19 DIVIDED DATA READ/WRITE FROM/TO BFM INSTRUCTION

19.1 Divided BFM Read
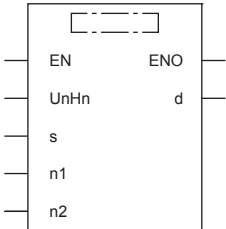
RBFM

FX5S	FX5UJ	FX5U	FX5UC

This instruction reads data from continuous buffer memory areas in an FX3 intelligent function module

Ladder diagram	Structured text
▢▢▢ (U/H) (s) (d) (n1) (n2)	ENO:=RBFM(EN,UnHn,s,n1,n2,d);

FBD/LD

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    ┌─ ▢:▢ ─┐
    │ EN   ENO │
    │ UnHn   d │
    │ s        │
    │ n1       │
    │ n2       │
    └──────────┘
```

Setting data

■Descriptions, ranges, and data types

| Operand	Description	Range	Data type	Data type (label)
(U/H)[*1]	Module number	1H to 10H	16-bit unsigned binary	ANY16_U
(s)	Head buffer memory number	0 to 32767	16-bit unsigned binary	ANY16_U
(d)	Head device number storing data to be read from buffer memory	—	16-bit signed binary	ANY16
(n1)	Number of all buffer memory areas to be read	1 to 32768	16-bit unsigned binary	ANY16_U
(n2)	Not used	—	16-bit unsigned binary	ANY16_U
EN	Execution condition	—	Bit	BOOL
ENO	Execution result	—	Bit	BOOL

*1 In the case of the ST language and the FBD/LD language, U/H displays as UnHn.

■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	$	
(U/H)	○	○	○	○	—	—	○	○	—	—	—
(s)	○	○	○	○	—	—	○	○	—	—	—
(d)	—	○	—	○	—	—	○	—	—	—	—
(n1)	○	○	○	○	—	—	○	○	—	—	—
(n2)	○	○	○	○	—	—	○	○	—	—	—

Processing details

- This instruction reads (n1) points of buffer memory starting from (s) inside the intelligent function module number (U/H) to (d) in the CPU module. When (n1) exceeds 64 points, it divides and reads by several scans. (64 points are read in one scan)
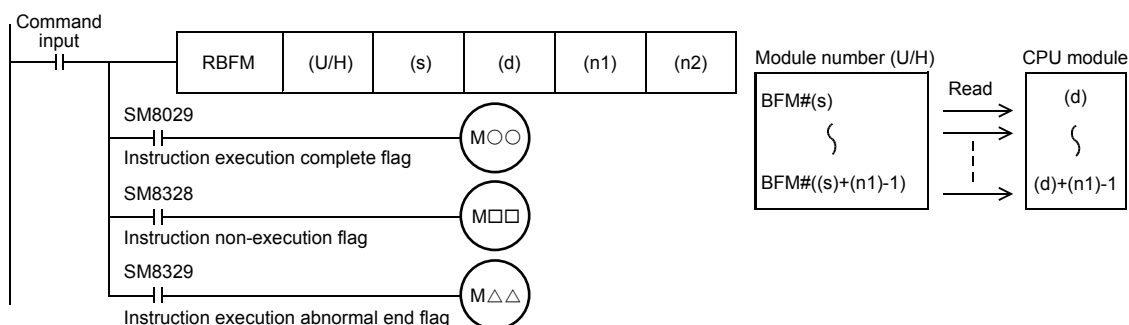

- When this instruction is finished normally, instruction execution complete flag (SM8029) turns on. When this instruction is finished abnormally, instruction execution abnormal end flag (SM8329) turns on.
- When this instruction or the WBFM instruction is executed in the same scan, instruction non-execution flag (SM8328) is set to on, and execution of such an instruction is paused. When execution of the other target instruction is complete, the paused instruction resumes.

■Related devices

Device	Name	Description
SM8029	Instruction execution complete	Turns ON when an instruction is finished normally.
SM8328	Instruction non-execution	Turns ON when the RBFM instruction or WBFM instruction in another step is executed for the same module number.
SM8329	Instruction execution abnormal end	Turns ON when an instruction is finished abnormally.

Precautions

- Do not stop the instruction while it is being executed. If driving is stopped, the buffer memory reading processing is suspended, but the data that is already read is stored in (d) onwards. Stop the instruction after execution completes as in the following program.
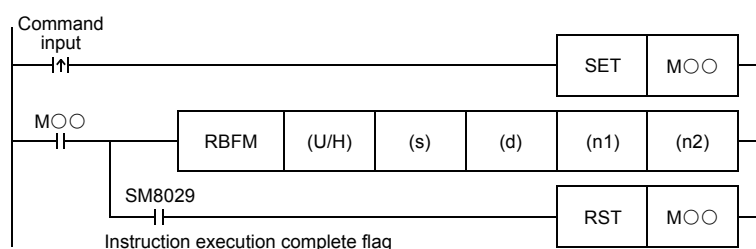
- When indexing is executed, the contents of index registers at the beginning of execution are used. Even if the contents of index registers are changed after the instruction, such changes do not affect the process of the instruction.
- The contents of (n1) points starting from (d) update (change) every scan while this instruction is executed. Use the data after the instruction is completed.
- Do not update (change) the contents of (n1) buffer memory areas starting from the buffer memory (s) while this instruction is executed. If the contents are updated, the intended data may not be read.
