



AI-MODBUS-TCP Multifunctional Communication Controller

Users' Manual



1. Summary

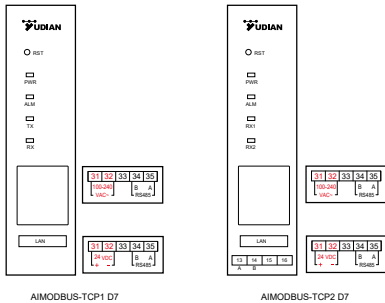
The multifunctional communication controller supports four instructions under the MODBUS protocol and can communicate more widely with other MODBUS devices. To ensure the rate, the RTU (binary) mode is adopted, which supports instructions 03H, 04H, 06H, 10H, and each channel of the multifunctional communication controller supports data collection of up to 36 instruments. In RTU mode, the controller can read up to 125 WORD at one time and write up to 8 WORD at one time. It can assemble 36 instruments into programmed instruments, non-programmed instruments, patrol instruments and measurement alarm instruments at any time. Addresses should be arranged in order of 1-36.

The multifunctional communication controller has seven sockets built in to support up to seven upper computers for simultaneous access.

1.1 Model and Difference

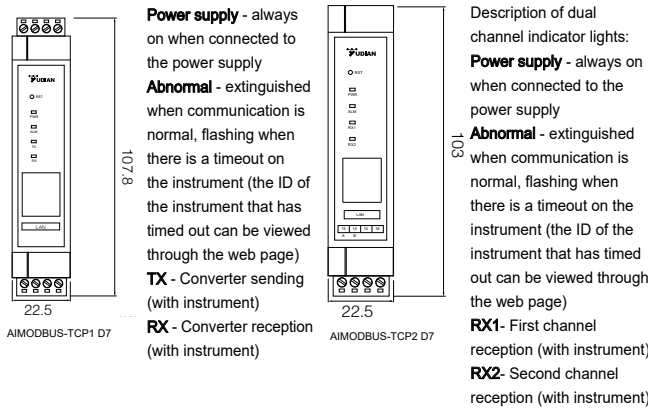
AI - □ - □ - □ - □ - □				说明
Model	MODBUS			AI-Modbus TCP Multifunctional Communication Controller
Slot	TCP1			Upper computer: Ethernet port; Lower computer: RS485(single channel)
	TCP2			Upper computer: Ethernet port; Lower computer: RS485(dual channel)
Shape		D7		D7, 22.5MM width, DIN rail mounting mode
Power Supply				100~240VAC
		24V	24VDC	

1.2Wiring and Dimension



Wiring of single channel: :
31, 32 ---- 220VAC / 24VDC
34, 35 ---- Lower computer:
RS485

Wiring of dual channel:
31, 32 ---- 220VAC/24VDC
34, 35 ---- Lower computer of the first channel:
RS485
13, 14 --- Lower computer of the second channel:
RS485



2. Description of Function Code

The international standard MODBUS-TCP has been adopted.

	Transaction ID	Protocol identifier	Length	Unit identifier	Function code	Data
Bytes	2	2	2	1	1	n

Transaction ID: Generally, 1 should be added after each communication to distinguish different communication data;

Protocol identifier: 00 00 represents the Modbus-TCP protocol;

Length: represents the length of the following data, in bytes;

Unit identifier: device address.

2. 1 03H (to read the holding register)

Range of register addresses	Range of length
0~56519	1~125

2. 2 04H (to read the input register)

Range of register addresses	Range of length
0~5144	1~109

2. 3 06H (to write the single holding register)

Range of register addresses	Range of data
0~56519	Depending on the range of instrument settings

2. 4 10H (to write the holding registers in batches)

Range of register addresses	Range of length	Range of data
0~56519	1~8	Depending on the range of instrument settings

3. Registers List of First Channel

3.1 Input Registers

Input registers (0~144) (30001~30145), read-only, with data as SHORT, defined as follows:

List of Registers for Measured Value PV, Output Value MV, and Alarm Status			
0~35	(30001~30036)	Address 1~36	Measured value PV
36~71	(30037~30072)	Address 1~36	Output value MV
72~107	(30073~30108)	Address 1~36	Alarm status
108~143	(30109~30144)	Address 1~36	Output value MV and alarm status
144	(30145)		number for current multifunctional communication controller version

Note 1: Definition of alarm status:

Bit0: HIAL, Bit1: LOAL, Bit2: HDAL, Bit3: LDAL, Bit4: Oral. Bit5: AL1 Status bit6: AI2 state. When AL1 and AL2 are 1, there's no output, when 0, there is a output signal;

Note 2: Registers 108~143 are values that combine the output value and alarm value.

