



Panel Detection



89051550

89051551

89051552

89051553

User Manual



88754802

Version 1.0, 28 February 2023

Information without guarantee, errors excepted.

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1 General information about these instructions

This manual contains important information about your product.

- ! Read the entire manual carefully. This will prevent installation errors and hazards/danger.
- ! Observe and follow these instructions, particularly the safety and warning instructions.
- ! Keep these instructions and all other product related instructions in a safe place.
- ! Follow the instructions in this manual step by step.
- ! Reliable operation is only possible if the unit is carefully installed in accordance with these instructions.
- ! The manufacturer does not take any responsibility for any consequences caused by improper use or tampering or defeat of the product/products.
- ! All PL/SIL information and associated data in this document is recommendations and the client need to perform their own risk assessment to confirm their respective safety level, the manufacturer takes no responsibility for the clients achieved safety level.

Troax Panel Detection system may only be commissioned by a skilled person.

The product may only be used for the purpose intended by the manufacturer. Any other use is considered improper and therefore hazardous/dangerous. We cannot give any guarantee or warranty for damage/defeat caused by others or incorrect installation and are not liable for this.

Changes, additions and/or conversions to the Troax panel Detections system parts which are not in accordance with the intended purpose may lead to unforeseeable hazards/danger.

More technical data, manuals and regulations can be found at www.troax.com



WARNING

If the instructions are not followed, the system may be defective!

Penetrating moisture or dirt can permanently damage or destroy the system.
Incorrectly connected cables can lead to malfunctions or destruction of the system.

2 System description

2.1 General



Figure 2-1

Troax Panel Detection is a system designed to ensure that the machine guard provides an active safety function.

Troax Panel Detection is a way of ensuring maximum possible safety for your personnel and process, and to fulfill the machinery directive.

Panel Detection is built to be combinable with Troax Rapid Fix for single channel systems.


Panel Detection (Standard, Left, Right) is a fixed guard system and should be used where the panel is expected to be removed less than once per week (ISO 14120:2015).

Panel Detection is a Type 2 interlocking device, low level coded, in accordance with ISO 14119:2013.

Panel Detection is a Type A system in accordance with IEC 61508:2010.

Panel Detection can be used in many ways in order to reach the required safety level of various systems.

Panel Detection is suitable for up to PLe / SIL 3 systems.

 Panel Detection (Standard, Left, Right) is not to be used for doors.

Note: Panel Detection is always to be connected to the safety control as a double channel system, even if it is used as a single channel system, (Panel Detection single channel is technically two separate safety systems (right side / left side) and is therefore connected as double channel).

2.2 Double channel system

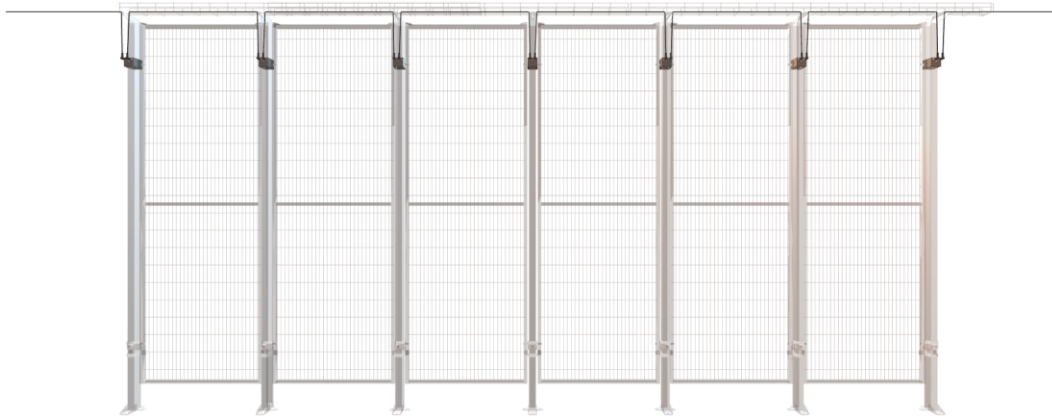


Figure 2-2

The Panel Detection system has separated safety signals on the left and right side, by putting one Panel Detection on each post you thereby achieve a double system safety for each panel.

(Hardware fault tolerance (HFT) 1 IEC 61508:2010)

(Category 3 ISO 13849-1:2015)

(Suitable for up to PLe or SIL 3 systems)

2.3 Single channel system



Figure 2-3

The Panel Detection system has separated safety signals on the left and right side, by putting one Panel Detection on every second post you thereby achieve a single system safety for each panel, effectively reducing the units needed to half compared to the setup for a double channel system. Rapid Fix is normally placed on the remaining posts.

(Hardware fault tolerance (HFT) 0 IEC 61508:2010)

(Category 1 ISO 13849-1:2015)

(Suitable for up to PLc or SIL 3 systems)

3 Parts of Panel Detection System

3.1 Panel Detection

3.1.1 Standard

(Art nr: 89051550)



Figure 3-1(backside)

Panel Detection Standard is a sensor for detecting panels on both sides of the post.

3.1.2 Right

(Art nr: 89051551)



Figure 3-2 (backside)

Panel Detection Right is a sensor for detecting panels on the right side of the post (seen from outside a panel system).

⚠ There is no safety monitoring on the left side, although it can be used as Rapid fix.

3.1.3 Left

(Art nr: 89051552)



Figure 3-3 (backside)

Panel Detection Left is a sensor for detecting panels on the left side of the post (seen from outside a panel system).

⚠ There is no safety monitoring on the right side, although it can be used as Rapid fix.

3.1.4 End Contact

(Art nr: 89051553)



Figure 3-4

Panel Detection End Contact is used to close a loop of Panel Detection units. It is attached to the last unit in the loop.

A loop can be between 1-100 units of Panel Detection depending on the setup and required safety level.

⚠ If required by the risk assessment, fix in place with appropriate thread locking.

3.2 Cable

Note: All Panel Detection cables are sensor cables, no separate power cables are required.

Cable specification in separate documents to be found at:



Figure 3-5

<https://www.troax.com/global/en/pt>

3.2.1 M12 Male/Male



Figure 3-6

This cable is used to connect two Panel Detection units.

To minimize space used and reduce risk of damage Troax Panel Detection Cable have two 90-degree M12 contacts.

Both contacts are male to easily allow the system to have the starting point of the loop in either end.

The cable is available in two lengths:

2,5 meters.

(Art nr: 89051554)

5 meters.

(Art nr: 89051555)

3.2.2 M12 extension Male/Female

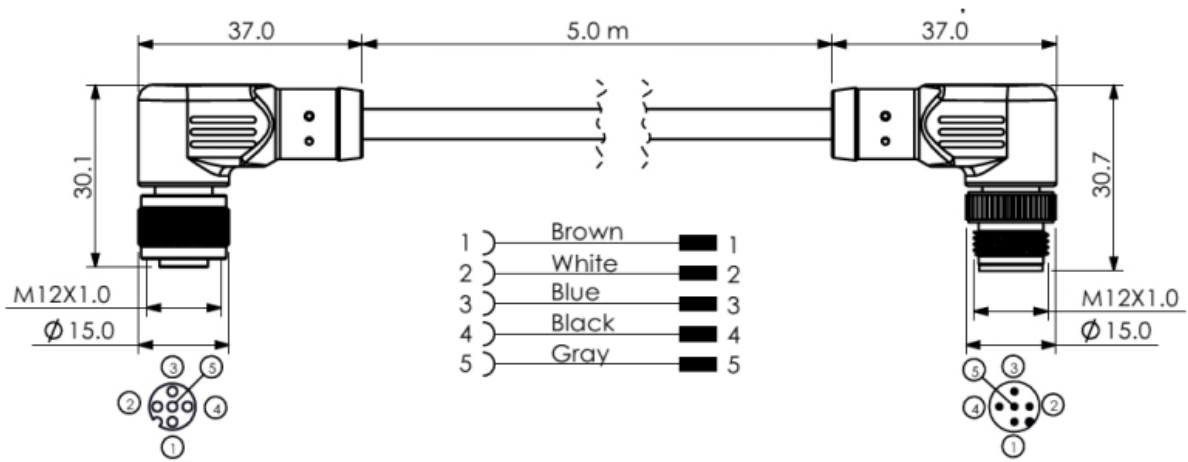


Figure 3-7

This cable is used as an extension in combination with the other cables for Panel Detection if the cables are too short.

