

Application Note

How to achieve PL d with single safety light beam series 46C-K4 and a Safety PLC

Which devices can be used?

Transmitter	Receiver	Connection	Range	Red light	Infrared light
SLS46C-40.K48	SLE46C-40.K4/4P	2m Cable	0,25m – 40m	x	
SLS46C-40.K48-M12	SLE46C-40.K4/4P-M12	4-pin M12	0,25m – 40m	x	
SLS46C-70.K48	SLE46C-70.K4/4P	2m Cable	5m – 70m	x	
SLS46C-70.K48-M12	SLE46C-70.K4/4P-M12	4-pin M12	5m – 70m	x	
SLS46CI-40.K48	SLE46CI-40.K4/4P	2m Cable	0,25m – 40m		x
SLS46CI-40.K48-M12	SLE46CI-40.K4/4P-M12	4-pin M12	0,25m – 40m		x
SLS46CI-70.K48	SLE46CI-70.K4/4P	2m Cable	5m – 70m		x
SLS46CI-70.K48-M12	SLE46CI-70.K4/4P-M12	4-pin M12	5m – 70m		x

Which safety PLC's can be used?

The test rate of PLC must be at least 100 times higher than the expected interruptions according EN 13849-1

For example:

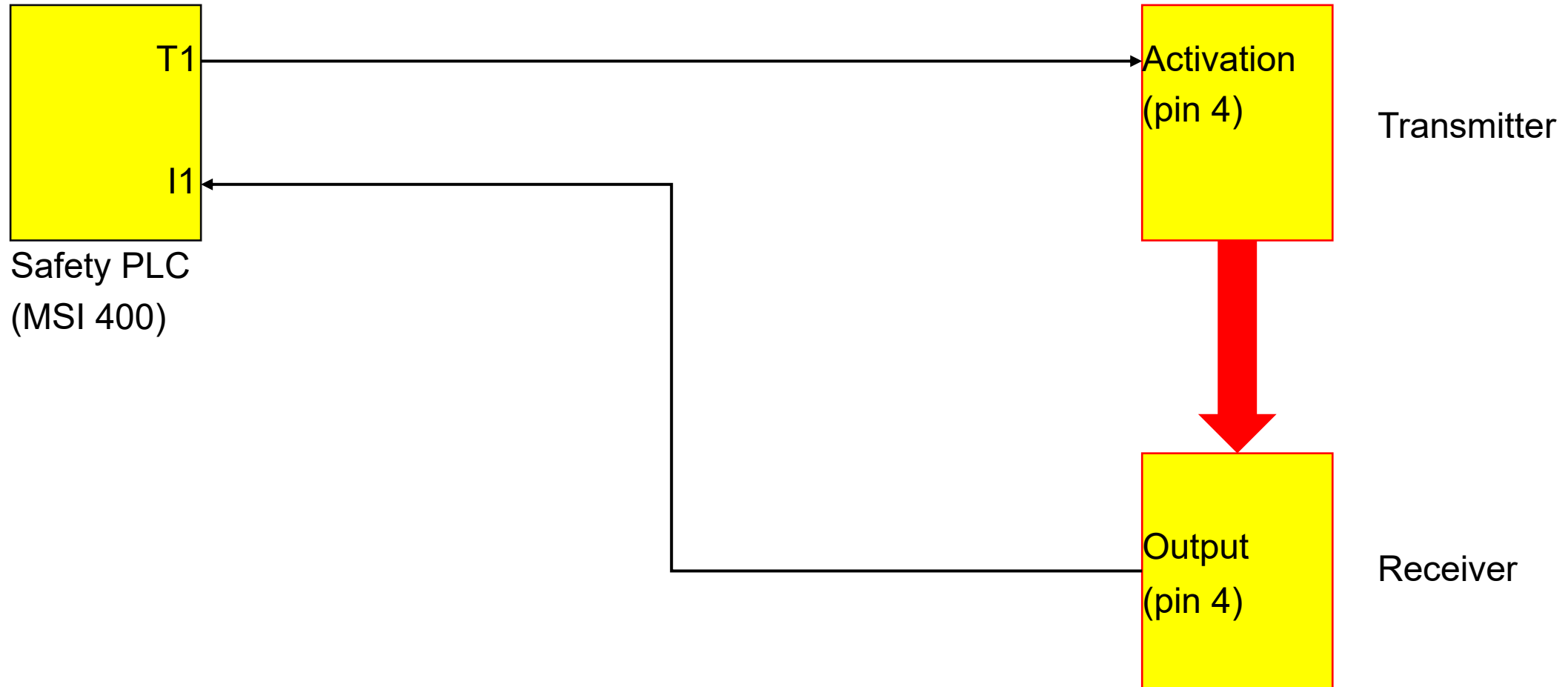
When the safety light barrier will be interrupted every minute, the test period must be at least 600ms.

