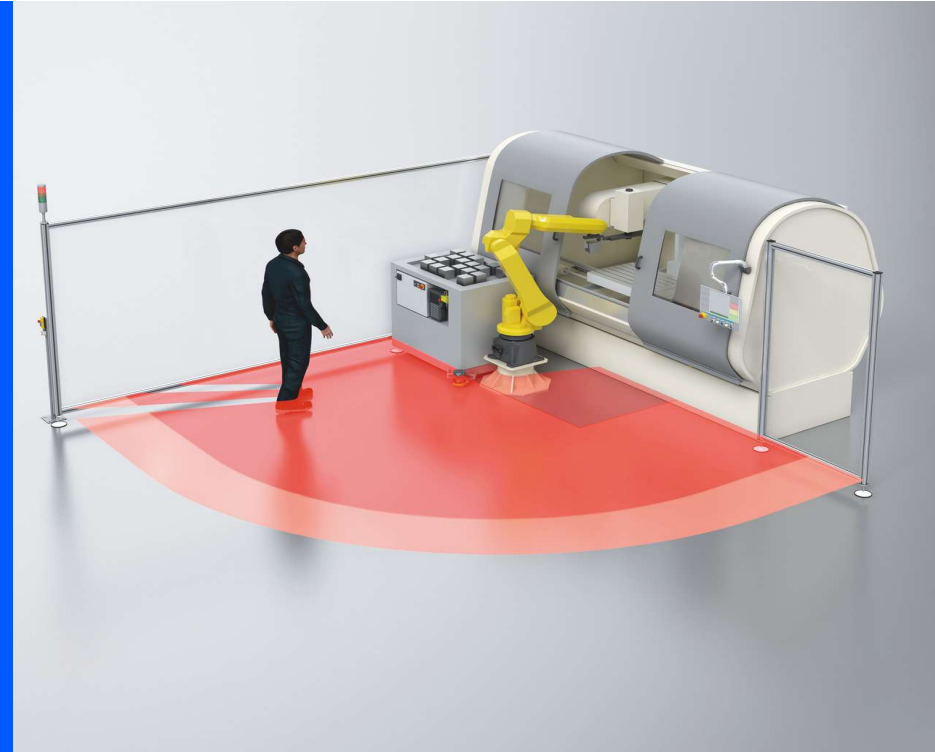


# SBOT SPEED CIP – FA (FANUC)

Customer Presentation

BU Safety Solutions  
Integrated Automation

**SICK** Sensor Intelligence



# SAFE ROBOTICS FROM SICK

## Introduction

- Are you looking for an easy way to increase the productivity of your robot applications?
- Do you need free access to your robot application to control the process?
- Are you looking for a partner who can:
  - Easily integrate their safety products into your robot?
  - Support you to ensure your robot applications are safe and comply with the relevant norms and standards?



The solution: Safe Robotics Area Protection from SICK

# SAFE ROBOTICS AREA PROTECTION

## New safety system specific to FANUC robots

We have extended the Safe Robotics Area Protection product family to include a new safety system for [cooperative human robot applications](#) that is totally dedicated to FANUC robots



Safety and flexibility

The intelligent combination of our new microScan3 Core EFI-Pro laser scanner with our safety controller via an EtherNet/IP™ CIP Safety™ interface provides free access to your FANUC robot application



Don't waste time

The safety system and the FANUC robot controller can be easily integrated thanks to tried-and-tested logic functions, pre-configuration files and detailed documentation.

