User Manual for PLC Industrial Control Board WS3U-B

Premium Series Products

--V1.35

Applicable to the following models：WS3U-14MR/MT-K-B
WS3U-14MRT-K-B
WS3U-20MR/MT-K-B
WS3U-20MRT-K-B
WS3U-28MR/MT-K-B
WS3U-28MRT-K-B
WS3U-32MR/MT-K-B
WS3U-32MRT-K-B

Product Catalog

Chapter1 Product Overview

1.1 Product Overview

CPU:

- WS3U Precision Speed Series, featuring 32-bit chips for high-speed processing and ample storage capacity.

Download newsletter:

- The download speed is 38.4 Kbps (you may request a reduction to 9.6 kbps under special circumstances). Use Mitsubishi GX Developer or GX Works2 directly for programming, downloading, debugging, and monitoring (monitoring and writing are not supported).

Power Supply and Consumption:

- Powered by DC 24V; under conditions where all output relays remain closed, the static current is 30mA;

  Each opened relay increases the current by 10mA. For example, when all output relays of 3U-14MR are fully open, the current reaches 70mA (1.44W).

Load：

- The relay adopts a 5A current relay, with long-term usage recommended below 3A;

  The transistor employs bipolar transistor drive, delivering an output current of 1A, and the maximum long-term usage should not exceed 500mA.

Analog input/output:

- Equipped with 6 analog input channels.

  3 voltage channels (0–10 V; can be configured as 2 PT100 or 2 Type K thermocouple temperature measurement channels);

  3 current channels (0–20 mA); 2 analog output channels (0–10 V voltage).

High-speed input：

- It features a built-in 6-channel 3K counting capability (6-channel 60K is available as an optional option) and supports 3-channel AB-phase inputs.

High-speed output：

- Supports up to 8 channels of 100K pulse outputs.

Products can be customized in bulk according to your requirements.

1.2 Essential parameter

Model	Outer shell dimensions: L*W*H	Download speed	Memory capacity	Enter point	Output Point	Output Type	Output(current)	Load	Counting	Pulse output	Analog Input	Analog Outpu	MODBUS	Clock	Shell
WS3U-14MR-K-B	90X80X61	38.4Kb	8000	8	6	Relay	5A	24V 220V	6/3K default 6/60K optional	None	3AD 0–10 V 3AD 4–20 mA The 3AD channel can be configured for temperature measurement using either 2 PT100 sensors or 2 Type K thermocouples.	2DA 0-10V	Optional	Optional	Optional
WS3U-14MT-K-B	90X80X61	38.4Kb	8000	8	6	Transistor	1A	24V	6/3K default 6/60K optional	2/100K		2DA 0-10V	Optional	Optional	Optional
WS3U-14MRT-K-B	90X80X61	38.4Kb	8000	8	6	2-channel transistors 4-channel relays	5A 1A	24V 220V	6/3K default 6/60K optional	2/100K		2DA 0-10V	Optional	Optional	Optional
WS3U-20MR-K-B	140X100X63	38.4Kb	8000	12	8	Relay	5A	24V 220V	6/3K default 6/60K optional	None	Default: 2AD 0–10 V, 2DA 0–10 V (can be changed to 4AD) Or optionally select 2-channel PT100 or 2-channel Type K thermocouple temperature measurement (in which case the 2AD and 2DA channels are occupied)		Optional	Optional	Optional
WS3U-20MT-K-B	140X100X63	38.4Kb	8000	12	8	Transistor	1A	24V 220V	6/3K default 6/60K optional	4/100K			Optional	Optional	Optional
WS3U-20MRT-K-B	140X100X63	38.4Kb	8000	12	8	4-channel transistors 4-channel relays	5A 1A	24V 220V	6/3K default 6/60K optional	4/100K			Optional	Optional	Optional
WS3U-28MR-K-B	140X100X63	38.4Kb	8000	16	12	Relay	5A	24V 220V	6/3K default 6/60K optional	None			Optional	Optional	Optional
WS3U-28MT-K-B	140X100X63	38.4Kb	8000	16	12	Transistor	1A	24V 220V	6/3K default 6/60K optional	4/100K			Optional	Optional	Optional
WS3U-28MRT-K-B	140X100X63	38.4Kb	8000	16	12	4-channel transistors 8-channel relays	5A 1A	24V 220V	6/3K default 6/60K optional	4/100K			Optional	Optional	Optional
WS3U-32MR-K-B	140X100X63	38.4Kb	8000	16	16	Relay	5A	24V 220V	6/3K default 6/60K optional	None			Optional	Optional	Optional
WS3U-32MT-K-B	140X100X63	38.4Kb	8000	16	16	Relay	5A	24V 220V	6/3K default 6/60K optional	8/100K			Optional	Optional	Optional
WS3U-32MRT-K-B	140X100X63	38.4Kb	8000	16	16	8-channel transistors 12-channel relays	1A	24V 220V	6/3K default 6/60K optional	8/100K			Optional	Optional	Optional

Fig2-1

The analog input can be configured to use either 2-channel PT100 or 2-channel K-type thermocouple temperature sensors.(For other temperature measurement types, please contact us for customization)

The temperature ranges for the two measurement methods are as follows:

PT100 temperature measurement range: -50 to 450°C

Temperature measurement accuracy: ±1°C (±0.2%FS)

K-type thermometer temperature range: -60 to 840°C

Temperature measurement accuracy: ±1.5℃ (±0.2%FS), excluding cold junction compensation error.

Please refer to Chapter 3.11 on page sixteen for wiring methods.

1.3 Usage Environment and Installation Method

- To prevent overheating inside the machine, install it on a wall. Ensure there is sufficient space above and below for heat dissipation.
- Maintain a clearance of at least 50 mm between the PLC unit and other equipment or structures. Keep it as far away as possible from high-voltage lines, high-voltage equipment, and power equipment.
- Avoid dusty, oily, or corrosive environments; take precautions against static electricity (avoid direct contact with circuit board traces).
- Secure the unit using rubber mounting posts. Optional mounting on enclosure rails is available.

