

VortexMaster FSV430, FSV450

SwirlMaster FSS430, FSS450

Modbus register and command description

Measurement made easy



Short product description

Vortex and Swirl flowmeter for flow measurement of liquid and gaseous measuring media.

Devices firmware version:

- 01.01.00 (HART)
- 01.00.00 (Modbus)

Further information

Additional documentation on VortexMaster FSV430, FSV450 SwirlMaster FSS430, FSS450 is available for download free of charge at www.abb.com/flow.

Alternatively simply scan these codes:



FSV430



FSV450



FSS430



FSS450

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1 Revision history

1.1 Software history

In accordance with NAMUR recommendation NE53, ABB offers a transparent and traceable software history.

Standard and HART version

Firmware version (name plate)	Transmitter firmware version	Sensor firmware version	Date	Type of change	Description
01.00.00	01.03.00	01.04.00	24.06.2014	New release	OI/FSS/FSV430/450 Rev. B
01.01.00	01.04.00	01.04.02	01.11.2015	Hot-Water calculation added	OI/FSS/FSV430/450 Rev. C

Modbus version

Firmware version (name plate)	Transmitter firmware version	Sensor firmware version	Date	Type of change	Description
01.00.00	01.00.00	01.04.00	16.10.2015	New release	OI/FSS/FSV430/450 Rev. C

2 Introduction

This document describes the addressing of registers used for accessing VT5-Modbus flow meter parameters using Modbus protocol. Modbus is an application layer messaging protocol, positioned at level 7 of the OSI model, which provides client/server communication between devices connected on different types of buses or networks. Modbus is a request/reply protocol and offers services specified by function codes.

The objective of this document is to describe the function codes of Modbus protocol and registers addressing table which help users to apply the VT5-Modbus flow meter correctly.

2.1 Abbreviations

Abbreviation	Definition
CB	Communication Board
FEB	Frontend board
VT5	Vortex flow meter 5
Modbus	A communication protocol
PDU	Protocol Data Unit
ADU	Application Data Unit
HMI	Human Machine Interface
OSI	Open System Interconnection

3 Modbus protocol description

3.1.1 Modbus data types

The Modbus protocol defines input and holding registers, and output coils and discrete inputs as its supported data-types. The following table defines the mapping from the Modbus data-types to internal ABB data-types.

ABB data type	Data type	Register count	Description
ACTION	unsigned char	One register	The data type "ACTION" is used to trigger device functions. Parameters with the data type "ACTION" have no internal memory requirements. Writing any value except "0" into the parameters triggers the corresponding device function.
USIGN8	unsigned char	One register	8-bit data value. Each byte is addressed by a register address, with the upper-byte of the value being ignored. When Byte parameters are read, the upper-byte is always set to 0x00 (space character). A Byte value of 10 would be returned as (Hex) 0x000A.
USIGN16	unsigned short	One register	Unsigned 16-bit data value. Data is interpreted in standard Modbus big-endian format. For example, the value 256 would be returned as (Hex) 0x0100.
USIGN32	unsigned long	Two consecutive registers	Unsigned 32-bit data value. Data is interpreted in standard Modbus big-endian format. For example, the value 256 would be returned as (Hex) 0x0100.
FLOAT	float	Two consecutive registers	32-bit IEEE floating point. Data is interpreted in standard Modbus big-endian format.
INT16	signed long	Two consecutive registers	16-bit data value. Data is interpreted in standard Modbus big-endian format. For example, the value 256 would be returned as (Hex) 0x0100.
CHAR	unsigned char	One register. The total length of the register depends on the object length.	8-bit data value for character in ASCII.

3.1.2 Supported Modbus function codes

This section details the function, and request and response format for all Modbus function codes supported by the VortexMaster FSV430, FSV450 SwirlMaster FSS430, FSS450.

3.1.3 Overview

The function codes listed below are supported by the VortexMaster FSV430, FSV450 SwirlMaster FSS430, FSS450.

Function code	Description	Applicable to register tables
03 (0x03)	Read Holding Registers	Read-only Byte parameters Read-only Byte string parameters Read-only Short parameters Read-only Integer parameters Read-only Float parameters
04 (0x04)	Read Input Registers	Read-only Byte parameters Read-only Byte string parameters Read-only Short parameters Read-only Integer parameters Read-only Float parameters Diagnosis alarm counter
06 (0x06)	Write Single Register	Read-write Byte parameters Read-write Byte string parameters Read-write Short parameters Read-write Integer parameters Read-write Float parameters Action parameters
16 (0x10)	Write Multiple Registers	Read-write Byte parameters Read-write Byte string parameters Read-write Short parameters Read-write Integer parameters Read-write Float parameters

3.1.4 0x03 Read Holding Registers

This function code is used to read the contents of a contiguous block of holding registers in a remote device. The request PDU specifies the starting register address and the number of registers.

The request format is as follows.

Request	
Byte number	Description
2	1 byte, Function code: 0x03.
3, 4	2 bytes, Holding register address (0x0000 ... 0xFFFF). 16-bit address indicating the address of the starting address to read.
5, 6	2 bytes, Holding register count (0 ... 125). 16-bit value indicating the number of holding registers to read.

The format of successfully processed Read Holding Registers requests is as follows.

Response	
Byte number	Description
2	1 byte, Function code: 0x03.
3, 4	Holding register count ('n'). 16-bit value indicating the count of holding registers returned in the message.
5, 6 (n x 2bytes)	Holding register value.

Example:

See chapter "Example 1: Read Holding Registers" on page 10.

3.1.5 0x04 Read Input Registers

This function code is used to read the contents of a contiguous block of input registers in a remote device. The request PDU specifies the starting register address and the number of registers. The request format is as follows.

Byte number	Description
1	1 byte, Function code: 0x04.
2, 3	2 bytes, Input register address (0x0000 ... 0xFFFF). 16-bit value indicating the address of the first input register to read.
3, 4	2 bytes, Input register count (0 ... 125). 16-bit value indicating the number of input registers to read.

Responses to successfully processed Read Input Registers requests appear as follows.

Byte number	Description
1	1 byte, Function code: 0x04.
2, 3	2 bytes, Byte count ('n'), number of data bytes in response.
4, 5 (n x 2bytes)	Input register data.

Example:

See chapter "Example 2: Read Input Registers" on page 11.

3.1.6 0x06 Write Single Register

This function code is used to write a single holding register in a remote device. The request PDU specifies the address of the register to be written. The normal response is an echo of the request, returned after the register contents have been written. The request format is as follows.

Byte number	Description
1	1 byte, Function Code: 0x06.
2, 3	2 bytes, 16-bit holding register address (0x0000 ... 0xFFFF).
4, 5	2 bytes, Holding register value. 16-bit value indicating the value to write.

The format of responses to successfully processed Write Single Register requests is as follows.

Byte number	Description
1	1 byte, Function Code: 0x06.
2, 3	2 bytes, Holding register address (0x0000 ... 0xFFFF). 16-bit value indicating the address of the holding register that was written.
4, 5	2 bytes, Holding register value. 16-bit value indicating the value that was written to the holding register.

Example:

See chapter "Example 3: Write Single Register" on page 12.

3.1.7 0x10 Write Multiple Registers

This function code is used to write a block of contiguous registers in a remote device. The requested written values are specified in the request data field. Data is packed as two bytes per register. The normal response returns the function code, starting address, and quantity of registers written.

The request format is as follows.

Byte number	Description
1	1 byte, Function Code: 0x10.
2, 3	2 bytes, Holding register address (0x0000 ... 0xFFFF). 16-bit value indicating the address of the first holding register to write.
4, 5	2 bytes, Holding register count (0 ... 123). 16-bit value indicating the number of holding registers to write
6	1 byte, Byte count ('n'), number of data bytes in the request.
7, 8 (n x 2 bytes)	Holding register message data. The data to write to the holding registers.

When successfully processed, the format of responses to Write Multiple Registers requests is as follows.

Byte number	Description
1	1 byte, Function Code: 0x10.
2, 3	2 bytes, Register address (0x0000 ... 0xFFFF). 16-bit value indicating the address of the first holding register.
4, 5	2 bytes, Holding register count (0 ... 123). 16-bit value indicating the number of holding registers written.

Example:

See chapter "Example 4: Write Multiple Registers" on page 13.

3.1.8 Modbus exception codes

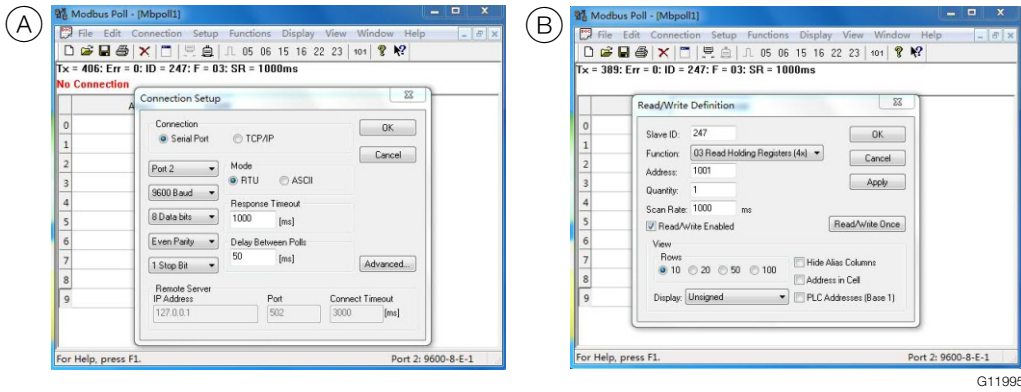
In the event of an error occurring during processing of a request, an exception response is returned. This is characterized by 0x80 being added to the request Function Code. A single byte exception code then follows detailing the nature of the exception. The following exception codes are supported.

Exception code	Exception name	Details
0x01	ILLEGAL_FUNCTION	An unrecognized command has been received, or the device is in an incorrect state to handle the request.
0x02	ILLEGAL_DATA_ADDRESS	An invalid register/coil address has been requested.
0x03	ILLEGAL_DATA_VALUE	The request structure is incorrect, or the data in the request is invalid.
0x04	SLAVE_DEVICE_FAILURE	An internal device error occurred while processing the request.

The format for exception responses is always as follows.

Byte number	Description
1	Slave device identifier.
2	Function Code with 0x80 added.
3	Exception code.
4,5	Message CRC.