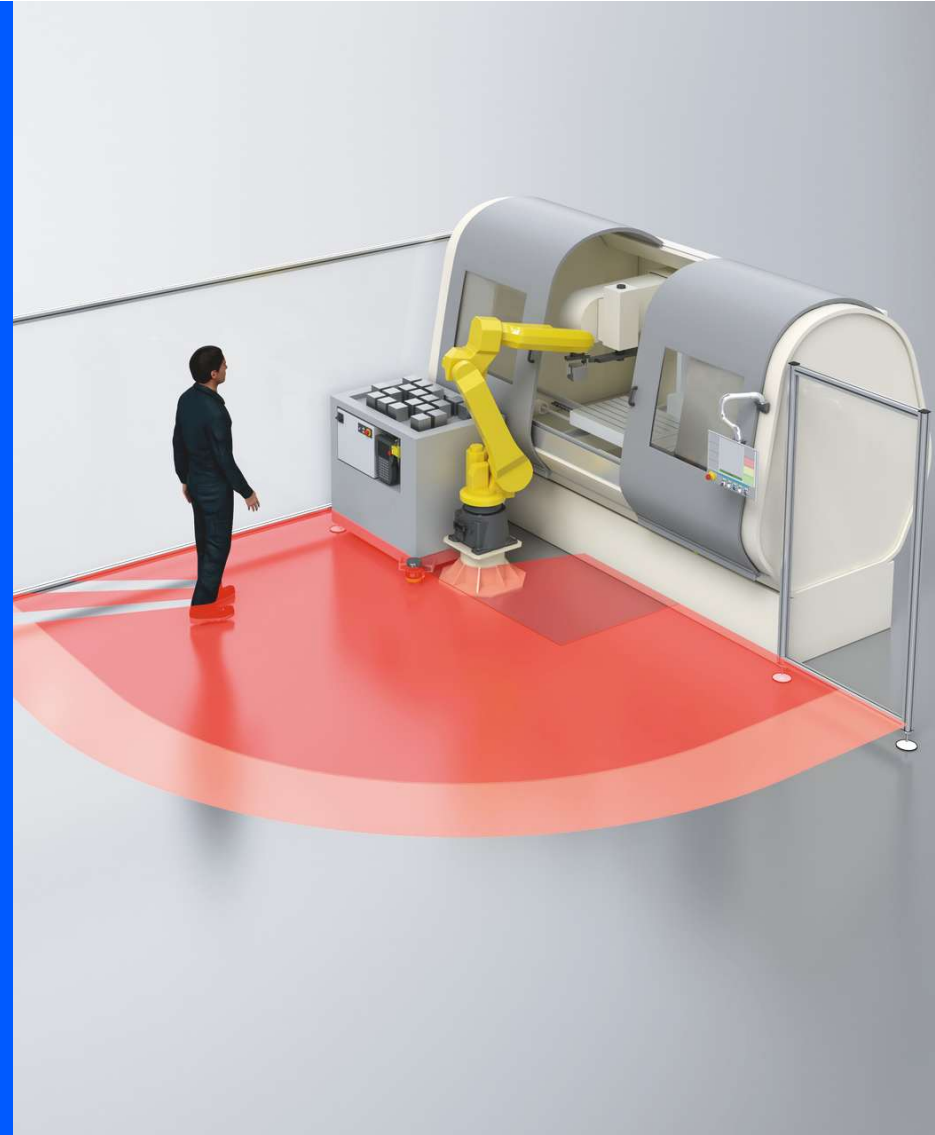
The safety system triggers the safety functions of the robot controller and covers the FANUC robot features



Increase the productivity

of the manufacturing process with less downtime and an optimized working process

# INTRODUCTION



# SAFE ROBOTICS AREA PROTECTION

sBot Speed CIP - FA safety system specific to FANUC robots

What do our customers want?

- A system that allows **safe, cooperative** and **freely accessible** FANUC robot applications using possibly only one laser scanner, even in applications where the worker can step behind the scanned area.
  - As the **FANUC robot** with CIP safety functionality acts only as the **target/slave**, the safety system should act as the **originator/master** with the robot controller and has the advantage of being **compact, extendable** and **easy to integrate**
- To maintain the productivity of their robot applications at the highest level



**The solution: sBot Speed CIP - FA**  
The first safety logic based on a safe EFI-pro safety system

# SAFE ROBOTICS AREA PROTECTION

## sBot Speed CIP - FA safety system specific to FANUC robots

Our safety system offers you a complete, easy, ready-to-use safety system to safeguard freely accessible FANUC robot applications that can be integrated into the [R-30iB Plus FANUC robot controller](#) via an [EtherNet/IP™ CIP Safety™ interface](#)

