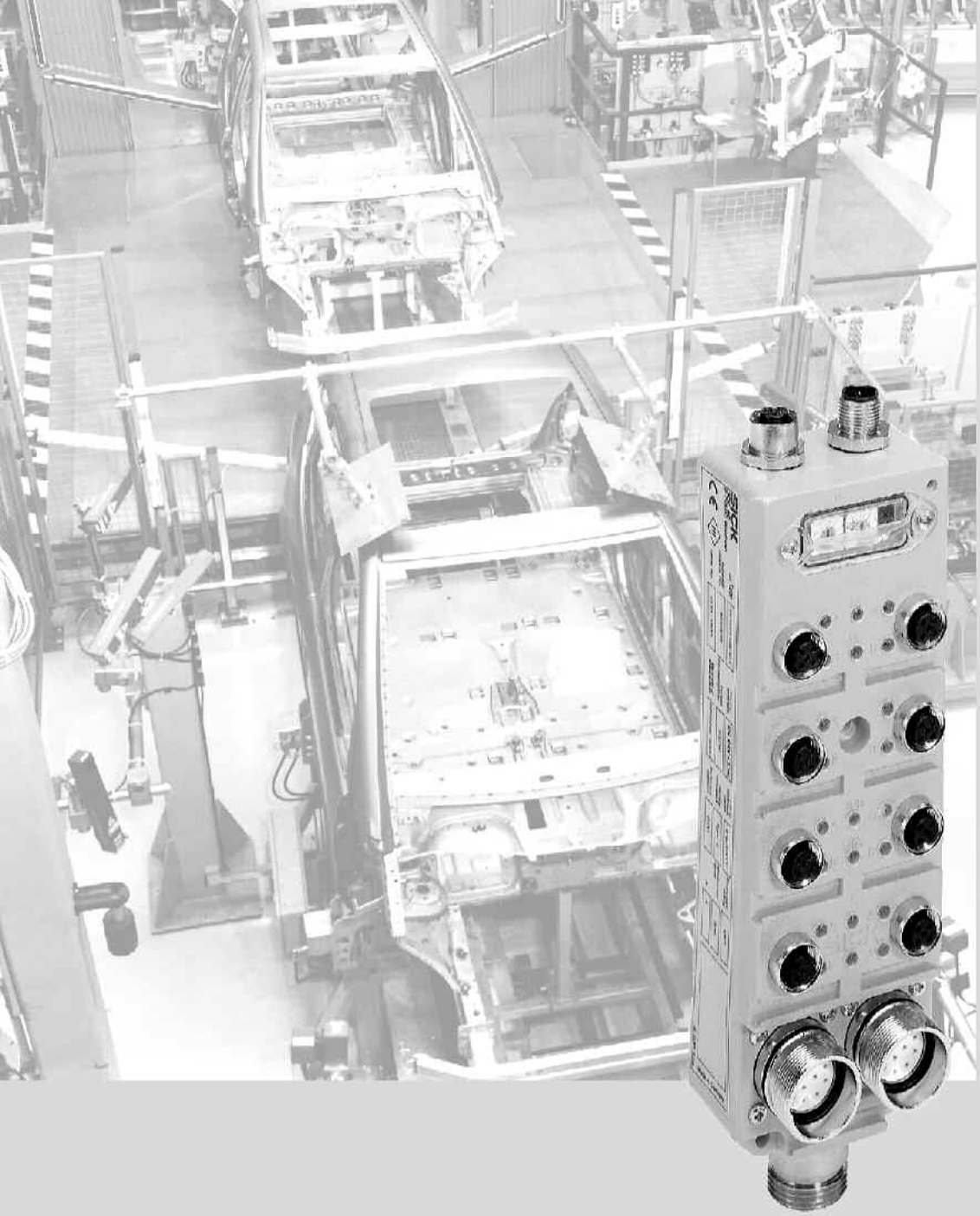


OPERATING INSTRUCTIONS

UE 4100 for I/O
Function Package

SICK

Contents

1 Function package UE 4100 for I/O 4
1.1 Emergency stop 4
1.1.1 Emergency stop (single-channel) 4
1.1.2 Emergency stop (two-channel, common testing) 4
1.1.3 Emergency stop (two-channel, isolated testing) 5
1.2 Safety switches and safety locking devices 5
1.2.1 Safety switch (single-channel) 5
1.2.2 Safety switch (two-channel) 5
1.2.3 Safety switch (two-channel, complementary) 5
1.2.4 Safety locking device (single-channel) 6
1.2.5 Safety locking device (two-channel) with safety switch (single-channel) 6
1.2.6 Safety locking device (two-channel) with indicator 7
1.3 T 4000 Compact 7
1.4 Two-hand (type IIIC) 8
1.5 Electro-sensitive protective equipment (ESPE) with output signal switching device (OSSD) 8
1.5.1 ESPE self-testing (type 2/3/4) 9
1.5.2 ESPE testable (type 2) 9
1.5.3 ESPE self-monitoring 9
1.6 Control switches 10
1.6.1 Control switch without indicator display 10
1.6.2 Control switch with indicator display 10
1.7 Enabling switch (two-channel) 11
1.8 Operating mode selector switch 3 times complementary 12
1.9 Operating mode selector switch 1 of n 13
1.10 Muting sensor untested 13
1.11 Reset button with test signal 14
1.12 DESINA 14

2 Error messages 15
2.1 Operating instructions not available 15

3 Annex 16
3.1 List of illustrations 16

1 Function package UE 4100 for I/O

The function package UE 4100 for I/O expands the functions of the CDS with pre-configured applications for the field signal inputs.

Note In the CDS, the pre-configured applications from this function package can be recognized by means of the prefix **I/O:**.

The available pre-configured applications are described in the following sections.

