



## Lingkong LK3U/ZK3U Series PLC User Manual

### Safety Guide

This manual includes precautions to ensure personal safety and protect this product and connected equipment. These precautions are highlighted with warning triangles in the manual and are marked as follows according to the hazard level. For other matters not covered, please comply with basic electrical operating regulations.



Danger

Indicates that improper operation may result in death or serious personal injury, as well as serious property damage.



Notice

Indicates that improper operation may lead to undesirable results or conditions, as well as property damage.

### User Notice

To ensure life safety and normal operation of the equipment, please strictly follow the following precautions when setting, installing, operating and maintaining the equipment.



Only operators with certain electrical knowledge are allowed to install and operate the equipment, including commissioning, grounding and marking the lines, equipment and systems in accordance with established safety practices and standards.



When using this device in combination with other equipment, the operator is requested to confirm whether the relevant electrical specifications are met, otherwise it may cause equipment failure or other losses.



Before programming the device, please read this manual carefully and program only after fully understanding the relevant contents of this manual. For software usage and programming issues, please refer to the relevant manuals.



The examples listed in this manual or other technical materials are for users' understanding and reference only and should not be used directly for commercial purposes.

### Disclaimer

We have checked that the contents of this manual are consistent with the hardware and software described. Since errors are difficult to completely avoid, we cannot guarantee complete consistency. We will check the data in the manual frequently and make necessary corrections in subsequent editing. We welcome your valuable comments.

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Technical data are subject to change without prior notice.

## Product Usage

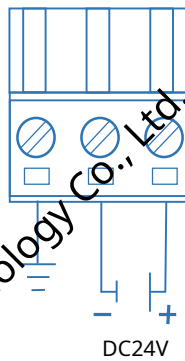


Before using the Lingkong LK3U/ZK3U series PLC purchased from any channel, please confirm whether the product is damaged, whether any parts are missing, and whether the model matches. If any of the above situations occur, do not use or install it, and contact the supplier as soon as possible for handling.

### PLC power supply



The LK3U/ZK3U series PLC of Lingkong adopts DC24V power supply design. Please strictly follow the power supply parameters for power supply and connect the power supply according to the specific product wiring diagram or logo. As shown below



Power wiring diagram

Installing or wiring PLC and related equipment under power supply may cause electric shock or malfunction of the operating equipment. Failure to disconnect all power supplies of PLC and related equipment during installation or removal may cause serious personal injury to the operator and damage the equipment.

### PLC connection programming cable

Lingkong LK3U/ZK3U series PLC supports three communication ports: 1 RS232 and 2 RS485, and can communicate with programming software at the same time.

### Programming software support

Supports Gx Works 2 or Gx Developer programming software to write, read, download, check, diagnose and monitor programs.

### Encryption

When the keyword is set to 8 bits, the value is 12345678. When the super encryption function is activated, the program upload function is directly disabled.

Changing the password will clear the program, which perfectly eliminates the password cracking software on the market.

Connect with human machine interface

Lingkong LK3U/ZK3U series PLC supports three communication ports: 1 RS232 and 2 RS485, which can communicate with the human-machine interface at the same time. Protocol selection [FX3U](#), the communication parameters are [19200,7,E,1](#).

Indicator lights

Power indicator PWR: always on

Running indicator RUN: flashing

Error indicator light ERR: Minor fault flashes; serious fault lights up.

Programming software [diagnosis](#) Function, get the error code, by viewing [Error code table](#) Perform troubleshooting.

## LK3U Shell Series Technical Specifications

Specifications	LK3U-14	LK3U-20	LK3U-32	LK3U-48	LK3U-64
Overall dimensions (mm)	117*108.6*65	117*108.6*65	199*124*65	199*124*65	250*124*65
Diagonal size of bottom shell (mm)	107.5*116.5	107.5*116.5	190.5*116.5	190.5*116.5	240.5*116.5
Digital input (1 input)	8/6	12/8	16/16	24/24	32/32
High-speed input/output	2*1/4		2/8		
Analog input * 2	4		10		
Analog output	2				
Input Power	DC24V ±10% 1A				
Input signal	DC24V NPN				
MR Output	Relay type voltage: DC30V, AC250V; current: 3A				
MT Output	Transistor type voltage: DC24V NPN; Current: 0.5A				
MRT Output	Mixed output 4-way high speed		Mixed output 8-way high speed		
Communication port-USB	1				
Communication port-RS485	2				
Expansion port-CAN	1*3				
Program capacity	32000 steps				
Boolean instruction efficiency	0.28μs				
Other optional features * 4	Weighing interface				
Operating temperature	-10°C ~ 50°C				
Storage temperature	- 20°C ~60°C				
Operating humidity	10%RH ~ 90%RH (no condensation)				

\* 1: All models have 2 high-speed inputs by default. Up to 6 high-speed inputs can be added. For specific parameters, please refer to "[High-speed input description](#)" Length description.

\* 2: All models have a default analog input signal of 0-10V, which can be changed to 0-20mA, NTC10K temperature probe (-40-150°C) / NTC50K temperature probe (-40-210°C). For analog reading, please refer to "[Analog Input Description](#)" Length description.

\* 3: All models can be equipped with a CAN interface, with two optional modes:

1. Register sharing mode between PLC hosts, similar to N:N network. For usage, please refer to "[CAN Share Mode Description](#)" Length description.
2. Expansion mode, you can connect dedicated expansion modules. For module usage, please refer to "[CAN Extended Mode Description](#)" Length description.

\* 4: All models can be equipped with 2-way weighing interface. For usage, please refer to "[Weighing Collection Instructions](#)" Length description.

## ZK3U Panel Series Technical Specifications

Specifications	ZK3U-32	ZK3U-48	ZK3U-64
Overall dimensions (mm)	180*100*30	190*110*40	250*110*40
Diagonal size of bottom shell (mm)	172.5*106.5	190.5*116.5	240.5*116.5
Digital input/output	16/16	24/24	32/32
High speed input/output	2+1/8		
Analog input*2	10		
Analog output	2		
Input Power	DC24V ±10% 1A		
Input signal	DC24V NPN		
MR Output	Relay type voltage: DC30V, AC250V; current: 3A		
MT Output	Transistor type voltage: DC24V NPN; Current: 0.5A		
MRT Output	Mixed output 8-way high speed		
Communication port-RS232	1		
Communication port-RS485	2		
Expansion port-CAN	1*3		
Program capacity	32000 steps		
Boolean instruction efficiency	0.28μs		
Other optional features*4	Weighing interface		
Operating temperature	- 10°C ~50°C		
Storage temperature	- 20°C ~60°C		
Operating humidity	10%RH ~ 90%RH (no condensation)		

\* 1: All models have 2 high-speed inputs by default; up to 6 can be added. For specific parameters, please refer to "[High-speed input description](#)" Length description.

\* 2: All models have a default analog input signal of 0-10V, which can be changed to 0-20mA, NTC10K temperature probe (-40-150°C) / NTC50K temperature probe (-40-210°C). For analog reading, please refer to "[Analog Input Description](#)" Length description.

\* 3: All models can be equipped with a CAN interface, with two optional modes:

1. Register sharing mode between PLC hosts, similar to N:N network. For usage, please refer to "[CAN Share Mode Description](#)"

Length description.

2. Expansion mode: you can connect special expansion modules. For module usage, please refer to "[CAN Extended Mode Description](#)" Length description.

\* 4: All models can be equipped with 2-way weighing interface. For usage, please refer to "[Weighing Connection Instructions](#)" Length description.

LK3U/ZK3U series internal soft component range

M Auxiliary relay	General use	M0~M499	500 points	
	Keep	M500~M7679	7180 points	
	Special use	M8000~M8511	512 points	
S Status Relay	initialization	S0~S9	10 o'clock	
	General use	S10~S499	490 points	
	Keep	S500~S899	400 points	
	For signal alarm	S900~S999	100 points (hold)	
T Timer	100ms General use	T0~T199	200 points	
	10ms General use	T200~T245	46 points	
	1ms Cumulative use	T246~T249	4 points	
	100ms cumulative	T250~T255	6 o'clock	
	1ms General use	T256~T511	256 points	
C Counter	16-bit up counter	General use	C0~C99	100 points
		Keep	C100~C199	100 points
	32-bit up/down counter	General use	C200~C219	20 points
		Keep	C220~C234	15 o'clock
		High speed holding	C235~C255	20 points
D Register	General use	D0~D199	200 points	
	Keep	D200~D7999	7800 points	
	Special use	D8000-D8511	512 points	
VZ Index Register		D10~V7.Z0~Z7	16 points	
Nested pointers	For master control	N0~N7	8 o'clock	
	Jump, subroutine	P0~P4095	4096 points	
	External interrupt	I0 □□~I5 □□	6 o'clock	
	Timer interrupt	I6 □□~I8 □□	3 o'clock	
	Counter interrupt	I010~I060	6 o'clock	
constant	K (decimal)	16 bits: -32768 to 32767	32 bits: -2147483648 to 2147483647	
	H (hexadecimal)	16 bits: 0 to FFFF	32 bits: 0 to FFFFFFFF	
	E (real number - floating point number)	-1.0×2 <sup>128</sup> ~-1.0×2 <sup>-126</sup> , 0, 1.0×2 <sup>126</sup>	1.0×2 <sup>128</sup>	

### LK3U/ZK3U Series M Special Relays

Position No.	Function	Position No.	Function
M8000	Operation monitoring contact	M8001	Operation monitoring negative contact
M8002	Initialization pulse contact	M8003	Initialization pulse back contact
M8004	Error indication contact	M8005	
M8006		M8008	
M8011	10ms clock pulse	M8012	100ms clock pulse
M8013	1s clock pulse	M8014	1 minute clock pulse
M8015	Set the clock	M8016	Clock display stopped
M8017	Clock plus or minus 30s correction	M8018	Real-time clock logo
M8019	Clock error flag	M8020	Zero mark
M8021	Borrow sign	M8022	Carry flag
M8024	BMOV transfer direction	M8029	Instruction execution end flag
M8031	PLC power-off data clearing	M8032	Power-off data clearing
M8034	Disable all output	M8039	Constant scan mode
M8040	STL prohibits branching	M8046	STL Actions
M8047	STL monitoring is effective	M8048	S900-S999 has ON status
M8049	Signal alarm is effective	M8050	I0 □ □ interrupt disable
M8051	I1 □ □ interrupt disable	M8052	I2 port interrupt disable
M8053	I3 □ □ interrupt disable	M8054	I4 port interrupt disable
M8055	I5 □ □ interrupt disable	M8059	I01, I02, I030, I040, I050, I060 Count interruption disabled
M8118		M8120	Weighing function 1 start
M8121	Weighing function 1 error, cannot be automatically reset	M8122	Weighing function 2 start
M8123	Weighing function 2 error, cannot automatically reset	M8124	Weighing function 3 start
M8125	Weighing function 3 error, cannot automatically reset	M8126	Weighing function 4 Start
M8127	Weighing function 4 error, cannot automatically reset	M8129	
M8139	HSCS, HSCR, HSZ, HSCT High-speed counter comparison instructions are being executed	M8149	CAN communication timeout flag
M8150	CAN operation permission flag	M8152	User interrupt input instruction Y4
M8153	User interrupt input instruction Y5	M8154	User interrupt input instruction Y6
M8155	User interrupt input instruction Y7	M8161	16-bit switching flag, RS instruction is valid
M8168	SMOV instruction HEX processing function	M8170	X0 pulse capture
M8171	X1 pulse capture	M8172	X2 pulse capture
M8173	X3 Pulse Catch	M8174	X4 Pulse Catch
M8175	X5 Pulse Catch	M8196	2x frequency mark of C251, C252, C254
M8197	C253, C255 2x frequency mark	M8198	4x frequency mark of C251, C252, C254
M8199	C253, C255 4 times frequency mark	M8200-M8234	Counting direction setting for C200-C234
M8235-M8345	Counting direction setting for C235-C245	M8346-M8255	Counting direction mark for C246-C255



### LK3U/ZK3U Series M Special Relays

Position No.	Function	Position No.	Function
M8329	Abnormal end of instruction execution flag	M8330	DUTY instruction timing clock output 1
M8331	DUTY instruction timing clock output 2	M8332	DUTY instruction timing clock output 3
M8333	DUTY instruction timing clock output 4	M8334	DUTY instruction timing clock output 5
M8335	Interrupt input specified function is valid	M8338	PLSV instruction acceleration and deceleration action is effective
M8340-M8349	High-speed output Y0 function	M8350-M8359	High speed output Y1 function
M8360-M8369	High speed output Y2 function	M8370-M8379	High speed output Y3 function
M8440-M8449	High speed output Y4 function	M8450-M8459	High speed output Y5 function
M8470-M8479	High speed output Y6 function	M8480-M8489	High speed output Y7 function
M8401-M8409	Communication port RS485-1 Function	M8410	Communication port RS485-1/RS485-2 uses ADPRW command to switch
M8421-M8429	Communication port RS485-2 Function	M8460	User interrupt input instruction Y0
M8461	User interrupt input instruction Y1	M8462	User interrupt input instruction Y2
M8463	User interrupt input instruction Y3	M8464	DSZR, ZRN instruction Y0 clear signal designation is valid
M8465	DSZR, ZRN instruction Y1 clear signal designation is valid	M8466	DSZR, ZRN instruction Y2 clear signal designation is valid
M8467	DSZR, ZRN instruction Y3 clear signal designation is valid		