3.2 Communication examples with Modbus Poll

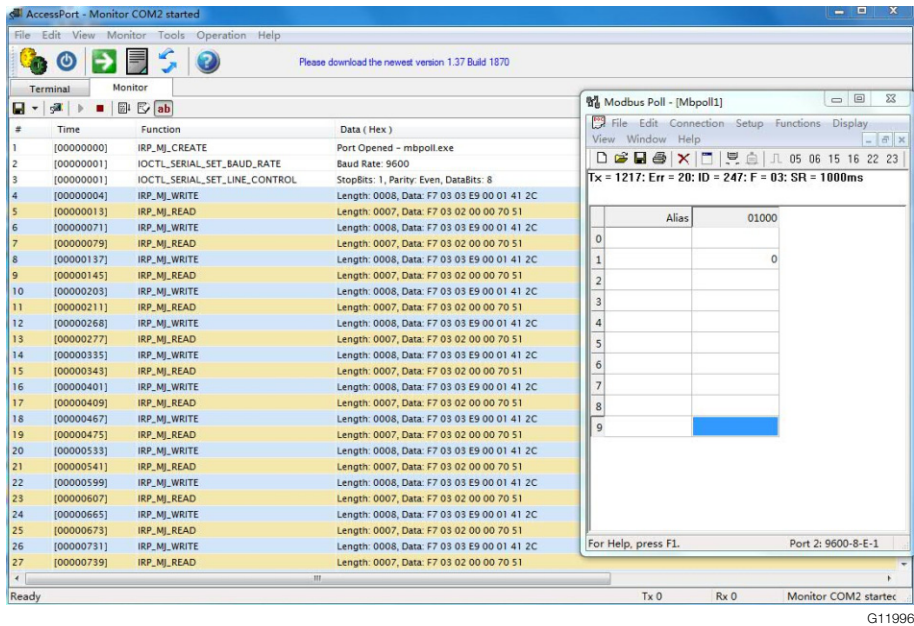


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Fig. 1: Configuration of Modbus Poll Software

(A) COM port and baud rate configuration (B) Slave address and function code configuration

3.2.1 Example 1: Read Holding Registers



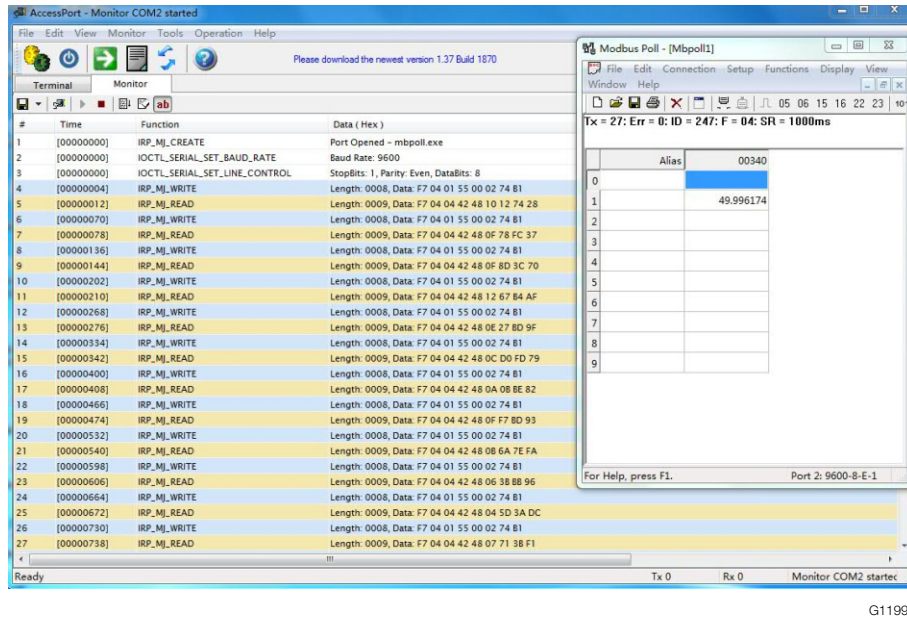
G11996

Fig. 2: Function code 0x03 request and reply data

As we can see from the Fig. 2, Modbus send request data is F7 03 03 E9 00 01 41 2C and the reply data is F7 03 02 00 00 70 51.

Request		Response	
Field Name	Hex data	Field Name	Hex data
Slave address	0xF7	Slave address	0xF7
Function code	0x03	Function code	0x03
Starting Address High-16bit	0x03	Byte Count	0x02
Starting Address Low-16bit	0xE9	Register value High-16bit (1001)	0x00
Quantity of Registers High-16bit	0x00	Register value Low-16bit (1001)	0x00
Quantity of Registers Low-16bit	0x01	CRC High-16bit	0x70
CRC High-16bit	0x41	CRC Low-16bit	0x51
CRC Low-16bit	0x2C		

3.2.2 Example 2: Read Input Registers



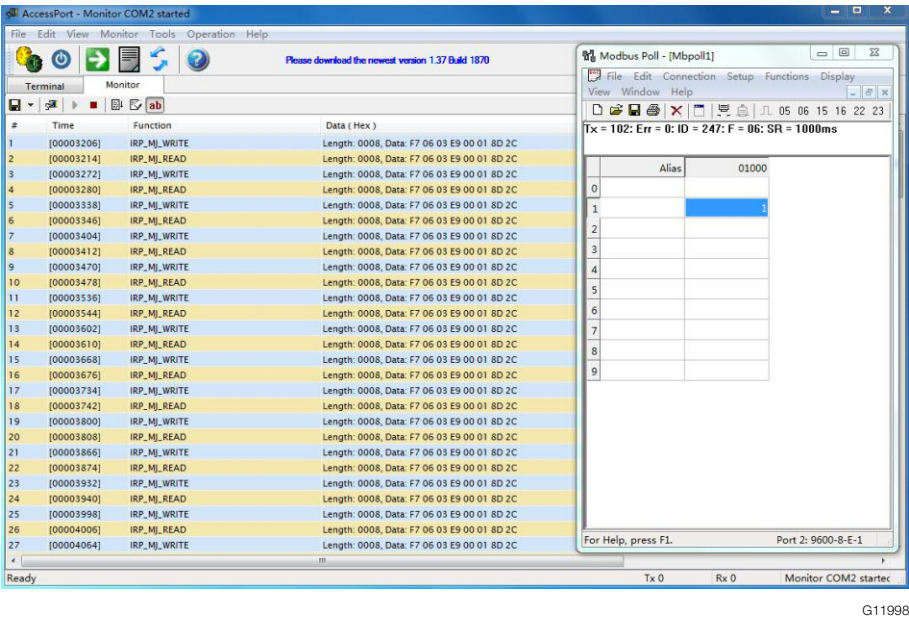
G11997

Fig. 3: Function code 0x04 request and reply data

As we can see from the Fig. 3, MODBUS send request data is F7 04 01 55 00 02 74 B1 and the reply data is F7 04 04 42 48 10 12 74 28.

Request		Response	
Field Name	Hex data	Field Name	Hex data
Slave address	0xF7	Slave address	0xF7
Function code	0x04	Function code	0x04
Starting Address High-16bit	0x01	Byte Count	0x04
Starting Address Low-16bit	0x55	Register value High-16bit (341)	0x42
Quantity of Registers High-16bit	0x00	Register value Low-16bit (341)	0x48
Quantity of Registers Low-16bit	0x02	Register value High-16bit (342)	0x10
CRC High-16bit	0x74	Register value Low-16bit (342)	0x12
CRC Low-16bit	0xB1	CRC High-16bit	0x74
		CRC Low-16bit	0x28

3.2.3 Example 3: Write Single Register



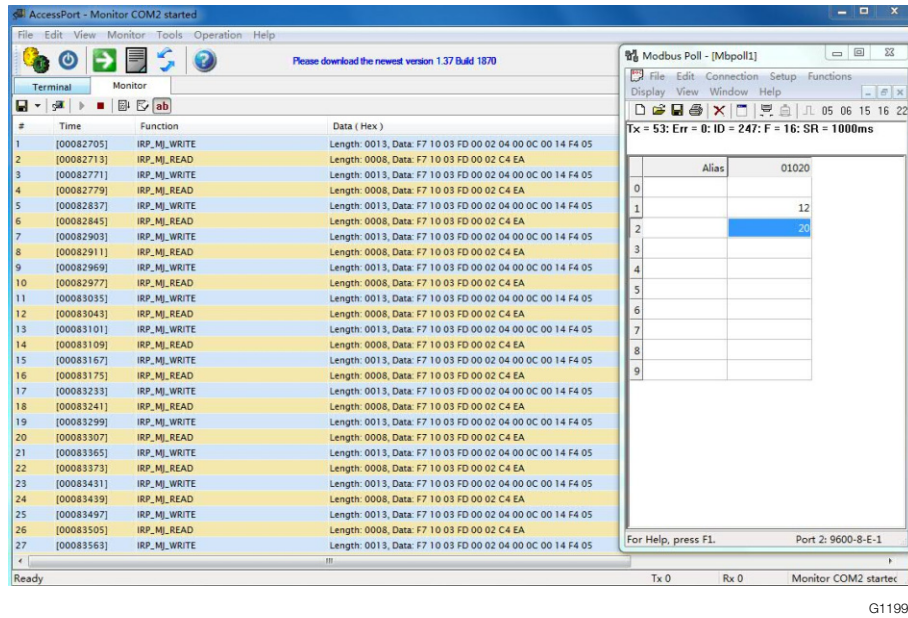
G11998

Fig. 4: Function code 0x06 request and reply data

As we can see from the Fig. 4, MODBUS send request data is F7 06 03 E9 00 01 8D 2C and the reply data is F7 06 03 E9 00 01 8D 2C.

Request		Response	
Field Name	Hex data	Field Name	Hex data
Slave address	0xF7	Slave address	0xF7
Function code	0x06	Function code	0x06
Register Address High-16bit	0x03	Register Address High-16bit	0x03
Register Address Low-16bit	0xE9	Register Address Low-16bit	0xE9
Register Value High-16bit	0x00	Register Value High-16bit	0x00
Register Value Low-16bit	0x01	Register Value Low-16bit	0x01
CRC High-16bit	0x8D	CRC High-16bit	0x74
CRC Low-16bit	0x2C	CRC Low-16bit	0x28

3.2.4 Example 4: Write Multiple Registers



G11999

Fig. 5: Function code 0x10 request and reply data

As we can see from the Fig. 5, Modbus send request data is F7 10 03 FD 00 02 04 00 0C 00 14 F4 05 and the reply data is F7 10 03 FD 00 02 C4 EA.

Request		Response	
Field Name	Hex data	Field Name	Hex data
Slave address	0xF7	Slave address	0xF7
Function code	0x10	Function code	0x10
Starting Address High-16bit	0x03	Starting Address High-16bit	0x03
Starting Address Low-16bit	0xFD	Starting Address Low-16bit	0xFD
Quantity of Registers High-16bit	0x00	Quantity of Registers High-16bit	0x00
Quantity of Registers Low-16bit	0x02	Quantity of Registers Low-16bit	0x02
Byte Count	0x04	CRC High-16bit	0xC4
Registers Value High-16bit	0x00	CRC Low-16bit	0xEA
Registers Value Low-16bit	0x0C		
Registers Value High-16bit	0x00		
Registers Value Low-16bit	0x14		
CRC High-16bit	0xF4		
CRC Low-16bit	0x05		

3.2.5 Changing the Modbus slave ID

It is advisable to modify the slave address by different ways:

1. The device address can be changed by using the LCD display.
2. The device address can be changed by changing the value of register "502 deviceAddress" in the range of 1 to 247 which represents the slave address of the device.
3. The device address can be changed by changing the value of register "1989-1995 tranSapErpNo". For that the Transmitter ERP number must be known (from the name plate or calibration protocol). See the example below.

Example - Changing the device address by using the register "1989-1995 tranSapErpNo"

SAP/ERP-No: "ABBDEE12345"

Old device address: "247"

New device address: "28"

Send the Write Multiple Registers command:

Request Hex Data	
1C 10 07 C5 00 0A 14 41 42 42 44 45 45 31 32 33 34 35 00 00 00 00 00 00 00 86 40	
1C	The new slave address "28"
10	The function code "16"
07 C5	The register address "1989"
00 0A	The quantity of registers "10"
14	The byte count of data 20, i.e. the supported length of transmitter SAP/ERP No.
41 42 42 44 45 45 31 32 33 34 35 00 00 00 00 00 00 00 00 00	The transmitter SAP/ERP No. "ABBDEE12345" in ASCII code
86 40	The check sum

The response in Hex Data should be:

1C 10 07 C5 00 0A 52 CA

The address is changed to 1C = "28" as requested.

3.3 Basic Setup

The device has some default values to be known first before our users start up the device.

Modbus interface	
Transmission	Modbus RTU - RS485 serial connection
Baud rate	1200, 2400, 4800, 9600 bps Factory setting: 9600 bps
Parity	None, even, odd Factory setting: none
Typical response time	< 100 milliseconds
Response delay time	0 ... 200 milliseconds Factory setting: 50 milliseconds
Device address	1 ... 247 Factory setting: 247
Register address offset	One base, Zero base Factory setting: One base

3.4 Parameter descriptions

3.4.1 Available units

For certain parameters it is possible to choose among the following units.

i NOTE

The "Code" column indicates the value to which the corresponding parameter must be set using the Modbus interface.

