# 03 Sequence control program instructions

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# Table of Contents

# Contact instructions

## Operation start, series connection, parallel connection

**LD, LDI, AND, ANI, OR, ORI**

• **LD:** Normally open contact instruction. **LD**I: Normally closed contact instruction.

Extract the ON/OFF information of the device specified in (s) as the result of the calculation.

• **AND:** Normally open contact series connection instruction. **ANI:** Normally closed contact series connection instruction.

Extract the ON/OFF information of the device specified in (s), and perform an AND operation with the calculation result so far as the calculation result.

• **OR:** Parallel connection instruction of 1 normally open contact. **ORI:** Parallel connection instruction of 1 normally closed contact

Extract the ON/OFF information of the device specified in (s), and perform an OR operation with the result of the operation so far as the result of the operation.

### Content, range and data type

| Parameter | Content | Range |
|---|---|---|
| (s) | Device used as contact | --- |

### Device used

| Instruction | Parameter | Devices | | | | |
|---|---|---|---|---|---|---|
| | | X | Y | M | S | SM |
| LD | Parameter 1 | ● | ● | ● | ● | ● |
| LDI | Parameter 1 | ● | ● | ● | ● | ● |
| AND | Parameter 1 | ● | ● | ● | ● | ● |
| ANI | Parameter 1 | ● | ● | ● | ● | ● |
| OR | Parameter 1 | ● | ● | ● | ● | ● |
| ORI | Parameter 1 | ● | ● | ● | ● | ● |

### Features

• **LD, LDI**

• The LD instruction is a normally open contact instruction, and the LDI instruction is a normally closed contact instruction. The ON/OFF information *1 of the specified device is extracted as the operation result.

*1: When the bit of the word device is specified, it is turned on/off according to 1/0 of the specified bit.

• **AND, ANI**

• The AND instruction is a normally open contact serial connection instruction, and the ANI instruction is a normally closed contact serial connection instruction. It extracts the ON/OFF information*1 of the specified bit device and performs an AND operation with the result of the operation so far. This value is used as the result of the operation.

*1: When the bit of the word device is specified, it is turned on/off according to 1/0 of the specified bit.

• There is no limit to the number of serial contacts, and this instruction can be used any time continuously.

• After the OUT instruction, it is called cascade output through the contact OUT to other coils. As long as the sequence is good, it can be repeated any number of times.

• **OR, ORI**

• The OR instruction is a parallel connection instruction for a normally open contact, and the ORI instruction is a parallel connection instruction for a normally closed contact. It extracts the ON/OFF information[1] of the specified device and compares it with the calculation result so far. Perform an OR operation and use the value as the result of the operation.

[1]: When the bit of the word device is specified, it is turned on/off according to 1/0 of the specified bit.

• OR and ORI instructions start from the step where the instruction is located, and connect in parallel to the step where the previous LD and LDI instructions are located.

• There is no limit to the number of parallel connections.

**Key point**

When specifying the bit of a word device, the bit is specified with a hexadecimal number. (For example, b11 of D0 will become "D0.B")
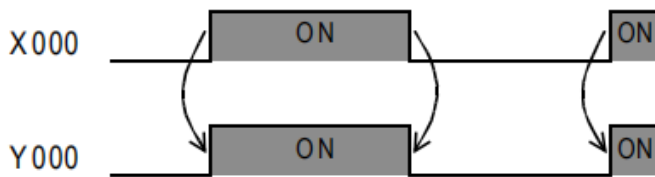
**Error code**

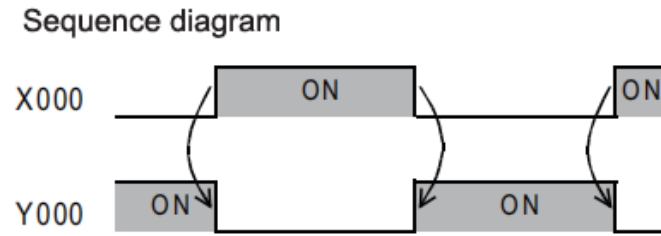| Error code | Content |
| --- | --- |
| 4085H | (S) read address exceeds the device range |

**Example**

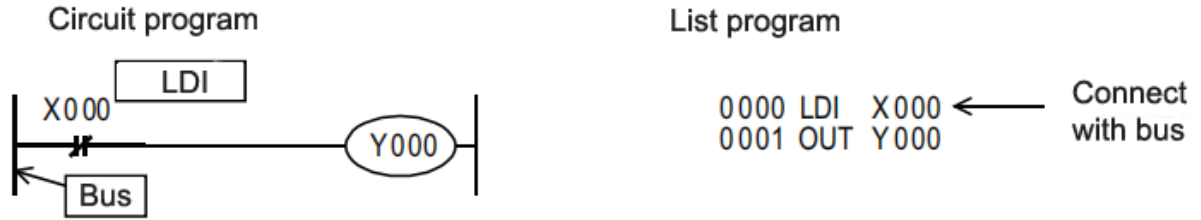**(1) LD instruction (the logic operation of a contact starts)**



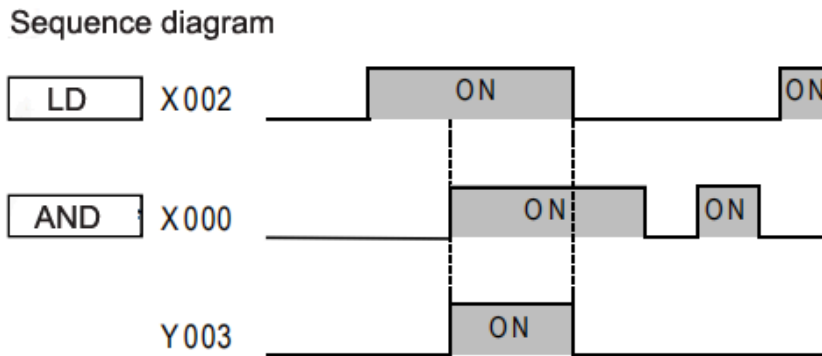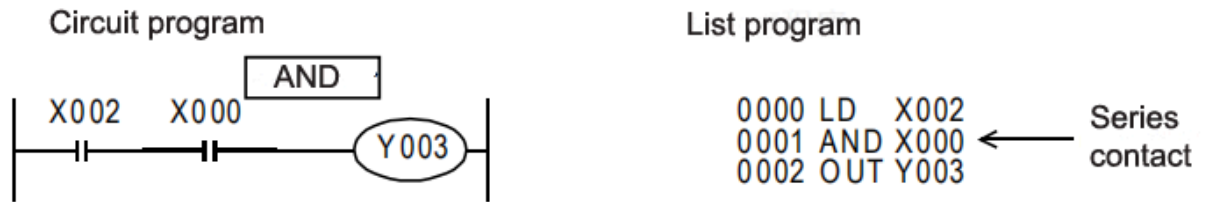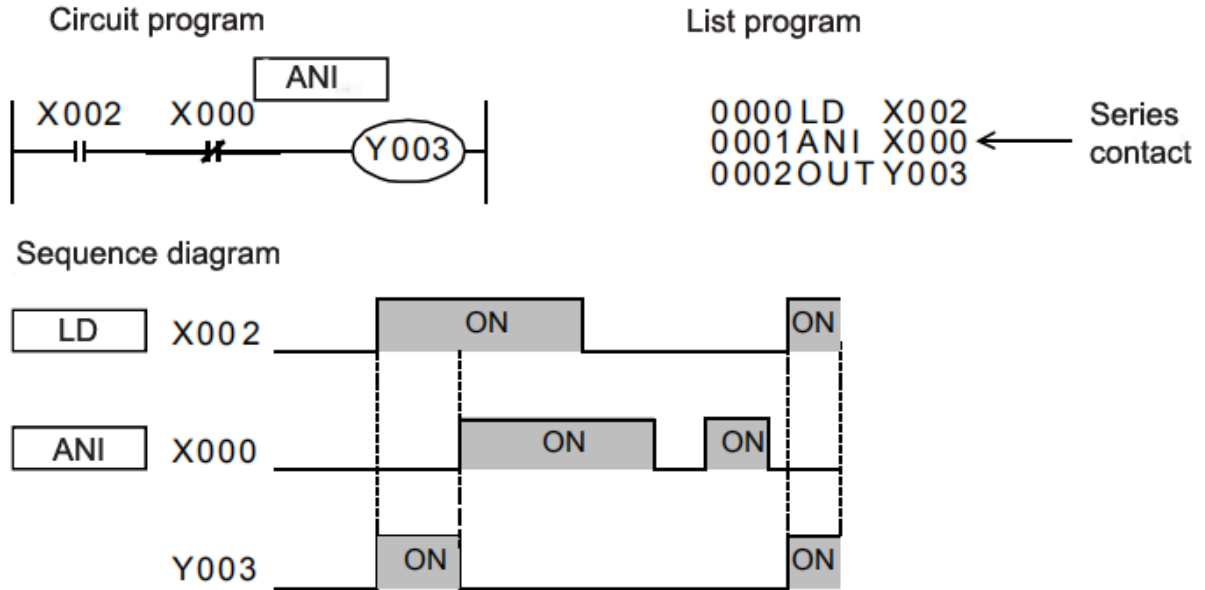**(2) LDI instruction (the logic operation of contact b starts)**

