

Chapter III General Description of Function Block

SR series adopt the programming methods by the use of function blocks. In total 8 general function blocks, 14 special function blocks and 8 input & output function blocks are configured. And each block can achieve a specific control function independently, e.g. TOND, TOFD, SBPL, SBPL, SCHD, etc. As several blocks are linked up in a specific way relatively complicated control functions can be realized. Programming with function blocks is simpler and better appreciated than the conventional PLC instruction programming.

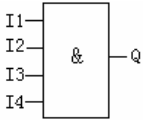
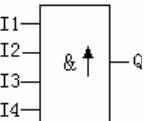
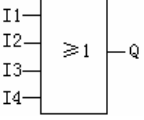
The following types of operator for FAB function blocks are available for options:

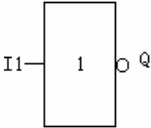
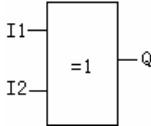
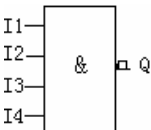
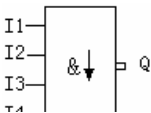
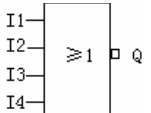
1. Options of input ports: IA0~IA7, IB0~IB5 (input ports of 22-point machine), IC0~IC7, ID0~ID3 (input ports of extension module 1), IE0~IE7, IF0~IF3 (input ports of extension module 2), IG0~IG7, IH0~IH3 (input ports of extension module 3), II0~II7, IJ0~IJ3 (input ports of extension module 4), IK0~IK7, IL0~IL3 (input ports of extension module 5), M00—M99, N00—N99 (intermediate relay), V00~V99 (virtual keys), HI (high potential status), LO (low potential status), X (no input connection), telephone two-tone pulse: P00--P99.
2. Options of output ports: QA0~QA7 (output ports of the machine), QC0~QC7 (output ports of extension module 1), QE0~QE7 (output ports of extension module 2), QG0~QG7 (output ports of extension module 3), QI0~QI7 (output ports of extension module 4), QK0~QK7 (output ports of extension module 5), M00—M99, N00—N99 (intermediate relay)

3.1 General Function Blocks (GF)

There are 8 general function blocks in total as listed in the following table:

Table 1: General Function Blocks

Line Diagram	SR Function Block	Function
Series connection Of NO contacts		AND
Series connection of NO contacts with RLO borderline test		AND (With RLO borderline test)
Parallel connection Of NO contacts		OR

Phase inverter		NOT
Dual communicator contact		XOR
Parallel connection Of NC contacts		NAND
Parallel connection of NC contacts with RLO borderline test		NAND (With RLO borderline test)
Series connection Of NC contacts		NOR

3.1.1 AND

Series connection of a certain of NO contacts in SR line diagram is as shown in follows:

In SR, the symbol of AND is number as shown in follows:



This function block is called as AND, because only when all of I1, I2, I3 and I4 are all in status 1, the status of Output Q will be 1 (i.e. the output is closed).

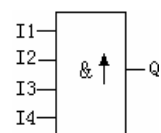
Logical frame of AND:

I1	I2	I3	I4	Q
0	0	0	0	0
0	0	0	1	0

0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

3.1.2 AND with RLO Borderline Test

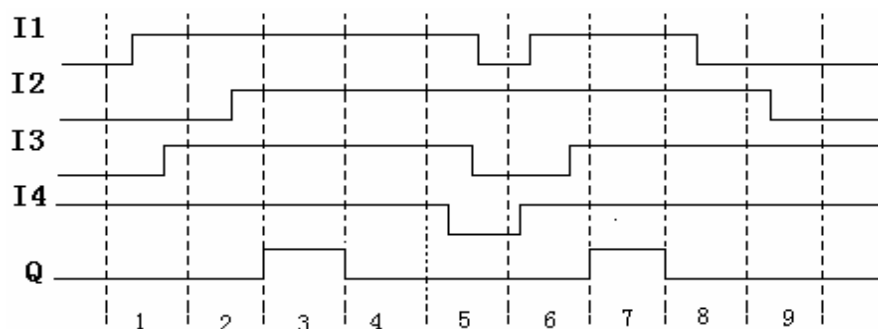
In SR, the symbol is as shown in follows:



Only when all the statuses of the inputs are 1 and at least the status of one input is 0 in the last period, the output status of AND with RLO borderline test is 1.

If the input line of this function block (X) is unconnected, then this input is X=1.

The time diagram of AND with RLO borderline test is as shown in follows:

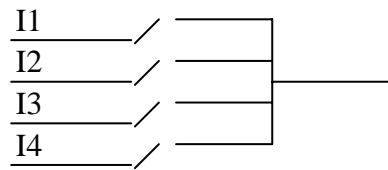


During the third period, all the statuses of the inputs are 1 and during the second period, the status of I2 is 0, so the status of the output is 1.

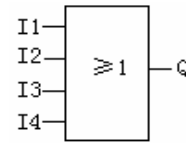
While during the fourth period, all the status of the inputs are 1 but during the third period, all the status of the inputs are 1, so the status of the output is 0.

3.1.3 OR

Parallel connection of a certain number of NC contacts is shown in the SR line follows:



In SR, the symbol of OR is as shown in follows: diagram as



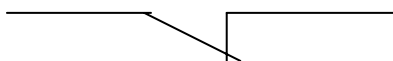
This function block is called as OR, because the status for at least one of the inputs I1, I2, I3 or I4 is 1 (i.e. closed), then output Q is 1.

Logic frame of OR:

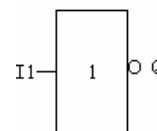
I1	I2	I3	I4	Q
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

3.1.4 NOT

The phase inverter is indicated in SR line diagram as follows:



The symbol of NOT is as shown in follows:



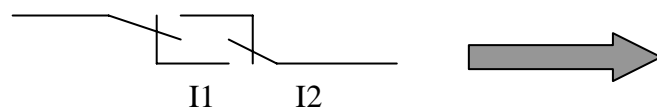
This function block is called as NOT, because if the input status is 0, then output Q is 1, and vice versa. In other words, NOT is the phase inverter for the input point.

Logic frame of NOT:

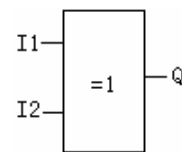
I1	Q
0	1
1	0

3.1.5 XOR

In SR line diagram, the two commutator contacts for XOR are connected in serial as follows:



In SR, the symbol of XOR is shown as follows:



When the statuses of all the inputs are not the same, the output status of XOR is 1.

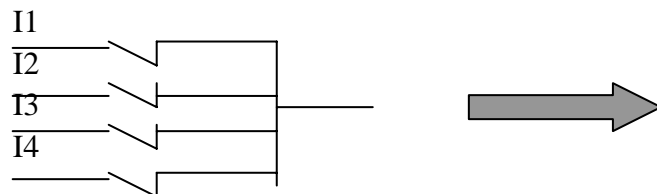
When the statuses of all the inputs are the same, the output status of XOR is 0.

Logic frame of XOR:

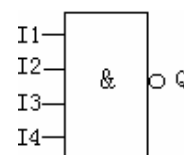
I1	I2	Q
0	0	0
0	1	1
1	0	1
1	1	0

3.1.6 NAND

Parallel connection of a certain number of NC contacts is shown in SR line diagram as follows:



The symbol of NAND is as shown in follows:

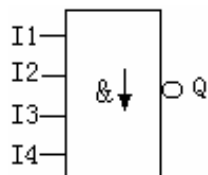


Logic frame of NAND:

I1	I2	I3	I4	Q
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

3.1.7 NAND with RLO Borderline Test

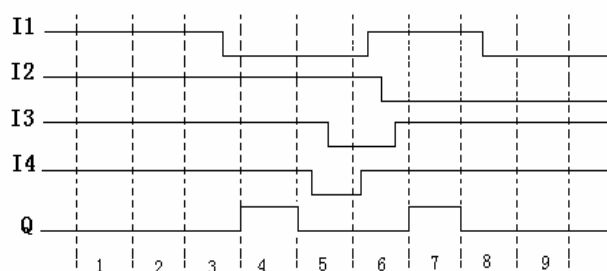
In SR, the symbol is as shown in follows:



Only when the status of at least one of the input is 0 and statuses of all the inputs in the last period are 1, the output status of this NAND with RLO borderline test is 1.

If one input line of this function block (X) is unconnected, then the status of this input is X=1.