3.2 Holding Register

Holding register (0-6519) (40001-46520), read/write, data is SHORT, defined as follows:

List of SV Set Value Register		
0~35	(40001~40036)	Address 1-36 Set value

其他参数寄存器列表		
36~215	(40037~40216)	Address 1
216~395	(40217~40396)	Address 2
396~575	(40397~40576)	Address 3
576~755	(40577~40756)	Address 4
756~935	(40757~40936)	Address 5
936~1115	(40937~41116)	Address 6
1116~1295	(41117~41296)	Address 7
1296~1475	(41297~41476)	Address 8
1476~1655	(41477~41656)	Address 9
1656~1835	(41657~41836)	Address 10
1836~2015	(41837~42016)	Address 11
2016~2195	(42017~42196)	Address 12
2196~2375	(42197~42376)	Address 13
2376~2555	(42377~42556)	Address 14
2556~2735	(42557~42736)	Address 15
2736~2915	(42737~42916)	Address 16
2916~3095	(42917~43096)	Address 17
3096~3275	(43097~43276)	Address 18
3276~3455	(43277~43456)	Address 19
3456~3635	(43457~43636)	Address 20
3636~3815	(43637~43816)	Address 21
3816~3995	(43817~43996)	Address 22
3996~4175	(43997~44176)	Address 23
4176~4355	(44177~44356)	Address 24
4356~4535	(44357~44536)	Address 25
4536~4715	(44537~44716)	Address 26
4716~4895	(44717~44896)	Address 27
4896~5075	(44897~45076)	Address 28
5076~5255	(45077~45256)	Address 29
5256~5435	(45257~45436)	Address 30
5436~5615	(45437~45616)	Address 31
5616~5795	(45617~45796)	Address 32
5796~5975	(45797~45976)	Address 33
5976~6155	(45977~46156)	Address 34
6156~6335	(46157~46336)	Address 35
6336~6515	(46337~46516)	Address 36

6516~6519 (46517~46520)	Stand-by register
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Note: When the controller is powered on for the first time, the first 26 parameters are collected by default; After the baud rate and data format have been modified, it needs to be powered on again to take effect.

4.Registers List of Second Channel

4.1 Input Register

Input register of the second channel(2000-2144) (32001-32145). Read only, data is SHORT, defined as follows:

List of measured value PV, output value MV, and registers in alarming status		
2000~2035 (32001~32036)	Address 1~36	measured value PV
2036~2071 (32037~32072)	Address 1~36	output value PV
2072~20107 (32073-32108)	Address 1~36	alarming status
2108~2143 (32109-32144)	Address 1~36	output value MV and alarming status
2144 (32145)		number of the current converter version

Note 1: Alarm status Bit0: HIAL, Bit1: LoAL, Bit2: HdAL, Bit3: LdAL, Bit4: orAL, Bit5: Event output status 1, Bit6: Event output status 2, Bit7: Fixed to 0; Generated when Bit0~5 is 1, not stopped when Bit0~5 is 0; When the event output status is 1, there is no output, and when the event output status is 0, an event output is generated;

Note 2: Registers 108~143 are values that combine the output value and alarm value.

4.2 Holding Register

Holding register of the second channel(20000~26519) (420001~426520). read/write, data is SHORT, defined as follows:

其他参数寄存器列表		
20000~20035 (420001~420036)	Address 1-36	Set value
20036~20215 (420037~420216)	Address 1	
20216~20395 (420217~420396)	Address 2	
20396~20575 (420397~420576)	Address 3	
20576~20755 (420577~420756)	Address 4	
20756~20935 (420757~420936)	Address 5	
20936~21115 (420937~421116)	Address 6	
21116~21295 (421117~421296)	Address 7	
21296~21475 (421297~421476)	Address 8	
21476~21655 (421477~421656)	Address 9	
21656~21835 (421657~421836)	Address 10	
21836~22015 (421837~422016)	Address 11	
22016~22195 (422017~422196)	Address 12	
22196~22375 (422197~422376)	Address 13	
22376~22555 (422377~422556)	Address 14	
22556~22735 (422557~422736)	Address 15	
22736~22915 (422737~422916)	Address 16	
22916~23095 (422917~423096)	Address 17	
23096~23275 (423097~423276)	Address 18	
23276~23455 (423277~423456)	Address 19	
23456~23635 (423457~423636)	Address 20	
23636~23815 (423637~423816)	Address 21	
23816~23995 (423817~423996)	Address 22	
23996~24175 (423997~424176)	Address 23	
24176~24355 (424177~424356)	Address 24	
24356~24535 (424357~424536)	Address 25	
24536~24715 (424537~424716)	Address 26	
24716~24895 (424717~424896)	Address 27	
24896~25075 (424897~425076)	Address 28	
25076~25255 (425077~425256)	Address 29	
25256~25435 (425257~425436)	Address 30	
25436~25615 (425437~425616)	Address 31	

25616~25795 (425617~425796)	Address 32
25796~25975 (425797~425976)	Address 33
25976~26155 (425977~426156)	Address 34
26156~26335 (426157~426336)	Address 35
26336~26515 (426337~426516)	Address 36
26517~26519 (426517~426520)	Stand-by register

Note: When the controller is powered on for the first time, the first 26 parameters are collected by default; After the baud rate and data format have been modified, it needs to be powered on again to take effect.