A safety system includes:

- A tested [software control logic](#) to increase the productivity of your robot application
  - With safe sequence monitoring to allow automatic restart
- With one laser scanner, together with simultaneous field monitoring, it is possible to safely detect the worker stepping behind the scanned area to prevent automatic restart
  - Also in the case of access by multiple people
- [Pre-configuration file](#) for the safety laser scanner and [FANUC-specific settings](#) to make the set-up process easier
- [Pre-selected](#) hardware components
- [Wiring diagram](#) and [CIP safety communication settings](#) to allow the communication to be set up easily
- [Guidance](#) for safeguarding and commissioning

# SBOT SPEED CIP – FA

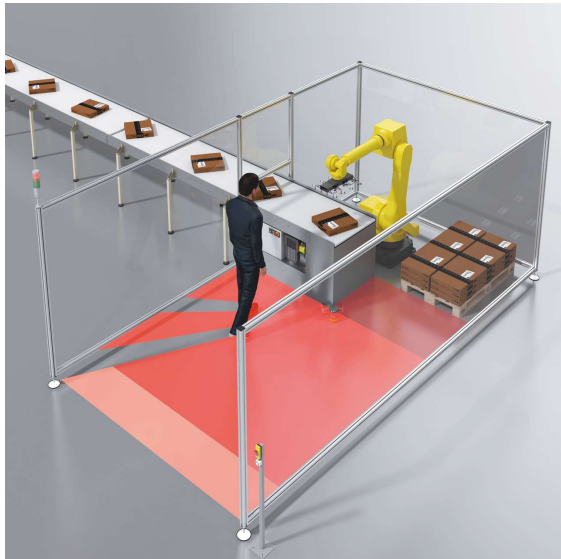
What are the Typical applications?

## PALLETIZING

Increased productivity – less downtime thanks to automatic restart

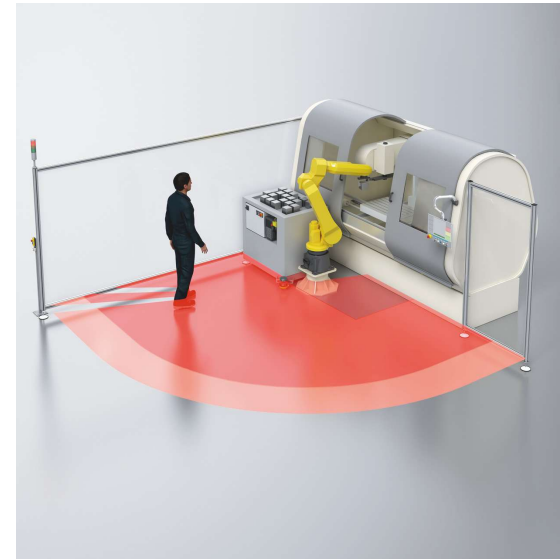
Possibility of detecting the worker stepping behind the scanned area to prevent automatic restart

In that case a [manual reset/restart](#) is requested



## TENDING

Possibility of detecting the worker coming too close to the machine and of requesting a manual reset/restart