The extension cable is available in one length:

5 meters.

(Art nr: 89051556)

3.2.3 M12 Male/Uncontacted

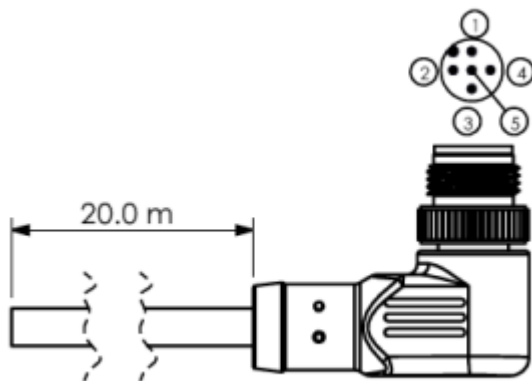


Figure 3-8

This cable is used to connect the first Panel Detection unit to a PLC / Power source.

The "start" cable is available in one length:

20 meters.

(Art nr: 89051559)

3.3 Kit

3.3.1 Rapid Fix Lower Bracket

(Art nr: 36701090)

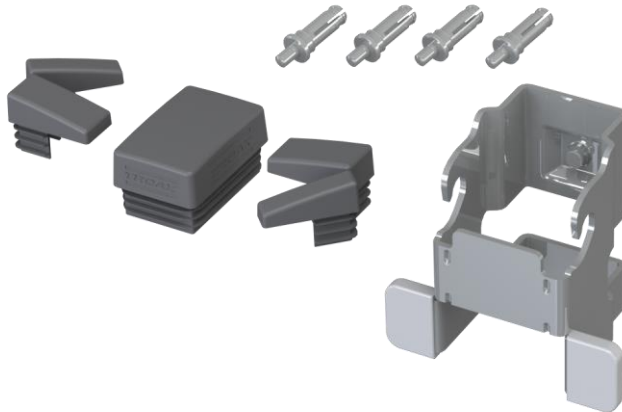


Figure 3-9

Kit Rapid Fix Lower Bracket is a kit with mechanical parts which is required for every Panel Detection unit (Standard, Right, Left) to be able to attach a panel to the post with the Panel Detection unit.

3.3.2 Smart Fix one way M8

(Art nr: 36907993)

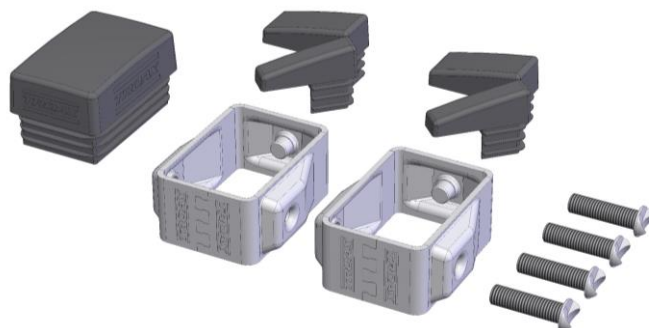


Figure 3-10

This kit is for a corner with a post of 90 degrees.
The kit can also be used to lock panes that do not require opening to reduce cost by lowering the amount of Panel Detection units needed.

3.3.3 Corner bracket one way M8

(Art nr: 36907991)

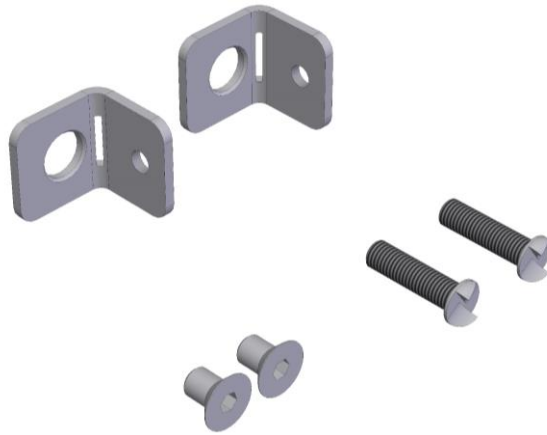


Figure 3-11

This kit is for a corner with a post other than 90 degrees.

3.3.4 Corner bracket threaded one way

(Art nr: 36907992)

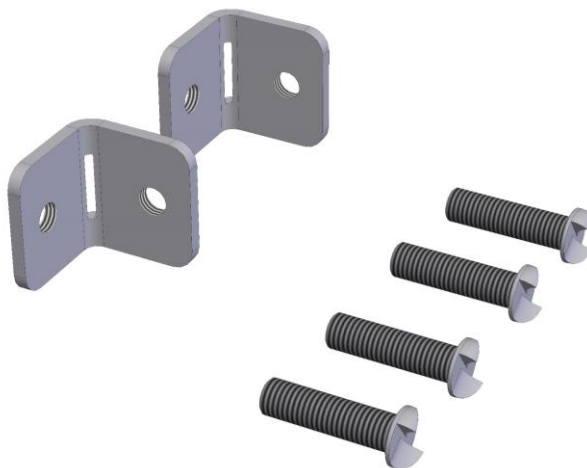


Figure 3-12

This kit is used when a corner is without a post.

3.3.5 One way screw for door

(Art nr: 36907994)



Figure 3-13

This kit is used to lock the panels next to a door.

Note: Posts directly connected to doors cannot use Panel Detection.

3.3.6 Rapid Fix bracket

(Art nr: 36701060)

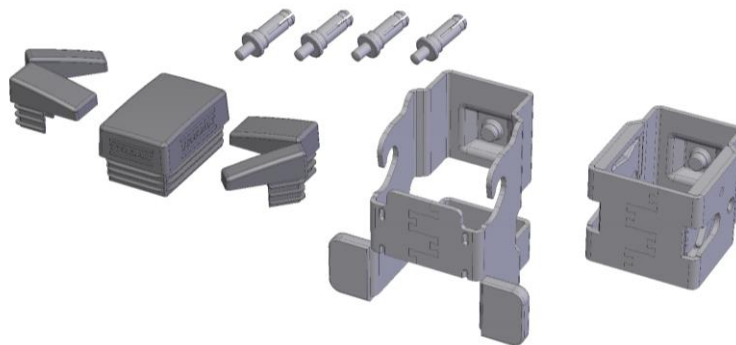


Figure 3-14

Kit Rapid Fix bracket is used in single channel systems on every second post where Panel Detection is not needed.

3.3.7 Rapid Fix bracket Rt

(Art nr: 36701070)

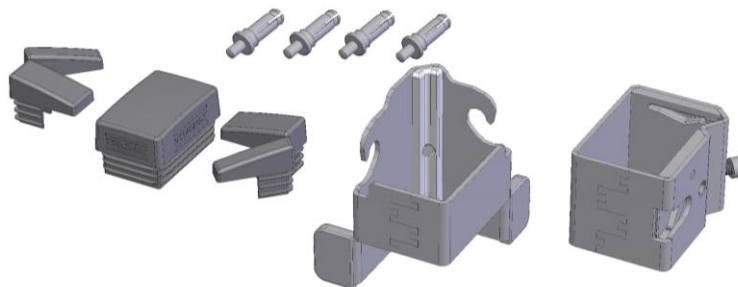


Figure 3-15

Kit Rapid Fix bracket Rt is used in single channel systems on corner posts of 90 degrees, (Kit for Right or Left available depending on the rotation of the post).