## LK3U/ZK3U Series D Special Registers

Position No.	Function	Position No.	Function
D8000	Monitoring timer setting value (default 200)	D8009	AD port NTC10K/NTC50K temperature acquisition switch
D8010	Current scan time value (0.1ms)	D8011	Minimum scan time (0.1ms)
D8012	Maximum scan time (0.1ms)	D8013	RTC clock seconds
D8014	RTC clock division	D8015	RTC clock time
D8016	RTC clock day	D8017	RTC clock month
D8018	RTC clock year	D8019	RTC clock day
D8020	X0-X17 filter coefficient (setting value: 0~60ms, default 10)	D8021	X20-X77 filter coefficient (setting value: 1~60ms, default 10)
D8028	Z0 index register contents	D8029	V0 index register content
D8039	Constant scan time (unit: 1ms, default 0)	D8040	1st active STL state
D8041	2nd Active STL Status	D8042	3rd Active STL Status
D8043	4th Active STL State	D8044	5th Active STL Status
D8045	6th Active STL Status	D8046	7th Active STL Status
D8047	8th Active STL Status	D8048	
D8049	Minimum Active STL Status	D8116	Weighing function 1 Filter times
D8117	Weighing function 2 Filter times	D8118	Weighing function 3 Filter times
D8119	Weighing function 4 Filter times	D8120	Weighing function 1 data low bit
D8121	Weighing function 1 data high bit	D8122	Weighing function 3 data low
D8123	Weighing function 2 data high	D8124	Weighing function 3 data low
D8125	Weighing function 3 data high bit	D8126	Weighing function 4 data low
D8127	Weighing function 4 data high	D8138	HSCS, HSCR, HSZ, HSCT instructions are executing (not more than 4)
D8140	Y0 Pulse output count register (32 bits)	D8142	Y1 pulse output count register (32 bits)
D8144	Y2 pulse output count register (32 bits)	D8146	Y3 pulse output count register (32 bits)
D8149	CAN master/slave communication timeout (1=1ms)	D8150	Master/slave station number (0~32)
D8151	Number of slaves (1~32, default: 8)	D8152	Number of shared registers (1~32, default: 8)
D8153	CAN communication baud rate (20K~1000K, default: 250K)	D8156	DSZR, ZRN instructions specify Y4 clear signal element
D8157	DSZR, ZRN instructions specify Y5 clear signal element	D8158	DSZR, ZRN instructions specify Y6 clear signal element
D8159	DSZR, ZRN instructions specify Y7 clear signal element	D8170	Y4 Pulse output count register (32 bits)
D8172	Y5 Pulse output count register (32 bits)	D8174	Y6 Pulse output count register (32 bits)
D8176	Y7 Pulse output count register (32 bits)	D8182	Z1 index register contents
D8183	V1 Index register contents	D8184	Z2 index register contents
D8185	V2 Index register contents	D8186	Z3 index register contents
D8187	V3 Index register contents	D8188	Z4 index register contents
D8189	V4 Index register contents	D8190	Z5 index register contents
D8191	V5 Index register contents	D8192	Z6 index register contents

**LK3U/ZK3U Series D Special Registers**

Position No.	Function	Position No.	Function
D8193	V6 Index register contents	D8194	Z7 index register contents
D8195	V7 index register contents	D8196	CAN communication failed for slaves 1 to 16
D8197	CAN communication failed for slaves 17-32	D8198	Summary of slaves that cannot communicate with CAN 1-16
D8199	Summary of slaves that cannot communicate with CAN 17-32	D8310	Random number (32 bits)
D8330	DUTY instruction timing clock output 1 Scan number counter	D8331	DUTY instruction timing clock output 2 Scan number counter
D8332	DUTY instruction timing clock output 3 Scan number counter	D8333	DUTY instruction timing clock output 4 scan number counter
D8334	DUTY instruction timing clock output 5 Scan number counter	D8336	DVIT interrupt input assignment Y0-Y3
D8337	DVIT interrupt input assignment Y4	D8340-D8349	High-speed output Y0 register
D8350-D8359	High-speed output Y1 register	D8360-D8369	High-speed output Y2 register
D8370-D8379	High-speed output Y3 register	D8400-D8419	Communication port RS485-1 Function
D8420-D8439	Communication port RS485-2 Function	D8440-D8449	High-speed output Y4 register
D8450-D8459	High-speed output Y5 register	D8470-D8479	High-speed output Y6 register
D8480-D8489	High-speed output Y7 register	D8464	DSZR, ZRN instructions specify Y0 to clear the signal element
D8465	DSZR, ZRN instructions specify Y1 clear signal element	D8466	DSZR, ZRN instructions specify Y2 clear signal element
D8467	DSZR, ZRN instructions specify Y3 clear signal element		

**LK3U/ZK3U Series Instruction Set**

**Basic instructions (all supported):**

LD LDI LDP LDF AND ANI ANDP ANDF ANDB OR ORI ORP ORF ORB MPS MRD MPP MC  
MCR INV PLS PLS OUT SET RST NOP MEP MEF END STL (max 8

Road branch) RET

**Application Instructions:**

**Program Flow**

Function Number	Instruction	Function	Remark
00	CJ	Conditional Jumps	
01	CALL	Calling a subroutine	
02	SRET	Subroutine returns	
03	IRET	Interrupt return	
04	ENI	Enable interrupt	
05	DISI	Disable interrupts	
06	FEND	End of main program	
07	WDT	Watchdog timer refresh	
08	FOR	Loop zone starts	
09	NEXT	End of loop area	

**Transfer and compare**

Function Number	Instruction	Function	Remark
10	CMP	Compare	
11	ZCP	Interval comparison	
12	MOV	Teleport	
13	SMOV	Bit transfer	
14	CML	Negate Teleport	
15	BMOV	Send together	
16	FMOV	Multicast	
17	XC	exchange	
18	BCD	BCD Conversion	
19	BIN	BIN Conversion	

Four logical operations

Function Number	Instruction	Function	Remark
20	ADD	BIN addition	
twenty one	SUB	BIN subtraction	
twenty two	MUL	BIN multiplication	
twenty three	DIV	BIN division	
twenty four	INC	BIN plus 1	
25	DEC	BIN minus 1	
26	WAND	Logical word and	
27	WOR	Logical word or	
28	WXOR	Logical XOR	
29	NEG	Find the two's complement	

Cyclic displacement

Function Number	Instruction	Function	Remark
30	ROR	Turn right	
31	ROL	Turn left	
32	RCR	Rotate right with carry	
33	RCL	Left rotation with carry	
34	SFTR	Bit shift right	
35	SFTL	Bit Shift Left	
36	WSFR	Word right	
37	WSFL	Word Left	
38	SFW	Shift Write	
39	SFRD	Shift read	

Data processing

Function Number	Instruction	Function	Remark
40	ZRST	Zone reset	
41	DECO	Decoding	
42	ENCO	coding	
43	SUM	Number of ON bits	
44	BON	ON bit judgment	
45	MEAN	Average value	
46	ALS	Signal alarm setting	
47	ANR	Signal alarm reset	
48	SQR	Square root operation	
49	FLT	BIN integer to binary floating point conversion	

High-speed processing

Function Number	Instruction	Function	Remark
50	REF	Input and output refresh	
53	HSCS	Compare Set	
54	HSCR	Compare reset	
55	HSZ	Interval comparison	
56	SPD	Input pulse density	Using the SPD instruction to switch to other high-speed input functions requires clearing the PLC program
57	PLSY	Pulse output	
58	PWM	Pulse modulation output	For usage of enhanced PWM instructions, please refer to "Enhanced PWM User Manual" Length description
59	PLSR	With acceleration and deceleration pulse output	

Convenient instructions

Function Number	Instruction	Function	Remark
61	SER	Data Retrieval	
62	ABS	Cam control absolute mode	
63	PRCD	Cam control relative mode	
64	TIMR	Teaching timer	
65	STMR	Special timer	
66	ALT	Alternate output	
67	RAMP	Ramp signal	
69	SORT	Data Sorting	

Peripheral instruction I/O

Function Number	Instruction	Function	Remark
73	SEGD	7-segment decoding	

Peripheral equipment SER

Function Number	Instruction	Function	Remark
80	RS	Serial Data Transmission	
81	PRUN	8-bit data transfer	
82	ASCI	HEX-ASCII Conversion	
83	HEX	ASCII-HEX conversion	
84	CCD	Verification Code	
87	RS2	Serial data transmission 2	
88	PID	PID Operation	For PID usage, please refer to "PID instruction instructions" Length description

Data transfer 2K

Function Number	Instruction	Function	Remark
102	ZPUSH	Batch storage of index registers	
103	ZPOP	Restoration of the index register	

Floating-point operations

Function Number	Instruction	Function	Remark
110	ECMP	Binary floating point comparison	
111	EZCP	Binary floating point number range comparison	
112	EMOVB	Binary floating point data transmission	
118	ABCD	Binary-decimal floating point conversion	
119	EBIN	Decimal-binary floating point conversion	
120	EADD	Binary floating point addition	
121	ESUB	Binary floating point subtraction	
122	EMUL	Binary floating point multiplication	
123	EDIV	Binary floating point division	
124	EXP	Binary floating point exponentiation	
125	LOGE	Binary floating point natural logarithm operation	
126	DLOG10	Common logarithmic operations for binary floating point numbers	
127	ESQR	Binary floating point square root operation	
128	ENEG	Binary floating point sign flip	
129	INT	Binary floating point to BIN conversion	
130	SIN	Floating-point SIN operation	
131	COS	Floating point COS operation	
132	TAN	Floating-point TAN operation	
133	ASIN	Binary floating point SIN-1 operation	
134	ACOS	Binary floating point COS-1 operation	
135	ATAN	Binary floating point TAN-1 operation	
136	RAD	Binary floating point angle to radian conversion	
137	DEG	Binary floating point radians-degrees conversion	

Data processing

Function Number	Instruction	Function	Remark
140	WSUM	Calculating data and values	
141	WTOB	Byte-based data separation	
142	BTOW	Byte-based data combination	
143	UNI	4-bit combination of 16-bit data	
144	DIS	4-bit separation of 16-bit data	
147	SWAP	Swap upper and lower bytes	
149	SORT2	Data sorting 2	

Positioning control

Function Number	Instruction	Function	Remark
150	DR	Origin return with DOG search	
156	ZRN	Return to origin	
157	PLSY	Variable pulse output	
158	SRVI	Relative positioning	
159	DRVA	Absolute positioning	

Clock Operation

Function Number	Instruction	Function	Remark
160	TCMP	Clock data comparison	
161	TCZP	Clock data interval comparison	
162	TADD	Clock Data Addition	
163	TSUB	Clock Data Subtraction	
164	HTO	Second conversion of hour, minute and second data	
165	STOH	Hour, minute, and second conversion of second data	
166	TRD	Clock data readout	
167	TWR	Clock data write	
169	HOUR	Timer	

External devices

Function Number	Instruction	Function	Remark
170	GRY	Gray code conversion	
171	GBIN	Gray code inverse transform	
176	RD3A	Reading analog modules	For analog quantity reading, please refer to "Analog quantity description" Length description
177	WR3A	Writing analog modules	For analog quantity writing, please refer to "Analog quantity description" Length description

Other instructions

Function Number	Instruction	Function	Remark
184	RND	Generate random numbers	
186	DUTY	Generate timing pulse	
188	CRC	CRC calculation	
189	HCMOV	High-speed counter transmission	



Other instructions

Function Number	instruction	Function	Remark
192	BK+	Addition of data blocks	
193	BK-	Subtraction of data blocks	
194	BKCMP=	Comparison of data blocks (S1) = (S2)	
195	BKCMP>	Comparison of data blocks (S1) > (S2)	
196	BKCMP<	Comparison of data blocks (S1) < (S2)	
197	BKCMP<>	Comparison of data blocks (S1) <> (S2)	
198	BKCMP<=	Comparison of data blocks (S1) <= (S2)	
199	BKCMP>=	Comparison of data blocks (S1) >= (S2)	

Data Processing 3

Function Number	instruction	Function	Remark
210	FDEL	Deleting data from a table	
211	FINS	Inserting data into the data table	
212	POP	Read the last input data	
213	SFR	16-bit data n bits right shift (with carry)	
214	SFL	16-bit data n bits left shift (with carry)	

Contact comparison instructions

Function Number	instruction	Function	Remark
224	LD=	(S1)=(S2)	
225	LD>	(S1)>(S2)	
226	LD<	(S1)<(S2)	
228	LD<>	(S1)≠(S2)	
229	LD<=	(S1)<=(S2)	
230	LD>=	(S1)>=(S2)	
232	AND=	(S1)=(S2)	
233	AND>	(S1)>(S2)	
234	AND<	(S1)<(S2)	
236	AND<>	(S1)≠(S2)	
237	AND<=	(S1)<=(S2)	
238	AND>=	(S1)>=(S2)	
240	ORD=	(S1)=(S2)	
241	ORD>	(S1)>(S2)	
242	ORD<	(S1)<(S2)	
244	ORD<>	(S1)≠(S2)	
245	ORD<=	(S1)<=(S2)	
246	ORD>=	(S1)>=(S2)	

Data table processing

Function Number	instruction	Function	Remark
256	LIMIT	Upper and lower limit control	
257	BAND	Dead zone control	
258	ZONE	Zone Control	
259	SCL	Coordinate setting (coordinate data of different points)	
260	SCL2	Coordinate setting 2 (XY coordinate data)	

Data table processing

Function Number	instruction	Function	Remark
276	ADPRW	Modbus-RTU Read/Write	M8410: RS485-1/2 uses ADPRW instruction to switch

Note:



- 1.Supports adding 32-bit instructions.
- 2.Support adding P, pulse command.
- 3.When an unsupported instruction is used, a 6506 fault code is reported.