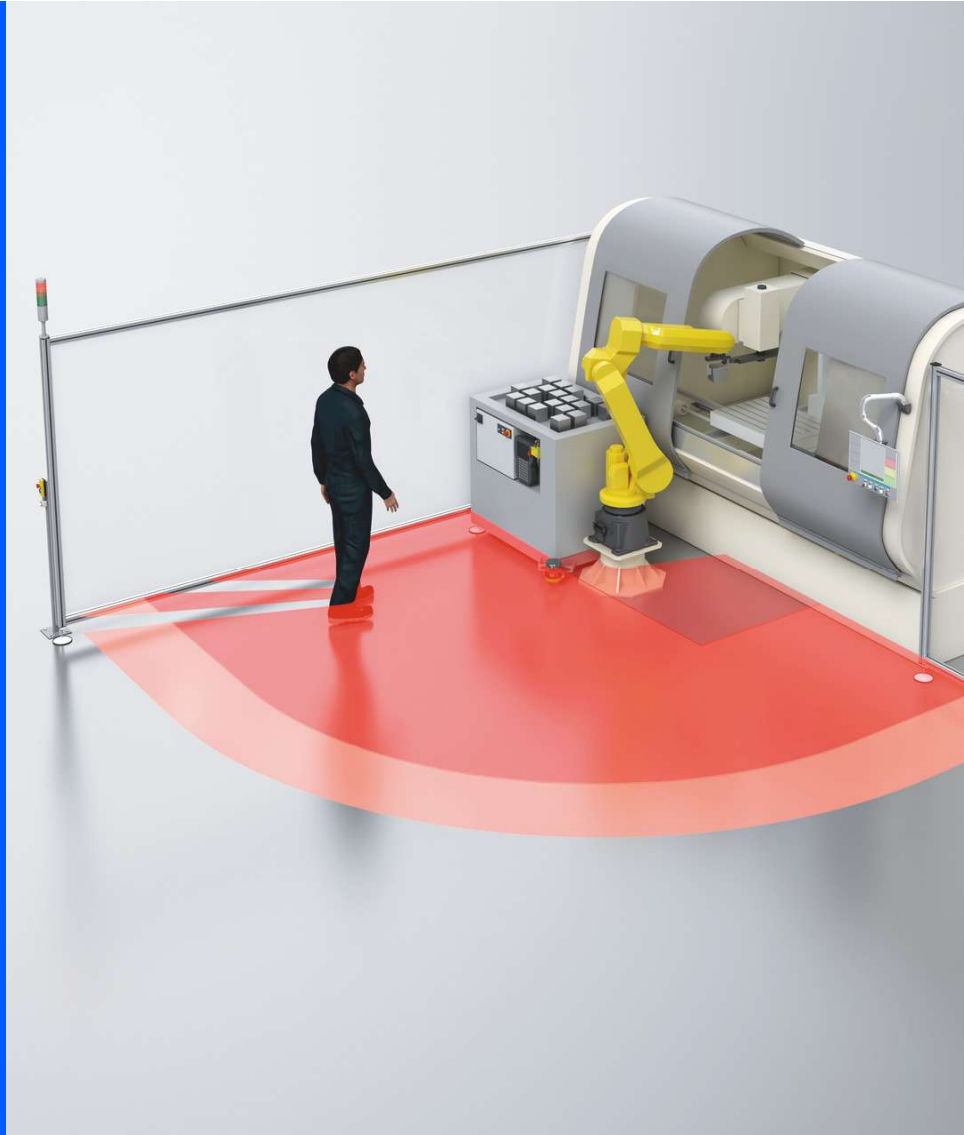
# SBOT SPEED CIP - FA

## Benefits

Your benefits at a glance:

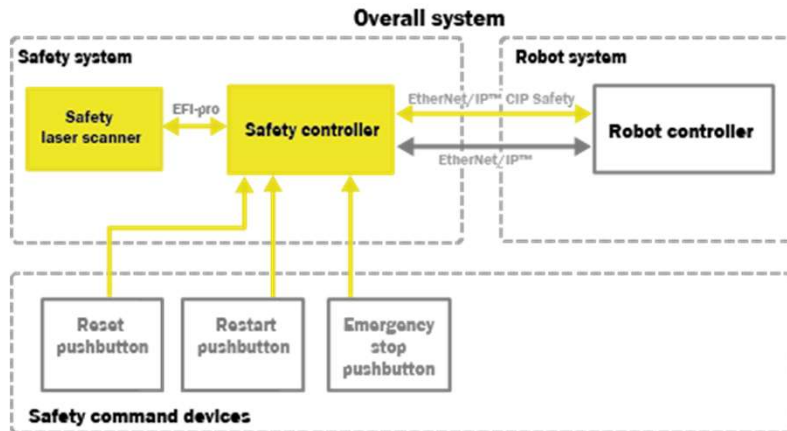
- Unlimited, free access to the robot application
- Simple and low-cost integration
- Reduced cabling effort
- Safe Productivity
  - Reduced downtime & increased efficiency during robot operation
- Reliable safety for your plant
  - Proven safety logic, developed by SICK experts
- Flexible safety system
- Future-proof
  - Modules can be added to the system and it can be flexibly adapted to individual customer requirements.

