Simple display and PLC in one User manual

--V1.0

Model: WS824&2-10MR

Catalogue

Chapter 1 Summary

1.1 Summary

WS824&2-10MR display

· It works for small space with simple request.

· User friendly operation, no need programming.

· 2 group 6 digits big size display.

· Functional and common buttons in the same.

· Eight LED indicator for Alarm/work completion and more functions.

· Enable to modify read&write address.

· No communication in 5 seconds after switched ON, shows NO PLC.

WS824&2-10MR PLC part

·WS2N-S gets high arithmetic speed and big capacity; Max program capacity is 4K steps.

·Download speed 9.6Kbps; The software is Mitsubishi GX Developer or GX Works2 for programming, downloading, debugging and monitoring (monitor writing unsupported)

·DC 24V power supply; the quiescent current is 5MA under the condition of the output relays turned-off. Every output relay turn-on will add 9MA current. For example, the current is 40MA (0.96W) after all output relays are turned on.

·Built-in 2 CH 3K single phase counting, AB phase input not supported.Transistor gets 2 CH 3K pulse output.

·The relay models use 5A current relay, which should be less than 3A for long-term use

·1 CH built-in PWM output. Because optical coupler gets the delay, this CH does not get through it. Frequency is 1KHZ, duty factor is D8033 and scope is 0-1000.

·2CH analog 0-10V in, 12 bit precision, corresponding to 0-4095.

1.2 Basic parameter

Model .NO	Shell DIM L*W (mm)	Download Speed	Capacity	Inputs	Outputs	Output type	Output current	Load	Counting	Pulse out	Analog in	Analog out	MODBUS	Time: RTC
WS824&2-10MR	96*54*51	9.6Kb	4000	6	4	Relay	5A	24V 220V	2/3K	N/A	2AD 0-10V	N/A	N/A	N/A

Picture 1-1

1.3 Usage Environment and Installation Method

■ In order to prevent the internal temperature of the PLC from overheating, please install it by wall hanging. It is required to leave enough space up and down as heat dissipation space.

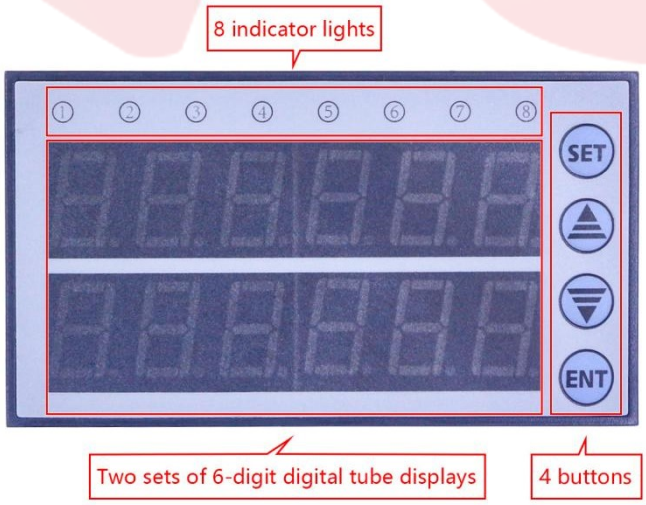
■ A gap of more than 50mm is left between the PLC and other equipment or structures. Stay away from high voltage wires, high voltage equipment and power equipment as far as possible,.

■ Avoid dust, oil and corrosive environment; Pay attention to electrostatic protection (avoid direct hand contact with circuit board's circuit).

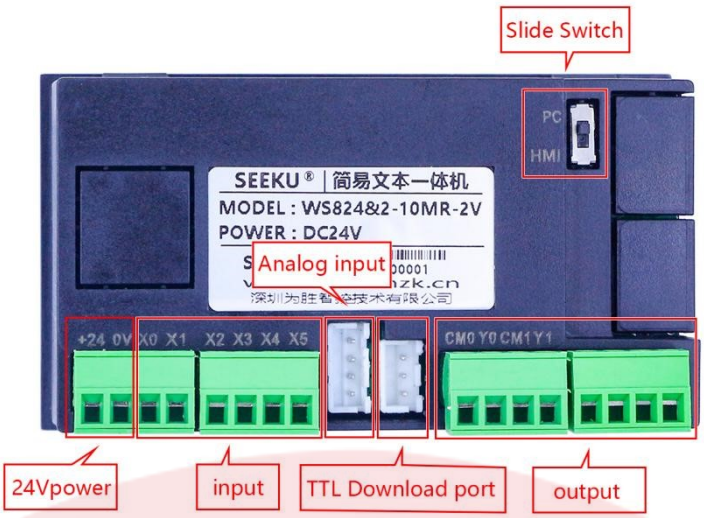
■ Fixed installation with glue isolation column.