Circuit program

```
      ┌─ LDI ─┐
X000  │       │
 ─┤/├─         ────────( Y000 )
  ↖
  Bus
```

List program

```
0000 LDI  X000  ←───── Connect
0001 OUT  Y000           with bus
```

Sequence diagram

X000 ⎯⎯⎯⎯⎯⎯/[ ON ]\⎯⎯⎯⎯⎯⎯⎯⎯/[ ON ]

Y000 ⎯[ ON ]↓⎯⎯⎯⎯↓[ ON ]↓

**(3) AND instruction (a contact in series)**

Circuit program

```
              ┌─ AND ─┐
X002   X000   │       │
 ─┤├────┤├─          ( Y003 )
```

List program

```
0000 LD   X002    Series
0001 AND  X000  ← contact
0002 OUT  Y003
```

Sequence diagram

```
┌─ LD ─┐ X002  ⎯⎯[ ON ]⎯⎯⎯⎯⎯⎯⎯⎯[ ON ]

┌─ AND ─┐ X000 ⎯⎯⎯⎯⎯[ ON ]⎯[ ON ]⎯⎯

        Y003  ⎯⎯⎯⎯⎯[ ON ]⎯⎯⎯⎯⎯⎯⎯
```

**(4) ANI instruction (series b contact)**

## Circuit program

```
         ┌─────┐
         │ ANI │
  X002   X000  └─────┘
  ─┤├────┤/├──────(Y003)─
```

## List program

```
0000 LD  X002      Series
0001 ANI X000 ←──  contact
0002 OUT Y003
```

## Sequence diagram

```
┌────┐
│ LD │  X002  _____▅▅▅ON▅▅▅_____ON
└────┘

┌────┐
│ ANI│  X000  _____▅▅ON▅▅___▅ON▅_____
└────┘

        Y003  _____▅ON_____ON
```

**(5) OR instruction (a contact in parallel)**

## Circuit program

```
      X000
  ─┬──┤├────────────(Y000)──
   │
   │  X001
   └──┤├──
```

## List program

```
0000 LD  X000
0001 OR  X001
0002 OUT Y000
```

## Sequence diagram

```
┌────┐
│ LD │  X000  ▅ON_____▅▅▅▅ON▅▅▅▅_____
└────┘

┌────┐
│ OR │  X001  _____▅ON____▅▅▅ON▅▅▅_____
└────┘

        Y000  ▅ON__▅ON____▅▅▅▅▅▅ON▅▅▅▅_____
```
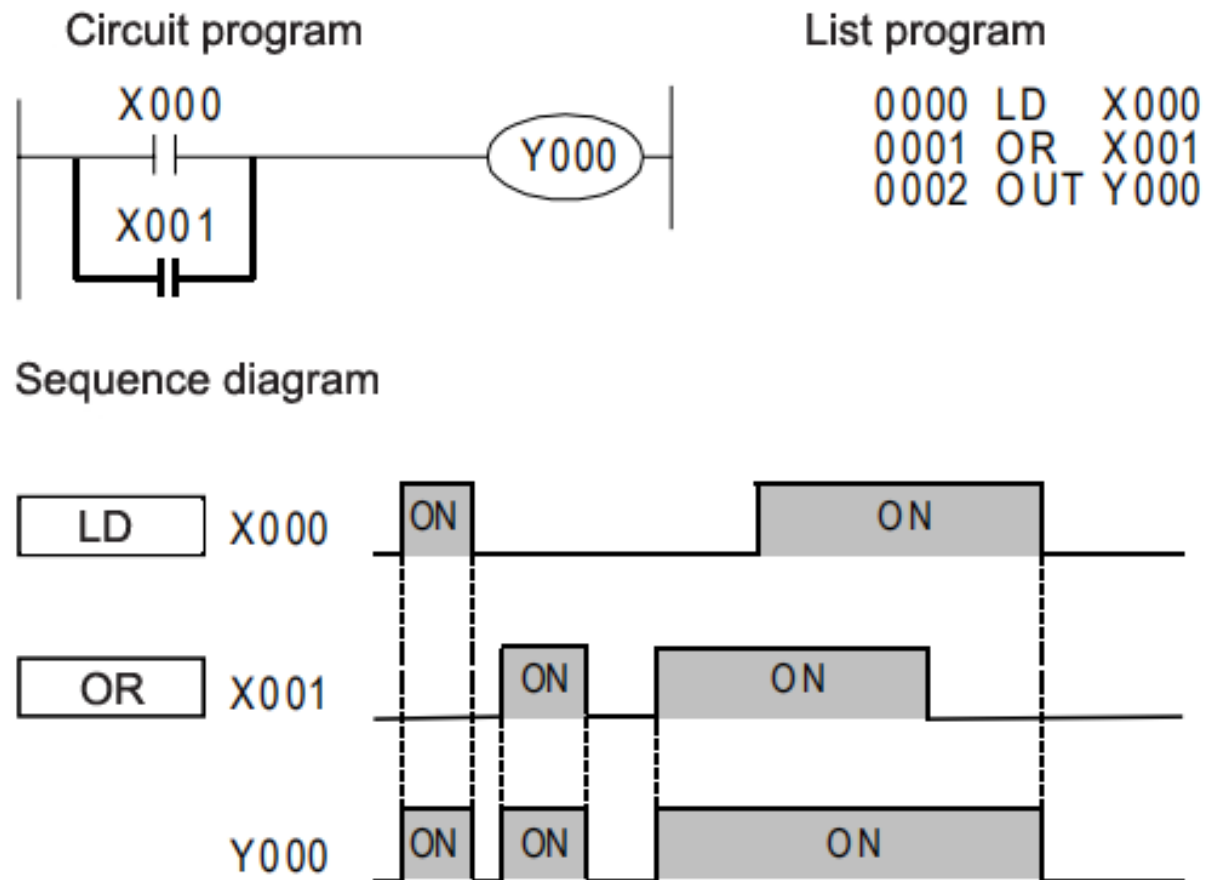
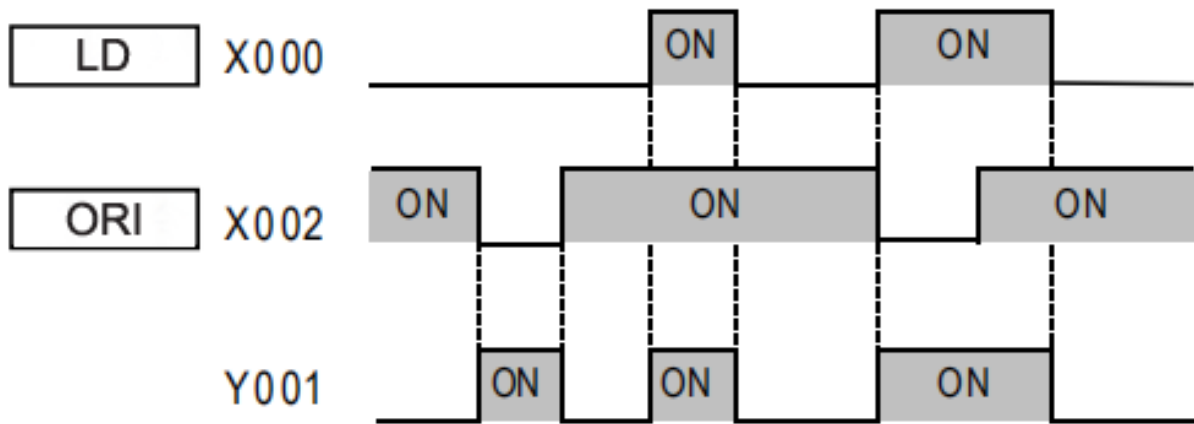**(6) ORI instruction (a contact in parallel)**

## Circuit program
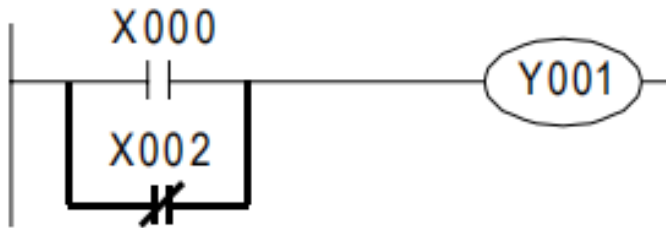


## List program

```
0000 LD  X000
0001 ORI X002
0002 OUT Y001
```
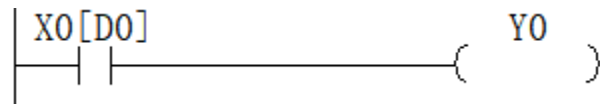
## Sequence diagram



### (7) Offset modification

The devices used in the LD, LDI, AND, ANI, OR, ORI instructions can all be indexed with D data devices (the status register S cannot be modified).

