PNOZ s3 with light curtain PSENop4F-s.../1

Product
Type: Light curtain, AOPD
Name: PNOZsigma, PSENopt
Manufacturer: Pilz GmbH & Co. KG, Safe Automation

Document
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Application Note - No. 1002208_EN_02

the spirit of safety

Document Revision History

Release	Date	Changes	Chapter
01	-	non-existent	-
02	2011-03-09	Creation	all

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We are grateful for any feedback on the contents.

March 2011

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Americas
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  +55 11 8245-8267
- Mexico
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- USA (toll free)
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Asia
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- The Netherlands
  +31 347 320477
- Turkey
  +90 216 5775552

You can reach our international hotline on:

+49 711 3409-444 or **mailto:support@pilz.com**

Pilz GmbH & Co. KG
Safe Automation
Felix-Wankel-Straße 2
73760 Ostfildern, Germany

Telephone: +49 711 3409-0
Telefax: +49 711 3409-133
E-Mail: pilz.gmbh@pilz.de
Internet: www.pilz.com

Contents

Abbreviations

EDM	**E**xternal **d**evices **m**onitoring
OSSD	**O**utput **s**ignal **s**witching **d**evice
AOPD	**A**ctive **o**ptoelectronic **p**rotective **d**evice

1. Useful documentation

Reading the documentation listed below is necessary for understanding this application note. The availability of the indicated tools and safe handling are also presupposed with the user.

1.1. Documentation from Pilz GmbH & Co. KG

No.	Description	Item No.
1	Pilz international homepage, download section	www.pilz.com
2	Operating instructions PNOZ s3	21 395-6NL-xx
3	Operating manual PSEN op4F/H-s-...../1	1001422-EN-xx
4		
5		
6		