3.3.8 Rapid Fix bracket Lt

(Art nr: 36701080)

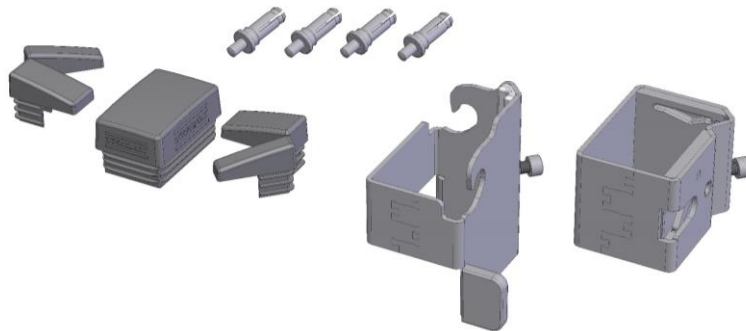


Figure 3-16

Kit Rapid Fix bracket Lt is used in single channel systems on corner posts of 90 degrees, (Kit for Right or Left available depending on the rotation of the post).

3.3.9 Rapid Fix tools

(Art nr: 36908500)



Figure 3-17

Kit Rapid Fix tools is a toolkit to install both Panel Detection and Rapid Fix in the correct position on the post.

The included Torx key can be used for opening panels on both systems from inside the protected area.

3.4 Panel Curve

(Art nr: 2008063x)



Figure 3-18

Panel curve is a panel that can be used instead of a 90 degree corner, this allows you to have double channel Panel Detection on the corners as well.

Panel Curve is 2050x800x20mm and delivered flat, the panel is manually bent up to 90 degrees in a smooth bend.

Note: Panel Curve requires Kit Smart Fix (without one way screws) to be installed and openable.

4 Installation guide mechanic:

Mechanical installation guide in separate document to be found at:



Figure 4-1

<https://www.troax.com/global/en/pt>

5 Installation guide electric:



DANGER

Disconnect the system from the power supply before carrying out any work.

- Electrical connections must only be connected by a skilled/licensed person.
- Ensure that the on-site electrical installation complies with the relevant safety regulations.
- To avoid hazards/danger, a damaged cable must be replaced with an intact cable by a skilled/licensed person.
- Reliable operation is only possible if the unit is carefully installed in accordance with these instructions.
- Switch on the main voltage only after a second inspection.

5.1 Connecting the Panel Detection Units

Panel Detection units can be connected individually or in loops of up to 100 units.

1. Connect all units together using Troax Panel Detection cables with M12-A male 90 degrees angled contacts of appropriate length. (Max 0,6Nm)
2. Make sure the cables are securely fastened and protected in a Troax wire tray.
3. Attach End Contact to the last units free contact (furthest from your control unit), if required by the risk assessment, fix in place with appropriate thread locking.
4. Connect the system to power / control unit (see chapter 5.2)

5.2 Connecting the system to power supply / safety control

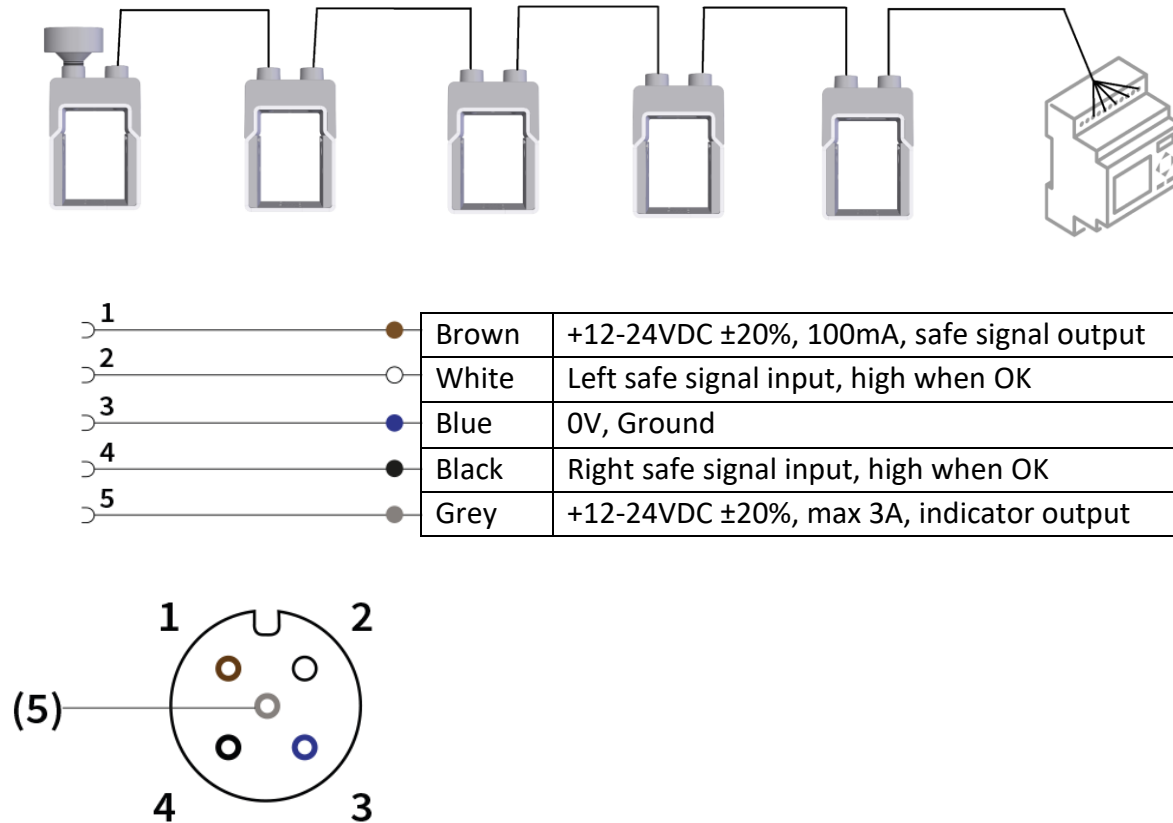



Figure 5-1

- Follow the connection scheme in Figure 5-1 to connect Panel Detection to your control system.
 - Make sure to connect the power supply for the led indicators, wire 5, to a 3A fuse.
- Note: if any of the wires, 1, 3 or 5 is disconnected (open) both wire 2 and 4 will be cut (open) at the End Contact and not return any signal.

5.3 When using Panel Detection with a safety PLC


- Connect wire 1 to a digital safe signal output.
- Connect wire 2 and 4 to two separate digital safe signal inputs.
- Program the safe output and the inputs to the same signal.
- Program the safety PLC in a way so it only accepts the Panel Detection as “OK” when both signals are showing a positive secure input.
- If connecting several separated Panel Detection units/loops next to each other it is recommended to use different signals for these systems.

6 Commissioning:



DANGER

System must be tested and verified after installation.

 All components showing a fault shall be immediately replaced with a new component.

Before safe operation of the system can be assumed, a full inspection needs to be performed. This inspection consists of two parts, Visual inspection, chapter 6.1, and Manual system diagnostics, chapter 6.2. Only after both inspections have been performed and no component is showing any faults can the system be commissioned.

To perform inspection the system needs to be fully connected and powered up.