D0 to D7999 can be used in index modification.

When the devices are input (X) and output (Y), the value of the index register is converted into an octal number and then added.

**Example**



When the value of D0 is 10, X012 determines LD contact ON (conduction)/OFF (non-conduction).

### (8) Bit specification in the data register

Among the devices used in the LD, LDI, AND, ANI, OR, and ORI instructions, the bits of the data register (D) can be specified.

When executing the bit specification of the data register, enter "." after the number of the data register (D), and then enter the bit number (0 to F). The usable data registers are specified in bits, but only 16-bit data registers are valid.

Please specify the bit number in the order of 0,1,2,…9,A,B,…F starting from the lower bit.

**Example**

The third bit of D0 determines the LD contact ON (conduction)/OFF (non-conduction).

# Pulse calculation starts, pulse series connection, pulse parallel connection

**LDP, LDF, ANDP, ANDF, ORP, ORF**

• LDP: Rising edge pulse operation start instruction.

Turns on only at the rising edge (OFF→ON) of the bit device specified in (s).

• LDF: Falling edge pulse operation start instruction.

Turns on only at the falling edge (ON→OFF) of the bit device specified in (s).

• ANDP: Rising edge pulse series connection instruction, ANDF: Falling edge pulse series connection instruction. The previous operation result up to that time is ANDed with the bit device specified in (s) as the operation result.

• ORP: Parallel connection instruction for rising edge pulse/ORF: Parallel connection instruction for falling edge pulse. The operation result up to that time is ORed with the bit device specified in (s) as the operation result.

### Content, range and data type

| Parameter | Content | Range | Data type | Data type (label) |
|---|---|---|---|---|
| (s) | Devices used as contacts | - | Bit | ANY_BOOL |

### Device used

| Instruction | Parameter | Devices | | | | | | | | | | Offset modification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | M | S | SM | T(bit) | C(bit) | LC(bit) | HSC(bit) | D.b | [D] |
| LD | Parameter 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| LDI | Parameter 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| AND | Parameter 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| ANI | Parameter 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| OR | Parameter 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| ORI | Parameter 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

### Features

• **LDP, LDF**

• The LDP instruction is a rising edge pulse operation start instruction, which turns on only at the rising edge (OFF→ON) of the specified bit device. When the bit of the word device is specified, it turns on only when the specified bit changes from 0→1. In the case of only the LDP instruction, it is the same as the pulsed instruction(P) of the instruction executed while ON.

When the circuit that uses the LDP instruction is replaced with a circuit that does not use the LDP instruction, the situation is as follows.

• The LDF instruction is a falling edge pulse instruction, which turns on at the falling edge (ON→OFF) of the specified bit device. When the bit of the word device is specified, it turns on only when the specified bit changes from 1→0.

### • ANDP, ANDF

• The ANDP instruction is a series connection instruction for rising edge pulses, and the ANDF instruction is a series connection instruction for falling edge pulses. The AND operation is performed with the operation result up to that time as the operation result. The ON/OFF information used in ANDP instructions and ANDF instructions is shown in the table below.

| Device specified in ANDP, ANDF | | ANDP status | ANDF status |
|---|---|---|---|
| Bit device | Bit specification of word device | | |
| OFF→ON | 0→1 | ON | OFF |
| OFF | 0 | OFF | OFF |
| ON | 1 | OFF | OFF |
| ON→OFF | 1→0 | OFF | ON |

### • ORP, ORF

• The ORP instruction is a parallel connection instruction for rising edge pulses, and an ORF instruction is a parallel connection instruction for falling edge pulses. The OR operation is performed with the operation result up to that time as the operation result. The ON/OFF information used in ORP instructions and ORF instructions is shown in the table below.

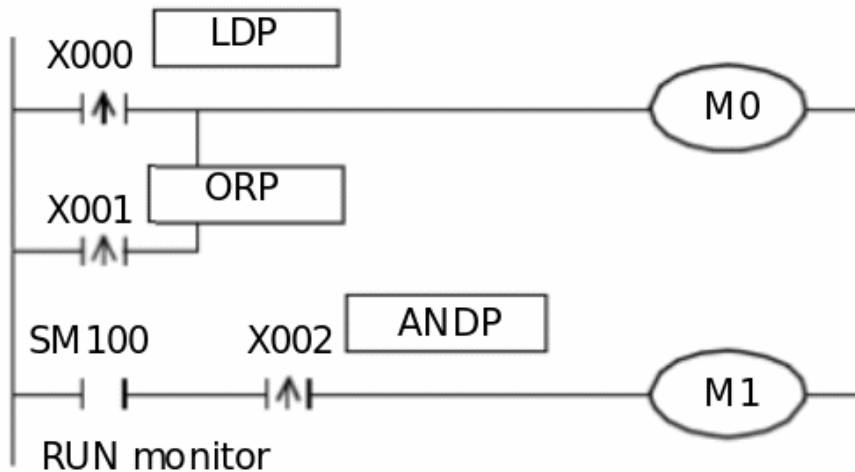| Device specified in ORP, ORF | | ORP status | ORF status |
|---|---|---|---|
| Bit device | Bit specification of word device | | |
| OFF→ON | 0→1 | ON | OFF |
| OFF | 0 | OFF | OFF |
| ON | 1 | OFF | OFF |
| ON→OFF | 1→0 | OFF | ON |

**Error code**

There is no operation error.

**Example**

**(1) LDP, ANDP, ORP instructions (calculation starts when a rising edge is detected, serial connection, parallel connection)**
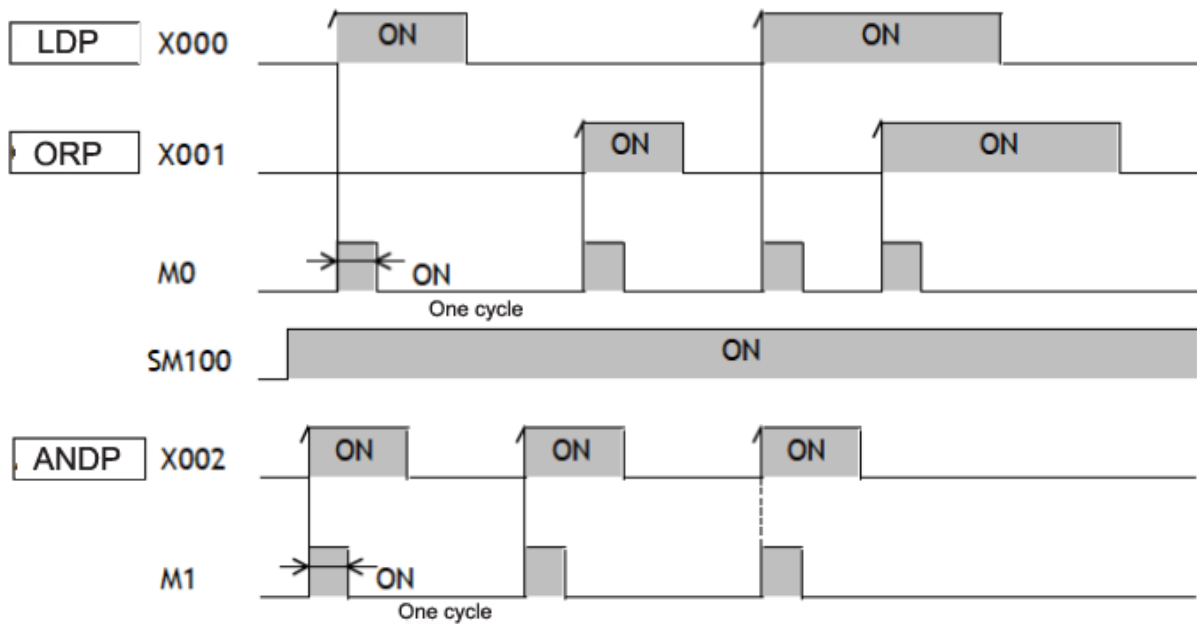
## Ladder diagram program