Chapter 2 Product Display

2.1 Main parts



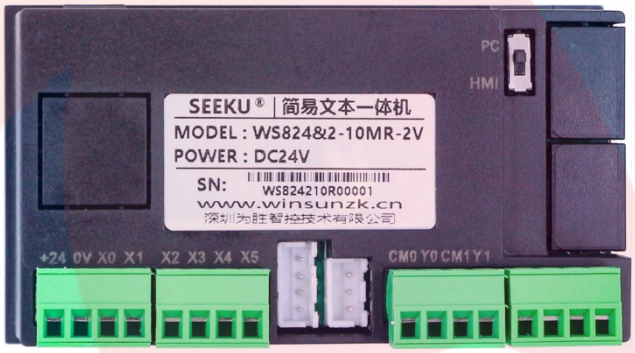
Picture 2-1



Picture 2-2

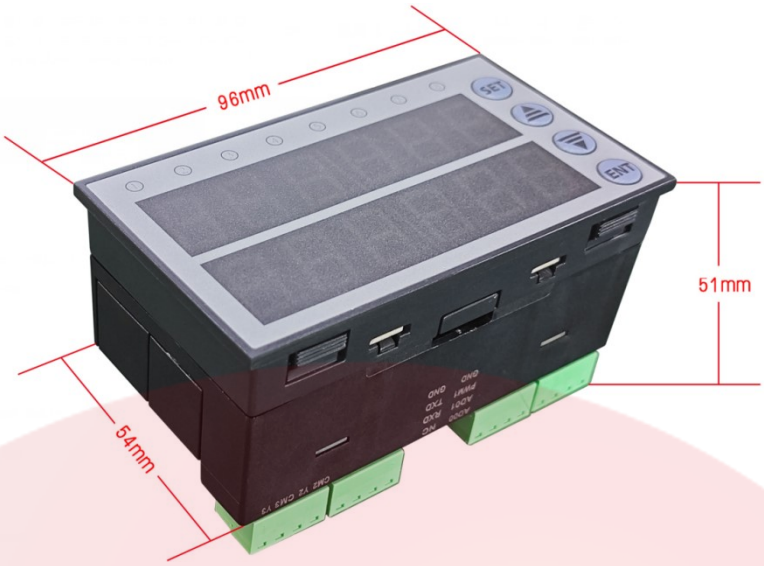
2.2 Exhibition

Picture 2-3 Front



Picture 2-4 Rear

2.3 Dimension



Picture 2-5

Chapter 3 Electrical Specifications

3.1 Power supply and power consumption

DC 12-24V power supply; the quiescent current is 5MA under the condition of the output relays turned-off;

Every output relay turn-on will add 9MA current. For example, the current is 40MA (0.96W) after all output relays are all turned on.

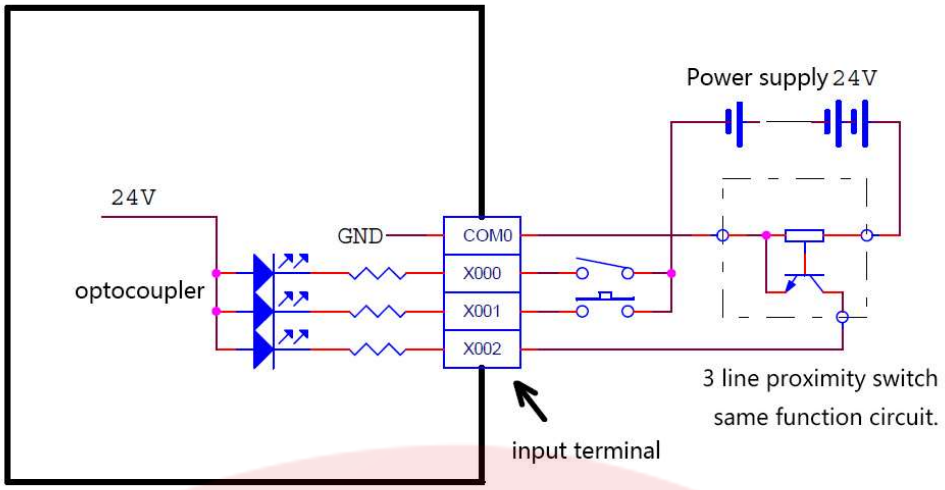
Note: If the switching power supply with small ripple is used, when there is strong interference in the circuit, please use an appropriate filter for filtering.

