07-2 Basic instruction

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on 2022/06/14 16:25

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Logic Operation Instructions

NEG/16-bit complement

NEG(P)

After inverting the sign of the BIN 16-bit device specified in (D), store it in the device specified in (D).

-[NEG (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(D)	The start device that stores the data complement of 2	-32768 to 32767	Signed BIN16	ANY16_S

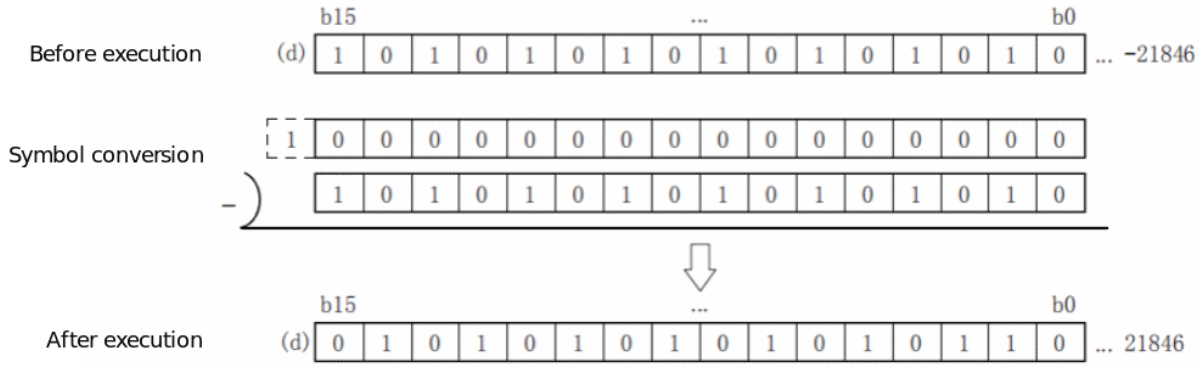
Device used

Instruction	Parameter	Devices									Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	[D]	XXP
NEG	Parameter 1	●	●	●	●	●	●	●	●	●	●	●

Features

• Invert the sign of the BIN 16-bit device specified in (D), and store it in the device specified in (D).

• Used when inverting positive and negative signs.



#**Note:** If the continuous execution (NEG) instruction is used, every operation cycle will be inverted, so care should be taken.

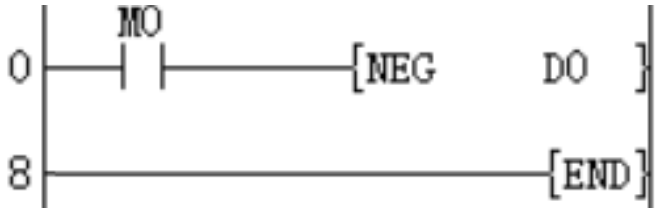
Error code

Error code	Content
4085H	The output results of (D) in the read application instruction exceed the device range
4086H	The output result of (D) in the write application instruction exceeds the device range

Example

In the two examples below, if D2=K4 and D4=K8, or D2=K8 and D10 is always K4.

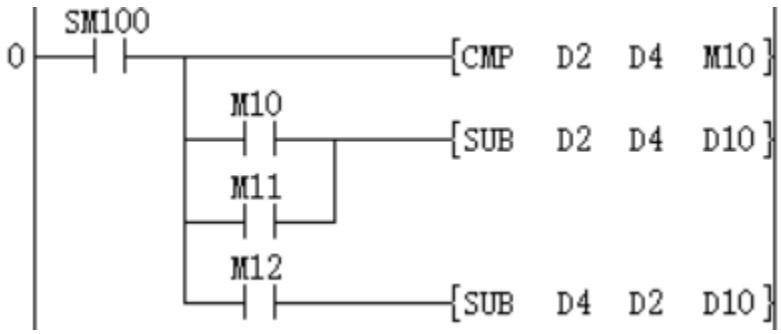
Each time M0 is set, the device value specified in D0 is reversed.



Take the absolute value of the difference of the subtraction operation.

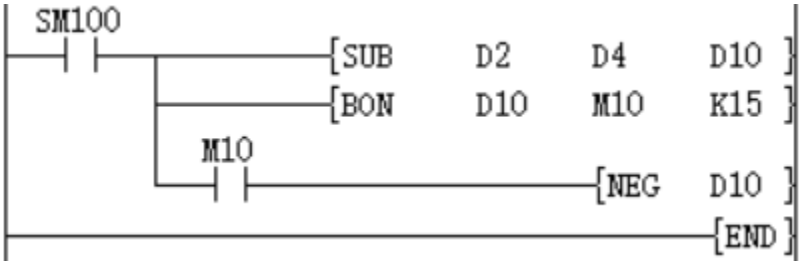
If D2>D4, M10=On. If D2=D4, M11=On. If D2 <D4, M12=On. This ensures that D10 is positive.

It can also be represented by the following program:



When bit15 of D10 is "1" (indicating that D10 is a negative number), M10 = On, use NEG instruction to complement D10 to obtain the absolute value of D10.

In the above two examples, if D2=K4, D4=K8; or D2=K8, D4=K4, the result of D10 is K4.



DNEG/32-bit complement

DNEG(P)

After inverting the sign of the BIN 32-bit device specified in (D), store it in the device specified in (D).

-[DNEG (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(D)	The start device that stores the data complement of 2	-2147483648 to 2147483647	Signed BIN16	ANY16_S

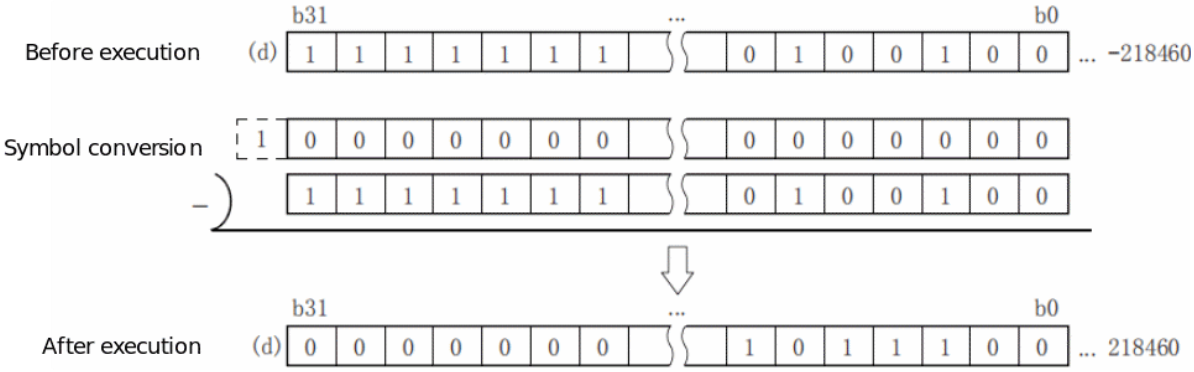
Device used

Instruction	Parameter	Devices											Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	[D]	XXP
DNEG	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

• Invert the sign of the BIN 32-bit device specified in (D) and store it in the device specified in (D).

• Used when inverting positive and negative signs.

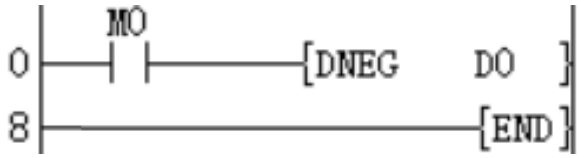


#Note: If you use continuous execution (DNEG) instructions, every operation cycle will be inverted, so care should be taken.

Error code

Error code	Content
4085H	The output results of (D) in the read application instruction exceed the device range
4086H	The output result of (D) in the write application instruction exceeds the device range

Example



Each time M0 is set, the device value specified in (D1, D0) is reversed.

WOR/16-bit data logical OR

WOR(P)

Perform a logical OR operation on the BIN 16-bit data of the device specified in (S1) and the BIN 16-bit data of the device specified in (S2), and store the result in the device specified in (D).

-[WOR (S1) (S2) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)

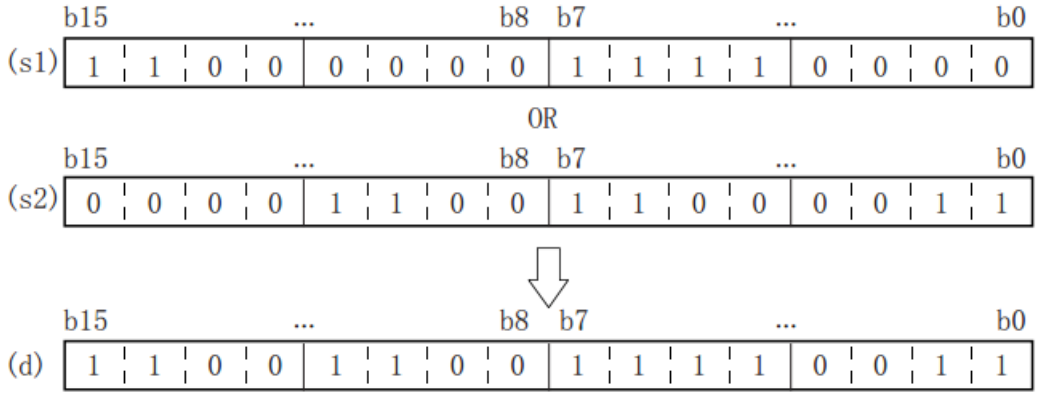
(S1)	Stores data for logical OR operation or a device that stores data	-32768 to 32767	Signed BIN16	ANY16_S
(S2)	Stores data for logical OR operation or a device that stores data	-32768to 32767	Signed BIN16	ANY16_S
(D)	Device for storing logic or result		Signed BIN16	ANY16_S

Device used

Instruction	Parameter	Devices										Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
WOR	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 3		●	●	●	●	●	●	●	●			●	●

Features

• Perform a logical OR operation on the BIN 16-bit data of the device specified in (S1) and the BIN 16-bit data of the device specified in (S2), and store the result in the device specified in (D).

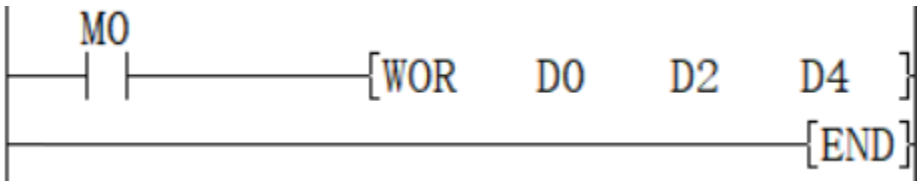


In the case of bit devices, bit devices after the number of points specified by the number of digits will be calculated as 0.

Error code

Error code	Content
4085H	The output results of (S1) and (S2) in the read application instruction exceed the device range
4086H	The output result of (D) in the write application instruction exceeds the device range

Example



When M0 is set, (D0) and (D2) are logically performed, and the value is stored in (D4), that is (D0)∨(D2) → (D4)

DOR/32-bit data logical OR

DOR(P)

After inverting the sign of the BIN 32-bit device specified in (D), store it in the device specified in (D).

-[DOR (S1) (S2) (D)]

Content, range and data type

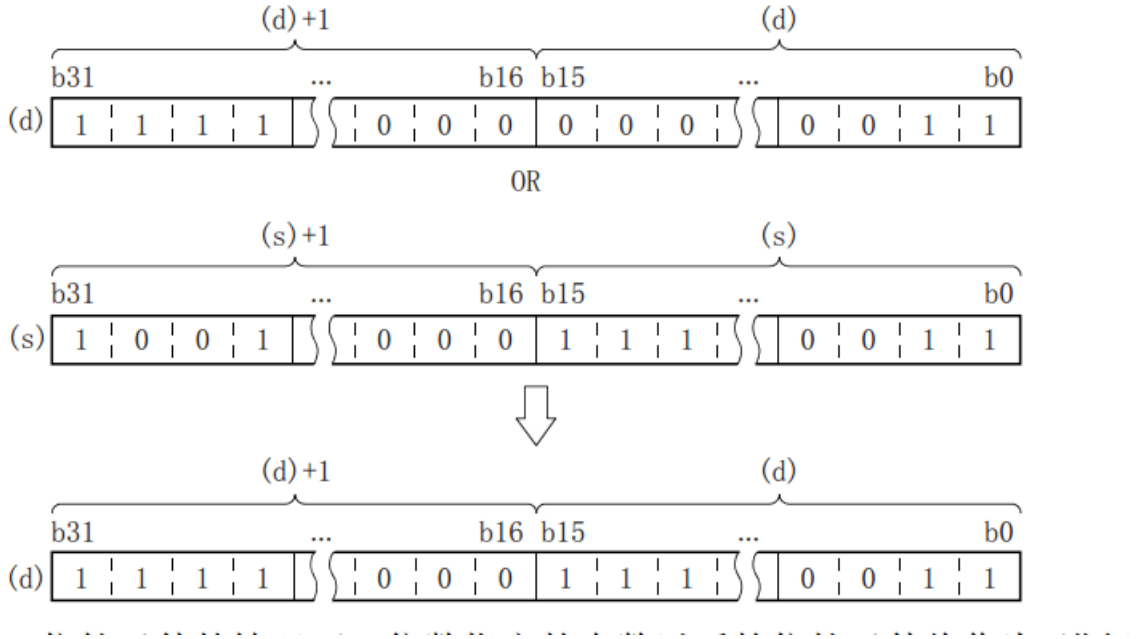
Parameter	Content	Range	Data type	Data type (label)
(S1)	Stores data for logical OR operation or a device that stores data	-2147483648 to 2147483647	Signed BIN32	ANY32_S
(S2)	Stores data for logical OR operation or a device that stores data	-2147483648 to 2147483647	Signed BIN32	ANY32_S
(D)	Device for storing logic or result		Signed BIN32	ANY32_S

Device used

Instruction	Parameter	Devices												Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	[D]	XXP
DOR	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 3		●	●	●	●	●	●	●	●	●	●			●	●

Features

Perform a logical OR operation on the BIN 32-bit data of the device specified in (S1) and the BIN 32-bit data of the device specified in (S2), and store the result in the device specified in (D).

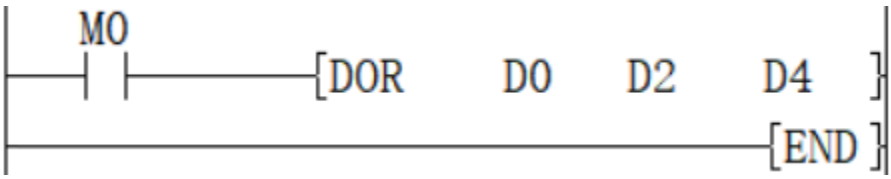


In the case of bit devices, bit devices after the number of points specified by the number of digits will be calculated as 0.

Error code

Error code	Content
4085H	The output results of (S1) and (S2) in the read application instruction exceed the device range
4086H	The output result of (D) in the write application instruction exceeds the device range

Example



When M0 is set, (D1, D0) and (D3, D2) are logically performed, and the value is stored in (D5, D4), that is, (D1, D0)∨(D3, D2) → (D5, D4)).

WAND/16-bit data logic AND

WAND(P)

Perform a logical AND operation on each bit of the BIN 16-bit data of the device specified in (S1) and the BIN 16-bit data of the device specified in (S2), and store the result in the device specified in (D).

-[WAND (S1) (S2) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S1)	Store the data for logical AND operation or the device storing the data	-32768to 32767	Signed BIN16	ANY16_S

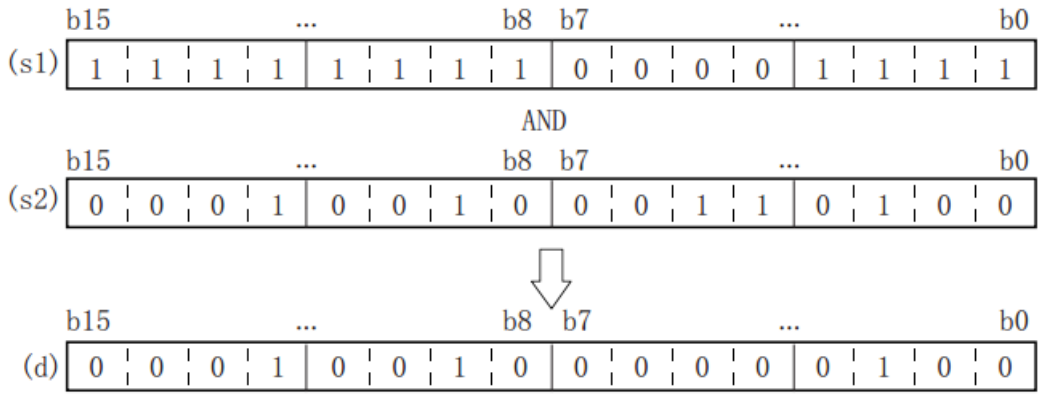
(S2)	Store the data for logical AND operation or the device storing the data	-32768 to 32767	Signed BIN16	ANY16_S
(D)	Device for storing logic and result		Signed BIN16	ANY16_S

Device used

Instruction	Parameter	Devices										Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
WAND	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 3		●	●	●	●	●	●	●	●			●	●

Features

Perform a logical AND operation on each bit of the BIN 16-bit data of the device specified in (S1) and the BIN 16-bit data of the device specified in (S2), and store the result in the device specified in (D).

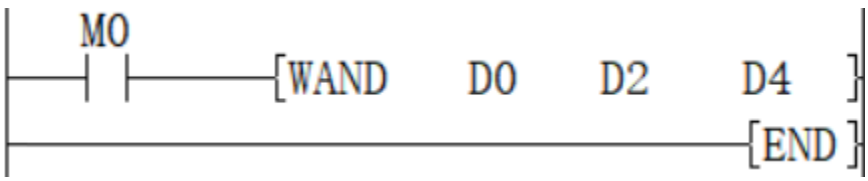


In the case of bit devices, bit devices after the number of points specified by the number of digits will be calculated as 0.

Error code

Error code	Content
4085H	The output results of (S1) and (S2) in the read application instruction exceed the device range
4086H	The output result of (D) in the write application instruction exceeds the device range

Example



When M0 is set, the logical AND operation of (D0) and (D2) is performed, and the value is stored in (D4), that is, (D0) ∧ (D2) → (D4).

DAND/32-bit data logic AND

DAND(P)

Perform a logical AND operation on each bit of the BIN 32-bit data of the device specified in (S1) and the BIN 32-bit data of the device specified in (S2), and store the result in the device specified in (D).

-[DAND (S1) (S2) (D)]

Content, range and data type

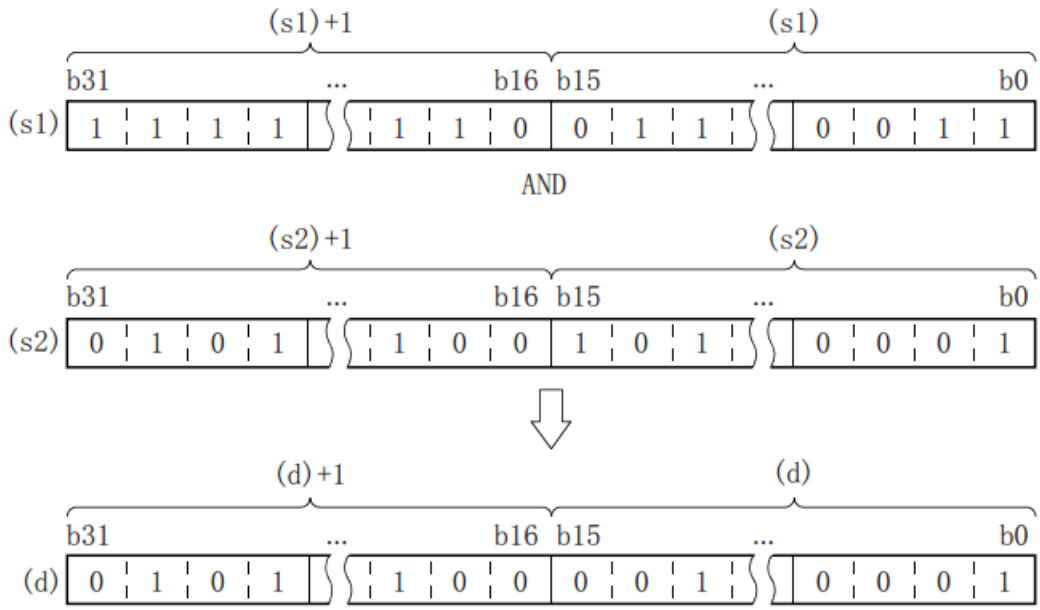
Parameter	Content	Range	Data type	Data type (label)
(S1)	Store the data for logical AND operation or the device storing the data	-2147483648 to +2147483647	Signed BIN32	ANY32_S
(S2)	Store the data for logical AND operation or the device storing the data	-2147483648 to +2147483647	Signed BIN32	ANY32_S
(D)	Device for storing logic and result		Signed BIN32	ANY32_S

Device used

Instruction	Parameter	Devices												Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	[D]	XXP
DAND	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 3		●	●	●	●	●	●	●	●	●	●			●	●

Features

Perform a logical AND operation on each bit of the BIN 32-bit data of the device specified in (S1) and the BIN 32-bit data of the device specified in (S2), and store the result in the device specified in (D).



In the case of bit devices, bit devices after the number of points specified by the number of digits will be calculated as 0.