## List program



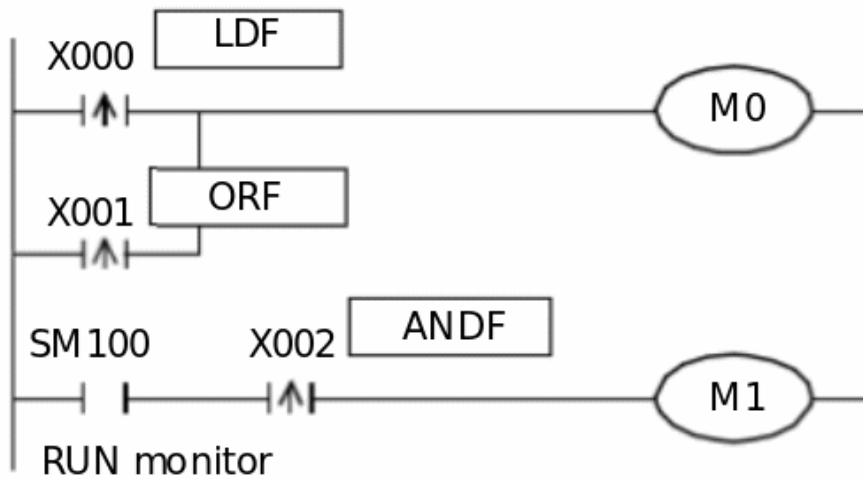| | |
|---|---|
| X000 [LDP] ──(M0) | LDP X000 |
| X001 [ORP] | ORP X001 |
| | OUT M0 |
| SM100 X002 [ANDP] ──(M1) | LD SM100 |
| RUN monitor | ANDP X002 |
| | OUT M1 |

## Timing chart



In the above figure, when X000 to X002 changes from OFF to ON, M0 or M1 only maintains ON for 1 operation cycle.

**(2) LDF, ANDF, ORF instructions (calculation starts when a falling edge is detected, serial connection, parallel connection)**
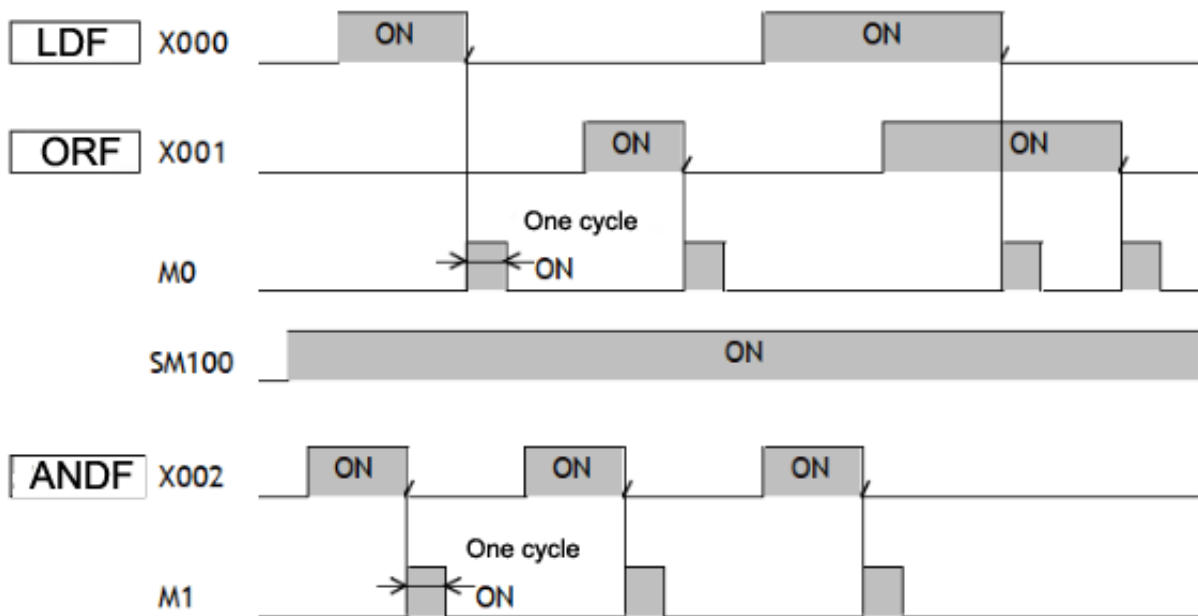
## Ladder diagram program



## List program

LDf X000

ORf X001

OUT M0

LD SM100

ANDF X002

OUT M1

## Timing chart



In the above figure, when X000 to X002 changes from ON to OFF, M0 or M1 only maintains ON for 1 operation cycle.
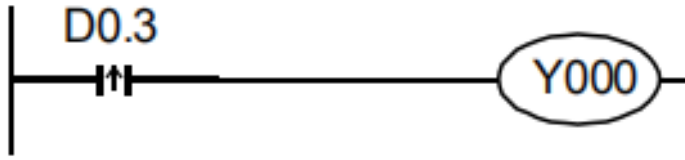
**(3) Bit specification of data register (D)**

In the devices used for LDP, LDF, ANDP, ANDF, ORP, ORF instructions, the bits of the data register (D) can be specified.

To specify the bit of the data register, enter "." after the number of the data register (D), and then enter the bit number (0 to F). The usable data registers are specified in bits, but only 16-bit data registers are valid.

Please specify the bit number in the order of 0,1,2,...9,A,B,...F starting from the low order.

**Example:**

The third bit of D0 determines the LDP contact ON (conduction)/OFF (non-conduction) when it changes from OFF to ON.

# Combining instructions

## Series connection and parallel connection of Circuit program blocks

### ANB, ORB

Perform AND operation or OR operation between block A and block B, and use it as the result of the operation.
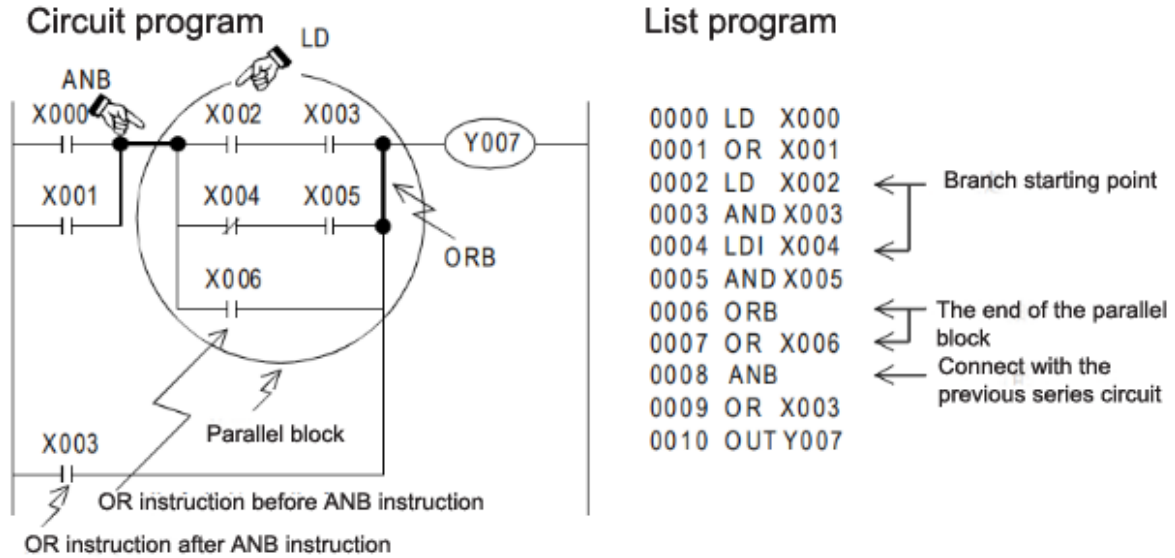
**Circuit program**

**Features**

  • **ANB**

• Perform AND operation of block A and block B and use it as the result of the operation.

• The Sign of the ANB instruction is not a contact Sign, but a connection Sign.

  • **ORB**

• Perform OR operation of block A and block B, and use it as the result of the operation.

  • The ORB instruction connects circuit blocks with 2 or more contacts in parallel. The parallel connection of only 1 contact uses OR instruction and ORI instruction, without ORB instruction.

• The Sign of the ORB instruction is not a contact Sign, but a connection Sign.

**Error code**

There is no operation error.

**Example**

| | Circuit program | | List program | |
|---|---|---|---|---|

Circuit program

List program

```
0000 LD  X000
0001 OR  X001
0002 LD  X002          ← Branch starting point
0003 AND X003
0004 LDI X004          ←
0005 AND X005
0006 ORB               ← The end of the parallel
0007 OR  X006          ←  block
0008 ANB               ← Connect with the
0009 OR  X003             previous series circuit
0010 OUT Y007
```

Parallel block

OR instruction before ANB instruction

OR instruction after ANB instruction

# Push, read, and pop of calculation results

**MPS, MRD, MPP**

• MPS: Store the calculation result (ON/OFF) before the MPS instruction.