Chapter2 Product display

2.1 Product Main Hardware Specifications

WS3U-14MRT-K-B

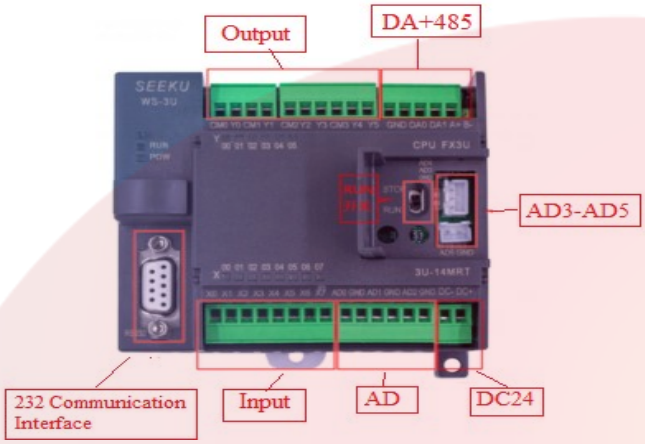


Fig2-2

WS3U-28MR-K-B

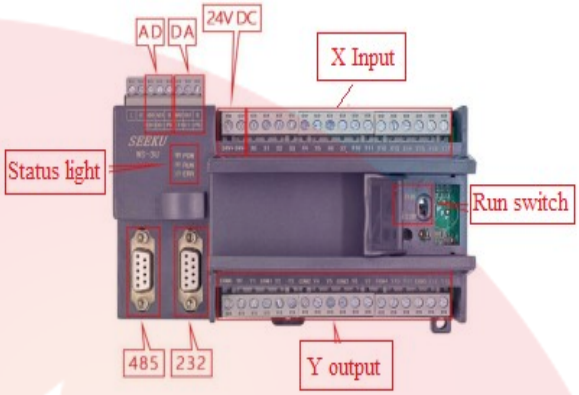


Fig2-3

2.2 Product front view

WS3U-14MRT-K-B

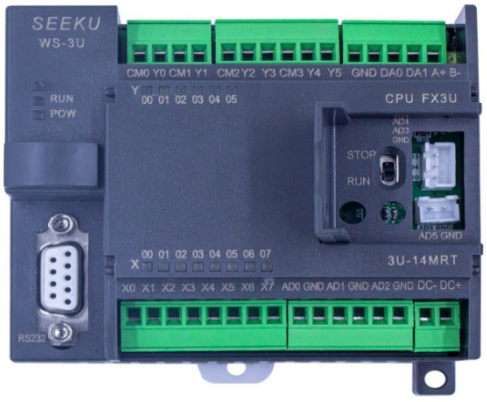


Fig2-4

WS3U-20MRT-K-B

Fig2-5

WS3U-28MRT-K-B

Fig2-6

WS3U-32MRT-K-B

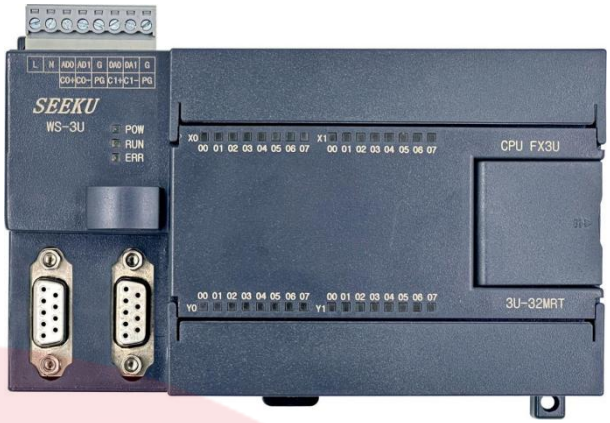


Fig2-7

Chapter3 Electrical Design Reference

3.1Power Supply and Power Consumption

Powered by 24 V DC;

Quiescent current: 20 mA when all output relays are off;

An additional 8 mA is drawn for each relay activated; for example, when all output relays of the 3U-14mr are activated, the current is 70 mA (1.44 W).

Note: Use a switching power supply with low ripple. If the circuit is subject to strong interference, be sure to use an appropriate filter.

3.2 Description of the 232 Communication Port

a.By default, it comes with a set of 232 interfaces, which are used for program downloads or human-machine interface communication.

Communication Interface Definition

2————TXD（Transmit Data）

3————RXD（receive data）

5————GND （Signal ground）

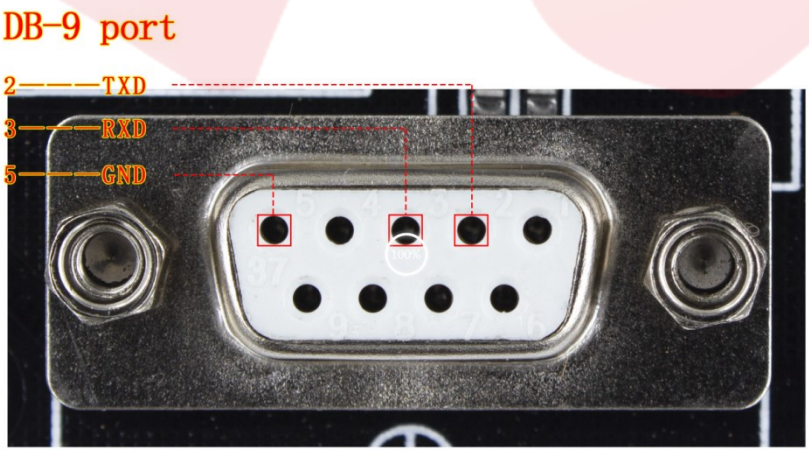


Fig 3－1 Nine-Stitch Port Definition

b. Connecting to the HMI touchscreen:

Connect the PLC’s TXD (transmit) to the touchscreen’s RXD (receive);

Connect the PLC's RXD (receive) to the touchscreen's TXD (transmit);

Connect the PLC's GND (signal ground) to the touchscreen's GND (signal ground).

c. Configure the touchscreen settings (baud rate 38400, Data bits: 7, Parity: Even, Stop bits: 1)

d. For touchscreens that require rewiring, first ensure that the touchscreen's serial port RXD, TXD, and GND are connected according to the communication interface specifications.

e. The D-type communication port is an RS232 port that supports the WS PLC programming protocol. It enables program download (using a 9-pin serial cable or a USB-to-serial adapter) and supports text-based and touchscreen interfaces.

