



TEK-CLAMP 1200A

Ultrasonic Clamp-On Flow Meter

Modbus Manual

Document Number: MM-1200A



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NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

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1 Serial Port and Communication Protocol

1.1 MODBUS Register Address Table

Table 1 shows the MODBUS Register Address Table.

Table 1: MODBUS Register Address Table

Register	Number of Register	Variable Name	Data Type	Description
0001-0002	2	Instant Flow Rate	REAL4	Unit: m ³ /hour
0003-0004	2	Instant Heat Flow Rate	REAL4	Unit: GJ/hour
0005-0006	2	Fluid Velocity	REAL4	Unit: m/s
0007-0008	2	Measuring Sound Velocity of Fluid	REAL4	Unit: m/s
0009-0010	2	Positive Totalizer Flow	LONG	All the Flow Totalizer That Use Long Integers, Its Measure Is Controlled By M32 (REG1438)
0011-0012	2	Positive Totalizer Flow Decimal Part	REAL4	REAL4 is standard IEEE-754 format float floating point. The format data is also called FLOAT format.
0013-0014	2	Negative Totalizer Flow	LONG	Long integers is lower digit in front and with character
0015-0016	2	Negative Totalizer Flow Decimal Part	REAL4	all the heat quantity Totalizer that use long integers, its measure is controlled by M84 (REG1441)
0017-0018	2	Positive Totalizer Heat Quantity	LONG	
0019-0020	2	Positive Totalizer Heat Quantity Decimal Part	REAL4	
0021-0022	2	Negative Totalizer Heat Quantity	LONG	
0023-0024	2	Negative Totalizer Heat Quantity Decimal Part	REAL4	
0025-0026	2	Net Totalizer Flow	LONG	
0027-0028	2	Net Totalizer Decimal Part	REAL4	
0029-0030	2	Net Totalizer Heat Quantity	LONG	
0031-0032	2	Net Totalizer Heat Quantity Decimal Part	REAL4	
0033-0034	2	Temperature 1/Supplying Water Temperature	REAL4	Unit: °C
0035-0036	2	Temperature 2/Return Water Temperature	REAL4	Unit: °C

0037-0038	2	Analogue Input AI3 Value	REAL4	converted dimensionless data
0039-0040	2	Analogue Input AI4 Value	REAL4	converted dimensionless data
0041-0042	2	Analogue Input AI5 Value	REAL4	converted dimensionless data
0043-0044	2	Analogue Input AI3 Current Value	REAL4	unit: mA
0045-0046	2	Analogue Input AI4 Current Value	REAL4	unit: mA
0047-0048	2	Analogue Input AI5 Current Value	REAL4	unit: mA
0049-0050	2	System Setup Password	BCD	writable。 00H represents to cancel password setup
0051	1	Hardware Setup Password	BCD	writable。 “A55Ah” represents opening
0053-0055	3	Date and Time of The Instrument	BCD	writable。 6 byte BCD respectively represent second, minute, hour, date, month, year, lower bit is in front.
0056	1	Automatically Store Data Day, Hour	BCD	writable。 2 byte represent scheduled storage data starting time and day, for example: 0312H represent the storage data of the third day and the twelve O'clock each month. 0012H represents storage data of the twelve O'clock each day.
0059	1	Input Key Value (Analogue Keyboard)	INTEGER	writable. Refer to manual key value list.
0060	1	Make Screen Display X Number Menu	INTEGER	writable。
0061	1	Input Backlit Light Time	INTEGER	writable。 unit: second
0062	1	Buzzer' Beeping Times Left	INTEGER	writable。 The mostly 255 times
0062	1	OCT Pulse Number Left	INTEGER	writable。 The mostly 65536
0072	1	Instrument Work Error Code	BIT	16 bit respectively represents following meanings in remark 4
0077-0078	2	Supply Water Resistor Number	REAL4	Unit: ohm
0079-0080	2	Return Water Resistor Number	REAL4	Unit: ohm
0081-0082	2	Total Transfer Time of Ultrasonic	REAL4	Unit:ms
0083-0084	2	Ultrasonic Transfer Time Difference	REAL4	Unit: ns
0085-0086	2	Ultrasonic Upstream	REAL4	Unit:ms