• MRD, MPP: Read the operation result stored by the MPS instruction, and start the operation from the next step with the operation result.

**Circuit program**
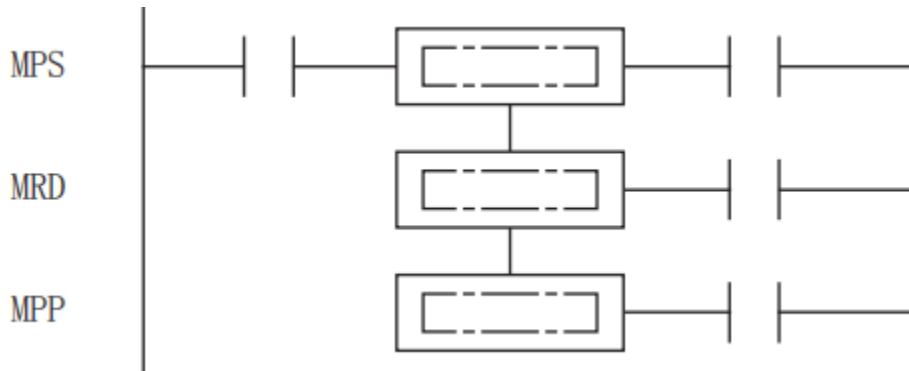


**Features**

• **MPS**

• Store the operation result (ON/OFF) before the MPS instruction.

• The MPS instruction can be used continuously up to 11 times. If the MPP instruction is used in the middle, the number of uses of the MPS instruction will be -1.

• **MRD**

• Read the operation result stored by the MPS instruction, and start the operation from the next step with the operation result.
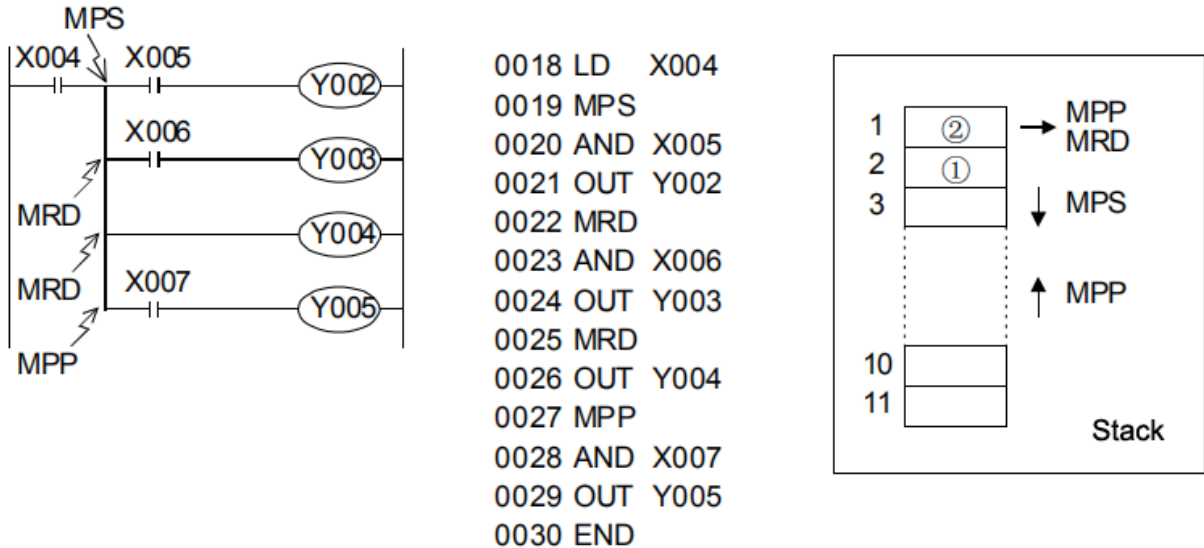
• **MPP**

• Read the operation result stored by the MPS instruction, and start the operation from the next step with the operation result.

• Clear the operation result stored by the MPS instruction.

• The used number of MPS instructions will be -1.

**Error code**

There is no operation error.

**Example**

MPS, MRD, MPP instructions (push stack, read stack, pop stack)



```
0018 LD    X004
0019 MPS
0020 AND   X005
0021 OUT   Y002
0022 MRD
0023 AND   X006
0024 OUT   Y003
0025 MRD
0026 OUT   Y004
0027 MPP
0028 AND   X007
0029 OUT   Y005
0030 END
```

• After using the MPS instruction to store the intermediate result of the operation, it drives the output Y002.

• After reading the storage content using MRD instruction, drive output Y003.
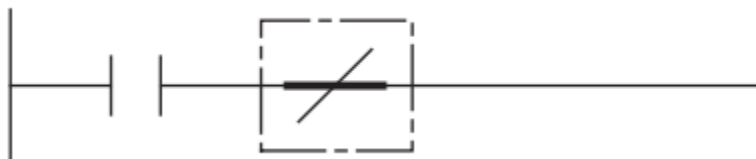
The MRD instruction can be programmed multiple times.

• Use the MPP instruction to replace the MRD instruction in the final output loop, so as to reset it while reading the above-mentioned stored content.

# Invert the result of operation

**INV**

Invert the results of operations up to the INV instruction.

**Circuit program**



**Features**

Invert the results of operations up to the INV instruction.

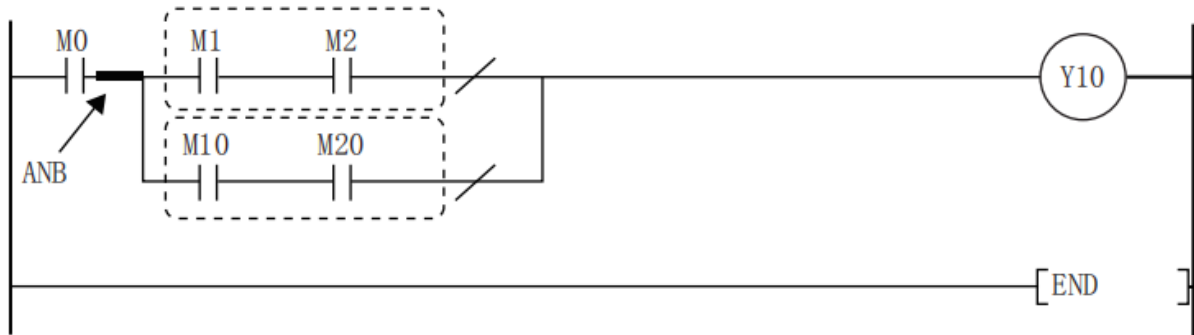| Operation result before INV instruction | Operation result after INV instruction is executed |
|---|---|
| OFF | ON |
| ON | OFF |

**Error code**

There is no operation error.

**Point**

• The INV instruction executes the operation as a result of the previous operation, so it should be used in the same position as the AND instruction. INV instruction cannot be used in the position of LD and OR instructions.

• When the INV instruction and ANB instruction are used together for ladder operation, pay attention to the inverted range.
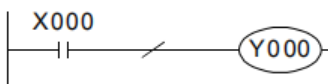


: Inverted range

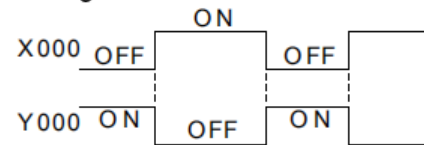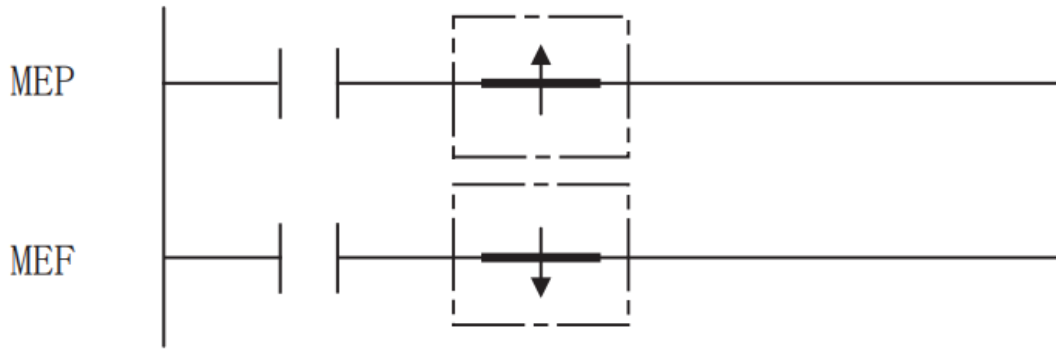**Example**

INV instruction (reverse operation result)



# Pulse operation result

**MEP, MEF**

• MEP: Turns on when the operation result before the MEP instruction is a rising edge, and turns off when it is not a rising edge.