3.3 Description of 485 Communication Port

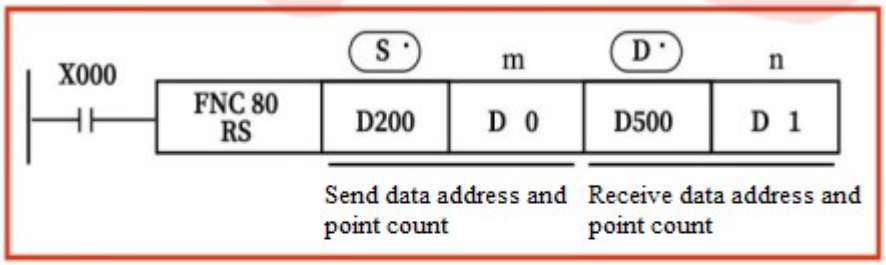
Serial data transmission：

Special Register	Instruction	Special Relay	Instruction
RS485 communication port			
D8120	Definition of RS485 Communication Format	M8121	Set when sending data and reset automatically after completion
D8121	RS485 Communication Station Number Configuration	M8122	Send a request: When the M8122 is activated, data transmission begins as soon as an idle communication port becomes available, and the system automatically resets upon initiation of transmission.
D8122	Remaining data for transmission	M8123	The data reception completion flag is automatically set upon receiving a frame of data. Users should reset this flag after data reception.
		M8124	Set during data reception, reset after data reception
M8129: Communication timeout flag. When the master sends a command and the slave fails to respond within the D8129 time limit, M8129 is set.			

The corresponding communication parameters for D8120 and D8126 are as follows:

Item	Name	Content	
		0 (bit OFF)	1（bit ON）
B0	Data length	7-bit	8 -bit
B1 B2	parity bit	b2 b1 (0,0) No parity (0,1): ODD (1,1): Even parity EVEN	
B3	stop bit	1-bit	2-bit
B4 B5 B6 B7	transfer rate bps	b7 b6 b5 b4 b7 b6 b5 b4 {0, 0, 1, 1}: 300 {0, 1, 1, 1}: 4800 {0, 1, 0, 0}: 600 {1, 0, 0, 0}: 9600 {0, 1, 0, 1}: 1200 {1, 0, 0, 1}: 19200 {0, 1, 1, 0}: 2400 {1, 0, 1, 0}: 38400	
B8	start symbol	None	Have（D8124）
B9	Terminal symbol	None	Have（D8125）
B10 B11	Do not use		
B12 B13 B14 B15	communication protocol	B15 b14 b13 b12 {0, 0, 0, 0}: Mitsubishi FX2N protocol (Slave) {0, 1, 0, 0}: MODBUS RTU (Slave) {1, 0, 0, 0}: MODBUS RTU (Master, IVRD, IVWR commands) {1, 1, 0, 0}: Free communication (RS command, using CCD parity)	

When the M8120 is reset and RS is executed, the parameters provided are for the RS485 port; when the M8120 is set and RS is executed, the parameters are for the RS232 port.



● The data transmission format can be configured using the special data register D8120, as described below. However, changes to the D8120 settings are not actually applied while the RS instruction is active.

● In systems that do not transmit data, set the number of data transmission points to "K0." Similarly, in systems that do not receive data, set the number of reception points to "K0."

Fig3-2

CCD instruction：

The n-point data starting from the element specified by S has its sum of bits stored with CRC check data in D. The sum is then placed in D+2 and D+3. In this example, the data and its checksum are stored in D0, while the CRC check is stored in D2 and D3.

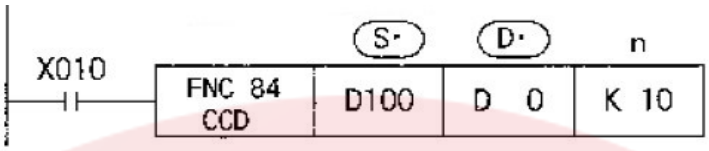


Fig3-3

3.4 Communicating with frequency converters or instruments:

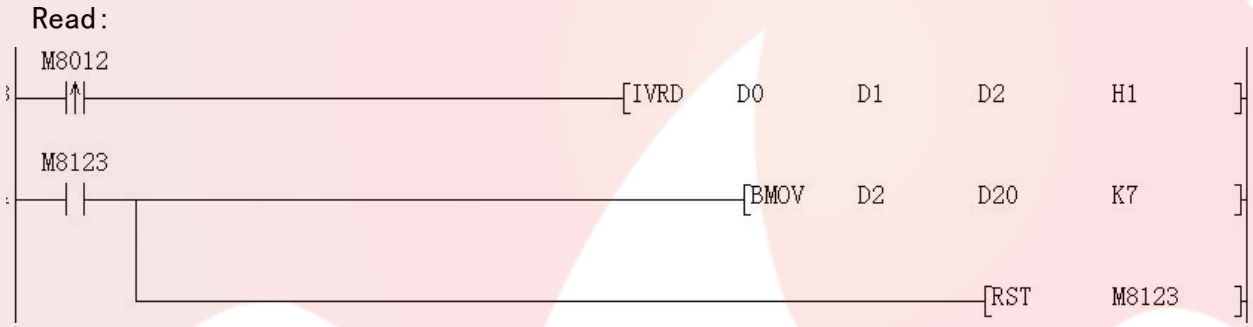


Fig3-4

D0 represents the read station number (high 8 bits) and command code (low 8 bits). For example, if D0 equals H103, it indicates Station 1 and Command 3. D1 specifies the data address to be read, while D2 denotes the starting address of data returned by frequency converters or instruments. Upon data reception (e.g., from Channel 0), the M8123 module activates its bit. H1 indicates the high 8-bit channel, with the low 8 bits specifying the read count. One data unit is read through Channel 0 (485 channel). If H101 is selected, one data unit is read via Channel 1 (RS232 channel).

Write in：

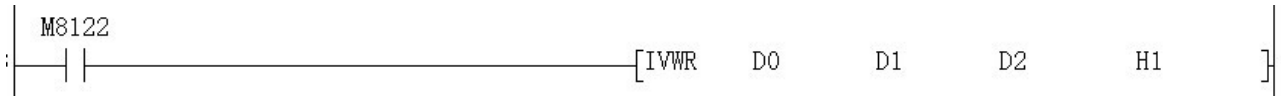


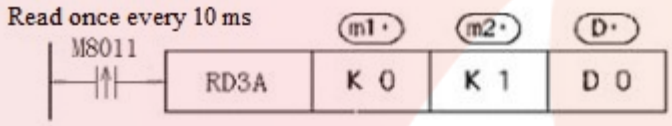
Fig3-5

D0 represents the written station number (high 8 bits) and command code (low 8 bits). For example, if D0 equals H106, it indicates Station 1 and activates Single Data Write Command 6. D1 specifies the target data address, while D2 defines the starting address for writing frequency conversion or instrument data. The high 8 bits of H1 represent the channel, and the low 8 bits indicate the write count. Data is written through Channel 0 (485 channel), with one data unit transmitted. If H101 is selected, the data is written via Channel 1 (RS232 channel). Upon completion, the M8122 module automatically resets.