Unsupported instructions

Function Number	instruction	Function Number	instruction	Function Number	instruction	Function Number	instruction
51	REFF	52	MTR	60	IST	68	ROTC
70	TKY	71	HKY	72	DSW	74	SEGL
75	ARWS	76	ASC	77	PR	85	VRRD
86	VRSC	77	ESTR	151	DVQ	152	TBL
155	ABS	182	COMRD	200	STR	201	VAL
202	\$K	203	LEN	204	RIGHT	205	LEFT
206	MIDR	207	MIDW	208	INSTR	209	\$MOV
260	DABIN	261	BINDA	270	IVCK	271	IVDR
272	IVRD	273	IVW	274	IVBW	275	IVMC
278	RBFM	279	WBFM	280	HSCT	290	LOADR
291	SAVER	292	INTR	293	LOGR	294	RWER
295	INITER	300	FLCRT	301	FLDEL	302	FLWR
303	FLRD	304	FLCMD	305	FLSTP		

### LK3U/ZK3U Series Fault Diagnosis

Take Gx Works 2 as an example



1: Click on the top menu bar "Diagnosis" - "PLC Diagnosis (P)"



2: Through the PLC diagnostic interface, you can view the error code and error program step in turn. 3:

According to the fault code, check the "[LK3U/ZK3U series fault code list](#)" Handling Errors.

**LK3U/ZK3U series fault code list**

category	Fault Codes	Error content	Remark
PLC hardware failure M8061(D8061) Operation stop	6101	Power-off data check error	Increase the power supply and contact the manufacturer
	6102	Data hold module detected error 1	Contact Manufacturer
	6103	Data hold module detected error 2	Contact Manufacturer
	6105	Monitor action (internal watchdog action)	Increase the setting value of D8000 or check the program
	6106	Logical Error	Check procedures, contact manufacturer
CAN extended mode error M8062(D8062) Run Continue	6206	Parameter validation error	
	6209	The number of expansion modules exceeds	Maximum 15
	6210	CAN initialization error	
	6211	The address receiving the extension is incorrect	
	6212	The received data is interfered with	
	6213	Extension returns error flag	
	6214	Receive timeout flag	For details, see D8196 and D8197
	6215	Receive illegal slave address	
	6216	The extended function of the receiving slave is inconsistent with the host configuration	
6217	Slave address setting is repeated		
RS485-1/RS485-2 M8063(D8063) Run Continue	6306	Receiving data timeout	Check the communication line or the settings of D8400 and D8409
	6308	D8400 Baud rate out of range	
	6309	D8400 selects 7-bit data, and cannot select no verification	
	6310	Use RS, RS2 command but D8400, D8420 are not turned on	
	6314	D8420 Baud rate out of range	
	6315	D8420 Select 7-bit data, no verification can be selected	
	6340	D8400 does not enable the MODBUS master function	
	6341	MODBUS protocol ADPRW slave address error	
	6342	MODBUS protocol ADPRW function code error	
	6343	MODBUS protocol ADPRW instruction length error	RS485-1
	6344	MODBUS protocol receiving data check error	
	6345	The station number and command for receiving data are incorrect	
	6346	Receiving data timeout	
	6360	D8440 The MODBUS master function is not enabled	
	6361	MODBUS protocol ADPRW slave address error	
	6362	MODBUS protocol ADPRW function code error	
	6363	MODBUS protocol ADPRW instruction length error	RS485-2
6364	MODBUS protocol receiving data check error		
6365	The station number and command for receiving data are incorrect		
6366	Receiving data timeout		

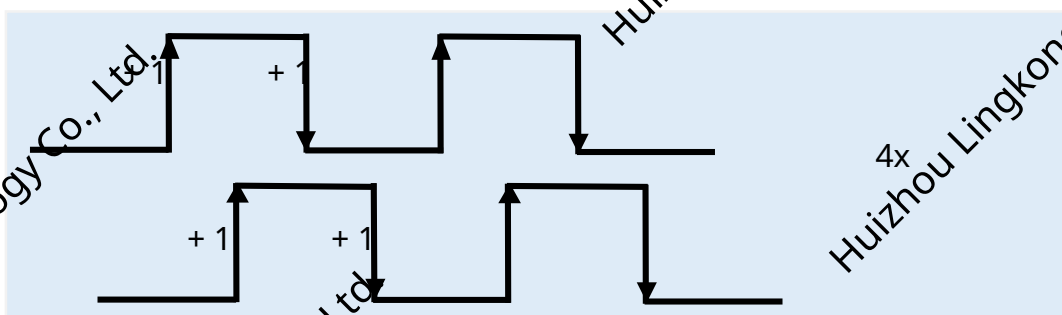
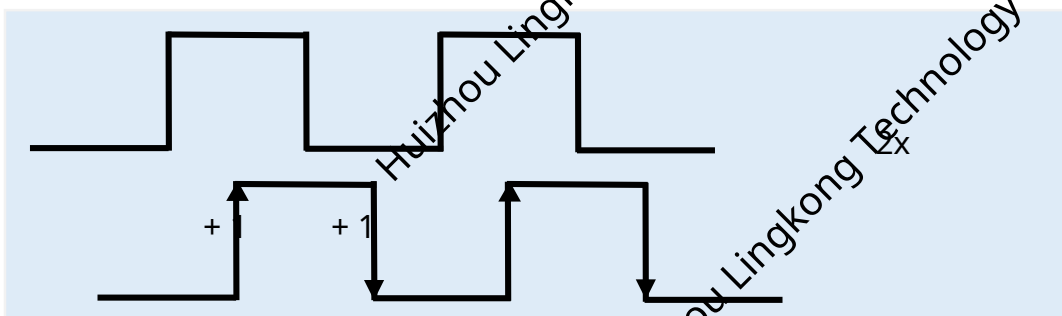
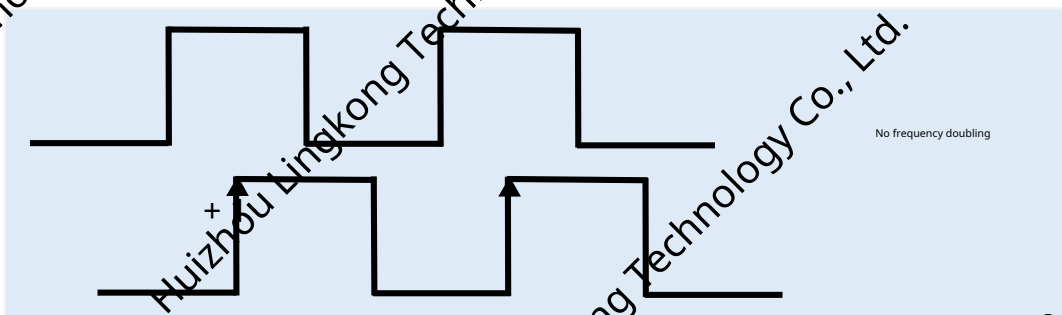
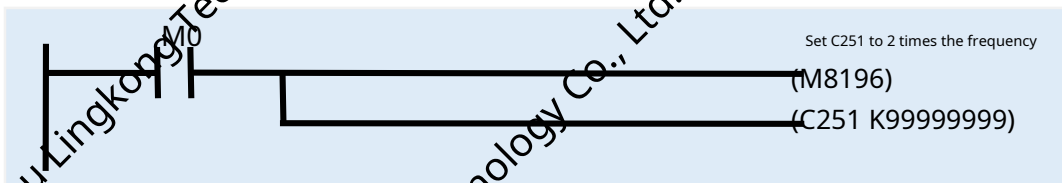
category	Fault Codes	Error content	Remark	
CAN sharing mode error M8063(D8063) Run Continue	6380	Initialization failed	CAN	
	6381	The returned slave ID is inconsistent with the read ID		
	6382	Receive length error		
	6383	Incomplete received data		
	6384	The slave has the same ID		
	6385	Receiving data timeout		
	6386	Hosts have the same ID		
Parameter error M8064(D8064) Operation stop	6401	Program and number check error	The program was maliciously modified or the download was incomplete; The CPU internal program FLASH is damaged;	
	6409		Internal FLASH is damaged.	
Syntax Error M8065(D8065) Operation stop	6504	Px or Ix or high-speed counter label is repeated		
	6505	Component range exceeded		
	6506	Using unsupported instructions		
	6507	Incorrect label used (L63 used)		
	6510	MC number size is wrong		
Loop Error M8066(D8066) Operation stop	6603	Use MPS more than 12 times		
	6605	STL is used more than 9 times in a row RET appears when STL is not used		
	6606	There is I (interrupt) IRET SRET in the main program No IRET SRET in the program		
	6609	other		
	6614	MPS is missing		
	6615	Missing MPP		
	6619	FOR~NEXT has I MC MCR IRET STL RST		
	6623	No MC instruction		
	6625	STL Sx is used continuously for more than 9 times STL Sx, Sx range is greater than S899		
	6626	STL has MC, MCR, SRET, I (interrupt), IRET		
	6627	There is no RET instruction after STL		
	6630	CALL SRET relationship incorrect		
	Operation Error M8067(D8067) Run Continue	6701	CALL, CJ No object	
		6706	The command component address or component value range exceeds	
6710		SFWR (P) command element 1 is the same as element 2		
6711		Analog AD input range setting error		
6712		The analog DA output range or data setting is wrong.		
6715		NTC resistor may be open	Please connect the NTC resistor	

**LK3U/ZK3U Series High Speed Input Description**

1. C251 C252 C254 (AB phase) maximum response frequency: 100KHz;
2. C253 C255 (AB phase) maximum response frequency: 100KHz;
3. C235 C241 C244 C238 (single phase) maximum response frequency: 100KHz;
4. The maximum response frequency of other high-speed counters: 10KHz;
5. The AB phase high-speed counter can be set to 2 times or 4 times (**The setting is only valid during the current cycle of OUT drive**);
  - (1) When M8196 is ON, the counting pulses of C251, C252, and C254 are doubled in frequency;
  - (2) When M8197-ON, the counting pulse frequency of C253 and C255 is doubled;
  - (3) When M8198 is ON, the counting pulses of C251, C252, and C254 are quadrupled;
  - (4) When M8199 is ON, the counting pulses of C253 and C255 are quadrupled;

For example, if you use an AB phase encoder, it has 1000 pulse inputs for one revolution.

If the frequency is set to 2 times, the counter will count 2000 per revolution; if the frequency is set to 4 times, the counter will count 4000 per revolution;



Inputs X000-X007 correspond to the high-speed counter numbers as shown in the table below. Inputs X000-X007 cannot be used repeatedly by high-speed counters. When the high-speed input point is not used as the pulse input terminal of the high-speed counter, it can be used for general input.

Interrupt enter	Single-phase single-count input										
	C235	C236	C237	C238	C239	C240	C241	C242	C243	C244	C245
category	H/W	S/W	S/W	H/W	S/W	S/W	H/W	S/W	S/W	H/W	S/W
X000	U/D						U/D			U/D	
X001		U/D					R			R	
X002			U/D					U/D			U/D
X003				U/D				R			R
X004					U/D				U/D		
X005						U/D			R		
X006										S	
X007											S

Interrupt enter	Single-phase dual count input					Dual-phase dual-count input				
	C246	C247	C248	C249	C250	C251	C252	C253	C254	C255
category	S/W	S/W	S/W	S/W	S/W	H/W	H/W	H/W	H/W	H/W
X000	U	U		U		A	A		A	
X001	D	D		D		B	B		B	
X002		R		R			R		R	
X003			U		U			A		A
X004			D		D			B		B
X005			R		R			R		R
X006				S					S	
X007					S					S

H/W: Hardware counter

S/W: Software Counter

U: Up count input

D: Down count input

A: A phase input

B: B phase input

R: Reset input

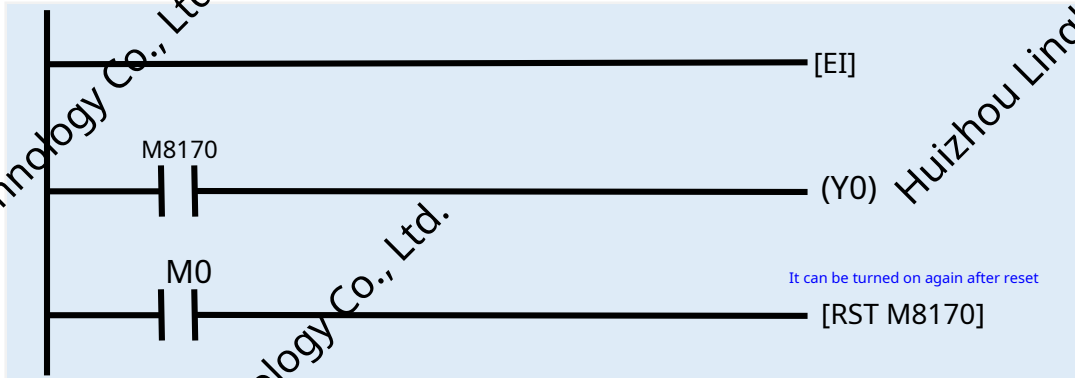
S: Start counting input



Inputs X000-X007 cannot be reused. For example, once C251 is used, X000 and X001 are occupied. Therefore, C235, C236, C244, C247, C249, C252, C254 and interrupt input pointers I00 and I01 and the corresponding input SPD instructions cannot be reused.