- This instruction cannot be used in FX5 intelligent function modules.
- This instruction cannot be used while a interrupt routine program is being executed.

Operation error

Error code (SD0/SD8067)	Description
2441H	Communication procedure with module is not completed correctly when this instruction is executed.
2801H	Module with the module number specified by (U/H) does not exist.
2823H	The number of transfer points specified by (n1) and the buffer memory number specified by (s) is beyond the buffer memory area range.
2820H	The number of transfer points specified by (n1) and the device number specified by (d) is beyond the specified device range.
3580H	An instruction that cannot be used in an interrupt program is used.

Common items between RBFM instruction and WBFM instruction

■Specification of module number of FX3 intelligent function module and buffer memory

For FX3 intelligent function module connection method, number of connectable FX3 intelligent function modules and handling of I/O numbers, refer to manuals of the CPU module and FX3 intelligent function modules.

 • Module number of FX3 intelligent function module

Use the module number to specify for which equipment the RBFM/WBFM instruction is used. (Setting range: 1H to 10H (K1 to K16))

		Module No. 1	Module No. 2	Module No. 3
CPU module	I/O module	Bus conversion module	Intelligent function module	Intelligent function module

A module number is automatically assigned to each intelligent function module connected to the CPU module. The module number is assigned as No.1 → No.2 → No.3… starting from the equipment nearest the CPU module.

 • Buffer memory number

The intelligent function module incorporates a RAM memory. The RAM memory is called buffer memory. Buffer memory numbers range from #0 to #32767 and their contents vary depending on the function of the extension equipment. (Setting range: K0 to K32767)

For the contents of buffer memory areas, refer to manuals of intelligent function modules.

Program example

In the example shown below, data is read from and written to the buffer memories in the module No. 2 as follows:
- When X0 is set to ON, data stored in D100 to D108 (9 points) is written to the buffer memories #0 to #8 in the FX3 intelligent module whose module number is No. 2.
- When X1 is set to ON, the buffer memories #0 to 91 (92 points) in the FX3 intelligent module whose module number is No. 2 are written to D200 to D291.

Ladder	Description
X0 (BFM write start) — [SET M0]	The BFM write start flag is set to ON.
M0 (BFM write start) — [WBFM K2 K0 D100 K9 K1]	D100 to D108 (9 points) are written to the buffer memories #0 to 8 in the module No. 2.
SM8029 (Instruction execution complete) — [RST M0]	The BFM write start flag is set to OFF.
SM8328 (Instruction non-execution) — [SET Y0]	Execution of the WBFM instruction is waited.
SM8329 (Instruction execution abnormally complete) — [RST M0]	The BFM write start flag is set to OFF.
X1 (BFM read start) — [SET M5]	The BFM read start flag is set to ON.
M5 (BFM read start) — [RBFM K2 K0 D200 K92 K1]	The buffer memories #0 to 91 (92 points) in the module No. 2 are read to D200 to D291.
SM8029 (Instruction execution complete) — [RST M5]	The BFM read start flag is set to OFF.
SM8328 (Instruction non-execution) — [SET Y1]	Execution of the RBFM instruction is waited.
SM8329 (Instruction execution abnormal end) — [RST M5]	The BFM read start flag is set to OFF.