3.5 Host with analog input/output specifications:

1、Analog read instruction:

AD0, AD1, and AD2 are 0-10V analog input channels, while AD3, AD4, and AD5 are 0-20mA analog input channels. The corresponding values range from 0 to 4095 for both 0-10V and 0-20mA inputs.



● Command for reading analog input values from an analog module.

m1: Module number; set to K0 on the host

m2: Analog input channel number
K0–K5 (corresponding to AI1–6)

D: Save the instantaneous data value to D0
Saves the value read from the analog module.

Fig3-6

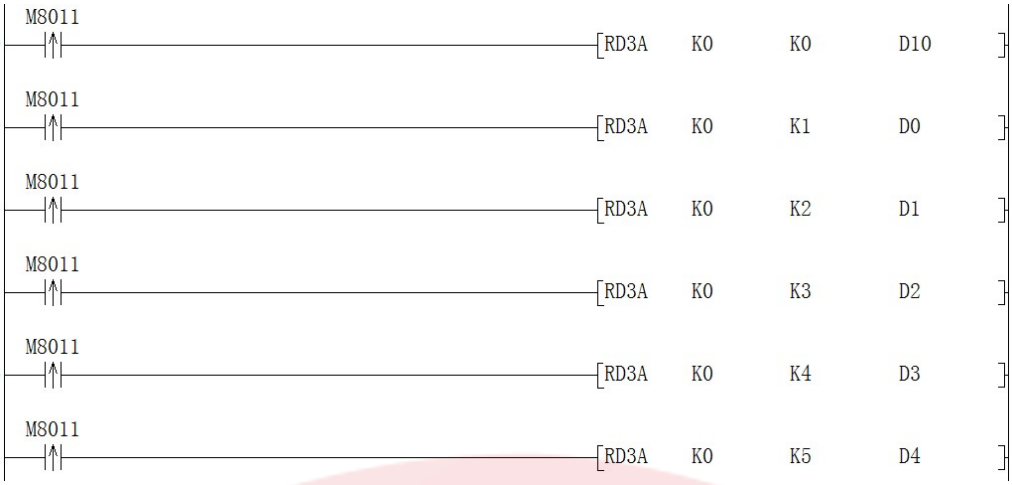
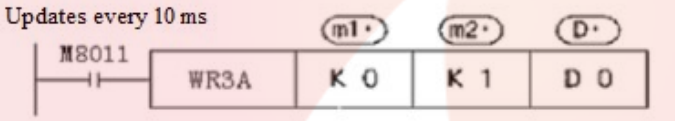


Fig3-7 Example of an analog input program

2、Analog output instruction：

DA0 and DA1 provide 0–10 V analog outputs, corresponding to values ranging from 0 to 4095.



● Command for writing digital values to an analog module

m1: Module number; set to 0 on the host

m2: Analog output channel number K0-K1

D: Data to be written; specifies the value to be written to the analog module (0-4095)

Fig3-8

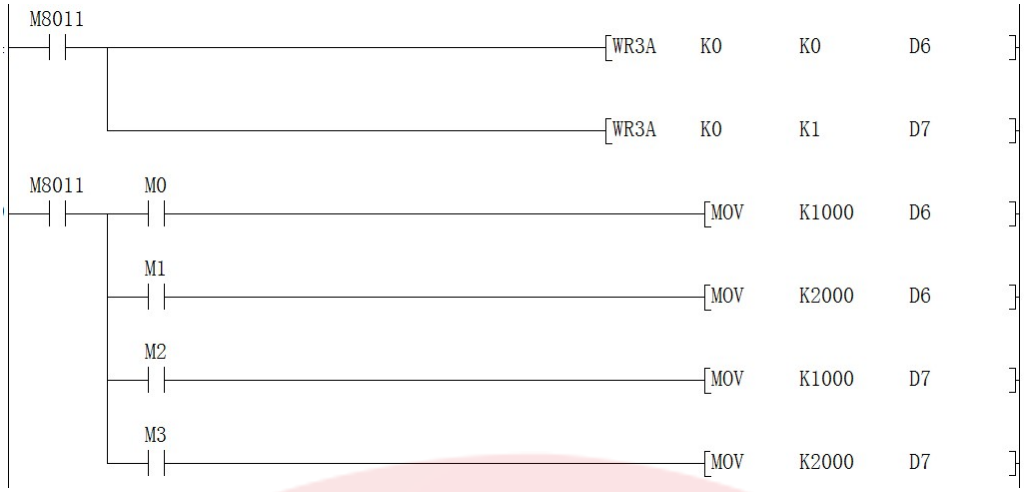


Fig3-9 Example of Analog Output Program

3.6 Clock module description:

When setting the clock, the M8015 must be set; to resume operation, reset the M8015. D8018 represents the year, D8017 the month, D8016 the day, D8019 the week, D8015 the hour, D8014 the minute, and D8013 the second. Clock data can be read into general registers using the Clock Data Read (TRD) instruction, or the clock can be modified using the Clock Write (TWR) instruction—this instruction does not require setting the M8015.

3.7 PID Operation Instruction Description:

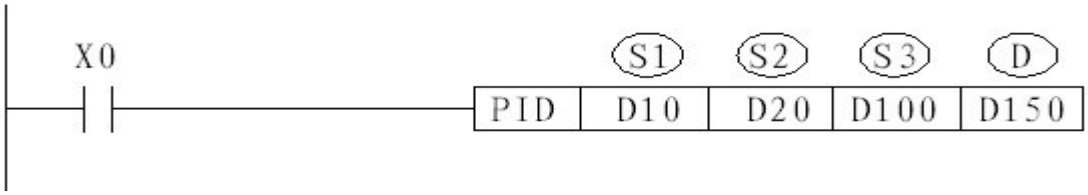


Fig3-10

This instruction is used for the PID calculation program in PID control. S1: Set target value; S2:

Current value (feedback value); S3: PID control parameters, occupying the first 9 consecutive D registers starting from S3. S3 is the PID channel number; S3+1 is the proportional coefficient KP; S3+2 is the integral coefficient KI; S3+3 is the derivative coefficient KD; S3+4 is the error coefficient KE, with PID processing initiated only when the error exceeds this value; S3+5 is the output upper limit PMAX; S3+6 is the output lower limit PMIN; S3+7 is a backup register; S3+8 is a backup register; D: Control value output.