1.1 Emergency stop

Depending on the required control category, you can realise the emergency stop as follows:

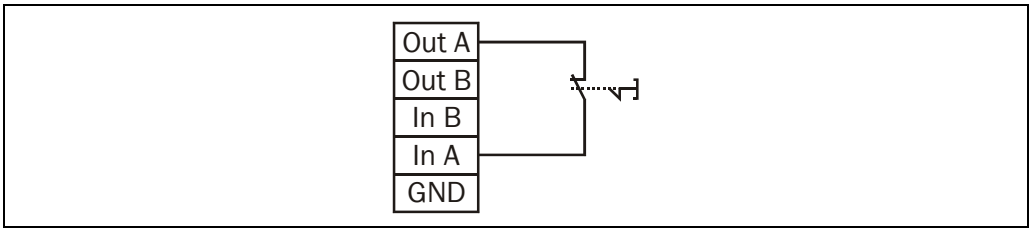
- single-channel
- two-channel with common testing
- two-channel with isolated testing

Notes The categorisation of contact switching elements (e.g. safety switch and emergency stop) in a control category depends not only on the connection layout (single-channel/two-channel), but also on the type (single/redundant, type of testing). You must therefore always select the appropriate switching element for the required control category and connection layout.

For the **Emergency stop** application, you must configure the outputs (Out) used as test signals and the safety input (In) as signal input.

1.1.1 Emergency stop (single-channel)

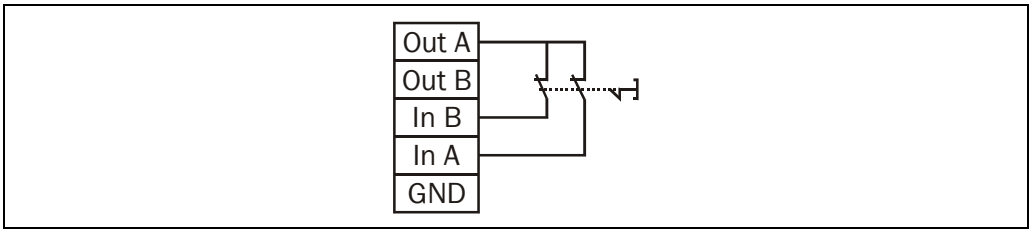
Fig. 1: Example of a circuit for an emergency stop (single-channel)



Note In the case of single-channel switching you can use the second input/output (In B and Out B) for another application.

1.1.2 Emergency stop (two-channel, common testing)

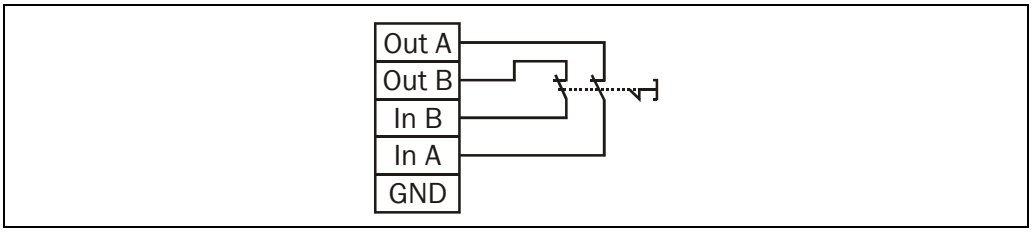
Fig. 2: Example of a circuit for an emergency stop (two-channel, common testing)



Note With a two-channel connection layout with common testing, the test signal allocation of the unused output (Out B) is irrelevant for the application **Emergency stop (two-channel, common testing)**. The test signal allocation can therefore not be configured.

1.1.3 Emergency stop (two-channel, isolated testing)

Fig. 3: Example of a circuit for an emergency stop (two-channel, isolated testing)



1.2 Safety switches and safety locking devices

If not otherwise shown, the two-channel circuits are of equivalent design.

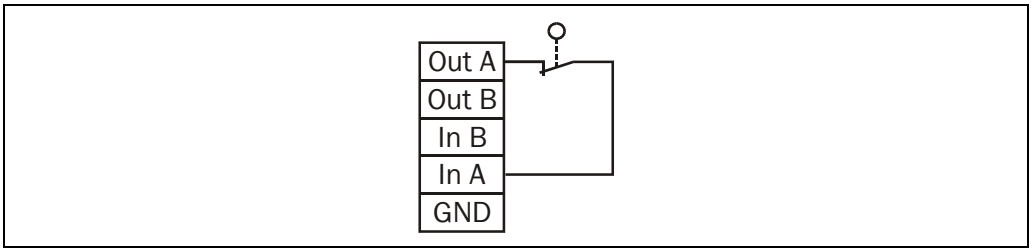
WARNING

Mount the safety switch according to EN 1088!

Otherwise the application does **not** met the control category.

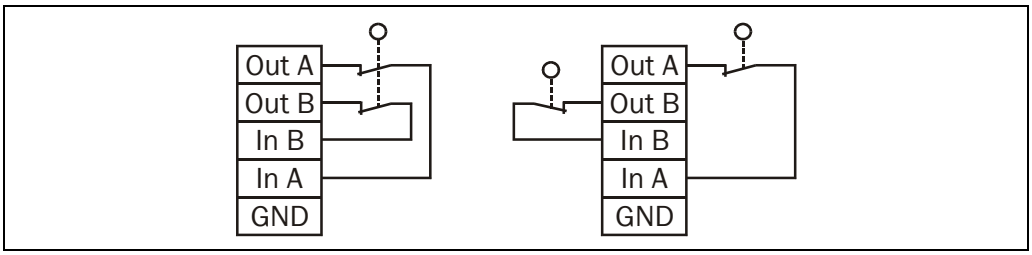
1.2.1 Safety switch (single-channel)

Fig. 4: Example of a circuit for a safety switch (single-channel)