Error code

Error code	Content
4085H	The output results of (S1) and (S2) in the read application instruction exceed the device range
4086H	The output result of (D) in the write application instruction exceeds the device range

Example

When M0 is set, perform logical AND operation of (D1, D0) and (D3, D2), and store the value in (D5, D4), (D1, D0) ∧ (D3, D2) → (D5, D4) .

WXOR/16-bit data logic exclusive OR

WXOR(P)

Perform an exclusive OR operation on the BIN 16-bit data of the device specified in (S1) and the BIN 16-bit data of the device specified in (S2), and store the result in the device specified in (D).

-[WXOR (S1) (S2) (D)]

Content, range and data type

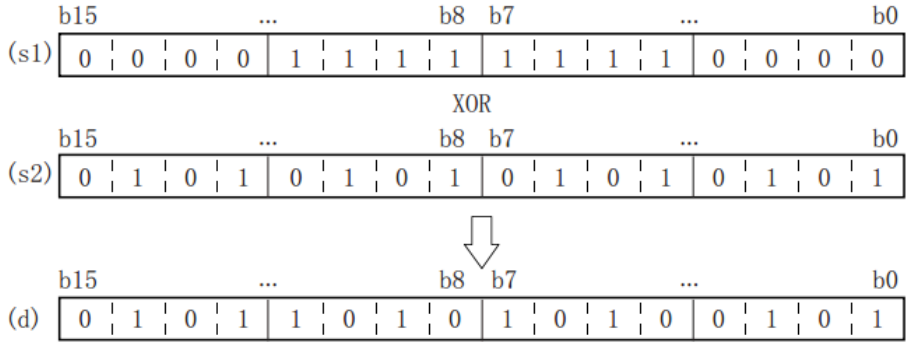
Parameter	Content	Range	Data type	Data type (label)
(S1)	Store the data for exclusive OR operation or the device storing the data	-32768 to 32767	Signed BIN16	ANY16_S
(S2)	Store the data for exclusive OR operation or the device storing the data	-32768 to +32767	Signed BIN16	ANY16_S
(D)	Device for storing XOR result		Signed BIN16	ANY16_S

Device used

Instruction	Parameter	Devices											Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
WXOR	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 3		●	●	●	●	●	●	●	●			●	●

Features

• Perform logical exclusive OR operation on the BIN 16-bit data of the device specified in (S1) and the BIN 16-bit data of the device specified in (S2), and store the result in the device specified in (D).



In the case of bit devices, bit devices after the number of points specified by the number of digits will be calculated as 0.

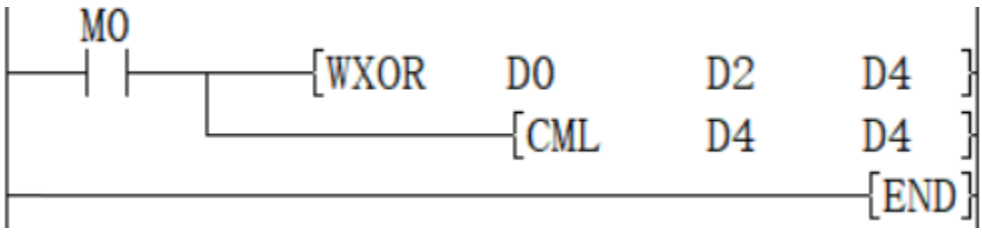
Error code

Error code	Content
4085H	The output results of (S1) and (S2) in the read application instruction exceed the device range
4086H	The output result of (D) in the write application instruction exceeds the device range

Example

Example 1: When M0 is set, (D0) and (D2) are XOR operation, and the value is stored in (D4), (D0)∀(D2)→(D4).

Example 2: When used with the CML instruction, it can realize the logic exclusive OR (XORNOT) operation:



DXOR/32-bit data logic exclusive OR

DXOR(P)

Perform an exclusive OR operation on the BIN 32-bit data of the device specified in (S1) and the BIN 32-bit data of the device specified in (S2), and store the result in the device specified in (D).

-[DXOR (S1) (S2) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)

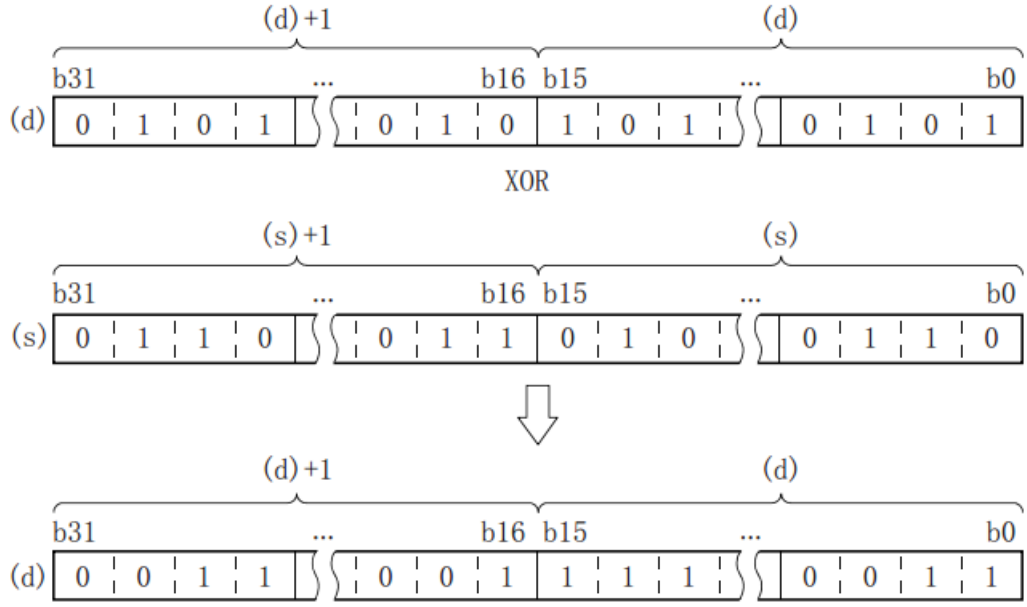
(S1)	Store the data for exclusive OR operation or the device storing the data	-2147483648 to 2147483647	Signed BIN32	ANY32_S
(S2)	Store the data for exclusive OR operation or the device storing the data	-2147483648 to 2147483647	Signed BIN32	ANY32_S
(D)	Device for storing XOR result		Signed BIN32	ANY32_S

Device used

Instruction	Parameter	Devices												Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	[D]	XXP
DXOR	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 3		●	●	●	●	●	●	●	●	●	●			●	●

Features

Perform an exclusive OR operation on the BIN 32-bit data of the device specified in (S1) and the BIN 32-bit data of the device specified in (S2), and store the result in the device specified in (D).



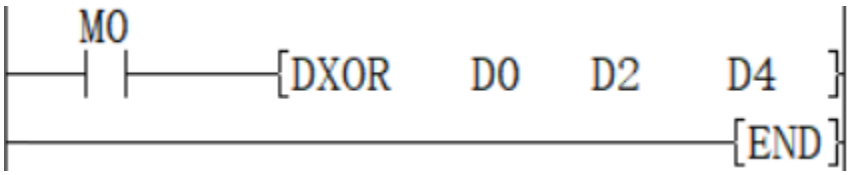
In the case of bit devices, bit devices after the number of points specified by the number of digits will be calculated as 0.

Error code

Error code	Content
4085H	The output results of (S1) and (S2)in the read application instruction exceed the device range

4086H	The output result of (D) in the write application instruction exceeds the device range

Example



When M0 is set, (D1, D0) and (D3, D2) are XOR operation, and the value is stored in (D5, D4), that is, (D1, D0) ∀ (D3, D2) → (D5, D4))

PRUN/8 digit transmission (16-bit data)

PRUN(P)

After processing the device numbers of (s) and (d) with designated digits as octal numbers, transfer the data.

-[PRUN (s) (d)]

Content, range and data type

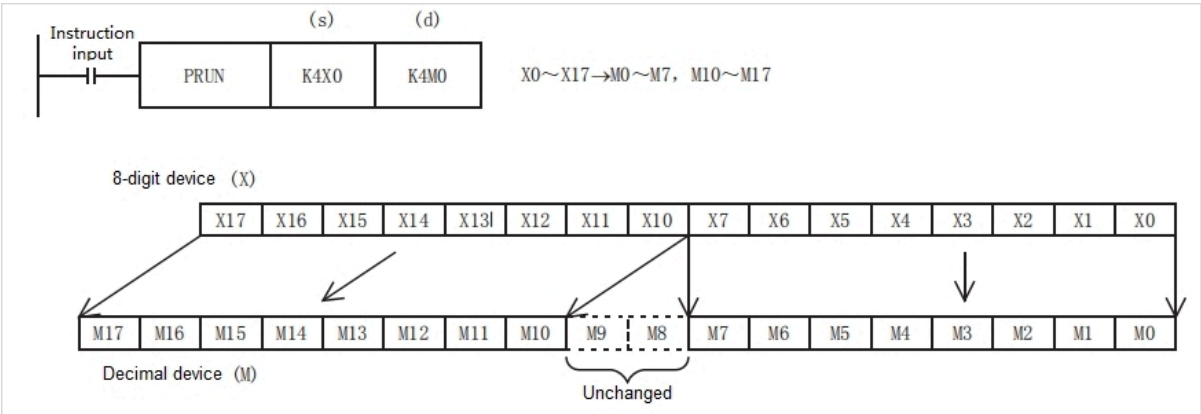
Parameter	Content	Range	data	Data type (label)
(s)	Digit designation*1	-	BIN16 bit	ANY16
(d)	Transfer destination device number*1	-	BIN16 bit	ANY16

Device used

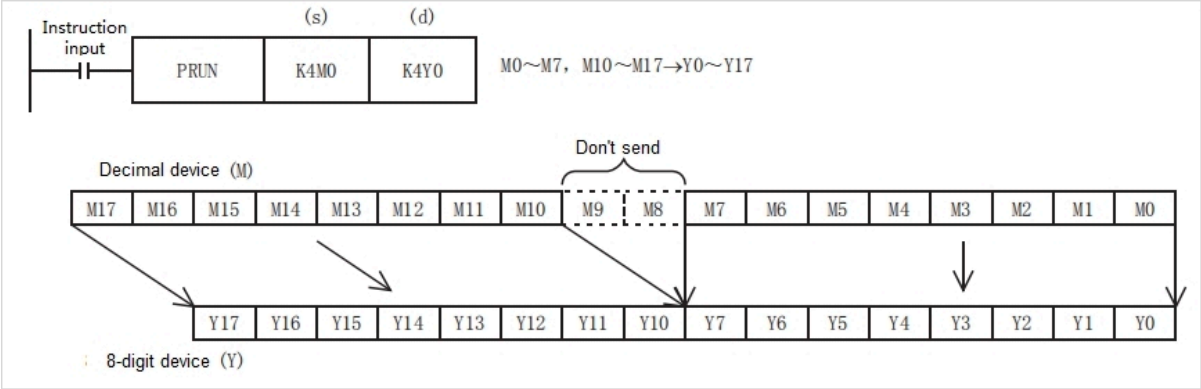
Instruction	Parameter	Devices			Offset modification	Pulse extension
		KnX	KnY	KnM	[D]	XXP
PRUN	Parameter 1	●		●	●	●
	Parameter 2		●	●	●	●

Features

• 8-digit device → decimal device



• Decimal digit device → octal digit device



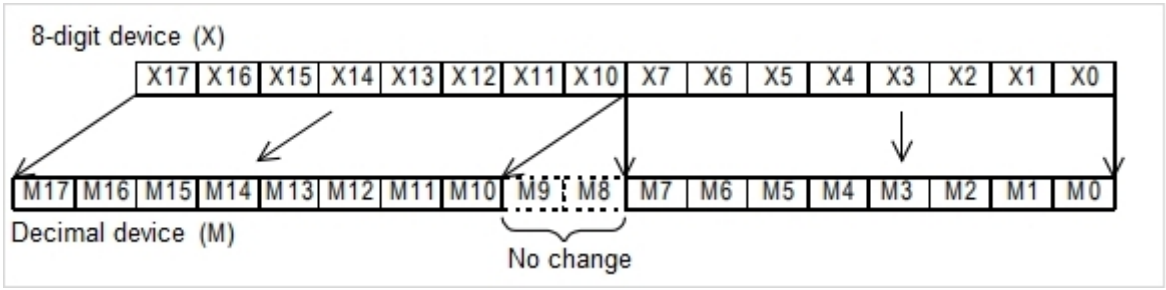
Error code

Error code	Content
4085H	When reading the specified device range exceeds the corresponding device range
4086H	When the specified device range for writing exceeds the range of the corresponding device

Example

As shown in the above Circuit program:

X0 to X17 take the value of octal digits and pass it to the Devices corresponding to M.



Data processing instructions

BCC/BIN16 and BIN8 bit data addition, subtraction and exclusive check

BCC (P)

Specify the calculation method of BCC in (S1), specify the destination start address in (S2), and specify the destination data length in (S3), and then store the operation result in the device specified in (D).

- [BCC (S1) (S2) (S3) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S1)	16-bit constant or the calculation method of 16-bit regions (block check code)	0 to 2	BIN16 bit	ANY16_S
(S2)	Calculate the initial 16-bit regions of BCC	-	BIN16 bit	ANY16_S
(S3)	16-bit constant or 16-bit regions (specify the number of bytes calculated by BCC)	0 to 32767	BIN16 bit	ANY16_S
(D)	Stores 16-bit regions of BCC results	-	BIN16 bit	ANY16_S

Device used

Instruction	Parameter	Devices											Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
BCC	(S1)	●	●	●	●	●	●	●	●	●	●	●	●	●
	(S2)					●	●	●	●	●			●	●
	(S3)	●	●	●	●	●	●	●	●	●	●	●	●	●
	(D)		●	●	●	●	●	●	●	●			●	●

Features

According to the calculation method specified by S1, starting from the 16-bit data specified by S2, calculate the ASCII block check code (BCC) of the number of bytes specified by S3, and then store the result of BCC code in the low byte of 16-bit data specified by D.

S1: Specify the calculation method of BCC.

K0: Addition operation

K1: Subtraction operation

K2: Exclusive or operation

S2 and s3: Specify the destination data

For example, if the destination is the 12 bytes data starting from D0, the settings are as below.

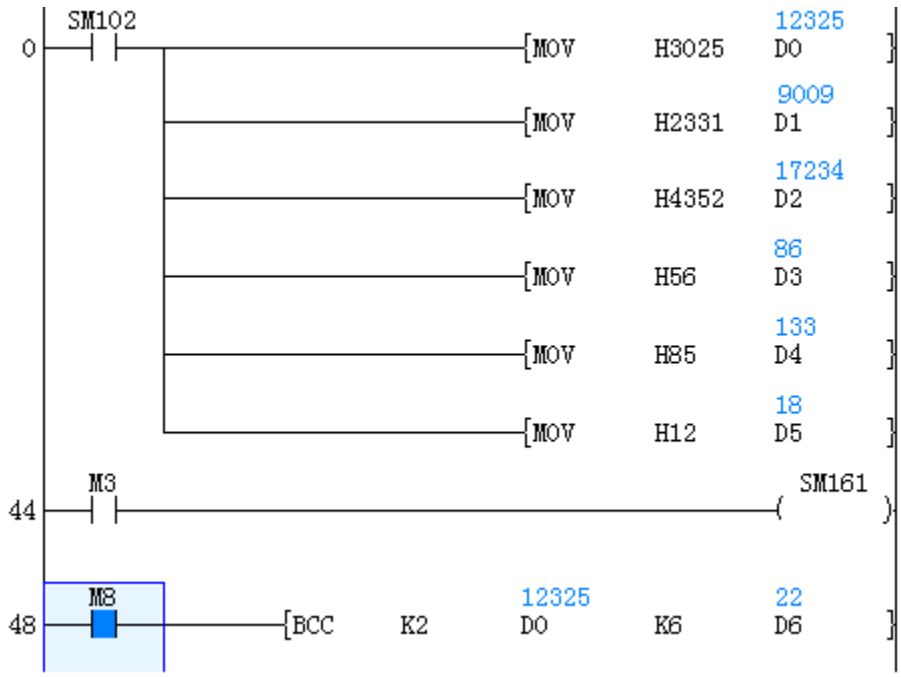
S2: D0

S3: K12 (specify the data by decimal)

The modes used in the calculation of this instruction are 16-bit conversion mode and 8-bit conversion mode. For the actions of each mode, refer to the followings.

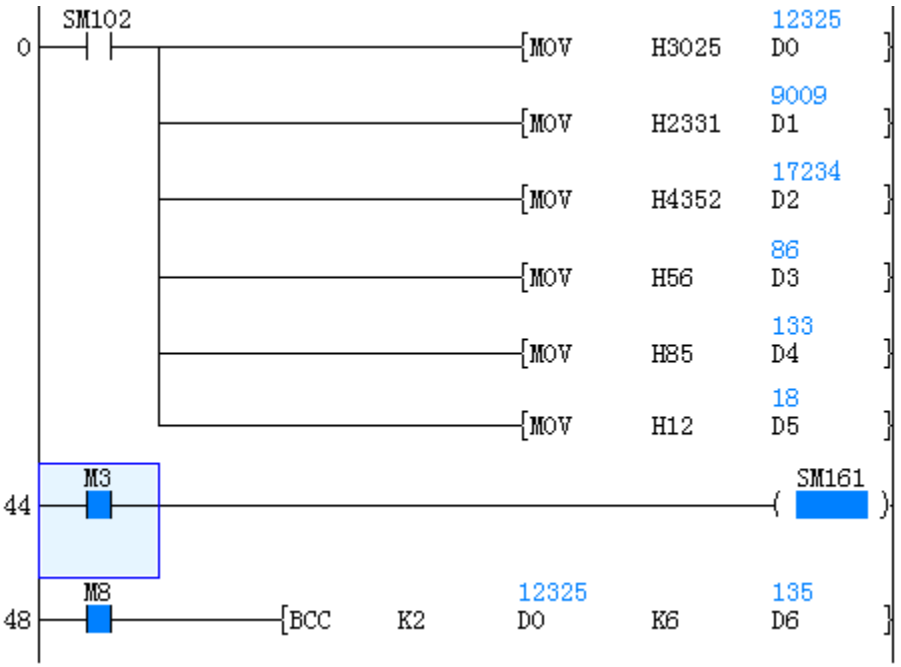
(1) 16-bit conversion mode (When SM161 is OFF)

Calculate the high 8-bit (byte) and low 8-bit (byte) of device that started from (S2) and specify the byte length by (S3), and store the low 8-bit of device specified by (D). The conversion result is as below.



(2) 8-bit conversion mode (When SM161 is ON)

Calculate the low 8-bit (byte) of device that started from (S2) and specify the byte length by (S3), and store the low 8-bit of device specified by (D). The conversion result is as below.

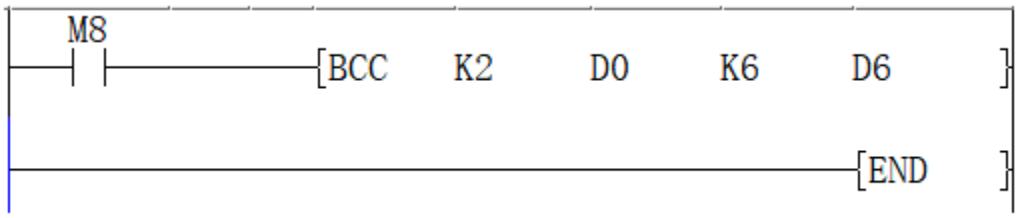


Error code

Error code	Content
4084H	The read application instructions (S1) and (S3) input the data that exceeds the specified range

4085H	The device specified in the read application instructions (S1), (S2) and (S3) exceeds the corresponding device range
4086H	The device specified in the write application instruction (D) exceeds the corresponding device range

Example



When the trigger M0 is ON, calculate the a block check code (BCC) of 12-bit bytes of ASCII data starting from data register D0 by “exclusive or operation”. The block check code (BCC) is stored in the low bit byte of data register D6.

Application example

In the example ,calculate the BCC code and send as information after adding to the string “%01→RC”.

The data transmission is carried out in the form of ASCII codes.

CC calculations use logical exclusive OR, addition, and subtraction.