3.2 Download Communication

Can use TTL for the downloading. ATTN:
*A. Pin to Pin(3pin)
*B. GND to GND connected
DIP switch to choose the HMI or PLC program downloading.

3.3 Input circuit and wiring

The controller is equipped with a power supply (DC24V) for user switching state detection. The user only needs to access the dry contact switch signal. If the user want to connect the output signal of the active transistor sensor, the NPN sensor is required.



Picture 3-1 input connection

3.4 Output circuit and wiring

Project		Relay output interface	Transistor output interface
Loop supply voltage		AC220V, DC30V	DC24V
Circuit insulation		Relay mechanical insulation	Optocoupler insulation
Action indication		Relay Output Contact Closed LED Bright	The LED is illuminate when that optocoupler is driven
Open circuit leakage current			Less than 0.1 MA/DC30V
Maximum output current	Resistance load	1A/1; Common point 4A	0.5 A/point
	Inductive load	AC220V, 40VA	High speed port: 7.2 W/DC24V;
			Others: 12W/DC24V
	Light load	AC220V，50W	High speed port: 0.9 W/DC24V;
			Others: 1.5 W/DC24V
ON Response time		20ms max	High speed output: 10us;
OFF Response time		20ms max	Others: 0.5 ms
High speed output frequency		/	100KHz max per channel
Output common		Each group shares a common end, and groups and groups are isolated from each other.	
Fuse protection		None	

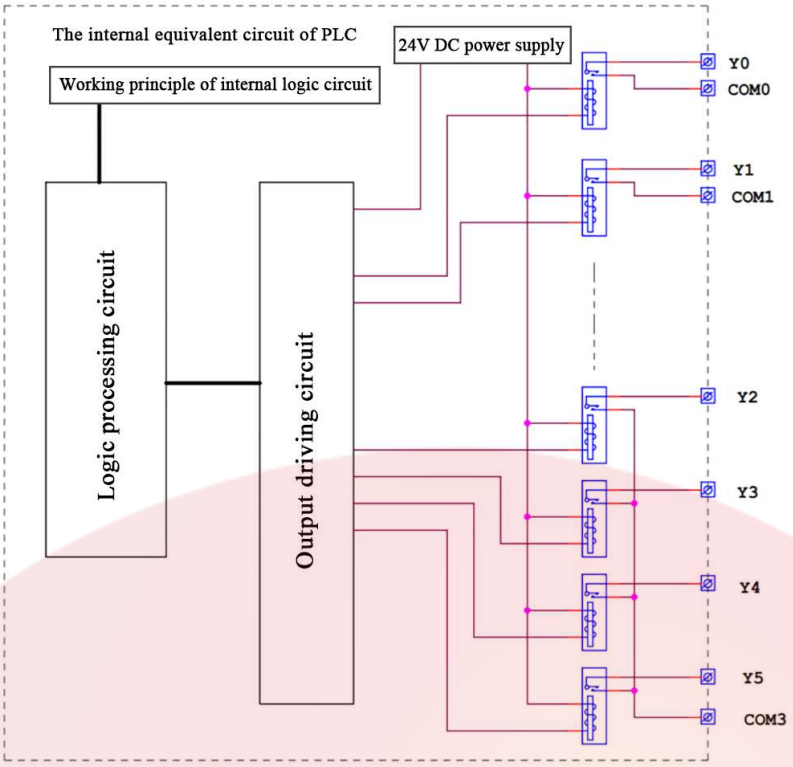
Picture 3-2 Output specification

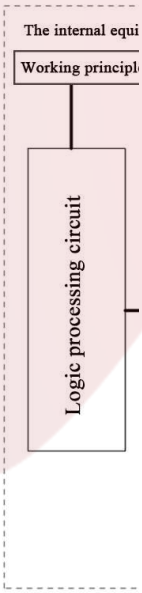
The output terminals of relay output type are divided into several groups, each group is electrically isolated, and the output contacts of different groups can be connected to different power supply circuits.