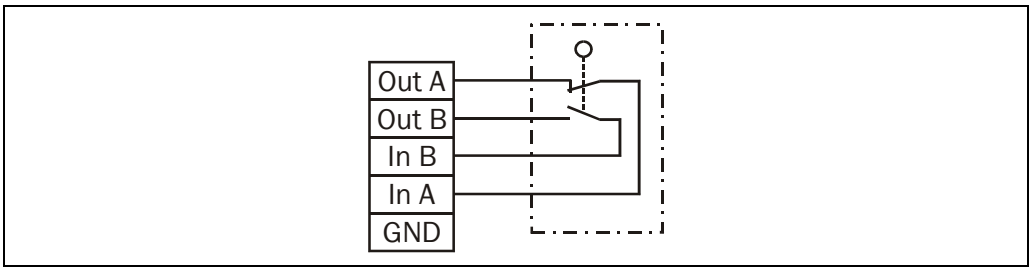
1.2.2 Safety switch (two-channel)

Fig. 5: Example circuits for a safety switch (two-channel)



1.2.3 Safety switch (two-channel, complementary)

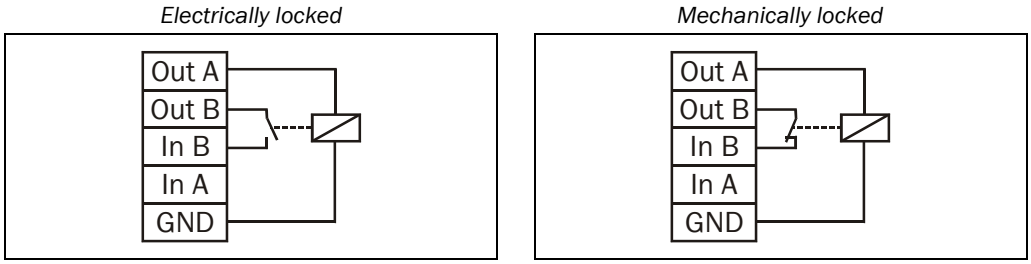
Fig. 6: Example of a circuit for a safety switch (two-channel, complementary)



1.2.4 Safety locking device (single-channel)

The safety locking device has a contact for monitoring the solenoid coil (solenoid coil monitoring contact). The solenoid coil monitoring contact is closed when the safety locking device is locked. The solenoid coil monitoring contact is open when the safety locking device is unlocked. With the application **Safety locking device (single-channel)**, you can connect the solenoid coil monitoring contact to the bus node. In this way the FPLC can check the status of the locking.

Fig. 7: Example of a circuit for a safety locking device (single-channel)

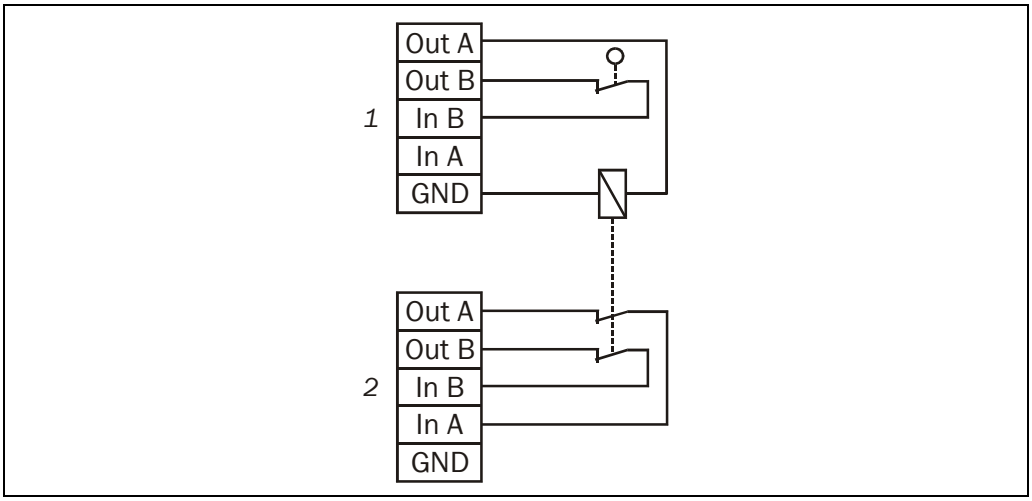


1.2.5 Safety locking device (two-channel) with safety switch (single-channel)

The safety locking device has two contacts for monitoring the solenoid coil (solenoid coil monitoring contacts). The solenoid coil monitoring contacts are closed when the safety locking devices is locked. The solenoid coil monitoring contacts are open when the safety locking devices is unlocked. With the application **Safety locking device (two-channel) with safety switch (single-channel)**, you can connect the solenoid coil monitoring contacts to the bus node. In this way the FPLC can check the status of the locking.

Note The application **Safety locking device (two-channel) with safety switch (one-channel)** consists of two parts, which are both contained in the **Application** list. To use the application **Safety locking device (two-channel) with safety switch (single-channel)**, you must configure both parts. You can configure each of the two parts on any field signal connection.

Fig. 8: Example of a circuit for a safety locking device (two-channel) with safety switch (single-channel)

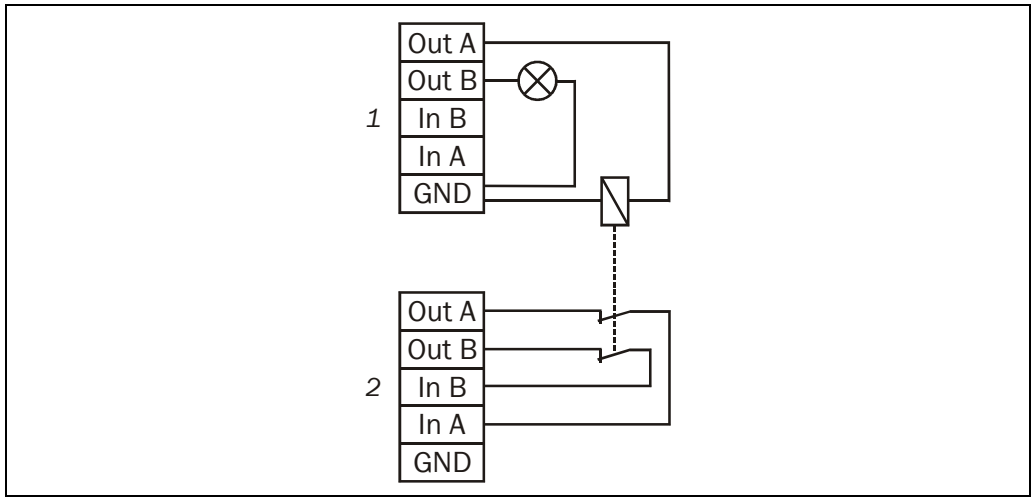


1.2.6 Safety locking device (two-channel) with indicator

The safety locking device has two contacts for monitoring the solenoid coil (solenoid coil monitoring contacts). The solenoid coil monitoring contacts are closed when the safety locking devices is locked. The solenoid coil monitoring contacts are open when the safety locking devices is unlocked. With the application **Safety locking device (two-channel) with indicator**, you can connect the solenoid coil monitoring contacts to the bus node. In this way the FPLC can check the status of the locking.

