i he appearance of the product is subject to actual product, entinel® has all right of the technical changes. отистат website Post Code : 300384 Fax: 86-22-85689517 Tel: 86-22-85689572 83726972 moɔ.enidɔ-lenitnes@seles : liem-3 Huayuan industrial park, Tianjin China

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TIANJIN SENTINEL ELECTRONICS CO., LTD.

Address : Hitech green industry base,







Thank you for choosing the Sentinel FMV series vortex flow sensor. This manual mainly describes the specifications, features, usage, and accessories of the vortex flow sensor. Please read this ma-nual carefully before using the product. Our company reserves the right to continuously improve the product. For the latest version of the documentation, please refer to the Sentinel company website (www.sentinel-china.com), as updates will not be separately notified.

1 Safety Instructions

- Please read and follow these safety precautions before installing, operating, and maintaining the product.
- To ensure personal and equipment safety, please follow the operating instructions or technical documentation to ensure that the product is suitable for your application range and is not subject to any limitations.
- This product should be used in an environment that meets the design specifications. Failure to do so may result in malfunctions, and any issues arising from non-compliance are not covered by the warranty.
- We are not liable for any personal injury or property damage caused by improper operation. Warranty claims will be void if the equipment is improperly installed or used.

2 Product Overview

In the field of industrial automation, accurate flow measurement is essential to ensure the efficiency and quality of the production process. Vortex flow sensors play an indispensable role in many application scenarios with their high precision, stability and reliability. The FMV series of small volume vortex flow sensors not only inherit the advantages of vortex flow sensors, but also make innovations in size, function and portability.

3 Features and Functions

- Von Karman vortex principle vortex flow sensor Cumulative flow recording function
- Flow, Temperature dual output, dual display Process connections with various thread specifications
- High-resolution IPS display
- M12 A code pin interface Support IO-Link communication

- Units can be selected, simple button menu operation Four viewing directions can be switched
 - The product is small in size and occupies little space

4 Product model naming rules

FMV - 040 -	- 2AO	- G38			
			Interface t	hread spec	ifications
Flowmeter vortex		Model	Corresponding specifications	Adap	table
FMV series		G38	G3/8	016	
		RC38	RC3/8	016	
		NPT38	NPT3/8	016	
Range		G12	G1/2	016	040
016: 216L/min 040: 540L/min		RC12	RC1/2	016	040
100: 10100L/min		NPT12	NPT1/2	016	040
		G34	G3/4	100	040
		RC34	RC3/4	100	040
		NPT34	NPT3/4	100	040
Output signal		G1	G1	100	
2AO: Two 4-20mA outputs		RC1	RC1	100	
IOL: Two-way switching IO-Link		NPT1	NPT1	100	

5 Wiring Diagram





Pin	2AO Output definition	2VO Output definition	IOL Output definition		
1	+24VDC	+24VDC	+24VDC		
2	(OUT2) 420mA(flow or temp)	(OUT2) 010V(flow or temp)	(OUT2) Switch(flow or temp)		
3	OV	OV	0V		
4	(OUT1) 420mA(flow or temp)	(OUT1) 010V(flow or temp)	(OUT1) Switch(flow) or IO-Link		



7 Piping precautions

When piping the product, use a wrench to connect the metal parts (pipe fittings) that are integra-ted with the piping. If a wrench is used on other parts, the flow sensor may be damaged. The safe torque for piping is shown in the table below.

Thread (G/RC/NPT)	3/8	1/2	3/4	1
Applicable torque range	22~24N.m	28~30N.m	28~30N.m	36~38N.m
Torque safety range	<200N.m	<200N.m	<200N.m	<200N.m

8 Description of switching signal data and analog signal data output





	Definition	Status Indication
1	Operation status indication	Green Flashing: Normal equipment operation
2	IO-Link Communication instructions	On: IO-Link communication normal White Off: Communication not established
2	Switch output indication	OUT1: Flow OUT2: Flow Temperature (Optional) Green On: Output Off: No output
3	Analog output indication	1T 2F: OUT1 Temperature, OUT2 Flow 1F 2T: OUT1 Flow, OUT2 Temperature
4	Error code display	Switch output: E1-E3 Indicates sensor error data abnormality Analog output: ERR1-ERR3 Indicates sensor error data abnormality
5	Flow display	White Instantaneous flow or cumulative flow
6	Temperature display	Blue Temperature or total flow
7	Setting button	