**Pulse catch function description**

1. Support the pulse capture function of X0-X5, corresponding to: X0-M8170, X1-M8171, X2-M8172, X3-M8173, X4-M8174, X5-M8175;
2. To use the pulse capture function, you need to use the EI instruction first.



**Instructions for using DHSCS, DHSCR, and DHSZ instructions**

1. Three high-speed comparison instructions, the number of times driven simultaneously: X0 related hardware counter 2 times, X3 related hardware counter 3 times for hardware high-speed counters, 4 times for other software counters (greater than 6705 fault code).
2. When using hardware high-speed counters for comparison, the response frequency will not change. DHSC and DHSCR are real-time comparison. However, the interval comparison of DHSZ hardware is not real-time, but is compared once every 5us.
3. When using the hardware high-speed counter, as long as DHSCS, DHSCR, and DHSZ are driven, the comparison result will be output;
4. When using a software high-speed counter, comparison is performed only when there is an input to the high-speed counter.

**Input interrupt I0-I5 Description**

1. Support input interrupt of X0-X5.
2. Input interrupt delay execution (D8393 function) is not supported.



**LK3U/ZK3U Series High Speed Output Description**

The maximum output frequency of Y0, Y1, Y2, Y3, Y4, and Y5 is 200KHz, and the maximum output frequency of Y6 and Y7 is 100KHz, and they can output simultaneously; Y0-Y7 all support enhanced PWM instructions;

**Special M Relay Description**

Special M relay number								use	property	Supported commands	
Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7				
M8029								Instruction execution end flag	R	PLSY/PLSR/DSZR/ DVIT/ZRN/DRVI/ DRVA, etc.	
M8335								Abnormal end of instruction flag		PLSY/PLSR/DSZR/ DVIT/ZRN/PLSV/ DRVI/DRVA	
M8336								Interrupt input specified function is valid	R/W	DVIT	
M8338								PLSV instruction acceleration and deceleration action is effective		PLSV	
M8340	M8350	M8360	M8370	M8440	M8450	M8470	M8480	Pulse output flag	R	PLSY/PLSR/DSZR/ DVIT/ZRN/PLSV/ DRVI/DRVA	
M8341	M8351	M8361	M8371	M8441	M8451	M8471	M8481	Clear signal output function is effective <sup>1</sup>	R/W	DSZR/ZRN	
M8342	M8352	M8362	M8372	M8442	M8452	M8472	M8482	Origin return direction specification		DR	
M8343	M8353	M8363	M8373	M8443	M8453	M8473	M8483	Forward limit		PLSY/PLSR/DSZR/ DVIT/ZRN/PLSV/ DRVI/DRVA	
M8344	M8354	M8364	M8374	M8444	M8454	M8474	M8484	Reversal Limit		DR	
M8345	M8355	M8365	M8375	M8445	M8455	M8475	M8485	Proximity signal logic inversion		DR	
M8346	M8356	M8366	M8376	M8446	M8456	M8476	M8486	Zero signal logic inversion		DVIT	
M8347	M8357	M8367	M8377	M8447	M8457	M8477	M8487	Interrupt signal logic inversion		DVIT	
M8348	M8358	M8368	M8378	M8448	M8458	M8478	M8488	Positioning instruction drive flag		R	PLSY/PWM/PLSR/ DSZR/DVIT/ZRN/ PLSV/DRVI/DRVA
M8349	M8359	M8369	M8379	M8449	M8459	M8479	M8489	Pulse stop command		R/W	PLSY/PLSR/DSZR/ DVIT/ZRN/PLSV/ DRVI/DRVA
M8460	M8461	M8462	M8463	M8152	M8153	M8154	M8155	User interrupt input instruction			DVIT
M8464	M8465	M8466	M8467	M8156	M8157	M8158	M8159	Clear signal device designation function is effective		DSZR/ZRN	

\* 1 When the clear signal soft element specified function is invalid, the clear signals Y0-Y10, Y1-Y11, Y12, Y3-Y13, Y4-Y14, Y5-Y15, Y6-Y16, Y7-Y17;

R : read only;

R/W: read/write;

Special D register description

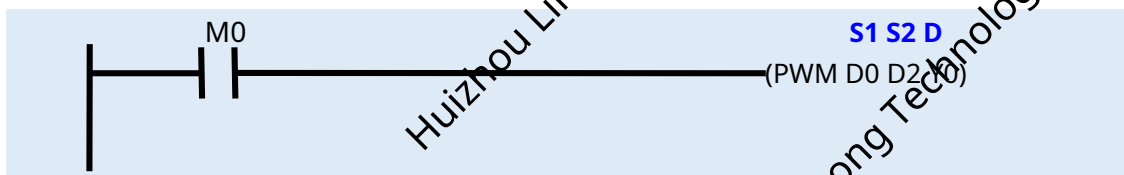
Special D register number								USE	Data bits	default value	Supported commands
Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7				
D8336				D8337				Interrupt input assignment	16 bit	0	DVIT
D8340	D8350	D8360	D8370	D8440	D8450	D8470	D8480	Current location register	32-bit	0	DSZR/DVIT/ ZRN/DSZR/ PLSV/DRVI/ DRVA
D8341	D8351	D8361	D8371	D8441	D8451	D8471	D8481				
D8342	D8352	D8362	D8372	D8442	D8452	D8472	D8482	Base speed	16 bit	0	DR
D8343	D8353	D8363	D8373	D8443	D8453	D8473	D8483	Top speed	32-bit	100000	
D8344	D8354	D8364	D8374	D8444	D8454	D8474	D8484	Crawling speed	16 bit	1000	DR
D8345	D8355	D8365	D8375	D8445	D8455	D8475	D8485	Origin return speed	32-bit	50000	
D8346	D8356	D8366	D8376	D8446	D8456	D8476	D8486	Acceleration time	16 bit	100	DSZR/DVIT/ ZRN/PLSV*1/ DRVI/DRVA
D8347	D8357	D8367	D8377	D8447	D8457	D8477	D8487	Deceleration time	16 bit	100	
D8348	D8358	D8368	D8378	D8448	D8458	D8478	D8488	Clear signal device designation	16 bit	0	DSZR/ZRN
D8140	D8142	D8144	D8146	D8170	D8172	D8174	D8176	Pulse current value register	32-bit	0	PLSY/PLSR*2
D8141	D8143	D8145	D8147	D8171	D8173	D8175	D8177				

\* 1: M8338 needs to be turned ON for the acceleration and deceleration functions of PLSV to be effective;

\* 2: This pulse is the corresponding register for the pulse accumulation when using the PLSY and PLSR instructions;

Enhanced PWM User Manual

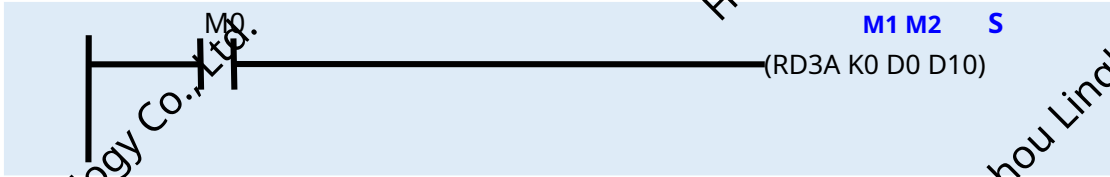
Y0-Y7 ports are enhanced PWM instructions;



1. S1: PWM output frequency, Y0-Y5 up to 200KHz, Y6-Y7 up to 10KHz, the higher the frequency, the greater the duty cycle error;
2. S2: PWM output duty cycle, 0-1000 corresponds to 0%-100.0%, if it exceeds the range, a 6706 fault code will be reported;
3. D: PWM output specified channel number, supports Y0-Y7.

## LK3U/ZK3U Series Analog Input Description

### Analog input instruction RD3A



1. M1: specifies the analog input channel number. If it exceeds the maximum channel number of the PLC, a 6711 fault code will be reported;
2. M2: analog input range upper and lower limit register, M2 is the upper range, M2+1 is the lower range, M2+2 is the first-order lag filter coefficient (0-128, the larger the coefficient, the greater the lag, it is recommended to set it to 50), M2, M2+1 and M2+2 can only specify D registers, and specify other data to report 6711 fault code;
3. S: specifies the data collected by the AD port;

### Example

Example program principle: when M0 is turned on, the analog data of AD0 port is collected and stored in D10. The specific voltage or current value displayed is determined by the upper range register D0 and the lower range register D1.

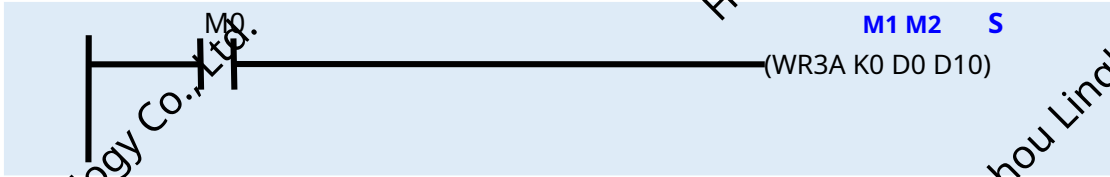
- (1) D0=1000, D1=0, AD0 input range 0-10V, when input 5V, D10 data is 500;
- (2) D0=0, D1=0, AD0 input range 0-20mA, when input 5mA, D10 data is 1024;
- (3) D0=1000, D1=-1000, AD0 input range 0-10V, when input 6V, D10 data is 200;



When both the upper and lower ranges are 0, the AD data range is 0-4095; When the upper range setting data is less than or equal to the lower range setting data (not 0 at the same time), the 6711 fault code is reported;

### LK3U/ZK3U Series Analog Output Description

#### Analog output instruction WR3A



1. M1: specifies the analog output channel number. If it exceeds the maximum channel number of the PLC, a 6712 fault code will be reported;
2. M2: analog output range upper and lower limit register, M2 is the upper range, M2+1 is the lower range, only D register can be specified, specifying other data will report 6712 fault code;
3. S: specifies the data output by the DA port;

#### Example

Example program principle: when M0 is turned on, port DA0 outputs the voltage or current value corresponding to the data in D10. The specific data output voltage or current value is determined by the upper range register D0 and the lower range register D1.

like:

- (1) D0=1000, D1=0, DA0 output range 0-10V, when 5V output is required, D10 data is 500;
- (2) D0=0, D1=0, DA0 output range 0-20mA, when 5mA output is required, D10 data is 1024;
- (3) D0=1000, D1=-1000, DA0 output range 0-10V, when 6V output is required, D10 data is 200;



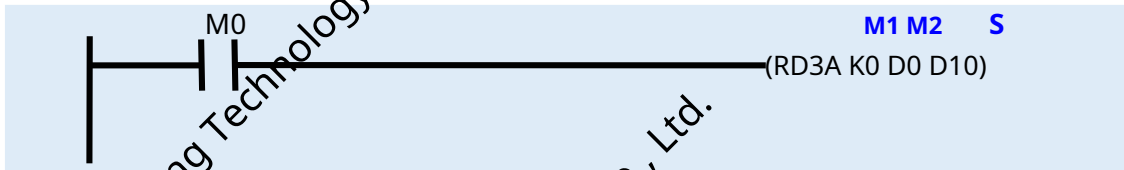
When both the upper and lower ranges are 0, the DA data range is 0-4095; When the upper range setting data is less than or equal to the lower range setting data (not 0 at the same time), 6712 fault code is reported; When the DA output setting value is not within the setting range of D0 and D1, a 6712 fault code is reported;

**LK3U/ZK3U Series Temperature Collection Instructions**

**NTC10K/NTC50K Temperature Collection Instructions**

The AD port can be changed to NTC10K/NTC50K (B value 3950K) thermal resistance temperature acquisition port. The NTC10K/NTC50K switch is determined by the specific bit of D8009. The NTC10K acquisition temperature range is -40°C-150°C, and the NTC50K acquisition temperature range is -40°C-210°C.

