01 03 00 00 00 0A C5 CD （hex）

Unit Function start REG Numbers of REGs Check-sum

While under the MODBUS-ASCII format, the command could be

:01030000000AF2(CR and LF)

Details about the standard MODBUS protocol will not be studied in this manual; please the users find them on other related materials.

By default, the RS232/RS485 will setup with 9600,none,8,1(9600bd，none parity，8 data bits， 1 stop bit)

7.1.1 MODBUS REGISTERS TABLE

MODBUS REGISTERS TABLE for TUF-2000M

（please take notice the difference with the water meter MODBUS table）

REGISTER	NUMBER	VARIABLE NAME	FORMAT	NOTE
0001-0002	2	Flow Rate	REAL4	Unit: m^3/h
0003-0004	2	Energy Flow Rate	REAL4	Unit: GJ/h
0005-0006	2	Velocity	REAL4	Unit: m/s
0007-0008	2	Fluid sound speed	REAL4	Unit: m/s
0009-0010	2	Positive accumulator	LONG	Unit is selected by M31, and depends on totalizer multiplier
0011-0012	2	Positive decimal fraction	REAL4	Same unit as the integer part
0013-0014	2	Negative accumulator	LONG	Long is a signed 4-byte integer, lower byte first
0015-0016	2	Negative decimal fraction	REAL4	REAL4 is a format of Singular IEEE-754 number, also called FLOAT
0017-0018	2	Positive energy accumulator	LONG	
0019-0020	2	Positive energy decimal fraction	REAL4	
0021-0022	2	Negative energy accumulator	LONG	
0023-0024	2	Negative energy decimal fraction	REAL4	

0025-0026	2	Net accumulator	LONG	
0027-0028	2	Net decimal fraction	REAL4	
0029-0030	2	Net energy accumulator	LONG	
0031-0032	2	Net energy decimal fraction	REAL4	
0033-0034	2	Temperature #1/inlet	REAL4	Unit: C
0035-0036	2	Temperature #2/outlet	REAL4	Unit: C
0037-0038	2	Analog input AI3	REAL4	
0039-0040	2	Analog input AI4	REAL4	
0041-0042	2	Analog input AI5	REAL4	
0043-0044	2	Current input at AI3	REAL4	In unit mA

0045-0046	2	Current input at AI3	REAL4	In unit mA
0047-0048	2	Current input at AI3	REAL4	In unit mA
0049-0050	2	System password	BCD	Writable。00H for unlock
0051	1	Password for hardware	BCD	Writable。“A55Ah” for unlock
0053-0055	3	Calendar (date and time)	BCD	Writable。6 Bytes of BCD stands SMHDMY，lower byte first
0056	1	Day+Hour for Auto-Save	BCD	Writable。For example 0512H stands Auto-save on 12:00 on 5th。0012H for 12:00 on everyday。
0059	1	Key to input	INTEGER	Writable
0060	1	Go to Window #	INTEGER	Writable。
0061	1	LCD Back-lit lights for number of seconds	INTEGER	Writable。In unit second
0062	1	Times for the beeper	INTEGER	Writable。Max 255
0062	1	Pulses left for OCT	INTEGER	Writable。Max 65535
0072	1	Error Code	BIT	16bits, see note 4
0077-0078	2	PT100 resistance of inlet	REAL4	In unit Ohm
0079-0080	2	PT100 resistance of outlet	REAL4	In unit Ohm
0081-0082	2	Total travel time	REAL4	In unit Micro-second
0083-0084	2	Delta travel time	REAL4	In unit Nino-second
0085-0086	2	Upstream travel time	REAL4	In unit Micro-second
0087-0088	2	Downstream travel time	REAL4	In unit Micro-second
0089-0090	2	Output current	REAL4	In unit mA
0092	1	Working step and Signal Quality	INTEGER	The high byte is the step and low for signal quality，range 00-99，the larger the

				better.
0093	1	Upstream strength	INTEGER	Range 0-2047
0094	1	Downstream strength	INTEGER	Range 0-2047
0096	1	Language used in user interface	INTEGER	0 : English，1:Chinese Other language will be supported later
0097-0098	2	The rate of the measured travel time by the calculated travel time.	REAL4	Normal 100+-3%
0099-0100	2	Reynolds number	REAL4	