3.8 High-speed counting

The SPD instruction (supporting X0-5) enables the encoder to generate 720 pulses at 2x frequency multiplication and 1440 pulses at 4x frequency multiplication when a single encoder cycle contains 360 pulses, thereby enhancing the encoder's resolution.

Countinput	Single-phase counter number	Upward and downward counting	Countinput	Single-phase 2-frequency counter	Upward and downward counting direction switch
X0	C235	M8235	X0	C241	M8241
X1	C236	M8236	X1	C242	M8242
X2	C237	M8237	X2	C243	M8243
X3	C238	M8238	X3	C244	M8244
X4	C239	M8239	X4	C245	M8245
X5	C240	M8240	X5	C246	M8246

Countinput	Biphasic 2-fold frequency counter number	Upward/Downward Counting Direction	Countinput	Biphasic 4-frequency counter	Upward/Downward Counting Direction
X0（Phase A）	C250	M8250	X0（Phase A）	C253	M8253
X1（Phase B）			X1（Phase B）		
X2（Phase A）	C251	M8251	X2（Phase A）	C254	M8254
X3（Phase B）			X3（Phase B）		
X4（Phase A）	C252	M8252	X4（Phase A）	C255	M8255
X5（Phase B）			X5（Phase B）		

The counters C247 (X0, X1), C248 (X2, X3), and C249 (X6, X7) are non-duplexed bi-phase counters.

3.9High-speed Pulse Output and Pulse Width Modulation

Supports 8-channel pulse outputs Y0–Y7 (PLSY, PLSV, PLSR, DRVA, DRVI) or 6-channel pulse width modulation (PWM) outputs Y0–Y5, operating at a frequency of 100 kHz.

Pulse	Output pulse count	Output tag	Pulse inhibit	Minimum output frequency	Acceleration and deceleration	DSZR DVIT Direction	DVIT interrupt input X address 0-17	Origin Regression Speed	Original Origin Regression Walking Speed	ZRN crawling pulse count
Y0	D8132	M8147	M8141	D8144	D8145	M8080	D8080	D8220	D8090	D8072
Y1	D8134	M8148	M8142	D8146	D8147	M8081	D8081	D8221	D8091	D8073
Y2	D8136	M8149	M8143	D8148	D8149	M8082	D8082	D8222	D8092	D8074
Y3	D8138	M8150	M8144	D8150	D8151	M8083	D8083	D8223	D8093	D8075
Y4	D8140	M8151	M8145	D8152	D8153	M8084	D8084	D8224	D8094	D8076
Y5	D8142	M8152	M8146	D8154	D8155	M8085	D8085	D8225	D8095	D8077
Y6	D8166	M8153	M8155	D8156	D8157	M8086	D8086	D8226	D8096	D8078
Y7	D8168	M8154	M8156	D8158	D8159	M8087	D8087	D8227	D8097	D8079

3.10 Interrupt Description

1. External interrupts support X0–X5, with interrupt numbers listed in the table below:

	Rising edge	Trailing edge	Interrupt inhibit
X0	I0	I1	M8050
X1	I100	I101	M8051
X2	I200	I201	M8052
X3	I300	I301	M8053
X4	I400	I401	M8054
X5	I500	I501	M8055

2. The timer interrupt pointer is I600, and the interrupt disable is M8056. The interrupt time range is I601 (1 ms) to I699 (99 ms).

3、Counter Interrupt Pointer

Pointer number	Interrupt inhibit
I10	M8059
I20	
I30	
I40	
I50	
I60	

3.11 Product Wiring Diagram

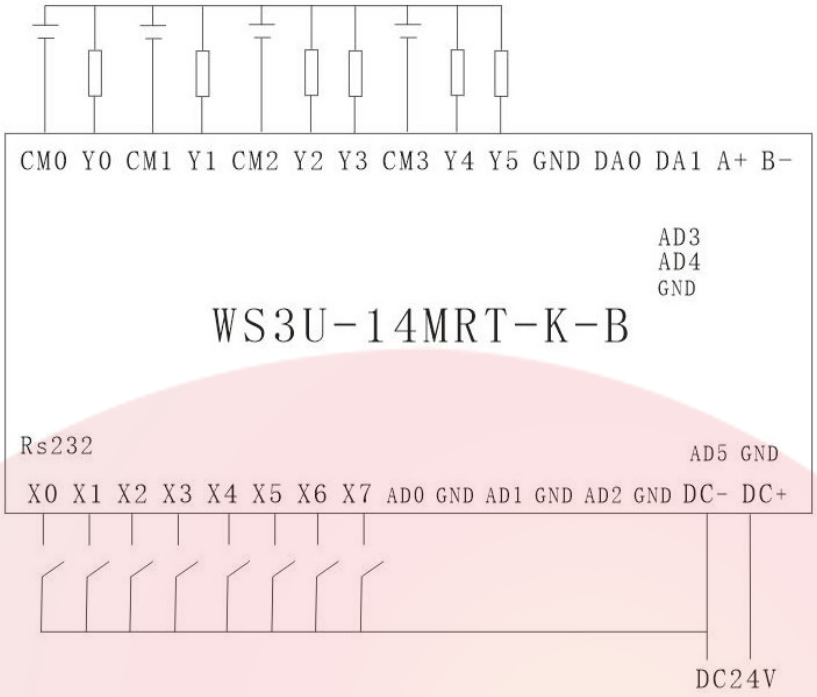


Fig3-11

When selecting the PT100 or Type K thermocouple temperature measurement function, the wiring instructions for the AD terminals are as shown in the figure below.

(Applicable to WS3U-14MR/MT-K-B and WS3U-14MRT-K-B)

AD0 corresponds to P0+ and K0+, and GND corresponds to P0- and K0-.

AD1 corresponds to PG and NC; GND corresponds to P1+ and K1+.

AD2 corresponds to P1- and K1-; GND corresponds to PG and NC.