• MEF: Turns on when the operation result before MEF instruction is a falling edge, and turns off when it is not a falling edge.

**Circuit program**

**Features**

- **MEP**

• When the operation result before the MEP instruction is a rising edge (OFF→ON), it becomes ON (conduction state). When the operation result before the MEP instruction is other than the rising edge, it turns off (non-conduction state).

• When using the MEP instruction, if multiple contacts are connected in series, pulse processing will be easier.

- **MEF**

• When the operation result before the MEF instruction is a falling edge (ON→OFF), it becomes ON (conduction state). When the operation result before the MEF instruction is other than the falling edge, it turns OFF (non-conduction state).

• When using the MEF instruction, if multiple contacts are connected in series, pulse processing will be easier.

**Error code**

There is no operation error.

**Point**

• For MEP instructions and MEF instructions, if the indexed contacts are pulsed by subroutines, FOR to NEXT instructions, etc., they may not operate normally.
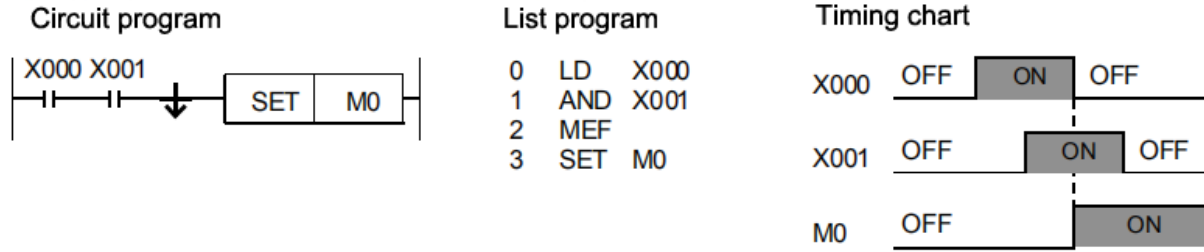
• The MEP instruction and MEF instruction perform actions based on the previous calculation results, so they should be used in the same position as the AND instruction. The MEP instruction and MEF instruction cannot be used in the position of LD instruction and OR instruction.

**Example**

**(1) MEP instruction (ON at the rising edge of the operation result)**
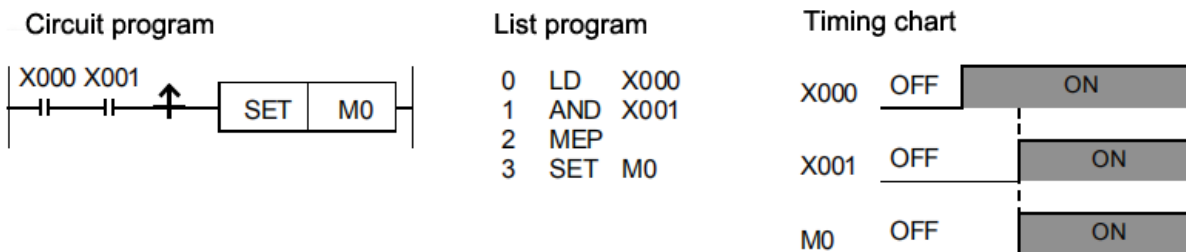


**(2) MEF instruction (ON at the falling edge of the operation result)**

**Circuit program**

X000 X001
├┤├──┤├──┬──↓──┤ SET │ M0 ├

**List program**

```
0    LD    X000
1    AND   X001
2    MEF
3    SET   M0
```

**Timing chart**

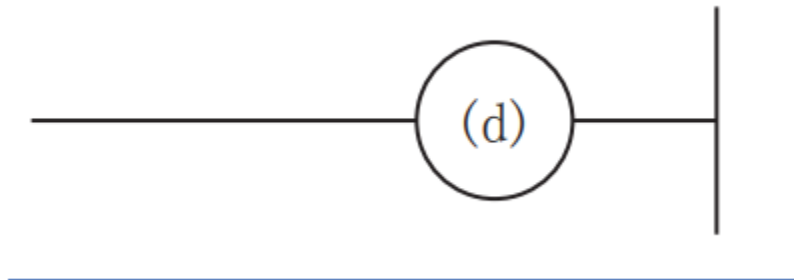| X000 | OFF | ON | OFF |
| X001 | OFF | ON | OFF |
| M0 | OFF | | ON |

# Output instructions

## OUT instruction (except timers and counters)

Output the results of the previous OUT instruction to the specified device.

### Circuit program



### Content, range and data type

| Parameter | Content | Range | Data type | Data type (label) |
|---|---|---|---|---|
| (d) | ON/OFF device number | - | Bit | ANY_BOOL |

### Device used

| Instruction | Parameter | Devices | | | | | | | | | | Offset modification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | M | S | SM | D.b | T | C | LC | HSC | [D] |
| OUT | Parameter 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

- Refer to OUT T instruction when using T;
- Refer to OUT C instruction when using C, LC, HSC;
- Offset modification cannot be used when using S device.

### Features

Outputs the results of the previous OUT instruction to the specified device.

| Condition | Calculation result | Coil / specified position |
|---|---|---|
| When using bit devices | OFF | OFF |
| | ON | ON |
| When using word devices | OFF | 0 |
| | ON | 1 |

### Error code

| Error code | Content |
|---|---|
| 4086H | (D) write address exceeds the device range |

**Example**

**(1) When using bit devices**

The device programmed with the OUT instruction executes ON/OFF according to the state of the drive contact, and the parallel OUT instruction can be used continuously for many times.

In the following program example, OUT M101 followed by OUT M100 means this.

However, if multiple OUT instructions are used for the same device number, it will become a dual output (double coil). Please be careful.
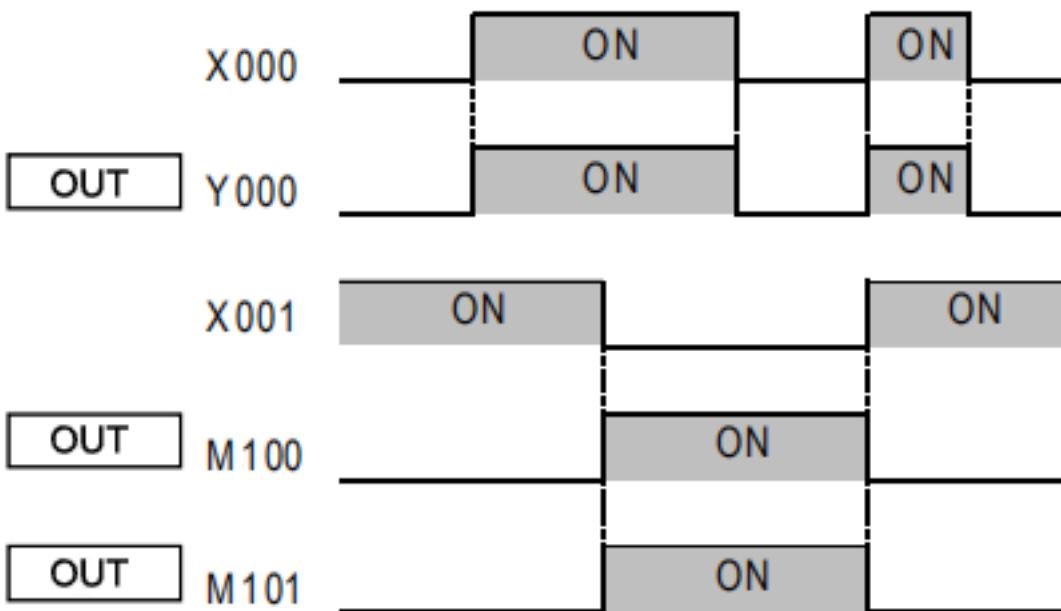
## Circuit program



Drive contact of OUT instruction
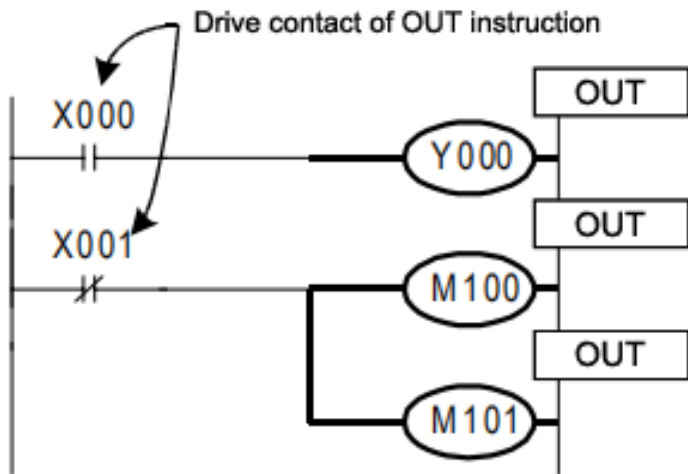
## List program

```
0000 LD   X000
0001 OUT Y000
0002 LDI  X001
0003 OUT M100
0004 OUT M101
```

Automatically manage step numbers

## Timing chart

**(2) Offset modification**

All the devices used in the OUT instruction can be indexed with the D data device (the status register S cannot be modified).