picture 3-3 Relay output equivalent circuit

The output terminals of transistor output type are divided into several groups each group is electrically isolated, and the output contacts of different groups can be connected to different power supply circuits. Crystal output stage can only be used for DC load loop.

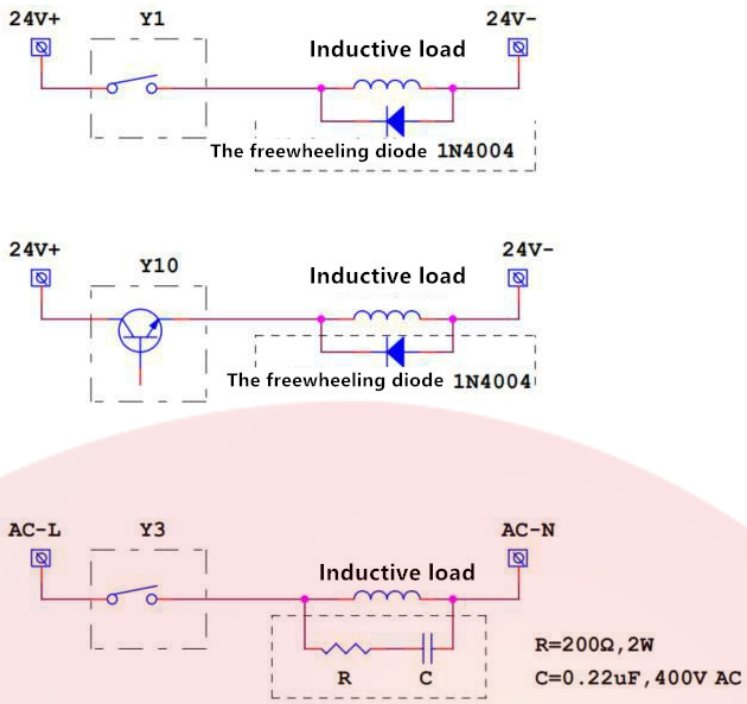
When MR PLC is connected to inductive load of AC circuit, RC instantaneous voltage absorption circuit should be considered in external circuit.





picture 3-4 Transistor output equivalent circuit

Corresponding to the inductive load of the DC loop, the addition of freewheeling diodes should be considered. As shown in the following figure:



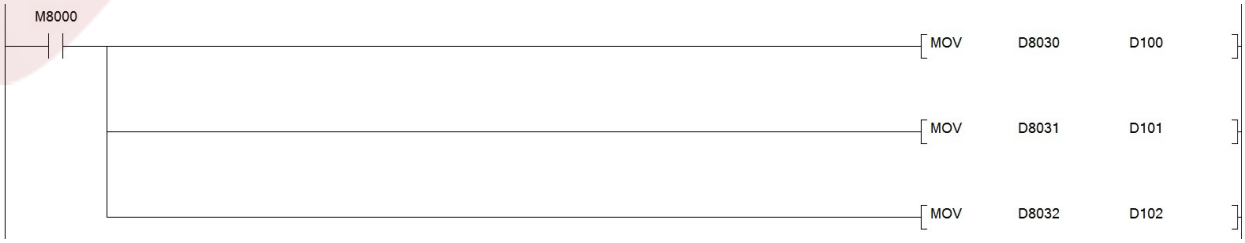
picture 3-5 Load protection circuit

3.5 Analog input

2 CH optional analog input, no wiring terminal. Analog port is 2.54mm pin header, wiring requires 2.54mm DuPont female cable connection.

