

### Documentation for Siemens function block for electronic circuit breakers

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### Supported devices

Sequencer for generating a communication frame for the following electronic circuit breakers:

#### *2 channels:*

- PM-0724-120-0
- PM-0724-200-0
- PM-0712-200-0
- PM-0824-120-x
- PM-1824-120-0

#### *4 channels*

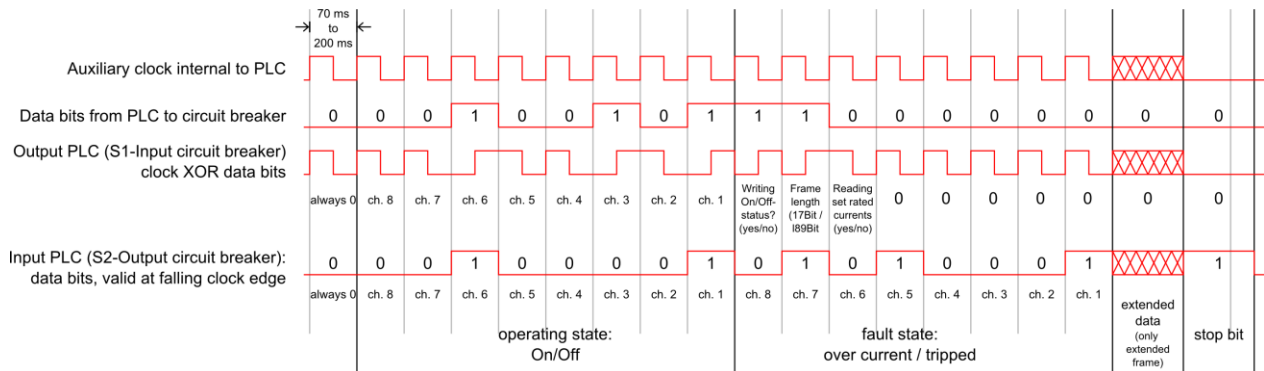
- PM-0724-240-0
- PM-0724-400-0
- PM-0712-400-0
- PM-0824-240-x
- PM-1824-240-0

#### *8 channels*

- PC-0724-480-0
- PC-0724-800-0
- PC-0824-480-x
- PC-1824-480-0

## Integrating the FB27 in a Step 7 program

The block must be controlled via an interrupt (cyclic interrupt) (S7 e.g. OB35). The clock for a bit in Manchester code (cyclic interrupt time) can be between 35 ms and 100 ms and must be adjusted according to the cycle time/jitter of the application in question.



### Pulse pattern short description

The pulse pattern consists of 17 or optionally 89 bits that must be sent as Manchester code (in accordance with IEEE 802.3). The first bit to be transferred has the value "0" and serves as a start bit. This is followed by 16 or optionally 88 bits of user data.

The first 8 bits represent the required on/off state of the individual channels in descending order. If the value is "1", the corresponding channel is switched on, if the value is "0", it is switched off. For the following 8 bits, only the first three most significant bits are relevant.

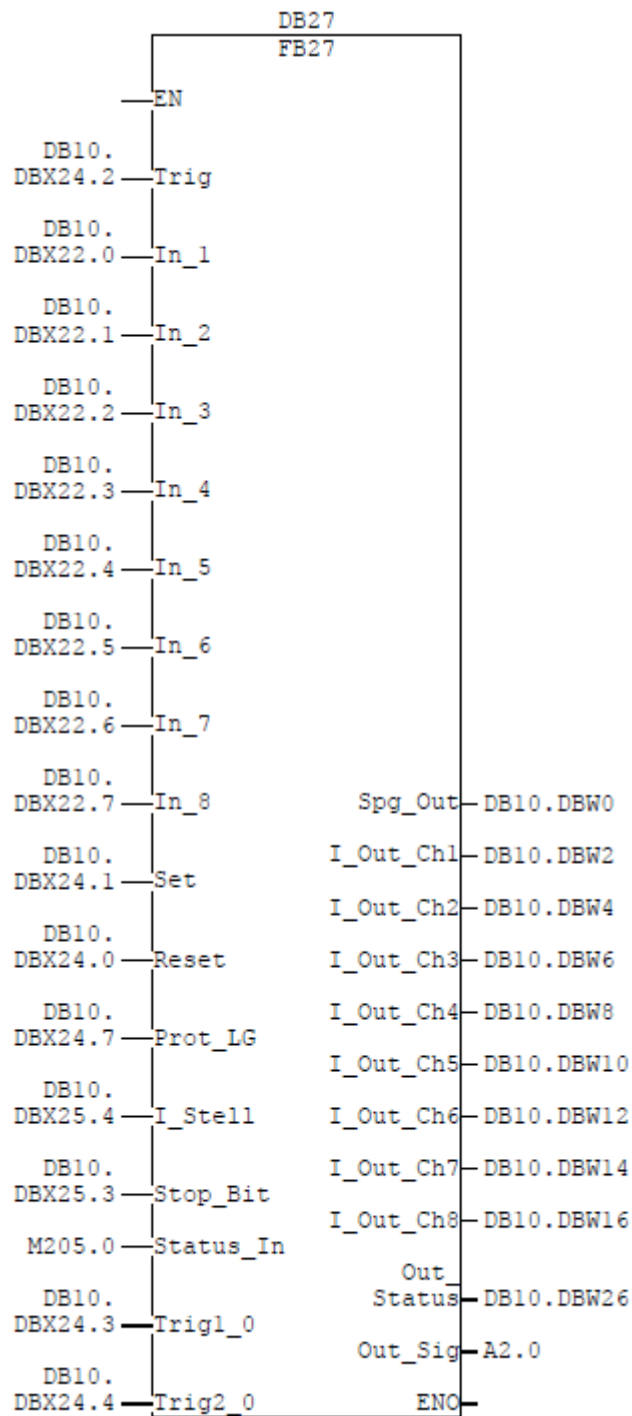
- Bit 7 = "1": the on/off state transferred in the first 8 bits is used
- Bit 7 = "0": the on/off state transferred in the first 8 bits is ignored
- Bit 6 = "1": the extended 89 bit protocol is used, the circuit breaker transmits additional user data
- Bit 6 = "0": the short 17 bit protocol is used
- Bit 5 = "1": the set rated currents on the current selector and the current input voltage are transmitted
- Bit 5 = "0": the current input voltage, and for all "BASIC SMART (PM/PC-08xx)" circuit breakers, the output currents are transmitted.

