Turbine Flow Meter **Model: LWQ**

Gas Turbine Flow Meter

MT100TBG-LWQ Series

Without Compensation and with compensation type

METERY TECH INC

Content

Warning

When the Flowmeter is installed at explosion hazard field, DON'T remove the COVERPLATE when the meter is powered. Please make parameter setting at safe filed prior to installation.

Special Notice

Pictures & Descriptions are for your information only, please refer to the actual product. Parameters are subjected to changes without notice.

1.0 GENERAL INFORMATION

This manual will assist you in installing, using and maintaining your turbine flow meter. It is your responsibility to make sure that all operators have access to adequate instructions about safe operating and maintenance procedure.

Warning

For your safety, review the major warnings and cautions below before operating your equipment.

1. Use only fluids that are compatible with the housing material and wetted components of your turbine.

2. When measuring flammable gas, observe precautions against fire or explosion.

3. When handling hazardous gas, always follow the gas manufacturer's safety precautions.

4. When working in hazardous environments, always exercise appropriate safety precautions.

5. During turbine removal, gas may leak. Follow the gas manufacturer's safety precautions for clean up of minor spills.

6. Handle the rotor carefully. Even small scratches or nicks can affect accuracy.

7. When tightening the turbine, use a wrench only on the wrench flats.

8. For best results, calibrate the meter at least 1 time per year.

Product Description

LWQ series turbine flow meters have the features: high accuracy, good repeatability, convenient installation/maintenance, simple structure etc.

Gas flows through the turbine housing causing an internal rotor to spin. As the rotor spins, an electrical signal is generated in the pickup coil. This signal is converted into engineering units (liters, cubic meters, gallons etc.) on the local display where is applicable. Optional accessory modules can be used to export the signal to other equipment.

Upon receipt, examine your meter for visible damage. The turbine is a precision measuring instrument and should be handled carefully. Remove the protective plugs and caps for a thorough inspection. If any items are damaged or missing, contact distributor.

Make sure the turbine flow model meets your specific needs. For your future reference, it might be useful to record this information on nameplate in the manual in case it becomes unreadable on the turbine.

2.0 SPECIFICATIONS

Performance

Repeatability: ±0.2%

Accuracy: Standard: ± 1.5% (Qmin ~ 0.2*Qmax: ± 3.0%; 0.2*Qmax ~ Qmax: ± 1.5%)
Optional: ± 1.0% (Qmin ~ 0.2*Qmax: ± 2.0%; 0.2*Qmax ~ Qmax: ± 1.0%)
(Comply to criteria: ISO9951)

Wetted Components

Housing: Standard - Tungsten Carbide;
Optional - 304, 316 Stainless Steel

Bearings and Shaft: ABS (Corrosion Resist) or Aluminum-Alloy

Rotor: ABS (Corrosion Resist) or Aluminum-Alloy

Retaining Rings: 304 Stainless Steel

Output Signal: (Where applicable)

Sensor: Pulse signal (Low Level: ≤0.8V; High Level: ≥8V)

Transmitter: 4 to 20 mA DC current signal

Signal Transmission Distance: ≤1,000 m

Electrical Connections:

Basic Type: Hausman Connector or three-core cable

Explosion Proof Type: ISO M20×1.5 Female

Explosion Proof Level:

Standard: None

Optional: ExdIIBT6

Protection Level: IP65

3.0 OPERATION CONDITIONS

Ambient:

Temperature: -10℃ to +55℃
Pressure: 86 to 106 KPa
Relative Humidity: 5% to 90%

Power Supply:

Sensor: +12V DC (Optional: +24V DC)
Transmitter: +24V DC
Field Display Type B: Integral 3.2V Lithium Battery
Field Display Type C: +24V DC

Fluid Temperature and Pressure:

Temperature: -30℃ to +80℃
Pressure: Fluid pressure should be limited according to flange rating.

Measurable Flow Rate Range and Pressure Level: (See table 1)

Table 1. Measurable Flow Rage Range and Pressure Rating

Nominal Diameter		Standard Flow Range (SFR)		Extended Flow Range (EFR)		Standard Pressure Rating
(mm)	(in.)	Mark	(m^3/h)	Mark	(m^3/h)	(MPa)
25	1	S1	3 to 30	W1	1.5 to 30	2.5
		S2	4 to 40	W2	2 to 40	2.5
				W3	0.5 to 4	2.5
				W4	0.7 to 7	2.5
				W5	1.5 to 30	2.5
40	1.5	S1	5 to 50	W1	2.5 to 50	2.5
		S2	8 to 80	W2	4 to 80	2.5
50	2	S1	10 to 100	W1	5 to 100	2.5
		S2	15 to 150	W2	8 to 150	2.5
65	2.5	S	15 to 200	W	10 to 200	1.6
80	3	S1	15 to 300	W1	10 to 300	1.6
		S2		W2	15 to 350	1.6
100	4	S	20 to 400	W1	15 to 400	1.6
				W2	20 to 500	1.6
125	5	S	20 to 800	W1	18 to 800	1.6
				W2	20 to 900	1.6
150	6	S	50 to 1000	W1	25 to 1000	1.6
				W2	50 to 1200	1.6
200	8	S	150 to 2000	W	80 to 2500	1.6
250	10	S	200 to 3000	W	150 to 3500	1.6
300	12	S	250 to 4000	W	200 to 4000	1.6
400	16	S	400 to 8000	W	260 to 8000	1.6

4.0 MODEL AND SELECTION

Model

4.1 Turbine Flow Sensor/Transmitter

LWQ-N Type Sensor: 12 to 24V DC Power Supply; Pulse Output
LWQ-A Type Transmitter: 24V DC Power Supply; 2-wire 4 to 20 mA Output

Basic Type (Without Explosion Proof) and Explosion Proof Type are optional for LWQ-N and LWQ-A.