D0 to D7999 can be used in index modification.

When the devices used are input (X) and output (Y), the value of the index register is converted to an octal number and then added.

**Example:**
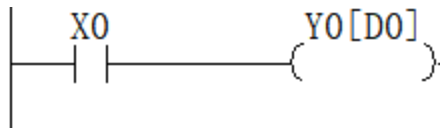


When the value of D0 is 10, when X0 is ON (conducting), the Y12 contact is ON (conducting).

**(3) Bit specification in the data register**

Among the devices used in the OUT instruction, the bit of the data register (D) can be specified.To specify the bit of the data register, enter "." after the number of the data register (D), and then enter the bit number (0 to F). The usable data registers are specified in bits, but only 16-bit data registers are valid.

Please indicate the positioning number in the order of 0,1,2,...9,A,B,...F starting from the low order.

**Example:**


In the example on the left, the state of X1 determines the ON (conduction)/OFF (non-conduction) of the third bit in D0.

# SET instruction

When the execution instruction turns ON, the device specified in (d) will be in the following state.

• Bit device: Turn on the coil and contact.

• Bit specification of word device: Set the specified position to 1.
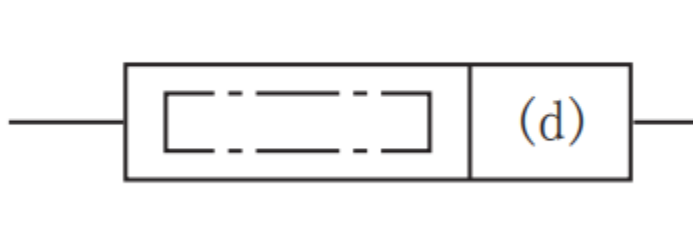


**Content, range and data type**

| Parameter | Content | Range | Data type | Data type (label) |
|---|---|---|---|---|
| (d) | Set (ON) bit device number/bit specification of word device | - | Bit | ANY_BOOL |

**Device used**

| Instruction | Parameter | Devices | Offset modification |
|---|---|---|---|

| | | X | Y | M | S | SM | D.b | [D] |
|---|---|---|---|---|---|---|---|---|
| SET | Parameter 1 | ● | ● | ● | ● | ● | ● | ● |

*1: Offset modification cannot be used when using S devices.

### Features

When the execution instruction turns ON, the device specified in (d) will be in the following state.

| Devices | Device status |
|---|---|
| Bit Device | Turn on the coil and contact |
| Bit specification of word device | Set the specified position to 1 |

The device that is turned on will remain on even if the execution instruction turns off. The device that is turned ON by the SET instruction can be turned OFF by the RST instruction.

### #Note:

For the output relay (Y), if the SET instruction and the RST instruction are executed in the same operation, the instruction result close to the END instruction (end of program) will be output.
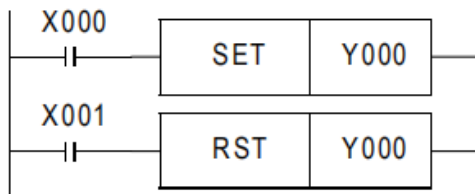
### Error code

| Error code | Content |
|---|---|
| 4086H | (d) In the case of using offset, the offset address exceeds the device range |

### Example

### (1) When using bit devices

The parallel SET instruction could be used multiple times in succession. In the following program example, this is the case for the program with SET Y000 followed by RST Y000.
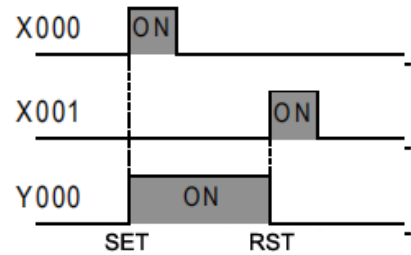
Circuit program

```
X000
 ┤├      SET    Y000

X001
 ┤├      RST    Y000
```

List program

```
0  LD   X000
1  SET  Y000
2  LD   X001
3  RST  Y000
```

Timing chart

```
X000    ┌ON┐
        │  │
X001              ┌ON┐
                  │  │
Y000    ┌────ON────┐
        SET        RST
```

### (2) Offset modification

All the devices used in the SET instruction can be indexed with D data devices (the status register S cannot be modified).

D0 to D7999 can be used in index modification.

When the devices used are input (X) and output (Y), the value of the index register is converted into octal number and then added.

### Example:

When the value of D0 is 10, when X0 is ON (conduction), the Y12 contact is ON (conduction), X0 is OFF (non-conduction), and the Y12 contact remains unchanged.

**(3) Bit specification in the data register**

Among the devices used in the SET instruction, the bits of the data register (D) can be specified.

To specify the bit of the data register, enter "." after the number of the data register (D), and then enter the bit number (0 to F). The usable data registers are specified in bits, but only 16-bit data registers are valid.

Please specify the bit number in the order of 0,1,2,…9,A,B,…F starting from the lower bit.

**Example:**

In the example on the left, the state of X1 is ON (conduction), and the third bit in D0 is ON (conduction). The state of X1 is OFF (non-conduction), and the state of the third bit in D0 remains unchanged.

**RST instruction**

When the RST input turns ON, the device specified in (d) will change to the following state.

• Bit device: Turn off the coil and contact.

• Timers and counters: Set the current value to 0, and set the coil and contact to OFF.

• Bit specification of word device: Set the specified position to 0.

• Word device, module access device, index register: Set the content to 0.
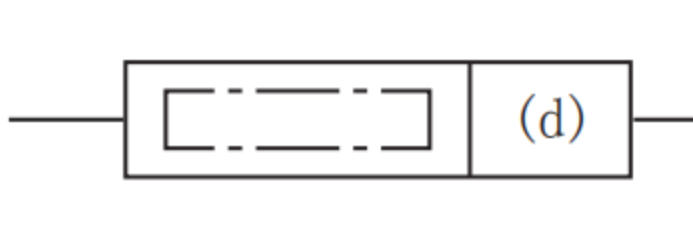


**Content, range and data type**

| Parameter | Content | Range | Data type | Data type (label) |
|---|---|---|---|---|
| (d) | Reset bit device number/bit specification of word device or reset word device number | - | Bit/word/double word | ANY_ELEMENTARY |

**Device used**

| Instruction | Parameter | Devices | | | | | | | | | | | | | | | | Offset modification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | M | S | SM | T(bit) | C(bit) | LC(bit) | HSC(bit) | D.b | T | C | D | R | SD | LC | HSC | [D] |
| RST | Parameter 1 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

*1: Offset modification cannot be used when using S devices.

**Features**

When the execution Instruction is ON, the specified device will be in the following state.

| Devices | Device status |
|---|---|
| Bit Device | Turn on the coil and contact |
| Timer, counter | Set the current value to 0, set the coil and contact to OFF |

| Bit specification of word device | Set the specified position to 0 |
| Word device | Set the content to 0 |

When the execution instruction is OFF, the device status does not change.

The function when specifying a word device with the RST instruction is the same as the following Circuit program.
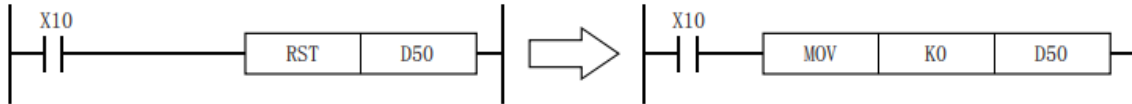


**#Note:**

For timers and counters, when the RST instruction is executed in the program, subroutine, and interrupt program where the RST instruction is jumped, the timer and counter may remain unchanged after reset, and the timer and counter will not operate.

**Error code**

| Error code | Content |
|---|---|
| 4086H | (d) write address exceeds the device range |

**Example**

**(1) Use bit device**

When X0 is ON (conducting), Y0 is set to OFF, R10 is set to 0, the word device of T10 is set to 0, the bit device is set to OFF, and the word device of C100 is set to 0. The device is turned off.

When X0 is OFF (non-conduction), all states remain unchanged.

**(2) Offset modification**

All the devices used in the RST instruction can be indexed with D data devices. (The status register S could not be modified)

D0 to D7999 can be used in index modification.

When the devices used are input (X) and output (Y), the value of the index register is converted into an octal number and then added.

