

10 DI8N (DIGITAL INPUT UNIT, NPN) D201127

10.1 USE

The DI8N is an eight-channel digital input unit used to read contact data, two-wire proximity switches or NPN type switches.

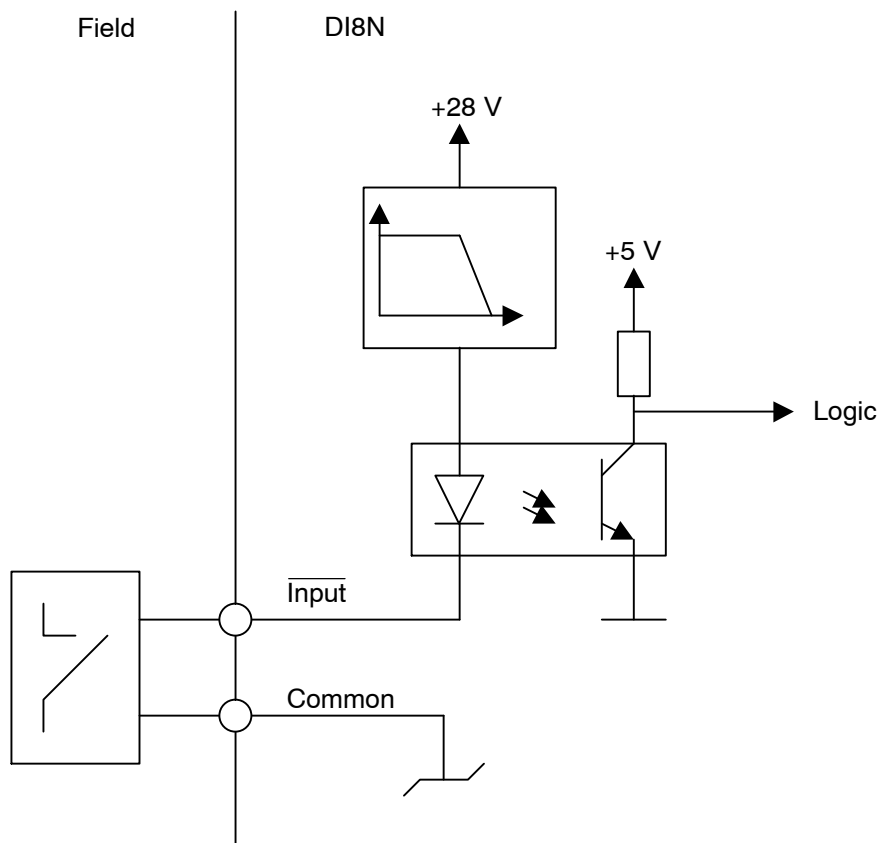
The DI8N unit includes a channel-specific current-limited (40 mA) voltage supply.

Signals with negative polarity (NPN) can be connected to the inputs.

The unit can be parameterized to either digital input mode or pulse counter mode.