10 Key Operation





11 IO-Link Parameter

11.1 Parameter data/Request data/Indexing service(ISDU indexed service data unit)

Index	Subindex	Parameter name	Length	Permissions	describe			
0x02 2	0	System commands	1Byte	Write	0x80 128 Reset device 0x82 130 Restore factory settings			
0x10 16	0	Manufacturer name	8Byte	Read	Sentinel			
0x11 17	0	Manufacturer description	41Byte	Read	Sentinel Industrial Ethernet manufacturer			
0x12 18	0	Product name	11Byte	Read	FMV-xxx-IOL			
0x13 19	0	Product ID	8Byte	Read	19816201			
0x14 20	0	Product description	23Byte	Read	Vortexflos sensor io-link			
0x15 21	0	Serial-Number	10Byte	Read	1981620101			
0x16 22	0	Hardware version	8Byte	Read	HW-V0.01			
0x17 23	0	Software version	8Byte	Read	FW-V0.01			
0x18 24	0	Apply tags	maximum 32Byte	Read Write	ApplicationSpecificTag is used to mark the device in the application This item is defined in the IODD file, Included in the DataStorage(DS)			
0x19 25	0	Function label	maximum 32Byte	Read Write	FunctionTag is a special tag for device functions, including This item is not defined in the IODD file, It can be set directly through Index.			
0x1A 26	0	Local tags	maximum 32Byte	Read Write	LocationTag is a special tag used for local devices, including This item is not defined in the IODD file, It can be set directly through Index			
0x24 36	0	Device status	1Byte	Read	0:The equipment is operating normally; 1:Need to maintain; 2:Running incorrect environment or parameters; 3:Device abeyance; 4:Device failed to run;			

Inc	dex	Subindex	Parameter name	Length	Permissions	Ranges
0x E	(1F4 500	0	Flow Unit	1Byte	Read Write	0: L/min 1: m3/h
0x 5	(1F5 501	0	TOC1 Output 1 Type	1Byte	Read Write	0: NO Normally open 1: NC Normally Closed
0x 5	(1F6 502	0	TOC2 Output 2 Type	1Byte	Read Write	0: NO Normally open 1: NC Normally Closed
0× 5	(1F7 503	0	OUT1 Output 1 method	1Byte	Read Write	0: NPN output 1: PNP output 2: P-P push-pull output
0x E	<1F8 504	0	OUT2 Output 2 method	1Byte	Read Write	0: NPN output 1: PNP output 2: P-P push-pull output
0x	(1F9 505	0	DIS1 Output 1 Mode	1Byte	Read Write	0: HYS hysteresis mode 1: GAT window mode
0x E	(1FA 506	0	DIS2 Output 2 Mode	1Byte	Read Write	0: HYS hysteresis mode 1: GAT window mode
0x 5	(1FB 507	0	Display Mode	1Byte	Read Write	0: UP Positive display 1: Rotate 90 ° clockwise 2: Rotate 180° clockwise 3: Rotate 270° clockwise
0x	1FD 509	0	FOU1 When FOU1 fails, output mode 1	1Byte	Read Write	0: OFF1 (Off switch) 1: ON1 (Turn on the switch)
0x 5	1FE 510	0	FOU2 When FOU2 fails, output mode 2	1Byte	Read Write	0: OFF2 (Off switch) 1: ON2 (Turn on the switch)
0x E	200 512	0	Temp unit	1Byte	Read Write	0: Centigrade 1: Fahrenheit
0x	(201 513	0	Aflow unit	1Byte	Read Write	0: L 1: m3
0x E	202 514	0	OUT2 Data	1Byte	Read Write	0: Flow 1: Temp
						16 Range: 22~160 Unit: L/min SP1 should be greater than RP1 otherwise it will be rejected
0×	<258 600	0	SP1 Output 1 Switch point	2Byte	Read Write	40 Range: 54~400 Unit: L/min SP1 should be greater than RP1 otherwise it will be rejected
						100 Range:110~1000 Unit: L/min SP1 should be greater than RrP1 otherwise it will be rejected
						16 Range: 20~158 Unit: L/min RP1 should be less than SP1 otherwise it will be rejected
0× 6	<259 601	0	RP1 Output 1 Release point	2Byte	Read Write	40 Range: 50~396 Unit: L/min RP1 should be less than SP1 otherwise it will be rejected
						100 Range: 100~990 Unit: L/min RP1 should be less than SP1 otherwise it will be rejected
						OUT2 When Data select Temp: 10 to 1000 i Wite: unit "C SP2 should be greater than RP2 otherwise 16 Range: OUT2 When Data select Flow: 22 to 160 Note: unit Version Provided be greater than RP2 other-
0x	(25A	0	SP2 Output 2 Switch point	2Byte	Read Write	OUT2 When Data select Temp: 10 to 1000 Note: unit "C SP2 should be greater than RP2 otherwise 40 Range: OUT2 When Data select Flow: 54 to 400 Note: unit Limin SP2 should be greater than RP2 other-
	502					OUT2 When Data select Temp: 10 to 1000 Note: unit "C SP2 should be greater than RP2 otherwise 100 Range: 100 Range:
						OUT2 When Data select Temp: 0 to 990 16 Ranpe:
0×	(25B		0 RP2 Output 2 Release point	2Byte	Read	OUT2 When Data select Flow: 20 to 158 Note: unit Umin RP2 should be smaller than SP2 other- Wise it will be rejected OUT2 When Data select Temp: 0 to 990 Note: unit 'C RP2 should be smaller than SP2 otherwise
e	503	0			Write	40 Range: OUT2 When Data select Flow: 50 to 396 Note: unit //min RP2 should be smaller than SP2 other- wise it will be rejected
						OUT2 When Data select Temp: 0 to 990 100 Range? OUT2 When Data select Flow: 100 to 990 Note: unit (/min RP2 should be smaller than SP2 other- with) be rejected