Table 1: Units for the volume flow

Selection	Code	Description
m ³ /s	13	Cubic meters per second
m ³ /min	14	Cubic meters per minute
m ³ /h	15	Cubic meters per hour
m ³ /d	16	Cubic meters per day
ft ³ /s	29	Cubic feet per second
ft ³ /min	30	Cubic feet per minute
ft ³ /h	31	Cubic feet per hour
ft ³ /d	32	Cubic feet per day
l/s	48	Liters per second
l/min	49	Liters per minute
l/h	50	Liters per hour
l/d	51	Liters per day
kl/s	52	Kiloliter per second
kl/min	60	Kiloliter per minute
kl/h	61	Kiloliter per hour
kl/d	62	Kiloliter per day
ugal/s	63	US gallons per second
ugal/min	64	US gallons per minute
ugal/h	65	US gallons per hour
ugal/d	66	US gallons per day
igal/s	83	Imperial gallons per second
igal/min	84	Imperial gallons per minute
igal/h	85	Imperial gallons per hour
igal/d	86	Imperial gallons per day
bbl/s	104	Oil barrels per second
bbl/min	105	Oil barrels per minute
bbl/h	106	Oil barrels per hour
bbl/d	107	Oil barrels per day

Table 2: Units for the volume flow (standard / normal)

Selection	Code	Description
m ³ /s	13	Cubic meters per second
m ³ /min	14	Cubic meters per minute
m ³ /h	15	Cubic meters per hour
m ³ /d	16	Cubic meters per day
ft ³ /s	29	Cubic feet per second
ft ³ /min	30	Cubic feet per minute
ft ³ /h	31	Cubic feet per hour
ft ³ /d	32	Cubic feet per day
kft ³ /s	35	Cubic kilofeet per second
kft ³ /min	36	Cubic kilofeet per minute
kft ³ /h	37	Cubic kilofeet per hour
kft ³ /d	38	Cubic kilofeet per day
l/s	48	Liters per second
l/min	49	Liters per minute
l/h	50	Liters per hour
l/d	51	Liters per day
kl/s	52	Kiloliter per second
hl/s	56	Hectoliter per second
hl/min	57	Hectoliter per minute
hl/h	58	Hectoliter per hour
hl/d	59	Hectoliter per day
kl/min	60	Kiloliter per minute
kl/h	61	Kiloliter per hour
kl/d	62	Kiloliter per day
ugal/s	63	US gallons per second
ugal/min	64	US gallons per minute
ugal/h	65	US gallons per hour
ugal/d	66	US gallons per day
igal/s	83	Imperial gallons per second
igal/min	84	Imperial gallons per minute
igal/h	85	Imperial gallons per hour
igal/d	86	Imperial gallons per day
bbl/s	104	Oil barrels per second
bbl/min	105	Oil barrels per minute
bbl/h	106	Oil barrels per hour
bbl/d	107	Oil barrels per day
US bbl/d	127	US barrels per day
US bbl/h	128	US barrels per hour
US bbl/min	129	US barrels per minute
US bbl/s	130	US barrels per second

Table 3: Units for the mass flow

Selection	Code	Description
g/s	1	Grams per second
g/min	2	Grams per minute
g/h	3	Grams per hour
kg/s	5	Kilograms per second
kg/min	6	Kilograms per minute
kg/h	7	Kilograms per hour
kg/d	8	Kilograms per day
t/s	9	Metric tons per second
t/min	10	Metric tons per minute
t/h	11	Metric tons per hour
t/d	12	Metric tons per day
lb/s	13	Pounds (avdp) per second
lb/min	14	Pounds (avdp) per minute
lb/h	15	Pounds (avdp) per hour
lb/d	16	Pounds (avdp) per day
US t/s	17	Short ton per second
US t/min		Short ton per minute
US t/h		Short ton per hour
US t/d		Short ton per day

Table 4: Power flow units

Selection	Code	Description
W	1	Watt
MW	4	Megawatt
kW	5	Kilowatt
kJ/s	19	Kilojoule per second
kJ/min	20	Kilojoule per minute
kJ/h	21	Kilojoule per hour
kJ/day	22	Kilojoule per day
MJ/h	25	Mega joule per day

Table 5: Density units

Selection	Code	Description
kg/m ³	1	Kilogram per cubic meter
g/cm ³	3	Grams per cubic centimeter
kg/l	6	Kilograms per liter
g/ml	7	Grams per milliliter
g/l	8	Grams per liter
lb/inch ³	9	Pound per cubic inch
lb/ft ³	13	Pounds (avdp) per cubic foot

Table 6: Temperature units

Selection	Code	Description
K	1	Kelvin
°C	2	Celsius
°F	3	Fahrenheit

Table 7: Units for the mass totalizer

Selection	Code	Description
kg	1	Kilograms
g	2	Grams
t	5	Tons (metric)
oz	6	Ounces
Pound	7	Pounds (advp)
US Short ton	8	Short ton
US Long ton	9	Long ton

Table 8: Units for the volume totalizer

Selection	Code	Description
m ³	1	Cubic meters
ft ³	7	Cubic feet
l	11	Liters
ml	13	Milliliters
hl	14	Hectoliters
ugal	19	US gallons
igal	20	Imperial gallons
bls	22	Barrels (beer, USA)

Table 9: Units for the energy totalizer

Selection	Code	Description
J	1	Joule
MJ	6	Mega joule
kJ	7	Kilojoule
kWh	19	Kilo Watt hour

Table 10: Pressure units

Selection	Code	Description
Pa	1	Pascal
MPa	3	Mega pascal
kPa	4	Kilopascal
hPa	7	Hecto pascal
Bar	8	Bar
mBar	9	Millibar
psi	65	Pounds per square inch
kg/cm ²	69	Kilogram force per square centimeter
mmH ₂ O	53	Millimeter H ₂ O

3.4.2 Diagnosis / error messages

The VortexMaster FSV430, FSV450 SwirlMaster FSS430, FSS450 has three "diagDeviceStatus" and three "DiagHistory" registers. Every register consist of 2 bytes, each containing 8 bits. Each bit represents an error.

The registers are structured as follows:

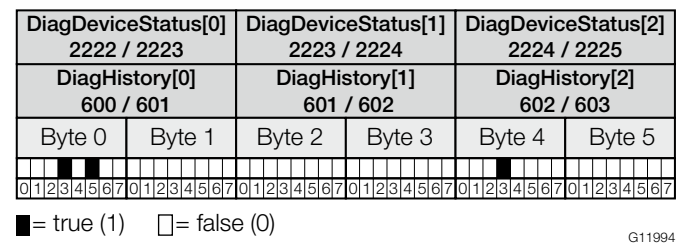


Fig. 6: diagDeviceStatus and DiagHistory (Example)

The bit position is assigned to the errors in accordance with the "Byte / Bit pos." column in the table in the chapter "Alarm status and alarm history status" on page 18.

The following assignment applies to the example in Fig. 6:

Byte / Bit	Fault message
Byte 0 / Bit 3	Min Int. Temp Alarm
Byte 1 / Bit 0	Sig. Sensor Fault
Byte 4 / Bit 3	Sensor RAM Fault

3.5 Alarm status and alarm history status

Modbus address		Byte / bit pos.	Error text	Description	NAMUR classification
diagDeviceStatus	DiagHistory				
2222 / 2223	600 / 601	0 / 0	Reserved	—	—
		0 / 1	Reserved	—	—
		0 / 2	Min Flowrate Alarm	The present flow rate is lower than the min. alarm configured.	S113.010 / Operation
		0 / 3	Min Int. Temp Alarm	The measuring medium temperature is lower than the min. alarm configured.	S111.011 / Operation
		0 / 4	Reserved	—	—
		0 / 5	Reserved	—	—
		0 / 6	Reserved	—	—
		0 / 7	Reserved	—	—
		1 / 0	Sig. Sensor Fault	Errors in sensor self-test. Signal errors from Piezo sensor.	F213.000 / Sensor
		1 / 1	Int. T Sensor Fault	Errors in internal temperature sensor.	F212.001 / Sensor
		1 / 2	Vbr.Sensor Fault	Errors in sensor self-test. Signal errors from Piezo sensor.	F211.002 / Sensor
		1 / 3	Reserved	—	—
		1 / 4	Max Flowrate Alarm	The present flow rate is greater than the max. alarm configured.	S114.004 / Operation
		1 / 5	Max Int. Temp Alarm	The measuring medium temperature is greater than the max. alarm configured.	S112.005 / Operation
		1 / 6	Reserved	—	—
		1 / 7	Reserved	—	—

Modbus address		Byte / bit pos.	Error text	Description	NAMUR classification
diagDeviceStatus	DiagHistory				
2223 / 2224	601 / 602	2 / 0	Reserved	—	—
		2 / 1	Pulse Output Cutoff	Incorrect configuration of pulse output. The maximum pulse rate has been exceeded.	S103.025 / Operation
		2 / 2	Re. Out of Range	The Reynolds number (Re) is lower than the min. alarm configured. Measuring accuracy is reduced if the Reynolds number (Re) falls below a specific value.	S109.026 / Operation
		2 / 3	Reserved	—	—
		2 / 4	Reserved	—	—
		2 / 5	Reserved	—	—
		2 / 6	Wrong Steam Type	Incorrect steam type (saturated steam / overheated steam) configured.	S116.030 / Operation
		2 / 7	Maintenance Warning	Maintenance interval reached.	M052.031 / Operation
		3 / 0	Bad SNR	Signal-to-noise ratio for the sensor signal is outside of the set limit values.	F210.016 / Electronics
		3 / 1	Sensor NV Error	Faulty transmitter electronics.	F209.017 / Electronics
		3 / 2	Sensor Not Calibrated	The sensor has not been calibrated or the calibration status has not been set to "Calibrated".	M051.018 / Operation
		3 / 3	Sync. Signal Error	Faulty SensorMemory.	F214.019 / Elektronik
		3 / 4	Sensor Comm Error	Communication errors between sensor and transmitter.	F215.020 / Electronics
		3 / 5	Reserved	—	—
		3 / 6	Reserved	—	—
		3 / 7	Transmitter NV Error	Faulty communication board.	F207.023 / Electronics

Modbus address		Byte / bit pos.	Error text	Description	NAMUR classification
diagDeviceStatus	DiagHistory				
2224 / 2225	602 / 603	4 / 0	Reserved	—	—
		4 / 1	Reserved	—	—
		4 / 2	Reserved	—	—
		4 / 3	NV Replace Warning	The communication board or frontend board has been replaced without downloading the system data. The system data was not downloaded correctly.	M054.043 / Operation
		4 / 4	Sensor RAM Fault	Faulty transmitter electronics.	F208.044 / Electronics
		4 / 5	Totalizer Stop	Totalizer stopped.	C155.045 / Configuration
		4 / 6	Reserved	—	—
		4 / 7	Reserved	—	—
		5 / 0	Reserved	—	—
		5 / 1	Reserved	—	—
		5 / 2	Reserved	—	—
		5 / 3	Flowrate Cutoff	The ambient temperature of the transmitter is outside permissible limits.	S105.034 / Operation
		5 / 4	Flowrate > 103%	The flow rate exceeds the configured upper range value by more than 3 %.	S115.036 / Operation
		5 / 5	Data Simulation	A process variable is being simulated. Simulation mode is activated.	C151.037 / Configuration
		5 / 6	Alarm Simulation	An alarm is being simulated. Alarm simulation is switched on.	C152.038 / Configuration
		5 / 7	Reserved	—	—

3.5.1 Modbus register addressing Map

Follow is the MODBUS Registers' addressing table for VT5-MODBUS flow meter when the default value for "500/501 ModbusMapRegisterOffset" is 1.

However, if the value of "500/501 ModbusMapRegisterOffset" be changed to 0, the following register address should be added one (+1).

For example, if the value of "500/501 ModbusMapRegisterOffset" is 1, then the address of "300/301 QD Percentage" is 300; if the value of "500/501 ModbusMapRegisterOffset" is 0, then the address of "300/301 QD Percentage" is 301.