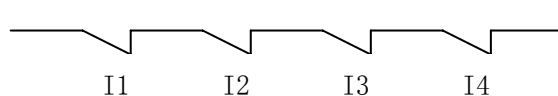
Time diagram of NAND with RLO borderline test is as shown in follows:



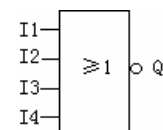
3.1.8 NOR

Serial connection of a certain NC contacts is shown in the line

Diagram as follows:



In SR, the symbol of NOR is as shown in follows:



In NOR function block, when the statuses of all the inputs are low potential (status 0), then the output is connected (status 1). If the status of any input is high potential (status 1), then the output is opened (status 0).

Logic frame of NOR:

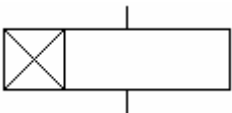
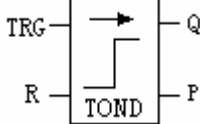
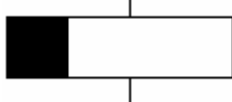
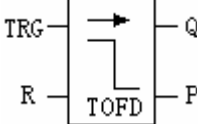
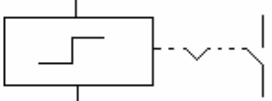
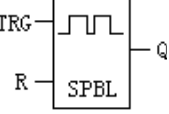
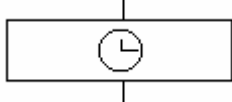
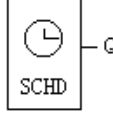
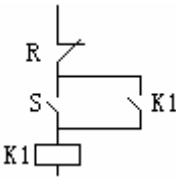
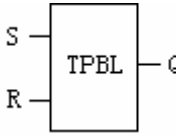
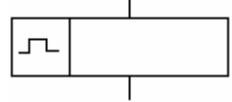
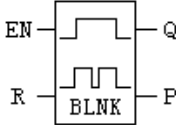
I1	I2	I3	I4	Q
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0

1 1 1 1 0

3.2 Special Function Block (SF)

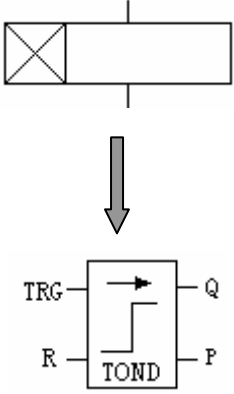
There are 14 special function blocks in total as list in the following table.

Table 2: Special Function Blocks

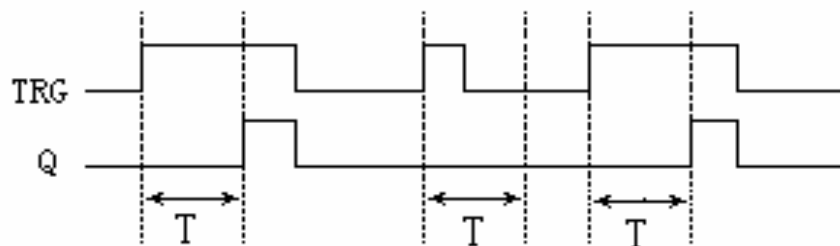
Function	Representation	Graphic
TOND		
TOFD		
SBPL		
SCHD		
TPBL		
BLNK		

MTOD		
UDCT		
PONS		
CMPR		
TSEQ		
SSEQ		
HOUR		
T/C-Comparator		

3.2.1 TOND

Line diagram/Symbol in SR	Pin	Description
	Input TRG	After TRG is triggered, the time delay timer starts timing. (If TRG stop triggering during the timing of timer, the timer will terminate the timing.)
	Parameter T	After time T, the output is on (the output signal changes from 0 to 1).
	Output Q	If there is still trigger signal, when time T is up, the output will be on.
	Output P	If the property pin of the output P is connected with the properties pin of the SLCD, the parameter of this function block will be transferred to HMI.

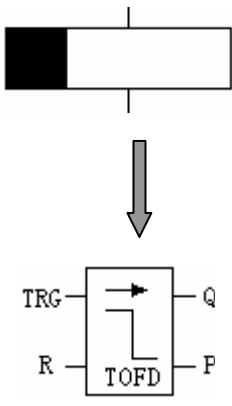
Time Sequence Frame:



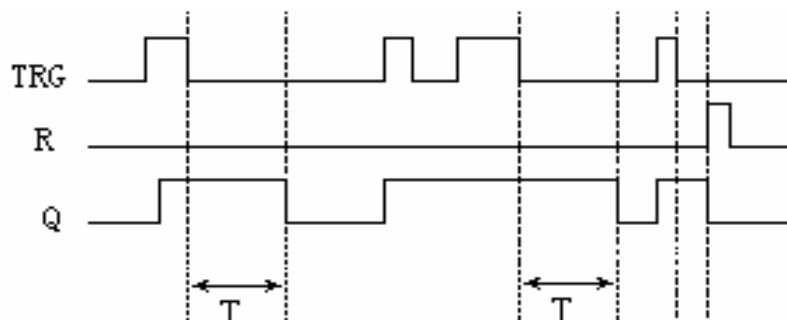
Function Description:

1. When the status of TRG changes from 0 to 1, the time delay timer starts timing. If TRG holds the status 1 for a sufficiently long time, the output will be changed to 1 after the time T has elapsed. There is a time delay between the input turning ON and the output turning ON, that why the TOND is so called.
2. If the status of TRG input changes into 0 before the fixed time, the timer will be reset.
3. When the status of TRG input is 0, then the reset status of the output is 0.
4. This function is applicable to override vibrations of switches, delayed start-up of motor, delayed turning-on of lights, etc.
5. The assignment range for T is 0.01-99.99, and the time units can be set respectively to hour (H), minute (M) and second (S). Its time accuracy can reach 0.5‰.

3.2.2 TOFD

Line diagram/ Symbol in SR	Pin	Description
	Input TRG	Turn on the timer of the time-delay off relay, when the input TRG (trigger) is at the descending edge (changing from 1 to 0).
	Input R	The timer of disconnecting time-delay relay is reset via R (Reset Input), and Output Q is set to 0. (R has higher priority to TRG.)
	Parameter T	The output is disconnected (the Q status is changed from 1 to 0), when the time T elapses.
	Output Q	Input TRG is activated then the output is turned on (Q=1) and is kept ON until it is reset when the set time T is up.
	Output P	If the property pin of the output P is connected with the properties pin of the SLCD, the parameter of this function block will be transferred to HMI.

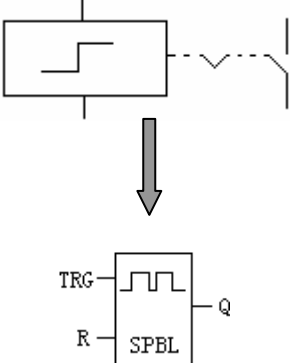
Time Sequence Frame:



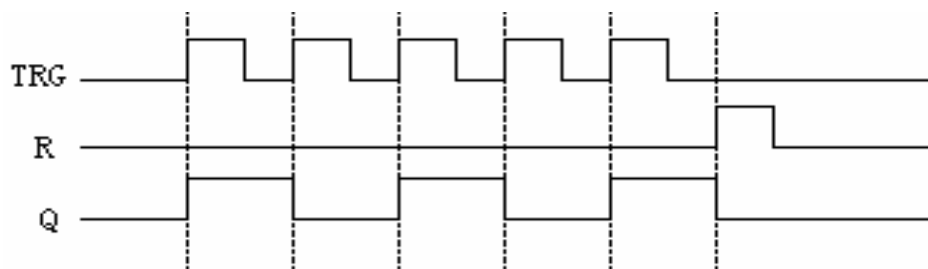
Function description:

1. When Input TRG is Status 1, Output Q is changed at once to Status 1. When Input TRG is changed from 1 to 0 (when the descending edge comes), the internal time delay timer of FAB is activated and Output Q is still remained in status 1. When the set time T is up, Output Q becomes 0 and the timer is reset 1.
2. If Input TRG changes from Status 1 to Status 0 again, the timer is activated again.
3. Before the set time T is up, the timer and output can be reset via R (Reset) input
4. This function is applicable to the lighting of staircase, the control of barriers in a car park, the control of a water throttling valve, etc.
5. The assignment range of T is 0.01-99.99, and the time units can be set respectively to hour (H), minute (M), second (S).
6. TRG and R terminals are treated as Status 0 if they are set as X..