Note The application **Safety locking device (two channel) with indicator** consists of two parts, which are both contained in the **Application** list. To use the application **Safety locking device (two-channel) with indicator**, you must configure both parts. You can configure each of the two parts on any field signal connection.

Fig. 9: Example of a circuit for a safety locking device (two-channel) with indicator



1.3 T 4000 Compact

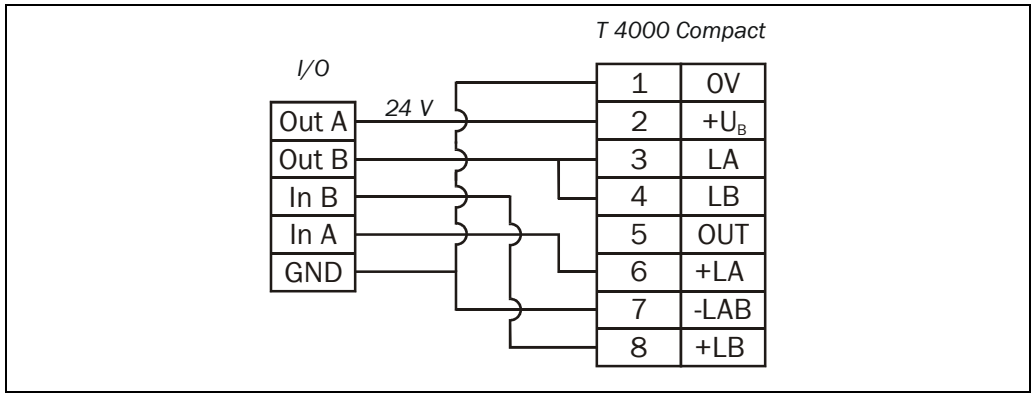
Note Using the T 4000 Compact, you can achieve control category 3 as a maximum.

WARNING

Mount the safety switch according to EN 1088!

Otherwise the application does **not** met the control category.

Fig. 10: Example of a circuit for a T 4000 Compact



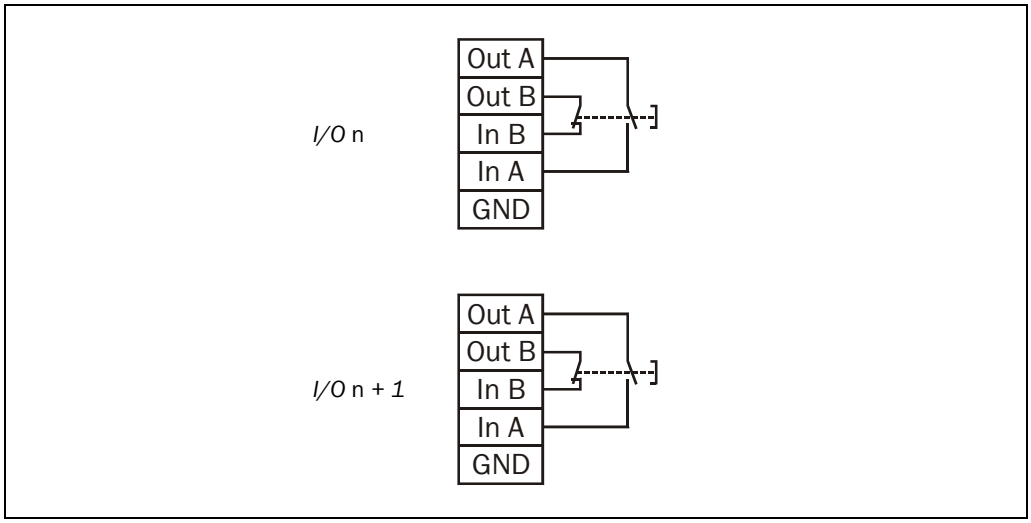
1.4 Two-hand (type IIIC)

With this form of two-hand control unit, both actuating elements are connected two-channel complementary. I.e. the two-hand control console occupies both channels on this field signal connection and the following field signal connection. The actuating element must be operated synchronously.

Notes

- The bus node can only monitor the discrepancy time between the two channels of one actuating element. For this reason the FPLC must monitor that both actuating elements are operated simultaneously.
- You can set the input delay and the discrepancy time only for the first of the two field signal connections. The values then also apply to the second of the two field signal connections.

Fig. 11: Example of a circuit for a two-hand (type IIIC)



1.5 Electro-sensitive protective equipment (ESPE) with output signal switching device (OSSD)

In the connection of electro-sensitive protective equipment (ESPE), the sender and the receiver can be considered as a system's inputs and outputs. Sender and receiver are allowed to use the same power supply (output Out A, permanently 24 V). Output Out B is present at the test input of the sender as a test signal. The switching outputs of the receiver are present on inputs In A and In B.

Many EPSE senders have a test input using which the function of the sender and the related receiver can be checked. During the test, the sender no longer emits light beams. Thus, it simulates — for the receiver — an interruption of the protective field. The sender test is performed when 0 V is present at the test input.

1.5.1 ESPE self-testing (type 2/3/4)

Only use this application if EPSE sender and receiver are self-testing, e.g.