5.Parameters of Holding Register

Code	V8.x	V7.x
0	Set value	Set value or program segment number
1	HIAL upper limit alarm	HIAL upper limit alarm
2	LoAL lower limit alarm	LoAL lower limit alarm
3	HdAL positive deviation alarm	HdAL positive deviation alarm
4	LdAL negative deviation alarm	LdAL negative deviation alarm
5	AHYS alarm return difference	dF return difference
6	Ctrl control mode	Ctrl control mode
7	P ratio band	M5 Holding Parameters
8	I Integral time	P ratio parameter
9	d Differential time	t Lag time
10	Ctl control period	Ctl control period
11	InP input specifications	Sn input specifications
12	dPt decimal point position	dIP decimal point position
13	SCL lower limit of scale	dIL lower limit of input
14	SCH upper limit of scale	dIH upper limit of input
15	AOP alarm output selection	ALP alarm output definition
16	Scb measurement translation correction	Scb measurement translation correction
17	OPt main output mode	OPT output mode
18	OPL lower limit of output	OPL lower limit of output
19	OPH upper limit of output	OPH upper limit of output
20	AF function selection	CF function selection
21	Characteristic characters of instrument models	Program control word (run: 0; pause: 4; stop: 12) (program table only supports the functions of start and stop)
22	Address	Address
23	FILt digital filtering	dL digital filtering
24	A-M manual/automatic selection	Run running parameters
25	Loc parameter blocking	Loc parameter blocking
26	MV manual output	C01 (AI-808/519 is manual output)
27	Srun RUN/STOP	T01
28	CHYS control return	C02
29	At auto-tuning	T02
30	SPL Lower limit of set value	C03
31	SPH upper limit of set value	T03
32	Fru unit and power frequency	C04
33	OEF OPH effective range	T04
34	Act positive/negative	C05
35	ADIS alarm	T05
36	Aut specifications of cold output	C06
37	P2 proportional band of cold output	T06

38	I2 integral time of cold output	C07
39	D2 differential time of cold output	T07
40	Ctl2 period of cold output	C08
41	Et event input	T08
42	SPR ramp rate limit	C09
43	Pno segments	t09
44	Ponp power on	C10
45	PAF program parameters	t10
46	STEP segment number	C11
47	Elapsed time	t11
48	Event output status	C12
49	OPrt soft start time	t12
50	Strt valve rotation time	C13
51	SPSL lower limit of external set value	t13
52	SPSH upper limit of external set value	C14
53	Ero fault output	t14
54	AF2	C15
55~63	Standby	t15~t19
64~71	EP1~EP8	C20~t23
72	Valve (read only)	C24
73~79	Standby	t24~t27
80~81	SP 1 ~ t1	C28~t28
82~85	SP2 ~ t3	C29~t30
86	SP4	Elapsed time
87	t4	AI808p manual output
88~179	SP5~ t50	

Note 1: The calculation method for the parameter address of each channel: the starting address of the register area to which the instrument address belongs+the parameter code is the register address. For example, the InP parameter address of the instrument with the first channel address of 10 is 1656+11=1667, which is (41668);

Note 2: Register 21 bits, different instruments have different functions, please refer to the manual for details;

Note 3: Registers 22- instrument address, 25- LOC parameter blocking, default values cannot be modified;

Note 4: All registers will be set to -1 during initialization; When the reading register exceeds the time limit, PV, SV, and MV are displayed as 32767;

Note 5: Please refer to the manual for specific registers and do not choose instruments without registers to avoid affecting communication.

6.Parameter setting

6.1 Description

The multi-functional communication controller is set through a web page. After connecting it to the network, enter its IP address in the browser to set it. Its default IP is 192.168.1.8. It is recommended to use Google, IE, and 360 browsers. The controller does not support browsers below IE8 version.

When using it for the first time, please set the instrument to be queried and its corresponding registers.

6.2 Communication

The communication between the multi-functional communication controller and the upper computer follows the ModbusTCP protocol, with the IP set by the user and the slot number 502.

The slot number of the current version cannot be changed, and the IP can be customized.

When multiple upper computers access simultaneously, the slot number of the socket remains 502.