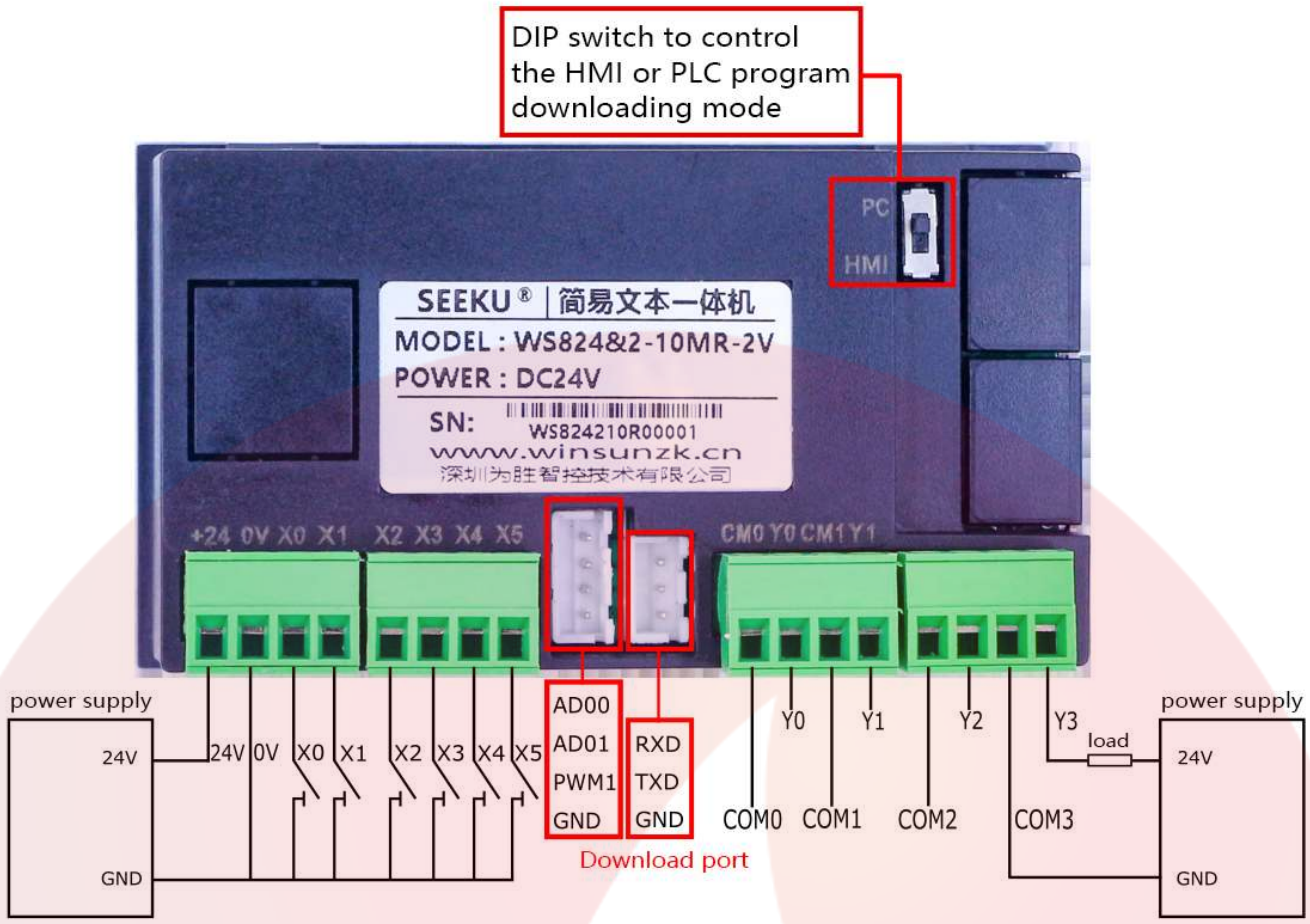
Analog input single type and scope

Type	Scope	Register read value: D8030-D8031
Voltage	0-10V	0-4095



picture 3-6 Analog input example

3.6 Wiring



Picture 3-7

Chapter 4 Display operation

4.1 Modify D register Value

【1】Long press to SET 5 seconds till the first upper digits shinning, then modify it.
【2】Press UP to increase D register value. Down to decrease the value.
【3】Press ENT, upper setting done. Then modify another digits.