**Example**

When the value of D0 is 10, when X0 is ON (conduction), the Y12 contact is OFF (conduction), X0 is OFF (non-conduction), and the Y12 contact remains unchanged.

**(3) Bit specification in the data register**

Among the devices used in the RST instruction, the bits of the data register (D) can be specified.

To specify the bit of the data register, enter "." after the number of the data register (D), and then enter the bit number (0 to F). The usable data registers are specified in bits, but only 16-bit data registers are valid.

Please specify the bit number in the order of 0,1,2,…9,A,B,…F starting from the lower bit.

**Example**

In the example on the left, the state of X1 is ON (conduction), and the third bit in D0 is OFF (conduction). The state of X1 is OFF (non-conduction), and the state of the third bit in D0 remains unchanged.

# PLF/Falling edge output

When the PLF instruction is ON→OFF, one scan of the device specified in (d) is ON, and when it is other than ON→OFF, it is OFF.
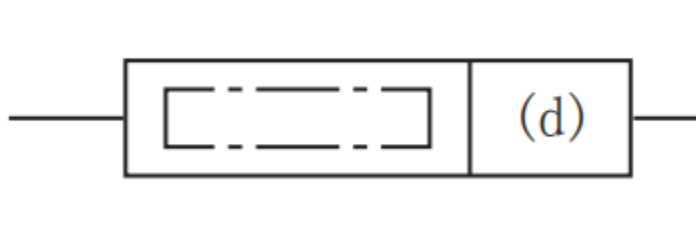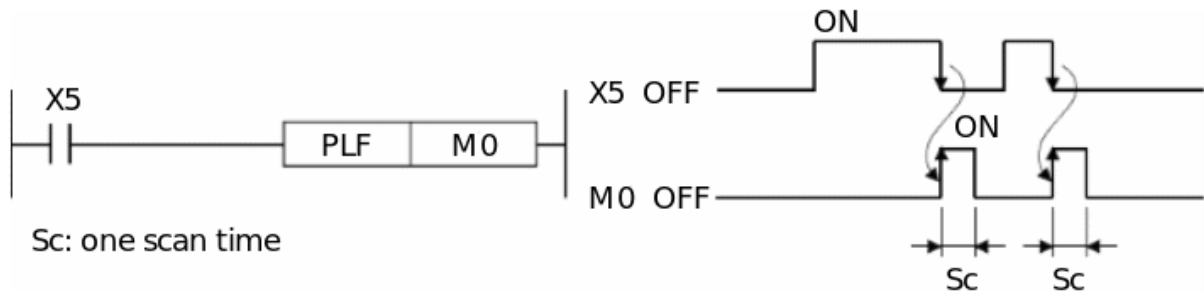


### Content, range and data type

| Parameter | Content | Range | Data type | Data type (label) |
|---|---|---|---|---|
| (d) | Pulsed device | - | Bit | ANY_BOOL |

### Device used

| Instruction | Parameter | Devices | | | | | | Offset modification |
|---|---|---|---|---|---|---|---|---|
| | | X | Y | M | S | SM | D.b | [D] |
| PLF | Parameter 1 | ● | ● | ● | ● | ● | ● | |

### Features

When the execution instruction is ON→OFF, the specified device is turned ON, and when the execution instruction is other than ON→OFF, it is turned OFF. When there is one PLF instruction for the device specified in (d) in one scan, the specified device will turn on one scan.
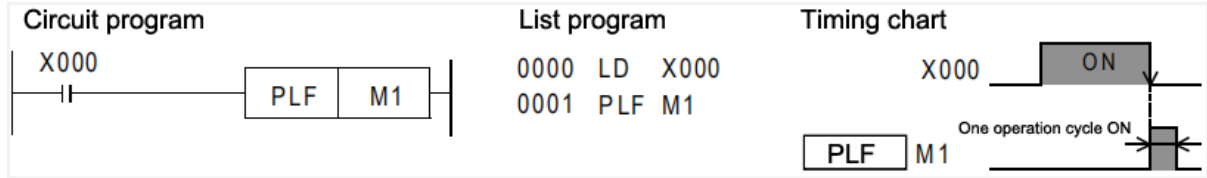


#### #Note:

If the PLF instruction is jumped by the CJ instruction, or the executed subroutine is not called by the CALL(P) instruction, the device specified in (d) may be turned on for more than one scan. Be careful.
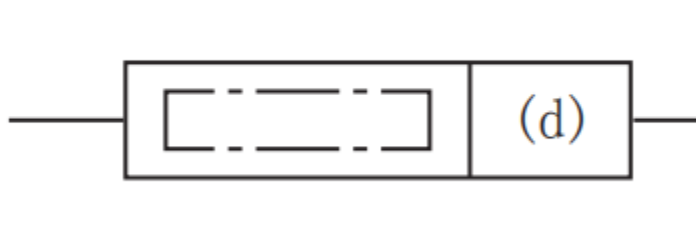
### Error code

No Error code

### Example

PLF instruction (differential output of falling edge)

In the above figure, when X000 changes from ON to OFF, only one operation cycle of M1 is ON.

# PLS/Rising edge output

When the PLS instruction is OFF→ON, one scan of the device specified in (d) is turned ON, and when it is other than OFF→ON, it is turned OFF.



### Content, range and data type

| Parameter | Content | Range | Data type | Data type (label) |
|---|---|---|---|---|
| (d) | Pulsed device | - | Bit | ANY_BOOL |

### Device used

| Instruction | Parameter | Devices | | | | | | Offset modification |
|---|---|---|---|---|---|---|---|---|
| | | X | Y | M | S | SM | D.b | [D] |
| PLS | Parameter 1 | ● | ● | ● | ● | ● | ● | |

### Features

When the PLS instruction is OFF→ON, one scan of the specified device is turned on, and when it is other than OFF→ON, it is turned off. When there is one PLS instruction for the device specified in (d) in one scan, the specified device turns on one scan.
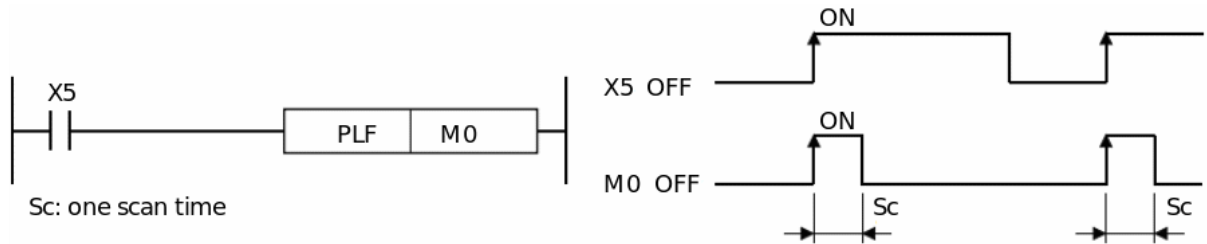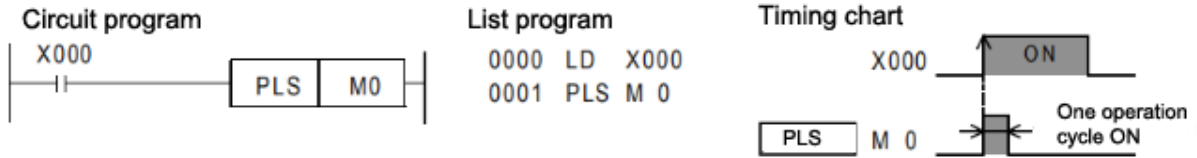


#### #Note:

If the PLS instruction is jumped by the CJ instruction, or the executed subroutine is not called by the CALL(P) instruction, the device specified in (d) may be turned on for more than one scan. Be careful.

### Error code

No Error code

**Example**

PLS instruction (differential output on rising edge)

| Circuit program | List program | Timing chart |
|---|---|---|

Circuit program

X000
—| |———[ PLS | M0 ]—

List program

```
0000  LD   X000
0001  PLS  M 0
```

Timing chart

In the above figure, when X000 changes from OFF to ON, only one operation cycle of M0 is ON.

# END/Sequence control program end instruction

Indicates the final end of the program.
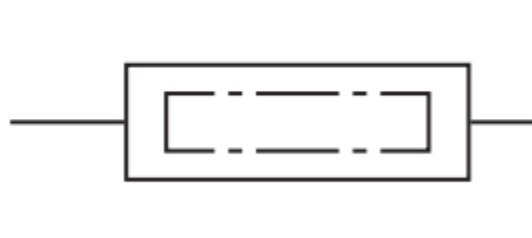
**Features**

Indicates the end of the program including the main program, subprogram, interrupt program, and event. When the END instruction is executed, the CPU module will end the program being executed.

(1) Sequence control program

END