Basic Type

Explosion Proof Type

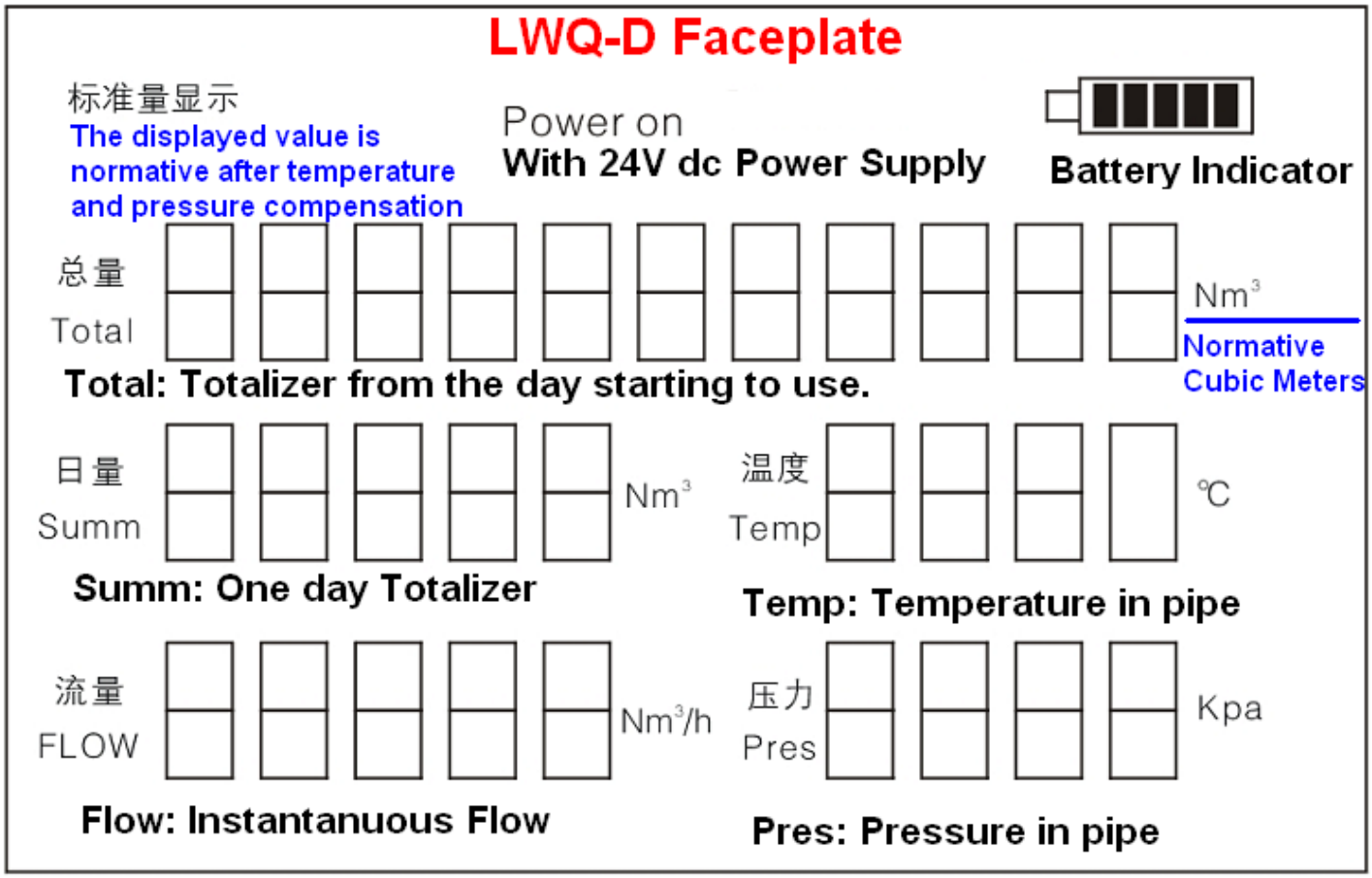
4.2 Intelligent Integrated Turbine Flow Meter

- 4 digital instantaneous flow display
- 8 digital totalizator flow display (Resettable)
- With Explosion Proof (Level: ExdIIBT6)
- 3-Point Correction and Non-linearity Compensation on K-Factor

Note: The K-Factor represents the number of output pulses transmitted per cubic meter (Optional: Liter and Gallons) of fluid passing through the turbine meter. Each turbine has a unique K-Factor. However, turbine meters are not functionally consistent throughout the full flow range of the meter. Therefore, correction and non-linearity compensation on K-Factor can enhance accuracy.

LWQ-B Type: powered with 3.2V10AH lithium battery (Battery life > 4 years); no output
LWQ-C Type: 24V DC Power Supply; 2-wire 4 to 20 mA Output (Optional: RS485 or HART)

LWQ-D Type (With temperature and pressure compensation): 24V DC Power Supply



Model Selection (See Table 2)

Table 2. Model Selection Guidance

Model Suffix Code							Description (SFR: Standard Flow Range)
LWQ-	□	/□	/□	/□	/□	/□	
Type	N						Basic Type: +12V to +12V DC Power Supply; Pulse Output
	A						4 to 20 mA current output
	B						Battery Power Supply with filed Display
	C						Field Display and 4 to 20 mA current output
	C1						Standard: 24V DC with Pulse output and RS485 Optional: 4-20mA Output
	D						Field Display and output; Temperature and Pressure Compensation
Nominal Diameter (mm)		25					DN25
		40					DN40
		50					DN50
		65					DN65
		80					DN80
		100					DN100
		125					DN125
		150					DN150
		200					DN200
		250					DN250
		300					DN300
		400					DN400
Range Selection			W(X)				Extended Flow Range: Refer to table 1
			S(X)				Standard Flow Range: Refer to table 1
Housing Material				S			304 Stainless Steel
				I			Carbide Iron
				L			Aluminum-Alloy
Core Material (Rotar, Bearing)					S		Corrosion Resistance ABS
					L		Aluminum-Alloy
Structure						N	Standard Structure
						A	For Oxygen Only (O_2 Only)
						B	Compressed-Air Only

5.0 CAUTIONS FOR INSTALLATION

Mounting Positions

Turbine flow meters should be installed at the place in compliance with the requirements below:

- ♦ Easy maintenance
- ♦ No vibration
- ♦ No electromagnetic interface
- ♦ Away from heat source

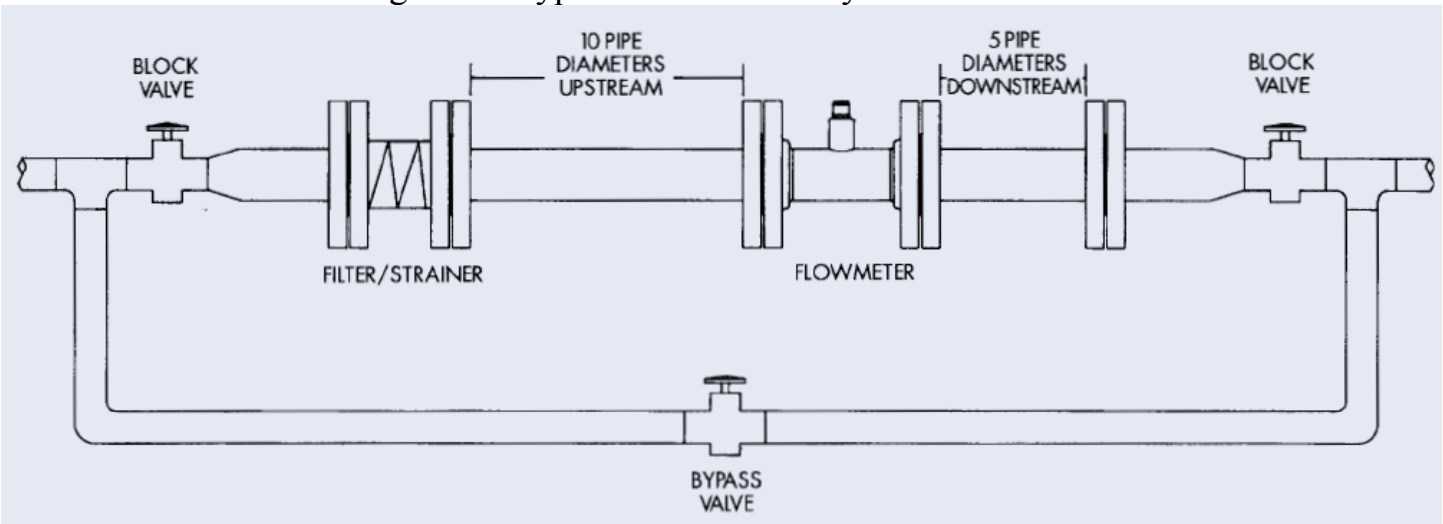
Mounting Orientation

All turbine flow meters are designed to measure flow in only one direction. The direction is indicated by the arrow on the body.

Required Lengths of Straight Runs

Flow altering device such as elbows, valves and reducers can affect accuracy. See diagram 1 for typical flow meter system installation.