The information is stored as follows:

Data register	D6	D2	D1	D0
ASCII hexadecimal code		4 3 5 2	2 3 3 1	3 0 2 5
ASCII code		C R	# 1	0 %

↑

BCC check code 6 byte

BCC instruction is as below: Execution or operation

a	**b**	**OR result**
0	0	0
0	1	1
1	0	1
1	1	0

S1: logic exclusive OR

S2: The start of destination data

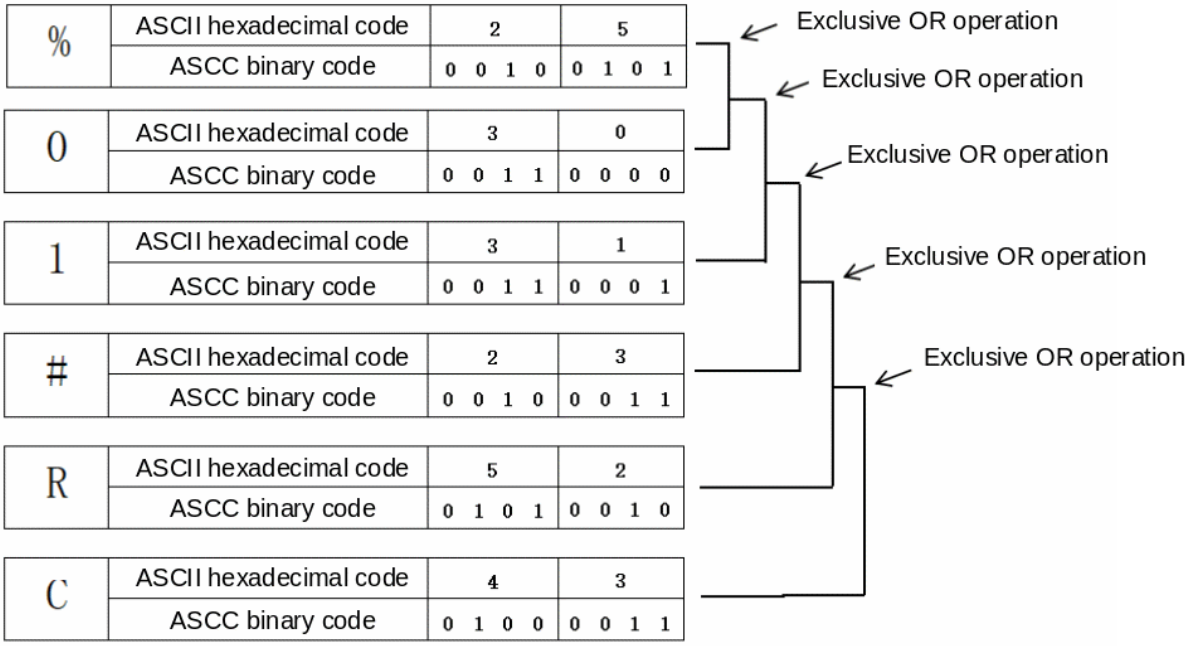
S3: destination data lengt

D: calculation result

After the execution BCC code is stored in the last byte of D6.

How to calculate block check code (BCC)

Calculate block check code (BCD) with XOR for each ASCII code.



BCC code

ASCII hexadecimal code	1	6
ASCII binary code	0 0 0 1	0 1 1 0

The calculation result is stored in the low bit byte of D6

MAX/BIN16 bit the maximum value of 16-bit data

MAX (P)

Specify the destination start address in (S1), and specify the destination end address in (S2), and then store the operation result in the device specified in (D).

- [MAX (S1) (S2) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)

(S1)	Device that stores the start address when getting the max data	-32768 to 32767	Signed BIN16	ANY16_S
(S2)	Device that stores the end address when getting the max data	-32768 to 32767	Signed BIN16	ANY16_S
(D)	Stores the max value between the device data of (S1) and (S2)	-32768 to 32767	Signed BIN16	ANY16_S

Device used

Instruction	Parameter	Devices					Offset modification	Pulse extension
		T	C	D	R	SD	[D]	XXP
MAX	(S1)	●	●	●	●	●	●	●
	(S2)	●	●	●	●	●	●	●
	(D)	●	●	●	●	●	●	●

Features

Use the BIN16 bit data specified in (S1) as the start address, and use the BIN16 bit data specified in (S2) as the end address to get the maximum value between the device of (S1) and (S2).

#Note

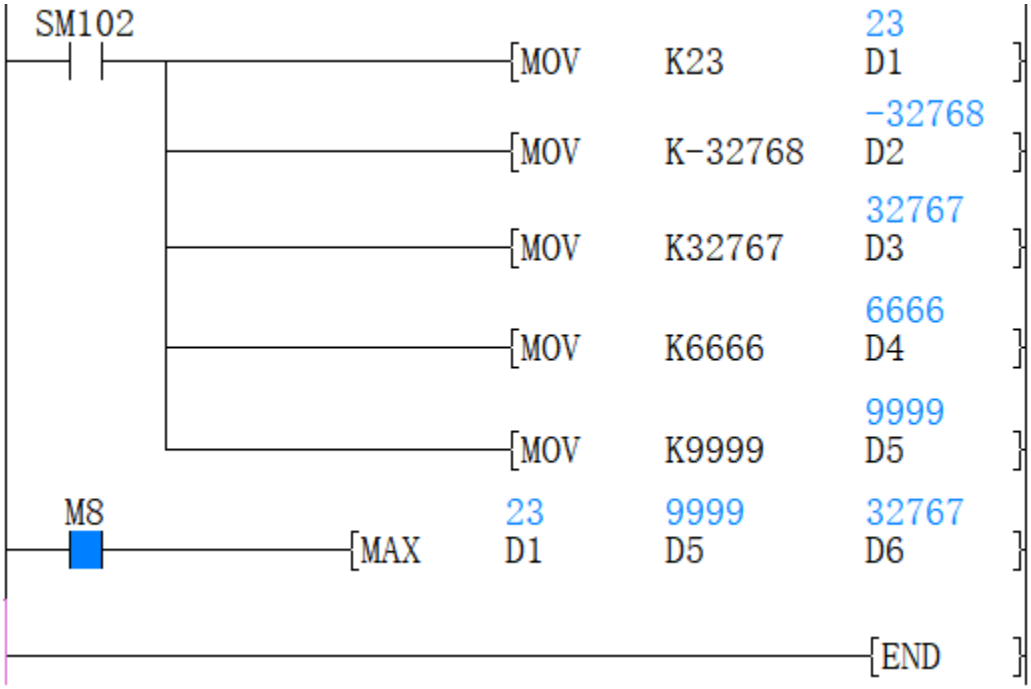
1. The devices specified by (S1) and (S2) should be the same type. The type of device (D) that gets the results could be different.

2. The device size specified by (S1) can’t exceed the device size specified by (S2). For example, MAX D1 D5 D10 works, but MAX D5 D1 D10 doesn't.

Error code

Error code	Content
4084H	The read application instructions (S1) and (S2) input the data that exceeds the specified range
4085H	The device specified in the read application instructions (S1) and (S2) exceeds the device range
4086H	The device specified in the write application instruction (D) exceeds the device range
4093H	The specified ranges (S1) and (S2) are not the same device
4094H	The sequence of specified ranges (S1) and (S2) is abnormal

Example



Use (D1) as the start address, and use (D5) as the end address to get the max value between them and store the result in (D6). As the figure above, the max value between (D1) and (D5) is the value in (D3) which is stored in (D6) for output.

DMAX/BIN32 bit the maximum value of 32-bit data

DMAX (P)

Specify the destination start address in (S1), and specify the destination end address in (S2), and then store the operation result in the device specified in (D).

- [DMAX (S1) (S2) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S1)	Device that stores the start address when getting the max data	-2147483648 to 2147483647	Signed BIN32	ANY32_S
(S2)	Device that stores the end address when getting the max data	-2147483648 to 2147483647	Signed BIN32	ANY32_S
(D)	Stores the max value between the device data of (S1) and (S2)	-2147483648 to 2147483647	Signed BIN32	ANY32_S

Device used

Instruction	Parameter	Devices							Offset modification	Pulse extension
		T	C	D	R	SD	LC	HSC	[D]	XXP
DMAX	(S1)	●	●	●	●	●	●	●	●	●
	(S2)	●	●	●	●	●	●	●	●	●
	(D)	●	●	●	●	●	●	●	●	●

Features

Use the BIN32 bit data specified in (S1) as the start address, and use the BIN32 bit data specified in (S2) as the end address to get the maximum value between the device of (S1) and (S2).

#Note

1. The devices specified by (S1) and (S2) should be the same type. The type of device (D) that gets the results could be different.

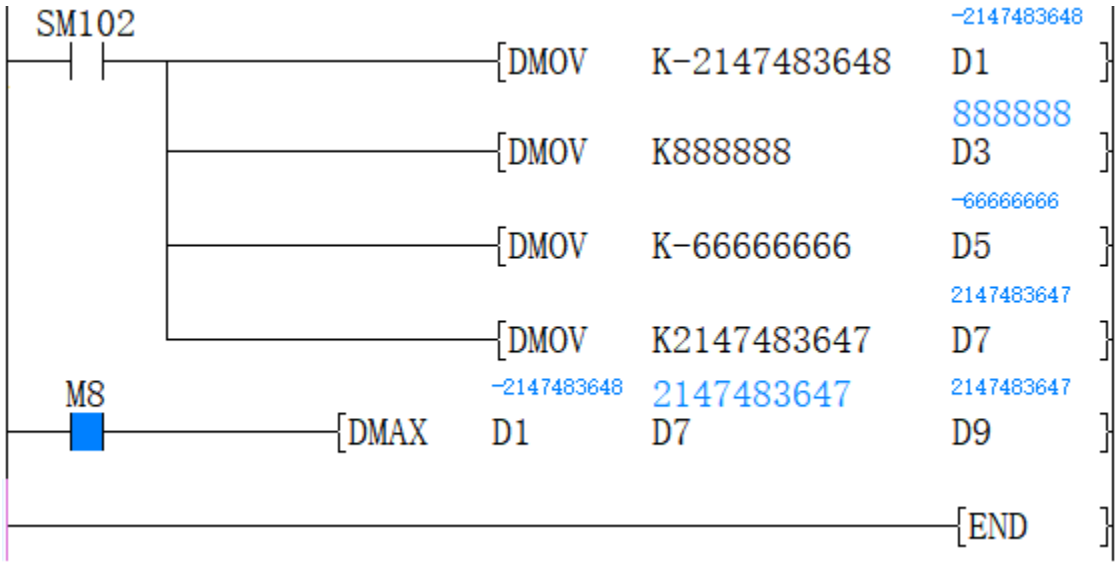
2. The device size specified by (S1) can't exceed the device size specified by (S2). For example, DMAX D1 D5 D10 works, but DMAX D5 D1 D10 doesn't.

Error code

Error code	Content
4084H	The read application instructions (S1) and (S2) input the data that exceeds the speicified range
4085H	The device specified in the read application instructions (s1) and (S2) exceeds the device range
4086H	The device specified in the write application instruction (D) exceeds the device range
4093H	The specified ranges (S1) and (S2) are not the same device
4094H	The sequence of specified ranges (S1) and (S2) is abnormal

Example

Use (D1) as the start address, and use (D7) as the end address to get the max value between them and store the result in (D9). As the figure above, the max value between (D1) and (D7) is the value in (D7) which is stores in (D9) for output.



MIN/BIN16 bit the minimum value of 16-bit data

MIN (P)

Specify the destination start address in (S1), and specify the destination end address in (S2), and then store the operation result in the device specified in (D).

- [MIN (S1) (S2) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S1)	Device that stores the start address when getting the minimum data	-32768 to 32767	Signed BIN16	ANY16_S
(S2)	Device that stores the end address when getting the minimum data	-32768 to 32767	Signed BIN16	ANY16_S
(D)	Stores the minimum value between the device data of (S1) and (S2)	-32768 to 32767	Signed BIN16	ANY16_S

Device used

Instruction	Parameter	Devices					Offset modification	Pulse extension
		T	C	D	R	SD	[D]	XXP
MIN	(S1)	●	●	●	●	●	●	●
	(S2)	●	●	●	●	●	●	●
	(D)	●	●	●	●	●	●	●

Features

Use the BIN16 bit data specified in (S1) as the start address, and use the BIN16 bit data specified in (S2) as the end address to get the maximum value between the device of (S1) and (S2).

#Note

1. The devices specified by (S1) and (S2) should be the same type. The type of device (D) that gets the results could be different.

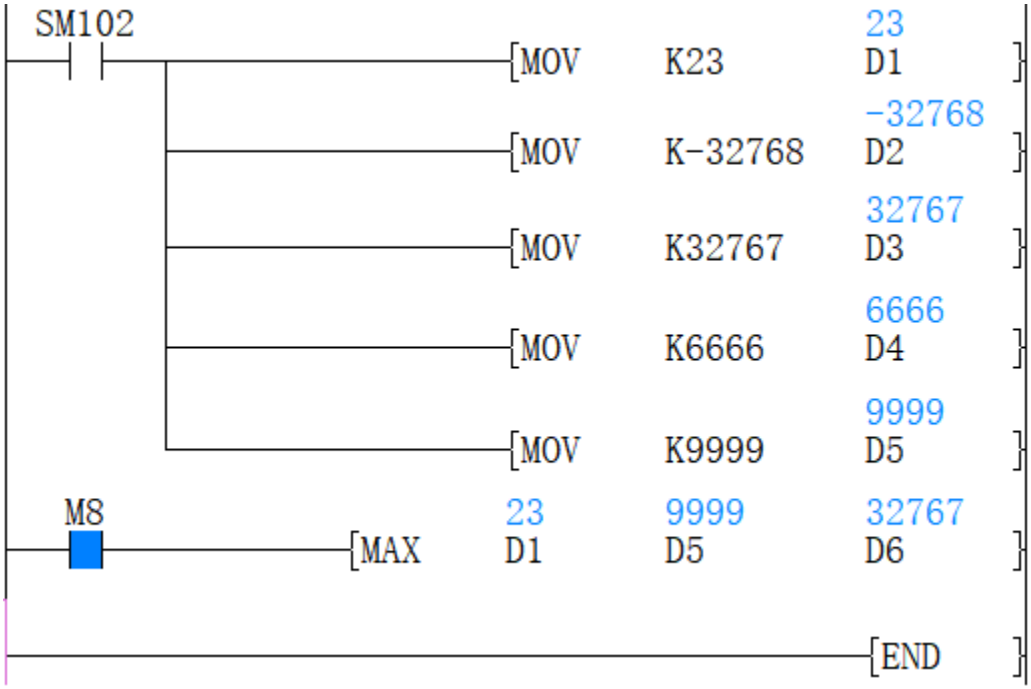
2. The device size specified by (S1) can’t exceed the device size specified by (S2). For example, MAX D1 D5 D10 works, but MAX D5 D1 D10 doesn't.

Error code

Error code	Content
4084H	The read application instructions (S1) and (S2) input the data that exceeds the specified range
4085H	The device specified in the read application instructions (S1) and (S2) exceeds the device range
4086H	The device specified in the write application instruction (D) exceeds the device range
4093H	The specified ranges (S1) and (S2) are not the same device
4094H	The sequence of specified ranges (S1) and (S2) is abnormal

Example

Use (D1) as the start address, and use (D5) as the end address to get the max value between them and store the result in (D6). As the figure above, the max value between (D1) and (D5) is the value in (D3) which is stored in (D6) for output.



DMIN/BIN32 bit the minimum value of 32-bit data

DMIN (P)

Specify the destination start address in (S1), and specify the destination end address in (S2), and then store the operation result in the device specified in (D).

- [DMIN (S1) (S2) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S1)	Device that stores the start address when getting the minimum data	-2147483648 to 2147483647	Signed BIN16	ANY16_S
(S2)	Device that stores the end address when getting the minimum data	-2147483648 to 2147483647	Signed BIN16	ANY16_S
(D)	Stores the minimum value between the device data of (S1) and (S2)	-2147483648 to 2147483647	Signed BIN16	ANY16_S

Device used

Instruction	Parameter	Devices					Offset modification	Pulse extension
		T	C	D	R	SD	[D]	XXP
DMIN	(S1)	●	●	●	●	●	●	●
	(S2)	●	●	●	●	●	●	●
	(D)	●	●	●	●	●	●	●

Features

Use the BIN32 bit data specified in (S1) as the start address, and use the BIN32 bit data specified in (S2) as the end address to get the maximum value between the device of (S1) and (S2).

#Note

1. The devices specified by (S1) and (S2) should be the same type. The type of device (D) that gets the results could be different.

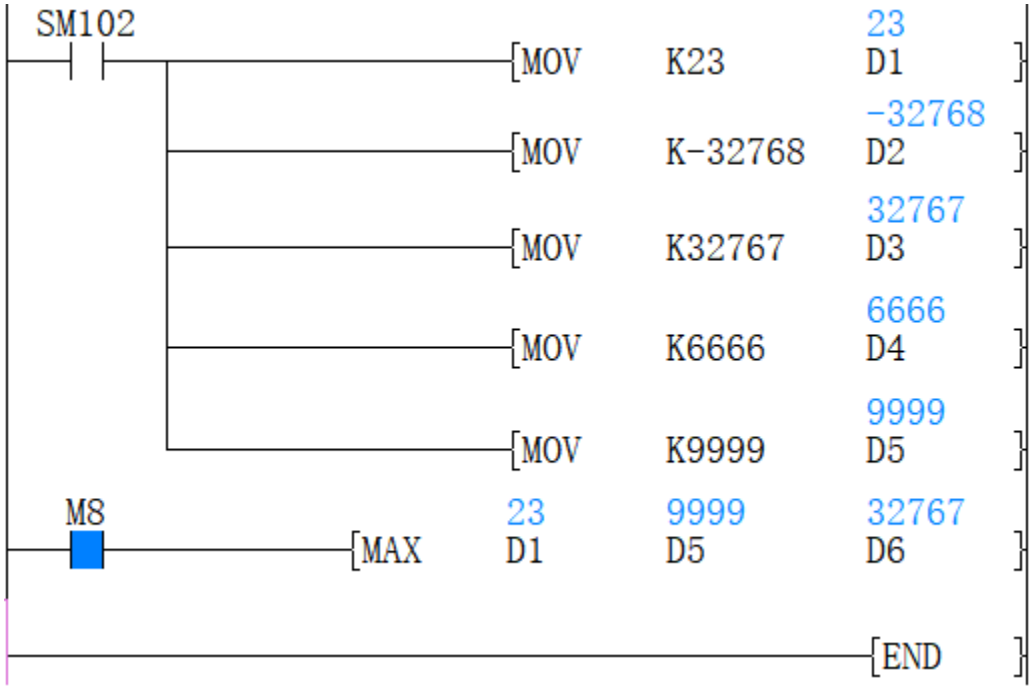
2. The device size specified by (S1) can't exceed the device size specified by (S2). For example, MAX D1 D5 D10 works, but MAX D5 D1 D10 doesn't.

Error code

Error code	Content
4084H	The read application instructions (S1) and (S2) input the data that exceeds the specified range
4085H	The device specified in the read application instructions (S1) and (S2) exceeds the device range
4086H	The device specified in the write application instruction (D) exceeds the device range
4093H	The specified ranges (S1) and (S2) are not the same device
4094H	The sequence of specified ranges (S1) and (S2) is abnormal

Example

Use (D1) as the start address, and use (D5) as the end address to get the max value between them and store the result in (D6). As the figure above, the max value between (D1) and (D5) is the value in (D3) which is stored in (D6) for output.



ANS/alarm settings

ANS(P)

Used to set alarm instructions.

-[ANS (S) (N) (D)]

Content, range and data type

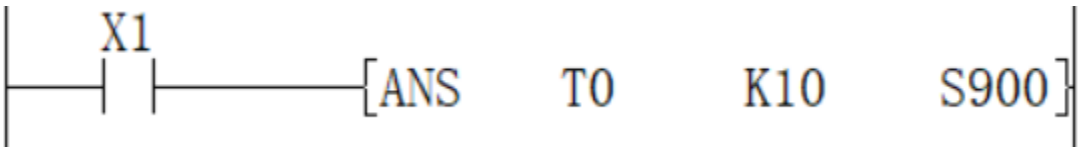
Parameter	Content	Range	Data type	Data type (label)
(S)	Timer number for judging time	-	Signed BIN 16 bit	ANY16
(N)	Data that judges time	1 to 32767	Signed BIN 16 bit	ANY16
(D)	The set alarm device	-	Bit	ANY16_BOOL

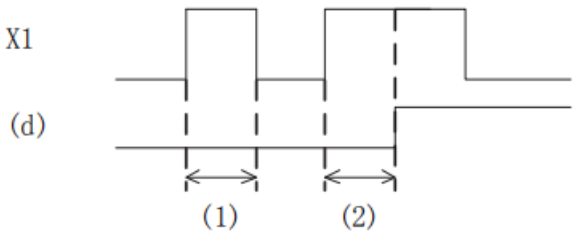
Device used

Instruction	Parameter	Devices											Offset modification	Pulse extension
		S	KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
ANS	Parameter 1						●							●	●
	Parameter 2		●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 3	●												●	●

Features

When the instruction input continues to be ON for the judgment time [(N)×100ms, timer (S)], set (D). If the instruction time turns off below the judgment time [(N)×100ms], the current value of the judgment timer (S) is reset, and (D) is not set. In addition, if the instruction input turns off, the judgment timer will be reset.





1. Judge the time ((N)X 100ms or less)

2. Judgment time or more (inclusive) ((N) X 100ms or more (inclusive))

Related device

Devices	Name	Content
SM249	Signal alarm is valid	After SM249 is ON, the following SM248 and SD249 act.
SM248	Signal alarm action	SM249 is ON, when any one of the states S900 to S999 is active, SM248 is ON
SD249	Signal alarm ON state minimum number	Save the smallest number of actions in S900 to S999.

Error code

Error code	Content

4084H	The value specified in (N1) and (N2) exceeds the range of 0 to 32767 The timer number is not in the range of T0 to T199. The signal alarm is not in the range of S900 to S999.
4085H	When the device specified in the read application instructions (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example

The fault number is displayed by the signal alarm.

Monitoring is effective after SM249 is turned ON

As shown below, when you write a program for diagnosing external faults, such as monitoring the content of SM249 (the smallest number in the ON state), the smallest number in the ON state among S900 to S999 will be displayed. When multiple faults occur at the same time, the next fault number can be obtained after eliminating the fault with the smallest number.