- multi-beam photoelectric safety switch MSL (type 4)
- multi-beam photoelectric safety switch M 2000 (type 2)
- safety laser scanner PLS, S 3000 (type 3)
- safety light curtain C 2000 (type 2)
- safety light curtains C 4000 and FGS (type 4)

Fig. 12: Example of a circuit for a self-testing ESPE (safety light curtains or safety photoelectric switches)

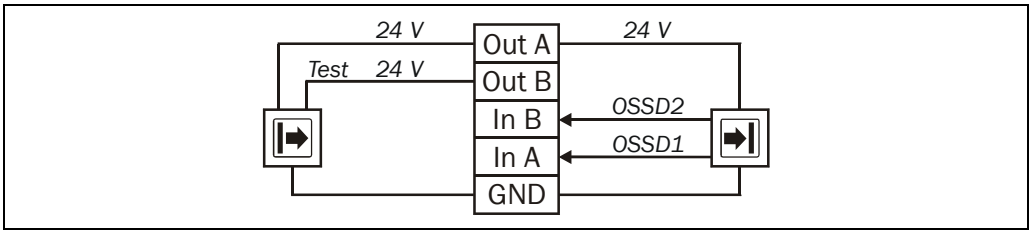
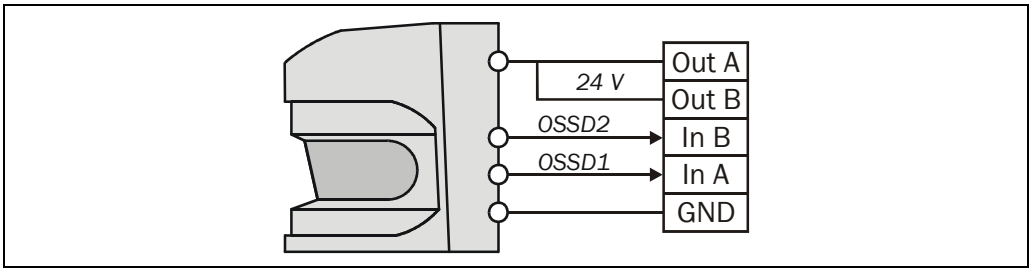


Fig. 13: Example of a circuit for a self-testing ESPE (safety laser scanner)



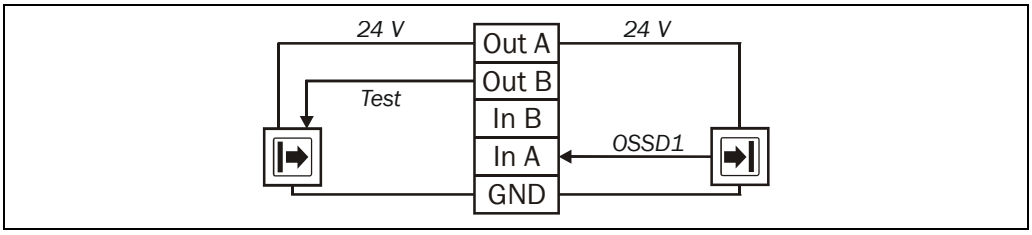
1.5.2 ESPE testable (type 2)

In this application the test output (Out B) is connected as a signal output. The EPSE can be tested at appropriate intervals with the aid of this output. Suitable devices must have type 2 approval in compliance with IEC 61496, e.g.

- single-beam photoelectric switches WS/WE 12-2 P-160/460
- single-beam photoelectric switches WS/WE 18-2 P-162/460/660
- single-beam photoelectric switches WS/WE 24-2 P-250/260/450/460
- single-beam photoelectric switches WS/WE 27-2 F-430/450 S-05/730/750
- single-beam photoelectric switches VS/VE 18

This function must be triggered and evaluated in the FPLC.

Fig. 14: Example of a circuit for a testable ESPE (type 2)



1.5.3 ESPE self-monitoring

Suitable devices are e.g. the one-beam photoelectric switches WSU/WEU 26-2-130/230 using which the system achieves type 4 in compliance with IEC 61496.

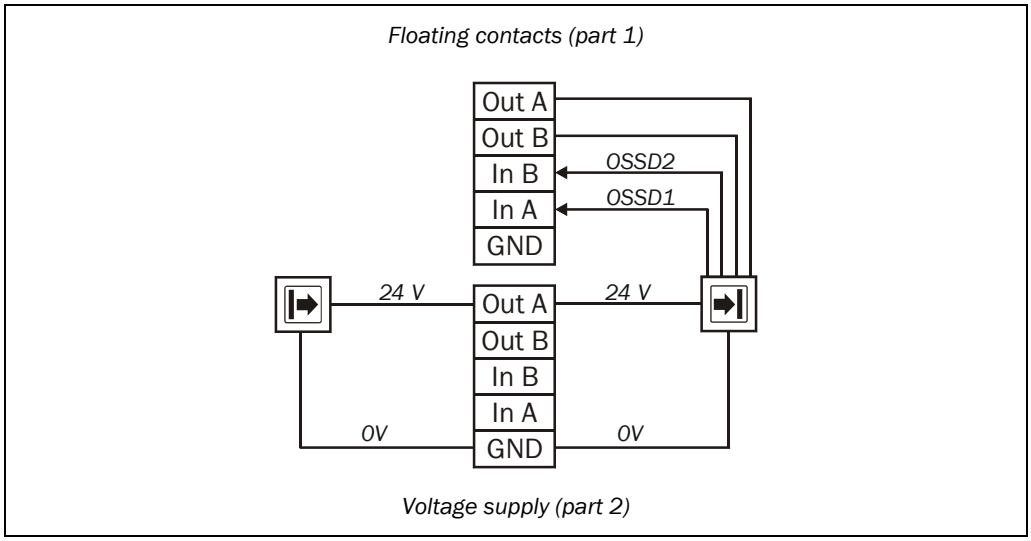
Notes

- In this application, both OSSDs must always be connected and floating.
- The application **ESPE self-monitoring** consists of two parts, which are both contained in the **Application** list. Connect the floating contacts to part 1 of the application and the

voltage supply to part 2. To use the application **ESPE self-monitoring**, you must configure both parts.