Diagram 1. Typical Flow Meter System Installation

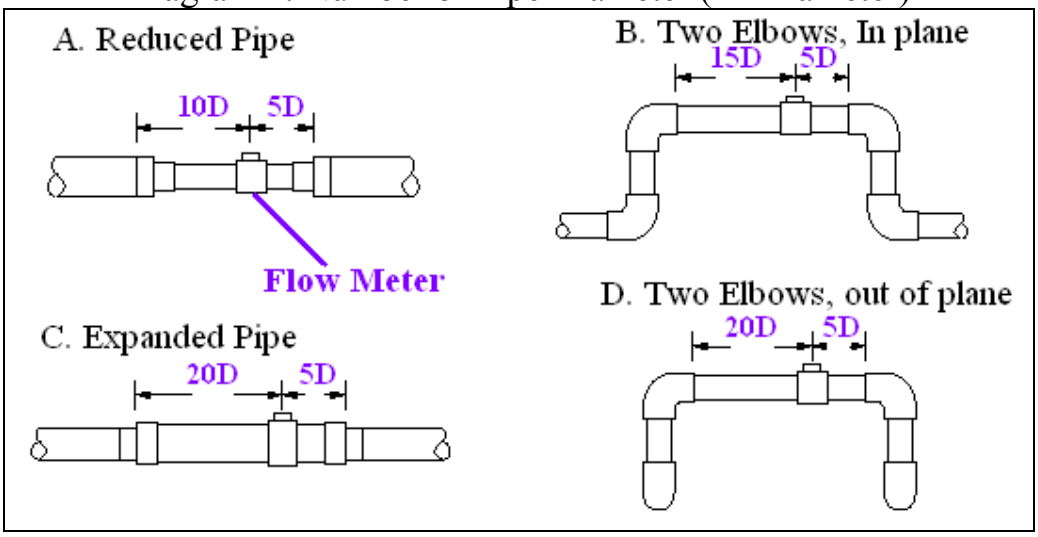


The recommended guidelines are given to enhance accuracy and maximize performance. Distance given here are minimum requirements; double them for desired straight pipe lengths.

- Upstream: allow a minimum straight pipe length at least 10 times the internal diameter of the pipe. For example, with the 50mm pipe, there should be 500mm of straight pipe immediately upstream. Desired upstream straight pipe length is 1000mm.
- Downstream: allow a minimum straight pipe length at least 5 times the internal diameter of the pipe. For example, with the 50mm pipe, there should be 250mm of straight pipe immediately upstream. Desired upstream straight pipe length is 500mm.

See diagram 2 for straight pipe length requirement when there is altering device.

Diagram 2. Number of Pipe Diameter (D=Diameter)



Warning: Precaution for direct sunshine and rain when the meter is installed outside.

Special Notice

- Foreign material in the gas being measured can clog the meter's rotor and adversely affect accuracy. If this problem is anticipated or experienced, install screens to filter impurities from incoming gas.

- When the meter contains removable coverplates. Leave the coverplate installed unless accessory modules specify removal. Don't remove the coverplates when the meter is powered, or electrical shock and explosion hazard can be caused.

- Avoid to open the valve from shut to full open, as the sudden flow can cause permanent damage on turbine's rotor.

Flange Connections

The flange follows ISO 7005-1; BS4504 RF (Raised Face).

Note: flange can be customized following other criterias.

Use a gasket between the meter flange and mating flange. Determine the material of the gasket based on the operating conditions and type of fluid.

Note: Do not over tighten the flange bolts. This may cause the gasket to be compressed into the flow stream and may decrease the accuracy of the meter.

Installation Dimensions

Thread or flange connection is used according to different flow models. See Figure 1 and Table 3 for detailed dimensions.

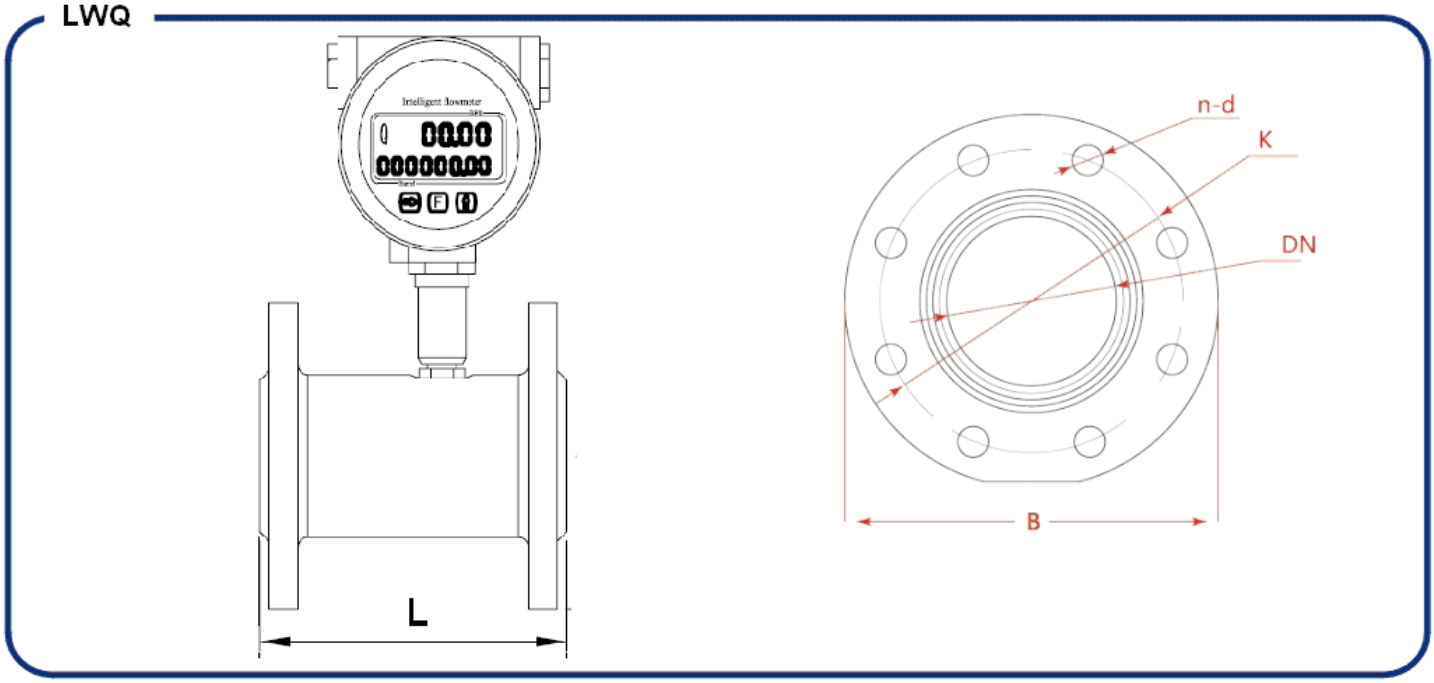


Figure1: Installation Dimension

Table 3. Dimensions (mm)

3.1 Flange: BS4504 PN16 (DIN PN16)				
Diameter DN	**L**	**B**	**K**	**n × Φ d**
25	170	115	85	4 × 14
40	200	150	110	4 × 18
50	220	165	125	4 × 18
65	220	185	145	4 × 18
80	240	200	160	8 × 18
100	300	220	180	8 × 18
125	340	250	210	8 × 28
150	450	285	240	8 × 22
200	500	340	295	8 × 22
250	500	400	355	12 × 26
300	500	460	410	16 × 26
400	1200	580	525	16 × 30

6.0 ELECTRICAL WIRING

Warning: Electrical Hazard
Disconnect power before beginning installation.