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
300 / 301	QD Percentage	Float	R	03, 04	2 / 4	Damped volume flow present in percentage.
302 / 303	Qv Percentage	Float	R	03, 04	2 / 4	Volume flow present in percentage.
304/305	Qv	Float	R	03, 04	2/4	Volume flow.
306/307	Qv Damped	Float	R	03,04	2/4	Damped volume flow.
308/309	Qn Percentage	Float	R	03,04	2/4	Standard/normal volume flow present in percentage.
310/311	Qn	Float	R	03,04	2/4	Standard/normal volume flow.
312/313	Qn Damped	Float	R	03,04	2/4	Damped standard/normal volume flow.
314/315	Qm Percentage	Float	R	03,04	2/4	Mass flow present in percentage.
316/317	Qm	Float	R	03,04	2/4	Mass flow.
318/319	Qm Damped	Float	R	03,04	2/4	Damped mass flow.
320/321	Qp Percentage	Float	R	03,04	2/4	Power flow present in percentage.
322/323	Qp	Float	R	03,04	2/4	Power flow.
324/325	Qp Damped	Float	R	03,04	2/4	Damped power flow.
326/327	Qn Partial Percentage	Float	R	03,04	2/4	Standard/normal volume flow of bio-gas present in percentage.
328/329	Qn Partial	Float	R	03,04	2/4	Standard/normal volume flow of bio-gas.
330/331	Qn Partial Damped	Float	R	03,04	2/4	Damped standard/normal volume flow of bio-gas.
332/333	Qv Partial Percentage	Float	R	03,04	2/4	Volume flow of bio-gas present in percentage.
334/335	Qv Partial	Float	R	03,04	2/4	Volume flow of bio-gas.
336/337	Qv Partial Damped	Float	R	03,04	2/4	Damped volume flow of bio-gas.
338/339	Electronic Temperature	Float	R	03,04	2/4	Ambient temperature.

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
340/341	Frequency	Float	R	03,04	2/4	The frequency value, input from sensor, simulated value or pre-set value. 0.7 ... 3000.0; Increment: 0.1; Unit: Hz
342/343	Frequency Damped	Float	R	03,04	2/4	Damped value of frequency. 0.7 ... 3000.0; Increment: 0.1; Unit: Hz
344/345	Temperature Percentage	Float	R	03,04	2/4	Temperature value present in percentage.
346/347	Temperature Sensor	Float	R	03,04	2/4	Piezo sensor temperature.
348/349	Temperature	Float	R	03,04	2/4	Temperature value, input from sensor, simulated value or dvTemperatureObj. -200.0 ... 500.0; Increment: 0.1
350/351	Temperature Damped	Float	R	03,04	2/4	Damped temperature value: -200.0 ... 500.0; Increment: 0.1
352/353	TotOverrollBase	Float	R	03,04	2/4	Totalizer overall base.
354/355	TotQvFloatAcc UserUnit	Float	R	03,04	2/4	Overflow counter for totalizer volume.
356/357	TotDispQv	Float	R	03,04	2/4	Totalizer volume on display.
360/361	TotQnFloatAcc UserUnit	Float	R	03,04	2/4	Overflow counter for totalizer normal volume.
362/363	TotDispQn	Float	R	03,04	2/4	Totalizer normal volume on display.
366/367	TotQmFloatAcc UserUnit	Float	R	03,04	2/4	Overflow counter for totalizer mass.
368/369	TotDispQm	Float	R	03,04	2/4	Totalizer mass on display.
372/373	TotEnergyFloatAcc UserUnit	Float	R	03,04	2/4	Overflow counter for totalizer energy.
374/375	TotDispEnergy	Float	R	03,04	2/4	Totalizer energy on display.
378/379	TotQvPartialFloatAccUserUnit	Float	R	03,04	2/4	Overflow counter for totalizer partial volume.
380/381	TotDispQvPartial	Float	R	03,04	2/4	Totalizer partial volume on display.
384/385	TotQnPartialFloatAccUserUnit	Float	R	03,04	2/4	Overflow counter for totalizer partial normal volume.
386/387	TotDispQnPartial	Float	R	03,04	2/4	Totalizer partial normal volume on display .
400/401	QvMaxDN	Float	R/W	03,04,16	2/4	The maximum limitation of volume flow: 0.01 ... 260000.00; Increment: 0.01
402/403	QnMaxDN	Float	R	03,04	2/4	The maximum limitation of standard/normal volume flow.
404/405	QmMaxDN	Float	R	03,04	2/4	The maximum limitation of mass flow.

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
406/407	QpMaxDN	Float	R	03,04	2/4	The maximum limitation of power flow.
408/409	QnPartialMaxDN	Float	R	03,04	2/4	The maximum limitation of standard/normal volume flow for bio-gas.
410/411	QvPartialMaxDN	Float	R	03,04	2/4	The minimum limitation of volume flow for bio-gas.
412/413	Compress Factor S	Float	R	03,04	2/4	Compress Factor at standard status.
414/415	Compress Factor R	Float	R	03,04	2/4	Compress Factor at operating status.
416/417	Compress Factor Preset	Float	R	03,04	2/4	Pre-set Compress Factor.
418/419	Hc Preset	Float	R	03,04	2/4	Pre-set Hc, which Hc is enthalpy of steam at inlet(KJ/kg).
420/421	Hw Preset	Float	R	03,04	2/4	Pre-set Hw, which Hw is enthalpy of steam at outlet (KJ/kg).
422/423	Hc	Float	R	03,04	2/4	Enthalpy of steam at inlet(KJ/kg).
424/425	Hw	Float	R	03,04	2/4	Enthalpy of steam at outlet(KJ/kg).
500/501	Modbus Map Register Offset	Usign8	R/W	03,04,06	1/1	MODBUS map register offset: 0 add zero(+0) to the register address 1 add one(+1) to the register address The default value is 1.
501/502	Baud Rate	Usign8	R/W	03,04,06	1/1	Baud rate setting: 1 Baudrate 1200 bps 2 Baudrate 2400 bps 3 Baudrate 4800 bps 4 Baudrate 9600 bps The default value is 4.
502/503	Device Address	Usign8	R/W	03,04,06	1/1	MODBUS slave address: 1 ... 247; Increment: 1 The default value is 247.
503/504	Response Delay Time	Usign8	R/W	03,04,06	1/1	MODBUS response delay time value: 0 ... 200; Increment: 1; Unit: ms The default value is 50 ms.
504/505	Parity Setting	Usign8	R/W	03,04,06	1/1	Parity setting: 0 Parity NULL 1 Parity EVEN 2 Parity ODD The default value is 0.
511/512	memReadOprn Result	Usign16	R	03,04	1/2	Memory Read Operation Result. 0 is OK, other is Failure
512/513	memWriteOprn Result	Usign16	R	03,04	1/2	Memory Write Operation Result. 0 is OK, other is Failure

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
513/514	objWriteOprn Result	Usign16	R	03,04	1/2	Object Write Operation Result. 0 is OK, other is Failure
514/515	objReadOprnResult	Usign16	R	03,04	1/2	Object Read Operation Result. 0 is OK, other is Failure
515/516	rdWrBoard	Usign8	R/W	03,04,06	1/1	Read Write to Board. 0 is OK, other is Failure
516/517	feAddressHolder	Usign8	R/W	03,04,06	1/1	FE Address Holder.
517/518	feDataLength	Usign8	R/W	03,04,06	1/1	FE Data Length.
518/519	memAdrsHolder	Usign16	R/W	03,04,06	1/2	Memory Address Holder.
519/520	memRdWriteLen	Usign8	R/W	03,04,06	1/1	Memory Read/Write Length.
520/521	sublIdxHolder	Usign16	R/W	03,04,06	1/2	Sub-Index Holder.
521/522	objlIdxHolder	Usign16	R/W	03,04,06	1/2	Object Index Holder.
522/523	attrlIdxHolder	Int16	R/W	03,04,06	1/2	Attribute Index Holder.
523-538 / 524-539	dataByteHolder	Usign8	R/W	03,04,16	16/32	Data byte holder[32]
600/601	DiagHistory[0]	Usign16	R	03,04	1/2	16-bit unsigned integer. See chapter "Diagnosis / error messages" on page 17. The bit position is assigned to the errors in accordance with the "Byte / Bit pos." column in the table in the chapter "Alarm status and alarm history status" on page 18.
601/602	DiagHistory[1]	Usign16	R	03,04	1/2	
602/603	DiagHistory[2]	Usign16	R	03,04	1/2	
603/604	Diagnosis Condition Details Class	Usign8	R	03,04	1/1	0 None 1 Check Function 2 Off specification 3 Maintenance 4 Failure
604/605	Diagnosis Condition Details Group	Usign8	R	03,04	1/1	0 Hardware Status electronics 1 Hardware Status sensor 2 Config Status 3 Operating condition
605/606	Diagnosis Condition Details Priority	Usign8	R	03,04	1/1	Min: 0 Max: 255
606/607	Diagnosis Condition Details Alarm Counter	Usign16	R	03,04	1/2	Indicates the total number of occurrences of the alarm.
607/608	Diagnosis Condition Details Alarm Time Counter Day	Usign16	R	03,04	1/2	The number of days for the current alarm instance has been active for.

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
608/609	Diagnosis Condition Details Alarm Time Counter Msec.	Usign32	R	03,04	2/4	The number of ms for the current alarm instance has been active for.
610/611	Diagnosis Condition Details Time Stamp Last Alarm Day	Usign16	R	03,04	1/2	The number of days for the last alarm instance has been active for.
611/612	Diagnosis Condition Details Time Stamp Last Alarm Msec.	Usign32	R	03,04	2/4	The number of ms for the last alarm instance has been active for.
1000/1001	Operating Mode	Usign8	R/W	03,04,06	1/1	Operating mode selection: 0 Liquid volume 7 Gas energy 1 Liquid normal volume 8 Biogas actual volume 2 Liquid mass 9 Biogas standard volume 3 Liquid energy 10 Steam actual volume 4 Gas actual volume 11 Steam/water mass 5 Gas standard volume 12 Steam/water energy 6 Gas mass
1001/1002	Liquid Correction	Usign8	R/W	03,04,06	1/1	Selection of the correction method for liquid mass measurement in operating mode "Liquid Mass". 0 Density correction 1 Volume correction 2 Without correction
1002/1003	Gas Density Selection	Usign8	R/W	03,04,06	1/1	Gas density selection: 0 Select the reference density 1 Select the preset density or actual density
1003/1004	Gas Ref.	Usign8	R/W	03,04,06	1/1	Gas Reference Conditions: 0 UK 1 US 2 DEG0 3 DEG20
1004/1005	Gas Compute Type	Usign8	R/W	03,04,06	1/1	Gas compute type: 0 Ideal gas 1 ISO12213_MOLAR 2 ISO12213_PHYSICAL_PROPERTY
1005/1006	Steam Type	Usign8	R/W	03,04,06	1/1	Steam type: 0 Overheat steam 1 Saturated steam 2 Hot Water
1006/1007	Actual Density Selection	Usign8	R/W	03,04,06	1/1	Actual density selection: 0 Density from external input 1 Density calculation from Temperature & Pressure 2 Density calculation only from Temperature 3 Density calculation only from Pressure

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1007/1008	Energy calc. method	Usign8	R/W	03,04,06	1/1	Energy calculation method: 0 Gross energy 1 Net energy
1008/1009	Qv Unit Code	Usign8	R/W	03,04,06	1/1	Selection of unit for the volume flow. Unit Code: See Table "Table 1: Units for the volume flow" on page 15.
1009/1010	Qn Unit Code	Usign8	R/W	03,04,06	1/1	Selection of unit for the standard volume flow. Unit Code: See Table "Table 2: Units for the volume flow (standard / normal)" on page 15.
1010/1011	Qm Unit Code	Usign8	R/W	03,04,06	1/1	Selection of the unit for the mass flow. Unit Code: See Table "Table 3: Units for the mass flow" on page 16.
1011/1012	Qp Unit Code	Usign8	R/W	03,04,06	1/1	Selection of the unit for the power flow. Unit Code: See Table "Table 4: Power flow units" on page 16.
1012/1013	Temperature Unit Code	Usign8	R/W	03,04,06	1/1	Selection of the unit for the temperature. Unit Code: See Table "Table 6: Temperature units" on page 16.
1013/1014	Frequency Unit Code	Usign8	R/W	03,04,06	1/1	Selection of the unit for the frequency. 1 Hz
1014/1015	Pressure Unit Code	Usign8	R/W	03,04,06	1/1	Selection of the unit for the pressure. Unit Code: See Table "Table 10: Pressure units" on page 16.
1015/1016	Density Unit Code	Usign8	R/W	03,04,06	1/1	Selection of the unit for density. Unit Code: See Table "Table 5: Density units" on page 16.
1016/1017	Tot Qv Unit	Usign8	R/W	03,04,06	1/1	Selection of the unit for the volume totalizer. Unit code: See Table "Table 8: Units for the volume totalizer" on page 16.
1017/1018	Tot Qn Unit	Usign8	R/W	03,04,06	1/1	Selection of the unit for the standard / normal volume totalizer. Unit code: See Table "Table 8: Units for the volume totalizer" on page 16.
1018/1019	Tot Qm Unit	Usign8	R/W	03,04,06	1/1	Selection of the unit for the mass totalizer. Unit code: See Table "Table 7: Units for the mass totalizer" on page 16.
1019/1020	Tot Energy Unit	Usign8	R/W	03,04,06	1/1	Selection of the unit for the energy totalizer. Unit code: See Table "Table 9: Units for the energy totalizer" on page 16.