# BASIC INFORMATION - OVERVIEW



# SBOT SPEED CIP - FA

## Overall system



Our software control logic running on the Flexi Soft safety controller interacts with the command devices and FANUC robot controller to create the safety system

**The overall system consists of three components:**



sBot Speed CIP - FA

Hardware + Software



FANUC robot system

FANUC robot with R-30iB Plus FANUC robot controller

FANUC pictures

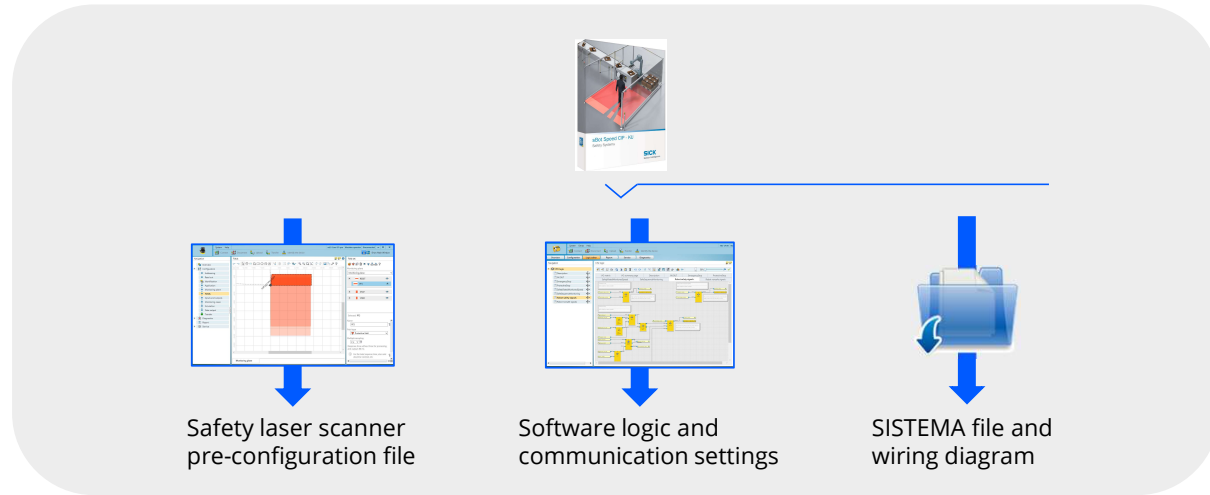


Safety Command Devices

# SBOT SPEED CIP - FA

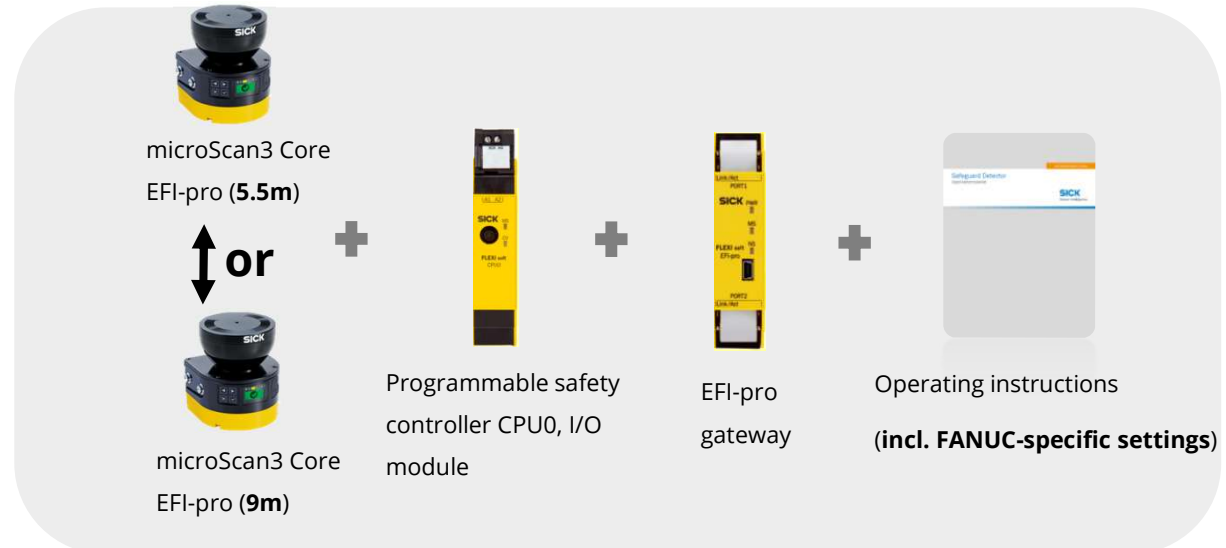
