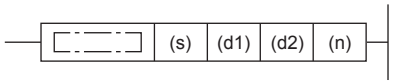
8.19 Input Matrix Instruction

Input matrix

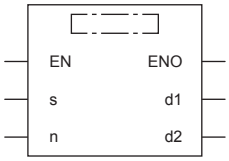
MTR

FX5S FX5UJ FX5U FX5UC

Reads matrix input as 8-point input × "n"-point output (transistor) in the time division method.

Ladder diagram	Structured text
	ENO:=MTR(EN, s, n, d1, d2);

FBD/LD



Setting data

■Descriptions, ranges, and data types

Operand	Description	Range	Data type	Data type (label)
(s)	Input device (X) number of matrix signal input X0, X10, X20 … final input device number (Only "0" is allowed in the least significant digit of device numbers.)	—	Bit	ANYBIT_ARRAY (Number of elements: 8)
(d1)	Head device (Y) number of matrix signal output Y0, Y10, Y20 … final output device number (Only "0" is allowed in the least significant digit of device numbers.))	—	Bit	ANY_BOOL
(d2)	Head bit device (Y, M or S) number of ON output destination Y0, Y10, Y20 … final Y number, M0, M10, M20 … final M number or S0,S10, S20 … final S number (Only "0" is allowed in the least significant digit of device numbers.)	—	Bit	ANY_BOOL
(n)	Number of columns in matrix input	2 to 8	16-bit unsigned binary	ANY16_U
EN	Execution condition	—	Bit	BOOL
ENO	Execution result	—	Bit	BOOL

■Applicable devices

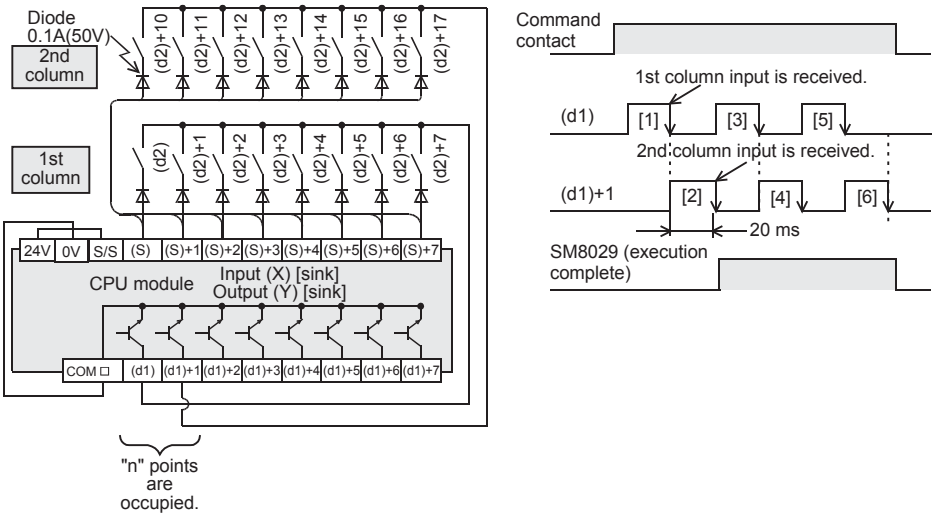
Operand	Bit	Word			Double word		Indirect specification	Constant			Others
	X, Y, M, L, SM, F, B, SB, S	T, ST, C, D, W, SD, SW, R	U□\G□	Z	LC	LZ		K, H	E	$	
(s)	○*1	—	—	—	—	—	—	—	—	—	—
(d1)	○*2	—	—	—	—	—	—	—	—	—	—
(d2)	○*3	—	—	—	—	—	—	—	—	—	—
(n)	○	○	○	○	—	—	○	○	—	—	—

*1 Only X can be used.
*2 Only Y can be used.
*3 X cannot be used.

Processing details

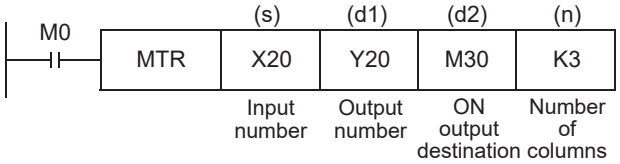
- An input signal of 8 points x "n" columns is controlled in the time division method using 8 inputs specified in (s) and transistor outputs specified in (d1). Each column is read in turn, and then output to devices specified in (d2).
- For each output, the I/O processing is executed immediately in turn in interrupt at every 10 ms or 20 ms.
- For the connection example of matrix input, refer to the following manual.

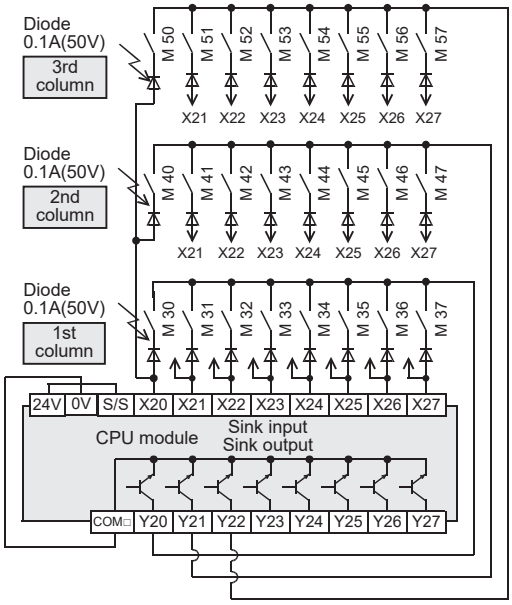
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)

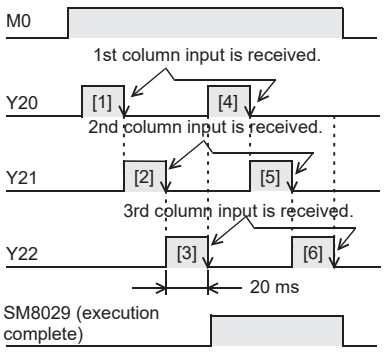


- In this program example, n=Three outputs (Y20, Y21 and Y22) are set to ON in turn repeatedly. Every time an output is set to ON, eight inputs in the 1st, 2nd and 3rd columns are received in turn repeatedly, and stored to M30 to M37, M40 to M47 and M50 to M57 respectively. For wiring details, refer to the following manual.

MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)





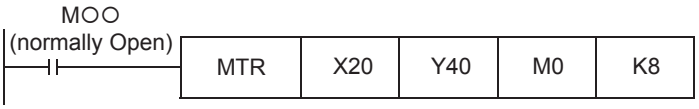


• The table below shows the related devices.

Device	Name	Description
SM8029	Instruction execution complete	ON: Turns ON after the matrix in the nth (last) column is input. OFF: Remains OFF while the matrix in the 1st to nth (last) columns is being input.

Precautions

- Eight devices are occupied from the device specified in (s).
- When specifying the output in (d2) , make sure that "n" output numbers specified in (d1) does not overlap the output specified in (d2).
- The MTR instruction can only be used once in a program.
- One diode of 0.1 A/50 V is required for each switch.
- Use the transistor output format.
- If write during RUN is executed while the MTR instruction is being executed, the control right is released by the END processing. The MTR instruction executed first in the next scan will acquire the control right next.
- For the MTR instruction, set the command input to normally Open.

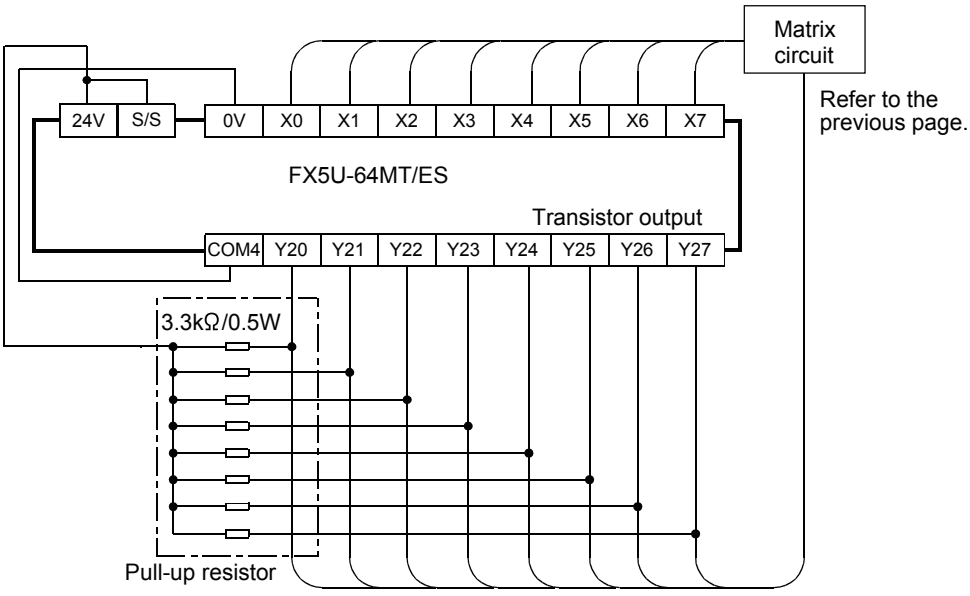


- Normally, the following inputs should be used with the MTR instruction.
  - FX5S/FX5UJ CPU module: X10 and higher
  - FX5U/FX5UC CPU module: X20 and higher
- When using inputs other than those above, the receiving speed will be faster. However, the output transistor recovery time may be longer and the input sensitivity will be high, so there may be erroneous inputs. Change the input response time of unit parameter setting to “5 ms” to input at intervals of 10 ms. To prevent erroneous input pulses, connect pull-up resistors (3.3 kΩ/0.5 W) to transistor outputs used in MTR instruction. For pull-up resistors, use the power supply shown in the table below.

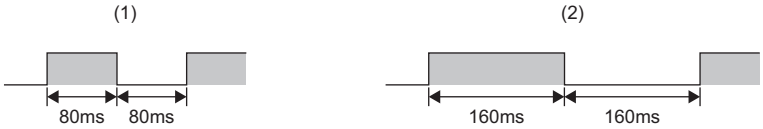
Programmable controller	Power supply used for pull-up resistors transistor output
AC power type CPU module.	Service power supply

Ex.

For FX5U-64MT/ES (sink input/sink output)



- Because 64 input points (8 rows × 8 columns) are received in a cycle of 80 or 160 ms, the ON/OFF duration of each input signal should be greater than or equal to the value shown below:



(1) FX5S/FX5UJ CPU module: When using X0 to X7 FX5U/FX5UC CPU module: When using X0 to X17

(2) FX5S/FX5UJ CPU module: When using X10 and higher FX5U/FX5UC CPU module: When using X20 and higher

Operation error

Error code (SD0/SD8067)	Description
3405H	The value specified by (n) is outside the following range. 2 to 8
2820H	• The device range specified by (s) exceeds the corresponding device range. • The device range specified by (d1) exceeds the corresponding device range. • The device range specified by (d2) exceeds the corresponding device range.
1811H	The number of times the MTR instruction is simultaneously driven exceeds 1.
3582H	The MTR instruction is used in the interrupt program.