3.2.3 SPBL

Line diagram/ Symbol in SR	Pin	Description
	Input TRG	Trigger input (TRG) makes the output ON and OFF.
	Input R	The output Q is reset via R (Reset Input). (Q=0, R has a higher priority to TRG.)
	Output Q	Every time TRG changes from 0 to 1, the status of Q will be changed (i.e. from Status 0 to Status 1 or vice versa).

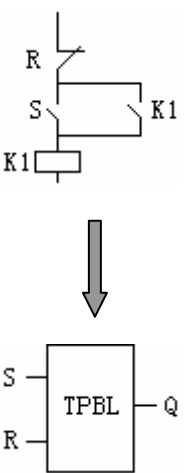
Time Sequence Frame:



Function Description:

1. Every time the trigger input TRG changes from Status 0 to Status 1, the status of Output Q will change accordingly (The status of Q will be reversed).
2. Reset Q to Status 0 via Input R.
3. After the power is ON or OFF, the pulse relay is reset and Output Q changes to 0.
4. If the status of TRG is being Status 1 from the start, it can be regarded as the descending edge from the start.
5. TRG and R terminals are treated as Status 0 if they are set as X.
6. This function is applicable to the lighting of staircase, the control of barriers in a car park, the control of a water throttling valve, etc.

3.2.4 TPBL

Line diagram/ Symbol in SR	Pin	Description
	Input S	Make the Output Q be Status 1 via Input S (Position).
	Input R	The Output Q is reset to 0 via R (Reset Input). If S and R are both Status 1, Output Q is 0. (R has a higher priority.)
	Output Q	When S is the Input, Q is connected and remained. It will be reset till R inputs the position.

Switch Features:

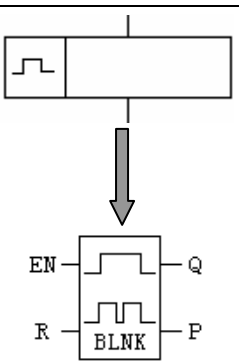
RS Relay is a simple trigger with two values. The output value is decided by the input status and the original output status. The following table can explain the logic relationship between them:

S	R	Q	Remarks
0	0		The status remain the original value.
0	1	0	Reset
1	0	1	Position
1	1	0	Reset (Reset has a higher priority to Position.)

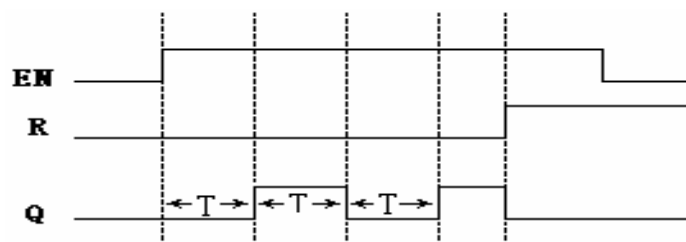
Explanation:

TRG and R terminals are treated as Status 0 if they are set as X.

3.2.5 BLNK

Line diagram/ Symbol in SR	Pin	Description
	Input EN	Input (only be effective in high potential). Make the clock pulse generator connected or open via EN input.
	Input R	Make Output Q be 0 via Input R (Reset).
	Parameter T	Time parameter. T is the time length of output to be ON and OFF.
	Output Q	Every time EN changes from 0 to 1, the internal timer begins to time, and when Time T is up, the output is 1. If EN is held on 1, timing can be started again, and when Time T is up again, the output is 0. The cycle operation is continued in this way until EN is 0 and Output Q is 0. When R is 1, then the output Q is 0. And when R changes from 1 to 0 and EN is 1, all the initial status of Q changing from 0 to 1 will start its cycle.
	Output P	If the property pin of the output P is connected with the properties pin of the SLCD, the parameter of this function block will be transferred to HMI.

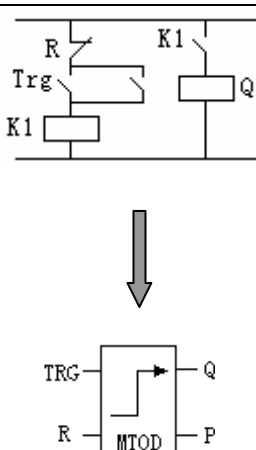
Time Sequence Frame:



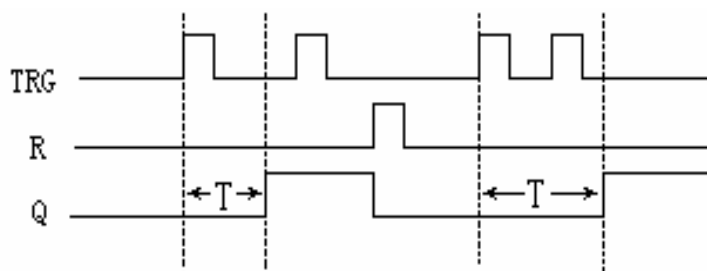
Function Description:

1. Use Parameter T to set ON/OFF time. The assignment range of T is 0.01-99.99 and the time units can be set respectively to hour (H), minute (M), second (S).
2. Input EN enables the clock pulse generator to work. Output Q of clock pulse generator will flip-flop the status every time the time T elapses, and cycle operation is continued in this way until Input En is 0. The clock pulse generator then stops operation and Output Q is 0.
3. EN and R terminals are treated as Status 0 if they are set as X.
4. This function is applicable to generate pulse automatically and to switch ON/OFF.

3.2.6 TMOD

Line diagram/ Symbol in SR	Pin	Description
	Input TRG	Timer for ON time delay is started via Input TRG (Trigger).
	Input R	Timer for ON time delay is reset to ON via Input R, and make Output Q be 0). (The priority of R is higher than that of TRG.)
	Parameter T	After TRG is triggered and the time T elapses, the output is On.
	Output Q	After time delay T elapses, the output is ON.
	Output P	If the property pin of the output P is connected with the properties pin of the SLCD, the parameter of this function block will be transferred to HMI.

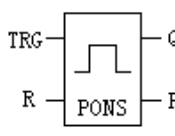
Time Sequence Frame:



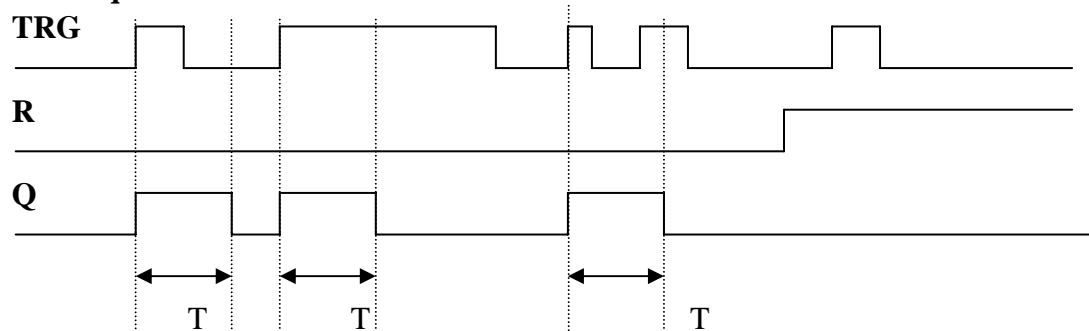
Function Description:

1. If the status of Input TRG changes from 0 to 1, the internal timer will be activated. When time T is up. Output Q becomes 1 and then the input TRG coming again has no effect on output Q. Only when Input R becomes 1 again Output Q and Timer T will be reset to 0.
2. TRG and R terminals are treated as Status 0 if they are set as X.
3. This function is applicable to the locations where the time-delay ON and hold ON status are required.
4. The assignment range for T is 0.01-99.99, and the time units can be set respectively to hour (H), minute (M), second (S). Its time accuracy can reach 0.5%.

3.2.7 PONS

Line diagram/ Symbol in SR	Pin	Description
	Input TRG	Input TRG activated the single-pulse time and relay. When the descending edge is coming, it will output a pulse with the width of T.
	Input R	Reset Single-pulse time relay. When R is 1, the Output Q changes to 0.
	Parameter T	The assignment range of pulse width is 0.01-99.99.
	Output Q	Every time TRG changes from 0 to 1, the Q outputs a pulse with the width of T.