- You can configure each of the two parts on any field signal connection.

Fig. 15: Example of a circuit for a self-monitoring ESPE



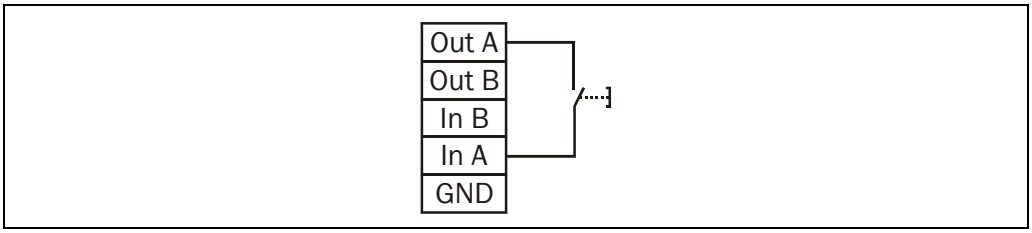
1.6 Control switches

You can connect control switches to the field-signal connection in the same way as tactile sensors. This enables you to carry out all the usually functions of the control switches, e.g. reset, restart or startup.

1.6.1 Control switch without indicator display

E.g. can be used as reset button/start button.

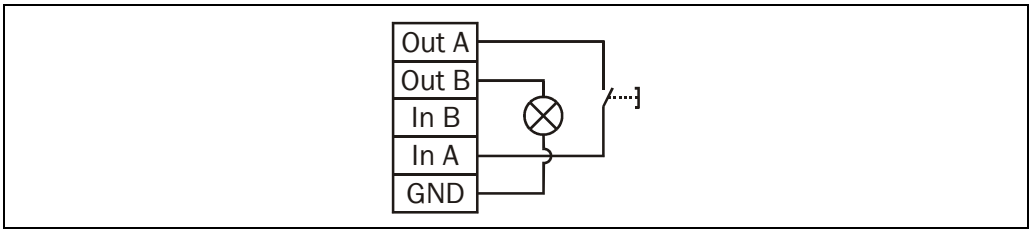
Fig. 16: Example of a circuit for a control switch without indicator display



Note You can use the unused second channel (Out B and In B) for a further application.

1.6.2 Control switch with indicator display

Fig. 17: Example of a circuit for a control switch with indicator display



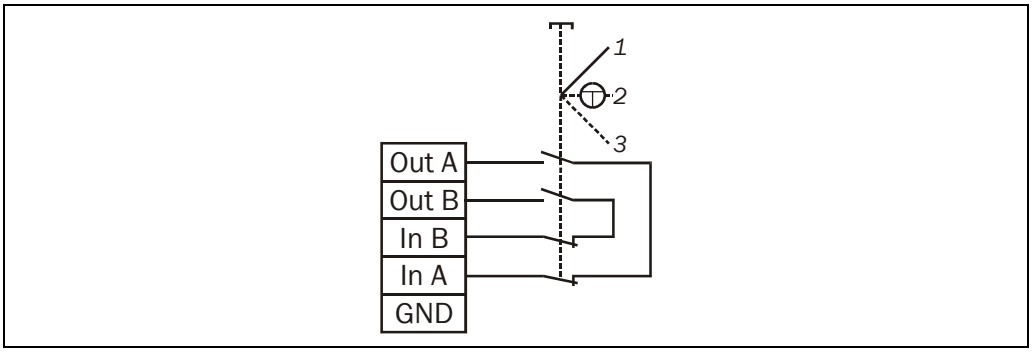
Note You must ensure that the FPLC actually controls the indicator.

1.7 Enabling switch (two-channel)

The application **Enabling switch** (**two-channel**) is suitable for the connection of manually operated control switches. After operating the enabling switch, authorised personnel can then enter the hazardous areas, e.g. to perform programming, setup, testing or service tasks.

You can connect two or three-stage enabling switches.

Fig. 18: Example of circuit for a three-stage enabling switch

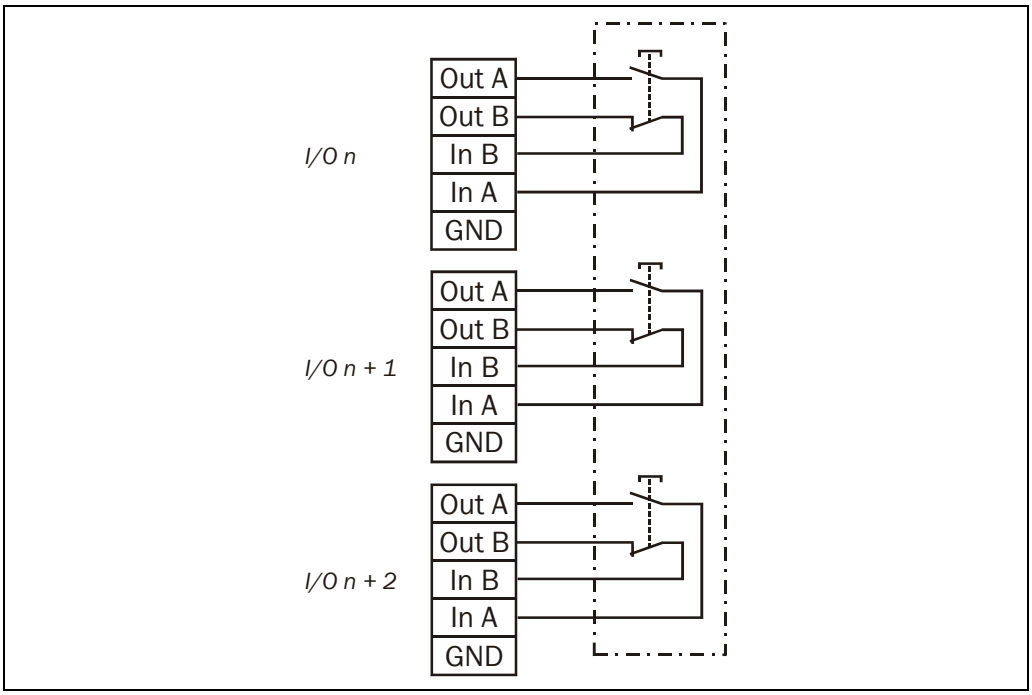


1.8 Operating mode selector switch 3 times complementary

You can connect a complementary signal pair on each of up to four field connections in sequence on the bus node. A signal pair corresponds to one safe input signal. The bus node monitors that the signal pair is complementary.