		Transfer Time		
0087-0088	2	Ultrasonic Downstream Transfer Time	REAL4	Unit:ms
0089-0090	2	Present Current Loop Output Current Value	REAL4	Unit : mA
0092	1	Work Procedure and Signal Quality	INTEGER	high byte represents signal adjustment step, low byte represents signal quality, data range: 0-9, high data represent good signal
0093	1	Upstream Signal Strength	INTEGER	Data range: 0-4095
0094	1	Downstream Signal Strength	INTEGER	Data range: 0-4095
0096	1	Operating Interface Language Type	INTEGER	0 represent Chinese, 1 represent English
0097-0098	1	Ultrasonic Signal Transit Ratio	REAL4	Normal range: 100+-3%
0099-0100	1	Present Reynolds Number	REAL4	
0101-0102	2	Present Reynolds Correction Coefficient	REAL4	
0103-0104	2	Work Timer Time	LONG	no character, Unit: s
0105-0106	2	Total Work Time	LONG	no character, Unit: s
0105-0106	2	Total Power on Times	LONG	no character
0113-0114	2	Net Totalizer Flow (Floating Point Format)	REAL4	Unit: m ³ ,7 significance digit
0115-0116	2	Positive Totalizer Flow (Floating Point Format)	REAL4	Unit: m ³ ,7 significance digit
0117-0118	2	Negative Totalizer Flow (Floating Point Format)	REAL4	Unit: m ³ ,7 significance digit
0119-0120	2	Net Totalizer Heat Quantity (Floating Point Format)	REAL4	Unit: GJ, 7 significance digit
0121-0122	2	Positive Totalizer Heat Quantity (Floating Point Format)	REAL4	Unit: GJ, 7 significance digit
0123-0124	2	Negative Totalizer Heat Quantity (Floating Point Format)	REAL4	Unit: GJ, 7 significance digit
0125-0126	2	Today Total Flow (Floating Point Format)	REAL4	Unit: m ³ ,7 significance digit
0127-0128	2	This Month Total Flow (Floating Point Format)	REAL4	Unit: m ³ ,7 significance digit

0129-0130	2	Manual Total Flow	LONG	
0131-0132	2	Manual Totalizer Decimal Part	REAL4	
0133-0134	2	Batch Controller Total Flow	LONG	
0135-0136	2	Batch Controller Decimal Part	REAL4	
0137-0138	2	Today Total Flow	LONG	
0139-0140	2	Today Total Flow Decimal Part	REAL4	
0141-0142	2	This Month Total Flow	LONG	
0143-0144	2	This Month Total Flow Decimal Part	REAL4	
0145-0146	2	This Year Total Flow	LONG	
0147-0148	2	This Year Total Flow Decimal Part	REAL4	
0158	1	Display Present Menu	INTEGER	
0165-0166	2	Running Time with Trouble	LONG	Unit: s
0173-0174	2	Present Frequency Output Value	REAL4	Unit: Hz
0175-0176	2	Present Current Loop Output Value	REAL4	Unit: mA
0181-0182	2	Present Temperature Difference	REAL4	Unit: °C
0183-0184	2	Replenished Flow by This Power On	REAL4	Unit: m ³
0185-0186	2	Frequency Coefficient	REAL4	Lower than 0.1
0187-0188	2	Total Automatically Store Time	LONG	storage time is determined by register 0056
0189-0190	2	Automatically Store Positive Totalizer Flow	REAL4	storage time is determined by register 0056
0191-0192	2	Automatically Store Instant Flow	REAL4	storage time is determined by register 0056
0221-0222	2	Inside Pipe Diameter	REAL4	Unit: mm
0229-0230	2	Upstream Transfer Delayed	REAL4	Unit: μs
0231-0232	2	Downstream Transfer Delayed	REAL4	Unit: μs
0233-0234	2	Estimated Total Transfer Time	BCD	readable
0257-0288	32	Monitor Buffer Area	INTEGER	
0289	1	Monitor Buffer Area Storage Pointer	LONG	
0311	2	Worked Time of Today	LONG	no character, Unit: s
0313	2	Worked Time of This Month	INTEGER	no character, Unit: s