Time Sequence Frame:



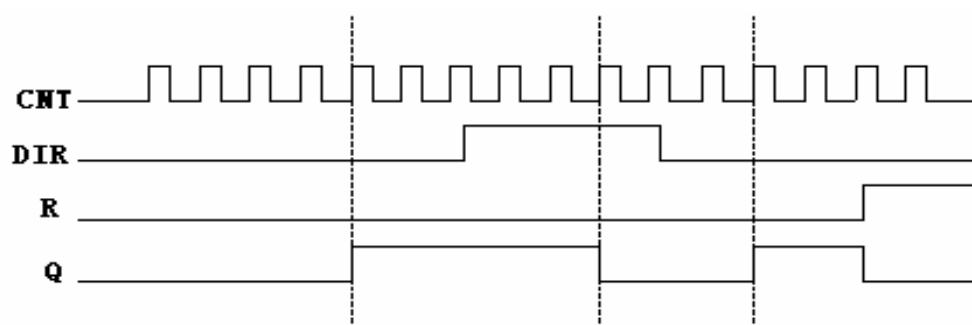
Function Description:

1. When Q is 1, TRG pulse has no effect on Output Q.
2. TRG and R terminals are treated as Status 0 if they are set as X.
3. This function is applicable to change the pulse width.

3.2.8 UDCT

Line diagram/ Symbol in SR	Pin	Description
	Input R	Internal counter value and the output are reset via R (Reset). R has a priority to CTN.
	Input CNT	When CNT (Counter) is inputting, the counter just counts the change from Status 0 to Status 1 and doesn't count the change from Status 1 to Status 0.
	Input DIR	Appoint the direction of the counter via DIR (Direction) DIR=0; Adding Counting DIR=1; Minus Counting
	Parameter PAR	When the internal counter value is larger than or equal to PAR, the Output Q is 1. When the internal counter value is less than PAR, the Output Q is 0. The assignment range of the counting value is 0-999999.
	Output Q	When the counting value is arriving, the Output is on.
	Output P	If the property pin of the output P is connected with the properties pin of the SLCD, the parameter of this function block will be transferred to HMI.

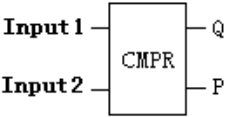
Time Sequence Frame When PAR=5:



Function Description:

1. TRG and R terminals are treated as Status 0 if they are set as X.
2. Every time on Input CNT's descending edge, the internal counter adds 1 (DIR=0) or minus 1 (DIR=1). If the internal counter is larger than or equal to Parameter PAR, Output Q is set to 1. Reset can be used to reset the internal counter to 0. If R=1, Output Q is 1.
3. The internal counter and the output terminal can be reset when the Input R is 1. If R is 1, the Output Q will be 0 and it will count the Input CNT.

3.2.9 CMPR

Line diagram/ Symbol in SR	Pin	Description
 <p>Comparison Function can be selected as: “<”, “>”, “<=”, “>=”, “!=”, “=”</p>	Input 1	Analog Input 1, can be selected as: the value calculated from the analog input IA through the math formula, or the preset analog value.
	Input 2	Analog Input 2, can be selected as: the value calculated from the analog input IA through the math formula, or the preset analog value.
	Output Q	If the comparing condition between Input 1 and Input 2 is YES, Q will be 1, and otherwise Q will be 0.
	Output P	If the property pin of the output P is connected with the properties pin of the SLCD, the parameter of this function block will be transferred to HMI.

Function Description:

Only SR-12MRDC, SR-12MTDC, SR-12MGDC, SR-22MRDC, SR-22MTDC, SR-22MGDC types have this function.

This function is used in the analogue input instructions.

Instruction of CMPR


The value of the analog input (IA), which the CMPR compares, is valued out through math formula and is not the actual input voltage value. And the math formula is $A \cdot IA + B$.

Actually the value of A and B don't need for you to calculate by pen. We have put the math formula into SR-WRT and the free software SUPER CAD. You only need to connect the sensor to the related analog input (IA) then the value of A and B will be written into SR machine according to the related methods.

Here we explain the method in SUPER CAD:

Connect the SR main machine and your PC via SR-CP. Power on the SR main machine and open the SUPER CAD software. Then select [Set Analog Parameters] in [Option] to select the two values of the linear relationship as in Fig. 3.2 and Fig. 3.3. (If the sensor tests the 0°C first and then tests a 50°C. Through these two times test, it will get the value of A and B. And then put the value of A and B into the main machine.)

Please refer to the details of SR-WRT for the methods how to set the value of A and B in SR-WRT.

 **Notes:** The value of A and B of each analog pin need to be set separately.

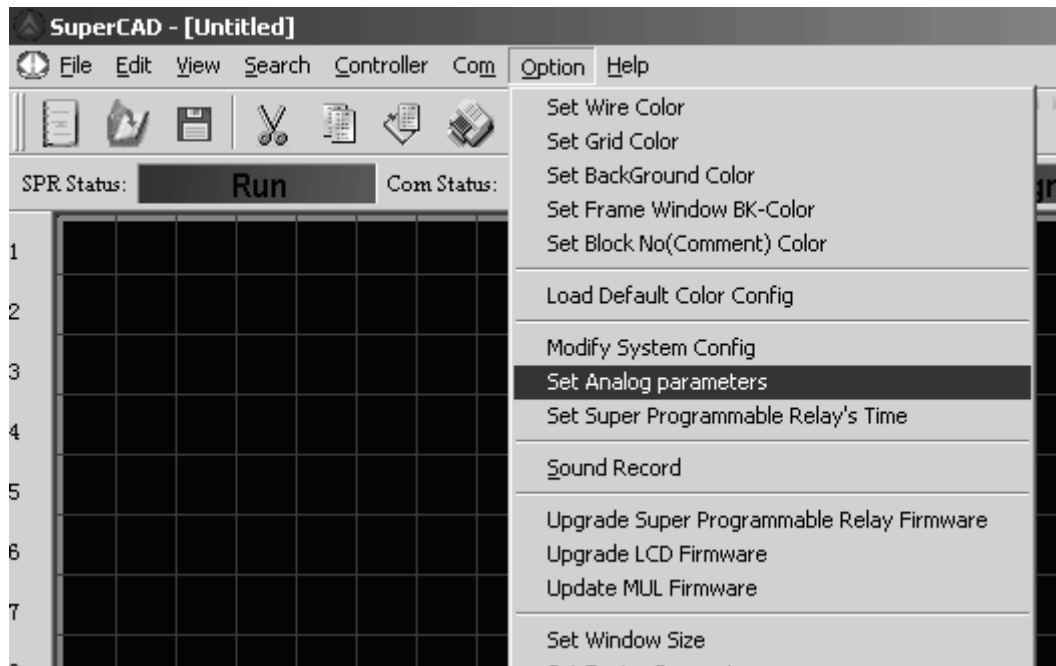


Fig. 3.1

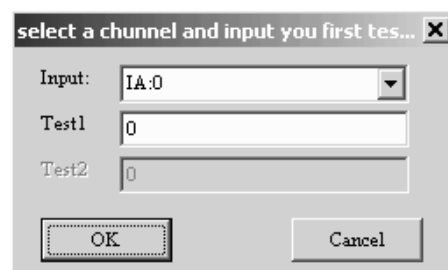


Fig. 3.2

Operation procedures are as the next page.

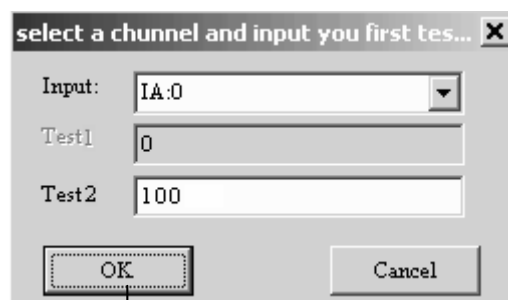


Fig. 3.3

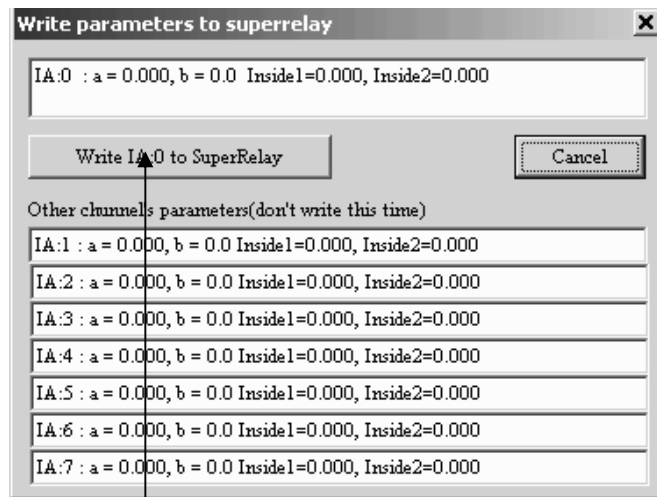


Fig. 3.4

Here it will calculate the value of A and B. And Click here, it will write the value of A and B of the IA0 pint into SR main machine.