Picture 4-1

4.2 Modify D register Address

【1】Default to show and modify D110 and D114 value after power ON, able to set it to show and modify other register value

【2】Method: press SET and ENT in the same time. Then power ON, hold on pressing more than 3 seconds. To register setting mode, upper digits to D110, lower to D114.

Picture 4-2

【3】 Press SET to modify D register, use UP/DOWN to change the address. After upper modification done,press ENT to lower digits. After that, press ENT to confirm. (Then upper register D116, lower D118)

Picture 4-3

picture 4-4

Chapter 5 PLC reference

5.1 Application environment

1. GX Developer (compatible with XP and WIN7 32-bit systems)
2. GX Works2 (compatible with WIN7 64-bit system, WIN8 system and WIN10 system)

5.2 Component number and function

Table 5-1 Soft component register

Item		WS2N-S	
Auxiliary relay	Common use	M0-M511	512 points
	Constant use	M512-M3071	2559 points
	Special use	M8000-M8255	256 points
Register	Common use	S0-S127	128 points
	Save use	S128-S999	872 points
Timer	100MS	T0-T99	100 points
	10MS	T200-T245	46 points
	1MS	T246-T249	4 points
	100MS	T250-T255	6 points
Counter	16 bit increment Mode (common use)	C0-C15	16 points
	16 bit increment Mode (constant use)	C16-C99	84 points
	32-bit bidirectional (constant use)	C200-C234	35 points
	32-bit bidirectional (high-speed constant use)	C235-C247	13 points
Register	16 bit common use	D0-D511	512 points
	16 bit constant use	D512-D998	487 points
	16 bit special use	D8000-D8255	256 points
	16 bit use address modify	V0-V7 Z0-Z7	15 points
Nest point	Jump guest program use,branch	P0-P127	128 points
	Main control	N0-N7	8 points
Constant	10 hexadecimal number（K）	16 bit-32768~+32767	32 bit-2147483648~+2147483647
	16 hexadecimal number（H）	16 bit：0～FFFF	32 bit：0～FFFFFFFF

5.3 Special components

Table 5-2 Instruction

Number	Name	Remarks	Number	Name	Remarks
M8000	RUN monitoring	RUN is always on	M8001	RUN Monitoring	RUN is always closed
M8002	Initialization pulse	Normally open scanning period flag	M8003	Initialization pulse	Normally closed scanning period mark
M8004	Error hint	PLC error	M8011	Clock,10ms	Oscillating at a period of 10ms
M8012	Clock,100ms	Oscillating at a period of 100ms	M8013	Clock,1s	Oscillating at a 1S cycle
M8014	Clock,1min	Oscillating in a period of 1min	M8022	Carry mark	
M8029	Y0 command end		M8040	Transmission stop	
M8030	Y1command end				

5.4Command support list

Table 4-3 27 basic command

Mnemonic bit name	Mnemonic bit name	Mnemonic bit name
[LD] take	[LDI] inverse	[AND] and
[ANI] and inverse	[OR] or	[ORI] or inverse
[OUT]Output	[SET] set	[RST] reset
[ANB] Loop block and	[ORB] Loop block or	[MPS] stack in
[MRD] stack read	[MPP] stack out	[INV] inverse
[LDP] Take upper pulse	[LDF] take lower pulse	[ANDP] and pulse rising edge
[ANDF] and pulse setting edge	[ORP] or pulse rising edge	[ORF] or pulse setting edge
[RET] return	[PLS] pulse rising edge	[PLF]pulse setting edge
[MC]main control	[MCR]main control reset	[END]end

table 4-4 Step command

[STL]step ladder picture		

table 4-5 Application command

Sort	FNC NO.	Instruction	Function
Program flow	00	CJ	Conditional jump
	01	CALL	Call subroutine
	02	SRET	Subprogram return
	03	FEND	End of main program
	04	WDT	Monitor timer refresh