The bus node transmits the result of the complementary check in channel A in the process image. Channel B always remains 0. On this topic see section “Two-channel connection layout on the field signal connections” in the operating instructions for the UE 4100. You can evaluate the result from all channels in the FPLC as a dual number and thus differentiate between the operating modes. Thus, e.g. with four input signals there are $2^4 = 16$ possible operating modes. In comparison to the application **Operating mode selector switch 1 of n**(see section 1.9 on page 13), you need fewer field signal connections with this application to be able to realise numerous operating modes.

Fig. 19: Example of a circuit for an operating mode selector switch 3 times complementary



Note You can set the input delay and the discrepancy time only for the first of the field signal connections used. The values then apply for all further field signal connections used by the operating mode selector switch.

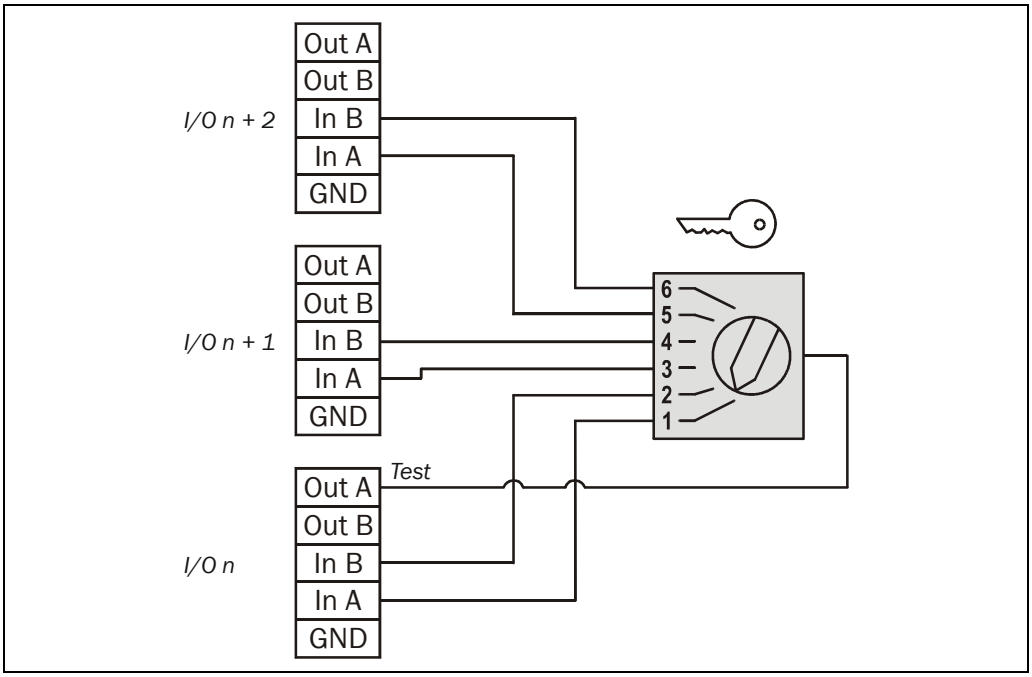
1.9 Operating mode selector switch 1 of n

You can connect an operating mode selector switch with up to eight switch positions to the field signal connections. In this application, one channel on a field signal connection corresponds to exactly one operating mode. For the application **Operating mode selector switch 1 of 8** you will need e.g. four field-signal connections.

Notes

- The number of defined operating modes must match the number of operating modes defined for the controlled device or for the FPLC.
- You must always connect the outputs on the operating mode selector switch to field signal connections in order, starting with channel A for the first field signal connection used. Example: Operating mode selector switch 1 of 3 on field signal connection 5, channel A and B and on field signal connection 6, channel A.
- You can set the input delay only for channel A on the first of the field signal connections used. The values then apply for all further field signal connections used by the operating mode selector switch.

Fig. 20: Example of a circuit for an operating mode selector switch 1 of 6

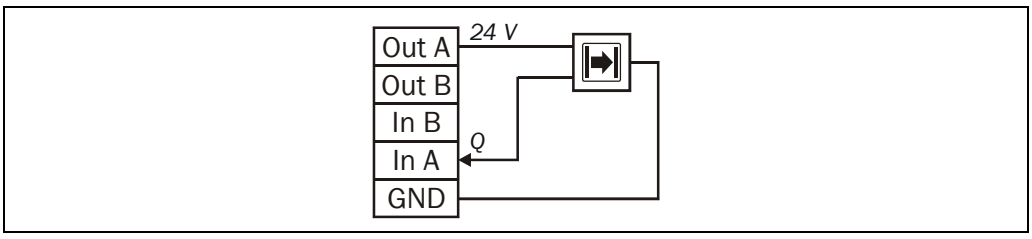


Note If you want to use fewer field signal connections, then you can also realise the operating mode selector switch with application **Operating mode selector switch 3 times complementary**(see section 1.8 on page 12).

1.10 Muting sensor untested

Suitable muting sensors are e.g. reflective photoelectric proximity switches, reflective photoelectric switches, one-beam photoelectric switches and magnetic proximity sensors.