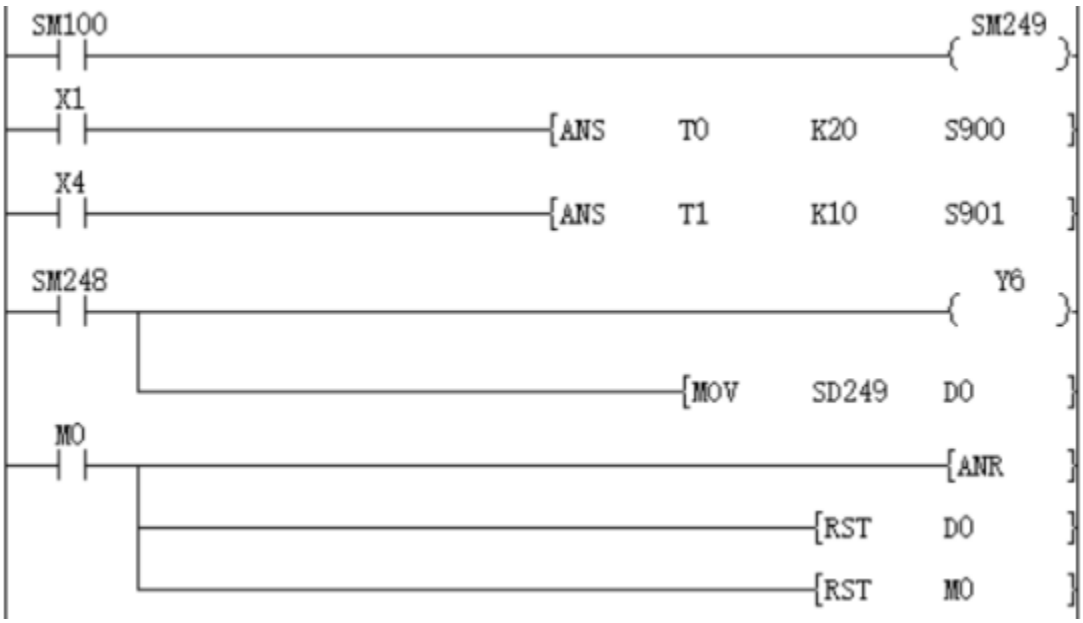
Detect X1 for 2 seconds, turn ON, set S900

X4 is detected for 1 second, turn ON, set S901

SM248 will act after any one of S900 to S999 is ON, and the output fault display YY6 will act

Display the fault number to the D0 device

Through the external fault diagnosis program, use the reset button M0 to turn off the activated state. Each time M0 turns ON, the action status of the new number is set in turn, and the new number that is already ON is reset.



ANR/Alarm reset

ANR(P)

The instruction to reset the small number that is ON in the alarm.

-[ANR]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
No	No parameter setting	-	-	-

Device used

Instruction	Parameter	X	Y	M	S	SM	T(bit)	C(bit)	L
ANR	No								

Features

If the instruction input is ON, reset the active alarm in the alarm.

If multiple alarms are operating, reset the smaller number. If the input instruction is turned ON again, the next small number in the alarm that is operating will be reset.

Related device

Devices	Name	Content
SM249	Signal alarm is valid	After SM249 is ON, the following SM248 and SD249 act.
SM248	Signal alarm action	SM249 is ON, when any one of the states S900 to S999 is active, SM248 is ON.
SD249	Signal alarm ON state minimum number	Save the smallest number of actions in S900 to S999.

#Note:

If you use the ANR instruction, reset in sequence every cycle.

If the ANRP instruction is used, it will be executed in only one operation cycle.

Error code

No operation error.

Example

The fault number is displayed by the signal alarm.

As shown below, when you write a program for diagnosing external faults, such as monitoring the content of SM249 (the smallest number in the ON state), the smallest number in the ON state among S900 to S999 will be displayed. When multiple faults occur at the same time, the next fault number can be obtained after eliminating the fault with the smallest number.

Monitoring is effective after SM249 is turned ON

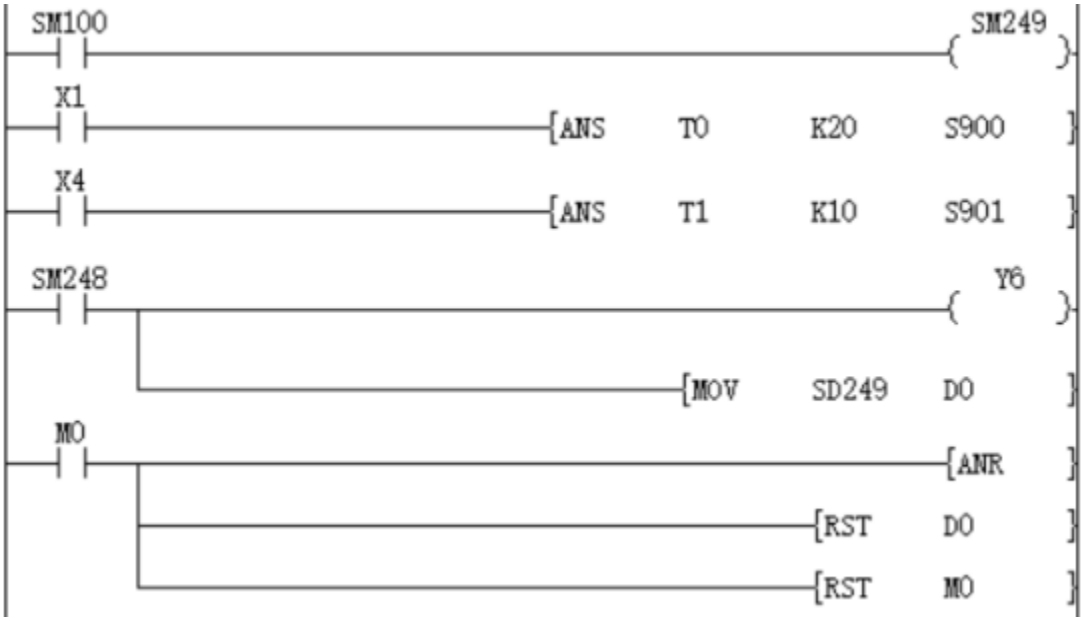
Detect X1 for 2 seconds, turn ON, set S900

X4 is detected for 1 second, turn ON, set S901

SM248 will act after any one of S900 to S999 is ON, and the output fault display YY6 will act

Display the fault number to the D0 device

Through the external fault diagnosis program, use the reset button M0 to turn off the activated state. Each time M0 turns ON, the action status of the new number is set in turn, and the new number that is already ON is reset.



BON/16-bit data bit judgment

BON(P)

Check whether the state of the BIN 16-bit data (N) bit of the device specified in (S) is ON or OFF, and output the result to the device specified in (D).

-[BON (S) (N) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	Data storage destination word device number	-	Signed BIN 16 bit	ANY16
(D)	Bit device number of drive	-	Bit	ANY16_BOOL
(N)	The position of the bit to be judged	0 to 15	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices																Offset modification	Pulse extension
		Y	M	S	SM	D.b	KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
BON	Parameter 1						●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●							●	●	●			●	●
	Parameter 3						●	●	●	●	●	●	●	●	●	●	●	●	●

Features

Check whether the state of the BIN 16-bit data (N) bit of the device specified in (S) is ON or OFF, and output the result to the device specified in (D).

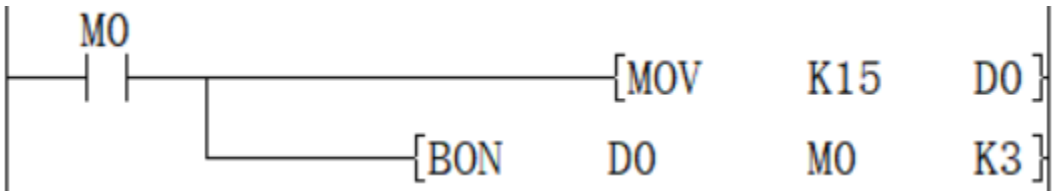
If the above result is ON, then (D)=ON, if it is OFF, then (D)=OFF.

If a constant (K) is specified in the device specified in (S), it will be automatically converted to BIN.

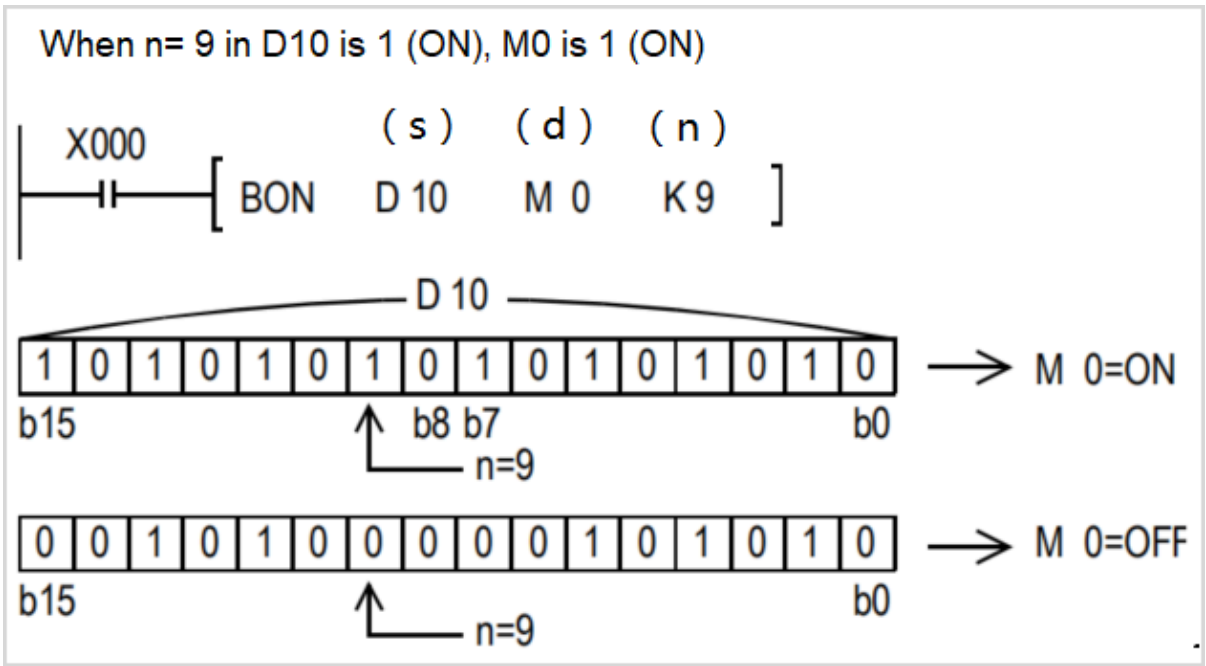
Error code

Error code	Content
4084H	The data input in (N) exceeds the specified range of 0 to 15.
4085H	When the device specified in the read application instructions (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When n in D0 = the third bit is 1 (ON), M0 is set to 1 (ON).



DBON/32-bit data bit judgment

DBON(P)

Check whether the state of the BIN 32-bit data (N) bit of the device specified in (S) is ON or OFF, and output the result to the device specified in (D).

-[DBON (S) (N) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	Data storage destination word device number	-	Signed BIN 32 bit	ANY32
(D)	Bit device number of drive	-	Bit	ANY32_BOOL
(N)	The position of the bit to be judged	0 to 31	Signed BIN 32 bit	ANY32

Device used

Instruction	Parameter	Devices																			Offset modification	Pulse extension
		Y	M	S	SM	D.b	KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	[D]		XXP
DBON	Parameter 1						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●							●	●	●					●	●	●
	Parameter 3						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

Check whether the BIN 32-bit data (N) bit status of the device specified in (S) is ON or OFF, and output the result to the device specified in (D).

If the above result is ON, then (D)=ON, if it is OFF, then (D)=OFF.

If a constant (K) is specified in the device specified in (S), it will be automatically converted to BIN.

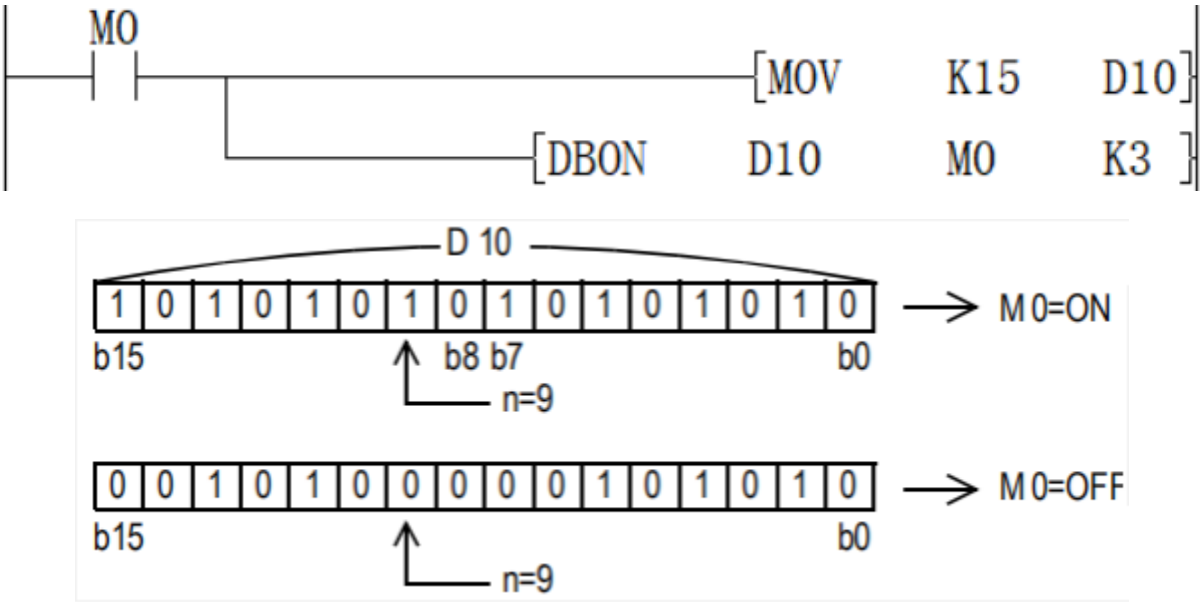
Error code

Error code	Content
4084H	The data input in (N) exceeds the specified range of 0 to 31.
4085H	When the device specified in the read application instructions (S) and (N) exceeds the corresponding device range

4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example

When n in D0 = the third bit is 1 (ON), M0 is set to 1 (ON).



ENCO/Encode

ENCO(P)

Encode the data of the 2th (N)th power from (S) and store it in (D).

-[ENCO (S) (N) (D)]

Content, range and data type

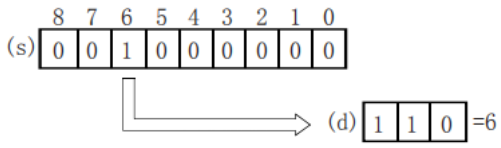
Parameter	Content	Range	Data type	Data type (label)
(S)	Start device for storing coded data	-	Bit/Signed BIN 16 bit	ANY_ELEMENTARY
(D)	Device number storing the encoding result	-	Signed BIN 16 bit	ANY_ELEMENTARY
(N)	Effective bit length	0 to 8	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices																	Offset modification	Pulse extension
		X	Y	M	S	SM	KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]		XXP
ENCO	Parameter 1	●	●	●	●	●					●	●	●	●	●			●		●
	Parameter 2							●	●	●	●	●	●	●	●			●		●
	Parameter 3						●	●	●	●	●	●	●	●	●	●	●	●		●

Features

The BIN value corresponding to the bit from $2^{(N)}$ bits of (S) to 1 is stored in (D).



When (N)=0, it will be no processing, and the content of the device specified in (D) will not change.

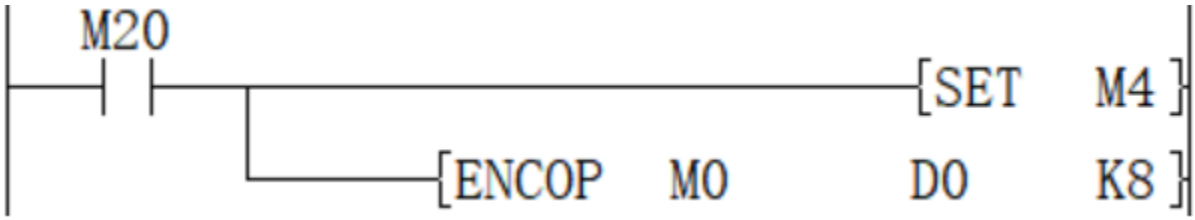
Bit devices are treated as 1 bit, and word devices are treated as 16 bits.

When multiple digits are 1, it will be processed at the upper position.

Error code

Error code	Content
	In the bit device specification of (S), when (N) is other than 0 to 8.
4084H	In the word device specification of (S), when (N) is other than 0 to 4.
	When the data of $2^{(N)}$ bits starting from (S) are all 0.
4085H	When the device specified in the read application instructions (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When M20 is turned ON, the D0 device is 16 after encoding.

DECO/Decode

DECO(P)

Decode the lower (N) bits of the device specified in (S), and store the result in the 2 (N)th power of the device specified in (D).

-[DECO (S) (N) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	Decoded data or the device number storing the decoded data	-	Bit/Signed BIN 16 bit	ANY_ELEMENTARY
(D)	The start device storing the decoding result	-	Signed BIN 16 bit	ANY_ELEMENTARY
(N)	Effective bit length	0 to 8	Signed BIN 16 bit	ANY16

Device used

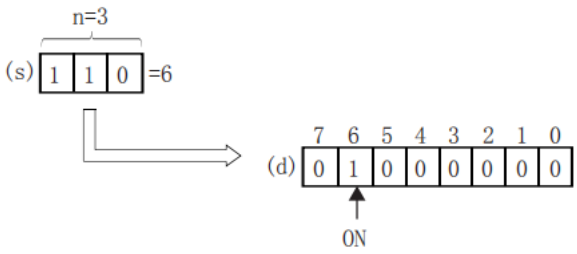
Instruction	Parameter	Devices															Offset modification	Pulse extension
		X	Y	M	S	SM	KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
DECO	Parameter 1	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2		●	●	●	●					●	●	●	●	●			●	●
	Parameter 3						●	●	●	●	●	●	●	●	●	●	●	●	●

Features

Turn ON the position of (D) corresponding to the BIN value specified in the lower (N) bit of (S).

When (N)=0, it will be no processing, and the content of the device specified in (D) will not change.

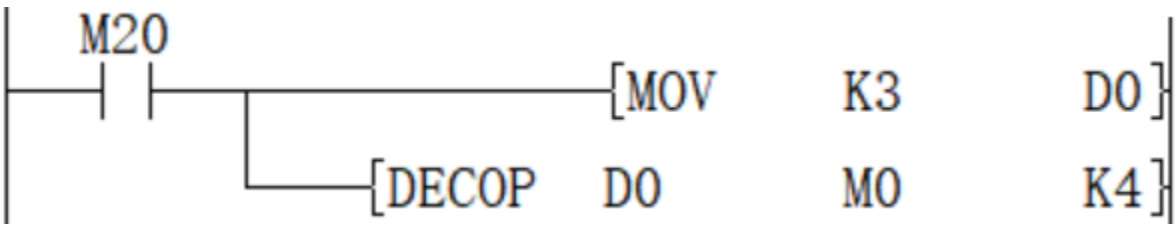
Bit devices are treated as 1 bit, and word devices are treated as 16 bits.



Error code

Error code	Content
4084H	In the bit device specification of (D), when (N) is other than 0 to 8. In the word device specification of (D), when (N) is other than 0 to 4.
4085H	When the device specified in the read application instructions (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When M20 is ON, M3 will be turned ON.

SUM/The ON bits of 16-bit data

SUM(P)

Store the total number of bits at 1 in the BIN 16-bit data of the device specified in (S) to the device specified in (D).

-[SUM (S) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The device start number that counts the total number of bits at 1	-	Signed BIN 16 bit	ANY16
(D)	The device start number of the total number of storage bits	-	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices										Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
SUM	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2		●	●	●	●	●	●	●	●			●	●

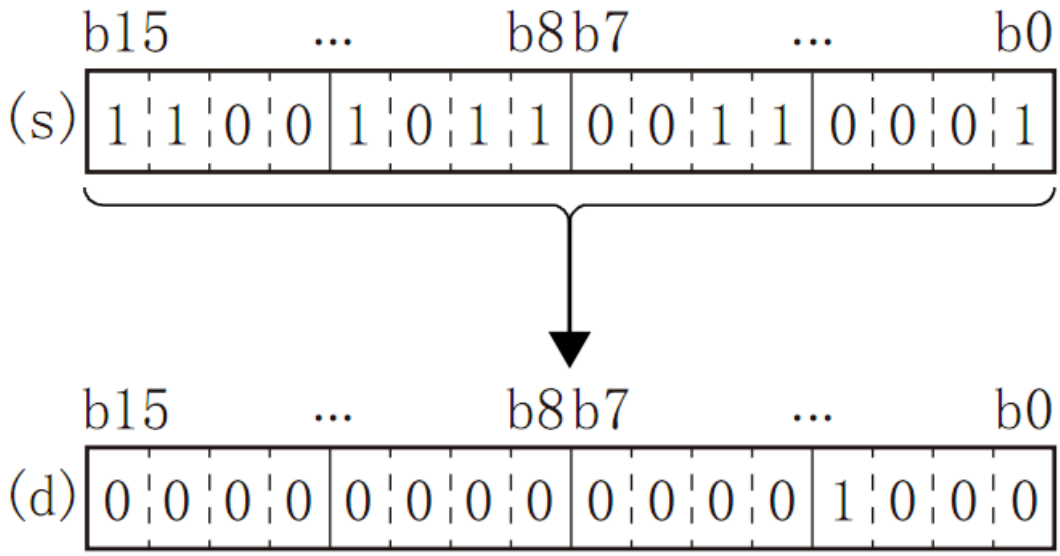
Features

Store the total number of bits at 1 in the BIN 16-bit data of the device specified in (S) to the device specified in (D).