1.2. Documentation from other sources of information

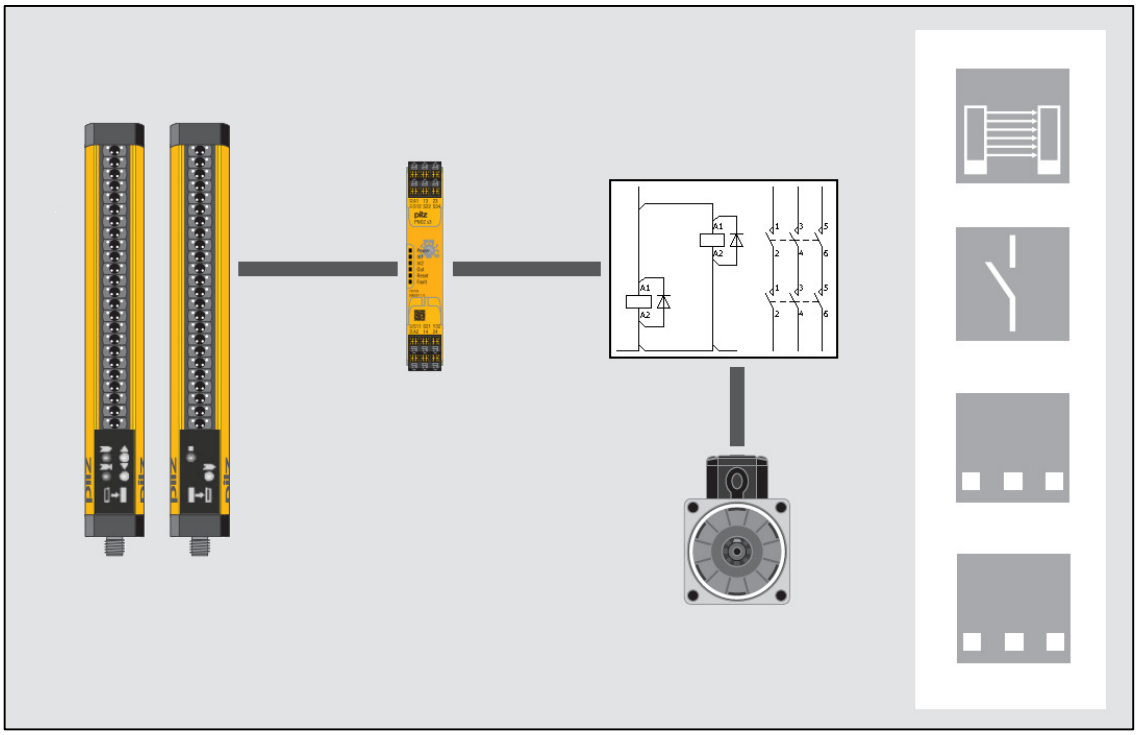
No.	Description	Item No.
1		
2		

2. Hardware configuration

2.1. Pilz products

No.	Description	Order number	Version	Number
1	PNOZ s3 C	751 103	-	1
2	PSEN op4F-s-14-045/1	630 742	-	1

2.2. Hardware configuration



3. Application Task

3.1. Description

The example shows the implementation of a protective device with a PSEN op4F-14-045/1.
The safe control and evaluation of the signals is taken over by a PNOZ s3

The process is divided into the following two main functions:
- Light Curtain and
- Feedback Loop Monitoring

3.1.1. Light curtain monitoring function

The semiconductor outputs in the receiver from the safety light curtain (B1) was opened, soon as a beam from light curtain was interrupted.
Therefore the input circuit of the safety device PNOZ s3 (A1) was disconnected and the safety contacts open. The contactors KM1 and KM2 de-energise.

Settings at PSENopt
The EDM function is switched by applying +24V to the “EDM selection” and 0V to the “EDM” set override.
The light curtain is switched by applying OSSD1 to the input “manual/automatic restart” to automatic restart mode.
The light curtain also acts as the normal operation automatically resume as soon as the beams of the light curtain are free.
If it not possible to prevent that the operator pass completely beyond the sensitive area, it is necessary that a manual restart procedure is performed on the safety relay.

3.1.2. Feedback loop monitoring function

The positive-guided N/C contacts of contactors KM1 and KM2 are monitored in the feedback loop S12-S34 of the safety relay (A1).

Start
The safety relay PNOZ s3 (A1) can be started by pressing the start button S3 if
- the light curtain was not interrupted and
- the semiconductor outputs of the light curtain B1 is activated and
- contactors KM1 and KM2 are de-energised.

Settings at PNOZsigma
- The terminator on the PNOZ s3 must be connected.
- The operating mode selector switch (mode) on the safety relay PNOZ s3 must be set to "Monitored reset, falling edge without detection of shorts across contacts (In2+)".

3.1.3. Safety assessment

- Earth faults and shorts between contacts in the input circuit are detected by the light curtain.
- A fault on the PNOZ s3 does not lead to the loss of the safety function.
- a single fault in the light curtain is recognized
- The safety relay PNOZ s3 (A1) can only be started if first the input circuit of A1 and then the reset button S3 are closed and reopened. This avoids an unwanted reset before the input circuit is closed or as a result of the reset button being overridden.
- If the position of the operating mode selector switch (mode) on the PNOZ s3 (A1) is changed during operation, an error message will be triggered and the safety contacts on A1 will open. This fault condition can only be rectified by switching the supply voltage on the safety relay A1 off and then on again.

- The safety relay PNOZ s3 (A1) and contactors KM1 and KM2 must be installed in a single mounting area (control cabinet) in order to exclude a short across the output.

3.2. Functional safety

3.2.1. Safety-related characteristics in accordance with EN ISO 13849-1

No.	Safety function	Performance Level	Safety-related parts of the control system
1	Machine shut down when the safety light curtain is interrupted	PL e	Sensor (PSEN op4F-s-14-045/1 B1) Logic (PNOZ s3 A1) Actuator (contactors KM1, KM2)

Prerequisites:

No.	Description		Identification
1	Common cause failure (CCF):		Requirements are considered to be met (must be tested on implementation)
2	Mission time:		20 years
3	Operating interval (electromechanical components):	Actuator	Two operations per hour
4	Characteristic data of contactors KM1/KM2:	B10d	2,000,000

Please note the further requirements of EN ISO 13849-1, e.g. requirements for avoiding systematic faults.