Please note, that the transmitter and receiver have an activation time!

⇒ Test pulse gap must be higher than 5 ms.

Applicable Safety PLC's:

Company	Device
Leuze	MSI 400 series
Siemens	S7 – 300F series
	S7 – 1200F series
	S7 – 1500F series



How we achieve Performance Level d?

The system is a category 2 system (EN ISO 13849-1)

MTTF SLS46C – XX : 900 years

=> PFH: $2,3E-07$ / h

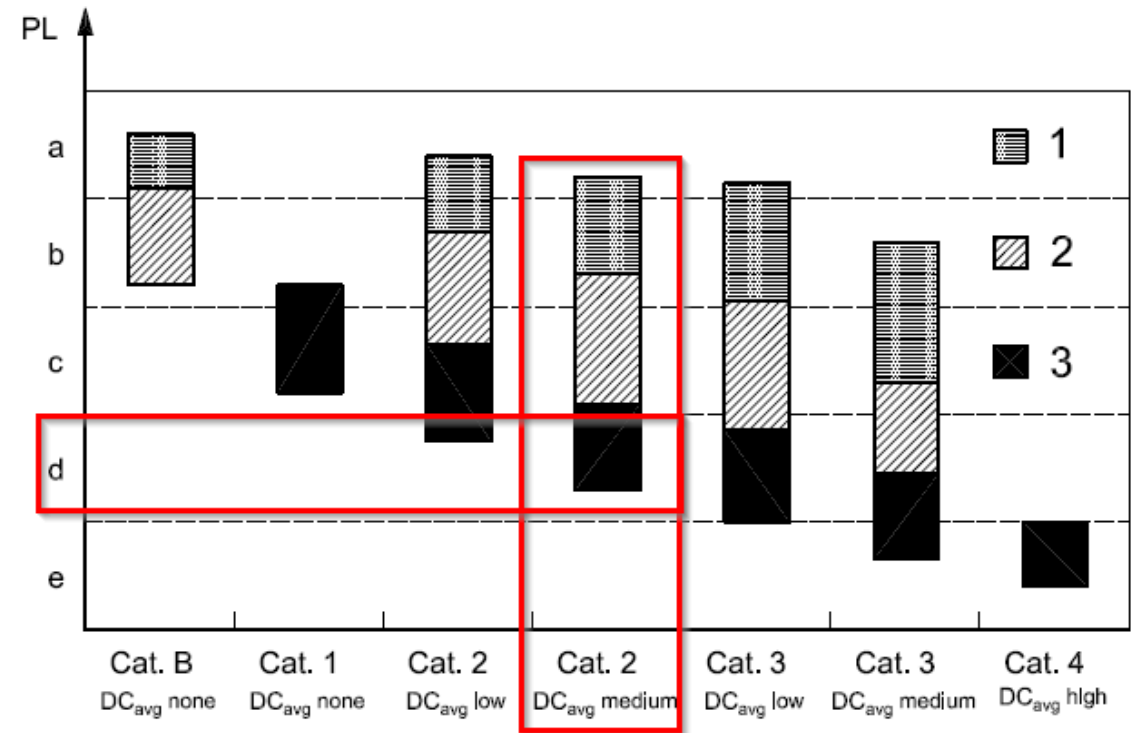
PFH MSI400 series: $4,3E-09$

PFH SLS46C + PFH MSI400 = $2,3E-07$ / h

PFH for PLd = $PFH < 1E-06$ / h

PFH SLS46C + MSI400 < PFH for PLd

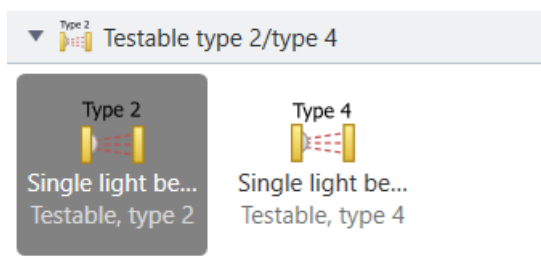
$2,3E-07$ / h < $1E-06$ / h



Steps you have to do in MSI.Designer (MSI400 series)