CMPR will compare the calculated value of the input 1 and input 2. When the comparison function is selected as “<”, it means the calculated value of input 1 is smaller than that of input 2 and the output is high. Otherwise it will be low.

And the value of input 1 or input 2 can be select as the fix value, and the other is connected to the pin of the analog input. Thus CMPR will compare this fix value and the calculated value of the analog pin.

Example 1: Comparing the calculated value of input 1 and input 2.

Input 1 is connected to IA0;

Input 2 is connected to IA1;

Output is connected to QA1;

CMPR function is selected as “<=”

Then If the calculated value of IA0 is <= that of IA1, QA1 will become 1. Otherwise QA1 will become 0.

Example 2: Comparing the calculated value of the analog input with the fix value.

Input 1 is connected to IA01;

Input 2 is empty. And then select the property dialogue frame of Input 2 and put in the fix value;

Output is connected to QA0;

CMPR function is selected as “<=”.

Then if the calculated value of IA0 is <= to the fix value, QA1 will become 1. Otherwise QA1 will become 0.

3.2.10 T/C-CMPR

Line diagram/ Symbol in SR Function	Pin	Description
-------------------------------------	-----	-------------

<div> <div> <div>Input 1</div> <div>Input 2</div> </div> <div> <div>T/C</div> <div>CMPR</div> </div> <div>Q</div> </div> <p>Comparison Function can be selected as: “<”, “>”, “<=”, “>=”, “!=”, “=”</p>	Input 1	Analog Input 1, can be selected as: the value calculated from the analog input IA through the math formula, or the preset analog value.
	Input 2	Analog Input 2, can be selected as: the value calculated from the analog input IA through the math formula, or the preset analog value.
	Output Q	If the comparing condition between Input 1 and Input 2 is YES, Q will be 1, and otherwise Q will be 0.

Function Description:

This function block can compare the value of timer or counter. And the compared time range is 0.01~99.99 (Unit: hour, minute, second). And the counter range is 1~999999.

The type of the two connected inputs of this function block must be the same. If Input 1 is TSEQ function block, Input 2 must be TSEQ function block too. And if Input 1 is UDCT function block, then Input 2 must be UDCT function block too.

In the following we will explain the applications of this function block by examples.

Example 1: Comparing the length of two timers

Logic Relationship is as follows:

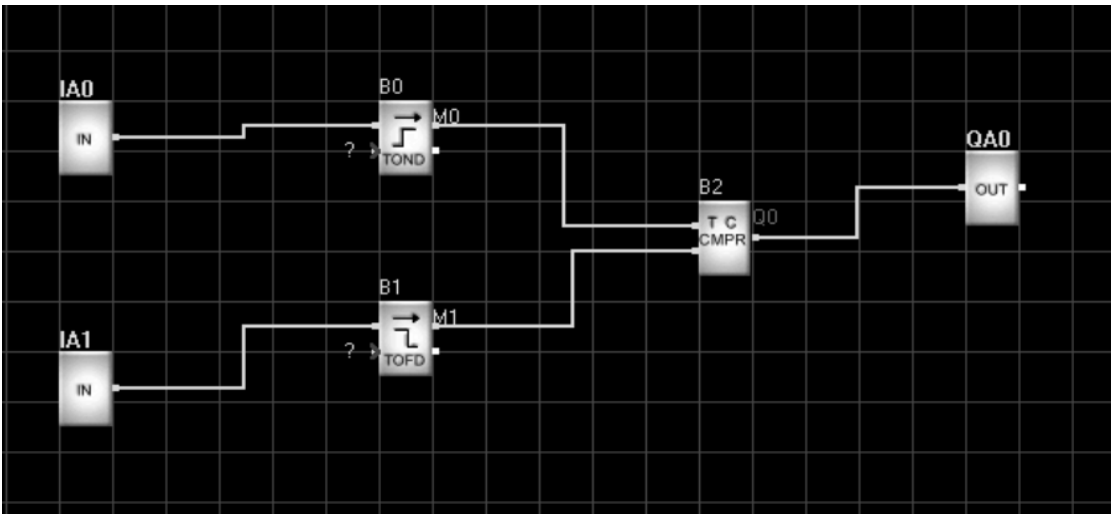


Fig. 3.5

Function relationship is selected as “>”;
Then when the time of B0 is > the time of B1, QA1 is 1. Otherwise it will be 0.

Example 2: Comparing the times of two counters

Logic Relationship is as follows:

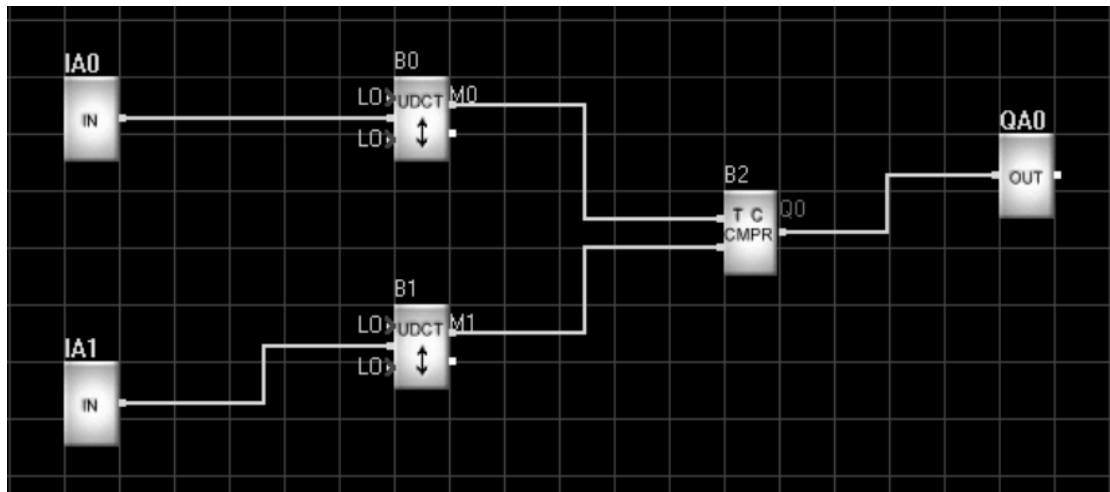


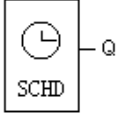
Fig. 3.6

Function relationship is selected as “>”;

Then when the number of B0 is > the number of B1, QA1 is 1. Otherwise it will be 0.

3.2.11 SCHD

SR has clock switches for 127 time intervals.

Line diagram/ Symbol in SR	Pin	Description
	Input ON	Set powering on time of the time switch and select the model of the time switch.
	Input OFF	Set powering off time of the time switch. The model of the time switch is the same as which of the powering on time.
	Output Q	Output of the SCHD. If one set time interval is connected, the output will be Status 1. Otherwise it is Status 0.

The SCHD instruction is a very powerful tool of time switch, and it has 5 formats for selection: yearly/ monthly/weekly/ daily/definite day.

Yearly means circle once a year; monthly means circle once a month;

Weekly means circle once a week; daily means circle everyday;

Definite day means execute this function on the definite day and without circle.

Some key points of SCHD:

1. In time switches, the set time should be according to the time schedule, such as (day style):

ON time: AM 8:00 of May.1 2003

OFF time: PM 5:00 of May.1 2003

ON time: AM 9:00 of Oct.01 2003

OFF time: PM 7:00 of Oct. 01 2003

Q1

The above of time sequence is correct, and the following is not correct:

ON time: AM 8:00 of May.02 2003

OFF time: AM 6:00 of May 01 2003

ON Time: PM 7:00 of Oct. 01 2003

OFF time: PM 3:00 of Oct. 01 2003

Q1

2. In the SCHD instruction, if you set ON time and OFF time, then the output will be ON

between the ON time and OFF time, the output will keep the previous status before the ON time, and will become OFF after the OFF time.