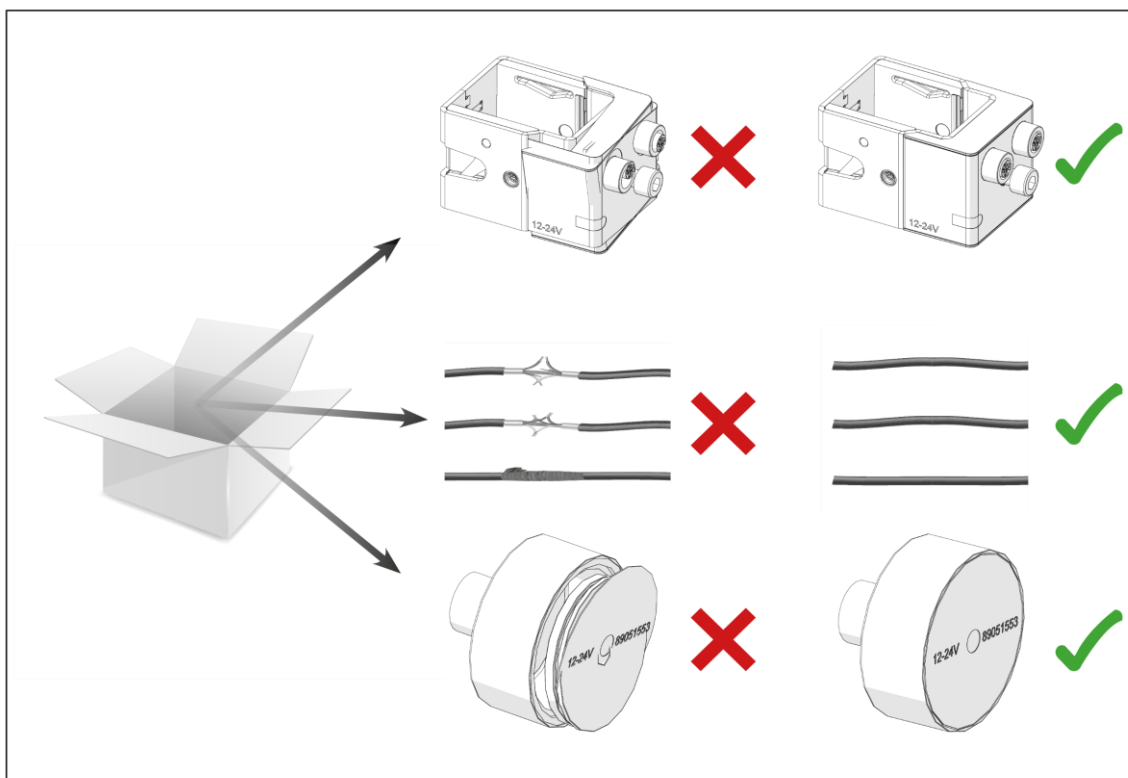


Figure 6-1

6.1 Visual inspection

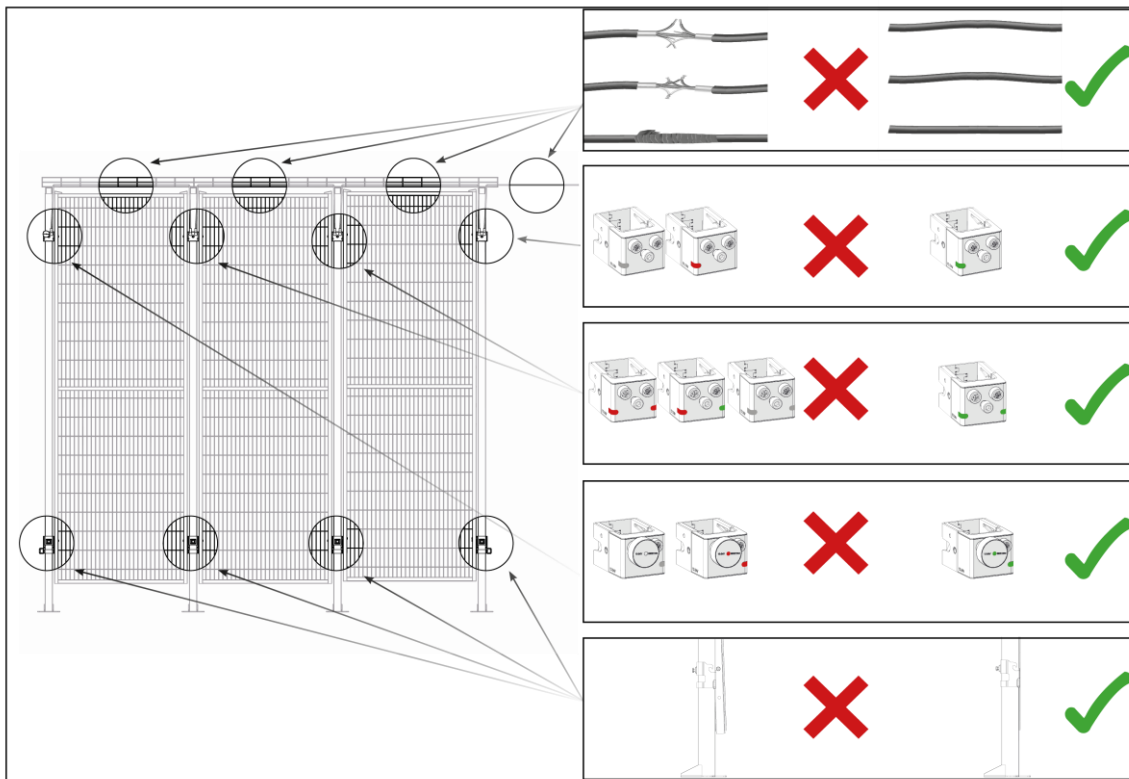


Figure 6-2

Make sure all components of the Panel Detection system are undamaged, properly mounted and functioning as expected.

Note: A visual inspection is to be performed at every maintenance instance.