10.1.1 Polarity diagram



10.2 TECHNICAL SPECIFICATIONS

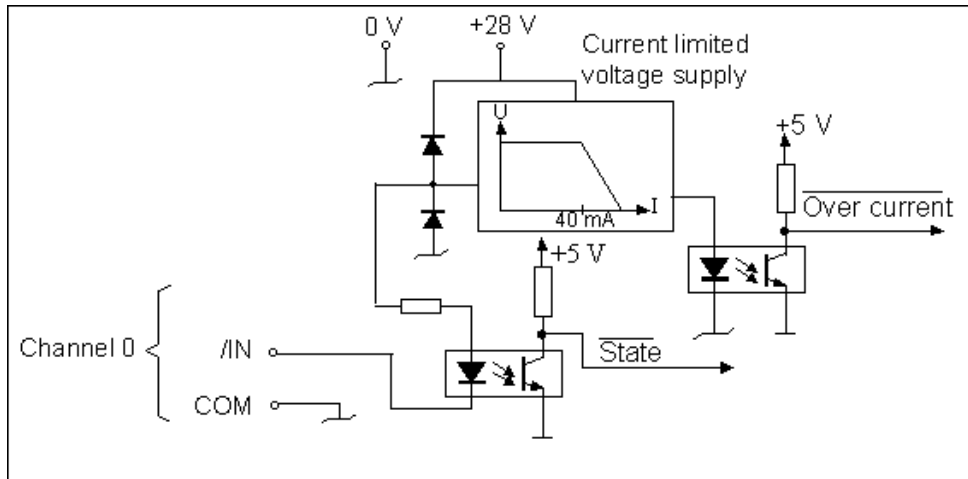
10.2.1 Structure

- the size of the casing: 95 mm x 24 mm x 95 mm [H x W x D]
- weight: 90 g

10.2.2 Field interfaces

Inputs	DI8N D201127
Number of channels	8
Input impedance	1.7 k Ω (24 V), 2.2 k Ω (0 V)
Channel-specific current limit	40 mA
Field voltage supplies [VS]	18...32 VDC
Max. leakage current of field circuit	2 mA
Decision levels	State 1: I > 4.5 mA State 0: I < 2.0 mA
Filtering	$\tau = 0.5$ ms
Pulse frequency	≤ 400 Hz
Parameterizable shortest pulse length	1...500 ms