## Safety System Overview

Software package  
Part number: [1614143](#)



Hardware set 5.5m  
Part number: [1105347](#)

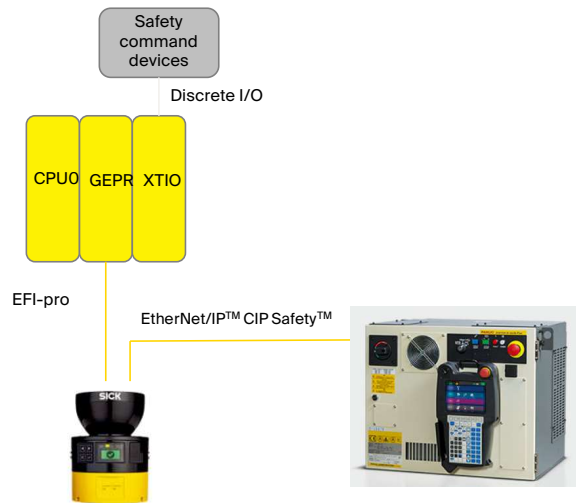
Hardware set 9m  
Part number: [1151557](#)



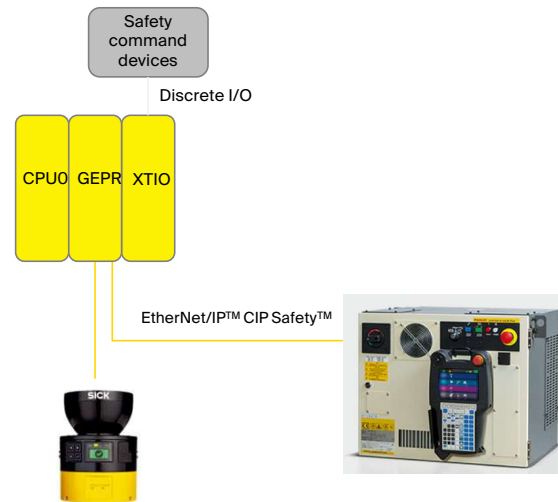
# INTEGRATION WITH THE FANUC ROBOT SYSTEM

Possible network configurations

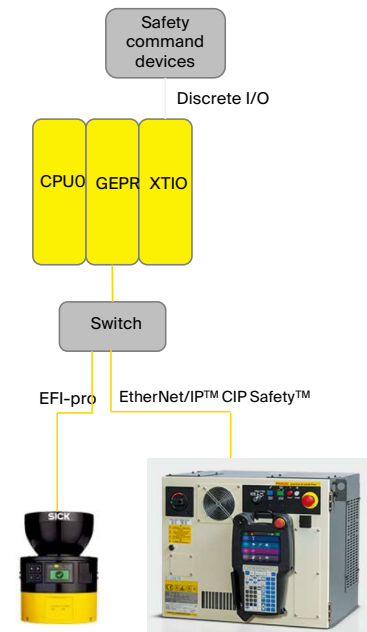
## THROUGH THE LASER SCANNER



## DIRECTLY TO THE GATEWAY



## USING A SWITCH



The gateway and safety laser scanner have 2 switched connections each. These allow for several connections, also with additional switches.