Turbine Flow Sensor/Transmitter (Type: LWQ-N, LWQ-A)

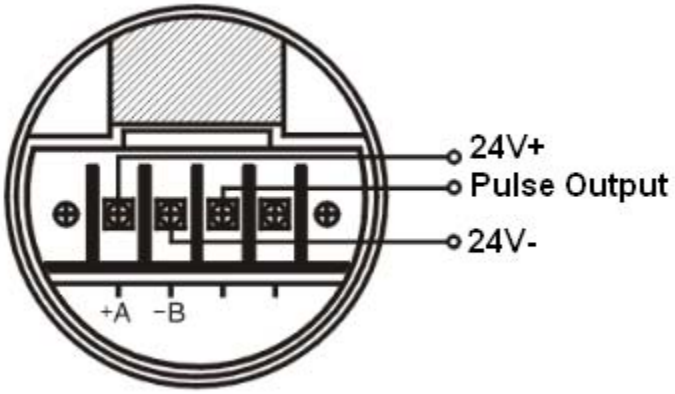
- Basic Type: LWQ-N (See Table 4)

Table 4. Terminal wiring for LWQ-N

Terminal Symbols	Description
Red Wire	Power Supply: "24V+"
White Wire	Power Supply: "24V-"
Yellow Wire	Pulse Output

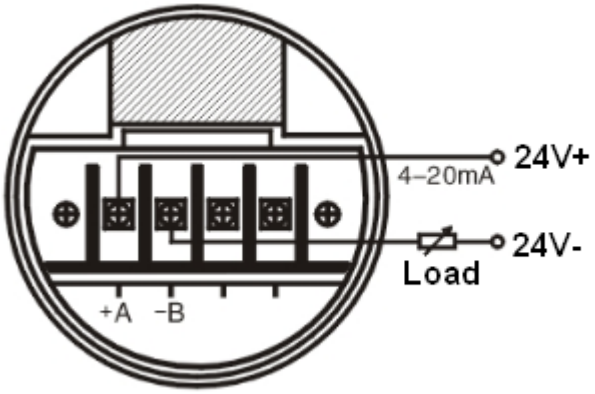
- Explosion Proof Type: LWQ-N (See Figure 2)

Figure 2. Terminal configuration and terminal wiring for LWQ-N Explosion Proof Type



- Explosion Proof Type: LWQ-A (See Figure 3)

Figure 3. Terminal configuration and terminal wiring for LWQ-A Explosion Proof Type



Intelligent integrated Turbine Flow Meter (Type: LWQ-C)

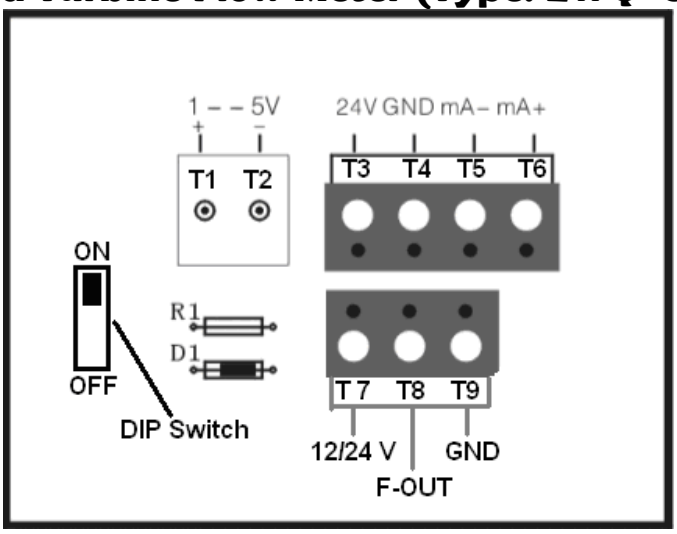


Figure 4. Terminal Configuration for LWQ-C

Table 5. Terminal wiring for LWQ-C

Function (Optional)	Terminal Symbols	Description
(2 wires) 4 to 20 mA Output	T3: 24V	Current Output 4 to 20 mA DC (+)
	T4: GND	Current Output 4 to 20 mA DC (-)
(3 wires) 4 to 20 mA Output	T3: 24V	24V+ DC Power Supply
	T4: GND	24V- DC Power Supply
	T6: mA+	Current Output 4 to 20 mA DC (+)
(4 wires) 4 to 20 mA Output	T3: 24V	24V+ DC Power Supply
	T4: GND	24V- DC Power Supply
	T5: mA-	Current Output 4 to 20 mA DC (-)
	T6: mA+	Current Output 4 to 20 mA DC (+)
Pulse Output	T7: 12/24 V	12/24V: 12V+ to 24V+ DC Power Supply
	T8: F-OUT	F-OUT: Pulse output
	T9: GND	GND: 24V- DC Power Supply
1 to 5V DC Output	T1: +	1 to 5V DC output (+)
	T2: -	1 to 5V DC output (-)
	T3: 24V	24V+ DC Power Supply
	T4: GND	24V- DC Power Supply

DIP Switch Function: (Default position: OFF)

ON: Terminal T4 (GND) connects to Housing, solving 50Hz interference.

OFF: Disconnect the connection between Terminal T4 (GND) and Housing.

Note: When multi flow meters are powered with same power supply, only one meter's DIP switch can be set at "ON" and others should be at "OFF" position.

Intelligent integrated Turbine Flow Meter (Type: LWGY-□C1)

DIP Switch	Description
1	ON: Original Frequency Output
2	ON: Pulse Output (m3)
3	ON: Scaled Pulse Output (1L; 10L; 100L)
4	ON: NC

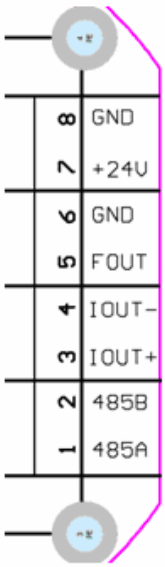
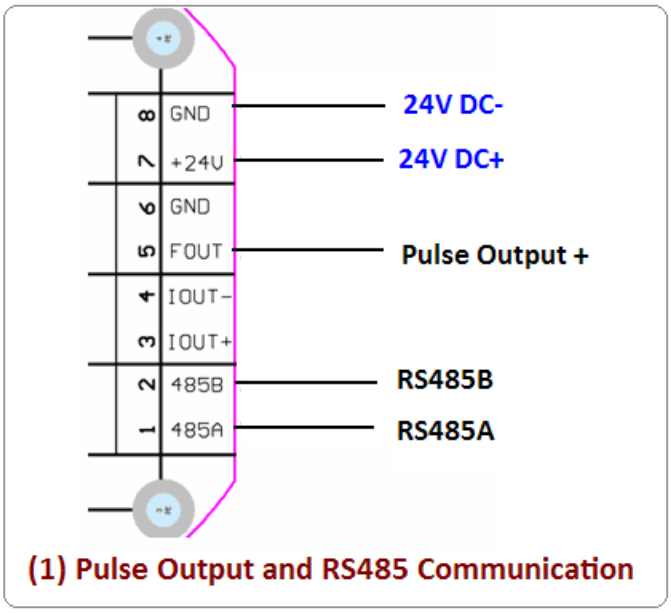


Figure 1. Terminal Wiring for LWQ-C1 (Four Buttons Display)