11.2 Error code

 32785 / 0x8011:Invalid index
 32819 / 0x8033:The length of the written parameter exceeds the defined length

 32786 / 0x8012:Invalid subindex
 32820 / 0x8034:The length of the written parameter is less than the defined length

 32816 / 0x8030:The written parameter exceeds the settable range
 32810 / 0x8030:The written parameter exceeds the settable range

11.3 General information

The sensor has an IO-Link communication interface and requires a module with IO-Link function (IO-Link master) to operate. For more detailed information about IO-Link, please visit the company website.

12 IO-Link Process Data Mapping

BYTE	BYTE0											
BIT	31	30	29	28	27	26	25	24				
DATA	Fbit15	Fbit14	Fbit14 Fbit13		Fbit11	Fbit10	Fbit9	Fbit8				
BYTE		BYTE1										
BIT	23	22	21	20	19	18	17	16				
DATA	Fbit7	Fbit6	Fbit5	Fbit4	Fbit3	Fbit2	Fbit1	Fbit0				
BYTE		BYTE2										
BIT	15	14	13	12	11	10	9	8				
DATA	Tbit13	Tbit12	Tbit11	Tbit10	Tbit9	Tbit8	Tbit7	Tbit6				
BYTE		BYTE3										
BIT	7	6	5	4	3	2	1	0				
DATA	Tbit5	Tbit4	Tbit3	Tbit2	Tbit1	Tbit0	OUT2	OUT1				

Note: Foir represents 16-bit flow data, which is an unsigned number in L/min, with a range of 10 times the range, that is, the actual flow is magnified 10 times. Tbit represents 14-bit temperature data, which is an unsigned number in "C, with a range of 0 to 1000, that is, the actual temperature is magnified 10 times. OUT1 and OUT2 represent the output status of the switch; use the right shift instruction to remove OUT1 and OUT2 to obtain 14-bit temperature data

13 FAC Default Parameter

Parameter List	SP1	RP1	SP2	RP2	Display	Flow unit	Temp unit	AFlow unit	OUT2 Data
FAC Default Value	25%F.S	23%F.S	50.0°C	45.0°C	UP	L/min	°C	L	Temp
Parameter List	OUt1	OUt2	TOC1	TOC2	DIS1	DIS2	FOUT1	FOUT2	
FAC Default Value	PNP1	PNP2	NO1	NO2	HYS1	HYS2	OFF1	OFF2	

14 Pipeline Installation Precautions

Sensor upstream pipeline type and straight pipe length before and after



Note: DN represents the nominal diameter or diameter of the pipe.