		D8009									
bit	bit0	bit1	bit2	bit3	bit4	bit5	bit6	bit7	bit8	bit9	
AD port	AD0	AD1	AD2	AD3	AD4	AD5	AD6	AD7	AD8	AD9	
NTC10K	0	0	0	0	0	0	0	0	0	0	
NTC50K	1	1	1	1	1	1	1	1	1	1	



Use RD3A instruction with analog input

1. M1: Specify the temperature input channel number. If it exceeds the maximum channel number of the PLC, a 6711 fault code will be reported;
2. M2: Temperature input range upper and lower limit register, M2 is the upper range, M2+1 is the lower range, M2+2 is the first-order lag filter coefficient (0-127, the larger the coefficient, the greater the lag, it is recommended to set it to 50), M2, M2+1 and M2+2 can only specify D registers. If other data are specified, 6711 fault code will be reported. The range register data value cannot be changed. The upper and lower range data values must be 0 at the same time. If other data values are set, the temperature data will be inaccurate.
3. S: specifies the temperature data of the temperature input port;

**Example**

Example program principle: when M0 is turned on, the temperature data of port AD0 is collected and stored in D10; For example:

- (1) D0=0, D1=0, AD0 is NTC10K detection, when the temperature is 98.5°C, the D10 data is 985;
- (2) D0=0, D1=0, AD0 is NTC10K detection, when the temperature is -23.8°C, the D10 data is -238;
- (3) D0=0, D1=0, AD0 is NTC50K detection, when the temperature is 203.4°C, the D10 data is 2034;



The upper and lower ranges must be 0 at the same time, otherwise the temperature data will be inaccurate;  
The data collected by the temperature acquisition port is the actual temperature after taking a decimal point, such as the data is 1234, then the temperature is 123.4°C;

**LK3U/ZK3U Series Weighing Collection Instructions**

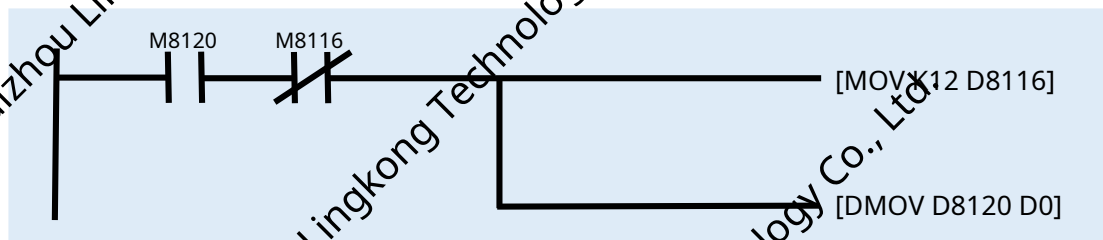
**Weighing interface description**

1. Support four-wire interface: power positive E+, power negative E-, signal positive S+, signal negative S-;
2. Excitation voltage: 5V;
3. Signal voltage range: -20mV~+20mV;
4. Data collection frequency 10HZ;

Weighing interface 1 Special M relay and special D register			
M8120	Start weighing collection 1 function	M8121	Weighing collection 1 error, manual reset
D8116	Filter times (3-32, default 12)	D8120	Load cell raw data, 32 bits

Weighing interface 2 Special M relay and special D register			
M8122	Start weighing collection 1 function	M8123	Weighing collection 1 error, manual reset
D8117	Filter times (3-32, default 12)	D8122	Load cell raw data, 32 bits

Above special relays and special registers are all power-off retention type;

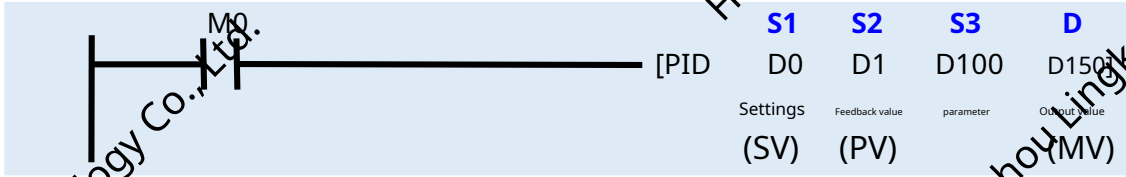


**Example**

The principle of the sample program is that when M8120 is turned on, the weighing acquisition port 1 starts to collect the raw data of the weighing sensor and transmits it to the D0 register. D0 is a 32-bit register. When the weighing acquisition port fails, the acquisition function stops.

### LK3U/ZK3U Series PID Instruction Description

#### PID instruction format (incremental PID)



1. The PID instruction is used to call the PID operation program;
2. Before the PID operation starts, the MOV instruction should be used to write the parameter setting value (see the table below) into the corresponding data register in advance;
3. If you use a data register with power-off retention function, you do not need to write repeatedly;
4. If the target operand D0 has a power-off retention function, use the normally open contact of the initialization pulse M8002 to reset it.

PID function selection			
address	Function	illustrate	
S1	Set value (SV)		
S2	Feedback value (PV)		
S3	Sampling time (TS)	The setting range is 1 to 32767 (ms), which must be greater than the PLC program scanning cycle;	
S3+1	Function model ACT	bit0	0: positive action; 1: reverse action;
		bit1	0: No input change alarm; 1: Input change alarm is valid;
		bit2	0: No output change alarm; 1: Output change alarm is valid, do not set bit2 and bit5 to ON at the same time;
		bit3	Reserve, set to 0;
		bit4	Reserve, set to 0;
		bit5	0: No upper and lower limits of output value are set; 1: The upper and lower limits of the output value are valid; Do not set bit2 and bit5 to ON at the same time;
		bit6~bit15	Reserve, set to 0;

Positive action: The more the feedback value is less than the set value, the greater the output value is, such as controlling the on-off time of the heating wire.

Current heating system;

Reverse action: The more the feedback value is greater than the set value, the greater the output value, such as a system that achieves cooling by controlling the fan speed.

system;

Incremental PID Description				
address	name	Setting range	illustrate	
S3+2	Proportional gain Kp	0~32767(%)	The difference between two consecutive feedback values * proportional gain = the proportional part of the output value	
S3+3	Integral gain Ki	0~32767(%)	The real-time difference between the feedback value and the set value * integral gain = the integral part of the output value	
S3+4	Differential gain Kd	0~32767(%)	Feedback value change prediction value * differential gain = differential part of output value	
S3+(5~11)	Internal operation use - do not use in the program			
S3+12	Input change (increase side )	0~32767	Valid when bit 1 of <ACT> = 1	
	Alarm setting value			
S3+13	Input change (minus side )	0~32767		
	Alarm setting value			
S3+14	Output change (increase side )	0~32767		It is effective when bit2=0 and bit5=1 of <ACT>
	Alarm setting value	- 32768~32767		It is effective when bit2=1 and bit5=0 of <ACT>
S3+15	Output change (minus side )	0~32767	It is effective when bit2=0 and bit5=1 of <ACT>	
	Alarm setting value	- 32768~32767	It is effective when bit2=1 and bit5=0 of <ACT>	
S3+16	Alarm output	Bit0 Input change (increase side) overflow		
		Bit1 Input change (decreasing side) overflow		
		Bit2 Output change (increase side) overflow		
		Bit3 Output change (decrease side) overflow		
		Valid when bit1=1 or bit2=1 of <ACT>		
S3+(17~28)	Internal operation use - do not use in the program			

The PID instruction can be used multiple times at the same time, but the D register occupied by each PID instruction cannot be reused.

**PID parameter setting (incremental PID)**

- There are 4 main parameters that need to be set for PID instruction: TS, Kp, Ki, Kd;
- The smaller the TS, the more timely it can reflect the change of feedback value. However, if the TS is too small, it will increase the calculation workload of PLC and And if the two feedback values have almost no change, the output value of PID will not change either; TS needs to select a suitable value according to the actual project.
- The functions of the three control modes: P (proportional), I (integral), and D (differential):
  - The proportional part is related to the difference between two consecutive feedback values. As long as there is a difference, the proportional part can promptly produce a regulatory effect proportional to the difference, which has the characteristic of timely regulation.
  - The effect of the integral part is related to the difference between the current set value and the feedback value. As long as the difference is not zero, the output value will continue to be output due to the integral effect. The integral part will not stop outputting until the difference disappears.
  - The differential part gives a greater adjustment effect in advance based on the speed of change of the difference between the set value and the feedback value. The differential part reflects the trend of system changes.



**LK3U/ZK3U Series RS485 Communication Port Description**

**Functional Description**

1. The default programming port protocol of RS485-1/RS485-2 communication port is communication parameters: 19200, 7, E, 1.
  2. You can change the value of D8400/D8420 to select MODBUS-RTU protocol, RS free port protocol (RS485-1), RS2 free port protocol (RS485-2), and select the corresponding communication parameters. (When the PLC stops running, switch to the programming port protocol)
- For more information on fault detection, see "Fault code list".

**D8400 (RS485-1) / D8420 (RS485-2) parameter settings**

Position No.	name	content	
		0(bit=OFF)	1(bit=ON)
bit0	Data length	7-bit*1	8-bit
bit1 bit2	Parity	bit2 (0 (0	bit1 0) - No verification 1) -Odd number (ODD) 1) -Even number (EVEN)
bit3	Stop bits	1 bit	2 digits
bit4 bit5 bit6 bit7	rate	bit7 bit6 bit5 bit4 (0 0 1 1):300 (0 1 0 0):600 (0 1 0 1):1200 (0 1 1 0):2400 (0 1 1 1):4800	bit7 bit6 bit5 bit4 (1 0 0 0):9600 (1 0 0 1):19200 (1 0 1 0):38400 (1 0 1 1):57600 (1 1 0 1):115200
bit8~bit11	Disable	Set to 0	
bit12		bit14 bit13 bit12 (0 0 0):FX programming port protocol	
bit13		(0 0 1): RS non-protocol communication (RS485-1 dedicated)	0):
bit14		(0 1 1): RS2 non-protocol communication (RS485-1 dedicated)	
bit15	Disable	Set to 0	



1. When the data bit is 7, the parity cannot be set to no check, otherwise the fault code 6304 will be reported. When the programming port protocol is selected, the data length is 7 bits, the stop bit is 1 bit, and the parity is even check. These are fixed parameters and cannot be changed. Settings, baud rate can be set.
3. Select MODBUS-RTU protocol, RS free port protocol, RS2 free port protocol, data length, stop bit, odd bit, etc. The pairing and baud rate can be set.
4. If the MODBUS-RTU master function is not enabled on D8400 or D8420, the ADPRW instruction will be used. 6706 fault code.
5. When the value of D8401/D8421 is H0, select the MODBUS master protocol. 6. When the value of D8401/D8421 is H10, select the MODBUS slave protocol.

**RS485-1 RS command (RS non-protocol communication) Special M relay and special D register function description**

Position No.	Function	Position No.	Function
M8401	RS instruction sending flag	M8402	RS command send request flag
M8403	RS instruction reception completion flag	M8409	Communication timeout flag
M8161	8/16 bit processing mode (ON-8 bit, OFF-16 bit)		
D8400	Protocol selection and communication parameter setting	D8402	RS command sends the remainder of the data
D8403	RS command received number	D8409	RS command receiving timeout setting (1=10ms)
D8419	The protocol flag being executed by the communication port		

**RS485-1 RS2 command (RS2 non-protocol communication) Special M relay and special D register function description**

Position No.	Function	Position No.	Function
M8421	RS2 Command sending flag	M8422	RS2 command send request flag
M8423	RS2 command reception completion flag	M8429	Communication timeout flag
D8420	Protocol selection and communication parameter setting	D8422	RS2 command sends the remainder of the data
D8423	RS2 command received number	D8429	RS2 command receiving timeout setting (1=10ms)
D8439	The protocol flag being executed by the communication port		

**Function code description supported by MODBUS-RTU master/slave protocol**

Function	Order	Supported software types	
		Bit Components	Word component
Bit Read Command	1(H1), 2(H2)	X, Y, M, S, T, C, Special M	— —
Bit Write Command	5(H5)	Y, M, S, T, C, Special M	— —
Register read command	3(H3), 4(H4)	X, Y, M, S, T, C, Special M	D, T, C, Special D
Register write command	6(H6)	Y, M, S, T, C, Special M	D, T, C, Special D
Register batch write command	16(H10)	Y, M, S, T, C, Special M	D, T, C, Special D



1. The maximum length of ADPRW read and write data is 520. If it exceeds the limit, a fault of 6343 or 6363 will be reported.
2. Use register to read bits, the register will read the status of 16 bit elements.
3. Using register write bits, a register write will affect the status of 16 bit elements.