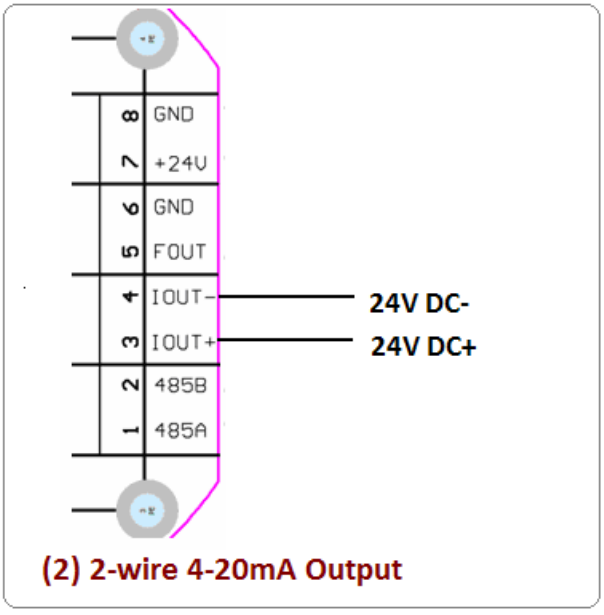
Table 1. Terminal wiring for LWQ-C1

Function (Optional)	Terminal Code	Terminal Symbols	Description
(2 wires) 4 to 20 mA Output	3	IOUT+	Current Output 4 to 20 mA DC (+)
	4	IOUT-	Current Output 4 to 20 mA DC (-)
(3 wires) 4 to 20 mA Output	7	+24V	24V+ DC Power Supply
	8	GND	24V- DC Power Supply
	3	IOUT+	Current Output 4 to 20 mA DC (+)
（4 wires）4 to 20mA Output	7	+24V	24V+ DC Power Supply
	8	GND	24V- DC Power Supply
	3	IOUT+	Current Output (+)
	6	GND	Current Output (-)
Pulse Output and RS485 Communication	7	+24V	24V+ DC Power Supply
	8	GND	24V- DC Power Supply
	5	FOUT	Pulse output+
	6	GND	Pulse output-
	1	485A	RS485+
	2	485B	RS485-

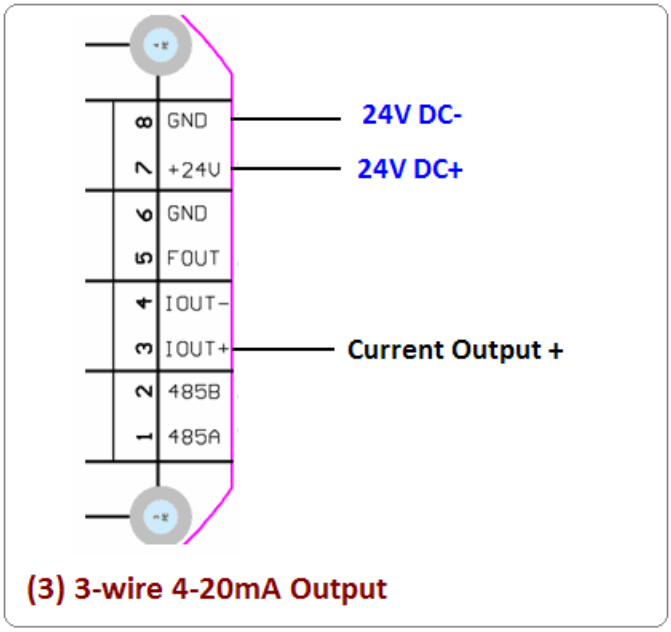
Please refer to picture below for detailed electrical wiring.



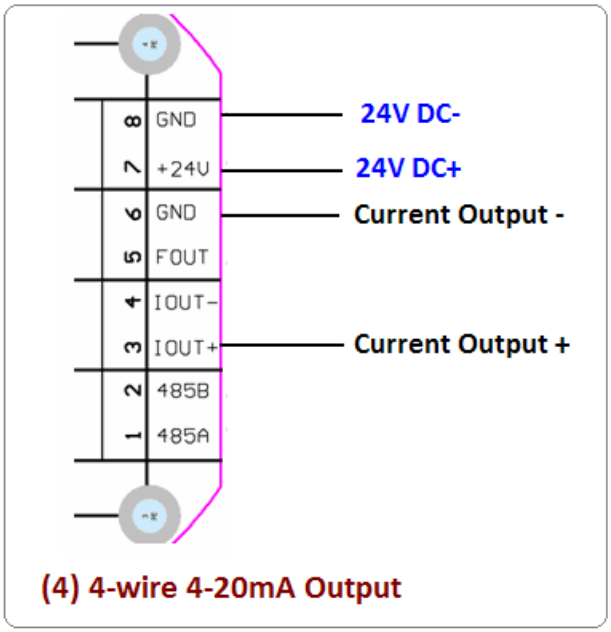
(1) Pulse Output and RS485 Communication



(2) 2-wire 4-20mA Output



(3) 3-wire 4-20mA Output



(4) 4-wire 4-20mA Output

Intelligent integrated Turbine Flow Meter (Type: LWQ-D)

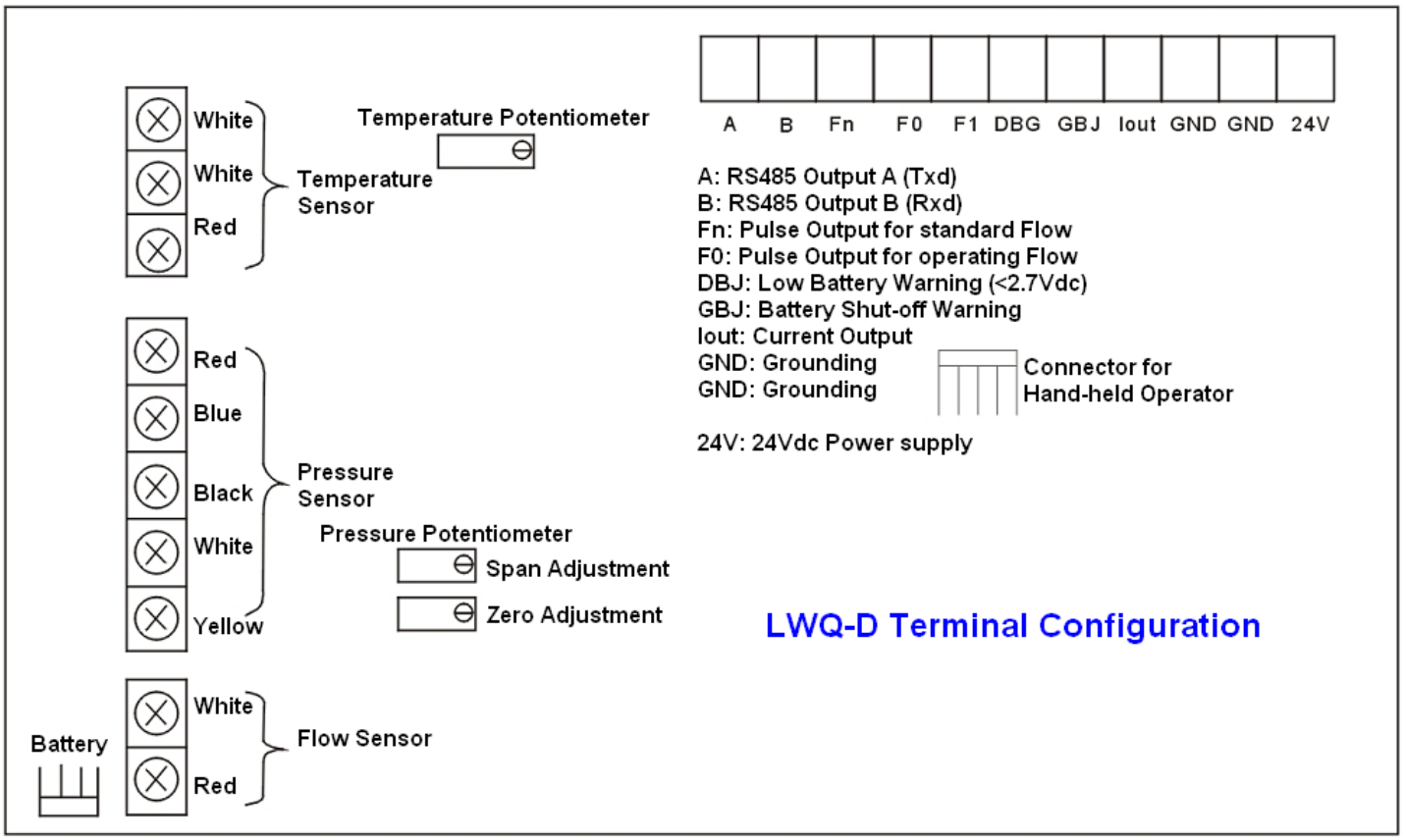


Figure 5. Terminal Configuration for LWQ-D

7.0 OPERATION AND SETUP

Basic Type: LWQ-N Turbine Flow Sensor

The sensor has been calibrated and qualified prior to leave the plant. Connections between this sensor and secondary instrument: At first check whether the sensor's output characters (pulse's frequency, amplitude and width) can match secondary instrument's input characters. Set secondary instrument's parameter according to sensor's K-Factor.