6.2 Manual system diagnostic

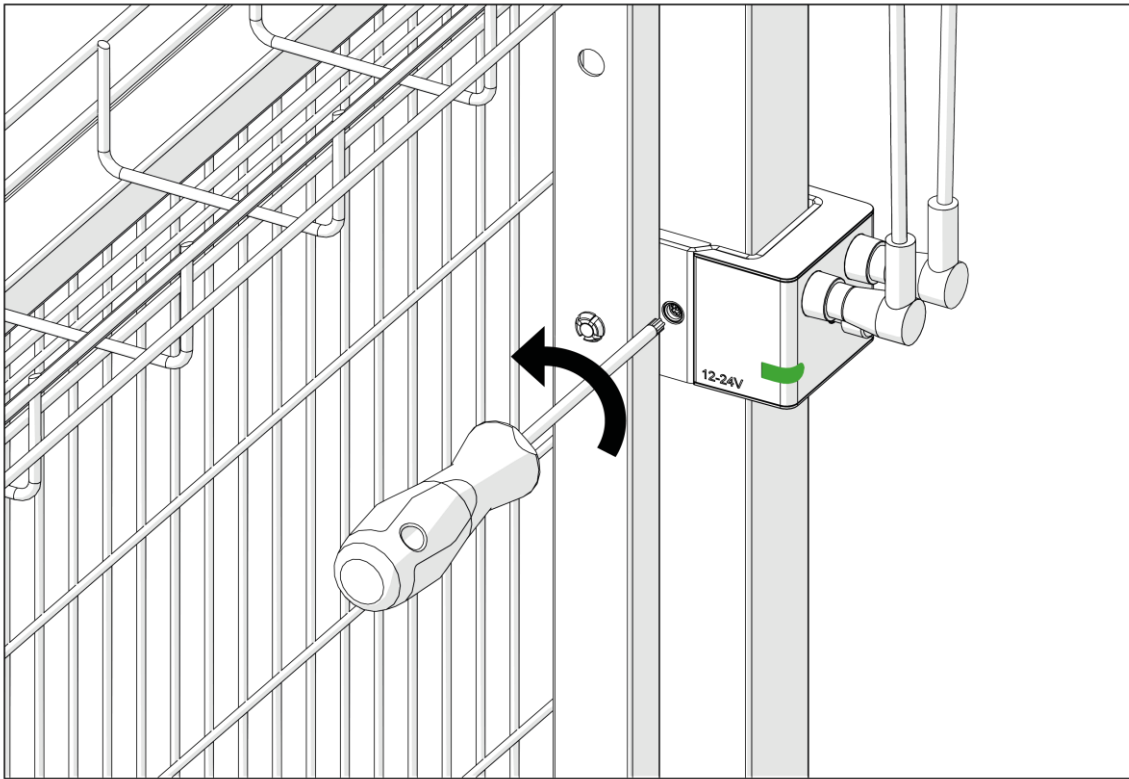


Figure 6-3

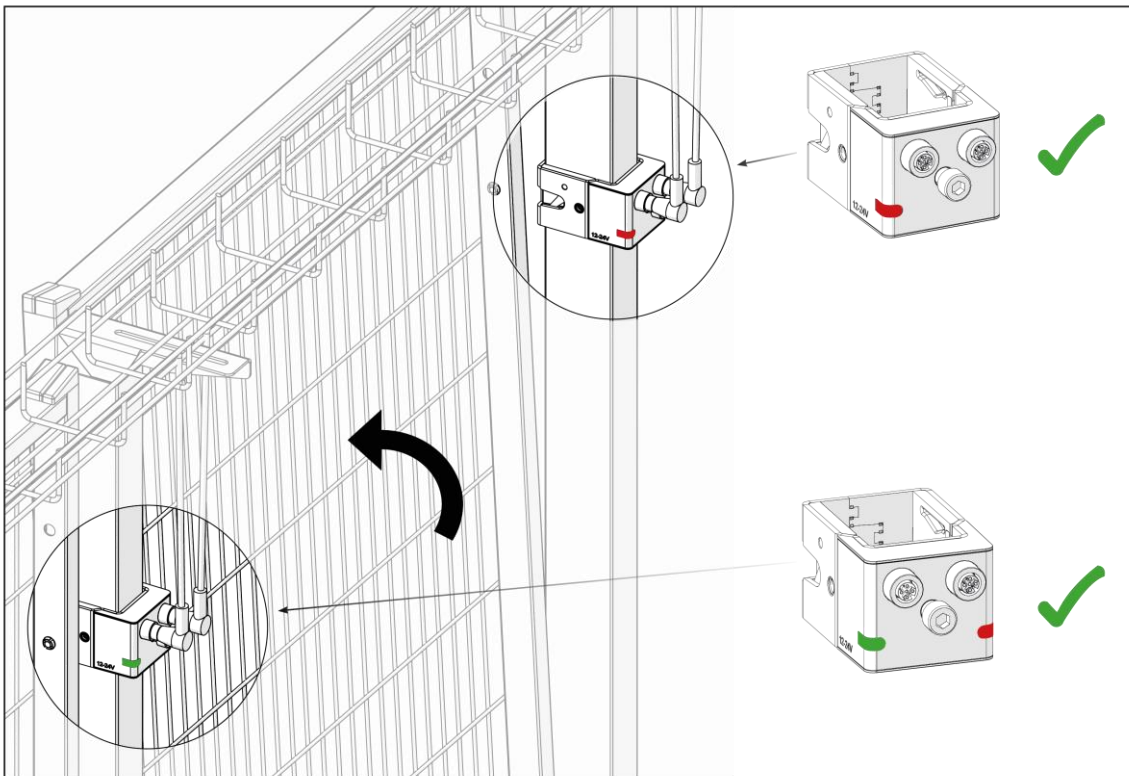


Figure 6-4

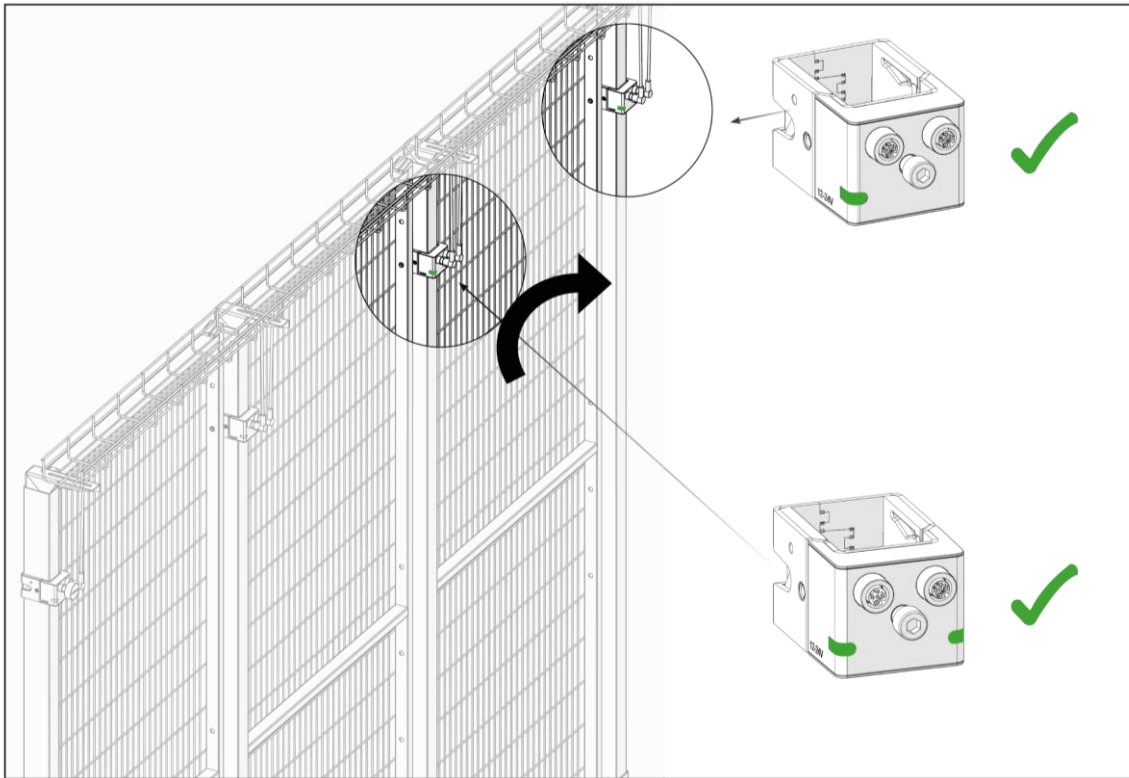


Figure 6-5

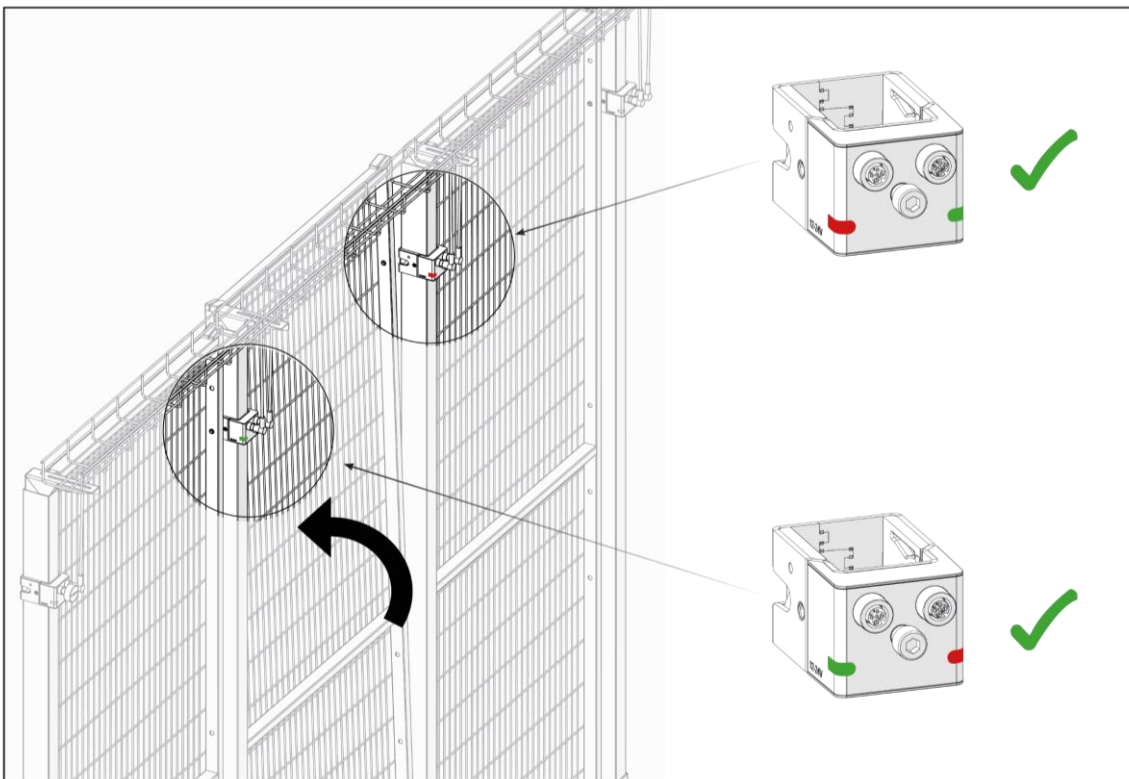


Figure 6-6

Test all units of Panel Detection to make sure they are functioning as expected.