3. Regarding week style and day style, you can set ON time or OFF time. Its output will change as follows:

Preset Condition	Time	Output Status
Only ON Time Set	Before the ON Time	Keep the Previous Status
	At or After the ON Time	ON
Only OFF Time Set	Before the OFF Time	Keep the Previous Status
	At or After the OFF Time	OFF

4. Whichever function you selected of the Clock switch, you should list the time as the time sequence of the same day. For example:

Day style:

AM 8:00 May 1 2003 ON
 AM 12:00 May 01 2003 OFF
 PM 1:00 May 01 2003 ON
 PM 5:00 May 01 2003 OFF

This order is correct

Monthly style:

10:00 AM of Each June 01 ON
 11:00 AM of each June 01 OFF
 8:00 AM of each June 01 ON
 9:00 AM of each June 01 OFF

This order is wrong, and the output will become OFF from 10:00 to 11:00

Week style:

Monday 9: 00 ON
 11: 00 OFF
 Monday 15: 00 ON
 18: 00 OFF

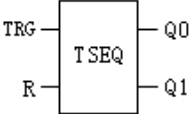
This order is correct

Monday 9: 00 ON
 11: 00 OFF
 Monday 6: 30 ON
 8: 30 OFF

This order is wrong, and the output will be OFF from 9:00 to 11:00

Note : This phenomenon is called last instruction priority proposal.

3.2.12 TSEQ (Time Sequence)

Line diagram/ Symbol in SR	Pin	Description
	TRG Input	There are totally 8 output points (Output 0-7) in the TSEQ function block. And the Output 0 retains the state ON and is not limited by the Input R. While other outputs (Output 1-7) will output the ON state in time sequence one by one and will be reset controlled by Input R. TRG is activated signal of this instruction.

	R Input	R is reset signal of this instruction, will let the output (Output 1-7) become 0.
	Q Output	Time sequence output, and it has 7 selectable outputs, it can offer 7 outputs statuses at the same time.

The function of the time sequence is as follows.

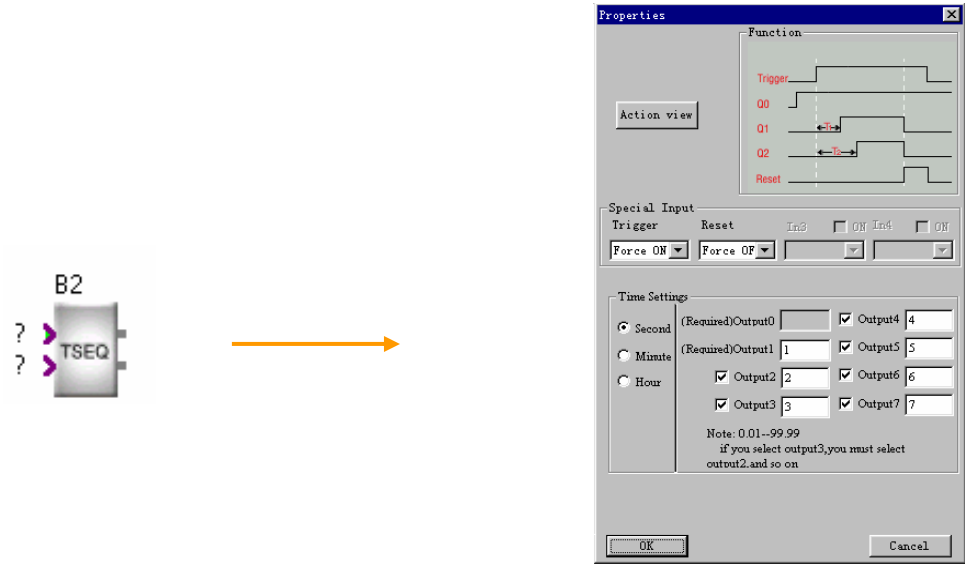


Fig. 3.7

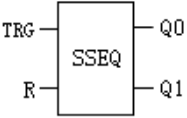
When you select a TSEQ instruction in the program and double click it, it will display as above figure. And at this time you can select the output points. If you select Output 3, Output 2 will be selected automatically, the same way for Output 4, Output 5.....Output 7. It means that if you select the behind one, then all the previous ones will be selected automatically. And you can set the ON time for this output after TRG being ON, and the time unit can be selected as second, minute, hour.

In above figure, when the TRG become 1, then 7 outputs will become 1 one by one. It means: First second, OUTPUT 1 become 1, then 2nd second, OUTPUT 2 will become 1, and so on, till the OUTPUT 7 become 1 in the 7th second, then it will stop. And the output loop will start again when there is a reset signal 1 was received on R.

⚠Note: The Output 0 will be in ON state all the time no matter the Input TRG is ON or OFF.

It is forbidden for the user to change.

3.2.13 SSEQ (Step Sequence)

Line diagram/ Symbol in SR	Pin	Description
	TRG Input	There are totally 8 output points (Output 0-7) in the SSEQ function block. Among them Output 1-7 will output the ON state in time sequence one by one. This function block is activated by TRG signal.
	R Input	Reset signal will let the outputs become OFF state.

	Q Output	There are 6 outputs can be selected, and this instruction can offer 6 status outputs (Output 2-7).
--	----------	--

The function of SSEQ is as follows:

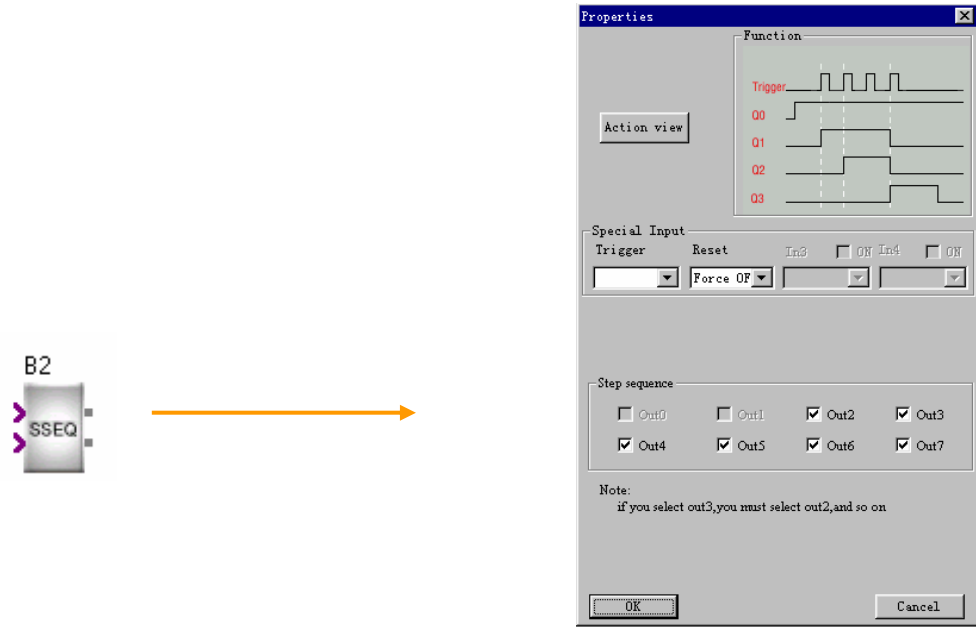


Fig. 3.8

When you select a SSEQ instruction in the program and double click it, it will display as above figure. At this time you can select the output points. If you select Output 3, output 2 will be selected automatically, the same way for output 4, output 5...output 8. It means that if you select the behind one, then the previous one will be selected automatically.

As shown in Fig. 3.8, every time when TRG has a pulse, it will make one output become 1. And when all the selected outputs are ON. The next TRG pulse will make all the selected output be OFF one by one in turn. But Output 0 will retain the ON state. Then the loop will start again.

⚠Note: The Output 0 and Output 1 is fixed and are forbidden to change by the users.

1.2.14 HOUR

Line diagram/ Symbol in SR	Pin	Description
	Input INC	When INC was activated, the system time will increase one hour automatically.
	DEC Input	When DEC was activated, the system time will decrease one hour automatically.

Function Description:

When there is a high potential on INC, the system time will increase one hour automatically, when there is a high potential on DEC, the system time will decrease one hour automatically.

1.2.15 Explanation to Property Pin (The property pin of TOND, TOFD, BLNK, MTOD, PONS, UDCT, CMPR function blocks)

There is an output pin defined as the property pin in the TOND, TOFD, BLNK, MTOD, PONS, UDCT, CMPR function blocks. And also one output pin of SLCD is also defined as the property pin.

Meanings of Property Pin:

Property pin can only be connected with other property pins. After connection, it will transfer the time/counter/analog and so on parameters the SLCD. When SR-HMI is used, it will display the parameters of the function block according to the relationship of the property pins.