When the BIN 16-bit data of the device specified in (S) is all 0, the zero flag (SM153) turns on.

The total number of 1 (ON) is stored in BIN.

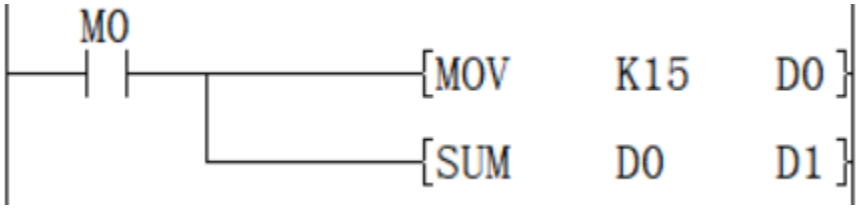
There are 8 in the example on the left.



Error code

Error code	Content
4085H	When the device specified in the read application instructions (S) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When M0 is ON, the number of ON bits in D0 is counted and stored in D1. The value after D1 is executed is 4.

DSUM/The ON bits of 32-bit data

DSUM(P)

Store the total number of bits at 1 in the BIN 32-bit data of the device specified in (S) to the device specified in (D).

-[SUM (S) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The device start number that counts the total number of bits at 1	-	Signed BIN 32 bit	ANY32
(D)	The device start number of the total number of storage bits	-	Signed BIN 32 bit	ANY32

Device used

Instruction	Parameter	Devices												Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	[D]	XXP
DSUM	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2		●	●	●	●	●	●	●	●	●	●			●	●

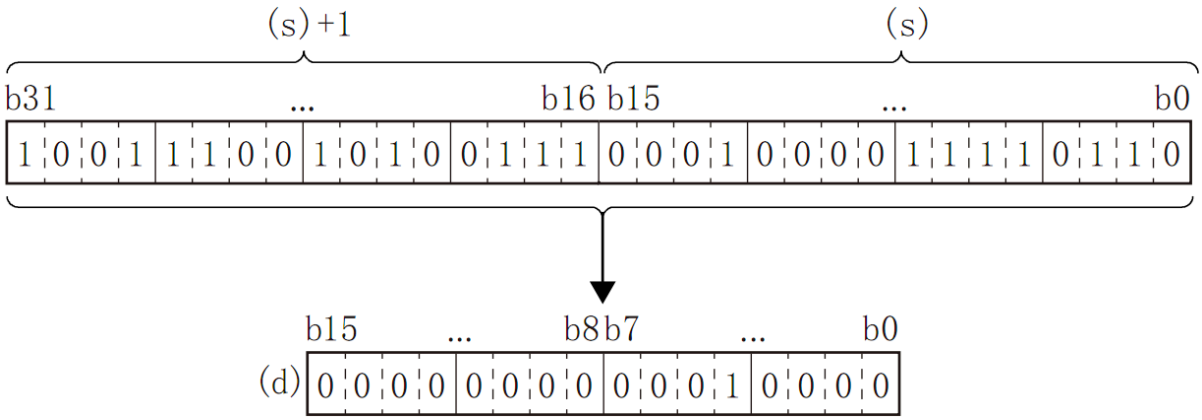
Features

Store the total number of bits at 1 in the BIN 32-bit data of the device specified in (S) to the device specified in (D).

When the BIN 32-bit data of the device specified in (S) is all 0 (OFF), the zero flag (SM153) turns on.

The total number of 1 (ON) is stored in BIN.

There are 16 in the example on the left.

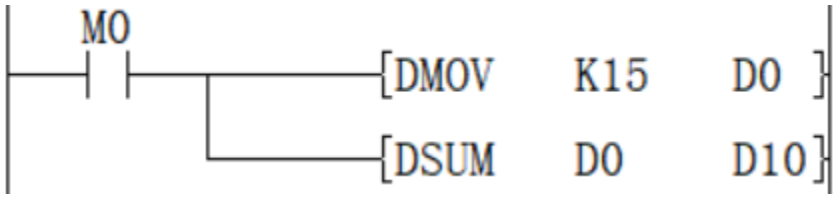


#Note: When the instruction input is OFF, the instruction will not be executed, and the output of the ON digits of the action will remain the same as before.

Error code

Error code	Content
4085H	When the device specified in the read application instructions (S) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When M0 is ON, the number of ON bits in D0 is counted and stored in D10, and the value after D10 is executed is 4.

MEAN/Mean value of 16-bit data

MEAN(P)

Store the total number of bits at 1 in the BIN 16-bit data of the device specified in (S) to the device specified in (D).

-[MEAN (S) (D) (N)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The device start number storing the data for average calculation	-	Signed BIN 16 bit	ANY16
(D)	The device start number storing the average value	-	Signed BIN 16 bit	ANY16

(N)	Number of data or the device number storing the number of data	1 to 32767	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices										Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
MEAN	Parameter 1	●	●	●	●	●	●	●	●	●			●	●
	Parameter 2		●	●	●	●	●	●	●	●			●	●
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

Calculate the average value of the 16-bit data at (N) points starting from the device specified in (S) and store it in the device specified in (D).

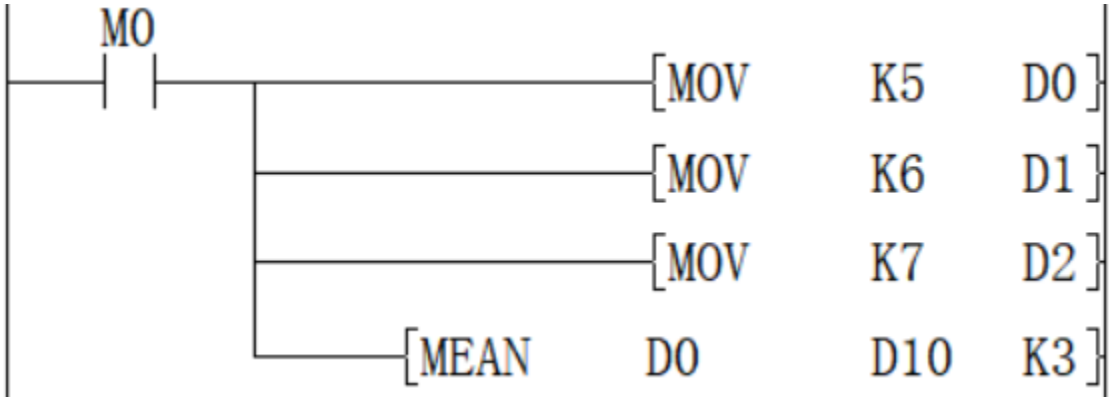
The total is calculated from the algebraic sum and divided by (N).

The remainder is rounded off.

Error code

Error code	Content
4084H	The data input by (N) in the application instruction exceeds the specifiable range. N≤0
4085H	When the device specified in the read application instructions (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



Add the data of D0, D1, and D2 and save the value obtained after dividing by 3 in D10. The calculated average value is 6.

DMEAN/Mean value of 16-bit data

DMEAN(P)

Store the total number of bits at 1 in the BIN 32-bit data of the device specified in (S) to the device specified in (D).

-[DMEAN (S) (D) (N)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The device start number storing the data for average calculation	-	Signed BIN 32 bit	ANY32
(D)	The device start number storing the average value	-	Signed BIN 32 bit	ANY32
(N)	Number of data or the device number storing the number of data	1 to 2147483647	Signed BIN 32 bit	ANY32

Device used

Instruction	Parameter	Devices												Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	[D]	XXP
DMEAN	Parameter 1	●	●	●	●	●	●	●	●	●	●	●			●	●
	Parameter 2		●	●	●	●	●	●	●	●	●	●			●	●
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

Calculate the mean value of BIN 32-bit data at (N) points starting from the device specified in (S) and store it in the device specified in (D).

The total is calculated from the algebraic sum and divided by (N).

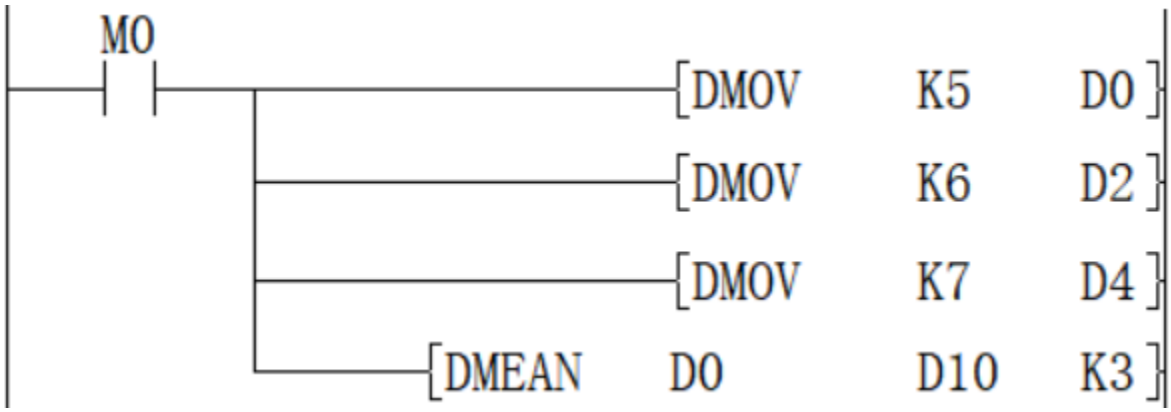
The remainder is rounded off.

#Note: When the device number exceeds, (N) is handled as a smaller value within the allowable range.

Error code

Error code	Content
4084H	The data input in (N) exceeds the specifiable range. N≤0
4085H	When the device specified in the read application instructions (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



Add the data of D0, D2, and D4, and save the value obtained after dividing by 3 in D10 and D11, and the calculated average value is 6.

SQR/16-bit square root

SQR(P)

Calculate the square root of the BIN 16-bit data specified in (S), and store the calculation result in (D).

-[SQR (S) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The data device storing for square root calculation	0 to +32767	Signed BIN 16 bit	ANY16
(D)	The device storing the calculated square root	-	Signed BIN 16 bit	ANY16

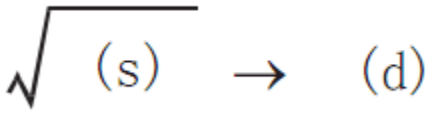
Device used

Instruction	Parameter	Devices	Offset modification	Pulse extension

		D	R	SD	K	H	[D]	XXP
SQR	Parameter 1	●	●	●	●	●	●	●
	Parameter 2	●	●	●			●	●

Features

Calculate the square root of the BIN 16-bit data specified in (S), and store the calculation result in (D).



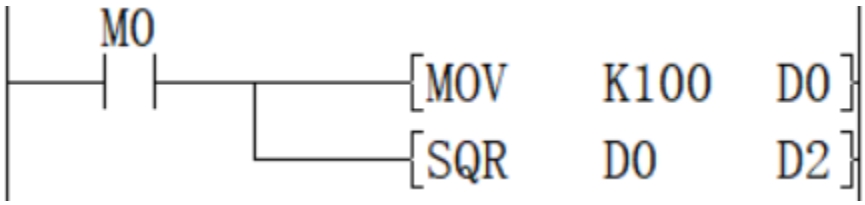
#Note: The decimal point of operation result will be rounded off and become an integer. If rounding occurs, SM152 (borrow flag) turns ON.

When the operation result is really 0, SM153 (zero flag) turns ON.

Error code

Error code	Content
4084H	When a negative value is specified in (S).
4085H	When the device specified in the read application instructions (S) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



The square root of D0 is stored in D2, and the value of D0 is 100, so the value of D2 is 10.

DSQR/32-bit square root

DSQR(P)

Calculate the square root of the BIN 32-bit data specified in (S), and store the calculation result in (D).

-[DSQR (S) (D)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The data device storing for square root calculation	0 to 2147483647	Signed BIN 32 bit	ANY32
(D)	The device storing the calculated square root	-	Signed BIN 32 bit	ANY32

Device used

Instruction	Parameter	Devices	Offset modification	Pulse extension

		D	R	SD	LC	HSC	K	H	[D]	XXP
DSQR	Parameter 1	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●			●	●

Features

Calculate the square root of the BIN 32-bit data specified in (S) and store the calculation result in (D).

$$\sqrt{(s)+1,\ (s)} \rightarrow (d)+1,\ (d)$$

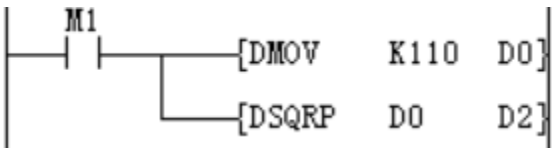
#Note: The decimal point of operation result will be rounded off and become an integer. If rounding occurs, SM152 (borrow flag) turns ON.

When the operation result is really 0, SM153 (zero flag) turns on.

Error code

Error code	Content
4084H	When a negative value is specified in (S).
4085H	When the device specified in the read application instructions (S) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



The square root of D0 is stored in D2, and the value of D0 is 110, so the value in the D2 soft component is 10 (the fractional part is discarded), and the borrow flag SM152 is turned ON.

WSUM/The sum value of 16-bit data

WSUM(P)

After adding all the BIN 16-bit data of point starting from the device specified in (S), it is stored in the device specified in (D).

-[WSUM (S) (D) (N)]

Content, range and data type

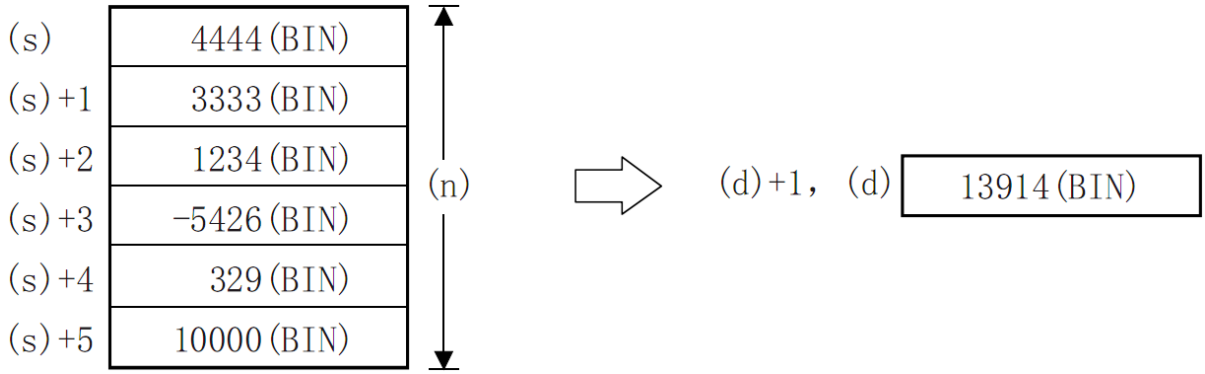
Parameter	Content	Range	Data type	Data type (label)
(S)	The device start number storing the data for sum value calculation	-	Signed BIN 16 bit	ANY16
(D)	The device start number storing the sum value	-	Signed BIN 32 bit	ANY32
(N)	Number of data	-	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices											Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
WSUM	Parameter 1					●	●	●	●	●			●	●
	Parameter 2		●	●	●	●	●	●	●	●			●	●
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

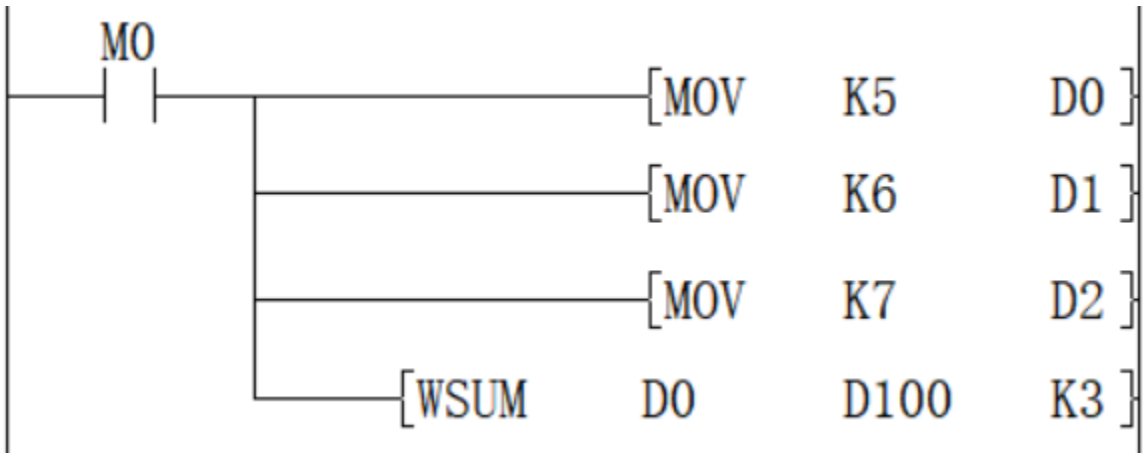
After adding all the BIN 16-bit data of point (N) starting from the device specified in (S), it is stored in the device specified in (D).



Error code

Error code	Content
4084H	When a negative value is specified in (N).
4085H	When the device specified in the read application instructions (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When M0=ON, the total of 16-bit data of D0 to D2 is saved in [D100, D101], and the accounting result is 18.

DWSUM/The sum value of 32-bit data

DWSUM(P)

Add all the 32-bit BIN data of point (N) starting from the device specified in (S) and store it in the device specified in (D).

-[DWSUM (S) (D) (N)]

Content, range and data type

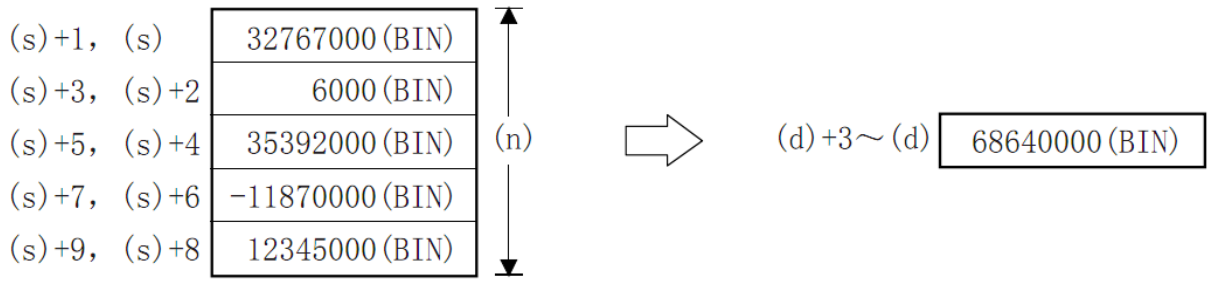
Parameter	Content	Range	Data type	Data type (label)
(S)	The device start number storing the data for total value calculation	-	Signed BIN 32 bit	ANY32
(D)	The device start number storing the total value	-	Signed BIN64 bit	ANY64
(N)	Number of data	-	Signed BIN 32 bit	ANY32

Device used

Instruction	Parameter	Devices												Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	[D]	XXP
DWSUM	Parameter 1					●	●	●	●	●	●	●			●	●
	Parameter 2		●	●	●	●	●	●	●	●	●	●			●	●
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

Add all the 32-bit BIN data of point starting from the device specified in (s) and store it in the device specified in (d).



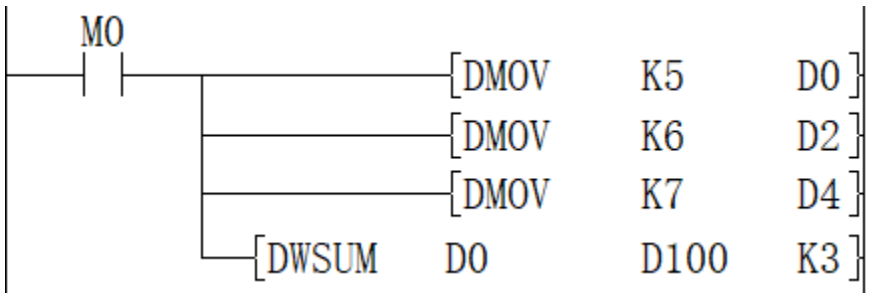
#Note: When the number of bits is specified in (D), the value of n ranges from 1 to 8, such as K8 (32-bit instructions, such as K8M0) without K16 (64-bit instructions).

Error code

Error code	Content
4084H	When a negative value is specified in (N).
4085H	When the device specified in the read application instructions (S) and (N) exceeds the corresponding device range

4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When M0=ON, the total of 16-bit data of D0 to D2 is saved in [D100, D101], and the accounting result is 18.

SORT/16-bit data sorting

SORT

Sort the data rows in ascending order based on the group data of column (N3) in the BIN 16-bit data table (sorting source) of (N1×N2) points specified in (S) and store them in the specified in (D) (N1×N2) points in the BIN 16-bit data table (after sorting).