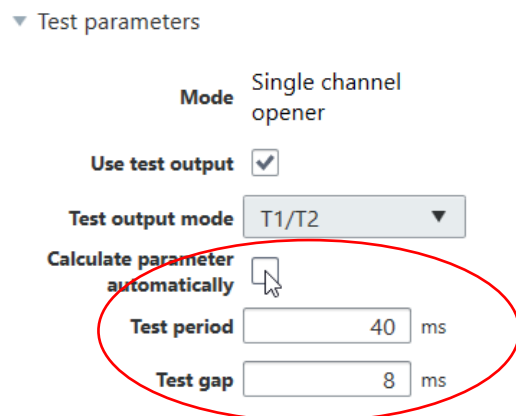
For 1 single beam device:

1. Use the function block „testable type 2“



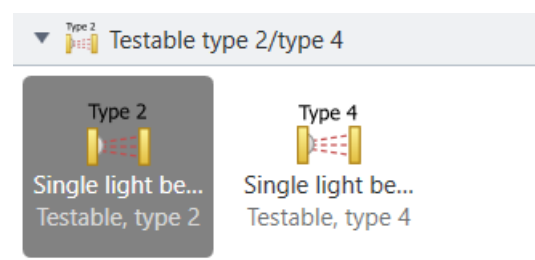
2. Uncheck calculate parameter

3. Change test gap parameter to 8 ms and test period at least to 40 ms.



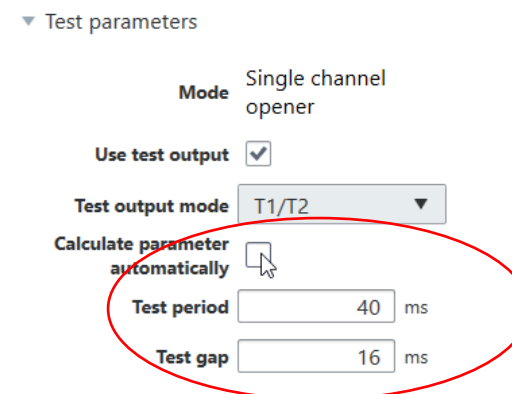
For up to 3 single beam devices:

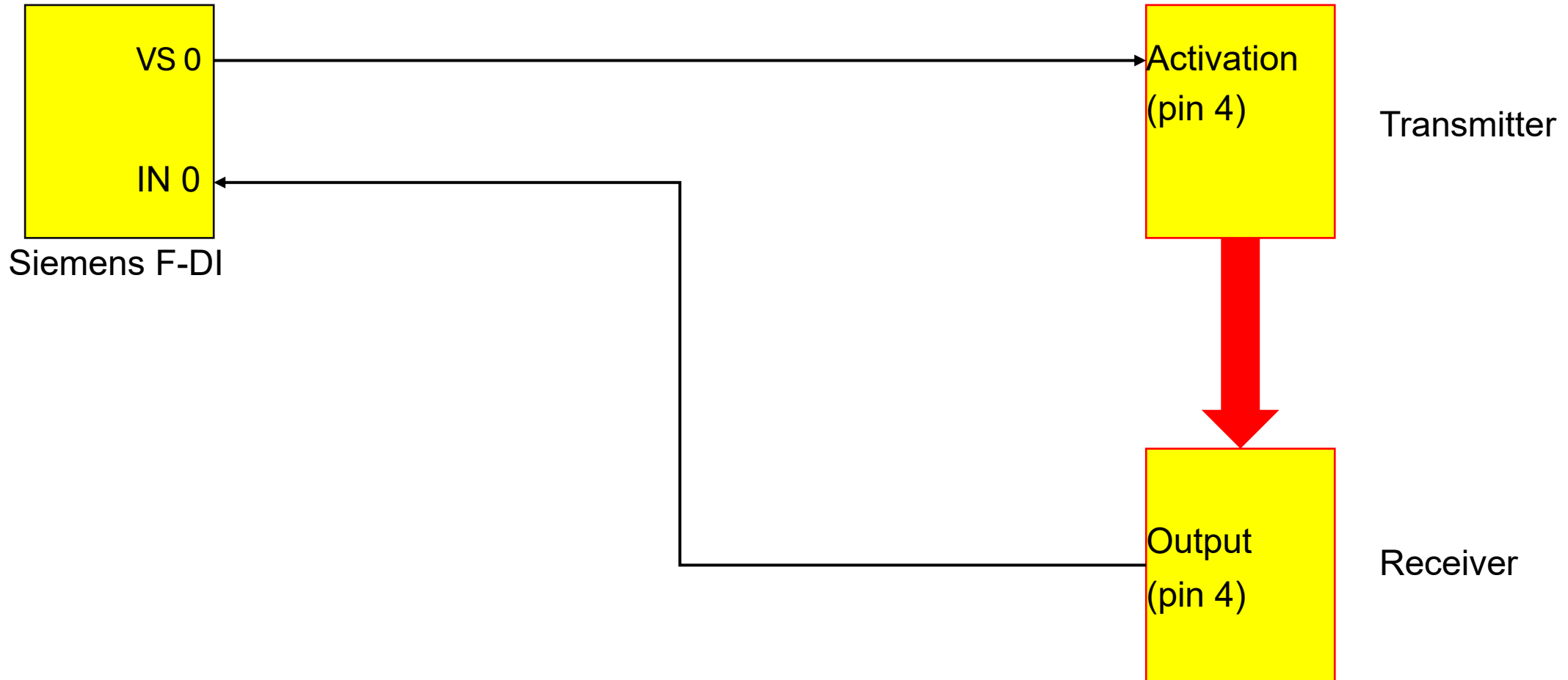
1. Use the functional block „testable type 2“