	05	FOR	Start of cycle range
	06	NEXT	End of cycle range
Transmission and comparison	07	MOV	Transmission
	08	CML	Reverse move
	09	CMP	comparison
	10	ZCP	Zone comparison
	11	FMOV	Multi-points Transmission
Arithmetic and logic	12	ADD	Binary addition
	13	SUB	Binary subtraction
	14	MUL	Binary multiplication
	15	DIV	Binary division
	16	INC	Binary plus 1
	17	DEC	Binary minus 1
	18	WAND	Logical words and
	19	WOR	Logical word or
	20	WXOR	Logical word XOR
	21	NEG	Complement code
Recycle and shift	22	ROR	Circular right shift
	23	ROL	Circular left shift
	24	RCR	Rotate right with carry
	25	RCL	Rotate left with carry
bit Data processing	26	ZRST	Batch reset
High speed processing	27	PWM	Pulse width adjustment output
	28	PLSY	assigned pulse output
	29	PLSR	Pulse output with speed up/down
Convenient order	30	ALT	Alternate output

Contact Comparison	31	LD=	(S1)= (S2) start point connected
	32	LD>	(S1)> (S2) start point connected
	33	LD<	(S1)< (S2) start point connected
	34	LD<>	(S1)<> (S2) start point connected
	35	LD≦	(S1)≦(S2) start point connected
	36	LD≧	(S1)≧(S2) start point connected
	37	AND=	(S1)= (S2) Series connection points connected
	38	AND>	(S1)> (S2) Series connection points connected
	39	AND<	(S1)< (S2) Series connection points connected
	40	AND<>	(S1)<> (S2) Series connection points connected
	41	AND≦	(S1)≦(S2) Series connection points connected
	42	AND≧	(S1)≧(S2) Series connection points connected
	43	OR=	(S1)= (S2) parallel connection points connected
	44	OR>	(S1)> (S2) parallel connection points connected
	45	OR<	(S1)< (S2) parallel connection points connected
	46	OR<>	(S1)<> (S2) parallel connection points connected
	47	OR≦	(S1)≦(S2) parallel connection points connected
	33	OR≧	(S1)≧(S2) parallel connection points connected

5.5 Unsupported command list

No.	Command	Definition	Item	Command	Definition
1	WDT	watch date refresh	12	IST	Initialize status
2	CML	get reverse move	13	ABSD	CAM control (absolute)
3	XCH	exchange	14	INCD	CAM control (incremental)
4	FMOV	multi points move	15	DSW	BCD digital switch input
5	SMOV	site move	16	SEGL	seven segment code time display
6	NEG	binary count complement	17	FROM	BFM read
7	REF	input/output refresh	18	TO	BFM write
8	REFF	filter input refresh	19	CCD	verify
9	MTR	matrix input	20	VRRD	potentiometer variation input
10	HSCS	contrast site set(high-speed count use)	21	VRSC	potentiometer variation scope
11	HSCR	contrast site reset(high-speed count use)	22	ABS	ABS current value read