Fig. 21: Example of a circuit for an untested Muting-Sensor

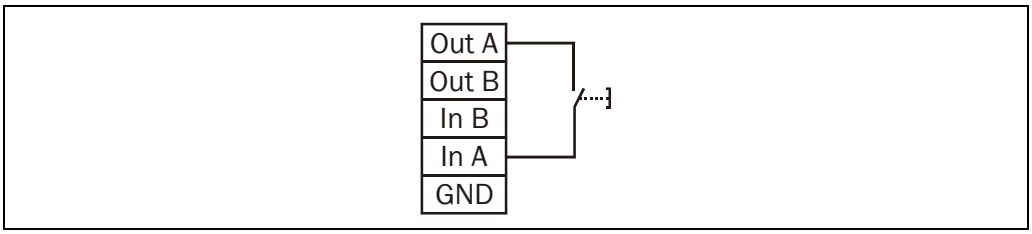


1.11 Reset button with test signal

Unlike the applications for control switches (see section 1.6 on page 10), the bus node monitors the input signal with a test signal.

Note The bus node transfers the input signal in the process image only after it has detected the test signal. The input signal is thus monitored for short-circuits. If the bus node does not detect the test signal, then is does not report the input signal to the FPLC and transfers an error message in the diagnostic image.

Fig. 22: Example of a circuit for a reset button



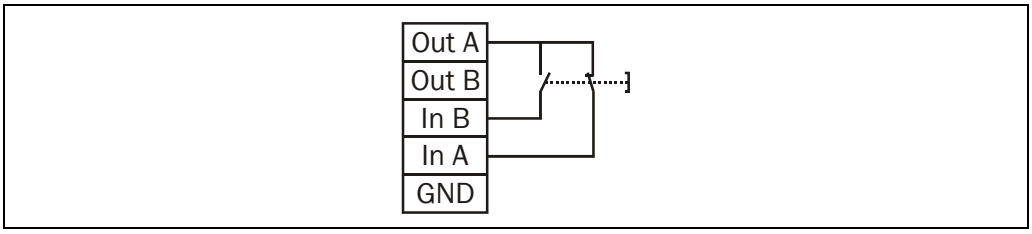
1.12 DESINA

DESINA stands for **De**central and **S**tandardised **In**stallation system for machine tools and production systems.

DESINA describes an installation system and specifies the components necessary for uniform decentralisation of the field devices with high enclosure rating independent of the fieldbus.

The application **DESINA** corresponds to a two-channel connection with common testing and complementary connection layout. The bus node monitors the discrepancy time and that the input signals are complementary. Further information on the complementary monitoring is included in the operating instructions “UE 4100 Profibus Bus Node”.

Fig. 23: Example of a circuit for DESINA



2 Error messages

2.1 Operating instructions not available

Possible cause	Remedying the error
No operating instructions in the Portable Document Format (PDF) were found on your PC.	➢ Repeat the installation of the CDS. Or: ➢ Open the operating instructions directly from the installation CD.
Acrobat® Reader™ has not yet been installed on your PC. To display the operating instructions, Acrobat® Reader™ must be installed on your PC.	➢ Install Acrobat® Reader™ from the CDS installation CD-ROM. Or: ➢ Open the operating instructions directly from the installation CD.

How to install Acrobat® Reader™ from the installation CD:

➢ Place the installation CD in your CD-ROM drive. After a few seconds the SICK installation wizard starts automatically.

If Windows does not start the installation wizard automatically:

– Click **Run...** in the **Start** menu.
– Enter the following command line in the **Open** field:
[Drive letter for your CD-ROM drive]:\setup.exe
– Click on **OK**.

➢ In the **Configuration & Diagnostic Software** dialog box choose **Acrobat Reader** in the **Install software** field.

➢ Using the left mouse button click **OK**. The installation program for Acrobat® Reader™ is loaded from CD-ROM.

➢ Follow the instructions in the Acrobat installation wizard.

Once the installation is complete, you will be able to open the operating instructions directly from the CDS online help.

How to open the operating instructions directly from the installation CD:

➢ Place the installation CD in your CD-ROM drive. After a few seconds the SICK installation wizard starts automatically.

If Windows does not start the installation wizard automatically:

– Click **Run...** in the **Start** menu.
– Enter the following command line in the **Open** field:
[Drive letter for your CD-ROM drive]:\setup.exe
– Click on **OK**.

➢ In the **Configuration & Diagnostic Software** dialog box, select the required document from the **Read documentation** list.

➢ Using the left mouse button click **OK**. Acrobat® Reader™ is loaded from the CD-ROM and the required document is displayed on the screen. Neither Acrobat® Reader™ nor the operating instructions are installed on your PC during this process.

3 Annex

3.1 List of illustrations

Fig. 1: Example of a circuit for an emergency stop (single-channel) 4
Fig. 2: Example of a circuit for an emergency stop (two-channel, common testing) 4
Fig. 3: Example of a circuit for an emergency stop (two-channel, isolated testing) 5
Fig. 4: Example of a circuit for a safety switch (single-channel) 5
Fig. 5: Example circuits for a safety switch (two-channel) 5
Fig. 6: Example of a circuit for a safety switch (two-channel, complementary) 5
Fig. 7: Example of a circuit for a safety locking device (single-channel) 6
Fig. 8: Example of a circuit for a safety locking device (two-channel) with safety switch (single-channel) 6
Fig. 9: Example of a circuit for a safety locking device (two-channel) with indicator 7
Fig. 10: Example of a circuit for a T 4000 Compact 7
Fig. 11: Example of a circuit for a two-hand (type IIIC) 8
Fig. 12: Example of a circuit for a self-testing ESPE (safety light curtains or safety photoelectric switches) 9
Fig. 13: Example of a circuit for a self-testing ESPE (safety laser scanner) 9
Fig. 14: Example of a circuit for a testable ESPE (type 2) 9
Fig. 15: Example of a circuit for a self-monitoring ESPE 10
Fig. 16: Example of a circuit for a control switch without indicator display 10
Fig. 17: Example of a circuit for a control switch with indicator display 10
Fig. 18: Example of circuit for a three-stage enabling switch 11
Fig. 19: Example of a circuit for an operating mode selector switch 3 times complementary 12
Fig. 20: Example of a circuit for an operating mode selector switch 1 of 6 13
Fig. 21: Example of a circuit for an untested Muting-Sensor 13
Fig. 22: Example of a circuit for a reset button 14
Fig. 23: Example of a circuit for DESINA 14

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