3.2.2. Safety-related characteristics in accordance with EN 62061

No.	Safety-related control function (SRCF):	Safety Integrity Level	Subsystems
1	Machine shut down when the safety light curtain is interrupted	SIL 3	Sensor (PSEN op4F-s-14-045/1 B1) Logic (PNOZ s3 A1) Actuator (contactors KM1, KM2)

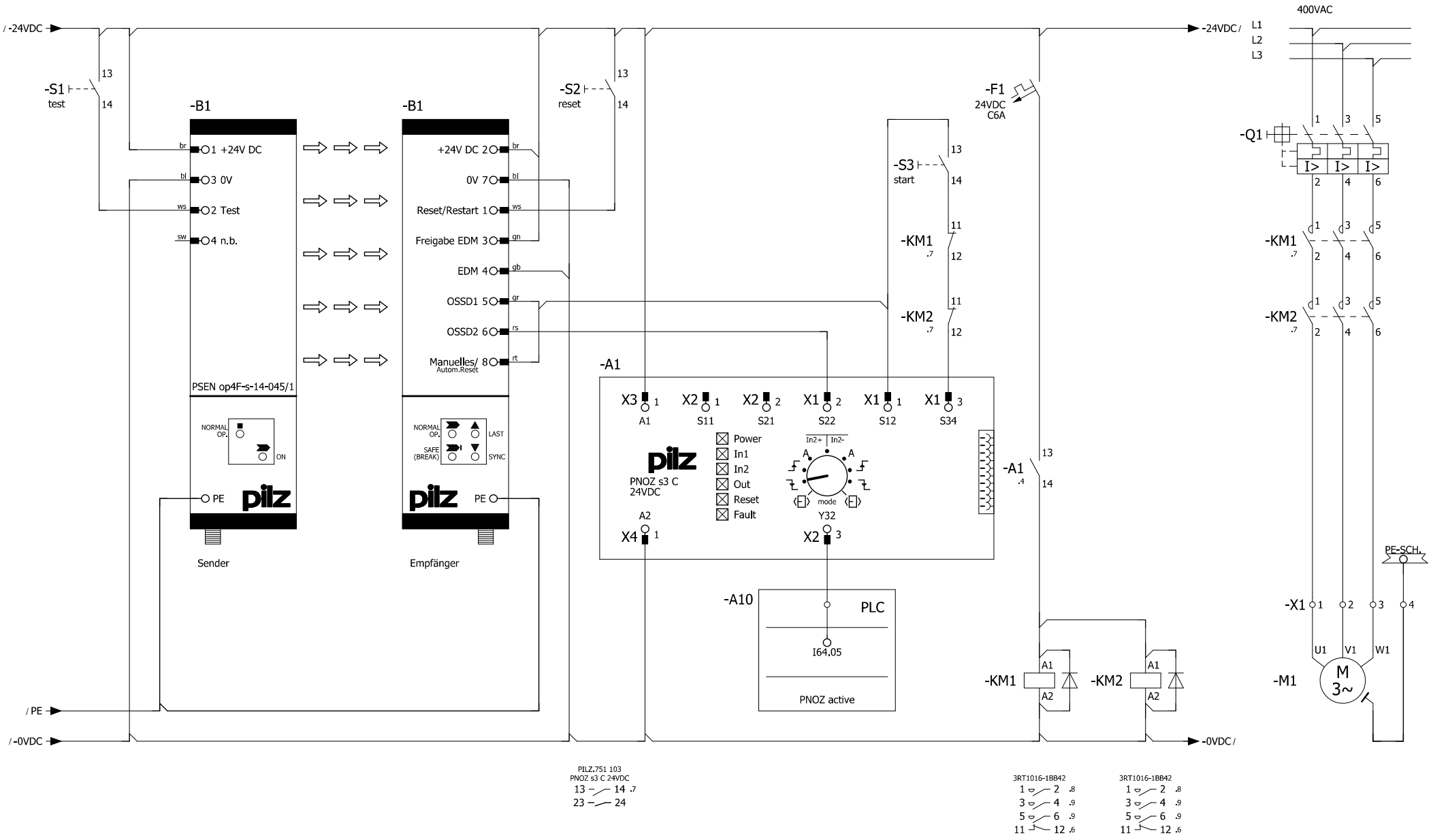
Prerequisites:

No.	Description		Identification
1	Common cause failure (CCF):		ß = 2 % (must be tested on implementation)
2	Proof test interval:		20 years
3	Operating interval (electromechanical components):	Actuator	two operations per hour
4	Characteristic data of contactors KM1/KM2:	B10d	2,000,000
		Dangerous failure rate	65 %

Please note the further requirements of EN 62061, e.g. requirements for systematic safety integrity.

3.2.3. Classification in accordance with EN 954-1

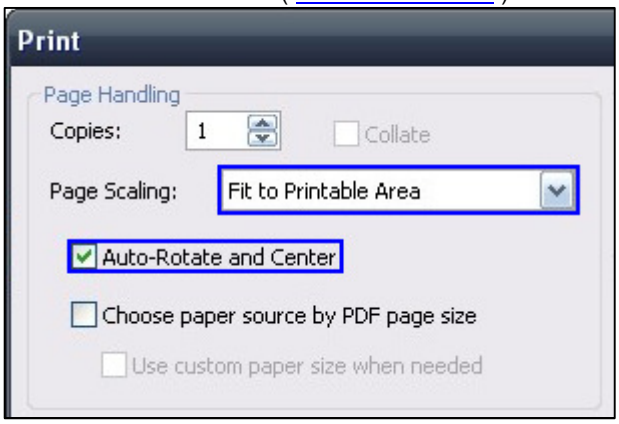
Depending on the application area and its respective regulations, this connection example is suitable for applications up to Category 4 of EN 954-1.



Revision	09.03.2011	Date	30.11.2010	EN ISO 13849-1:2006 PL e	pilz Pilz GmbH & Co.KG Felix-Wankel-Str.2 73760 Ostfildern	Light curtain PSEN op4F-s-14-045/1 with PNOZ s3	Mounting place + AN_1002208_02
Name	RDS	Name	RDS				
				EN 62061:2005 SIL 3			Page: 1 / 1
		Dep.	CS				

Recommended printer settings

Adobe Acrobat Reader (www.adobe.com)



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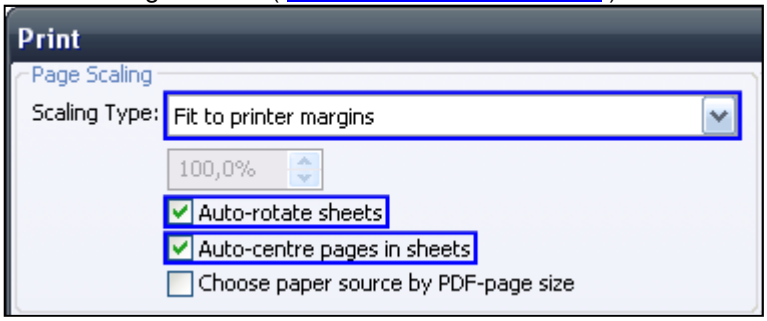

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Technical support

+49 711 3409-444
support@pilz.com

Pilz GmbH & Co. KG
Felix-Wankel-Straße 2
73760 Ostfildern, Germany
Telephone: +49 711 3409-0
Telefax: +49 711 3409-133
E-Mail: pilz.gmbh@pilz.de
Internet: www.pilz.com