Parameterizable pulse hold time	0...1250 ms
Measuring interval	1.0 ms
Field circuit current supply	Field power

10.3 INPUT CIRCUIT



The flat cable connectors on the MB2 and MB8 mounting bases are connected according to the following table:

/IN = Input, C = COM, CH = channel

CH	0	1	2	3	4	5	6	7
Pin	2	4	6	8	10	12	14	16
	/IN	/IN	/IN	/IN	/IN	/IN	/IN	/IN
Pin	1	3	5	7	9	11	13	15
	C	C	C	C	C	C	C	C

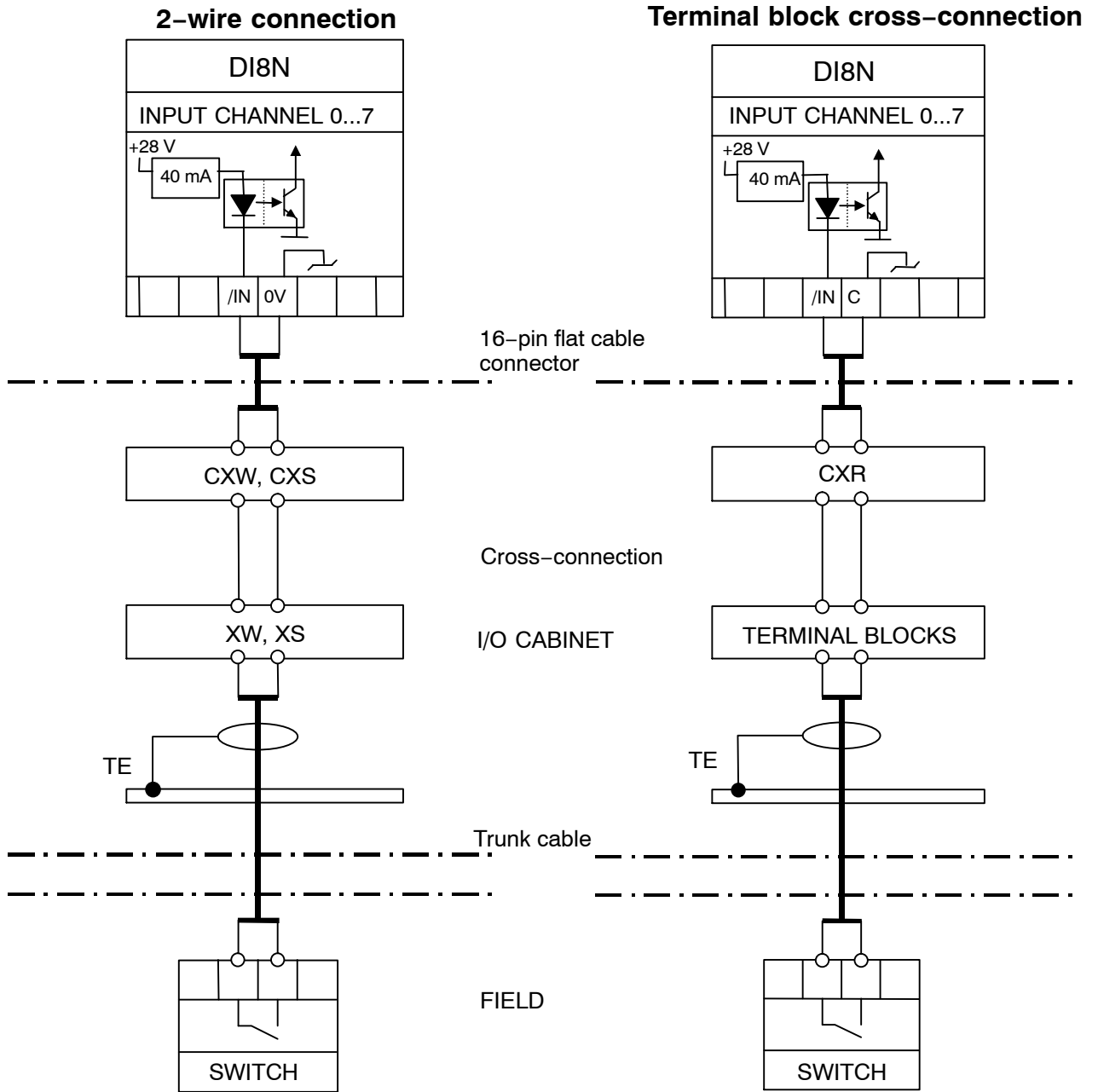
The connecting order for the cable connector signals of CXS, CXW and CXR cross connection boards is as follows:

CH	7	7	6	6	5	5	4	4	3	3	2	2	1	1	0	0
DI8N	/IN	C	/IN	C	/IN	C	/IN	C	/IN	C	/IN	C	/IN	C	/IN	C
CXx	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

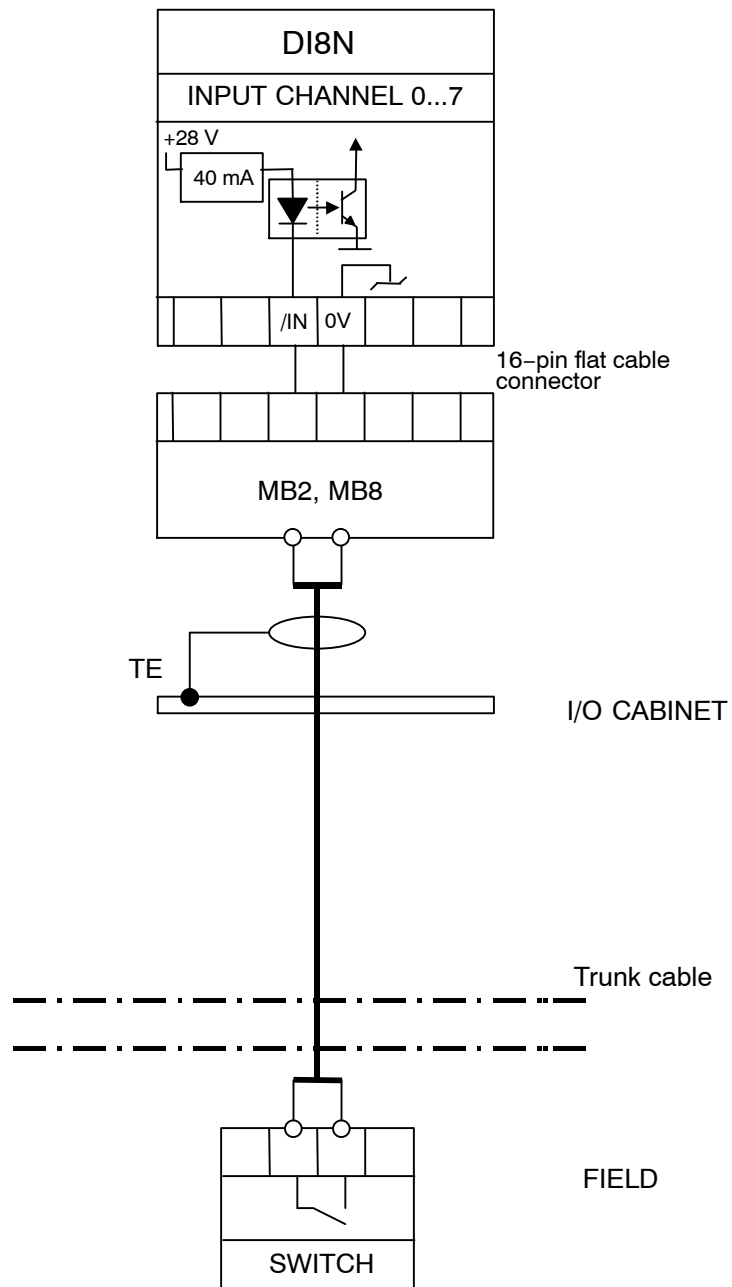
There are two versions of the connection units for the MB2 and MB8 mounting bases. With the FCx units, FCS S446105 and FCR S446106, the connection order is as listed in the table below:

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
13	Ch6 COM	14	Ch6 /IN	15	Ch7 COM	16	Ch7 /IN
9	Ch4 COM	10	Ch4 /IN	11	Ch5 COM	12	Ch5 /IN
5	Ch2 COM	6	Ch2 /IN	7	Ch3 COM	8	Ch3 /IN
1	Ch0 COM	2	Ch0 /IN	3	Ch1 COM	4	Ch1 /IN

10.3.1 Example connections



Without cross-connection



10.4 SIGNAL LIGHTS

There are eight yellow signal lights on the unit, marked 0..7.

The signal light is on when the input state of the channel in question is '1'.



10.5 FAULT BITS

In fault situations in which the process control server is not able to read a new measurement from the I/O unit, the default action is that the measurement freezes and the fault bit 'OLD' is added to it. Measurement processing and the operation of the 'OLD' fault bit can be controlled by using the "Input fault control" (infctrl) parameter of the configuration symbol.

10.6 CONFIGURATION

10.6.1 Symbols

The symbols can be added in the I/O – MIO M80 menu of the FbCAD tool.

MIO	M80	DI8
pr:TAG_CODE.I		
Address	2 : 0 : 0 : 0	
Measurement		:m

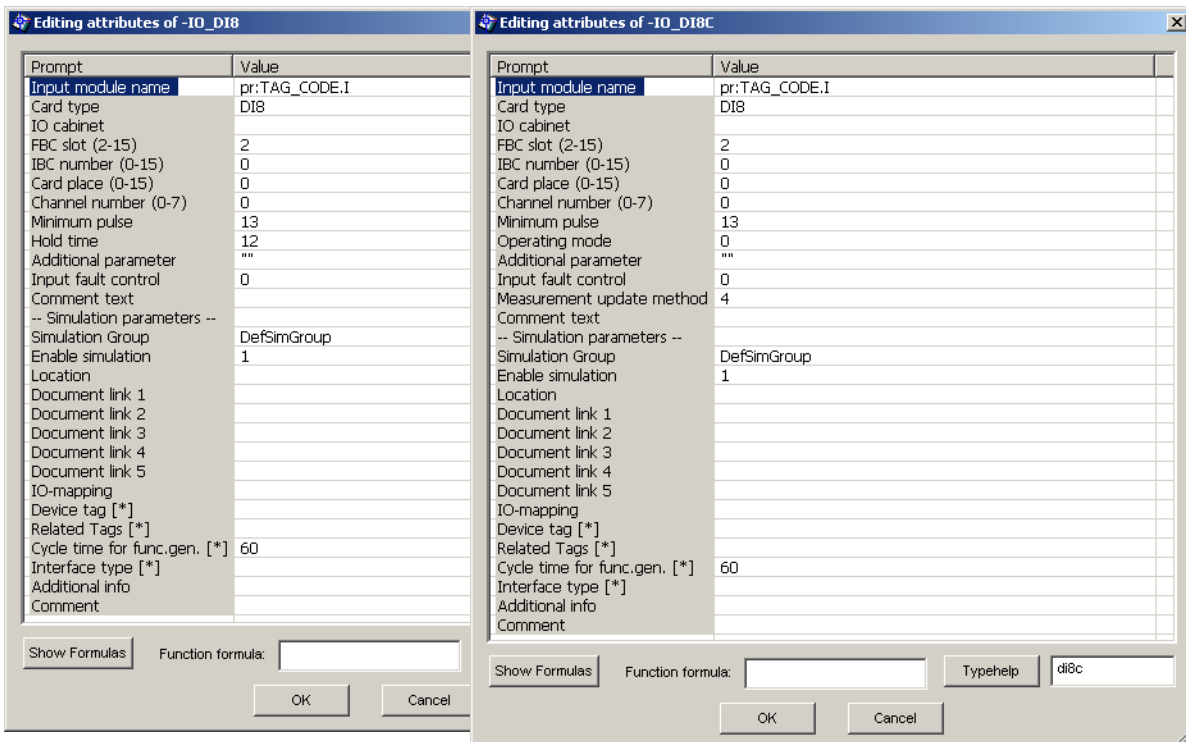
Normal digital input mode symbol

MIO	M80	DI8
pr:TAG_CODE.I		
Address	2 : 0 : 0 : 0	
Measurement		:m

Pulse count mode symbol

In the FbCAD tool there are also symbols with inverted input.

The parameters and default values of the symbol:



10.6.2 Parameters connected to run-time operation

Input module name

I/O function identifier.

Card type

I/O unit's exact type.

IO cabinet

The identifier of the I/O cabinet where the I/O unit is located.

FBC slot (2–15)

FBC slot number.

IBC number (0–15)

IBC Bus Controller number.

Card place (0–15)

I/O unit's place in I/O group.

Channel number (0–7)

I/O channel number.

Minimum pulse (find)

The parameter of I/O's digital input that specifies the minimum length of the shortest detectable pulse.

The parameter is encoded as follows:

0 = 1 ms	9 = 10 ms	18 = 80 ms
1 = 2 ms	10 = 15 ms	19 = 90 ms
2 = 3 ms	11 = 20 ms	20 = 100 ms
3 = 4 ms	12 = 25 ms	21 = 150 ms
4 = 5 ms	13 = 30 ms	22 = 200 ms
5 = 6 ms	14 = 40 ms	23 = 350 ms
6 = 7 ms	15 = 50 ms	24 = 500 ms
7 = 8 ms	16 = 60 ms	25...31 = 500 ms
8 = 9 ms	17 = 70 ms	

The parameter also includes a tolerance caused by the unit's sampling frequency. It is + 0.5 ms for parameter value 0, and + 1 ms for other values of the parameter.

For instance, the value of the parameter is 2, i.e. 3 ms:

- 1 Actual pulse length < 3 ms => the pulse will not be detected.
- 2 Actual pulse length 3.5 ms => the pulse may or may not be detected, depending on the sampling moment.
- 3 Actual pulse length > 4 ms => the pulse is always detected, because actual pulse length > 3 ms + 1 ms (tolerance).

Hold time (hold)

NOTE!

This parameter is available only in the normal digital input mode symbol.

The parameter of I/O's digital input that specifies the minimum time to which all the detected pulses are stretched.