Note: A manual system diagnostic is to be performed at least every 365 days.

7 Status lights

7.1 Panel Detection



Figure 7-1



Figure 7-2



Figure 7-3

Green	Local panel is in position	Figure 7-1
Red	Local panel is not in position or missing	Figure 7-2
No light	No power supply	Figure 7-3

7.2 Panel Detection End Contact



Figure 7-4



Figure 7-5

Figure 7-6

Green	All panels in this loop are in position	Figure 7-4
Red	One or more panels are not in position or missing	Figure 7-5
No light	No power supply	Figure 7-6

8 Connection/Setup examples

Following are some examples of how the Panel Detection system can be connected.

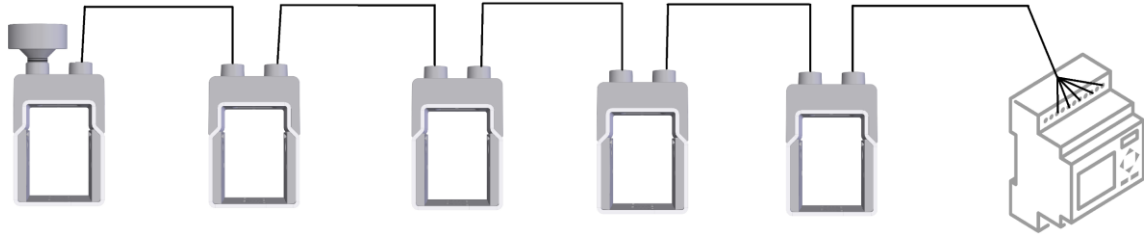


Figure 8-1

8.1 Safety PLC

Connecting Panel Detection to a safety PLC is the recommended option but other ways are possible.

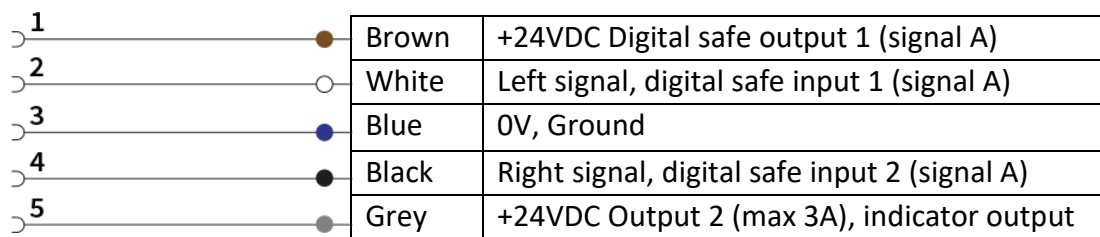


Figure 8-2

Note: Make sure the safety PLC can give enough current on output 2 for your connected system, see Figure 15-1. If it cannot then instead connect output 2 to a separate power supply.

8.1.1 Warning

This is a great option if you want to warn the operator that something is wrong with the guard around the machine, but you don't want it to otherwise affect production.

Only possible if approved by risk assessment.

After connecting the system as shown in Figure 8-2 the safety PLC needs to be programmed to produce a warning signal if input 1 or 2 or both are in state low.

Warning signal can for example be a flashing signal on a tower light, a message in a control panel etc.

8.1.2 Prevent startup

This is a great option if you want to prevent production from starting in a possibly hazardous situation, but you don't want to risk production stopping once it has started.

 Only possible if approved by risk assessment.

After connecting the system as shown in Figure 8-2 the safety PLC needs to be programmed to stop the function of the start button/sequence if input 1 or 2 or both are in state low. Thereby preventing a start but not stopping an active process.

A warning signal can also be programmed, for example a flashing signal on a tower light, a message in a control panel etc.


8.1.3 Stop machine

This is the option for maximum personal safety.

After connecting the system as shown in Figure 8-2 the safety PLC needs to be programmed to the desired stop function.

8.1.3.1 End of cycle

If input 1 or 2 or both are in state low the machine is to be given the normal stop signal making the machine stop at its next cycle end, thereby preventing harm to the machine.

 Only possible if approved by risk assessment.

8.1.3.2 Immediately

If input 1 or 2 or both are in state low the safety PLC is to issue a stop command to the machine creating an emergency stop of all machinery.

8.2 Safety Relay

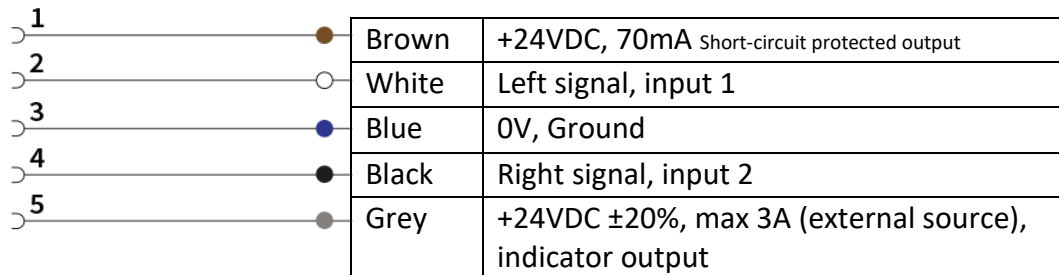


Figure 8-3

Note: Panel Detection is always to be connected to the safety control as a double channel system, even if it is used as a single channel system, (Panel Detection single channel is technically two separate safety systems (right side / left side) and is therefore connected as double channel).

8.2.1 Stop machine Immediately

After connecting the system as shown in Figure 8-3 the relay should be connected so the power to the hazardous parts of the machine is cut when the safety relays are open creating an emergency stop of all machinery.

9 SIL / PL calculations (simplified)

Note: These calculations and recommendations have been created specifically for working with Panel Detection and should not be used with any other system.

Note: SIL 1-3 and PLc have no specific requirements for double channel system, PLd-e require double channel system.

9.1 Specific Requirements

9.1.1 SIL 1

(IEC 61508:2010)

- Reach required PFH_D

9.1.2 SIL 2

(IEC 61508:2010)

- Reach required PFH_D
- SFF > 60% if single channel system
- SFF 0% if double channel system

9.1.3 SIL 3

(IEC 61508:2010)

- Reach required PFH_D
- SFF > 90% if single channel system
- SFF > 60% if double channel system

9.1.4 PLc

(ISO 13849-1:2015)

- Reach required PFH_D
- Single channel system

9.1.5 PLd

(ISO 13849-1:2015)

- Reach required PFH_D
- DC > 60%
- Double channel system
- CCF >= 65

9.1.6 PLe

(ISO 13849-1:2015)

- Reach required PFH_D
- DC > 60%
- Double channel system
- CCF >= 65

9.1.7 Graph of single channel systems

Graph showing the requirements of reaching different safety levels with Panel Detection, single channel system:

SIL / PL	PFH _D Max-value	SFF / DC Min-value	CCF
SIL 1	1e-5	NA	NA
PLc	3e-6	NA	NA
SIL 2	1e-6	60%	NA
SIL 3	1e-7	90%	NA
PLd (Not reachable)			
PLe (Not reachable)			

Figure 9-1

9.1.8 Graph of double channel systems

Graph showing the requirements of reaching different safety levels with Panel Detection, double channel system:

SIL / PL	PFH _D Max-value	SFF / DC Min-value	CCF Min-value
SIL 1	1e-5	NA	NA
PLc	3e-6	NA	NA
SIL 2	1e-6	NA	NA
SIL 3	1e-7	60%	NA
PLd	1e-6	60%	65
PLe	1e-7	90%	65

Figure 9-2

9.2 PFH_D (Probability of Failure per Hour, Dangerous)

PFH_D is one of the parts used to determine the reached SIL / PL level.