A Type: LWQ-A Turbine Flow Transmitter

According to customer's requirement, the current output for zero and full-scale flow has been adjusted prior to leave the plant.

B Type: LWQ-B Intelligent Turbine Flow Meter

Parameter Setup: (Authorized Engineer only)

Warning: Don't change the parameter unless get the approval from distributor. Even minor change on parameter can affect accuracy.

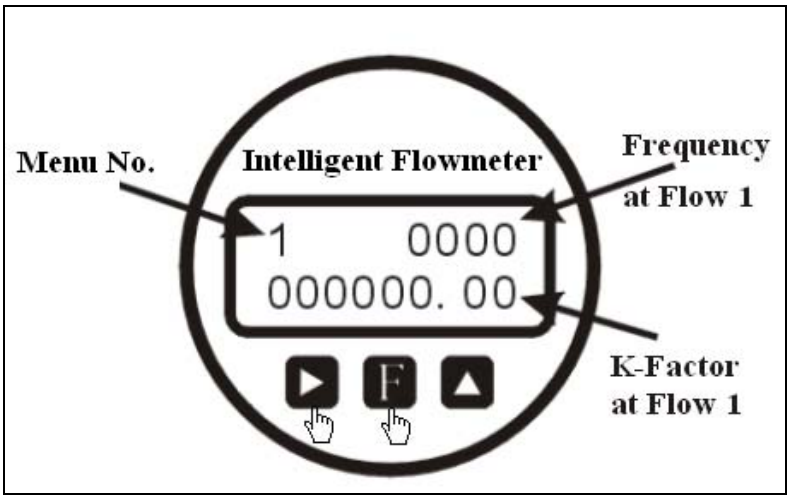


Figure 6. Enter Parameter Setup

To enter parameter setup, press and hold the ▶ and F buttons until the display changes.

Press ▶ to change cursor position: cursor-right

Press ▲ to change value

Press F to advance to next menu.

Press and hold ▶ F to exit and save setting.

To reset totalizator flow, under working state press and hold F ▲

C Type: LWQ-C Intelligent Turbine Flow Meter (4 to 20 mA output)

Parameter setup same as LWQ-B on Page 13. While C Type has totally 4 menus, and menu No.4 is the flow corresponding to 20 mA current output. See figure 8.

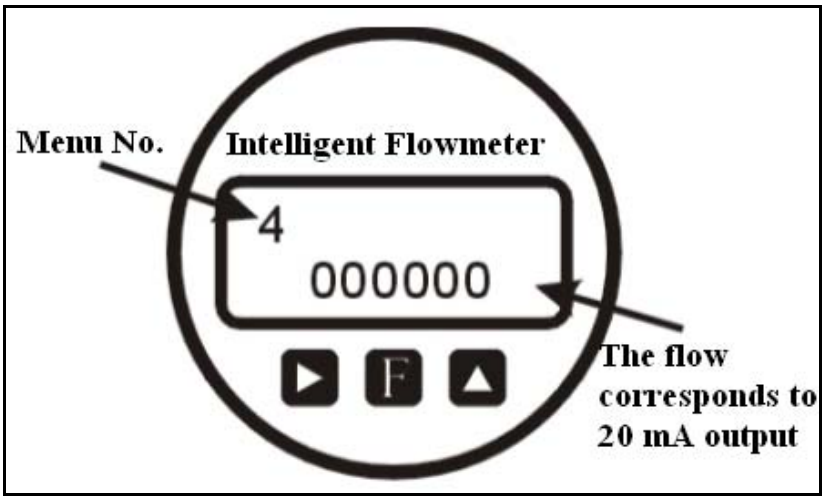


Figure 7. Menu No.4 for LWQ-C

C1 Type: LWGY-□C1 Intelligent Turbine Flow Meter

Four Buttons: "SET"; "→"; " ↑ "; "ESC"

"SET": Enter parameter setting; advance to next menu; save setting
"ESC": Exit current menu
"→": Change cursor position
" ↑ ": Change value

Password	Note
1234	Can view and change the parameters
5678	Save this setting as factory parameter
1111	Restore to factory parameter
Invalid Password	Only can view parameter

Menu Code	Menu Name (Unit)	Value	Note
User Setting for 4 KEYS Converter			
F - - - 01	Unit	1: m3 2: L	Please refer to unit on nameplate
F - - - 02	Scaled Pulse Output	1: 1L/Pulse 10: 10L/Pulse 100: 100L/Pulse	
F - - - 03	Damping	1-10 second	Default Value: 4 second
F - - - 04	Max. Flow Rate		The max. flow rate
F - - - 05	Small Flow cutoff		Unit: same as F---01.
F - - - 06	Max. Frequency Output	0-3000 Hz	
F - - - 07	Baud Rate	1200; 2400; 4800; 9600; 19200	Unit: Hz; Data format: n, 8, 1
F - - - 08	Unit Address – RS485	01-99	
F - - - 09	Frequency Output Mode	1: Original Frequency 2: Corrected Frequency	If only K1 is set, and others blank, then should be set to 1. If K1-K5, Average K-Factor are set, then F---09 must be set to 2
F - - - 10	Reset Totalizer		Set the new default value for totalizer
P1	K1		The frequency and factor should be input at same time
P2	K2		The frequency and factor should be input at same time
P3	K3		The frequency and factor should be input at same time
P4	K4		The frequency and factor should be input at same time
P5	K5		The frequency and factor should be input at same time
P	Average K-Factor		This value is used for output when there is more than one K. For example: K1, K2, K3 (3 point nonlinearity correction) If only one K factor is used: K1. Then this value should be left blank.

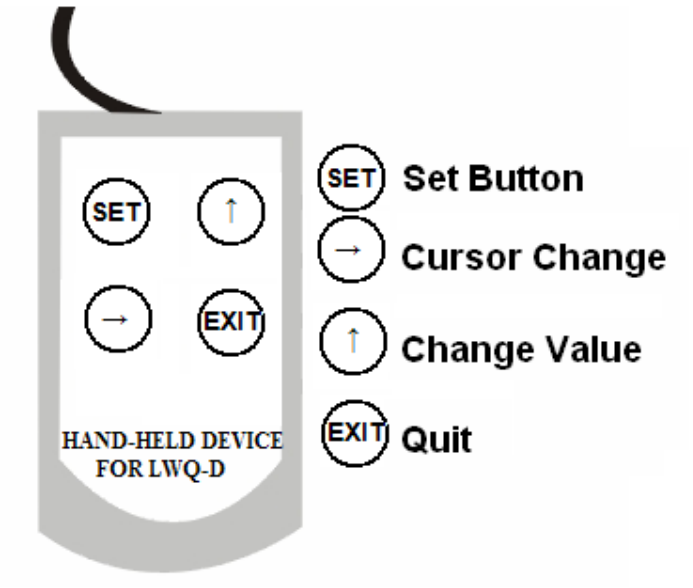
D Type: LWQ-D Intelligent Turbine Flow Meter (Temperature and Pressure Compensation)