0315	2	Today Max Instant Flow	INTEGER	Unit: m ³ /h
0317	2	This Month Max Instant Flow	INTEGER	Unit: m ³ /h
1437	1	Present Instant Flow Measuring Unit	INTEGER	Data range: 0-31(remark 5)
1438	1	Present Totalizer Flow Measuring Unit	INTEGER	Data range: 0-7(remark 1)
1439	1	Present Totalizer Flow Multiplier Factor	INTEGER	n: range 0-7, (remark 1)
1440	1	Present Totalizer Heat Quantity Multiplier Factor	INTEGER	n: range 0-10, (remark 1)
1441	1	Present Heat Energy Measuring Unit	INTEGER	Range :0~3。0=GJ , 1=Kcal 2=KWh, 3=BTU
1442	1	Instrument Communication Address Number	INTEGER	
1491	1	Instrument Types	INTEGER	BIT0=0 represent flow meter BIT0=1 represent heat meter BIT3=1 represent heat meter installed on supply water pipe BIT3=0 represent heat meter installed on return water pipe
1451	2	User Scaling Factor	REAL4	
1521	2	Factory Scaling Factor	REAL4	unmodifiable
1529	2	Equipment Electronic Serial Number	BCD	this equipment electronic serial Number

Register bits 0-7 are as follows:

- 0 cubic meter (m3)
- 1 litre (L)
- US gallon (GAL)
- imperial gallon (IGL)
- US Mega gallon (MGL)
- cubic feet (CF)
- US oil barrel [42] (OB)
- imperial oil barrel (IB)

1.1.1 Instant Flow Unit Code

Table 2 shows instant flow unit code

Table 2 : Instant Flow Unit Code

Data Bits	Unit	Data Bits	Unit	Data Bits	Unit	Data Bits	Unit
0	m ³ /s	1	m ³ /minute	2	m ³ /h	3	m ³ /day
4	L/s	5	L/minute	6	L/h	7	L/day
8	GAL/s	9	GAL/minute	10	GAL/h	11	GAL/day
12	IGL/s	13	IGL/minute	14	IGL/h	15	IGL/day
16	MGL/s	17	MGL/minute	18	MGL/h	19	MGL/day
20	CF/s	21	CF/minute	22	CF/h	23	CF/day
24	OB/s	25	OB/minute	26	OB/h	27	OB/day
28	IB/s	29	IB/minute	30	IB/h	31	IB/day

1.2 Total Data MODBUS Address Table (Year, Month, Day)

Total data adopts a 32-byte data block every day to store circulation. Total of 512 data blocks. The pointer address of the present data block is in register 0162—the data range: 0 to 511. Present pointer point to the data of “yesterday,” Present pointer minus 1 shows the data of “the day before yesterday.” The data pointer equal to 0, and minus 1 indicates the data block 511. Set the digit in register 0162 is 1 that shows total data of yesterday in 10257-10272 register, the data of the day before yesterday in 10241-10256 register, and three days ago 18417-18432 register.

Address table is as follows:

Table 3 : Total Data MODBUS Address Table

Data Block Number	Register Address	Pieces of Register	Name of Variable	Data Type	Introduction
n/a	0162	1	Day Total Data Pointer	Integer	Data Range: 0-127
0	10241	1	Status Byte and Day	BCD	Lower Byte is Status Higher Byte is Day
	10242	1	Month and Year	BCD	Lower Byte is Month Higher Byte is Year
	10243-10244	2	Total Work Time	LONG	Used to Check All Day Work Time
	10245-10246	2	All Day Net Total Flow	REAL4	Today Total Flow
	10247-10248	2	Net Total Heat Flow Value	REAL4	23:59:59 Totalizer Value at the Last Second Time
	10249-10250	2	Positive Totalizer Value	LONG	23:59:59 Totalizer Value at the Last Second Time
	10251-10252	2	Negative Totalizer Value	LONG	Totalizer Value at the

					Last Second Time
	10253-10254	2	Heat Quantity Positive Totalizer Value	LONG	23:59:59 Totalizer Value at the Last Second Time
	10255-10256	2	Heat Quantity Negative Totalizer Value	LONG	23:59:59 Totalizer Value at the Last Second Time
1	10257	1	Status Byte and Day	BCD	Lower Byte is Status Higher Byte is Day
	10258	1	Month and Year	BCD	Lower Byte is Month Higher Byte is Year
	10259-10260	2	Total Work Time	LONG	Used to Check All Day Work Time
	10261-10262	2	All Day Net Total Flow	REAL4	Today Total Flow
	10263-10264	2	Net Total Heat Flow Value	REAL4	23:59:59 second Time Totalizer Value
	10265-10266	2	Positive Totalizer Value	LONG	23:59:59 second Time Totalizer Value
	10267-10268	2	Negative Totalizer Value	LONG	23:59:59 second Time Totalizer Value
	10269-10270	2	Heat Quantity Positive Totalizer Value	LONG	23:59:59 second Time Totalizer Value
	10271-10272	2	Heat Quantity Negative Totalizer Value	LONG	23:59:59 second Time Totalizer Value
...
511	18417-18432	16			The Data Block of The Number 511