SIL / PL	Max value (scientific)	Min value (scientific)	Max value	Min value
SIL 1	1e-5	1e-6	0,000 01	0,000 001
PLc	3e-6	1e-6	0,000 003	0,000 001
SIL 2 / PLd	1e-6	1e-7	0,000 001	0,000 000 1
SIL 3 / PLe	1e-7	1e-8	0,000 000 1	0,000 000 01

Figure 9-3

NOTE: PFH_D can be calculated in many different ways (see IEC 61508:2010 / IEC 62061:2021 / ISO 13849-1:2015).

9.2.1 Single Channel

Below is a calculation that can be used with Panel Detection single channel system (without DC):

$$PFH_D = 1/(MTTF_{D1} * 8760)^n + 1/(MTTF_{D2} * 8760)$$

MTTF_{D1} = Panel Detection (Standard, Left, Right).

MTTF_{D2} = Panel Detection (End contact).

n = Number of Panel Detection units (Standard, Left, Right).

Note: MTTF_D values can be found in chapter 15 "Technical specifications".

Example:

50 Panel Detection Standard (2 sensors)

2 Panel Detection Left (1 sensor)

7 Panel Detection Right (1 sensor)

1 End Contact

Note: Left and right side (sensor) is two different channels.

Note: Even though it is a single channel system the PFH_D for determining the SIL / PL is separate for left and right side and two separate calculations need to be made.

Left channel:

$$PFH_D = 1/(7773 * 8760)^{52} + 1/(17192 * 8760) = 7,7e-7$$

Note: PFH_D level equal to SIL 2 / PLd

Right channel:

$$PFH_D = 1/(7773 * 8760)^{57} + 1/(17192 * 8760) = 8,4e-7$$

Note: PFH_D level equal to SIL 2 / PLd

9.2.2 Single Channel with DC

Below is a calculation from that can be used with Panel Detection single channel system with DC:

$$PFH_D = (1-DC)*1/(MTTF_{D1}*8760)*n+(1-DC)*1/(MTTF_{D2}*8760)$$

$MTTF_{D1}$ = Panel Detection (Standard, Left, Right).

$MTTF_{D2}$ = Panel Detection (End contact).

n = Number of Panel Detection units (Standard, Left, Right).

Note: $MTTF_D$ values can be found in chapter 15 "Technical specifications".

Example:

50 Panel Detection Standard (2 sensors)

2 Panel Detection Left (1 sensor)

7 Panel Detection Right (1 sensor)

1 End Contact

DC 90%

Note: Left and right side (sensor) is two different channels.

Note: Even though it is a single channel system the PFH_D for determining the SIL / PL is separate for left and right side and two separate calculations need to be made.

Left channel:

$$PFH_D = (1-0,9)*1/(7773*8760)*52+(1-0,9)*1/(17192*8760) = 7,7e-8$$

Note: PFH_D level equal to SIL 3 / PLe

Right channel:

$$PFH_D = (1-0,9)*1/(7773*8760)*57+(1-0,9)*1/(17192*8760) = 8,4e-8$$

Note: PFH_D level equal to SIL 3 / PLe

9.2.3 Double Channel

To calculate double channel system the easiest way is to recalculate the $MTTF_D$ from single components to your total in each loop using the following formula:

$$MTTF_{D3} = 1/(n/MTTF_{D1} + 1/MTTF_{D2})$$

$MTTF_{D1}$ = Panel Detection (Standard, Left, Right).

$MTTF_{D2}$ = Panel Detection (End contact).

$MTTF_{D3}$ = The entire loop.

n = Number of Panel Detection units (Standard, Left, Right).

Note: Using a Panel Detection Left or Right counts as 0.5 units in a double channel system.

Note: There should always be an equal number of Left and Right Panel Detection units in a double channel system.

Note: $MTTF_D$ values can be found in chapter 15 "Technical specifications".

Example:

90 Panel Detection Standard (2 sensors)

4 Panel Detection Left (1 sensor)

4 Panel Detection Right (1 sensor)

1 End Contact

$$MTTF_{D3} = 1/(94/7773 + 1/17192) = 82,3$$

After you have your $MTTF_{D3}$ for the loop you can find your achieved PFH_D in Table K.1 in ISO 13849-1:2015 (examples from Table K.1 can be seen in Figure 9-4):

Note: Double channel Panel Detection is Cat 3.

Note: The PFH_D in the table can be used to calculate SIL level as well. (As SIL 3 only needs 60% DC, systems retching above 110 $MTTF_{D3}$ is SIL 3 with DC 60%).

Example:

If

$$MTTF_{D3} = 82$$

Then

$$PFH_D \text{ at } 60\% \text{ DC} = 1,35e-7$$

Note: PFH_D level equal to SIL 2 /PLd

$$PFH_D \text{ at } 90\% \text{ DC} = 5,79e-8$$

Note: PFH_D level equal to SIL 3 /PLe

MTTF _D for each channel (Years)	Cat.1 DC _{avg} = none		Cat.3 DC _{avg} = low (60%)		Cat.3 DC _{avg} = medium (90%)	
		PL		PL		PL
13	-		2,23e-6	c	9,21e-7	d
24	-		9,47e-7	d	3,70e-7	d
30	3,80e-6	b	6,94e-7	d	2,65e-7	d
39	2,93e-6	c	4,53e-7	d	1,78e-7	d
62	1,84e-6	c	2,13e-7	d	8,84e-8	e
82	1,39e-6	c	1,34e-7	d	5,79e-8	e
100	1,14e-6	c	1,01e-7	d	4,29e-8	e

Figure 9-4

9.3 SFF (Safe Failure Fraction)

SFF is the same as DC in the case of Panel Detection. (See chapter 9.5).

9.4 CCF (Common Cause Failures)

CCF can be calculated from Table F.1 found in ISO 13849-1:2015 (example based on Table F.1 can be seen in Figure 9-5):

Note: Only full score or no score is allowed on the individual parts.

No.	Measure against CCF	Score
1	Separation/segregation	
	Physical separation between signal paths, for example: -detection of short circuits. -sufficient clearance and creepage distance on circuit board.	15
2	Diversity	
	Different technologies/design or physical principles are used, for example: -components of different manufactures.	20
3	Design/application/experience	
3.1	Protection against over-voltage, over-current, over-temperature, etc.	15
3.2	Components used are well-tried.	5
4	Assessment/analysis	
	For each part of safety related parts of control system a failure mode and effect analysis has been carried out and its results taken into account to avoid common-cause-failures in the design.	5
5	Competence/training	
	Training of designers to understand the causes and consequences of common cause failures.	5
6	Environmental	
6.1	Electronic systems EMC approved.	25
6.2	Other influences have been considered, temperature, vibration, etc.	10

Figure 9-5

9.5 DC (Diagnostic Coverage)

DC can most easily be found in one of the examples given in IEC 62061:2021, Table D.1 or ISO 13849-1:2015 (example based on Table D.1 can be seen in Figure 9-6):

Measure	Diagnostic coverage (DC)	Examples
Direct monitoring (e.g. electrical position monitoring of control valves, monitoring of electromechanical device by mechanically linked contact elements)	99 %	Monitoring the function of a contactor by a mechanically linked NC contact

Figure 9-6

Note: Panel Detection is a direct monitoring system.

9.6 SISTEMA

9.6.1 Double channel

If using “SISTEMA – Safety Integrity Software Tool for the Evaluation of Machine Applications” one loop of Panel Detection double channel is considered one subsystem.

To properly evaluate Panel Detection double channel in SISTEMA every unit of panel detection in the loop being evaluated needs to be added as blocks under Channel 1 & 2.