**RS485-1/RS485-2 ADPRW instruction (MODBUS-RTU protocol) Special M relay function description**

RS485-1	RS485-2	name	Valid Station	details	property
M8410		RS485-1/2 uses ADPRW command latch	Main Station	OFF: RS485-1 uses ADPRW instruction. ON: RS485-2 uses ADPRW instruction.	R/W
M8029		Instruction execution ends	Main Station	OFF: The instruction is not being executed or the instruction has not yet been executed. ON: The command execution is completed.	R
M8401	M8421	MODBUS communication in progress	Main Station	Set to ON during MODBUS communication.	R
M8402	M8422	MODBUS communication error	Master/Slave	Turns ON when a MODBUS communication error occurs.	R
M8403	M8423	MODBUS communication error latch	Master/Slave	It is turned ON if a MODBUS communication error occurs.	R
M8408	M8428	Retry occurs	Main Station	When the slave does not respond on time, the master sends a retry It is turned ON during the period.	R
M8409	M8429	A timeout occurred	Main Station	Turns ON when a response timeout occurs.	R

R : read only;

R/W: read/write;

**RS485-1/RS485-2 ADPRW instruction (MODBUS-RTU protocol) Special D register function description**

RS485-1	RS485-2	name	Valid Station	Details	property
D8400	D8420	Protocol selection and communication parameter setting	Master/Slave	Set the communication format.	R/W
D8401	D8421	MODBUS protocol selection	Master/Slave	When the value is H0, select the MODBUS master protocol. When the value is H10 (K16), select the MODBUS slave protocol.	R/W
D8402	D8422	Communication error code	Master/Slave	The latest error code that occurred in MODBUS communication is stored.	R
D8403	D8423	Error details	Master/Slave	The details of the latest error will be stored.	R
D8404	D8424	The step where the communication error occurred	Main Station	The step number of the first ADPRW instruction where the error occurred is stored.	R
D8407	D8427	Communication step number	Main Station	The step number of the ADPRW instruction in MODBUS communication will be stored. (When the instruction is not executed, 0 will be stored.) The step number of the last executed ADPRW instruction will be retained.	R
D8408	D8428	Current number of retries	Main Station	When retrying communication due to slave response timeout, the current retry count is stored. The number will be stored.	R
D8409	D8429	Slave response timeout	Main Station	After the master sends a request, if the slave does not respond within the set time, the master will send the text again, or according to the set number of retries (D8412, D8432) is judged as a timeout error, and the processing of the instruction ends. Setting range: 0~32767, 1=10ms, when it is 0, 3 seconds means timeout.	R/W
D8410	D8431	Sending delay	Master/Slave	The delay refers to the delay after receiving the data and then returning the data. Range: 0~16382, 1=1ms, default: 10ms	R/W
D8412	D8432	Retry times	Main Station	If the slave does not respond within the time set in the slave response timeout, the master sends the text until the set number of retries is reached, and then the error occurred and command processing ends. Setting range: 0~20 [times] When a value greater than 20 is set, the number of retries is 20.	R/W
D8414	D8434	Slave station number	Slave	Store the slave station number, setting range: 1 ~ 247.	R/W
D8063	D8438	Serial communication error codes	Master/Slave	When a communication error occurs, the error code corresponding to the error that occurred in the MODBUS communication is stored.	R
D8419	D8439	Action mode display	Master/Slave	0-FX programming port communication 4-RS instruction 5-RS2 Instructions 19-MODBUS communication master station 29-MODBUS communication slave	R

R : read only;

R/W: read/write;

**RS485-1/RS485-2 MODBUS-RTU slave protocol soft element address description**

MODBUS-RTU slave element address		PLC bit element address
Read only	Read/Write	
0x0000~0x1DFF	0x0000~0x1DFF	M0~M7679
0x1E00~0x1FFF	0x1E00~0x1FFF	M8000~M8511
0x2000~0x2FFF	0x2000~0x2FFF	S0~S4095
0x3000~0x31FF	0x3000~0x31FF	TS0~TS511
0x3200~0x32FF	0x3200~0x32FF	CS0~CS255
0x3300~0x33FF	0x3300~0x33FF	Y0~Y377
0x3400~0x34FF	--	X0~X377

MODBUS-RTU slave word component address		PLC word component address
Read only	Read/Write	
0x0000~0x1F3F	0x0000~0x1F3F	D0~D7999
0x1F40~0x213F	0x1F40~0x213F	D8000~D8511
0xA140~0xA33F	0xA140~0xA33F	TN0~TN511
0xA340~0xA407	0xA340~0xA407	CN0~CN199
0xA408~0xA477	0xA408~0xA477	CN200~CN255(32 bits)
0xA478~0xA657	0xA478~0xA657	M0~M7679
0xA658~0xA677	0xA658~0xA677	M8000~M8511
0xA678~0xA777	0xA678~0xA777	S0~S4095
0xA778~0xA797	0xA778~0xA797	TS0~TS511
0xA798~0xA7A7	0xA798~0xA7A7	CS0~CS255
0xA7A8~0xA7B7	0xA7A8~0xA7B7	Y0~Y377
0xA7B8~0xA7C7		X0~X377

**LK3U/ZK3U Series CAN Communication port description**

**Functional Description**

The CAN communication port can provide two working modes:

1. Register sharing mode, similar to N:N network.
2. Expansion mode: can connect dedicated digital quantity, analog quantity, temperature, weighing and other expansion modules.

**Register Sharing Mode Description**

In register sharing mode, 1 master can be set, and up to 32 slaves (setting range 1-32).  
 A maximum of 32 registers can be shared (setting range 1-32). 2. The host or slave can read/write the registers shared by the host, and can read/write the registers shared by other stations.  
 Read operation. (Each machine shares the register address range, see the table description below) 3. In the register sharing mode, the communication baud rate of the CAN function can be set: 20K, 50K, 80K, 100K, 125K, 200K, 250K, 400K, 500K, 600K, 800K, 1000K (If an unsupported baud rate is set, it will automatically default to 250K).  
 4. The master and slave addresses cannot be repeated, otherwise fault codes 6373 and 6374 will be reported.

**CAN communication speed and distance (For reference only)**

Baud rate	Distance m	Minimum wire diameter mm	Maximum number of slaves
50Kbps	500	0.7	32
100Kbps	250	0.5	32
125Kbps	150	0.5	32
250Kbps	80	0.3	32
500Kbps	40	0.3	32
1000Kbps	15	0.3	18

\*\* Please connect a 120R terminal matching resistor between the host and the farthest slave.

**Special relay and register description**

Main Station		Remark
M8150	CAN allows operation	
M8149	Communication timeout flag	Communication failure or timeout flag appears. After the flag is turned on, it needs to be turned off manually in the program.
D8149	Communication timeout	1=1ms, default 50ms
D8150	Address Settings	0 indicates host
D8152	Number of slaves	1-32; default 8
D8152	Number of shared registers	1-32; default 8
D8153	Communication baud rate	20K-1000K; default 250K
D8196	Slave device that cannot communicate	1-16
D8197	Slave device that cannot communicate	17-32
D8198	Summary of slaves that cannot communicate	1-16
D8199	Summary of slaves that cannot communicate	17-32
D8200	The maximum time for a successful communication with the slave	1=1ms

Slave		Remark
M8150	CAN allows operation	
M8149	Communication timeout flag	Communication failure or timeout flag appears. After the flag is turned on, it needs to be turned off manually in the program.
D8149	Communication timeout	1ms, default 50ms
D8150	Address Settings	Setting range 1-32
D8152	Number of shared registers	1-32; default 8
D8153	Communication baud rate	20K-1000K; default 250K
D8196	Slave device that cannot communicate	1-16
D8197	Slave device that cannot communicate	17-32
D8198	Summary of slaves that cannot communicate	1-16
D8199	Summary of slaves that cannot communicate	17-32
D8200	The maximum time for a successful communication with the host	1=1ms

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1. The slave flag of D8196 and D8197 that cannot communicate will be automatically reset every 500ms.
2. D8198 and D8199 are the summary of slaves that cannot communicate. After power-on, slaves that cannot communicate will not be automatically reset during PLC operation.
3. After setting the relevant register parameters of the CAN communication port, the new parameters will take effect only after the power is turned off and then on again.
4. For the communication timeout setting of the master and slave devices, it is recommended that the D8149 of the slave device be 10ms greater than the D8149 of the master device.
5. The number of shared registers D8152 of the master and slave devices must be set the same.

**D8196, D8197, D8198, D8199 Description**

	b0	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15
D8196																
D8198	1 Machine	2 Machines	3 Machines	4 Machines	5 Machine	6 Machines	7 Machines	8 Machines	9 Machine	10 Machine	11 Machine	12 Machines	13 Machine	14 Machine	15 Machine	16 Machines
D8197																
D8199	17 Machine	18 Machine	19 Machine	20 Machines	21 Machine	22 Machine	23 Machine	24 Machines	25 Machine	26 Machines	27 Machine	28 Machine	29 Machine	30 machines	31 Machine	32 Machines

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1. When the corresponding bit of the above register is 1, it means that the slave corresponding to the bit cannot communicate or the communication is wrong. D8198 and D8199 are the summaries of the slaves that have failed to communicate after the host is powered on, and they are reset after the host is powered off.

**Master/Slave Shared Registers (D8150) List**

D8150	Starting	Finish	illustrate	D8150	Starting	Finish	illustrate
0	D1000-D1031		Host Shared Registers	17	D1544-D1575		Slave 17 shared register
1	D1032-D1063		Slave 1 shared register	18	D1576-D1607		Slave 18 shared register
2	D1064-D1095		Slave 2 shared registers	19	D1608-D1639		Slave 19 shared register
3	D1096-D1127		Slave 3 shared registers	20	D1640-D1671		Slave 20 shared register
4	D1128-D1159		Slave 4 shared registers	twenty one	D1672-D1703		Slave 21 shared register
5	D1160-D1191		Slave 5 shared register	twenty two	D1704-D1735		Slave 22 shared register
6	D1192-D1223		Slave 6 shared register	twenty three	D1736-D1767		Slave 23 shared register
7	D1224-D1255		Slave 7 shared register	twenty four	D1768-D1799		Slave 24 shared register
8	D1256-D1287		Slave 8 shared register	25	D1800-D1831		Slave 25 shared register
9	D1288-D1319		Slave 9 shared register	26	D1832-D1863		Slave 26 shared register
10	D1320-D1351		Slave 10 shared register	27	D1864-D1895		Slave 27 shared register
11	D1352-D1383		Slave 11 shared register	28	D1896-D1927		Slave 28 shared register
12	D1384-D1415		Slave 12 shared register	29	D1928-D1959		Slave 29 shared register
13	D1416-D1447		Slave 13 shared register	30	D1960-D1991		Slave 30 shared register
14	D1448-D1479		Slave 14 shared register	31	D1992-D2023		Slave 31 shared register
15	D1480-D1511		Slave 15 shared register	32	D2024-D2055		Slave 32 shared registers
16	D1512-D1543		Slave 16 shared register				

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1. The starting address of all machine-shared registers is fixed, and the ending address is determined by D8152.  
 2. All machines can read/write the registers shared by the machine. Other machines can only read.

The maximum number of writable registers is  $1+2=32$ ;

The maximum number of readable registers is  $(1+32)*32=1056$ .



**Extended Mode Description**

1. The PLC host selects the expansion mode and can connect up to 15 expansion modules.

The function of each module is fixed. For example, if module 1 is an E8X8Y module, communication will fail if it is connected to an E16Y module. (For the module types corresponding to the specific module numbers, see the table below.)

2. In the expansion mode, the host does not need any initialization program and is plug and play.

**Function description of each module**

Module Number	Module Type	Enter address	Input filter time	Output Address	Remark
1	Digital expansion E8X8Y (R/T)	X100-X107	10ms	Y100-Y107	Suffix R-Relay output type
2	Digital expansion E8X8Y (R/T)	X110-X117	10ms	Y110-Y117	Suffix T - relay output type

Module Number	Module Type	Enter address	Input filter time	Remark
3	Digital expansion E16Y	X120-X127	10ms	
4	Digital expansion E16X	X130-X137	10ms	

Module Number	Module Type	Enter address	Remark
5	Digital expansion E16Y (R/T)	Y120-Y127	Suffix R-Relay output type
6	Digital expansion E16Y (R/T)	Y130-Y137	Suffix T - relay output type

Module Number	Module Type	Enter address	Output Address	Remark
7	Analog expansion E4AD4DA	D1000-D1003	D1004-D1007	Input, output: 0-10V corresponding data 0-4095
8	Analog expansion E4AD4DA	D1008-D1011	D1012-D1015	Input, output: 0-10V corresponding data 0-4095
9	Analog expansion E4AD4DA	D1016-D1019	D1020-D1023	Input, output: 0-10V corresponding data 0-4095
10	Analog expansion E4AD4DA	D1024-D1027	D1028-D1031	Input, output: 0-10V corresponding data 0-4095

Module Number	Module Type	Enter address	Fault address	Remark
11	Temperature extension E6TEMP-PT	D1032-D1037	M1032-M1037	The data accuracy is 0.1°C, such as 123 means 12.3°C.
12	Temperature extension E6TEMP-PT	D1038-D1043	M1038-M1043	The fault address indicates faults such as module disconnection and probe disconnection.

Module Number	Module Type	Enter address	Fault address	Remark
13	Temperature extension E6TEMP-TC	D1044-D1049	M1044-M1049	K-type thermocouple, data accuracy 0.1°C, such as 456 means 45.6°C.
14	Temperature extension E6TEMP-TC	D1050-D1055	M1050-M1055	The fault address indicates faults such as module disconnection and probe disconnection.

Module Number	Module Type	Enter address	Fault address	Remark
15	Weighing extension E4WT-H	D1056-D1063	M1056-D1059	Each channel data is 32 bits.