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1020/1021	volumeExpandBeta1	Float	R/W	03,04,16	2/4	Volume expand beta 1: 0 ... 1000; Increment: 0.001
1020/1021	volumeExpandBeta1	Float	R/W	03,04,16	2/4	Volume expand beta 1: 0 ... 1000; Increment: 0.001
1022/1023	densityExpandBeta2	Float	R/W	03,04,16	2/4	Density expand beta 2: 0 ... 100; Increment: 0.001
1024/1025	Heat Capacity	Float	R/W	03,04,16	2/4	Heat capacity: 0,0001 ... 10; Increment: 0.001
1026/1027	Calorific Energy	Float	R/W	03,04,16	2/4	Calorific energy: 1 ... 300; Increment: 0.01
1028/1029	Dyn. Viscosity	Float	R/W	03,04,16	2/4	Dynamic viscosity value: 1.0E-12 ... 2.0E+12; Increment: 1.0E-8
1030/1031	Density Ref.	Float	R/W	03,04,16	2/4	Density reference: 0.01 ... 3000; Increment: 0,01
1032/1033	Ref Temperature	Float	R/W	03,04,16	2/4	Reference temperature: -200 ... 500; Increment: 0.01
1034/1035	Ref Pressure	Float	R/W	03,04,16	2/4	Reference pressure: 0.001 ... 40000; Increment: 0.001
1036/1037	Temperature Preset	Float	R/W	03,04,16	2/4	Temperature preset: -200 ... 500; Increment: 0.1
1038/1039	dvTextPreset	Float	R/W	03,04,16	2/4	Preset external temperature: -200 ... 500; Increment: 0.1
1040/1041	dvPressurePreset	Float	R/W	03,04,16	2/4	Preset pressure: 0,0 ... 40101.325; Increment: 0.1
1042/1043	dvDensityPreset	Float	R/W	03,04,16	2/4	Preset density: 0.08 ... 3000; Increment: 0.01
1044/1045	dvContentPreset	Float	R/W	03,04,16	2/4	Preset content: 0.0 ... 100; Increment: 0,01
1046/1047	temperatureOffsetCorrect	Float	R/W	03,04,16	2/4	Temperature offset correct: -100 ... 100; Increment: 0.01
1048/1049	dvText	Float	R/W	03,04,16	2/4	External temperature: -300 ... 600; Increment: 0.1
1050/1051	dvPressure	Float	R/W	03,04,16	2/4	Pressure: 0.0 ... 40101.325; Increment: 0.1
1052/1053	dvDensity	Float	R/W	03,04,16	2/4	Density: 0.0 ... 3000; Increment: 0.1

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1054/1055	dvContent	Float	R/W	03,04,16	2/4	Content: 0.0 ... 100; Increment: 0.1
1056/1057	QvLowCutOff	Float	R/W	03,04,16	2/4	Low volume flow cut off: Sets the switching threshold for the low flow cut-off. The set value relates to the $Q_{v_{max}DN}$. If the flow rate is below the switching threshold, the flow indication is zero. 0.00 ... 20; Increment: 0.01
1058/1059	QvDampingTime	Float	R/W	03,04,16	2/4	Volume flow damping time: 0.2 ... 100; Increment: 0.00
1060/1061	QnDampingTime	Float	R/W	03,04,16	2/4	Standard/normal volume flow damping time: 0.2 ... 100; Increment: 0.1
1062/1063	Qm Damping Time	Float	R/W	03,04,16	2/4	Mass flow rate damping time: 0.2 ... 100; Increment: 0.001
1064/1065	Qp Damping Time	Float	R/W	03,04,16	2/4	Power flow rate damping time: 0.2 ... 100; Increment: 0.001
1066/1067	Qn Partial Damping Time	Float	R/W	03,04,16	2/4	Standard/normal volume flow damping time for bio-gas: 0.2 ... 100; Increment: 0.001
1068/1069	Frequency Damping Time	Float	R/W	03,04,16	2/4	Frequency damping time: 0.2 ... 100; Increment: 0.001
1070/1071	Temperature Damping Time	Float	R/W	03,04,16	2/4	Temperature damping time: 0.2 ... 100; Increment: 0.001
1100/1101	Simulation Mode	Usign8	R/W	03,04,06	1/1	Simulation mode: 0 simulation off 1 simulation Qv value 2 simulation Qv percentage 3 simulation Qm value 4 simulation Qm percentage 5 simulation medium temperature 8 simulation DO frequency 9 simulation DO logic 10 simulation DO pulse 13 simulation sensor frequency
1101/1102	QvSim Enable	Usign8	R/W	03,04,06	1/1	Qv simulation enable: 0 Enable 1 Disable
1102/1103	QvSim Unit Code	Usign8	R/W	03,04,06	1/1	Qv simulation Unit Code: See Table "Table 1: Units for the volume flow" on page 15.
1103/1104	QvSim	Float	R/W	03,04,16	2/4	Volume flow simulation value: 0.0 ... 1.1 x Q_{vMaxDN}
1105/1106	QvPerSim	Float	R/W	03,04,16	2/4	Volume flow simulation value present in percentage (%): 0.0 ... 120; Increment: 0.01
1107/1108	QnSimEnable	Usign8	R/W	03,04,06	1/1	Qn simulation enable: 0 Enable 1 Disable
1108/1109	QnSim Unit Code	Usign8	R/W	03,04,06	1/1	Qn simulation Unit Code: See Table "Table 2: Units for the volume flow (standard / normal)" on page 15.
1109/1110	QnSim	Float	R/W	03,04,16	2/4	Standard/normal volume flow simulation value: 0.0 ... 1.1 x Q_{nMaxDN}

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1111/1112	QmSim Enable	Usign8	R/W	03,04,06	1/1	Qm simulation enable: 0 Enable 1 Disable
1112/1113	QmSim Unit Code	Usign8	R/W	03,04,06	1/1	Qm simulation Unit Code: See Table "Table 3: Units for the mass flow" on page 16.
1113/1114	QmSim	Float	R/W	03,04,16	2/4	Mass flow simulation value: Min: 0.0 Max: 1.15*QmMaxDN
1115/1116	QmPerSim	Float	R/W	03,04,16	2/4	Mass flow simulation value present in percentage (%): 0.00 ... 120; Increment: 0.01
1117/1118	QpSim Enable	Usign8	R/W	03,04,06	1/1	Qp simulation enable: 0 Enable 1 Disable
1118/1119	QpSim Unit Code	Usign8	R/W	03,04,06	1/1	Qp simulation Unit Code: See Table "Table 4: Power flow units" on page 16.
1119/1120	QpSim	Float	R/W	03,04,16	2/4	Power flow simulation value: 0.00 ... 1.15 x QpMaxDN
1121/1122	frequencySim Enable	Usign8	R/W	03,04,06	1/1	Frequency simulation enable: 0 Enable 1 Disable
1122/1123	simFrequency UnitCode	Usign8	R/W	03,04,06	1/1	Frequency simulation Unit Code: 1 Hz
1123/1124	frequency_Sim	Float	R/W	03,04,16	2/4	Frequency simulation value: 0.0 ... 3000; Increment: 0.1
1125/1126	temperatureSim Enable	Usign8	R/W	03,04,06	1/1	Temperature simulation enable: 0 Enable 1 Disable
1126/1127	simTemperature UnitCode	Usign8	R/W	03,04,06	1/1	Temperature simulation Unit Code: 1 Kelvin 2 Celsius 3 Fahrenheit
1127/1128	temperatureSim	Float	R/W	03,04,16	2/4	Temperature simulation: -200 ... 500; Increment: 0.1
1129/1130	TExtSim Enable	Usign8	R/W	03,04,06	1/1	External temperature simulation enable: 0 Enable 1 Disable
1130/1131	TExtSim UnitCode	Usign8	R/W	03,04,06	1/1	External temperature simulation value in UnitCode: 1 Kelvin 2 Celsius 3 Fahrenheit
1131/1132	dvTExtSim	Float	R/W	03,04,16	2/4	External temperature simulation value in float: -200 ... 500; Increment: 0.1

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1133/1134	Pressure Sim Enable	Usign8	R/W	03,04,06	1/1	Pressure simulation enable: 0 Enable 1 Disable
1134/1135	Pressure Sim Unit Code	Usign8	R/W	03,04,06	1/1	Pressure simulation Unit Code: See Table "Table 10: Pressure units" on page 16.
1135/1136	dvPressureSim	Float	R/W	03,04,16	2/4	Pressure simulation value: 0.0 ... 40101.325; Increment: 0.1
1137/1138	Density Sim Enable	Usign8	R/W	03,04,06	1/1	Density simulation enable: 0 Enable 1 Disable
1138/1139	Density Sim Unit Code	Usign8	R/W	03,04,06	1/1	Density simulation Unit Code: See Table "Table 5: Density units" on page 16.
1139/1140	dvDensitySim	Float	R/W	03,04,16	2/4	Density simulation value: 0.0 ... 3000; Increment: 0.1
1141/1142	Content Sim Enable	Usign8	R/W	03,04,06	1/1	Content simulation enable: 0 Enable 1 Disable
1142/1143	dvContentUnitCode	Usign8	R/W	03,04,06	1/1	Content Unit Code 0 ... 65536
1143/1144	dvContentSim	Float	R/W	03,04,16	2/4	Content simulation value: 0.0 ... 100; Increment: 0.01
1145/1146	dvTemperatureObj	Float	R/W	03,04,16	2/4	dvTemperatureObj -200 ... 500; Increment: 0.1
1200/1201	QvRangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of Qv. $0.15 \cdot Q_{vMaxDN}$... $1.0 \cdot Q_{vMaxDN}$
1202/1203	QvRangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of Qv. 0.0 ... QvRangeMax
1204/1205	QnRangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of Qn. $0.15 \cdot Q_{nMaxDN}$... $1.0 \cdot Q_{nMaxDN}$
1206/1207	QnRangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of Qn. 0.0 ... QnRangeMax
1208/1209	QmRangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of Qm. $0.15 \cdot Q_{mMaxDN}$... $1.0 \cdot Q_{mMaxDN}$
1210/1211	QmRangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of Qm. 0.0 ... QmRangeMax
1212/1213	QpRangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of Qp. $0.15 \cdot Q_{pMaxDN}$... $1.0 \cdot Q_{pMaxDN}$
1214/1215	QpRangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of Qp. 0.0 ... QpRangeMax
1216/1217	QnPartialRangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of Qn for bio-gas. $0.15 \cdot Q_{nMaxDN}$... $1.0 \cdot Q_{nMaxDN}$
1218/1219	QnPartialRangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of Qn for bio-gas. 0.0 ... $1.0 \cdot Q_{nPartialRangeMax}$

