Alarm type	Indicating message	Error contents
Self-diagnosis error	*ROM ERROR*	ROM error
	RAM ERROR	RAM error
	PARAMETER FAILURE	System parameter error
	EX CURRENT OPEN	Excitation circuit error
	EX CURRENT ERROR	Excitation currenr error
	ADC ERROR	ADC error
	INVALID TOTAL	Invaid totalizer counts
Settig error	*HIGH OVER SPEC.*	Setting value exceeds the allowable high limit.
	LOW OVER SPEC.	Setting value exceeds the allowable low limit.
	HIGH OVER CNT RATE	Counting rate exceeds the allowable high limit.
	LOW OVER CNT RATE	Counting rate exceeds the allowable low limit.
	MULTI RANGE ERROR	Span is not appropriate for multi-range configuration.
Limit alarms	HIGH ALARM	Flow rate reading exceeds the high limit.
	HIGH HIGH ALARM	Flow rate reading exceeds the high high limit.
	LOW ALARM	Flow rate reading goes below the low limit.
	LOW LOW ALARM	Flow rate reading goes below the low low limit.
	OVER 125%	Measurement value exceeds the 125%
	UNDER -125%	Measurement value goes below the 125%
Empty pipe alarm	EMPTY ALARM	Detector pipe is not filled with fluid.

●Meter Size vs. Velocity/Rate●

unit: gal/min

Size (inch)	Flow rate		
	0.98ft/s	3.28ft/s	32.8ft/s
1/10"	0.02334	0.0778	0.7780
1/6"	0.05975	0.1992	1.992
1/4"	0.1344	0.4482	4.482
1/2"	0.8401	2.801	28.01
1"	2.334	7.780	77.80
1 1/4"	3.824	12.75	127.5
1 1/2"	5.975	19.91	199.1
2"	9.334	31.12	311.2
2 1/2"	15.78	52.61	526.1
3"	23.90	79.65	796.5
4"	37.35	124.5	1,245
5"	58.34	194.5	1,945
6"	84.01	280.1	2,801
8"	149.4	498.0	4,980
10"	233.4	778.0	7,780
12"	336.1	1,121	11,205
14"	457.5	1,525	15,252
16"	597.5	1,991	19,914
18"	756.0	2,521	25,206
20"	933.9	3,112	31,124
24"	1,345	4,482	44,821

unit: m^3/h

Size (mm)	Flow rate		
	0.3 m/s	1.0 m/s	10 m/s
2.5	0.005301	0.01767	0.1767
4	0.01357	0.04524	0.4524
6	0.03053	0.1018	1.018
15	0.1908	0.6361	6.361
25	0.5301	1.767	17.67
32	0.8686	2.895	28.95
40	1.357	4.523	45.23
50	2.120	7.067	70.67
65	3.584	11.95	119.5
80	5.428	18.09	180.9
100	8.482	28.27	282.7
125	13.25	44.17	441.7
150	19.08	63.61	636.1
200	33.93	113.1	1131
250	53.01	176.7	1767
300	76.34	254.5	2545
350	103.9	346.4	3464
400	135.7	452.3	4523
450	171.7	572.5	5725
500	212.1	706.9	7069
600	305.4	1018	10180

●Accuracy●

Micro meter size (Diameter from 2.5 to 6mm)

Flow rate as a percentage of range	Flow speed of full scale	
	From 0.3 to 1.0m/s (0.98 to 3.28 ft/s)	From 1.0 to 10m/s (3.28 to 32.8 ft/s)
From 0 to 50%FS	±0.8% FS	±0.4% FS
From 50 to 100%FS	±0.8% FS	±0.8% of rate

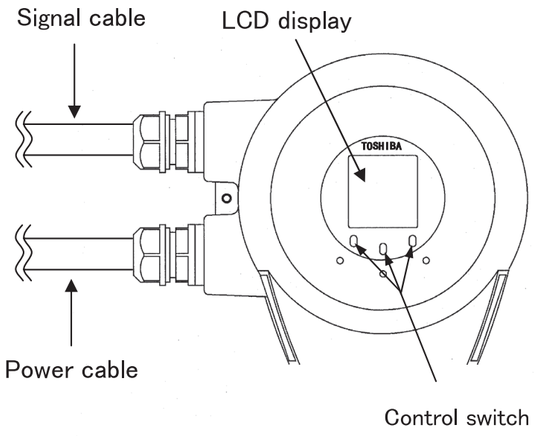
Small/Middle meter size (Diameter from 15mm to 450mm)

Flow rate as a percentage of range	Flow speed of full scale	
	From 0.1 to 1.0m/s (0.328 to 3.28 ft/s)	From 1.0 to 10m/s (3.28 to 32.8 ft/s)
From 0 to 20%FS	±0.25% FS	±0.1% FS
From 20 to 50%FS		±0.5% or rate
From 50 to 100%FS	±0.5% of rate	

Large meter size (Diameter 500 mm or longer)

Flow rate as a percentage of range	Flow speed of full scale	
	From 0.3 to 1.0m/s (0.98 to 3.28 ft/s)	From 1.0 to 10m/s (3.28 to 32.8 ft/s)
From 0 to 100%FS	±0.8% FS	±0.5% FS

●LCD●



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