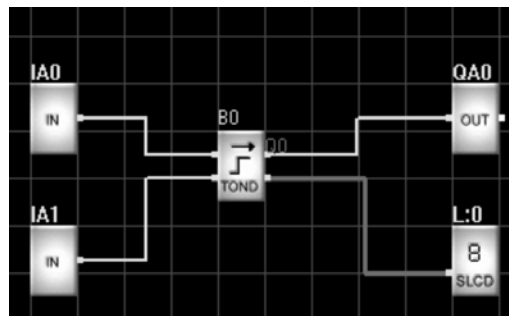


Fig. 3.9

As shown in Fig. 3.9, when HMI is turned to L:0 page, the set time of B0 and the current time will be displayed.

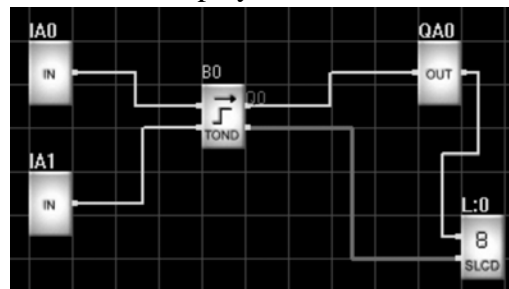


Fig. 3.10

As shown in Fig. 3.10, when the output pin of B0 is high, HMI will show L:0 page automatically and display the set time of B0 and the current time.

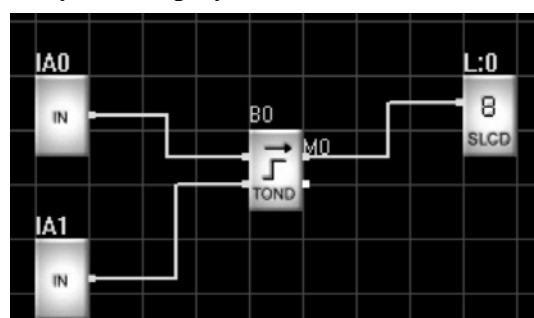


Fig. 3.11

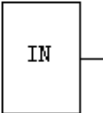
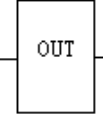
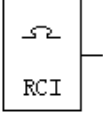
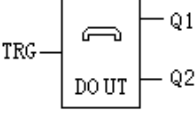
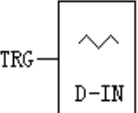
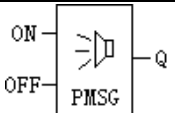
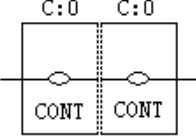

As shown in Fig. 3.11, coz' the property pin is shelled when SLCD is set. And the property pin of B0 is empty. And when the output pin of B0 is high, HMI will show L:0 page automatically. But it will not show the parameters of B0.

⚠Note: For more information about property pin, please refer to Chapter IV.

1.3 Input & Output Blocks

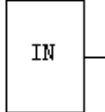
There are 8 Input & Output function blocks in total as list in the following table.

Table 2: Input & Output Function Blocks

Block	Graphic	Function
IN		One IN point is correspond to one input terminal of SR.
OUT		One OUT point is correspond to one output terminal of SR.
RCI		The function key of remote module.
DOUT		To dial the set telephone and then play the set message.
D-IN		The function block to dial the telephone and check the alarming message.
PMSG		To play the set message.
CONT		To program assistant. When wiring, the line connects the two points of the same code and different directions.
SLCD		To edit the HMI, each SLC has its correspondent HMI page.

3.3.1 IN

The symbol in SR is as follows:

Symbol in SR	Function	Explanation
	Input Pin	One IN point is correspond to one input terminal of SR.

Function Explanation & Icon:

One IN point is correspond to one input terminal of SR.

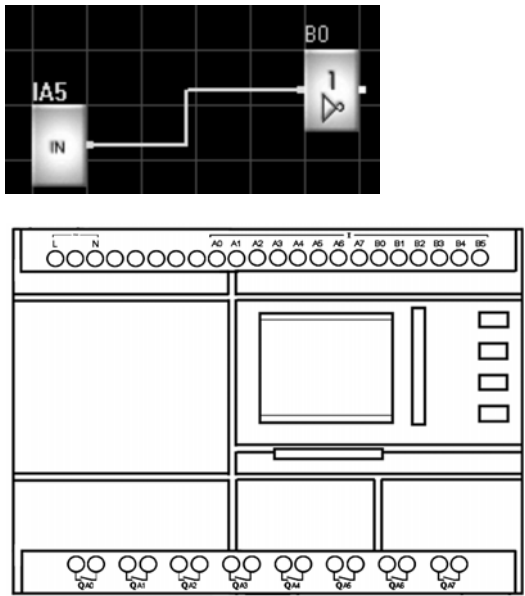
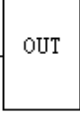


Fig. 3.12

3.3.2 OUT

The symbol in SR is as follows:

Symbol in SR	Function	Explanation
	Output Pin	One OUT point is correspond to one output terminal of SR.

Function Explanation & Icon:

One OUT point is correspond to one output terminal of SR.

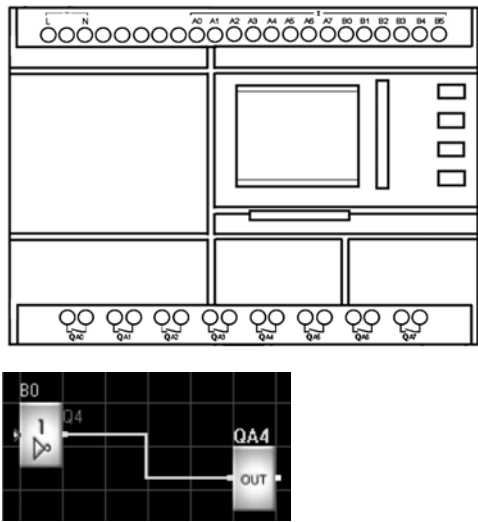
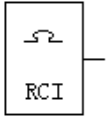


Fig. 3.13

3.3.3 RCI

The symbol in SR is as follows:

Symbol in SR	Function	Explanation
	Remote input pin	To select the input point of remote module and can be anyone of Y01, Y02, ... Y06. And one RCI remote input point is correspondent to one of Y01, Y02, ... Y06.

Function Explanation & Icon:

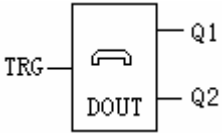
To select the input point of remote module and can be anyone of Y01, Y02, ... Y06. And one RCI remote input point is correspondent to one of Y01, Y02, ... Y06.

And the using methods are as follows:



Fig. 3.14

3.3.4 DOUT (Need to select SR-VPA/VPD to use together)

Line diagram/ Symbol in SR	Function	Pin	Description
	The voice module will dial the telephone to output.	Input TRG	When TRG is high (ON state), this function block will execute dialing out.
		Output Q1	When TRG is high, it's time to dial out. After dialing successfully, the Output Q1 is high and Output Q2 is low. This state will remain till the TRG terminal is low and at that time Q1 and Q2 are simultaneously placed down.
		Output Q2	When TRG is high, it's time to dial out. If dialing unsuccessfully, the Output Q1 is low and Output Q2 is high. This state will remain till the TRG terminal is high and at that time Q1 and Q2 are simultaneously placed down.

Function Description:

The telephone voice module is to explain the alarming reason by voice through telephone or mobile dialing the preset telephone No. Presentation on how to implement it is made as follows.

In the program, when the TRG pin of DOUT instruction was activated by an input, the voice module will dial the phone number which set in the DOUT instruction, if there is no answer

from the telephone, the voice module will wait for the answer according the ring time which pre-set, if there is still no answer from the telephone after ringing for set times, then the voice will dial the telephone repeatedly according to the set dialing times. If there is answer from the dialed telephone then the voice module will play the voice messages as the following process.

1. If there was password, the voice module will play the No.01 message, user should enter the correct password, then will hear the set messages.

A. If the entered password is correct, the voice module will play the No.2 message, and will play the message which was set in the DOUT module repeatedly for 3 times, then the voice module will send a success signal bit to the SR after 20 seconds, it means that the dialing is successful;

B. If the entered password is wrong, the voice module will play the NO.03 message, then play the No.01 message repeatedly, if the use enter wrong password for N times, the voice will stop playing and hang off the telephone. At this time, if all the dialing times were dialed, the voice will send a failure signal bit to the SR. Or the voice will dial the telephone which was set in the DOUT instruction, till finish dialing all the times or dial successfully, if the dialing failed for all the dialing times, the voice will send a failure bit to the SR, if the dialing is successful, voice module will send a success bit to SR.