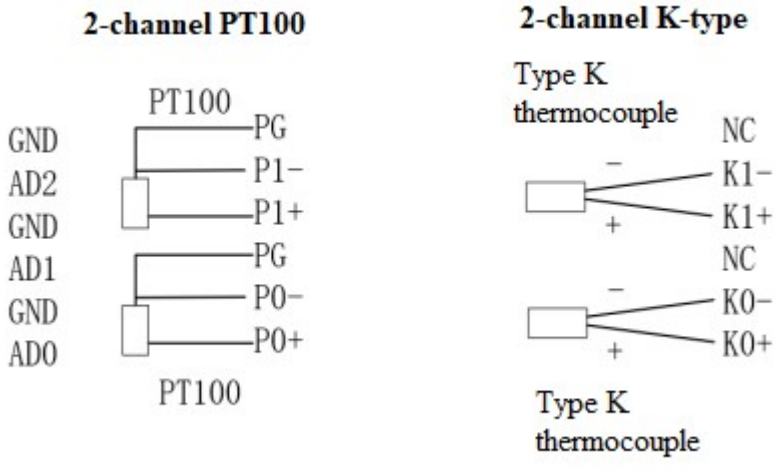


Fig3-12

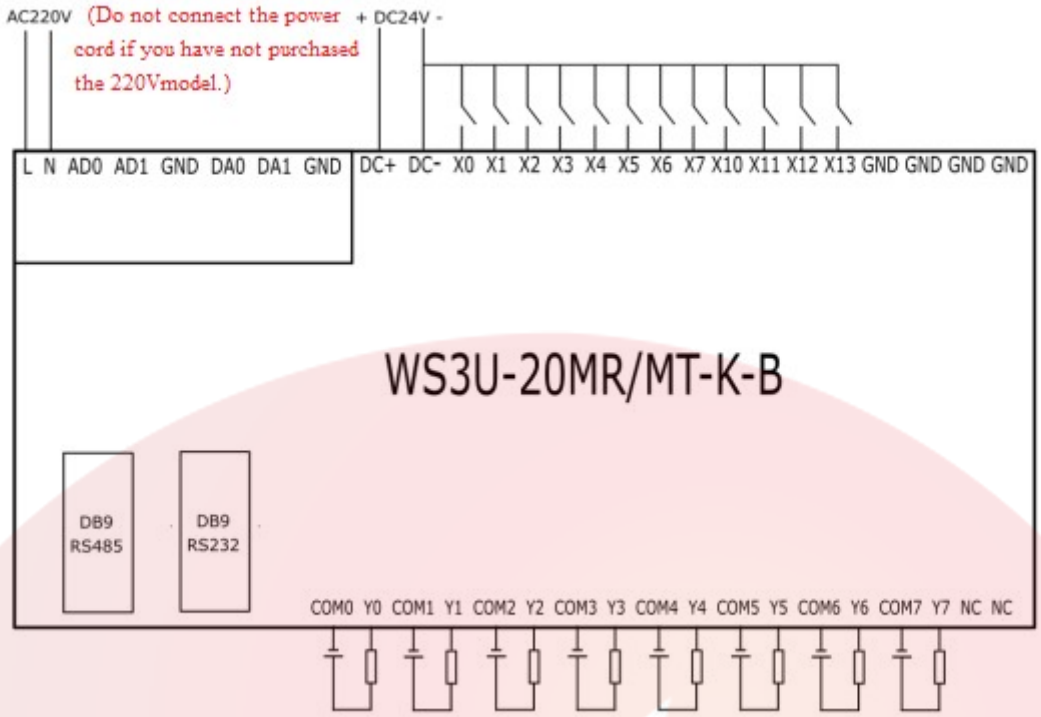


Fig3-13

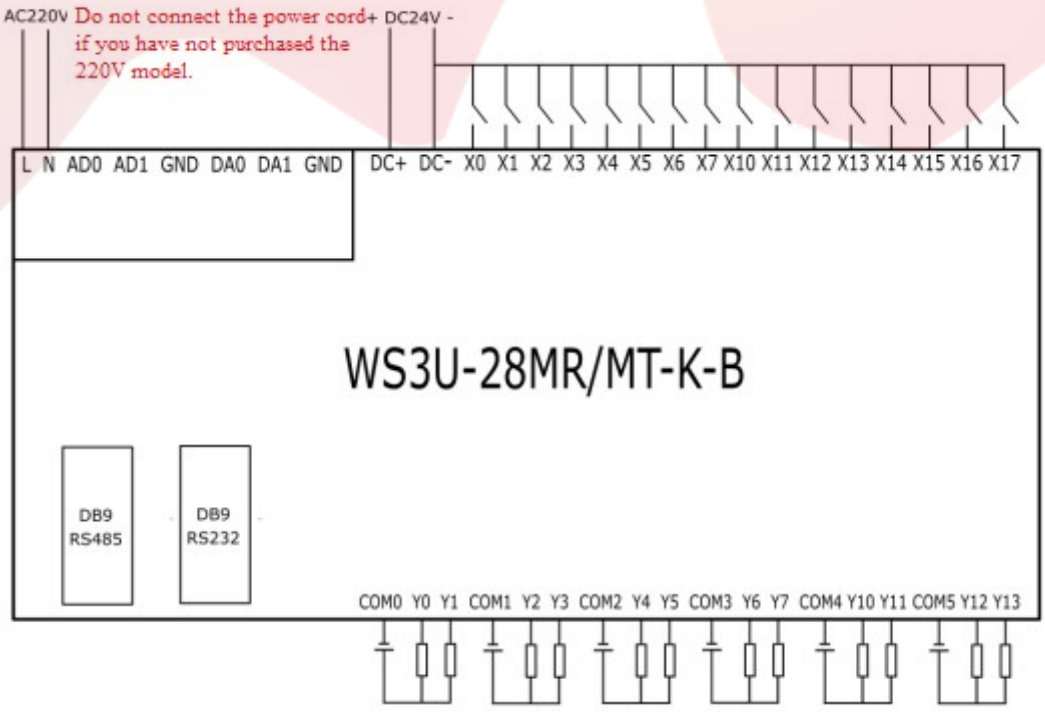


Fig3-14

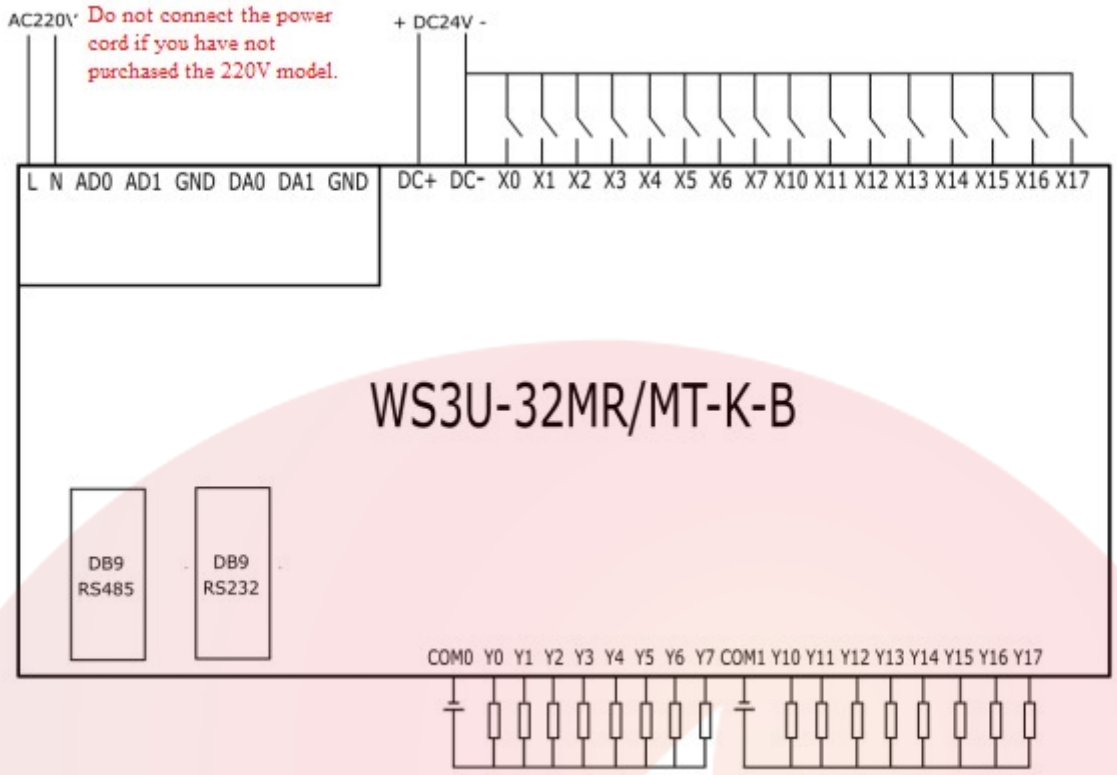


Fig3-15

When selecting the PT100 or Type K thermocouple temperature measurement function, the wiring instructions for the AD terminals are as shown in the figure below.

(Applicable to WS3U-20MR/MT-K-B, WS3U-20MRT-K-B

WS3U-28MR/MT-K-B, WS3U-28MRT-K-B

WS3U-32MR/MT-K-B, WS3U-32MRT-K-B)

AD0 corresponds to P0+ and K0+, AD1 corresponds to P0- and K0-, and GND corresponds to PG and NC.

DA0 corresponds to P1+ and K1+, DA1 corresponds to P1- and K1-, and GND corresponds to PG and NC.

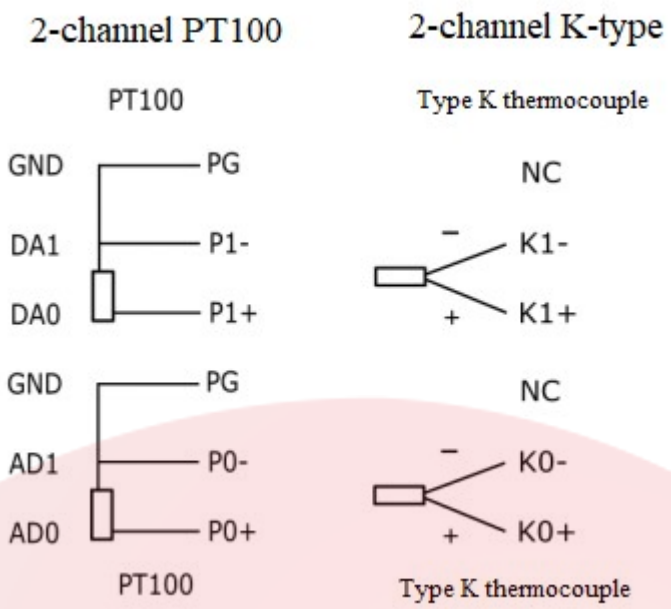


Fig3-16

Chapter4 Programming Reference

4.1 Application environment

1. GX Developer (compatible with XP and 32-bit Windows 7 systems)
2. GX Works2 (compatible with 64-bit Windows 7, Windows 8, and Windows 10 systems)

4.2 Soft Component Function Overview

Table 4-1 Functional Summary of Soft Components

Auxiliary relay M	M0-M3071 (with M500-M1023 supporting power loss preservation range)
Step point S	S0-1023 (where S500-S1023 denotes the power loss preservation range)