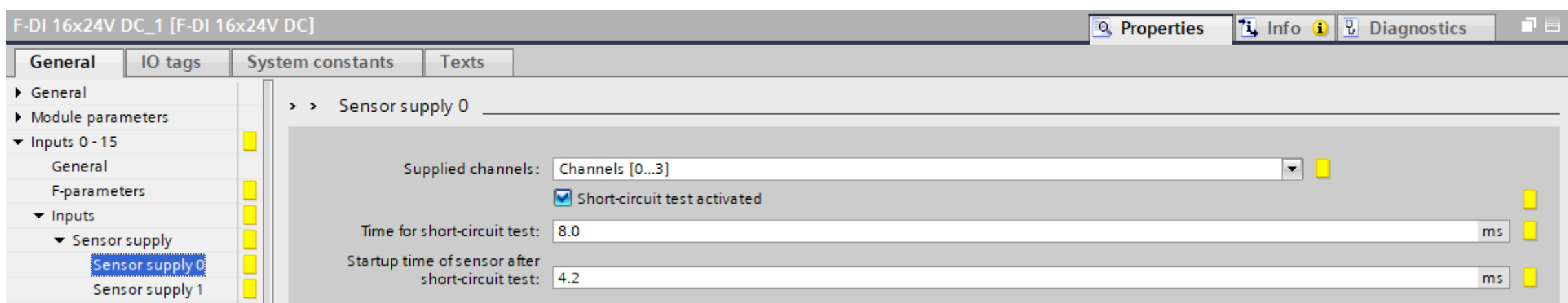
2. Uncheck calculate parameter

3. Change test gap parameter to at least 16 ms and test period at least to 40 ms.





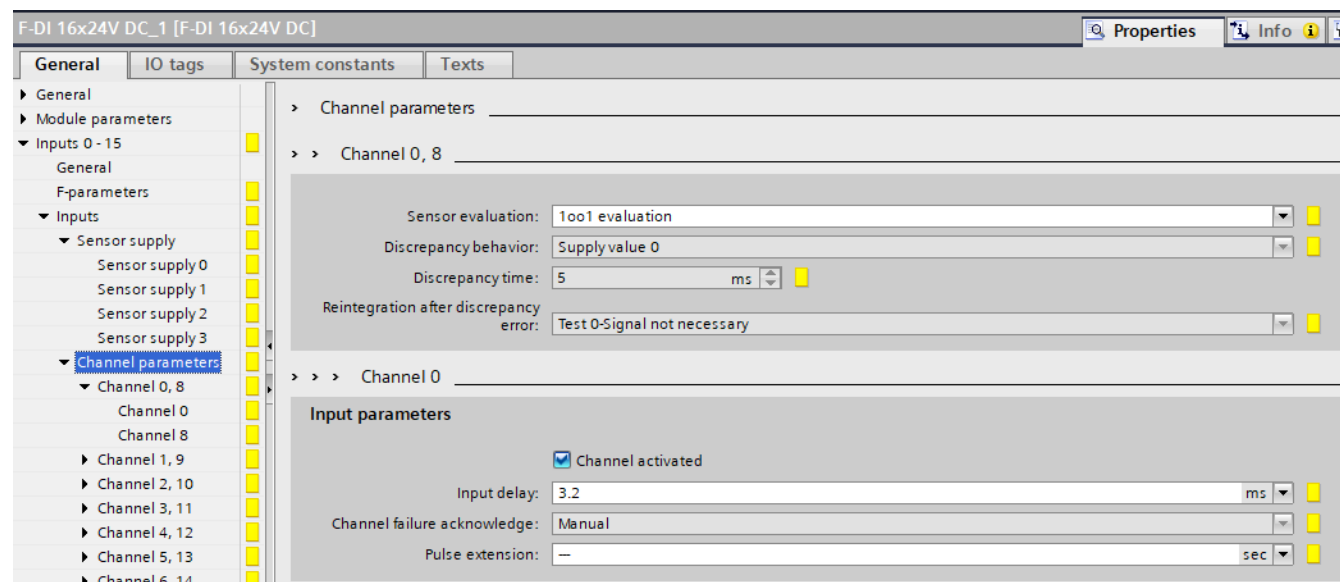
Steps in TIA Portal



For 1 single beam device:

1. Set time for short-circuit test to 8.0 ms
2. Set Startup time to 4,2 ms
3. Set Sensor evaluation to 1oo1
4. Set Input delay to 3,2 ms

For 2 or more devices, increase the values proportionally.



How we achieve Performance Level d?

The system is a category 2 system (EN ISO 13849-1)

MTTF SLS46C – XX : 900 years

=> PFH: $2,3E-07$ / h