0101-0102	2	Pipe Reynolds factor	REAL4	
0103-0104	2	Working Timer	LONG	unsigned，in second
0105-0106	2	Total working time	LONG	unsigned，in second
0105-0106	2	Total power on-off time	LONG	Unsigned
0113-0114	2	Net accumulator	REAL4	In Cubic Meter，float
0115-0116	2	Positive accumulator	REAL4	In Cubic Meter，float
0117-0118	2	Negative accumulator	REAL4	In Cubic Meter，float
0119-0120	2	Net energy accumulator	REAL4	In GJ，float
0121-0122	2	Positive energy accumulator	REAL4	In GJ，float
0123-0124	2	Negative energy accumulator	REAL4	In GJ，float
0125-0126	2	Flow for today	REAL4	In Cubic Meter，float
0127-0128	2	Flow for this month	REAL4	In Cubic Meter，float
0129-0130	2	Manual accumulator	LONG	
0131-0132	2	Manual accumulator decimal fraction	REAL4	
0133-0134	2	Batch accumulator	LONG	
0135-0136	2	Batch accumulator decimal fraction	REAL4	
0137-0138	2	Flow for today	LONG	
0139-0140	2	Flow for today decimal fraction	REAL4	
0141-0142	2	Flow for this month	LONG	
0143-0144	2	Flow for this month decimal fraction	REAL4	
0145-0146	2	Flow for this year	LONG	
0147-0148	2	Flow for this year decimal fraction	REAL4	
0158	1	Current display window	INTEGER	
0165-0166	2	Failure timer	LONG	In unit second
0173-0174	2	Current output frequency	REAL4	Unit：Hz
0175-0176	2	Current output with 4-20mA	REAL4	Unit：mA
0181-0182	2	Temperature difference	REAL4	Unit：C
0183-0184	2	Lost flow for period of last power off	REAL4	Unit：Cubic Meter
0185-0186	2	Clock coefficient	REAL4	Should less than 0.1

0187-0188	2	Total time for Auto-Save	REAL4	Time to save by 0056
0189-0190	2	POS flow for Auto-Save	REAL4	Time to save by 0056
0191-0192	2	Flow rate for Auto-Save	REAL4	Time to save by 0056
0221-0222	2	Inner pipe diameter	REAL4	In millimeter
0229-0230	2	Upstream delay	REAL4	In microsecond
0231-0232	2	Downstream delay	REAL4	In microsecond
0233-0234	2	Calculated travel time	REAL4	In microsecond
0257-0288	32	LCD buffer	BCD	
0289	1	LCD buffer pointer	INTEGER	
0311	2	Worked time for today	LONG	Unsigned, in seconds
0313	2	Worked time for this month	LONG	Unsigned, in seconds
1437	1	Unit for flow rate	INTEGER	See note 5
1438	1	Unit for flow totalizer	INTEGER	Range 0~7,see note 1
1439	1	Multiplier for totalizer	INTEGER	Range 0~7,see note 1
1440	1	Multiplier for energy accumulator	INTEGER	Range 0~10,see note 1
1441	1	Unit for energy rate	INTEGER	0=GJ 1=Kcal 2=KWh，3=BTU
1442	1	Device address	INTEGER	
1451	2	User scale factor	REAL4	
1521	2	Manufacturer scale factor	REAL4	Read only
1529	2	Electronic serial number	BCD	High byte first

Note ：(1) The internal accumulator is been presented by a LONG number for the integer part together with a REAL number for the decimal fraction. In general uses, only the integer part needs to be read. Reading the fraction can be omitted. The final accumulator result has a relation with unit and multiplier. Assume N stands for the integer part (for the positive accumulator, the integer part is the content of REG 0009, 0010, a 32-bits signed LONG integer,), Nf stands for the decimal fraction part (for the positive accumulator, the fraction part is the content of REG 0011, 0012, a 32-bits REAL float number,), n stands for the flow multiplier (REG 1439).

then

The final positive flow rate=$(N+Nf) \times 10^{n-3}$ (in unit decided by REG 1438）。

The meaning of REG 1438 which has a range of 0~7 is as following:

0 cubic meter (m^3)

1 liter (L)

2 American gallon (GAL)

3 imperial gallon (IGL)

4 American million gallon (MGL)