100ms timer	T0-T199 (where T184-T199 represents the cumulative power loss range)
10ms Timer	T200-T249 (where T246-T249 represents the cumulative power loss range)
1Ms Timer	T250-T383 (where T250-T255 represents the cumulative power failure range)
16-bit counter	C0-C199 (where C100-C195 are the supported power loss recovery ranges)

32-bit counter	C200-C234 (with C220-C234 supporting power loss recovery range)
32-bit high-speed counter	C235-255 and C235-240 are single-phase counters without frequency doubling; C241-240 is a single-phase counter with 2x frequency doubling; C247-249 is a two-phase counter without frequency doubling; C250-252 is a two-phase counter with 2x frequency doubling; C253-255 is a two-phase counter with 4x frequency doubling.
Register D	D0-D7999 (where D200-D7999 supports power loss recovery range)
Indirectly addressed pointers V and Z	V0-7，Z0-7
P subroutine jump number	P0-63
Interrupt	X0-5 External interrupt. Timer interrupt (1MS units). Counter interrupt.
Special M Element	The M8000 operates with continuous operation mode, the M8002 uses power-on pulses, the M8011 delivers 10ms pulses, the M8012 provides 100ms pulses, the M8013 generates 1-second pulses, and the M8014 outputs 1-minute pulses.