The parameter is encoded as follows:

0 = no stretching	6 = 50 ms	12 = 500 ms
1 = 5 ms	7 = 60 ms	13 = 750 ms
2 = 10 ms	8 = 80 ms	14 = 1000 ms
3 = 20 ms	9 = 100 ms	15 = 1250 ms
4 = 30 ms	10 = 150 ms	
5 = 40 ms	11 = 300 ms	

Operating mode (mode)

NOTE!

This parameter is available only in the pulse count mode symbol.

0 = pulse counting up from value 0

result = new_value – old_value

If the counter turns around, i.e. old_value > new_value, then

result = max – old_value + new_value + 1

max = $2^{14}-1$

If the pulse count for the sampled interval > max, there will be an error in the measured value.

Additional parameter (a_param)

Input fault control (infentrl)

This parameter specifies the measurement value, which is returned to the PCS, when there is no connection to IBC or to I/O unit. This parameter is used when the user wants to control the measurement value in the case of power supply failure, when I/O has no backup power supply.

The parameter determines the value returned to process control server and the unnecessary alarms generated by the fault bits can be avoided. The parameter has no effect on the OVF fault bit (real-time unreliable).

Input fault control parameter is encoded as follows:

- 0 Measurement freezes and OLD fault bit is set.
- 1 If connection to IBC but not to I/O unit, both the measurement value and the fault bits remain as they are. If no connection to IBC, measurement freezes and OLD fault bit is set.
- 2 If connection to IBC but not to I/O unit, measurement value is set to 0, no change to fault bits. If no connection to IBC, measurement freezes and OLD fault bit is set.
- 3 If connection to IBC but not to I/O unit, measurement value is set to 0, OLD fault bit is set. If no connection to IBC, measurement freezes and OLD fault bit is set.
- 4 If connection to IBC but not to I/O unit, measurement value is set to 1, no change to fault bits. If no connection to IBC, measurement freezes and OLD fault bit is set.
- 5 If connection to IBC but not to I/O unit, measurement value is set to 1, OLD fault bit is set. If no connection to IBC, measurement freezes and OLD fault bit is set.
- 6 If no connection to I/O unit, both the measurement value and the fault bits remain as they are.
- 7 If no connection to I/O unit, measurement value is set to 0, no change to fault bits.
- 8 If no connection to I/O unit, measurement value is set to 0, OLD fault bit is set.
- 9 If no connection to I/O unit, measurement value is set to 1, no change to fault bits.
- 10 If no connection to I/O unit, measurement value is set to 1, OLD fault bit is set.

Measurement update method (upd)

NOTE!

This parameter is available only in the pulse count mode symbol.

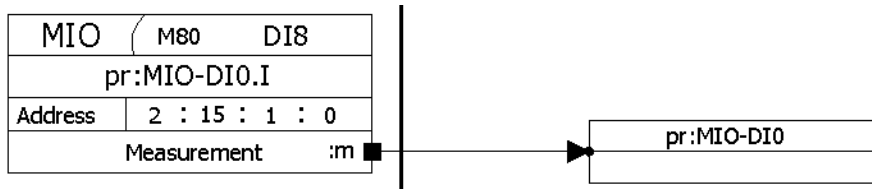
The update method parameter is used to optimize bus transfers to enable fast measurements (<= 20 ms control cycles).

- 0 = every cycle
- 1 = every 20 ms
- 2 = every 50 ms
- 3 = every 100 ms
- 4 = optimized to control task (CT) speed
 - If CT < 200 ms -> upd = 0
 - If CT >= 200 ms -> upd = 1
 - If CT >= 500 ms -> upd = 2
 - If CT >= 1000 ms -> upd = 3

If upd > 0, values from different channels may come from different time points.

Comment text

10.6.3 Example connection



10.7 EC DECLARATION OF CONFORMITY

EC Declaration of Conformity is described in section "EC Declarations of Conformity".