-[SORT (S) (N1) (N2) (D) (N3)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The start device number storing the data table	-	Signed BIN 16 bit	ANY16
(N1)	Number of data (rows)	1 to 32	Signed BIN 16 bit	ANY16
(N2)	Number of group data (columns)	1 to 6	Signed BIN 16 bit	ANY16
(D)	The start device number storing the operation result	-	Signed BIN 16 bit	ANY16
(N3)	The column number of the group data (column) as the sorting basis	-	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices											Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
SORT	Parameter 1					●	●	●	●	●			●	
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	
	Parameter 4					●	●	●	●	●			●	
	Parameter 5	●	●	●	●	●	●	●	●	●	●	●	●	

Features

The BIN 16-bit data table (sorting source) of (N1×N2) points specified in (S), based on the group data of column (N3), sort the data rows in ascending order, and store them in (D). The (N1×N2) point of the BIN 16-bit data table (after sorting).

Take (N1)=K3, (N2)=K4 in the sort source as an example, the data table structure is as follows. In the case of a sorted data table, (S) should be replaced with (D).

		Number of groups (N2) ((N2)=K4)			
		Column NO. 1	**Column NO. 2**	**Column NO. 3**	**Column NO. 4**
		Management number	**Height**	**Weight**	**Age**
When the number of data (N1)=3	Line NO.1	(S)	(S) +3	(S) +6	(S) +9
	Line NO.2	(S)+1	(S) +4	(S) +7	(S) +10
	Line NO.3	(S)+2	(S) +5	(S) +8	(s) +11

Data alignment starts when instruction input is ON, data alignment ends after (N1) scan, instruction execution end flag SM229 is set to ON. According to the source data sorted as follows, an example of the operation is shown below. In addition, by putting serial numbers such as management numbers in the first column in advance, the original row number can be judged based on the content, which is very convenient.

		Number of groups (N2) ((N2)=K4)			
		Column NO. 1	**Column NO. 2**	**Column NO. 3**	**Column NO. 4**
		Management number	**Height**	**Weight**	**Age**
When the number of data (N1) = 5	Line NO.1	(S)	(S) +5	(S) +10	(S) +15
		1	150	45	20
	Line NO.2	(S)+1	(S) +6	(S) +11	(S) +16
		2	180	50	40
	Line NO.3	(S)+2	(S) +7	(S) +12	(S) +17
		3	160	70	30
	Line NO.4	(S) +3	(S) +8	(S) +13	(S) +18
		4	100	20	8
	Line NO.5	(S) +4	(S) +9	(S) +14	(S) +19
		5	150	50	45

Press (N3)=K2 (column number 2) to execute the sorting result.

		Number of groups (N2) ((N2)=K4)			
		Column NO.1	**Column NO.2**	**Column NO.3**	**Column NO.4**
		Management number	**Height**	**Weight**	**Age**
When the number of data (N1) = 5	Line NO.1	(D)	(D) +5	(D) +10	(D) +15
		4	100	20	8
	Line NO.2	(D) +1	(D) +6	(D) +11	(D) +16
		1	150	45	20
	Line NO.3	(D) +2	(D) +7	(D) +12	(D) +17
		5	150	50	45
	Line NO.4	(D) +3	(D) +8	(D) +13	(D) +18
		3	160	70	30
	Line NO.5	(D) +4	(D) +9	(D) +14	(D) +19
		2	180	50	40

Press (N3)=K3 (column number 3) to execute the sorting result.

		Number of groups (N2) ((N2)=K4)			
		Column NO.1	**Column NO.2**	**Column NO.3**	**Column NO.4**
		Management number	**Height**	**Weight**	**Age**
When the number of data (N1) = 5	Line NO.1	(D)	(D) +5	(D) +10	(D) +15
		4	100	20	8
	Line NO.2	(D) +1	(D) +6	(D) +11	(D) +16
		1	150	45	20
	Line NO.3	(D) +2	(D) +7	(D) +12	(D) +17
		2	180	50	40
	Line NO.4	(D) +3	(D) +8	(D) +13	(D +18
		5	150	50	45
	Line NO.5	(D) +4	(D) +9	(D) +14	(D) +19
		3	160	70	30

#**Note:** only ascending order is supported by SORT instruction .

Do not change the operand and data content during operation.

When executing again, the instruction input should be turned OFF once.

SORT instruction can drive at most one in the program.

When the same device is specified in (S) and (D), the source data is rewritten to the sorted data order. Please pay special attention not to change the content of (S) before the end of execution.

Error code

Error code	Content
4084H	When the value specified in (N1) exceeds the range of 1 to 32 When the value specified in (N2) exceeds the range of 1 to 6 When the value specified in (N3) exceeds the range of 1 to n2
4085H	When the device specified in read application instruction (S), (N1), (N2)and (N3) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range
4087H	When the (D) parameter in the application instruction uses an unsupported device
4089H	The number of application instructions exceeds the limit.

Example

Refer to the function description example.

SORT2/16-bit data sorting

SORT2(P)

Sort the data rows in ascending or descending order based on the group data in column (N3), and store them in (D), based on the BIN 16-bit data table (sorting source) of (N1×N2) points specified in (S) In the BIN 16-bit data table (after sorting) of the specified (N1×N2) points.

-[SORT2 (S) (N1) (N2) (D) (N3)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The start device number storing the data table	-	Signed BIN 16 bit	ANY16
(N1)	Number of data (rows)	1 to 32	Signed BIN 16 bit	ANY16
(N2)	Number of group data (columns)	1 to 6	Signed BIN 16 bit	ANY16
(D)	The start device number storing the operation result	-	Signed BIN 16 bit	ANY16
(N3)	The column number of the group data (column) as the sorting basis	-	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices											Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
SORT2	Parameter 1					●	●	●	●	●			●	
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	
	Parameter 4					●	●	●	●	●			●	
	Parameter 5	●	●	●	●	●	●	●	●	●	●	●	●	

Features

Sort the data rows in ascending or descending order based on the group data in column (N3) and store them in (D) (N1×N2) point specified in the BIN 16-bit data table (after sorting).

Take (N1)=K3, (N2)=K4 in the sort source as an example, the data table structure is as follows. In the case of a sorted data table, (S) should be replaced with (D).

		When the number of groups (N2) (N2) = K4			
		Column NO.1	Column NO.2	Column NO.3	Column NO.4
		Management number	Height	Weight	Age
When the number of data (N1)=3	Line NO.1	(S)	(S)+1	(S) +2	(S) +3
	Line NO.2	(S) +4	(S) +5	(S) +6	(S) +7
	Line NO.3	(S) +8	(S) +9	(S) +10	(S) +100

Sequence is set by the ON/OFF status of SM165

	Sort order setting instruction
SM165=ON	Descending
SM165=OFF	Ascending

Data alignment starts when instruction input is ON, data alignment ends after (N1) scan, instruction execution end flag SM229 is set to ON.

According to the source data sorted as follows, an example of the operation is shown below. In addition, by putting serial numbers such as management numbers in the first column in advance, the original row number can be judged based on the content, which is very convenient.

		When the number of groups (N2) (N2) = K4			
		Column NO.1	**Column NO.2**	**Column NO.3**	**Column NO.4**
		Management number	**Height**	**Weight**	**Age**
When the number of data (N1) = 5	Line NO.1	(S)	(S)+1	(S) +2	(S) +3
		1	150	45	20
	Line NO.2	(S) +4	(S) +5	(S) +6	(S) +7
		2	180	50	40
	Line NO.3	(S) +8	(S) +9	(S) +10	(S) +100
		3	160	70	30
	Line NO.4	(S) +12	(S) +13	(S) +14	(S) +15
		4	100	20	8
	Line NO.5	(S) +16	(S) +17	(S) +18	(S) +19
		5	150	50	45

Press (N3)=K2 (column number 2) to execute the sorting result (SM165=OFF in the case of ascending order)

		When the number of groups (N2) (N2) = K4			
		Column NO.1	**Column NO.2**	**Column NO.3**	**Column NO.4**
		Management number	**Height**	**Weight**	**Age**
When the number of data (N1) = 5	Line NO.1	(D)	(D) +1	(D) +2	(D) +3
		4	100	20	8
	Line NO.2	(D) +4	(D) +5	(D) +6	(D) +7
		1	150	45	20
	Line NO.3	(D) +8	(D) +9	(D) +10	(D) +100
		5	150	50	45
	Line NO.4	(D) +12	(D) +13	(D) +14	(D) +15
		3	160	70	30
	Line NO.5	(D) +16	(D) +17	(D) +18	(D) +19
		2	180	50	40

Press (N3)=K3 (column number 3) to execute the sorting result (SM165=ON in the case of ascending order)

		When the number of groups (N2) (N2) = K4			
		Column NO.1	**Column NO.2**	**Column NO.3**	**Column NO.4**
		Management number	**Height**	**Weight**	**Age**
When the number of data (N1) = 5	Line NO.1	(D)	(D) +1	(D) +2	(D) +3
		3	160	70	30
	Line NO.2	(D) +4	(D) +5	(D) +6	(D) +7
		2	180	50	40
	Line NO.3	(D) +8	(D) +9	(D) +10	(D) +100
		5	150	50	45
	Line NO.4	(D) +12	(D) +13	(D) +14	(D) +15

Line NO.5	1	150	45	20
	(D) +16	(D) +17	(D) +18	(D) +19
	4	100	20	8

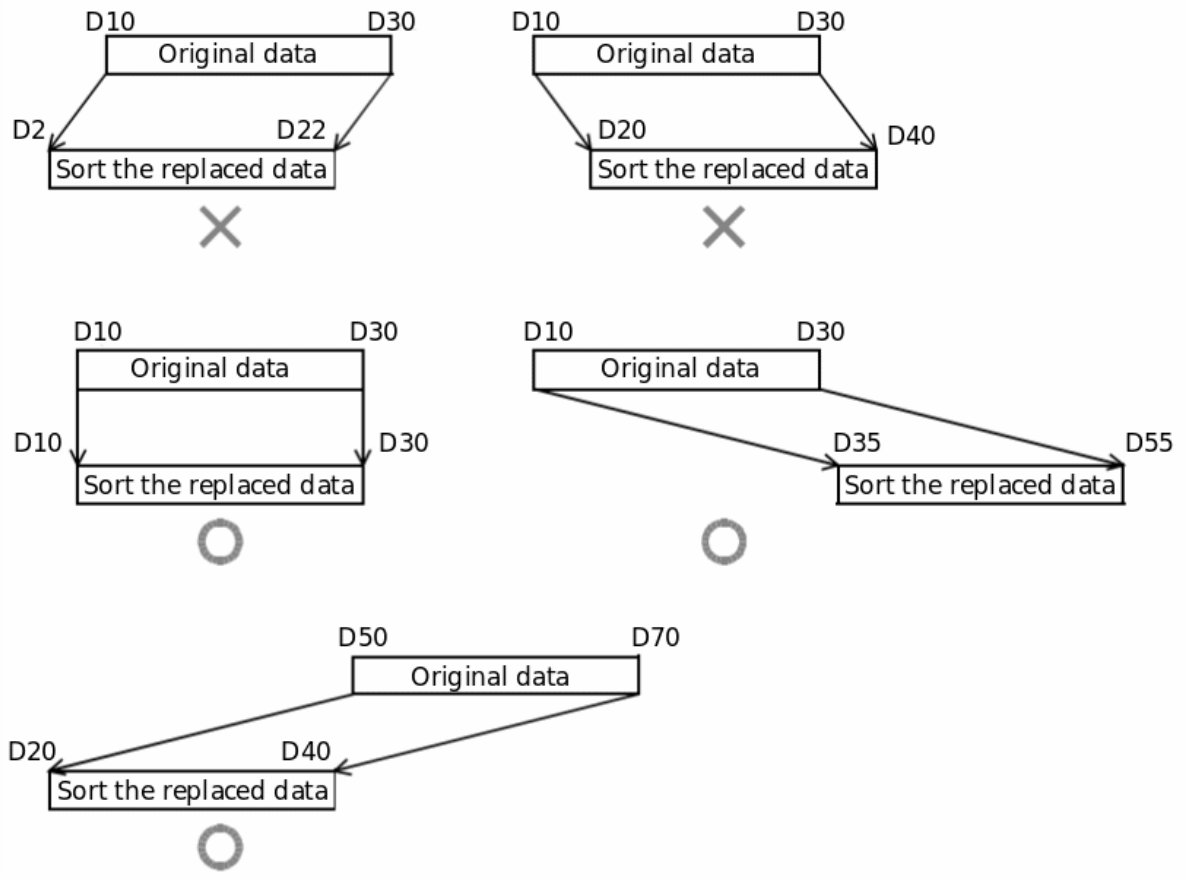
#Note: Do not change the operand and data content during operation.

When executing again, the instruction input should be turned OFF once.

The SORT2 instruction can only be written in the program to drive 2 at most.

When the same device is specified in (S) and (D), the source data is rewritten to the sorted data order. Please pay special attention not to change the content of (S) before the end of execution.

Do not overlap the source data and the sorted data.



Error code

Error code	Content
4084H	When the value specified in (N1) exceeds the range of 1 to 32 When the value specified in (N2) exceeds the range of 1 to 6 When the value specified in (N3) exceeds the range of 1 to n2
4085H	When the device specified in read application instruction (S), (D), (N1), (N2)and (N3) exceeds the corresponding device range

4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range
4089H	The number of application instructions exceeded the limit.

Example

Refer to the function description example.

DSORT2/32-bit data sorting

DSORT2(P)

Sort the data rows in ascending or descending order based on the group data of column (N3) in the BIN 32-bit data table (sorting source) of (N1×N2) points specified in (S) and store them in (D) The specified (N1×N2) point BIN 32-bit data table (after sorting).

-[DSORT2 (S) (N1) (N2) (D) (N3)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The start device number storing the data table	-	Signed BIN 32 bit	ANY32
(N1)	Number of data (rows)	1 to 32	Signed BIN 32 bit	ANY32
(N2)	Number of group data (columns)	1 to 6	Signed BIN 32 bit	ANY32
(D)	The start device number storing the operation result	-	Signed BIN 32 bit	ANY32
(N3)	The column number of the group data (column) as the sorting basis	-	Signed BIN 32 bit	ANY32

Device used

Instruction	Parameter	Devices													Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	K	H	[D]	XXP
DSORT2	Parameter 1					●	●	●	●	●	●	●			●	
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Parameter 4					●	●	●	●	●	●	●			●	

Parameter 5	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

Sort the data rows in ascending or descending order based on the group data in the (N3) column of the (N1×N2) point BIN 32-bit data table (sorting source) specified in (S), and store to (d) (N1×N2) specified in the BIN 32-bit data table (after sorting).

Take (N1)=K3, (N2)=K4 in the sort source as an example, the data table structure is as follows. In the case of a sorted data table, (S) should be replaced with (D).

		When the number of groups (N2) (N2) = K4			
		Column NO.1	**Column NO.2**	**Column NO.3**	**Column NO.4**
		Management number	**Height**	**Weight**	**Age**
When the number of data (N1)=3	Line NO.1	(S)+1, (S)	(S)+3, (S)+2	(S)+5, (S)+4	(S) +7, (S) +6
	Line NO.2	(S) +9, (S) +8	(S)+11, (S)+10	(S) +13, (S) +12	(S) +15, (S) +14
	Line NO.3	(S) +17, (S) +16	(S) +19, (S) +18	(S) +21, (S) +20	(S) +23, (S) +22

Sequence is set by the ON/OFF status of SM165

	Sort order setting instructions
SM165=ON	Descending
SM165=OFF	Ascending

Data alignment starts when instruction input is ON, data alignment ends after (n1) scan, instruction execution end flag SM229 is set to ON.

According to the source data sorted as follows, an example of the operation is shown below. In addition, by putting serial numbers such as management numbers in the first column in advance, the original row number can be judged based on the content, which is very convenient.

		When the number of groups (N2) (N2) = K4			
		Column NO.1	**Column NO.2**	**Column NO.3**	**Column NO.4**
		Management number	**height**	**body weight**	**age**
When the number of data (N1) = 5	Line NO.1	(S)+1, (S) 1	(S)+3, (S)+2 150	(S)+5, (S)+4 45	(S) +7, (S) +6 20
	Line NO.2	(S) +9, (S) +8 2	(S)+11, (S)+10 180	(S) +13, (S) +12 50	(S) +15, (S) +14 40
	Line NO.3	(S) +17, (S) +16 3	(S) +19, (S) +18 160	(S) +21, (S) +20 70	(S) +23, (S) +22 30
	Line NO.4	(S) +25, (S) +24 4	(S) +27, (S) +26 100	(S) +29, (S) +28 20	(S) +31, (S) +30 8
	Line NO.5	(S) +33, (S) +32 5	(S) +35, (S) +34 150	(S) +37, (S) +36 50	(S) +39, (S) +38 45

Press (N3)=K2 (column NO.2) to execute the sorting result (SM165=OFF in the case of ascending order)

		When the number of groups (N2) (N2) = K4			
		Column NO.1	**Column NO.2**	**Column NO.3**	**Column NO.4**
		Management number	**height**	**body weight**	**age**
When the number of data (N1) = 5	Line NO.1	(S)+1, (S) 4	(S)+3, (S)+2 100	(S)+5, (S)+4 20	(S) +7, (S) +6 8

	Line NO.2	(S) +9, (S) +8 1	(S)+11, (S)+10 150	(S) +13, (S) +12 45	(S) +15, (S) +14 20
	Line NO.3	(S) +17, (S) +16 5	(S) +19, (S) +18 150	(S) +21, (S) +20 50	(S) +23, (S) +22 45
	Line NO.4	(S) +25, (S) +24 3	(S) +27, (S) +26 160	(S) +29, (S) +28 70	(S) +31, (S) +30 30
	Line NO.5	(S) +33, (S) +32 2	(S) +35, (S) +34 180	(S) +37, (S) +36 50	(S) +39, (S) +38 40

Press (N3)=K3 (column NO.3) to execute the sorting result (SM165=ON in the case of ascending order)

		When the number of groups (N2) (N2) = K4			
		Column NO.1	**Column NO.2**	**Column NO.3**	**Column NO.4**
		Management number	**height**	**body weight**	**age**
When the number of data (N1) = 5	Line NO.1	(S)+1, (S) 3	(S)+3, (S)+2 160	(S)+5, (S)+4 70	(S) +7, (S) +6 30
	Line NO.2	(S) +9, (S) +8 2	(S)+11, (S)+10 180	(S) +13, (S) +12 50	(S) +15, (S) +14 40
	Line NO.3	(S) +17, (S) +16 5	(S) +19, (S) +18 150	(S) +21, (S) +20 50	(S) +23, (S) +22 45
	Line NO.4	(S) +25, (S) +24 1	(S) +27, (S) +26 150	(S) +29, (S) +28 45	(S) +31, (S) +30 20
	Line NO.5	(S) +33, (S) +32 4	(S) +35, (S) +34 100	(S) +37, (S) +36 20	(S) +39, (S) +38 8

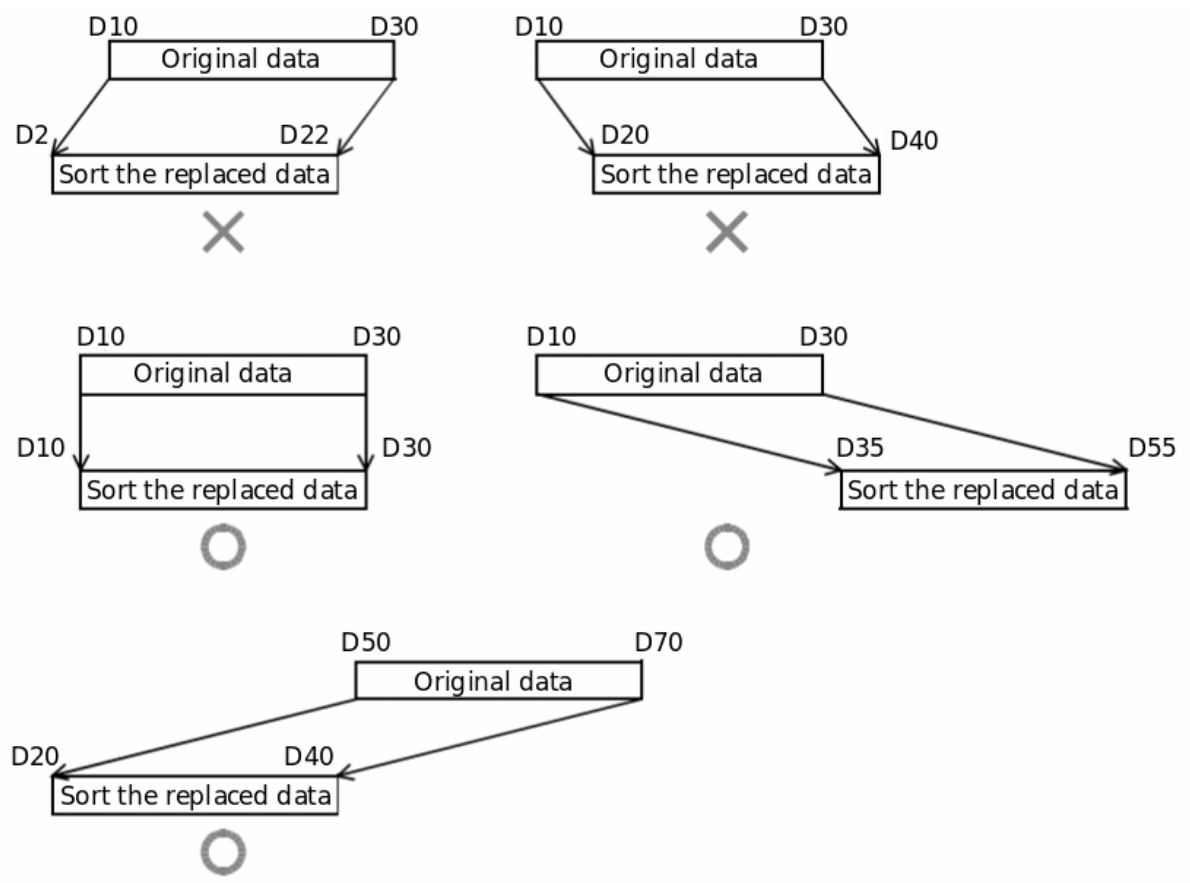
#**Note:** Do not change the operand and data content during operation.