4.3 Basic Instructions

Table 4-2 Basic Instructions

No.	Mnemonic	Function
1	LD	The operation starts with Normally Open Contact
2	LDI	The operation starts with Normally Closed Contact
3	LDP	Rising edge detecting with operation beginning.
4	LDF	Falling edge detecting with operation beginning.
5	AND	Normally Open Contact in series
6	ANI	Normally Closed Contact in series
7	ANDP	Rising edge detecting in Series connection
8	ANDF	Falling edge detecting in Series connection
9	OR	Normally Open Contact in parallel
10	ORI	Normally Closed Contact in parallel

No.	Mnemonic	Function
17	RST	Releasing coil action holding
18	PLS	Coil rising edge output
19	PLF	Coil falling edge output
20	ALT	Alternate output
21	MC	Common string contact with coil command
22	MCR	the command of releasing common contact
23	MPS	Operation storage
24	MRD	Storage reading
25	MPP	Storage reading and resetting
26	INV	Negation of operation result

11	ORP	Rising edge detecting in parallel connection
12	ORF	Falling edge detecting in parallel connection
13	ANB	Circuit blocks are connected in series.
14	ORB	Circuit blocks are connected parallel
15	OUT	Coil output driving
16	SET	Coil action holding

27	END	The end of program
28	STL	Step ladder start
29	RET	The end of step ladder
	CALL	Subroutine call
	SRET	Subroutine return

4.4 Application instruction

Table 4-3 Application Instructions

Sort	No.	Mnemonic	Function
Program flow	1	CJ	Conditional Jump
	2	CALL	Subroutine call
	3	SRET	Subroutine Return
	4	FEND	End of main program
	5	FOR	Loop Range start
	6	NEXT	Loop Range end
Transmission and comparison	7	CMP	Comparison
	8	ZCP	Regional comparison
	9	MOV	Transmission
	10	CML	Reverse transmission
	11	BMOV	Simultaneous transmission
	12	FMOV	multicast
	13	XCH	Exchange
	14	BCD	BCD conversion
	15	BIN	BIN conversion
Four logical operations	16	ADD	BIN Addition
	17	SUB	BIN Subtraction
	18	MUL	BIN Multiplication
	19	DIV	BIN Division
	20	INC	BIN Add 1
	21	DEC	BIN Minus 1
	22	WAND	Logical word and
	23	WPR	Logical word or
	24	WXOR	Logical Exclusive OR
	25	NEG	Complement code

Cyclic shift	26	ROR	Ring shift right
	27	ROL	Ring shift left
	28	RCR	Right shift
	29	RCL	Left shift
	30	SFTL	Bit left shift
	31	SFTR	Bit Shift Right
Bit data processing	32	ZRST	Batch Reset
	33	MEAN	Average
	34	FLT	BIN integer→Binary floating-point conversion
	35	GRY	BIN integer→Gray Code Conversion
	36	GBIN	Gray code →BIN integer
High Speed Processing	37	DHSCS	High Speed Comparison setting
	38	DHSCR	High Speed Comparison Resetting
	39	SPD	Pulse density and pulse width (pulse interval time) can also be measured.
	40	PLSY	Pulse Output
	41	PLSV	Pulse output with direction control
	42	PWM	Pulse Width Modulation, 0-32767us
	43	PLSR	Pulse output with acceleration and deceleration
	44	DRVA	Absolute position control
	45	DRVI	Relative position control
	46	ABSD	Cam Control (Absolute Mode)
Peripheral equipment	47	RS	Serial data transfer
	48	ASCI	HEX - ASCII conversion
	49	HEX	ASCII - HEX conversion
	50	CCD	Check code
	51	CRC	CRC operation
	52	PID	PID operation
	53	SEGD	BCD to 7-segment code digital tube
Floating point arithmetic	54	ECMP	The comparison of binary floating point number
	55	EZCP	Interval comparison of binary floating point number
	56	EBIN	The conversion between decimal floating point number and binary floating point number
	57	EADD	Addition of binary floating point number
	58	ESUB	Subtraction of binary floating point number
	59	EMUL	Multiplication of binary floating point number
	60	EDIV	Division of binary floating point number
	61	INT	Conversion between binary floating point number and BIN integer
	62	SIN	Operation of floating point number SIN
	63	TAN	Operation of floating point number TAN

	64	COS	Operation of floating point number COS
	65	ASIN	Operation of floating point number SIN-1
	66	ATAN	Operation of floating point number TAN-1
	67	ACOS	Operation of floating point number COS-1
	68	EXP	Exponent arithmetic of binary floating point number
	69	LOGE	Natural Logarithm Operation of Binary Floating Point Number
	70	LOGE10	Common Logarithmic Operation of Binary Floating Point Numbers
	71	SWAP	Conversion between Up and down byte
Convenience command	72	SER	Data lookup
	73	ALT	Alternating output
	74	RAMP	Ramp signal
	75	BON	ON bit Decision
	76	SUM	ON bits
	77	ANS	Alarm set
	78	ANR	Alarm Reset
	79	HOUR	Chronograph
	80	TRD	Clock data reading
	81	TWR	Clock data writing
Contact comparison	82	LD=	（S1=(S2)
	83	LD>	(S1)>(S2)
	84	LD<	(S1)<(S2)
	85	LD◇	(S1)≠(S2)
	86	LD≦	(S1)≤(S2)
	87	LD≧	(S1)≥（S2）
	88	AND=	（S1=(S2)
	89	AND>	(S1)>(S2)
	90	AND<	(S1)<(S2)
	91	AND◇	(S1)≠(S2)
	92	AND≦	(S1)≤(S2)
	93	AND≧	(S1)≥（S2）
	94	OR=	（S1=(S2)
	95	OR>	(S1)>(S2)
	96	OR<	(S1)<(S2)
	97	OR◇	(S1)≠(S2)
	98	OR≦	(S1)≤(S2)
	99	OR≧	(S1)≥（S2）

Note: Supports 32-bit instructions and pulse-execution instructions

4.5 Directive lists are not supported in this release

No.	Mnemonic	Function
1	ZRN	Regression Through the Origin, only 16-bit command supported
2	DSZR	Regression Through the Origin with DOG search
3	DVIT	Interrupt positioning

Chapter5 Common Issues and Solutions

No.	Questions/Problem	Solutions
1	Wiring method of Analog	The negative electrode to GND. The positive electrode to AD port.
2	Analog reading	Please refer to the section 3.5
3	Encryption	On the condition of communication confirmed: 1,Turn the switch to STOP, and the running light will flash 2, Click and write "keyword" 3, Set the same 8-digit number twice, and then turn the switch back to the original position.
4	RS232 Cable sequence	The sequence : 2-2 3-3 5-5
5	PLC power consumption	Please refer to the section 3.1
6	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.
7	Wiring method	All input ports are NPN input, negative conduction.

Chapter6 Warranty Clause

6.1 Warranty period: 12 months

The product comes with a one-year warranty from the date of shipment. During the warranty period, our company provides free repair services for the product.

6.2 Not covered by warranty

- Improper wiring, such as reversing the positive and negative terminals of the power supply
- Use outside the specified voltage range or environmental requirements
- Unauthorized modification of internal components