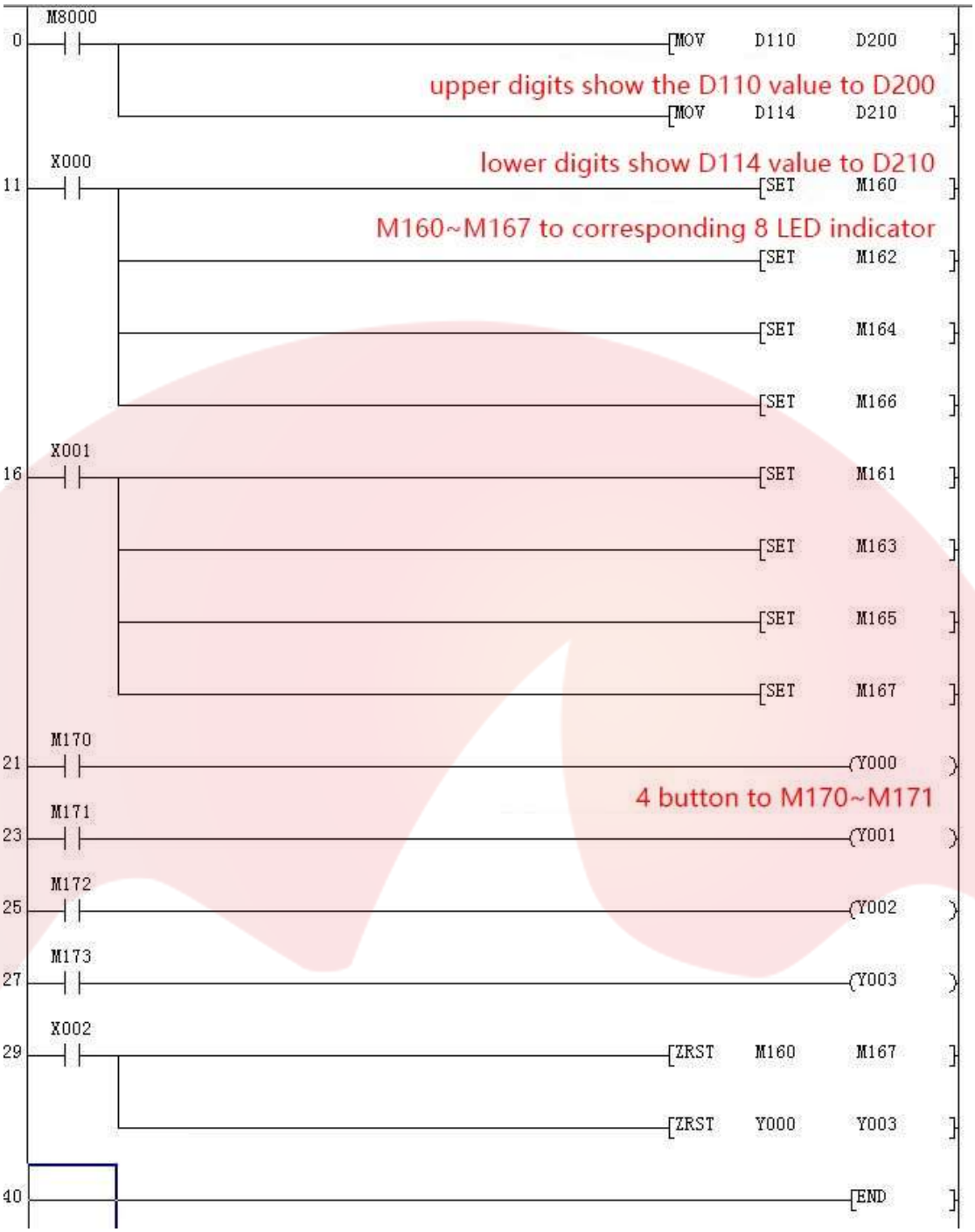
Chapter 6 Display instruction

6.1 Display to PLC corresponding register function

Item		Inter-middle register	remark
Button	SET	M170	While pressing the button, inner PLC relay will be open. While released, relay will be closed.
	UP	M171	
	DOW	M172	
	ENT	M173	
LED Indicator	0	M160	While open, corresponding indicator ON; Or indicator off.
	1	M161	
	2	M162	
	3	M163	
	4	M164	
	5	M165	
	6	M166	
	7	M167	
Upper digits	0-999999	D110	In main mode, it shows D110 value. While modification,it shows register code(0~1023)
Lower digits	0-999999	D114	In main mode, it shows D114 value. While modification,it shows register code(0~1023)

Picture 6-1

6.2 Machine to corresponding PLC instance



Picture 6-2, simple text program exmaple.

Chapter 7 Frequently asked questions and solutions

No.	Questions/Problem	Solutions

1	Wiring method of Analog	To corresponding port(AD0-AD1), Negative to GND
2	Analog reading	Please refer to the section 3.5
3	Encryption	Confirm all online: 1. GX click Online>remote operation>Stop PLC(DIP from RUN to STOP)>Click Execute. 2. Then RUN light off. 3. ONLINE>log in key word>create new login key word>click to write the key word. 4.Set a 8 digit PW twice. After finished, set STOP to RUN remotely.
4	PLC power consumption	Please refer to the section 3.0
5	The PLC doesn't communicate	1, Check if the cable is plugged in and the driver is installed. 2, Check the PLC configuration of SW, baud rate, Com port correct or not.
6	Wiring method	All input ports are NPN input, negative conduction.

Chapter 8 Warranty terms

8.1 Warranty period

The product provides a one-year warranty from the date of delivery. During the warranty period, our company will provide free maintenance services for the product.

8.2 Not supported by warranty

- Positive and negative part of power is reversed.
- Wrong voltage range or using environment.
- Unauthorized changes to internal componen