PFH Siemens Safe Input Modul: $< 1E-09$ / h*

PFH Siemens Safe PLC: $< 1E-09$ / h*

PFH SLS46C + PFH Safe PLC + Safe Input = $2,3E-07$ / h

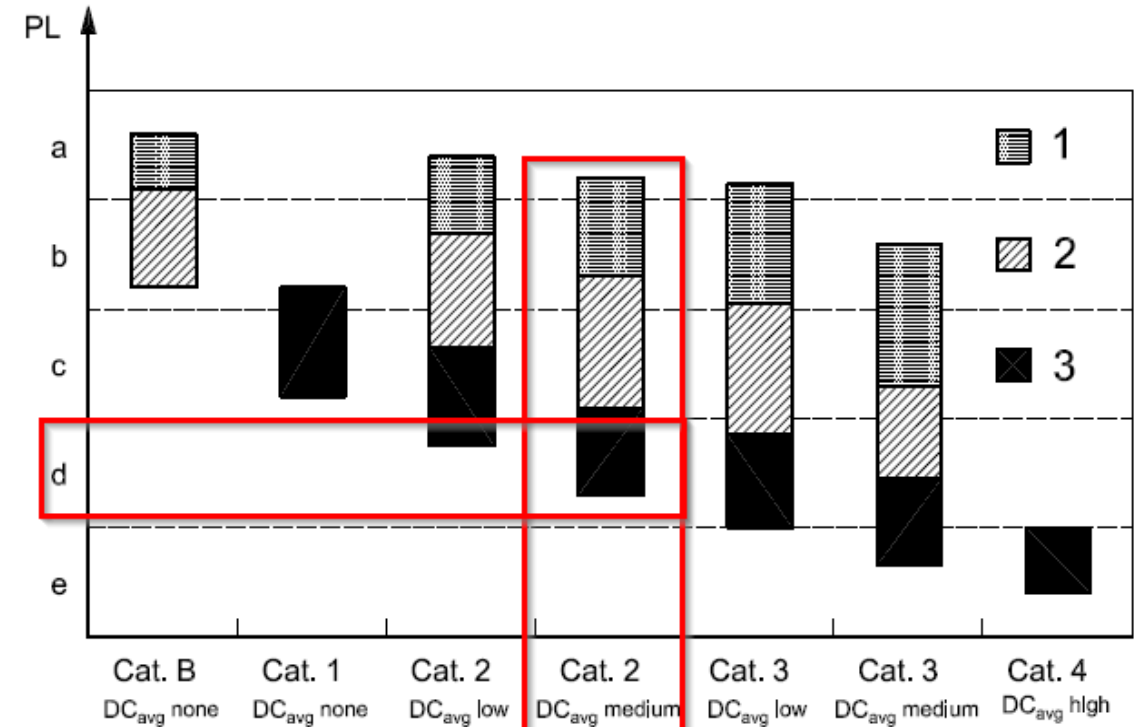
PFH for PLd = $PFH < 1E-06$ / h

PFH SLS46C + PFH Safe PLC + Safe Input $< PFH$ for PLd
 $2,3E-07$ / h $< 1E-06$ / h

* Source: Siemens manual

Table 5- 1 Conditions for achieving SIL/Cat./PL

Application	Sensor evaluation	Sensor supply	Achievable SIL/Cat./PL
1	1oo1	Any	3 / 3 / d





**For further support
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local Support**



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