(1) Parameters Illustration

Parameter Number	Description
01	The Max Flow corresponding to 20mA
02	K1 (First K-Factor)
03	f1 (The frequency corresponding to K1)
04	K2 (Second K-Factor)
05	f2 (The frequency corresponding to K2)
06	K3 (Third K-Factor)
07	f3 (The frequency corresponding to K3)
08	K4 (Fourth K-Factor)
09	f4 (The frequency corresponding to K4)
10	K5 (Fifth K-Factor)
11	f5 (The frequency corresponding to K5)
12	K6 (Sixth K-Factor)
13	Pressure Upper Limit
14	Local Atmospheric Pressure
15	Address For RS485
16	Totalizer Reset (2: clear Totolizer without compensated; 3: clear totalizer which has been compensated; 9: Clear all
17	
18	
19	Resevered Parameters

(2) Hand-held Operator

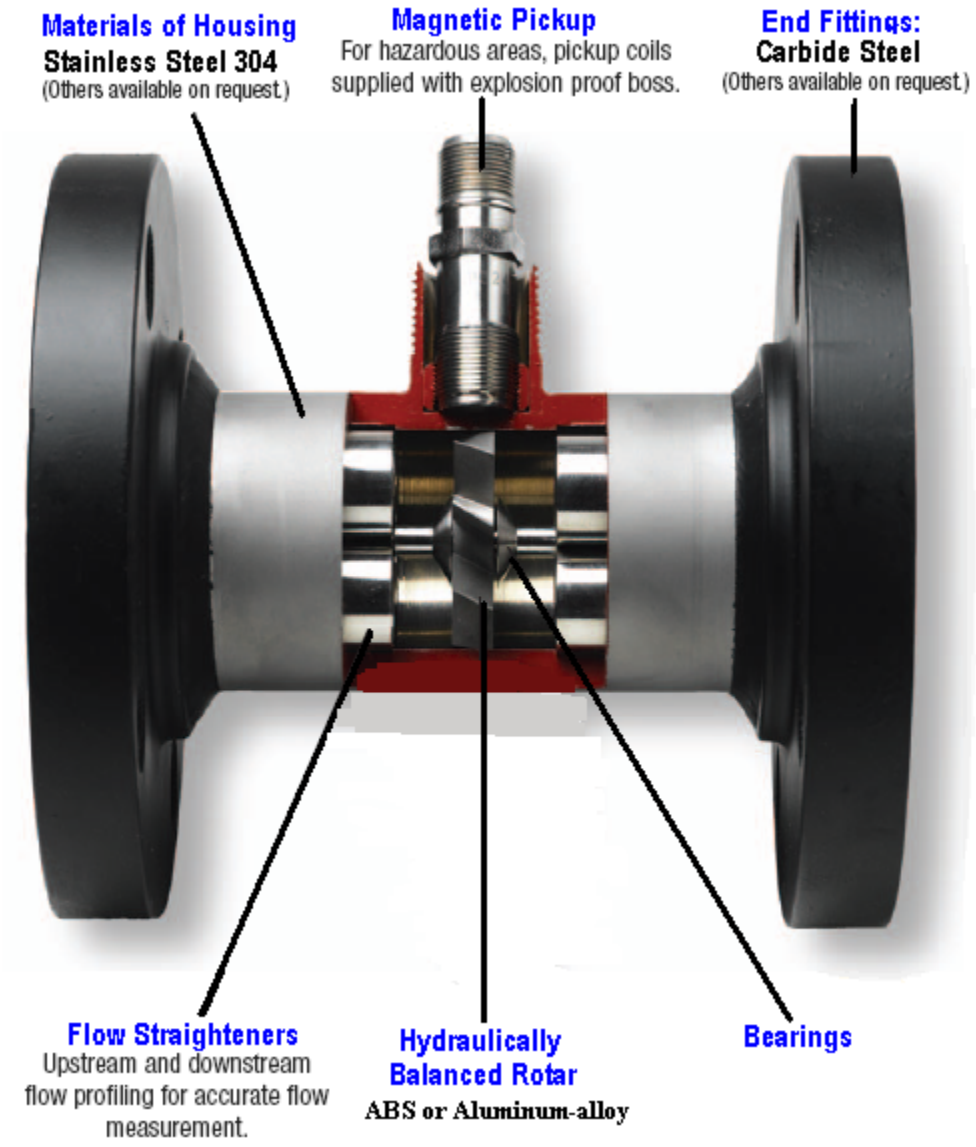
Warning: Push "Set" Button to save your setting.

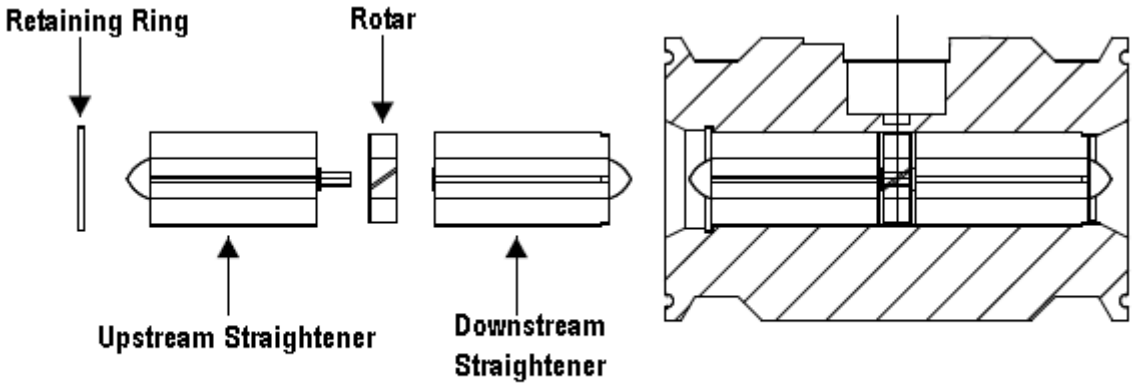


8.0 TROUBLESHOOTING

Symptom	Probable Cause	Solution
Measurement is not accurate	1. Turbine operated below minimum rate.	Increase flowrate. Refer to Section 3.0 Operation Conditions
	2. Installed too close to fittings.	Install correctly. Refer to Section 5.0 Cautions for Installation
LCD Display Abnormity	1. Battery Power Type: Bad contact on the connector between battery and PCB	Open back cover and repower the flow meter
	2. DC Power Type: supply voltage is abnormal	Check and ensure power supply is 24V DC

9.0 METER CONSTRUCTION





Exploded View of Internals

Assembled Internals

Annex 1. LWQ-C1 RS485 Communication Protocol

Transmission Mode: RS485 Modbus-RTU

Protocol: (1200 2400 4800 9600), NONE/ODD/EVEN, 8 Data Bits, 1 Stop Bit

- Telegram Frame (Query) :

  1 Start Bit : (1 BYTE) 'Z' 0x5a

  Unit Address : (2 BYTE) ("00" - "99")

- Telegram Frame (Response) :

  1 Start Bit : (1 BYTE) 0x3d

  Unit Address : (2 BYTE) Equal to the value of Unit Address in Query

  Data Structure : (x BYTE) See Note 1

  CRC (2 BYTE) See Note 2

Note 1: **Data Structure definition for response from flowmeter :**

Flow rate : xxxxxxx 7 Bytes (m3/h)

Total Flow : xxxxxxxxxxx 11 Bytes (m3)

Note 2: **CRC**

CRC Total is formed across the entire telegram and then appended at the end.