Panel Detection Standard and End Contact is added in both channel 1 & 2.

Panel Detection Right is added in channel 1 only.

Panel Detection Left is added in channel 2 only.

9.6.2 Single channel

If using “SISTEMA – Safety Integrity Software Tool for the Evaluation of Machine Applications” one loop of Panel Detection single channel is considered two subsystems.

To properly evaluate Panel Detection single channel in SISTEMA every unit of panel detection in the loop being evaluated needs to be added as blocks under Channel 1 in two different subsystems (1 & 2).

Panel Detection Standard and End Contact is added in both subsystem 1 & 2.

Panel Detection Right is added in subsystem 1 only.

Panel Detection Left is added in subsystem 2 only.

10 Safety instructions for maintenance



DANGER

The system shall be disconnected from the power supply before carrying out any work.

- All cleaning and maintenance must be carried out by skilled personnel.
 - To ensure the performance and operational capability of the system, the necessary maintenance must be carried out by skilled personnel at regular intervals in accordance with the applicable regulations.
 - Document any maintenance done on or near the Panel Detection system.
1. Maintenance of the system by performing a manual system diagnostic shall be carried out at an interval of at least 365 days. To perform a system diagnostic, follow the instructions in chapter 6.2 “Manual system diagnostic”.
 2. A visual inspection of the system is to be carried out at every instance of maintenance, follow the instructions in chapter 6.1 “Visual inspection”.
- ⚠ All components showing a fault shall be immediately replaced with a new component by a skilled/licensed person.

11 Troubleshooting instructions

11.1 Do I need single or double channel system?

To know if you need a single or double channel system, you need to perform a risk assessment (ISO 12100:2010) and determine the required safety level needed, you can then find which system fits this criteria in chapter 9 “SIL/PL calculations (simplified)”.

11.2 How do I assemble Panel Detection?

General assembly instructions in interactive form and in “Follow me” are available separately. See chapter 4 “Installation guide mechanic” for instructions on where to find the information.

11.3 No signal is coming from the system

Below are some steps to check in order to find and fix this problem:

- Are all the panels mounted properly?
 - A signal will only be received when the entire loop (all panels) is mounted properly.
 - Note: signal can be received on one line and not the other if one panel is improperly connected on one side.
- Is the Panel Detection loop connected to the PLC according to chapter 5?
- Is the end contact mounted in the end of the loop?
- Are all cables properly connected and intact?
- Are the indication lights working on the Panel Detection units?
 - If the lights are not working:
 - Make sure the system is connected to appropriate power supply on both supply cables.
 - Make sure no fuse has been triggered.
 - Make sure the ground is connected and common for both power supplies if separate supplies are used.

11.4 Red indication light on one unit

A red indication signifies that the panel is not mounted. If the panel is mounted and the unit still indicates red then the unit is indicating an internal failure and the unit needs to be replaced.

11.5 No indication light on one unit

A unit not indicating when the other units in the loop are indicating means that the indication function on this unit has had an internal failure and the unit needs to be replaced.

12 Recycling

The Troax products should be disposed of in accordance with applicable national regulations.



Figure 12-1

Following components should be considered as electronic goods:

89051550	Panel Detection Standard
89051551	Panel Detection Right
89051552	Panel Detection Left
89051553	Panel Detection End Contact
89051554	Cable M12 2,5m Male/Male
89051555	Cable M12 5m Male/Male
89051556	Cable M12 5m extension Male/Female
89051559	Cable M12 20m Male/Uncontacted

Figure 12-2

Following components should be considered as metal and plastic goods (separate components in kit):

36701090	Kit Rapid Fix lower bracket
36907993	Kit Smart Fix one way M8
36701060	Kit Rapid Fix bracket
36701070	Kit Rapid Fix bracket Rt
36701080	Kit Rapid Fix bracket Lt
36908500	Kit 8500 Rapid Fix tools

Figure 12-3

Following components should be considered as metal goods:

36907991	Kit corner bracket one way M8
36907992	Kit corner bracket threaded one way
36907994	Kit one way screw for door
2008063x	Panel Curve

Figure 12-4

13 Spare parts

To ensure system safety all damaged or malfunctioning components shall be replaced with a new component.

89051550	Panel Detection Standard
89051551	Panel Detection Right
89051552	Panel Detection Left
89051553	Panel Detection End Contact
89051554	Cable M12 2,5m Male/Male
89051555	Cable M12 5m Male/Male
89051556	Cable M12 5m extension Male/Female
89051559	Cable M12 20m Male/Uncontacted
36701090	Kit Rapid Fix lower bracket
36907991	Kit corner bracket one way M8
36907992	Kit corner bracket threaded one way
36907993	Kit Smart Fix one way M8
36907994	Kit one way screw for door
36701060	Kit Rapid Fix bracket
36701070	Kit Rapid Fix bracket Rt
36701080	Kit Rapid Fix bracket Lt
36908500	Kit 8500 Rapid Fix tools
2008063x	Panel Curve

Figure 13-1

14 Warranty

Troax Panel Detection system is covered by a 2-year warranty.

Warranty is only valid if the instructions in this document have been followed.

Warranty will be invalidated if the system is damaged due to faulty/incorrectly used/connected power supply/PLC.

Warranty will be invalidated if environmental conditions are not followed.

15 Technical specifications

Art nr:	89051550	89051551 / 89051552	89051553
Name:	Panel Detection Standard	Panel Detection Right / Left	Panel Detection End Contact
Service temperature:	0-60°C		
Storage temperature (in sealed packaging):	-20-80°C		
Humidity:	< 70% (no condensation)		
Nominal current:	6,5mA	3,3mA	10,3mA
Power supply:	12-24V ± 20%		
Surge voltage max:	500 V		
Serial connection (loop):	Up to 100 units		1 unit per serial connection
Holding force:	3000 Newton		NA
Impact resistance (Impact on panel):	1600 Joule		NA
Response time:	< 1ms		NA
Risk time:	< 1ms		NA
Connection:	2X M12 Female (Max 0,6Nm)		M12 Male (Max 0,6Nm)
Poles:	5		
Safety outputs:	2 NC	1 NC	NA
Local signalling:	2X Red/Green LEDs	Red/Green LED	
IP Class:	52		54
Weight:	387g		65g
Dimensions:	93x58x50mm		28x35mm
Color:	Grey, black text		
Mission time:	20 years		
MTTF _D :	7773 Years		17192 Years
Safety level up to:	SIL 3 (IEC 61508:2010) PLe (ISO 13849-1:2015)		
Additional standards:	Fixed guard system (ISO 14120:2015) Type 2 interlocking device (ISO 14119:2013) Low level coded (ISO 14119:2013)		NA
	Type A system (IEC 61508:2010) Hardware fault tolerance 1 (IEC 61508:2010) Category 3 (ISO 13849-1:2015)		

Figure 15-1

16 Declaration of conformity



EC DECLARATION OF CONFORMITY (Original declaration according to Directive 2006/42/EC Annex II.1.A)

We, Troax AB herewith declare, on our own responsibility, that the safety components:

System: Panel Detection, safety devices for Troax Rapid Fix/ Smart Fix systems.

Parts: Panel Detection Standard Art.nr: 89051550
Panel Detection Right Art.nr: 89051551
Panel Detection Left Art.nr: 89051552
Panel Detection End Contact Art.nr: 89051553

which this declaration refers to, are in accordance with the provisions of the following EC Directive:

**Directive 2006/42/EU on machinery &
Directive 2014/30/EU on electromagnetic compatibility.**

Used IEC, EN and ISO standards:

ISO 12100:2010	ISO 13849-1:2015	IEC 62061:2021
ISO 14120:2015	ISO 13849-2:2015	IEC 61508:2010
ISO 14119:2013		

Assembly constraints:

To ensure that the essential health and safety requirements of Directive 2006/42/EC are met, these products must before use, be assembled and installed according to the risk assessment in accordance with ISO 12100:2010, the Troax assembly instructions and instructions for use.

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17 Technical documentation

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