Remark:

Please refer introduction for status byte.

If all the read data is OFFH, that means the register is empty.

1.2.1 Month total data (the address are not the same with that of other vision flow meter)

Structure of month total data is the same with day total data. Please refer to introduction of day total data. Specially the data of date byte is always 0, has 128 data blocks.

Month Total Data Address table as follows:

Table 4 : Month Total Data

Data Block Number	Register Address	Pieces of Register	Name of Variable	Data Type	Introduction
n/a	0163	1	month total data pointer	Integer	Data Range: 0-127
0	8193	1	status byte	BCD	Lower Byte Is Status Higher Byte Is 0
	8194	1	Month and Year	BCD	Lower Byte Is Month Higher Byte Is Year

	8195-8196	2	Total Work Time	LONG	Used to Check All Month Work Time
	8197-8198	2	All Month Net Total Flow	REAL4	This Month Total Flow
	8199-8200	2	Net Total Heat Flow Value	REAL4	Totalizer Value at the Last Second Time of this Month
	8201-8202	2	Positive Totalizer Value	LONG	Totalizer Value at the Last Second Time of this Month
	8203-8204	2	Negative Totalizer Value	LONG	Totalizer Value at the Last Second Time of this Month
	8205-8206	2	Heat Quantity Positive Totalizer Value	LONG	Totalizer Value at the Last Second Time of this Month
	8207-8208	2	Heat Quantity Negative Totalizer Value	LONG	Totalizer Value at the Last Second Time of this Month
1	8209	1	Status Byte	BCD	Lower Byte is Status
	8210	1	Month and Year	BCD	Lower Byte is Month, Higher Byte is Year
	8211-8212	2	Total Work Time	LONG	Used to Check All Month Work Time
	8213-8214	2	All Day Net Total Flow	REAL4	This Month Total Flow
	8215-8216	2	Net Total Heat Flow Value	REAL4	Totalizer Value at the Last Second Time of this Month
	8217-8218	2	Positive Totalizer Value	LONG	Totalizer Value at the Last Second Time of this Month
	8219-8220	2	Negative Totalizer Value	LONG	Totalizer Value at the Last Second Time of this Month
	8221-8222	2	Heat Quantity Positive Totalizer Value	LONG	Totalizer Value at the Last Second Time of this Month
	8223-8224	2	Heat Quantity Negative Totalizer Value	LONG	Totalizer Value at the Last Second Time of this Month
• • • •	• • • • • • • • • •	• • •	• • • • • • • • • •	• • •	• • • • • • • • • •
127	10225-10240	16			The Data Block of the Number 127

Remark:

- Please refer introduction for status byte.
- If all the read data is OFFH, that means the register is empty.
- Year total data are exported from month total data.

2 Key Assignments Coding

Key Assignments Coding is used in networking, analogue keys function on upper machine. For Example: example: Input command “M1” through serial port and press key “1” of the keyboard of Tek-Clamp 1200A Ultrasonic Clamp-On Flow Meter simultaneously to operate all functions of keyboard on upper machine completely. All keys coding are as follows:

Table 5 : Key Assignments Coding

Key Number	Key assignment code (hexadecimal)	Key assignment code (decimal system)	ASCII code	key	Key assignment cod (hexadecimal)	Key assignment cod (decimal system)	ASCII code
0	30H	48	0	8	38H	56	8
1	31H	49	1	9	39H	57	9
2	32H	50	2	.	3AH	58	:
3	33H	51	3	◀	3BH	59	;
4	34H	52	4	MENU	3CH	60	<
5	35H	53	5	ENT	3DH	61	=
6	36H	54	6	▲/+	3EH	62	>
7	37H	55	7	▼/-	3FH	63	?




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