Example for getting flow from flowmeter:

	(ASCII Hex)	Description (Char)
Query	5a	Start Bit
	30 30	Unit Address: 00
Response	3d	Start Bit
	30 30	Unit Address: 00
	31 32 33 2e 34 35 36	Flow rate: 123.456 m3/h
	20 20 31 32 33 34 2e 35 36 37 38	Total Flow: 1234.5678
	04 12	CRC

Annex 2. LWQ-D RS485 Communication Protocol

A.1 Foreword

LWQ-D Gas Turbine Flowmeter's RS485 utilizes MODBUS RTU Format. The baud rate is selectable, and data format: n, 8, 1.

LWQ flowmeter utilizes three function commends of MODBUS Protocol.

Command 3	Read single or multi register	
Command 6	Write single register	This Command can be replaced by Command 16
Command 16	Write multi register	

This Protocol defines the device address between 1-247, and the broadcast is not supported.
All flowmeter's data are saved as single byte (8 bits) or character (16 bits).

The data is classified to two type based on the authority.

Number	Data	Property	Register Address
01	Record message	See list below	1000~1224
02	History records	See list below	2000~2042

All parameters follow Hex format. Total Flow: BCD Code Format.
Others are integer or float; float data follows IEEE754 format.

The property of register includes Read and Write; R: ONLY read; W: Write; R/W: Read and Write.

Command 3（Read register）

MODBUS Request

Device Address	1 BYTE	1 TO 0XF7
Function Code	1 BYTE	0X03
Starting Address	2 BYTE	0X0000 TO 0XFFFF
Data Gotten	2 BYTE	1 TO 125(0X7D)
CRC Check	2 BYTE	

MODBUS Response

Device Address	1 BYTE	1 TO 0XF7
Function Code	1 BYTE	0X03（0X06 或 0X10）
Byte Calculation	1 BYTE	N*2
Input State	N*2 BYTE	
CRC Check	2 BYTE	

Error Response
When the error occurs, (1) the data below is sent back; (2) there is no response.

Device Address	1 BYTE	1 TO 0XF7
Function Code	1 BYTE	0X03 (0X06 or 0X10) + 0X80
Error Code	1 BYTE	0x1 or 0x2 or 0x3
CRC Check	2 BYTE	

For example (Command 3):

Request		Response	
Domain Name	Data（hex）	Domain Name	Data（hex）
Device Address	01	Device Address	01
Function Code	03	Function Code	03
Starting Address - High (Byte)	00	Byte Calculation	06
Starting Address - Low (Byte)	6B	Register High（108）	02
Read Data – High (Byte)	00	Register Low（108）	2B
Read Data – Low (Byte)	03	Register High（109）	00
		Register Low（109）	00
		Register High（110）	00
		Register Low（110）	64
CRC Check	Check Code	CRC Check	Check Code

Command 6（Write single byte）

MODBUS Request

Device Address	1 BYTE	1 TO 0XF7
Function Code	1 BYTE	0X10
Register Address	2 BYTE	0X0000 TO 0XFFFF
Register Content	2 BYTE	
CRC Check	2 BYTE	

MODBUS Response

Device Address	1 BYTE	1 TO 0XF7
Function Code	1 BYTE	0X03（0X06 or 0X10）
Register Address	2 BYTE	0X0000 TO 0XFFFF
Register Content	2 BYTE	
CRC Check	2 BYTE	

Error Response

When the error occurs, (1) the data below is sent back; (2) there is no response.

Device Address	1 BYTE	1 TO 0XF7
Function Code	1 BYTE	0X03（0X06 or 0X10）+ 0X80
Error Code	1 BYTE	0x1 or 0x2 or 0x3
CRC Check	2 BYTE	

For example (Command 6):

Request		Response	
Domain Name	Data（hex）	Domain Name	Data（hex）
Device Address	01	Device Address	01
Function Code	06	Function Code	06
Register Address-High	00	Starting Address – High (Byte)	00
Register Address-Low	6B	Starting Address – Low (Byte)	6B
Register Value - High	00	Register Value - High	00
Register Value - Low	0F	Register Value - Low	0F
CRC Check	Check Code	CRC Check	Check code

2. Parameters record table

Property	Address	Register Length	Data Type	Symbol	Description
R	1000	2	SINGLE	QBT	Flow rate at normative state
R	1002	2	SINGLE	QM	Flow rate at operating state
R	1004	2	SINGLE	TEP_PT	Temperature
R	1006	2	SINGLE	DELT_P	Pressure
R	1008	1	Uint	Vbat	Battery Voltage
R/W	1009	3	2BCD	VBT1	Volume at normative state
R/W	1012	3	2BCD	VM1	Volume at operating state
R/W	1015	3	2BCD	VBTT1	Today's Volume at normative state
R/W	1018	3	2BCD	VBTP1	Yesterday's Volume at normative state
R/W	1021	3	2BCD	VMT1	Today's Volume at operating state
R/W	1024	3	2BCD	VMP1	Yesterday's Volume at operating state
R/W	1027	3	2BCD	VBMT1	Current Month's Volume at normative state
R/W	1030	3	2BCD	VMMT1	Current Month's Volume at operating state
R/W	1033	3	2BCD	VBMP1	Last Month's Volume at normative state
R/W	1036	3	2BCD	VMMP1	Last Month's Volume at operating state
R	1039	2	SINGLE	CFACTOR	Compressed Factor
R	1041	2	SINGLE	KFACTOR	Corrective K-Factor
R/W	1043	1	Uint	BAUD	☆Baud Rate
R/W	1044	1	Uint	ADR_ISR	☆Device Address
R/W	1045	2	SINGLE	FS	Full scale
R/W	1047	3	1BCD	SERNO	Flowmeter's Series Number
R/W	1050	2	1BCD	CALTM	Production Date
R/W	1052	1	1BCD	VERSION	Version

3. Meter's parameters table

Property	Address	Register Length	Data Type	Symbol	Description
R/W	3000	2	SINGLE	Km	Average K-Factor
R/W	3002	2	SINGLE	Pcn	Pressure
R/W	3004	2	SINGLE	Tcn	Temperature
R/W	3038	2	SINGLE	N2	N2 Mol Percent
R/W	3040	2	SINGLE	CO2	CO2 Mol Percent
R/W	3042	2	SINGLE	H2	H2 Mol Percent
R/W	3044	2	SINGLE	CO	CO Mol Percent
R/W	3046	2	SINGLE	HV	Enthalpy
R/W	3048	2	SINGLE	GR	Gravity
R/W	3050	1	Uint	ZFORM	☆Compressed Factor Formula
R/W	3051	1	Uint	POUTS	☆Pulse Output
R/W	3052	1	Uint	TTIME	☆Record Interval Time
R/W	3053	2	SINGLE	Pk	Pressure Slope Correction
R/W	3055	2	SINGLE	Pa	Pressure's Zero Point Correction
R/W	3057	2	SINGLE	PFS	Pressure Range
R/W	3059	2	SINGLE	Pair	Atmospheric Pressure
R/W	3061	2	SINGLE	T_KS	Temperature Slope Correction
R/W	3063	2	SINGLE	T_0	Temperature's Zero Point Correction
R/W	3065	2	SINGLE	Z_CNT	Constant Compressed Factor
R/W	3067	1	1BCD	YEART	★Year
R/W	3068	1	1BCD	MONTDAY	★Month
R/W	3069	1	1BCD	TIMET	★Day
R/W	3070	2	SINGLE	DA4	4mA Output Regulation
R/W	3072	2	SINGLE	DA20	20mA Output Regulation
R/W	3074	2	2BCD	Po	Set Isolated Pulse
R/W	3076	2	2BCD	PIC	Set IC Card Pulse Output Range