The following 6 or optionally 78 bits must be set to "0" and serve as the clock signal for the "S2" signal output.

If all 17 or 89 bits are successfully received, the circuit breaker sends an 18th bit as a stop bit. This takes 1.5 clock cycles. During this time, the PLC must not send any further bits. Once the pulse pattern has been sent, S1 and S2 are set to low level again.

**New pulse patterns to S1 are only permitted after a wait time of min. 200 ms.**

## Description of the FB27 function block



Connection designation	Data type	Input	Output	Description
EN	BOOL	x		Enable, permit processing of the block
Trig	BOOL	x		Duration "1" signal (cyclical operation), to cyclically activate the program sequence process. If single cycle mode is required (the block is only executed for one frame), the applied bit can be reset again via the "Trig_1" output (once a complete frame has been processed).
In_1 to In_8	BOOL	x		On/off state of channels 1 - 8 In_1 = "1" → channel 1 is switched on In_1 = "0" → channel 1 is switched off In the case of 4 or 2 channel devices, only use the relevant bit 1-2 or 1-4.
Set	BOOL	x		The on/off states of the channels (In_1 to In_8) are either accepted on the circuit breaker or the frame is only used to read out the user data from the circuit breaker (bit 10 in frame) Set = "1" → In_1 to In_8 are set (write access) Set = "0" → In_1 to In_8 are ignored. (read access)
Reset	BOOL	x		Resets triggered channels Reset = "1" a high pulse for >0.5 seconds switches on all channels tripped through overload.
Prot_LG	BOOL	x		The input voltage, the set rated current or the actual current for each channel (only for PM/PC-08xx) can be read out. For this, the frame is extended from 17 bits to 89 bits. Prot_LG = "0" → short frame with 17 bit data Prot_LG = "1" → extended frame with 89 bit data
I_Stell	BOOL	x		I_Stell = "0" → actual current per channel is read out (only for circuit breakers type PM/PC-08xx) I_Stell = "1" → set current per channel is read (supported from firmware 2.1 for all circuit breaker types)
Stop_Bit	BOOL	x		As of firmware 2.0, a stop bit is inserted at the end of a frame to increase transmission security. If all bits to be transmitted are successfully received by the circuit breaker, the circuit breaker sends another bit as a stop bit. Include stop bit → Stop_Bit = "1" Do not include stop bit → Stop_Bit = "0"
Status_In	BOOL	x		Signal output "S2" from circuit breaker
Trig1_0 and Trig2_0	BOOL	x	x	Bit memories can be connected to the connections which are set to 0 following a complete frame cycle, e.g. in order to send just one frame. (single cycle mode)
Spg_Out	INT		x	When extended frame is used (Prot_LG = "1"), the block outputs the connected input voltage (e.g. 241 = 24.1 V).
I_Out_Ch1 to I_Out_Ch8	INT		x	When extended frame is used (Prot_LG = „1“), the block outputs either the set currents or the actual currents depending on "I_Stell" (e.g. 14 = 1.4 A).
Out_Status	WORD		x	Output of the operating and error states. The 1st byte returns the current on/off state of channels 1 - 8, the second byte the operating states (tripped or overcurrent) for each channel. (e.g. MW58, M58.0 = state for channel 1)
Out_Sig	BOOL		x	Signal input "S1" from circuit breaker