2. If there is no password item, the voice module will play the message which was set in the DOUT instruction for 3 times, then will hang off the dialing after 20 seconds delay, and send a successful bit to SR.

When the user answer the telephone which was dialed by a voice module, if the user hang off the telephone, then the voice will finish to play the previous message, And will hang off after a few seconds delay.

Note:

(1). The No.01, No.02, No.03 and No.04 messages are system message, and these messages can only be recorded into the voice module by users, and can not be played by DOUT instruction.

(2). When the voice block are dialing a telephone number, if there is a password option, then only after the telephone was answered successfully and entered a correct password, then the voice will consider it as a successful dialing, and voice module will send a successful bit to SR. Or, voice will consider it as a failure dialing, and will send a failure bit to SR.

If there is no password item, then when the telephone was answered, then voice module will consider it as a successful dialing, after finishing to play the preset message, will send a successful bit to SR. Otherwise it will consider it as a failure dialing.

(3). When you use the voice module, you must record messages firstly, and the system messages No.01, No.02, No.03 and No.04 have the following functions.

Message 0: prompt the user press 0 key and listen to the telephone.

Message 1: prompt the user to enter the password.

Message 2: prompt the user the correct password.

Message 3: prompt the user the wrong password and re-enter the password.

Message 4: prompt the user the system is running normally and no alarming.

● Telephone Alarm

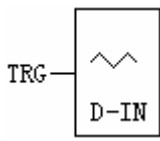
When the input of DOUT instruction was activated, it will start to dial the preset telephone number.

● Automatic Dial and Automatic Alarm.

Examples for the application of SR-VPA /VPD, please refer to Chapter VI.

⚠Notes: When programming with SR-HMI, the input of the telephone number must be ended with “:”. And the characters before “:” is the preset telephone number. And the telephone number after “:” is inefficient. And “:” is the mark for the end of the telephone number. If there is no “:”, then SR cannot recognize the telephone number.

3.3.5 D-IN (Need to select SR-VPA/VPD to use together)

Line diagram/ Symbol in SR	Function	Pin	Description
	Telephone dials the voice module to input.	Input TRG	When TRG become 1, will activate D-IN instruction, and will play the preset message

Function description:

1. After D-IN instruction was activated, the voice module will start to play the preset messages in D-IN instruction;

2. According to the different presetting in the D-IN instruction, the voice module has the following applications:

(1). If there is only one D-IN instruction in the user’s program of the SR:

A. If there is password protection, voice will play the No.01 message repeatedly, after the user enter the correct password, if the entered password is wrong, the voice will play the No.03 message, and then continue to play the No.01 message; if the entered password is correct, the voice module will play the No.02 message, and then play the preset alarm message which was set in the D-IN instruction by user for 3 times, after playing 3 times, the voice will stop playing any message. Then will hang off the telephone automatically after 20 seconds delay, and go back to waiting status;

B. When there is no password protection for D-IN instruction, voice module will play the preset message which was set in D-IN instruction by user for 3 times, after finish playing, the voice module will stop to play any message, and will hang off the telephone after 20 seconds delay, and go back to waiting status;

(2) .When there are more than 1 D-IN instructions in the user’s program of SR:

A. If all of the password protection of D-IN was selected, the voice module Will play the No.01 message repeatedly, when the user enter the password, If the password is wrong, the voice module will play the No.03 message, And then will play the No.01 message repeatedly, if the entered password is correct, voice module will play the No.02 message, and then play the preset alarm message which was set in the D-IN for 3 times, when it finish to play the 3 times, the voice module will stop playing any messages, and will hang off the telephone after 20 seconds delay. And go back to waiting status.

B. If there isn’t any password protection for the D-IN instruction, the voice module will play the alarm message which was preset in the D-IN by user for 3 times, after 3 times playing,

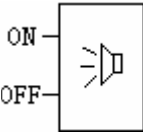
the voice module will stop playing any messages , and will hang off the telephone after 20 seconds delay, and then go back to waiting status;

- C. If there is password protection for some D-IN instructions, and some D-IN instructions haven't password protection, then the voice module will play the preset alarm messages that are preset in the D-IN instructions without password protection. After playing all the alarm message which haven't password protection, the voice module will play the No.01 message, after the user enter the password, if the entered password is wrong, the voice module will play the No.03 message, and will continue to play the No.01 message; if the entered password is correct, the voice module will play the No.02 message, then the voice module will play the alarm messages which preset in the D-IN instructions with password protection, after playing all the alarm messages for all D-IN instructions, the voice module will start to play all the alarm messages for 2 times, at last the voice module will stop playing any message, and hang off after 20 seconds delay, and go back to waiting status;
3. When the user dial the telephone number which is connected to the voice module, and the D-IN instruction wasn't activated, then voice will play the No.04 message to tell the user that there isn't any alarm.
4. When the user hear the voice module, if the user hang off the telephone, then the voice module will hang off the telephone automatically after a few seconds delay after playing the previous message.

Note:

1. The No.01, No.02, No.03 and No.04 message are system message, and cannot be played in D-IN instruction.
2. When this voice module is used, the related voice messages must be recorded first.
3. User must record the messages firstly, then can use the voice module No.01, No.02, No.03 and No.04 message must be record before using the voice module (Please refer the chapter VI to study Recording message of voice module)
4. Password input must be start as “*”.

3.3.6 PMSG (Need to select SR-VPA/VPD to use together)

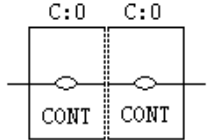
Line diagram/ Symbol in SR	Function	Pin	Description
	Voice Playing Function Block	ON	When the ON input becomes 1, the voice module will play all the message that preset in this instruction.
		OFF	When OFF input becomes 1, will stop playing the message.

Notes:

- This function is applicable to location where voice prompt is needed.

3.3.6 CONT

The symbol in SR is as follows:

Symbol in SR	Function	Pin	Explanation
	Contacts	Light Pin Input	One OUT point is correspond to one output terminal of SR.
		Right Pin Output	

Function Explanation & Icon:

When wiring, the line connects the two points of the same code and different directions. And you can see its function in the following program.

And the detailed using methods can be referred also in the following program.

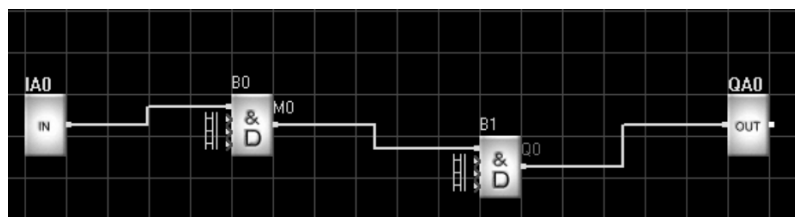


Fig. 3.15

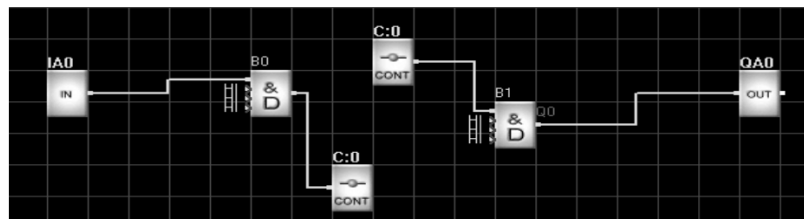
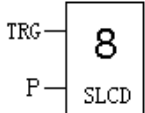


Fig. 3.16

The above two programs are of the same efficient. In Fig. 3.16, the two C:0 are considered as the same point, and then B0 and B1 are connected together. So the program function is the same as Fig. 3.15.

3.3.7 SLCD

The symbol in SR is as follows:

Symbol in SR	Function	Pin	Explanation
	Display the HMI pages	TRG	To edit the HMI, each SLC has its correspondent HMI page.
		P	Property Pin

Function Explanation & Icon:

To edit the HMI, each SLC has its correspondent HMI page.

⚠Notes:

The tow input pins of this function block will be displayed or hided according to your choice. The first input pin is the trigger. When TRG is high, the page will be displayed on the top of HMI.

The second input pin is the property pin, which can be connected to the timer, counter function

blocks and will display the property of the these function blocks.