When executing again, the instruction input should be turned OFF once.

The SORT2 instruction can only be written twice in the program.

When the same device is specified in (S) and (D), the source data is rewritten to the sorted data order. Please pay special attention not to change the content of (S) before the end of execution.

Do not overlap the source data and the sorted data.

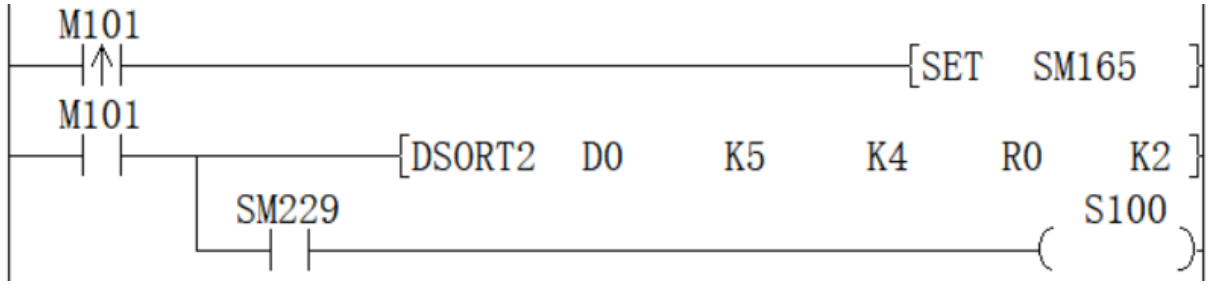


Error code

Error code	Content
	When the value specified in (N1) exceeds the range of 1 to 32
4084H	When the value specified in (N2) exceeds the range of 1 to 6
	When the value specified in (N3) exceeds the range of 1 to n2
4085H	When the device specified in read application instruction (S), (D), (N1), (N2)and (N3) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range
4089H	The number of application instructions exceeded the limit.

Example

Refer to the function description example.



SWAP/16-bit data high and low byte swap

SWAP(P)

Swap the high and low 8-bit value of the device specified in (D).

-[SWAP (D)]

Content, range and data type

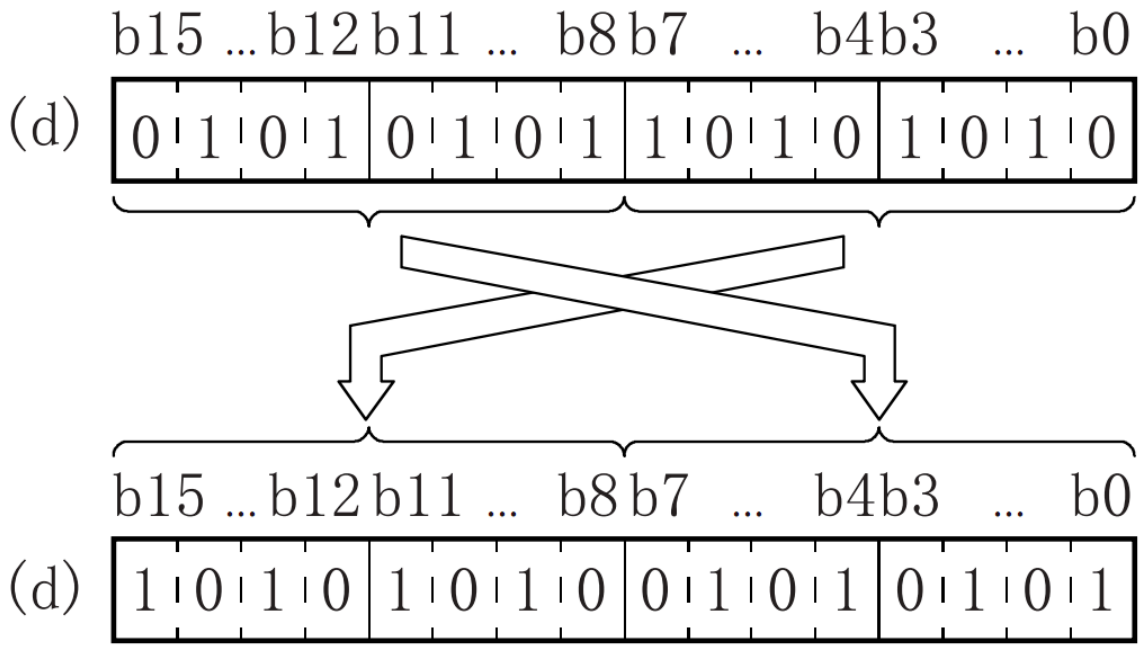
Parameter	Content	Range	Data type	Data type (label)
(D)	Word device with high and low byte swap	-	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices								Offset modification	Pulse extension
		KnY	KnM	KnS	T	C	D	R	SD	[D]	XXP
SWAP	Parameter 1	●	●	●	●	●	●	●	●	●	●

Features

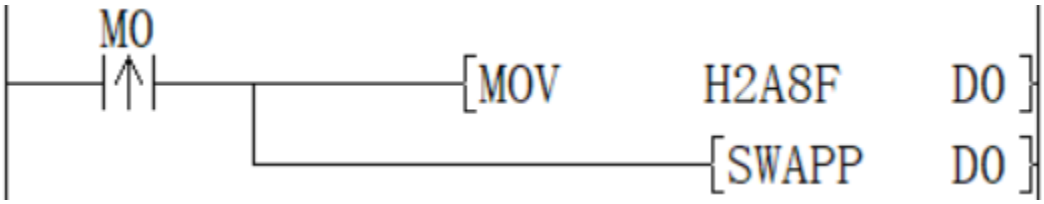
Convert the high and low 8-bit value of the device specified in (D).



Error code

Error code	Content
4085H	When the device specified in the read application instruction (D) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When the rising edge of M0 is triggered, swap the low 8 bits and high 8 bits of D0 to get H8F2A.

DSWAP/32-bit data high and low byte swap

DSWAP(P)

The devices specified in (D) and (D)+1 will be converted to the high and low 8-bit values respectively.

-[DSWAP (D)]

Content, range and data type

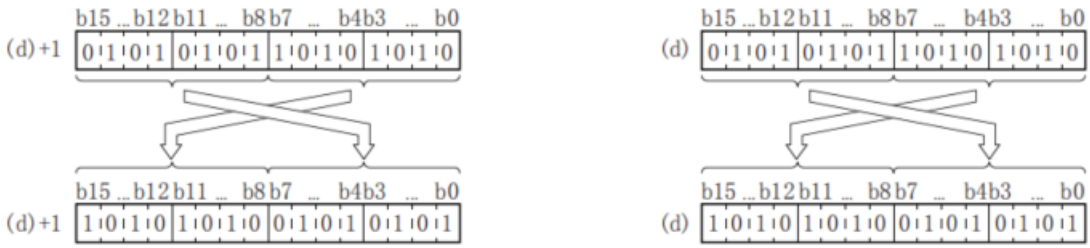
Parameter	Content	Range	Data type	Data type (label)
(D)	Word device with high and low byte swap	-	Signed BIN 32 bit	ANY32

Device used

Instruction	Parameter	Devices										Offset modification	Pulse extension
		KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	[D]	XXP
DSWAP	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●

Features

The devices specified in (D) and (D)+1 will be converted to the upper and lower 8-bit values respectively.



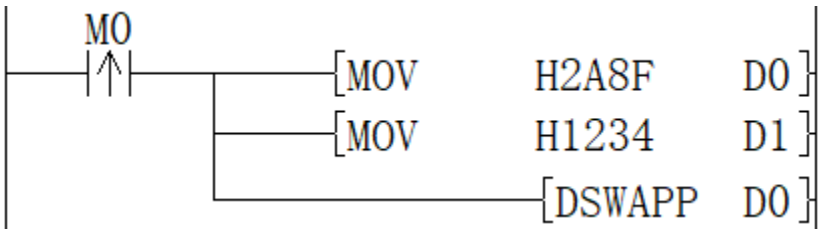
#**Note:** If continuous execution instructions are used, conversion will be performed every scan cycle.

Error code

Error code	Content
4085H	When the device specified in the read application instruction (D) exceeds the corresponding device range

4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When the rising edge of M0 is triggered, the low 8 bits and the high 8 bits of D0 and D1 are swapped, and D0=H8F2A, D1=H3412 are obtained.

Devices	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
D0	0	1	0	1	0	1	0	0	1	1	1	1	0	0	0	1	8F2A
D1	0	1	0	0	1	0	0	0	0	0	1	0	1	1	0	0	3412
D2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0000

BTOW/Byte unit data merge

BTOW(P)

Combine the low 8 bits of (N) bytes of BIN 16-bit data stored after the device number specified in (S) into word units and store it after the device number specified in (D).

-[BTOW (S) (D) (N)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The start device that stores the data merging in byte units	-	Signed BIN 16 bit	ANY16
(D)	The start device that stores the result of merging in byte units	-	Signed BIN 16 bit	ANY16
(N)	Number of byte data merged	0-32767	Signed BIN 16 bit	ANY16

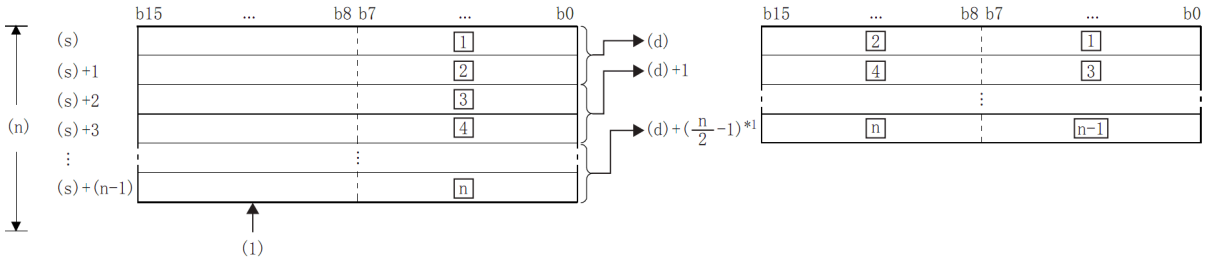
Device used

Instruction	Parameter	Devices											Offset modification [D]	Pulse extension XXP
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H		
BTOW	Parameter 1					●	●	●	●	●			●	●
	Parameter 2					●	●	●	●	●			●	●
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

After the device number specified in (s), the lower 8 bits of the 16-bit BIN data stored in bytes are combined into word units and stored in the device number specified in (d) or later.

The upper 8 bits of word data stored after the device number specified in (s) will be ignored. In addition, when is an odd number, 0 is stored in the upper 8 bits of the device storing the th byte of data.



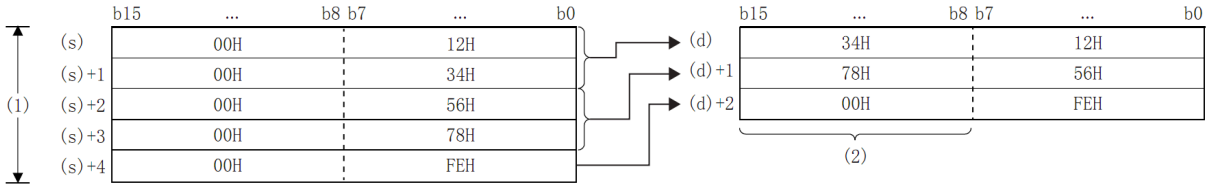
£: the £th byte data;

(1): Ignore the high byte

*1: Carry below the decimal point.

Example

When (N)=5, the data up to the lower 8 bits of (S)+(S)+4 is stored in (D)+(D)+2.



(1): When (N)=5

(2): Change to 00H

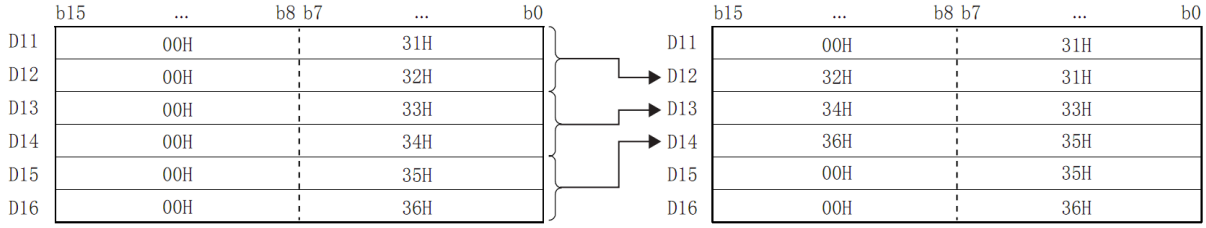
By setting the number of bytes in (N), the range of byte data specified in (S) and the range of the device storing the combined data specified in (D) will be automatically determined.

When the number of bytes specified in (N) is 0, no processing is performed.

The upper 8 bits of the byte data storage device specified in (S) will be ignored, and the lower 8 bits will be the target.

Example

When the low 8 bits of D11 to D16 is stored in D12 to D14.



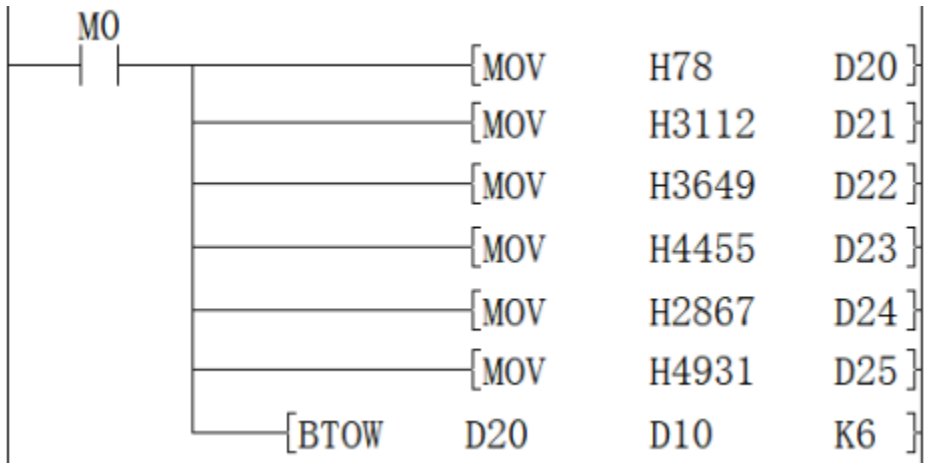
Even if the device range storing the data before merging overlaps the device rangestoring merged data, it will be handled as normal.

Device range storing the data before merging	Device range for storing merged data
(S)+0 to (S)+(N)-1	(D) to (D) + (N/2-1)

Error code

Error code	Content
4084H	The value specified in (N) exceed range of 0 to 32767
4085H	When the device specified in the write application instruction (S),(D) and (N) exceeds the corresponding device range

Example



When M0 is ON, the data of D20 to D25 is separated according to byte units, and then stored in D10 to D12.

WTOB/Byte unit data separation

WTOB(P)

After separating the BIN 16-bit data stored after the device number specified in (S) into (N) bytes, store it after the device number specified in (D).

-[WTOB (S) (D) (N)]

Content, range and data type

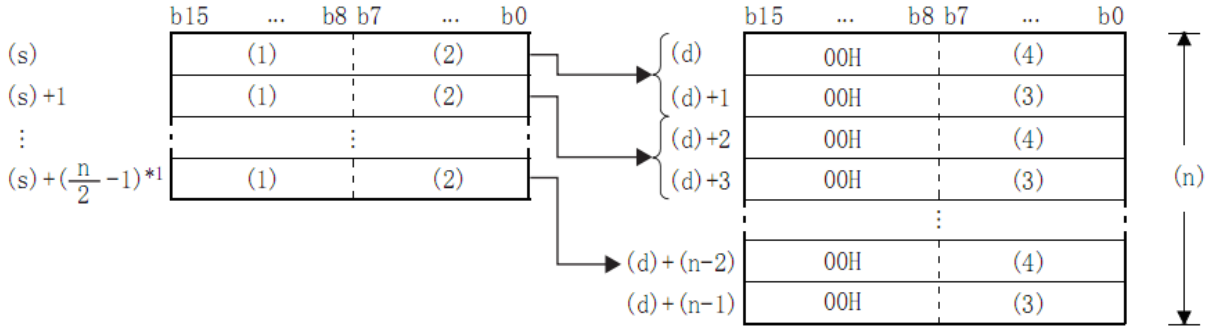
Parameter	Content	Range	Data type	Data type (label)
(S)	The start device that stores the data separation in byte unit	-	Signed BIN 16 bit	ANY16
(D)	The start device that stores the result of separation in byte unit	-	Signed BIN 16 bit	ANY16
(N)	Number of byte data separated	0-32767	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices							Offset modification	Pulse extension
		T	C	D	R	SD	K	H	[D]	XXP
WTOB	Parameter 1	●	●	●	●	●			●	●
	Parameter 2	●	●	●	●	●			●	●
	Parameter 3			●	●	●	●	●	●	●

Features

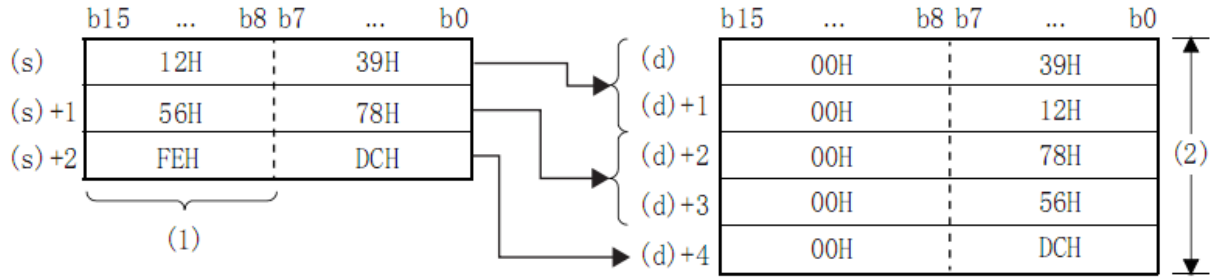
After separating the BIN 16-bit data stored after the device number specified in (S) into (N) bytes, store it after the device number specified in (D).



1. High byte;
2. Low byte;
3. High byte data;
4. Low byte data;
5. *1: Carry below the decimal point.

Example

In the case of (N)=5, store the data up to the lower 8 bits of (S) to (S)+2 in (D) to (D)+4:



1. (N)=5 is ignored.
2. (N)=5.

By setting the number of bytes in (N), the range of BIN 16-bit data specified in (S) and the range of the device storing the byte data specified in (D) will be automatically determined.

When the number of bytes specified in (N) is 0, no processing is performed.

00H is automatically stored in the upper 8 bits of the byte data storage device specified in (D).

Example

When D12 to D14 is stored in the low 8 bits of D11 to D16

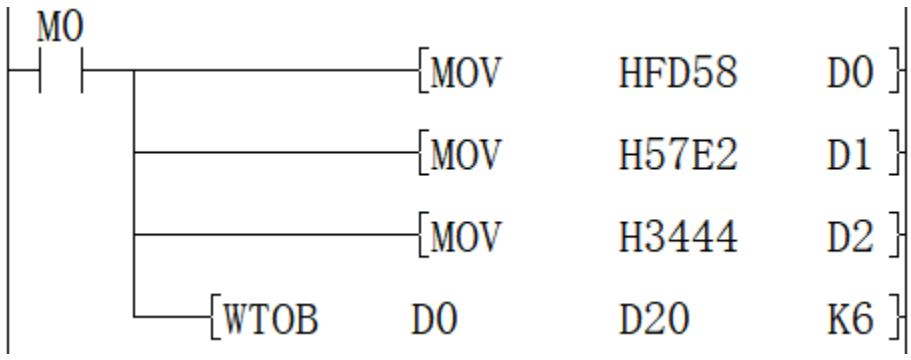
Even if the device range storing the data before merging overlaps the device rangestoring merged data, it will be handled as normal.

Device range storing the data before merging	Device range storing separated data
(S) to (S) + (N/2-1)	(D)+0 to (D)+(N)-1

Error code

Error code	Content
4084H	The value specified by (N) exceed the range of 0 to 32767
4085H	When the device specified in read application instruction (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When M0 is ON, the data of D10 to D12 are separated according to byte units, and then stored in D20 to D25.

DIS/4-bit separation of 16-bit data

DIS(P)

Store the data of the low (N) bits (1 bit of 4 bits) of the BIN 16-bit data specified in (S) into the low 4-bit of the (N) point starting from the device specified in (D).

-[DIS (S) (D) (N)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The start device storing the data before separation	-	Signed BIN 16 bit	ANY16
(D)	The start device storing separated data	-	Signed BIN 16 bit	ANY16
(N)	Separation number (0 means no processing)	0-4	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices											Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
DIS	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2					●	●	●	●	●			●	●
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

Store the low-(N) bit (1 bits of 4 bits) of the BIN 16-bit data specified in (S) in the low 4-bit of the (N) point starting from the device specified in (D).