### 1. Ethernet Function Description

- 1) Supports 8 independent ports, 5 ports (0-4) are enabled by default, all of which are in MELSOFT connection mode.  
The first channel is MODBUS TCP server function, the sixth channel supports SNTCP (if SNTCP is enabled in the programming software parameters), the 7th channel supports MELSOFT connection mode (fixed);
- 2) Support GX Works2 programming software to search for FXCPU on the network, automatically search for FX3U and the corresponding IP;
- 3) The new version of the program only supports downloading parameters using the dedicated Ethernet parameter software, and does not support GX Works2 programming. Software downloads Ethernet parameters;
- 4) Currently supported connections are: 1. MELSOFT connection; 2. MODBUS S connection (MODBUS TCP (UDP) server); 3. SNTCP connection; 4. MODBUS C connection (MODBUS TCP (UDP) client-UDP only supports one channel (supports up to 247 slaves), TCP supports 7 channels (supports up to 7 slaves));



After using the Ethernet parameter software to download Ethernet parameters, the new parameters will take effect only after power is turned off and on again;  
GX Works2 programming software - Diagnosis - Ethernet diagnostic function cannot be used, and Ethernet parameters do not support GX Works2 settings;

### 2. Register and relay description:

#### 1. Special relays are as follows

Special M	name	Details	R/W
M8404	ENET is ready	Normal detection W5500 reset successfully turned ON;	R
M8406	Executing time setting	The Ethernet adapter is ON when executing the time setting;	R
M8411	Execution time settings	After turning ON, the Ethernet adapter executes the time setting;	R/W
M8492	Request to write IP address storage area	When turned ON, the IP address settings saved in M8492 to D8497 are written to the IP address storage area in the basic unit;	R/W
M8493	Writing to IP address storage area completed	After writing is completed, it is set to ON; it is also set to ON when writing fails; After the IP address storage area write request M8492 changes from ON to OFF, it is set to OFF;	R
M8494	Error writing to IP address storage area	After writing fails, it is set to ON; After the address storage area write request M8492 changes from ON to OFF, it will be set to OFF;	R
M8495	Request to clear IP address storage area	When set to ON, the contents of the IP address storage area will be cleared;	R/W
M8496	IP address storage area clearing completed	After the clearing is completed, it is set to ON; it is also set to ON when the clearing fails; After the address storage area clear request M8495 changes from ON to OFF, it will be turned OFF	R
M8497	IP address storage area clear error	After clearing fails, it is set to ON; After the address storage area clear request M8495 changes from ON to OFF, it will be turned OFF	R
M8498	The flag bit of the IP address change function in operation	Turn ON when the IP address stored in the IP address storage area is valid.	R

## 2. Special registers are as follows

Special D	name	Details	R/W
D8405	Connection status of the Ethernet port	Save the Ethernet port connection status of the Ethernet adapter: b10: Connection status 0: The hub or external device is not connected or is disconnected. 1: Connect to a hub or external device b14: Data transmission speed 0: Running at 10BASE-T 1: Running at 100BASE-TX	R
D8406	Save Ethernet adapter state	Save the Ethernet adapter state: b1: INIT 1: Initialization processing completed normally, 0: - b2:100M/10M 1:100Mbps, 0:10Mbps/not linked b3:ERR. 1: Setting abnormal display, 0: Setting normal display b4:COM.ERR. 1: Communication abnormal display, 0: Communication normal display b5: 1: Initialization processing completed abnormally, 0: - b7: 1: Link signal ON, 0: Link signal OFF b8-b15: Port number 0-7, 0: Initialization failed, 1: Initialization successful	R
D8411	Time setting function action result	The action result of the save time setting function: 0: Not executed 1: Success - 1: Failed	R
D8413	M5500 Program Version	Not supported	R
D8415			
D8416	MAC address of this site	Stores the MAC address (full 3 words).	R
D8417			
D8418	Ethernet adapter error codes	Stores the error code detected by the Ethernet adapter.	R
D8435			
D8436	MODBUS UDP destination IP address (low bit)	Set the low bit of the destination IP address for UDP protocol communication	R/W
D8437	MODBUS UDP destination IP address (high bit)	Set the high bit of the destination IP address for UDP protocol communication	R/W
D8438	MODBUS UDP destination port address /TCP, UDP protocol selection	Set the UDP protocol communication destination port address/TCP, UDP protocol selection (0 is selected for TCP protocol, non-0 is the UDP protocol port address)	R/W
D8380	IP address (low bits)	The low-order part of the IP address	R
D8381	IP address (high)	The high-order part of the IP address	R
D8382	Subnet mask (low bit)	The low-order part of the subnet mask	R
D8383	Subnet mask (high bit)	The high-order part of the subnet mask	R
D8384	Default router IP address (low)	The low-order portion of the default router IP address	R
D8385	Default router IP address (high)	The high-order portion of the default router IP address	R
D8492	IP address setting (low bit)	The lower part of the IP address setting value	R/W
D8493	IP address setting (high bit)	The high-order part of the IP address setting value	R/W
D8494	Subnet mask settings (low)	The low-order part of the subnet mask setting value	R/W
D8495	Subnet mask setting (high bit)	The high-order part of the subnet mask setting value	R/W
D8496	Default router IP address settings (low)	The lower portion of the default router IP address setting value	R/W
D8497	Default router IP address settings (high)	The high-order part of the default router IP address setting value	R/W
D8498	IP address storage area error code	When ENET fails to rewrite parameters, save the error code	R

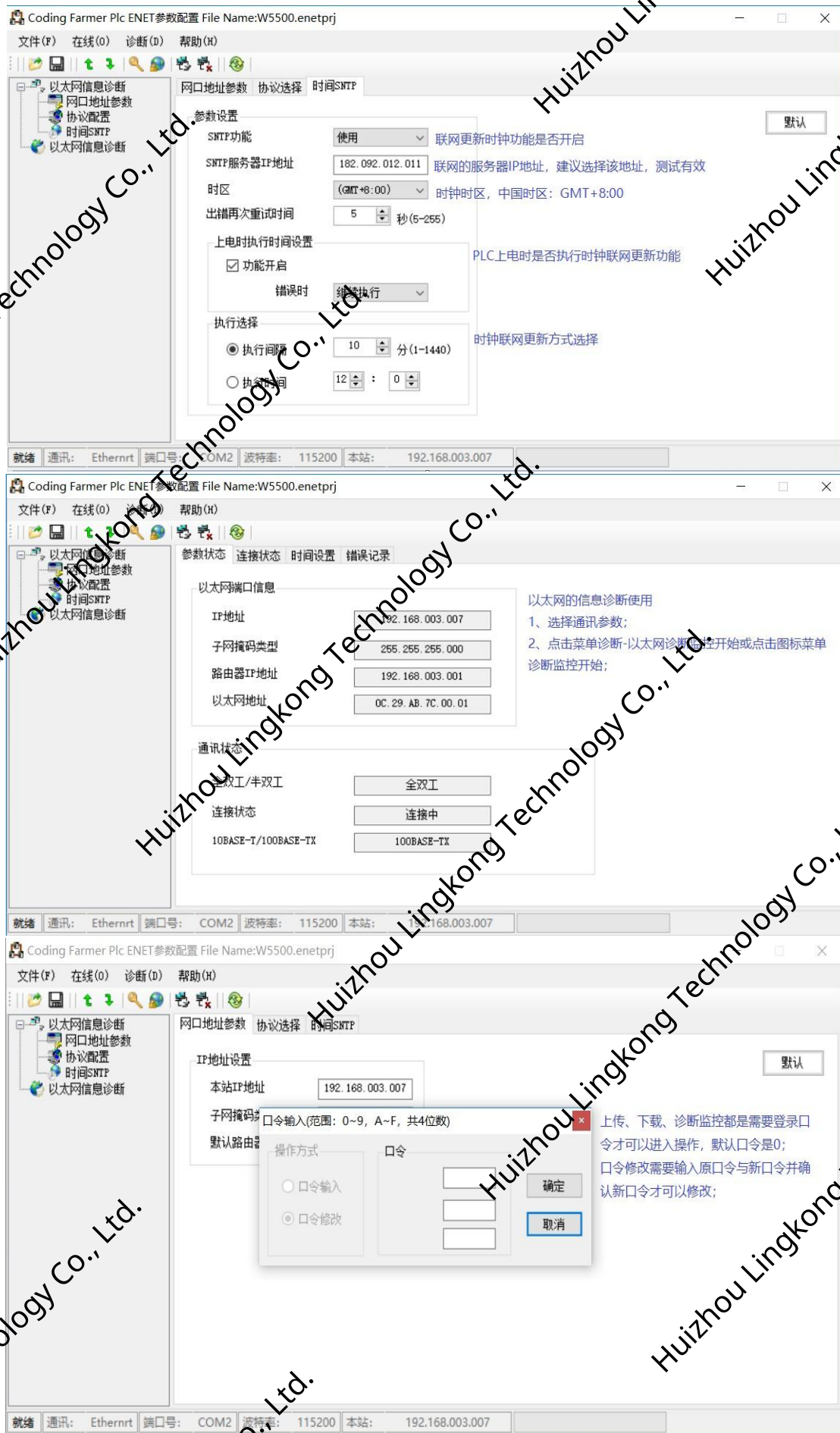
### 3. Setting Ethernet parameters

1. Upload, download, and diagnostic monitoring operations require a login password to perform the operation. The default password is 0 and no password is required.

You can also perform operations: **If you change the password, please remember it. If you lose it, you will not be able to perform operations;** 2. The

software supports the selection of RS232 or Ethernet to download parameters, and supports the automatic search of PLC and IP functions on Ethernet;





### 5. GX Works2 programming software connection via Ethernet

1. Open GX Works2 software, select FX3U, select the connection target, and double-click Ethernet Board;



2. The CPU module detailed settings pop up, select connect via a hub, enter the IP address of your board, and click OK;



You can also select the FXCPU function to search the network and automatically search for the FX3U and the corresponding IP address on the network.

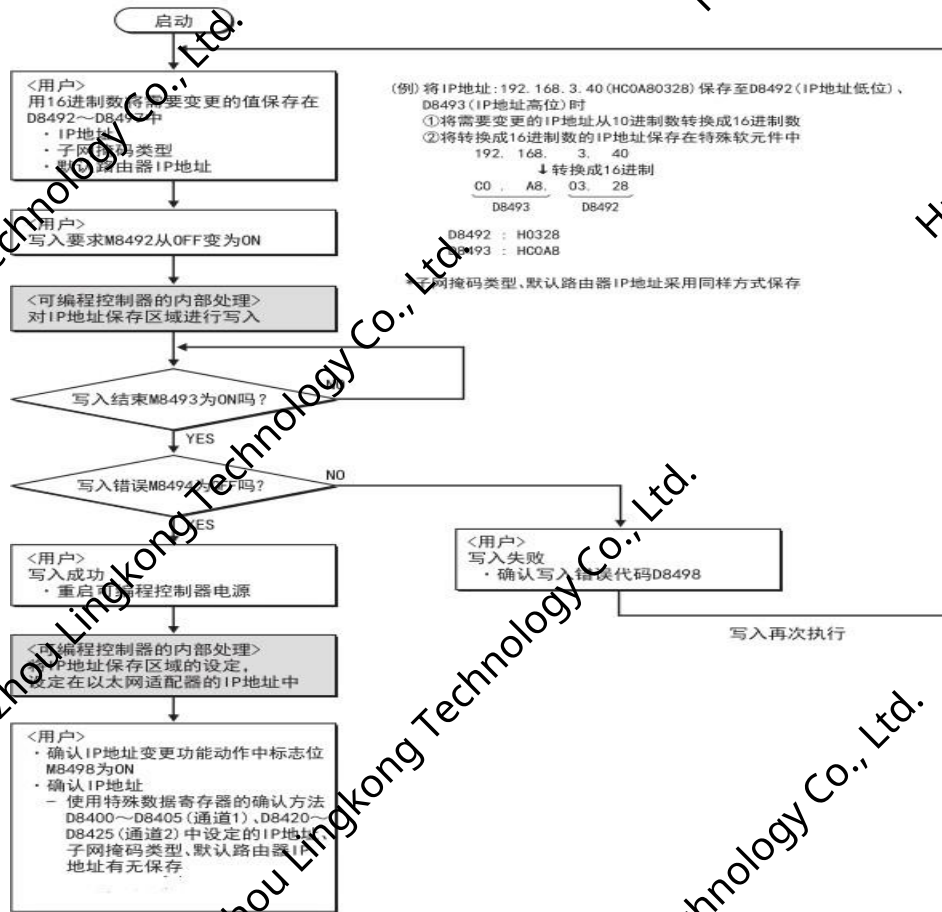
3. Now you can use the programming software to operate the PLC just like using the serial port;