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1220/1221	QvPartialRangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of Qv for bio-gas. 0.15*QvMaxDN ... 1.0*QvMaxDN
1222/1223	QvPartialRangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of Qv for bio-gas. 0.0 ... QvPartialRangeMax
1224/1225	frequency_rangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of frequency. 0.7 ... 3000
1226/1227	frequency_rangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of frequency. 0.7 ... 3000
1228/1229	temperature_rangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of temperature. -200 ... 500
1230/1231	temperature_rangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of temperature. -200 ... 500
1232/1233	QvAlmRangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of Qv Alarm. 0.0 ... 105
1234/1235	QvAlmRangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of Qv Alarm. 0.0 ... 105
1236/1237	QmAlmRangeMax	Float	R/W	03,04,16	2/4	The maximum limitation of Qm Alarm. 0.0 ... 105
1238/1239	QmAlmRangeMin	Float	R/W	03,04,16	2/4	The minimum limitation of Qm Alarm. 0.0 ... 105
1240/1241	Temperature Alarm Range Max	Float	R/W	03,04,16	2/4	The maximum limitation of temperature Alarm. -200 ... 500
1242/1243	Temperature Alarm Range Min	Float	R/W	03,04,16	2/4	The minimum limitation of temperature Alarm. -200 ... 500
1244/1245	Pressure Alarm Range Max	Float	R/W	03,04,16	2/4	The maximum limitation of pressure Alarm. 0.0 ... 40101.325f
1246/1247	Pressure Alarm Range Min	Float	R/W	03,04,16	2/4	The minimum limitation of pressure Alarm. 0.0 ... 40101.325f
1248/1249	Re Alarm Limits	Float	R/W	03,04,16	2/4	Reynolds coefficient Alarm limitation. 0.0 ... 40000

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1300/1301	language	Usign8	R/W	03,04,06	1/1	Language: 0 English 1 German 2 French 3 Spanish 4 Italian 11 Chinese
1301/1302	contrast	Usign8	R/W	03,04,06	1/1	Contrast value: 0 ... 100; Increment: 1
1302/1303	Auto-scroll Enable	Usign8	R/W	03,04,06	1/1	Auto scroll enable: 0 FALSE 1 True
1303/1304	customDP_1	Usign8	R/W	03,04,06	1/1	Custom DP 1: 0 DP 0 //X 1 DP 1 //X.X 2 DP 2 //X.XX 3 DP 3 //X.XXX 4 DP 4 //X.XXXX 5 DP 5 //X.XXXXX 6 DP 6 //X.XXXXXX
1304/1305	customDP_2	Usign8	R/W	03,04,06	1/1	Custom DP 2: 0 DP 0 //X 1 DP 1 //X.X 2 DP 2 //X.XX 3 DP 3 //X.XXX 4 DP 4 //X.XXXX 5 DP 5 //X.XXXXX 6 DP 6 //X.XXXXXX
1305/1306	Date Format	Usign8	R/W	03,04,06	1/1	Date Format: 0 DD-MM-YYYY 1 MM-DD-YYYY 2 YYYY-MM-DD
1306/1307	Display Test	Usign8	R/W	03,04,06	1/1	HMI display test: 0 ... 255
1307/1308	displayMode_1	Usign8	R/W	03,04,06	1/1	Display mode 1: 1 Graphy view 5 MODE 1x6_B: 1 row of 6 characters (Standard Style) 6 MODE 1x6_BAR_B: 1 row of 6 characters + Bargraph (Standard Style) 7 MODE 1x9: 1 row of 9 characters 8 MODE 1x9_BAR: 1 row of 9 characters + Bargraph 9 MODE 2x9: 2 rows of 9 characters 10 MODE 2x9_BAR: 2 rows of 9 characters + Bargraph (Default) 11 MODE 3x9: 3 rows of 9 characters

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1308/1309	mainOperatorView_1_1	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 1. 0 QD% 10 Gas% 1 QV 11 Density 2 QV% 12 Tot Act Vol 3 QVP 13 Tot Std Vol 4 QM 14 Tot Mass 5 QN 15 Tot Par Act 6 QNP 16 Tot Par Std 7 QP 17 Tot Energy 8 Temperature 18 Frequency (Default) 9 Pressure
1309/1310	mainOperatorView_1_2	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 2.
1310/1311	mainOperatorView_1_3	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 3.
1311/1312	mainOperatorView_1_bargraph	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed as a bar graph. 0 QD% (Default) 1 QV
1312/1313	displayMode_2	Usign8	R/W	03,04,06	1/1	See Parameter "displayMode_1". Selecting "0" deactivates the corresponding operator page.
1313/1314	mainOperatorView_2_1	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 1. See Parameter "mainOperatorView_1_1".
1314/1315	mainOperatorView_2_2	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 2. See Parameter "mainOperatorView_1_1".
1315/1316	mainOperatorView_2_3	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 3. See Parameter "mainOperatorView_1_1".
1316/1317	mainOperatorView_2_bargraph	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed as a bar graph. 0 QD% 2 QV% 4 QM 7 QP 16 Tot Par Std
1317/1318	displayMode_3	Usign8	R/W	03,04,06	1/1	See Parameter "displayMode_1". Selecting "0" deactivates the corresponding operator page.
1318/1319	mainOperatorView_3_1	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 1. See Parameter "mainOperatorView_1_1".
1319/1320	mainOperatorView_3_2	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 2. See Parameter "mainOperatorView_1_1".
1320/1321	mainOperatorView_3_3	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 3. See Parameter "mainOperatorView_1_1".
1321/1322	mainOperatorView_3_bargraph	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed as a bar graph. 0 QD% 2 QV% 4 QM 7 QP 16 Tot Par Std

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1322/1323	displayMode_4	Usign8	R/W	03,04,06	1/1	See Parameter "displayMode_1". Selecting "0" deactivates the corresponding operator page.
1323/1324	mainOperatorView_4_1	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 1. See Parameter "mainOperator View_1_1".
1324/1325	mainOperatorView_4_2	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 2. See Parameter "mainOperator View_1_1".
1325/1326	mainOperatorView_4_3	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed in row 3. See Parameter "mainOperator View_1_1".
1326/1327	mainOperatorView_4_bargraph	Usign8	R/W	03,04,06	1/1	Selection of process variable displayed as a bar graph. 0 QD% 2 QV% 4 QM 7 QP 16 Tot Par Std
1400/1401	totQvPreset Value	Float	R/W	03,04,16	2/4	Preset of totalizer readings (e.g. when replacing the transmitter).
1402/1403	totQn Preset Value	Float	R/W	03,04,16	2/4	The value range corresponds to IEEE single precision floating-point data.
1404/1405	totQm Preset Value	Float	R/W	03,04,16	2/4	
1406/1407	totEnergy Preset Value	Float	R/W	03,04,16	2/4	
1408/1409	totQv Partial Preset Value	Float	R/W	03,04,16	2/4	
1410/1411	totQn Partial Preset Value	Float	R/W	03,04,16	2/4	
1412/1413	PresetAllTotalizer	ACTION	R/W	03,04,06	1/1	
1413/1414	PresetQvTotalizer	ACTION	R/W	03,04,06	1/1	Sets the corresponding totalizer to the values entered under "totxxxPreset Value". 0 Disable 1 Enable
1414/1415	PresetQnTotalizer	ACTION	R/W	03,04,06	1/1	
1415/1416	PresetQmTotalizer	ACTION	R/W	03,04,06	1/1	
1416/1417	PresetEnergyTotalizer	ACTION	R/W	03,04,06	1/1	
1417/1418	PresetQvPartialTotalizer	ACTION	R/W	03,04,06	1/1	
1418/1419	PresetQnPartialTotalizer	ACTION	R/W	03,04,06	1/1	
1419/1420	StartAllTotalizer	ACTION	R/W	03,04,06	1/1	
1420/1421	StartQvTotalizer	ACTION	R/W	03,04,06	1/1	Start the corresponding totalizer. 0 Disable 1 Enable
1421/1422	StartQnTotalizer	ACTION	R/W	03,04,06	1/1	
1422/1423	StartQmTotalizer	ACTION	R/W	03,04,06	1/1	

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1423/1424	StartEnergyTotalizer	ACTION	R/W	03,04,06	1/1	Start the corresponding totalizer. 0 Disable 1 Enable
1424/1425	StartQvPartialTotalizer	ACTION	R/W	03,04,06	1/1	
1425/1426	StartQnPartialTotalizer	ACTION	R/W	03,04,06	1/1	
1426/1427	StopAllTotalizer	ACTION	R/W	03,04,06	1/1	Stop the corresponding totalizer. 0 Disable 1 Enable
1427/1428	StopQvTotalizer	ACTION	R/W	03,04,06	1/1	
1428/1429	StopQnTotalizer	ACTION	R/W	03,04,06	1/1	
1429/1430	StopQmTotalizer	ACTION	R/W	03,04,06	1/1	
1430/1431	StopEnergyTotalizer	ACTION	R/W	03,04,06	1/1	
1431/1432	StopQvPartialTotalizer	ACTION	R/W	03,04,06	1/1	
1432/1433	StopQnPartialtotalizer	ACTION	R/W	03,04,06	1/1	
1433/1434	ResetAllTotalizer	ACTION	R/W	03,04,06	1/1	Stop the corresponding totalizer to zero. 0 Disable 1 Enable
1434/1435	ResetQvTotalizer	ACTION	R/W	03,04,06	1/1	
1435/1436	ResetQnTotalizer	ACTION	R/W	03,04,06	1/1	
1436/1437	ResetQmTotalizer	ACTION	R/W	03,04,06	1/1	
1437/1438	ResetEnergyTotalizer	ACTION	R/W	03,04,06	1/1	
1438/1439	ResetQvPartialTotalizer	ACTION	R/W	03,04,06	1/1	
1439/1440	ResetQnPartialTotalizer	ACTION	R/W	03,04,06	1/1	
1500/1501	intRTDType	Usign8	R/W	03,04,06	1/1	Temperature sensor type: 0 PT100 1 PT1000 2 None
1501/1502	converterType	Usign8	R/W	03,04,06	1/1	Selection of flowmeter sensor type: 0 SwirlMaster FSS430, FSS450 1 VortexMaster FSV430, FSV450

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description																						
1502/1503	Vortex meter Size	Usign8	R/W	03,04,06	1/1	Selection of VortexMaster meter size: <table><tr><td>DIN device:</td><td>ANSI device:</td></tr><tr><td>0 DN 15 mm</td><td>10 1/2"</td></tr><tr><td>1 DN 25 mm</td><td>11 1"</td></tr><tr><td>2 DN 40 mm</td><td>12 1 1/2"</td></tr><tr><td>3 DN 50 mm</td><td>13 2"</td></tr><tr><td>4 DN 80 mm</td><td>14 3"</td></tr><tr><td>5 DN 100 mm</td><td>15 4"</td></tr><tr><td>6 DN 150 mm</td><td>16 6"</td></tr><tr><td>7 DN 200 mm</td><td>17 8"</td></tr><tr><td>8 DN 250 mm</td><td>18 10"</td></tr><tr><td>9 DN 300 mm</td><td>19 12"</td></tr></table>	DIN device:	ANSI device:	0 DN 15 mm	10 1/2"	1 DN 25 mm	11 1"	2 DN 40 mm	12 1 1/2"	3 DN 50 mm	13 2"	4 DN 80 mm	14 3"	5 DN 100 mm	15 4"	6 DN 150 mm	16 6"	7 DN 200 mm	17 8"	8 DN 250 mm	18 10"	9 DN 300 mm	19 12"
DIN device:	ANSI device:																											
0 DN 15 mm	10 1/2"																											
1 DN 25 mm	11 1"																											
2 DN 40 mm	12 1 1/2"																											
3 DN 50 mm	13 2"																											
4 DN 80 mm	14 3"																											
5 DN 100 mm	15 4"																											
6 DN 150 mm	16 6"																											
7 DN 200 mm	17 8"																											
8 DN 250 mm	18 10"																											
9 DN 300 mm	19 12"																											
1503/1504	Swirl meter Size	Usign8	R/W	03,04,06	1/1	Selection SwirlMaster meter size: Flange device: 0 DN 15 mm 1 DN 20 mm 2 DN 25 mm 3 DN 32 mm 4 DN 40 mm 5 DN 50 mm 6 DN 80 mm 7 DN 100 mm 8 DN 150 mm 9 DN 200 mm 10 DN 300 mm 11 DN 400 mm																						
1504/1505	Force Replace	Usign8	R/W	03,04,06	1/1	When replacing transmitter components (communication board), system data must be downloaded from the SensorMemory. See chapter "Repair" in the operating instruction for further information. Force replace: 0 NV replace is not enabled 1 NV replace from frontend board to communication board for common data 2 NV replace from frontend board to communication board for all data 3 NV replace from communication board to frontend board for all data																						