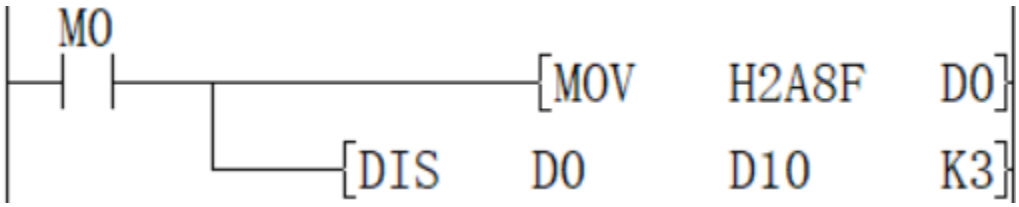
The hig-12 bit of the point (N) starting from the device specified in (S) will become 0.

When (N)=0, it will become no processing, and the content of point (N) starting from the device of (D) will not change.

Error code

Error code	Content
4084H	The data in (N) exceed the range of 0 to 4
4085H	When the device specified in read application instruction (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When M0 is ON, D0 is separated every 4 bits and stored in D10 to D12. The result is D10 = HF, D11 = H8, D12 = HA.

UNI/4-bit combination of 16-bit data

UNI(P)

Combine the low 4 bits of the BIN 16-bit data of point (N) starting from the device specified in (S) into the BIN 16-bit device specified in (D).

-[UNI (S) (D) (N)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(S)	The start device storing the data before merging	-	Signed BIN 16 bit	ANY16
(D)	The start device storing the merged data	-	Signed BIN 16 bit	ANY16
(N)	Number of merger	0-4	Signed BIN 16 bit	ANY16

Device used

Instruction	Parameter	Devices											Offset modification	Pulse extension
		KnX	KnY	KnM	KnS	T	C	D	R	SD	K	H	[D]	XXP
UNI	Parameter 1					●	●	●	●	●			●	●
	Parameter 2	●	●	●	●	●	●	●	●	●			●	●
	Parameter 3	●	●	●	●	●	●	●	●	●	●	●	●	●

Features

Combine the low 4 bits of the BIN 16-bit data at point (N) starting from the device specified in (S) into the BIN 16-bit device specified in (D).

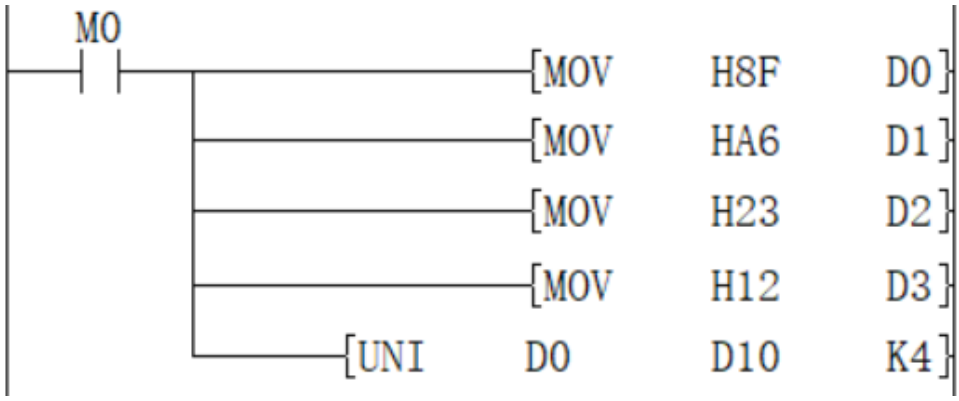
The high (4-N) bits of the device specified in (D) will become 0.

When (N)=0, it will become no processing, and the content of the device in (D) will not change.

Error code

Code	Content
4084H	The data in (N) exceed the range of 0 to 4
4085H	When the device specified in read application instruction (S) and (N) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (D) exceeds the corresponding device range

Example



When M0 is ON, the low 4 bits of D0 to D3 are combined and stored in D10, the value is H236F.

ZRST/Data batch reset

ZRST(P)

Perform a batch reset between the devices specified in (d1) and (d2) of the same type. It is used when interrupting operation, performing initial operation, or resetting control data.

-[ZRST (d1) (d2)]

Content, range and data type

Parameter	Content	Range	Data type	Data type (label)
(d1)	The start bit or word device number of batch reset	-	Bit/Signed BIN 16 bit	ANY_ELEMENTARY
(d2)	The final bit or word device number of batch reset	-	Bit/Signed BIN 16 bit	ANY_ELEMENTARY

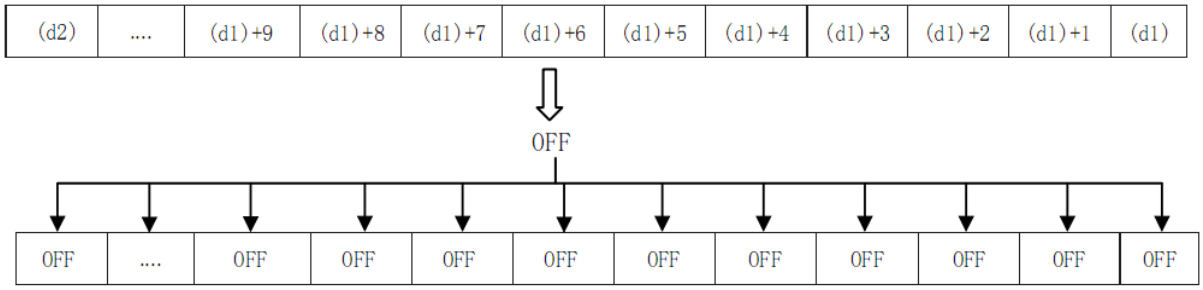
Device used

Instruction	Parameter	Devices															Offset modification	Pulse extension
		Y	M	S	SM	KnX	KnY	KnM	KnS	T	C	D	R	SD	LC	HSC	[D]	XXP
ZRST	Parameter 1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

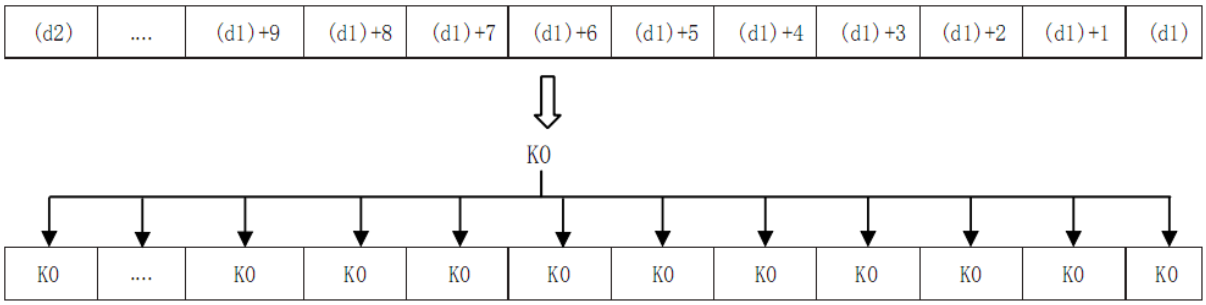
Features

Perform batch reset between the devices specified in (d1) and (d2) of the same type.

When (d1) and (d2) are bit devices, write OFF (reset) in the entire device range of (d1) to (d2).



When (d1) and (d2) are word devices, write K0 in the entire device range of (d1) to (d2).

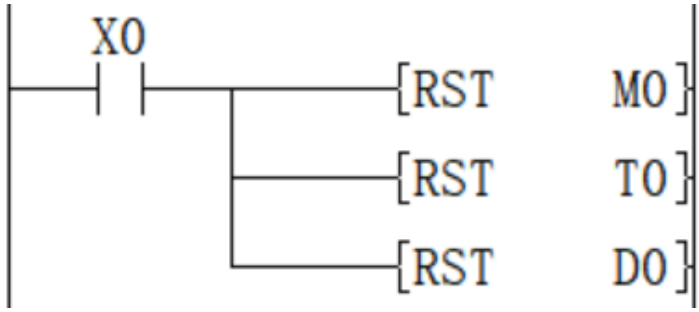


As a separate reset instruction for the device, the RST instruction can be used for bit devices or word devices.

Reset M0

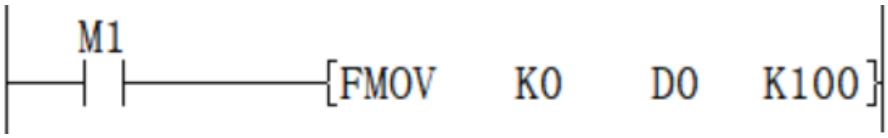
Reset D0

Reset the current value of T0



The batch write instruction of constant (for example: K0) has FMOV (P) instruction, which can write 0 to word devices (including bit device specification).

Write K0 in D0 to D99.



#Note: Please specify the same type number for (d1) and (d2), and make (d1) number <(d2) number. When (d1) number ≥ (d2) number, only 1 point will be reset for the device specified in (d1).

ZRST(P) instruction is a 16-bit instruction, which can specify (LC) and (HSC) devices for (d1) and (d2).

Error code

Error code	Content
4084H	When the device type specified in (d1) is different from the device type specified in (d2).
4085H	When the device specified in the read application instruction (d1) and (d2) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (d1) exceeds the corresponding device range

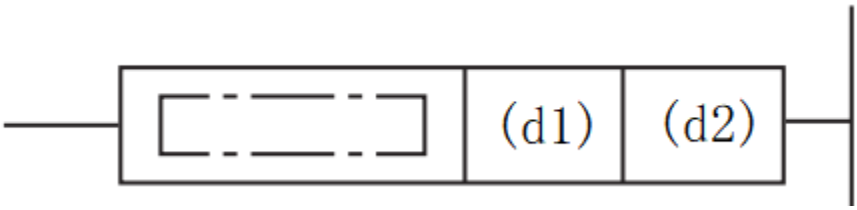
Example

The function of this Circuit program instruction is to set the value of the D0 to D100 device to 0.

ZSET/Data batch set

ZSET(P)

Perform a batch set between the devices specified in (d1) and (d2) of the same type.



Content, range and data type

Parameter	Content	Range	Data type	Data type(label)
(d1)	The start bit device number of batch set	-	Bit	ANY_BOOL
(d2)	The final bit device number of batch set	-	Bit	ANY_BOOL

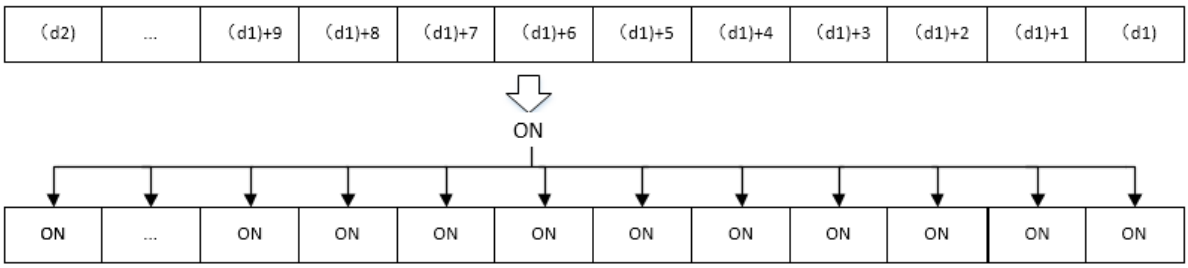
Device used

Instruction	Parameter	Devices					Offset modification
		Y	M	S	SM	D.b	[D]
ZSET	Parameter 1	●	●	●	●	●	●
	Parameter 2	●	●	●	●	●	●

Features

·Perform a batch set between the devices specified in (d1) and (d2) of the same type.

·Write ON (set) in the entire device range of (d1) to (d2)

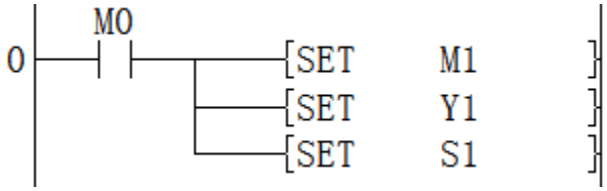


·As a separate set instruction for the device, the SET instruction can be used for bit devices.

Set M1

Set Y1

Set S1

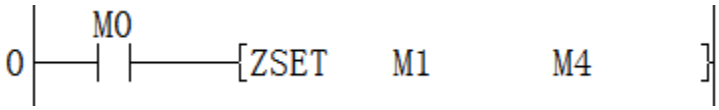


#Note: Please specify the same type number for (d1) and (d2), and make (d1) number <(d2) number. When (d1) number ≥ (d2) number, only 1 point will be set for the device specified in (d1).

Error code

Error code	Content
4084H	When the device type specified in (d1) is different from the device type specified in (d2).
4085H	When the device specified in the read application instruction (d1) and (d2) exceeds the corresponding device range
4086H	When the device specified in the write application instruction (d1) exceeds the corresponding device range
4087H	When the device type specified in (d1) and (d2) are not bit device.

Example



The function of this LAD instruction is to set the value of the M1 to M4 device to ON.

CRC/cyclic redundancy check instruction

CRC(P)

Calculate the CRC (Cyclic Redundancy Check) value, which is one of the error checking methods used in communications. In addition to CRC, error checking methods include parity and

Sum check (checksum), calculate horizontal parity check value and sum check value can use CCD(P) instruction . And this instruction is used in the generator polynomial that generates the CRC value (CRC-16)

"X 16 +X 15 +X 2 +1".

-[CRC(P) (S) (D) (N)]

Content, range and data type

Parameter	Content
(S)	The device start number storing the data of CRC value generated objects
(D)	The destination device number of the generated CRC value
(N)	The number of 8-bit data (bytes) for calculating the CRC value or the number of the device storing the number of data

Device used

Instruction	Parameter	Devices			
		KnX	KnY	KnM	KnS
CRC	Parameter 1	●	●	●	●
	Parameter 2		●	●	●
	Parameter 3	●	●	●	●

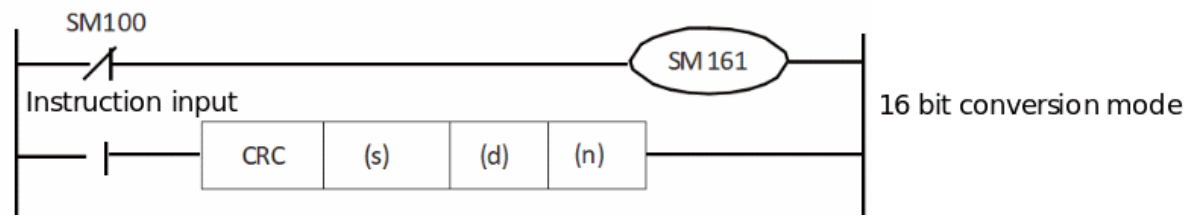
Features

Start with the device specified in (S), generate the CRC value of 8-bit data (byte unit) at (N) point, and store it in (D).

The mode used by this instruction in calculation includes 16-bit conversion mode and 8-bit conversion mode. For the operation of each mode, please refer to the following content.

1. 16-bit conversion mode (when SM161=OFF)

Calculate the upper 8 bits (byte) and lower 8 bits (byte) of the (S) device. The result is stored in 16 bits of 1 point of the device specified in (D). In the case of the following program, perform the conversion as shown below.

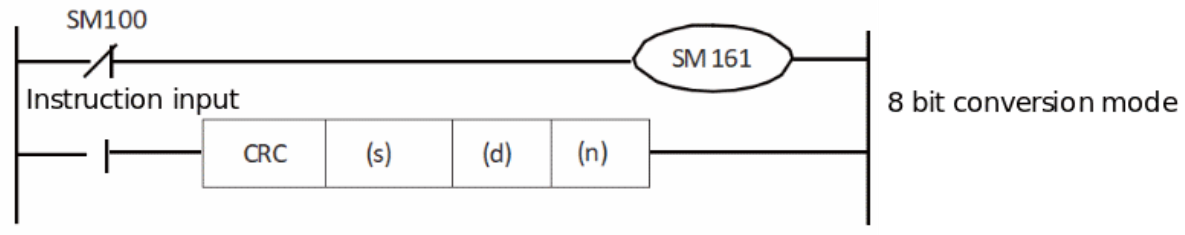


			Example (s)=D100, (d)=D0, =6		
			Devices	**Content of object data**	
				8-bit	**16-bit**
CRC value generation target data storage destination	(s)	Low byte	D100 low	01H	0301H
		High byte	D100 high	03H	
	(s)+1	Low byte	D101 low	03H	0203H
		High byte	D101 high	02H	
	(s)+2	Low byte	D102 low	00H	1400H
		High byte	D102 high	14H	
	...	#	#		
	(S)+(N)/2-1	Low byte	#		
		High byte			
CRC value storage target	(d)	Low byte	D0 low	E4H	41E4H
		High byte	D0 high	41H	

2. 8-bit conversion mode (when SM8161=ON)

In 8-bit conversion mode, only the lower 8 bits (lower byte) of the (s) device are operated on. As a result, 2 points are used starting from the device specified in (d), the lower 8 bits (bytes) are stored in (d), and the upper 8 bits (bytes) are stored in (d)+1.

In the case of the following program, perform the conversion as shown below.



Example) (s)=D100, (d)=D0, =6

			Devices	Content of object data
CRC value generation target data storage destination	(s)	Low byte	D100 low	01H
	(s)+1	Low byte	D101 low	03H
	(s)+2	Low byte	D102 low	03H
	(s)+3	Low byte	D103 low	02H
	(s)+4	Low byte	D104 low	00H
	(s)+5	Low byte	D105 low	14H
	...		#	
	(S)+(N)-1	Low byte	#	
CRC value storage target	(d)	Low byte	D0	E4H
	(d)+1	Low byte	D1	41H

In the CRC(P) instruction, the generator polynomial of the CRC value (CRC-16) uses "X16+X15+X2+1", but there are also many standardized generator polynomials for the CRC value. If the generator polynomial is different, it will become a completely different CRC value, which should be noted. The main CRC value generator polynomials are shown below.

Name	Generator polynomial
CRC-12	$X^{12}+X^{11}+X^3+X^2+X+1$
CRC-16	$X^{16}+X^{15}+X^2+1$
CRC-32	$X^{32}+X^{26}+X^{23}+X^{22}+X^{16}+X^{12}+X^{11}+X^{10}+X^8+X^7+X^5+X^4+X^2+X+1$
CRC-CCITT	$X^{16}+X^{12}+X^5+1$

#Note:

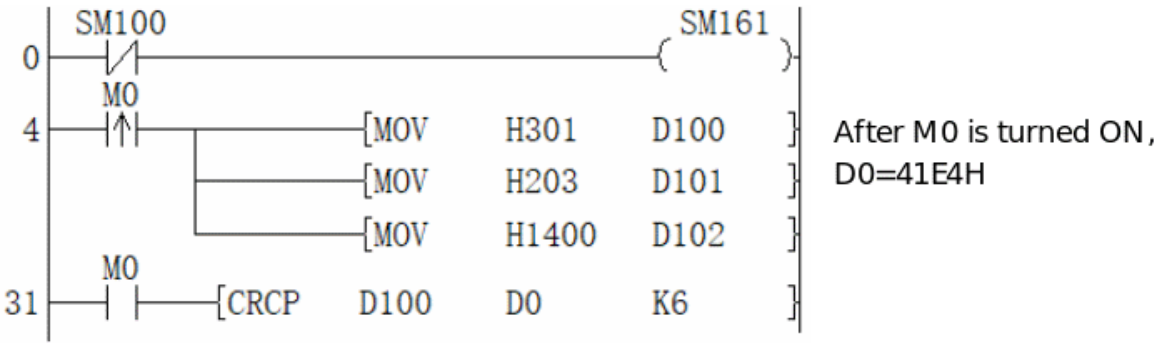
When (s1) use KnX, KnY, KnM, KnS, n must be specified as 4.

Error code

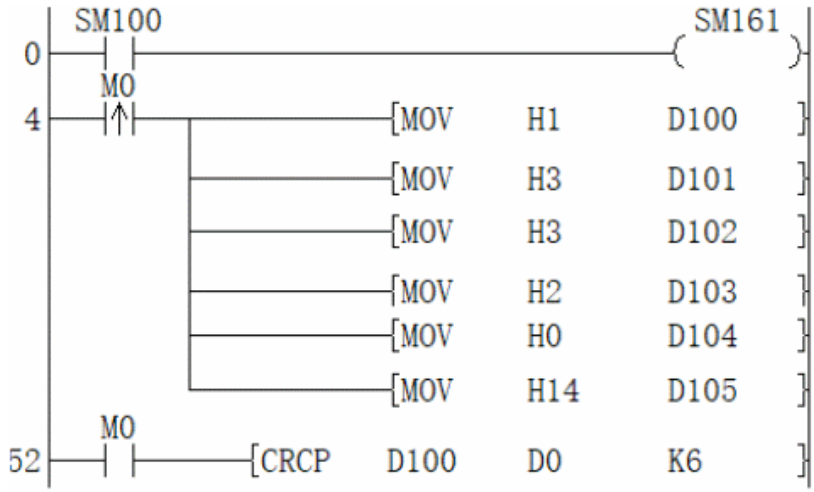
Error code	Content
4084H	The range of (N) exceeds 1 to 256
4085H	The data address of (S) to be converted exceeds the device range
4086H	The (D) write address exceeds the device range
4087H	Unsupported device type is used by (S) and (D)

Example

1. 16-bit conversion mode



2. 8-bit conversion mode



After M0 is turned ON, D0=E4H, D1=41H