## 6. Change IP parameter address function

### 1. Write IP address parameters

#### IP地址保存区域的写入步骤

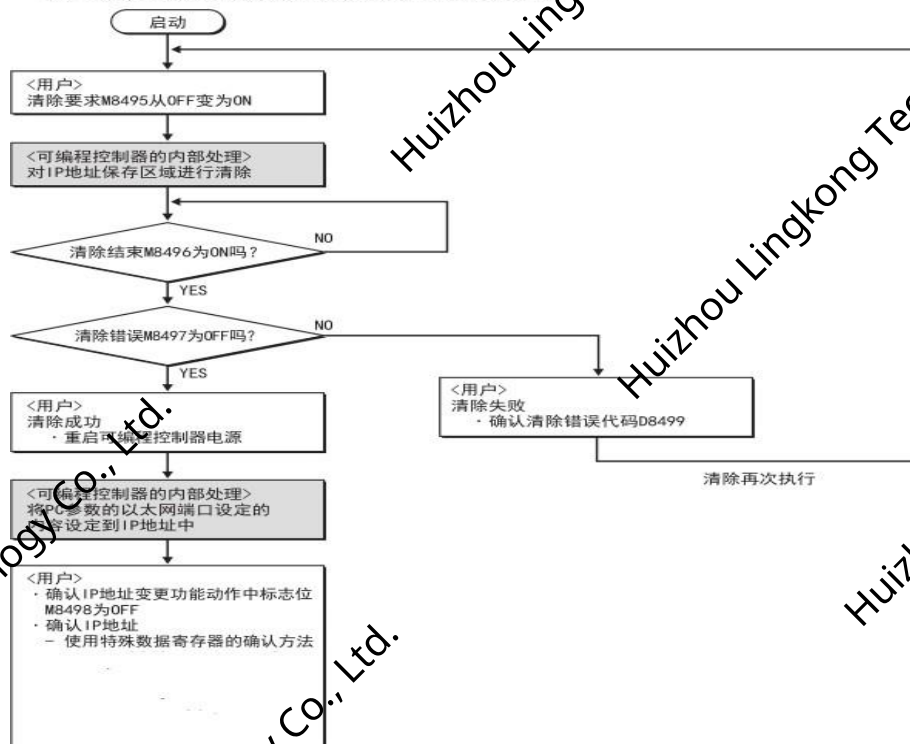
向IP地址保存区域写入数据、变更以太网适配器的IP地址的步骤如下。



### 2. Clear IP address parameters

#### IP地址保存区域的清除步骤

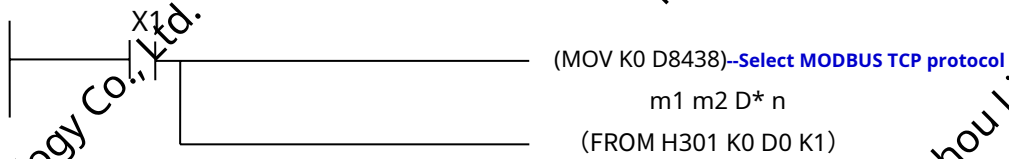
清除IP地址保存区域内容(设定IP地址变更功能为无效)的步骤如下所述。除了清除要求M8495的操作之外,利用PC存储器清除功能也可以清除IP地址保存区域。



## 7. Application of MODBUS TCP/MODBUSUDP Client

The register D8438 used, using the TCP protocol, write 0 to D8438. Instructions.

for master station to read slave station data:



\*\* Transfer the data of register address 0 of station 1 to D0

m1--The lower 8 bits represent the slave address, and the upper 8 bits represent the command to be sent; for example: H301-command 3 (read register

instruction), slave address 1 (1-7);

m2--slave component address; address data see the table above;

D\*--Save slave data register;

n --Read data length (1~255);

Instructions for master station to write slave station data:



\*\* Write the data of D0 to slave station 1 whose register address is 0

m1--The lower 8 bits represent the slave address, and the upper 8 bits represent the command to be sent; for example: H601-command 6 (read register

instruction), slave address 1 (1-7);

m2--slave component address, address data see the table below;

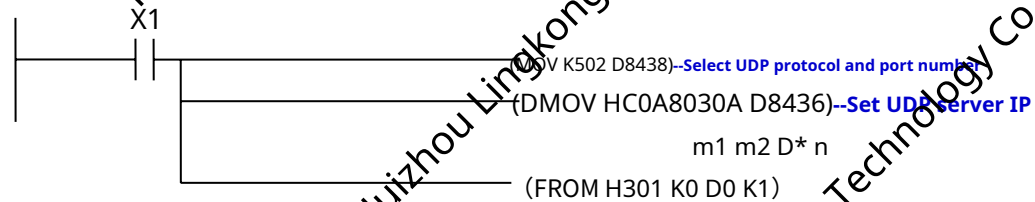
D\*--Write to slave data register;

n -- write data length; When using command 5 (write bit) and 6 (write register), the length is set to 1 regardless of the value.

When using H10 (K16) to write multi-bit registers, the data length (1~255)

The register D8438 used uses the UDP protocol and D8438 is entered into the port number of the destination server.

Instructions for master station to read slave station data:



\*\* Transfer the data of register address 0 of station 1 to D0

m1--The lower 8 bits represent the slave address, and the upper 8 bits represent the send command; for example: H301-command 3 (read register instruction), slave address

1(1~247);

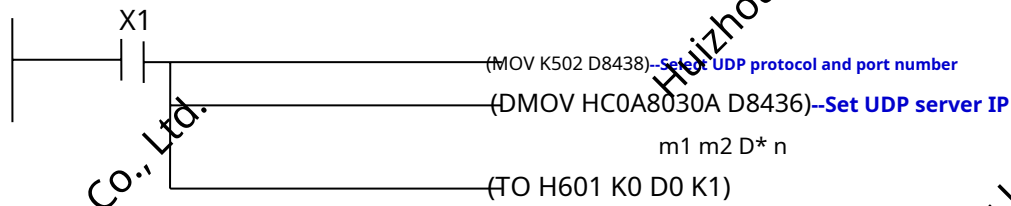
m2--slave component address; address data see the table below;

D\*--Save slave data register;

n --Read data length (1~255);



Instructions for master station to write slave station data:



m1--The lower 8 bits represent the slave address, and the upper 8 bits represent the command to be sent; for example: H601-Command 6 (read register instruction), from Machine address 1(1~247);

m2--slave component address, address data see the table below.

D\*--Write to slave data register;

n -- write data length; When using command 5 (write bit) and 6 (write register), the length is set to 1 regardless of the value. When using H10 (K16) to write multi-bit registers, the data length (1~255) ;

Special Notes:

- FROM and TO can be used multiple times in a program. When multiple instructions are executed at the same time, the system will communicate in sequence; If the communication times out, the fault code is recorded and the next communication instruction is executed;
- MODBUS UDP can only use one channel: supporting slave stations 1 to 247, MODBUS TCP can use up to seven channels: supporting slave stations 1 to 7;
- Maximum data length of FROM/TO instruction: bit (1~255), register (1~255);
- Use the FROM/TO instruction to enable the Ethernet function and download the Ethernet parameters to enable the MODBUS TCP client function. (Ethernet parameters);
- When using the 05 instruction to set the slave position element, such as: TO H501 K4000 D0 K1 - set the M0 status of slave station 1. If D0 is equal to 0, slave M0 is OFF; if D0 is not 0, slave M0 is ON;

MODBUS TCP/MODBUSUDP server component address

- FX3U/FX3UC可编程控制器位软元件:

MODBUS软元件		FX3U/FX3UC软元件
输入（读出专用）	线圈（读出/写入）	
0x0000~0x1DFF	0x0000~0x1DFF	M0~M7679
0x1E00~0x1FFF	0x1E00~0x1FFF	M8000~M8511
0x2000~0x2FFF	0x2000~0x2FFF	S0~S4095
0x3000~0x31FF	0x3000~0x31FF	TS0~TS511
0x3200~0x32FF	0x3200~0x32FF	CS0~CS255
0x3300~0x33FF	0x3300~0x33FF	Y0~Y377
0x3400~0x34FF	-	X0~X377

字软元件:

MODBUS软元件		FX3U/FX3UC软元件
输入寄存器（读出专用）	保持寄存器（读出/写入）	
0x0000~0x1F3F	0x0000~0x1F3F	D0~D7999
0x1F40~0x213F	0x1F40~0x213F	D8000~D8511
0x2140~0xA13F	0x2140~0xA13F	R0~R32767
0xA140~0xA33F	0xA140~0xA33F	TN0~TN511
0xA340~0xA407	0xA340~0xA407	CN0~CN199
0xA408~0xA477	0xA408~0xA477	CN200~CN255*1
0xA478~0xA657	0xA478~0xA657	M0~M7679
0xA658~0xA677	0xA658~0xA677	M8000~M8511
0xA678~0xA777	0xA678~0xA777	S0~S4095
0xA778~0xA797	0xA778~0xA797	TS0~TS511
0xA798~0xA7A7	0xA798~0xA7A7	CS0~CS255
0xA7A8~0xA7B7	0xA7A8~0xA7B7	Y0~Y377
0xA7B8~0xA7C7	-	X0~X377

\*1. CN200~255是32位计数器

**8. Supported Function Commands**

Function	Order	Support software	
		Bit Components	Word component
Bit Read Command	1(H1), 2(H2)	X, Y, M, S, T, C, Special M	
Bit Write Command	5(H5)	Y, M, S, T, C, Special M	
Register read command	3(H3), 4(H4)	X, Y, M, S, T, C, Special M	D, T, C, Special D
Register write command	6(H6)	Y, M, S, T, C, Special M	D, T, C, Special D
Register batch write command	16 (H10)	Y, M, S, T, C, Special M	D, T, C, Special D

**IX. FAULT CODE**

category	Error code	Error content
Serial Port 1.2/CAN/ENET Error M8063(D8063) Run Continue	6390	Ethernet parameter check error
	6391	Port initialization failed (see D8406.b8-b15)
	6392	Communication timeout with Ethernet W5500
	6393	IP address conflicts
	6394	W5500 module used and has an error
	6395	
	6396	
	6397	
	6368	The MODBUS TCP server/client function or Ethernet function is not enabled.
6399	ENET is faulty (see D8418 for details)	

**\*\* Error code during Ethernet communication (D8418)**

Error code	Error content	Workaround
753	The Ethernet adapter IP address setting is incorrect.	Modify IP address, set level to A/B/C
761	When specifying the default router IP address, the value set in the subnet mask field is out of range (range: 192.0.0.0 to 255.255.255.252)	Modify the subnet mask
763	When specifying the default router IP address, the default router IP address setting value is incorrect	Modify the IP address and set the level to A/B/C
764	When specifying the default router IP address, the Ethernet adapter IP address and the default router IP address do not belong to the same network address	Modify the IP address and set the level to A/B/C.
850	Failed to receive a response from the SNTP server	Confirm that the SNTP server is connected to the network; modify the IP address.
911	A receive error occurred during TCP/IP communications.	Confirm the operation of the other device. Sometimes there will be packet congestion on the line. Send after time. Check if the link cable is loose.
1000	MODBUS client FROM/TO instruction length range error	Confirm that the read and write lengths of the command are within the range
1001	MODBUS client FROM/TO uses unsupported commands	Use supported commands
1002	The protocol selected by the MODBUS client FROM/TO is inconsistent with the protocol of the parameter	Modify the protocol of FROM/TO instruction or Ethernet parameters To (D8438-0 = TCP protocol, if not 0, it means UDP protocol)
1003	The MODBUS client mainboard is not connected to the server.	Confirm that the Ethernet IP, port and other parameters are consistent and correct
1004	MODBUS client receiving timeout	Confirm that the parameters and connections are normal
1005	MODBUS client FROM/TO instruction slave address range error	Please select the correct range of slave address, TCP protocol address Address 1~7, UDP protocol 1-247.
1006	The data command or address received by the MODBUS client FROM/TO instruction is inconsistent	Possible interference or packet congestion
1007	The transmission logs received and sent by the MODBUS client FROM/TO instructions are inconsistent	Possible interference or packet congestion

**\*\* Error writing to IP address storage area (D8498)**

Error code	Error content	Workaround
100	The value of D8492~D8497 is outside the setting range	Please modify the setting value
400	The write request and clear request bit change from OFF to ON.	Please confirm whether the write request and clear request change from OFF to ON

## 10. Test program function description

### Preparation:

1. 3 boards are needed, one master station, one station 1, and one station 2; 2. If communication fails, please use the program software-diagnosis-to view the fault code;

3. There are three programs in the test program folder, one master station, one station 1, and one station 2; 4. After the

communication link is connected and all programs are downloaded, all three PLCs are in RUN;

5. Use Ethernet parameter setting software to configure the parameters of each station: for the master station, you need to configure the IP, port number and other parameters of station 1/2 corresponding to the MODBUS TCP channel; for station 1/2, you need to configure the MODBUS TCP channel parameters;

Working principle:

When the PLCs are running and the communication is normal, Y10 of the three boards flashes at the same time, and X0-X7 of all boards are mapped to Y0-Y7 of all boards (for example: if X0 of the master station is ON, X1 of station 1 is ON, and X2 of station 2 is ON, then Y0, Y1, and Y2 of all boards are ON)



If you choose UDP protocol, both the master and slave stations need to choose UDP protocol. If you choose TCP protocol, both the master and slave stations need to choose TCP protocol.

## 11. Appendix

### 1. IP address settings

Set the IP address of this station according to the input format (decimal/hexadecimal). Setting range: 0.0.0.1 to 223.255.255.254 (decimal)

00.00.00.01 to DF.FF.FF.FF (hexadecimal) Set the same class and subnet address for the local Ethernet adapter and the other party's device. For IP addresses, consult with the network administrator (the person who manages network plans and IP addresses) and set them.

### 2. Set the subnet mask type

Set the subnet mask of this station according to the input format (decimal/hexadecimal). Setting range: 192.0.0.0~255.255.255.252 (decimal)

C0.00.00.00~FF.FF.FF.FC (hexadecimal)

Regarding the subnet mask, consult your network administrator (the person who manages network planning, IP addresses, etc.) and set them.