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1505/1506	readParameters	ACTION	R/W	03,04,06	1/1	0 Disable 1 Enable
1506/1507	writeParameters	ACTION	R/W	03,04,06	1/1	0 Disable 1 Enable
1507/1508	saveCustomerDef	ACTION	R/W	03,04,06	1/1	0 Disable 1 Enable
1508/1509	saveFactoryDef	ACTION	R/W	03,04,06	1/1	0 Disable 1 Enable
1509/1510	resetCustomer Def	ACTION	R/W	03,04,06	1/1	0 Disable 1 Enable
1510/1511	resetFactoryDef	ACTION	R/W	03,04,06	1/1	0 Disable 1 Enable
1511/1512	resetFE_Runhour	ACTION	R/W	03,04,06	1/1	0 Disable 1 Enable
1512/1513	autoselfcheck_ Enable	Usign8	R/W	03,04,06	1/1	Start of sensor self-test. The device runs a self-test of the Piezo sensor and PT100 temperature sensor for wire breaks or short-circuits. Any errors detected will immediately trigger a corresponding error message. 0 Status Off 1 Status On
1513/1514	vbrCorrectionOn	Usign8	R/W	03,04,06	1/1	Vibration correction On: 0 Status Off 1 Status On
1514/1515	vbrFilStep	Usign16	R/W	03,04,06	1/2	Vibration fill step 33 ... 1310; Increment: 1
1515/1516	vbrFilNumCoef	Usign8	R/W	03,04,06	1/1	Vibration fill number coefficient 10 ... 50; Increment:1
1516/1517	lockMaxIntPeriod	Usign8	R/W	03,04,06	1/1	Lock Max Int Period 4 ... 8; Increment:1
1517/1518	lockMinIntPeriod	Usign8	R/W	03,04,06	1/1	Lock Min Int Period 1 ... 4; Increment:1
1518/1519	lockEstimation	Usign8	R/W	03,04,06	1/1	Lock Estimation 10 ... 30; Increment:1
1519/1520	accuracyHigh	Usign8	R/W	03,04,06	1/1	Accuracy High 1 ... 4; Increment:1
1520/1521	accuracyMiddle	Usign8	R/W	03,04,06	1/1	Accuracy Middle 1 ... 4; Increment:1
1521/1522	accuracyLow	Usign8	R/W	03,04,06	1/1	Accuracy Low 1 ... 4; Increment:1
1522/1523	gainCtrl	Usign8	R/W	03,04,06	1/1	Gain Ctrl: 0 Status Off 1 Status On
1523/1524	gainLowThresh	Usign16	R/W	03,04,06	1/2	Gain Low Thresh 2048 ... 10240; Increment:1
1524/1525	gainHighThresh	Usign16	R/W	03,04,06	1/2	Gain High Thresh 20480 ... 30720; Increment:1
1525/1526	analogGain	Usign8	R/W	03,04,06	1/1	1 Gain Control 1 Times 2 Gain Control 2 Times 4 Gain Control 4 Times 8 Gain Control 8 Times

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1526/1527	spanUpperRange	Usign16	R/W	03,04,06	1/2	Span Upper Range 0 ... 32767; Increment:1
1527/1528	snrThreshold	Usign16	R/W	03,04,06	1/2	Snr Threshold -80 ... 50; Increment:1
1528/1529	gainMarginFreq	Usign16	R/W	03,04,06	1/2	Gain Margin Frequency 660 ... 4096; Increment:1
1529/1530	gainMaxShift	Usign8	R/W	03,04,06	1/1	Gain Max Shift 0 ... 2; Increment:1
1530/1531	AutoZeroFlowThreshOn	Usign8	R/W	03,04,06	1/1	Auto zero flow threshold on: 0 Status Off 1 Status On
1531/1532	AutoZeroFlowThresh	Usign16	R/W	03,04,06	1/2	The auto zero threshold. 7 ... 1000; Increment:1
1532/1533	AutoZeroFlowThreshCoef	Usign16	R/W	03,04,06	1/2	Auto zero flow threshold coefficient: -10 ... 10; Increment:1
1533/1534	noiseSampSize	Usign8	R/W	03,04,06	1/1	Noise Sample Size 4 ... 8; Increment:1
1534/1535	staticDecimation	Usign8	R/W	03,04,06	1/1	Static Decimation 0 ... 5; Increment:1
1535/1536	middleBufDecimation	Usign8	R/W	03,04,06	1/1	Middle Buffer Decimation 1 ... 6; Increment:1
1536/1537	maxFlowFreq	Float	R/W	03,04,16	2/4	The maximum flow frequency: 19 ... 3000; Increment:0.1
1538/1539	minFlowFreq	Float	R/W	03,04,16	2/4	The minimum flow frequency: 0.0 ... 1000; Increment:0.1
1540/1541	freqMaxMarginPer	Usign8	R/W	03,04,06	1/1	0 ... 30; Increment:1
1541/1542	freqMinMarginPer	Usign8	R/W	03,04,06	1/1	0 ... 30; Increment:1
1542/1543	autoSelfCheckTime	Usign32	R/W	03,04,16	2/4	Auto Self-Check Time: 2 ... 525600; Increment:1
1600/1601	gasConfFlag	Usign8	R/W	03,04,06	1/1	Gas configure flag: 0 NonConfigured 1 Configing 2 Configed
1601/1602	matrixSize	Usign8	R/W	03,04,06	1/1	0 SIZE 3x3 1 SIZE 4x3 2 SIZE 9x7
1602-1643/1603-1644	MolFractions	Float	R/W	03,04,16	2/4	molFractions[0]- molFractions[20]: 0.00 ... 100; Increment:0.0001
1644-1657/1645-1658	CFTempArray	Float	R/W	03,04,16	2/4	CFTempArray[0]-CFTempArray[6]: -10.05 ... 64.85; Increment:0.01
1658-1675/1659-1676	CFPressArray	Float	R/W	03,04,16	2/4	CFPressArray[0]- CFPressArray[8]: 0.0 ... 12000; Increment:0.01

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1700/1701	trigCalibration	Usign8	R/W	03,04,06	1/1	Trigger calibration: 0 Disable 1 Enable
1701/1702	calBegin	Usign8	R/W	03,04,06	1/1	Calculate begin: 0 Disable 1 Enable
1702/1703	calTime	Usign8	R/W	03,04,06	1/1	Calculate time: 30 ... 300; Increment:1
1703/1704	meanFreq	Float	R/W	03,04,16	2/4	Min The minimum of float Max The maximum of float
1705/1706	stddevFreq	Float	R/W	03,04,16	2/4	Min The minimum of float Max The maximum of float
1707/1708	minFreq	Float	R/W	03,04,16	2/4	Min The minimum of float Max The maximum of float
1709/1710	maxFreq	Float	R/W	03,04,16	2/4	Min The minimum of float Max The maximum of float
1711/1712	numOfVals	Usign16	R/W	03,04,06	1/2	Number of variables 0 ... 65535; Increment:1
1712/1713	KSET	Usign8	R/W	03,04,06	1/1	KSET: 0 KFactor Gas Enable 1 KFactor Liquid Enable
1713/1714	KLinearisation	Usign8	R/W	03,04,06	1/1	K Linearization: 0 Average 1 1Point 2 2Points 3 3Points 4 4Points 5 5Points 6 6Points 7 7Points 8 8Points
1714/1715	KAverageLiquid	Float	R/W	03,04,16	2/4	K Average Liquid value: 10 ... 800000; Increment:0.01
1716/1717	KAverageGas	Float	R/W	03,04,16	2/4	K Average Gas value: 10 ... 800000; Increment:0.01
1718-1733/ 1719-1734	KLiquidFreq	Float	R/W	03,04,16	2/4	KLiquidFreq[0]- KLiquidFreq[7]: 0.30 ... 1000; Increment:0.01
1734-1749/ 1735-1750	KLiquid	Float	R/W	03,04,16	2/4	KLiquid[0]- KLiquid[7]: 10 ... 800000; Increment:0.01
1750-1765/ 1751-1766	KGasFreq	Float	R/W	03,04,16	2/4	KGasFreq[0]- KGasFreq[7]: 2 ... 3000; Increment:0.01
1766-1781/ 1767-1782	KGas	Float	R/W	03,04,16	2/4	KGas[0]- KGas[7]: 10 ... 800000; Increment:0.01
1782-1797/ 1783-1798	ReLiquid	Float	R/W	03,04,16	2/4	ReLiquid[0]- ReLiquid[7]: 2595 ... 3079000; Increment: 20000
1798-1813/ 1799-1814	ReGas	Float	R/W	03,04,16	2/4	ReGas[0]- ReGas[7]: 2052.50 ... 1826476; Increment: 0.01

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
1900-1901	softwareRevision	Usign8	R	03,04	2/3	Software Revision[3] 0x00 ... 0xFF; Increment: 1
1902-1903	hardwareRevision	Usign8	R/W	03,04,16	2/3	HardwareRevision[3] 0x00 ... 0xFF; Increment: 1
1904-1907/ 1905-1908	swRevisionHmi_transmitter	Char	R/W	03,04,16	4/8	swRevisionHmi_transmitter[4] 0x00 ... 0xFF; Increment: 1
1908-1911/ 1909-1912	hwRevisionHmi_transmitter	Char	R/W	03,04,16	4/8	hwRevisionHmi_transmitter[4] 0x00 ... 0xFF; Increment: 1
1912-1915/ 1913-1916	swRevisionHmi_fe	Char	R/W	03,04,16	4/8	swRevisionHmi_fe[4] 0x00 ... 0xFF; Increment: 1
1916-1919/ 1917-1920	hwRevisionHmi_fe	Char	R/W	03,04,16	4/8	hwRevisionHmi_fe[4] 0x00 ... 0xFF; Increment: 1
1920-1923/ 1921-1924	deviceSerialNumber	Usign8	R/W	03,04,16	4/8	deviceSerialNumber[8] 0x00 ... 0xFF; Increment: 1
1924-1925	feSerialNumber	Usign8	R/W	03,04,16	2/3	feSerialNumber[3] 0x00 ... 0xFF; Increment: 1
1926-1927	dipSwitchAndPushButtonsStatus	Usign16	R	03,04,06	1/2	Dip Switch And Push Buttons Status: 0 OFF 1 ON
1927-1928	cbSerialNumber	Usign8	R/W	03,04,16	2/3	cbSerialNumber[3]
1929-1932/ 1930-1933	sensorID	Char	R/W	03,04,16	4/8	sensorID[8]
1933-1942/ 1934-1943	sensorSapErpNo	Char	R/W	03,04,16	10/20	sensorSapErpNo[20]
1943-1948/ 1944-1949	sensorCalDate	Char	R/W	03,04,16	6/12	sensorCalDate[12]
1949-1958/ 1950-1959	sensorCalCertNo	Char	R/W	03,04,16	10/20	sensorCalCertNo[20]
1959-1974/ 1960-1975	sensorCalLocation	Char	R/W	03,04,16	16/32	sensorCalLocation[32]
1975-1978/ 1976-1979	bootloaderRevision	Usign8	R/W	03,04,16	4/8	bootloaderRevision[8]
1979-1984/ 1980-1985	tranType	Char	R/W	03,04,16	6/12	tranType[12]
1985-1988/ 1986-1989	tranID	Char	R/W	03,04,16	4/8	TranID[8]
1989-1998/ 1990-1999	tranSapErpNo	Char	R/W	03,04,16	10/20	TranSapErpNo[20]
1999-2004/ 2000-2005	tranCalDate	Char	R/W	03,04,16	6/12	TranCalDate[12]
2005-2014/ 2006-2015	tranCalCertNo	Char	R/W	03,04,16	10/20	TranCalCertNo[20]
2015-2030/ 2016-2031	tranCalLocation	Char	R/W	03,04,16	16/32	TranCalLocation[32]

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
2031-2040/ 2032-2041	manufacturer	Char	R/W	03,04,16	10/20	Manufacturer [20]
2041-2050/ 2042-2051	street	Char	R/W	03,04,16	10/20	Street [20]
2051-2060/ 2052-2061	city	Char	R/W	03,04,16	10/20	City [20]
2061-2070/ 2062-2071	phone	Char	R/W	03,04,16	10/20	Phone [20]
2071-2080/ 2072-2081	sensorTag	Char	R/W	03,04,16	10/20	SensorTag [20]
2081-2090/ 2082-2091	sensorLocation Tag	Char	R/W	03,04,16	10/20	SensorLocationTag [20]
2100-2102/ 2101-2103	internalRTD Password	Char	W	16	3/6	InternalRTDPassword [6]
2103-2105/ 2104-2106	energyFlow Password	Char	W	16	3/6	EnergyFlowPassword [6]
2106-2108/ 2107-2109	SetPassword_ StandardLevel	Usign8	W	16	3/6	setPasswordStandardLevel [6]
2200/2201	diagSimulation Type	Usign8	R/W	03,04,06	1/1	Diagnosis simulation type: 0 Alarm simulation off 4 Vortex sensor failure 5 Temperature sensor failure 6 Vibration sensor failure 8 Flowrate reach Qv Max 9 Process temperature reach T Max 14 Flowrate reach Qv Min 15 Process temperature reach T Min 20 Snr Failure 21 Sensor NV failure 22 Sensor calibration failure 23 Sensor Sync missing 24 Sensor communication error 27 Transmitter NV Failure 30 Re coefficient out Linear range 34 Steam type mismatch 35 Maintennace warning 39 Low flow rate cutoff 40 Flowrate big than 103% 41 Data simulation alarm 42 Diganosis simulation alarm 47 NV replace error 48 Sensor RAM failure 49 Totalizer counter stop
2209/2210	writeSelf Diagnosis	ACTION	R/W	03,04,06	1/1	Write self-diagnosis: 0 Disable 1 Enable
2210/2211	diagClearHistory	ACTION	R/W	03,04,06	1/1	Diagnosis clear history: 0 Disable 1 Enable
2211/2212	diagnosisConditio nNumber	Usign8	R/W	03,04,06	1/1	Diagnosis condition number. 0 ... 255; Increment:1
2212/2213	diagFunCheck Mask	Usign8	R/W	03,04,06	1/1	Diagnosis Function check mask: 0 Disable 1 Enable
2213/2214	diagOffSpecMask	Usign8	R/W	03,04,06	1/1	Diagnosis off spec mask: 0 Disable 1 Enable
2214/2215	diagMaintain Mask	Usign8	R/W	03,04,06	1/1	Diagnosis maintain mask: 0 Disable 1 Enable

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
2215/2216	diagMinFlow Mask	Usign8	R/W	03,04,06	1/1	Diagnosis Min Flow mask: 0 Disable 1 Enable
2216/2217	diagMaxFlow Mask	Usign8	R/W	03,04,06	1/1	Diagnosis Max Flow mask: 0 Disable 1 Enable
2217/2218	diagFlow103 Mask	Usign8	R/W	03,04,06	1/1	Diagnosis Flow 103 mask: 0 Disable 1 Enable
2218/2219	diagTSensorOff SpecMask	Usign8	R/W	03,04,06	1/1	Diagnosis T sensor off spec mask: 0 Disable 1 Enable
2219/2220	diagTxSensorOff SpecMask	Usign8	R/W	03,04,06	1/1	Diagnosis Tx sensor off spec mask: 0 Disable 1 Enable
2220/2221	diagTSensorFail Mask	Usign8	R/W	03,04,06	1/1	Diagnosis T sensor fail mask: 0 Disable 1 Enable
2221/2222	diagLowCutoff Mask	Usign8	R/W	03,04,06	1/1	Diagnosis low cut off mask: 0 Disable 1 Enable
2222/2223	diagDevice Status[0]	Usign16	R	03,04	1/2	16-bit unsigned integer description: See chapter "Diagnosis / error messages" on page 17. The bit position is assigned to the errors in accordance with the "Byte / Bit pos." column in the table in the chapter "Alarm status and alarm history status" on page 18.
2223/2224	diagDevice Status[1]	Usign16	R	03,04	1/2	
2224/2225	diagDevice Status[2]	Usign16	R	03,04	1/2	
2300/2301	Device Reset	ACTION	R/W	03,04,06	1/1	Device reset: 0 Disable 1 Enable
2301/2302	initializeNv	Usign8	R/W	03,04,06	1/1	Initialize NV: 0 NV not Initialize 1 NV initialize start 2 NV initialize end OK 3 NV initialize end FAILED
2302/2303	resetToDefault	Int16	R/W	03,04,06	1/2	Reset to default: 0 Disable 1 Enable
2303/2304	saveAsDefault	Int16	R/W	03,04,06	1/2	Save as default: 0 Disable 1 Enable
2304/2305	loadRomDefault	Int16	R/W	03,04,06	1/2	Load ROM default: 0 Disable 1 Enable
2305/2306	classLoadRom Default	Int16	R/W	03,04,06	1/2	Class load ROM default: 0 Disable 1 Enable

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
2306/2307	ramTestEnable	Usign8	R/W	03,04,06	1/1	RAM test enable: 0 Disable 1 Enable
2307/2308	romTestEnable	Usign8	R/W	03,04,06	1/1	ROM test enable: 0 Disable 1 Enable
2308/2309	cbNvWritelsActive	Usign8	R	03,04,06	1/1	CB board NV write is active: 0 Not active 1 Active
2309/2310	feNvWritelsActive	Usign8	R	03,04,06	1/1	FE board NV write is active: 0 Not active 1 Active
2310/2311	dynamicVariablesCheckEnable	Usign8	R/W	03,04,06	1/1	Dynamic variables check enable: 0 Disable 1 Enable
2311/2312	saveAllAsDefault	ACTION	R/W	03,04,06	1/1	Save all as default: 0 Disable 1 Enable
2312/2313	resetAllToDefault	ACTION	R/W	03,04,06	1/1	Reset all to default: 0 Disable 1 Enable
2313/2314	writeAutoZero	ACTION	R/W	03,04,06	1/1	Write auto zero: 0 Disable 1 Enable
2314/2315	resetCB_Runhour	ACTION	R/W	03,04,06	1/1	Reset CB Board running hour: 0 Disable 1 Enable
2400/2401	Cpu Load	Float	R	03,04,16	2/4	CPU Load value: 0.0 ... 100; Increment:0.01
2402/2403	Calibration Status	Usign8	R/W	03,04,06	1/1	Piezo sensor calibration status: 0 Sensor is calibrated 1 Sensor is not calibrated
2403/2404	Auto-zero Status	Usign8	R	03,04,06	1/1	Auto zero status: 0 Auto zero Status is Completed 1 Auto zero Status is Uncompleted 2 Auto zero Status is Fail 3 Auto zero Status is not Start
2404/2405	snr	Float	R	03,04,16	2/4	SNR value.
2406/2407	sigAmplitude	Usign16	R	03,04	1/2	Signal amplitude value.
2407/2408	vbrAmplitude	Usign16	R	03,04	1/2	Vibration amplitude value.
2408/2409	sigMagnitude	Usign16	R	03,04	1/2	Signal magnitude value.
2409/2410	Total Working Time Hour	Float	R	03,04	2/4	Total transmitter working time in hour.
2411/2412	Partial Working Time Hour	Float	R	03,04	2/4	Partial working time hour.
2413/2414	tranMaintenance Cyc	Float	R	03,04	2/4	Transmitter maintenance cycle value.

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
2415/2416	Frontend Operation Hour	Float	R	03,04	2/4	Frontend board Operation Hour.
2417/2418	Frontend Maintenance	Float	R	03,04	2/4	Frontend board Maintenance value.
2419/2420	Temperature Max Record	Float	R	03,04	2/4	The Maximum record of temperature value.
2421/2422	Ambient Temperature Max	Float	R	03,04	2/4	The Maximum value of ambient temperature.
2423/2424	Re	Float	R	03,04	2/4	Reynolds value.
2425/2426	readOnlySwitchStatus	Usign8	R/W	03,04,06	1/1	Access Right Management Read-only Switch status: 0 Inactive 1 Active
2426/2427	baudRate	Usign16	R/W	03,04,06	1/2	Baud rate value in unsigned integer. 0 ... 65535; Increment:1
2500-2625/2501-2626	compressFactorArray	Float	R/W	03,04,16	63/252	Compress Factor Array[0]-Compress Factor Array[62]: 0 ... 1.0; Increment:0.001
3000/3001	FormatFENV	Usign8	R/W	03,04,06	1/1	Format Front-End Board's NV Flash: 0 disable 1 enable
3001/3002	outputMode	Usign8	R/W	03,04,06	1/1	Output mode of hardware: 0 Hardware output is disabled 1 Hardware output logic signal 2 Hardware output pulse signal 3 Hardware output frequency signal
3002/3003	lgcActState	Usign8	R/W	03,04,06	1/1	Logic output active state: 0 Logic output active state is high 1 Logic output active state is low
3003/3004	generalAlarm	Usign8	R/W	03,04,06	1/1	General digital output alarm: 0 disable 1 enable
3004/3005	minFlowrateAlarm	Usign8	R/W	03,04,06	1/1	Enable or disable min flow rate alarm for diagnosis: 0 disable 1 enable
3005/3006	maxFlowrateAlarm	Usign8	R/W	03,04,06	1/1	Enable or disable max flow rate alarm for diagnosis: 0 disable 1 enable
3006/3007	maxTemperatureAlarm	Usign8	R/W	03,04,06	1/1	Enable or disable max Temperature alarm for diagnosis: 0 disable 1 enable
3007/3008	minTemperatureAlarm	Usign8	R/W	03,04,06	1/1	Enable or disable min Temperature alarm for diagnosis: 0 disable 1 enable

Register address	Parameter name	Data type	Read / Write	Function code	Register size / No. of Bytes	Description
3008/3009	pulseFactor	Float	R/W	03,04,16	2/4	Setting of the pulses per unit for the selected operating mode for the "Pulse on DO" function of the digital output. 0.001 ... 2000.0 pulses/unit
3010/3011	pulseWidth	Float	R/W	03,04,16	2/4	Setting of the pulse width unit for the selected operating mode for the "Pulse on DO" function of the digital output. 0.05 ... 2000 ms The range is defined by pulseFactor and Qmax
3012/3013	maxFrequency	Float	R/W	03,04,16	2/4	Setting of the frequency range for the "Freq on DO " function of the digital output. Max Output frequency: 0.25 ... 10500 Hz Min Output frequency: 0.25 ... 10500 Hz
3014/3015	minFrequency	Float	R/W	03,04,16	2/4	
3016/3017	simuEnabled	Usign8	R/W	03,04,06	1/1	Enable or disable the digital output simulation: 0 disable 1 enable
3017/3018	simuFrequency	Float	R/W	03,04,16	2/4	Simulation frequency: 0.25 ... 10000 Hz
3019/3020	simuPulsesNum	Usign16	R/W	03,04,06	1/2	Simulation pulses number: 0 ... 10000; Increment:1
3020/3021	lgcSimCmd	Usign8	R/W	03,04,06	1/1	Logic simulation command: 0 hardware logic output is low 1 hardware logic output is high
3021/3022	pulseNum	Usign32	R	03,04	2/4	Pulse output value(the actual number of pulse output): 0 ... 32-bit unsigned; Increment:1
3023/3024	frequencyValue	Float	R	03,04	2/4	The actual digital output frequency value: 0.25 ... 10500 Hz
3025/3026	logicValue	Usign8	R	03,04	1/1	Logic output value(on/off): 0 Hardware logic output is low 1 Hardware logic output is high
3026/3027	lowFlowCutOff	Usign8	R/W	03,04,06	1/1	Enable/Disable low flow cut off alarm for diagnosis: 0 Disable 1 Enable
3027/3028	temperature OffsetCorrect User	Float	R/W	03,04,16	2/4	Temperature offset setting register.
3029/3030	dvPressureGuage	Float	R/W	03,04,16	2/4	dvPressureGuage = dvPressure-101.325KPa

Notes

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3KXF300003R4001

Original instruction

COM/FSV/FSS/430/450/MOD-EN 02.2016