# WORKING PRINCIPLE



# WORKING PRINCIPLE VIDEO

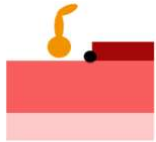


# SBOT SPEED CIP - FA

The safety system detects people entering the safeguarded area

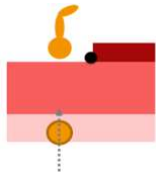
When a worker approaches the robot, the safety system slows down and stops the robot

## Principle of operation – robot access



The safety system monitors the access area to the hazardous area using three protective fields simultaneously

- › The third field is optional\* and is only used for presence detection



When the first protective field is infringed, the robot slows down

- › Our system triggers the safety-rated monitored speed function of the robot



When the second protective field is infringed, the robot stops

- › Our system triggers the protective stop function of the robot

(\*) The use of our safety system requires a risk assessment. Depending on your application, the third field can be de-selected using our Safety Designer tool.

# SBOT SPEED CIP - FA

## Principle of operation – Sequence monitoring

When the worker moves away from the robot, protective fields 1 and 2 are freed again one after the other

When all the fields are free, the robot will restart automatically\*

→ The automatic restart is only possible when the **exit sequence is fulfilled**

A manual reset/restart will be requested if the sequence monitoring based on protective fields 1 and 2 is erroneous

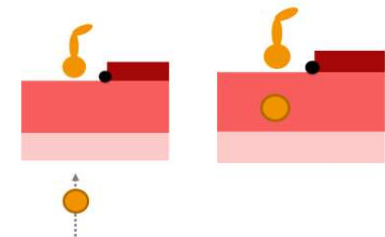
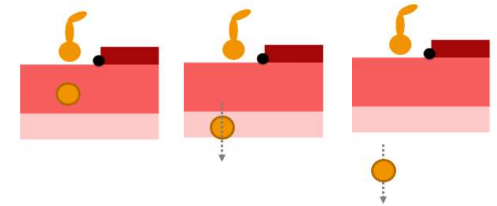
→ If there is a sequence error, it is not possible to ensure that the worker has moved away again

The **sequence monitoring** prevents an **automatic restart**

The **sequence monitoring** also monitors the **access sequence**

→ If the worker jumps over the first protective field, a manual reset/restart will be requested

- The robot is working at full speed when the worker infringes the second protective field and our system triggers the robot stop immediately

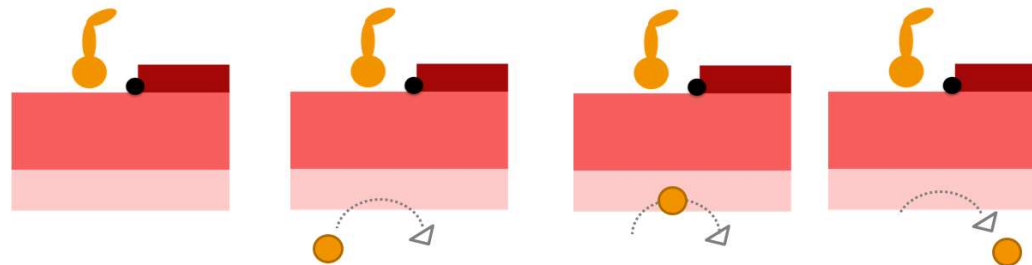


# SBOT SPEED CIP - FA

## Principle of operation – Passing by

When the worker is passing by and only infringing the first protective field

→ The robot slows down and accelerates again when all the fields are free



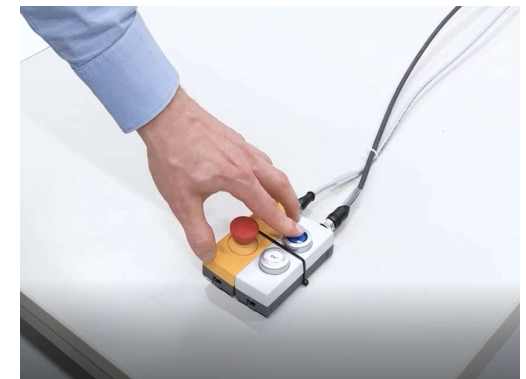
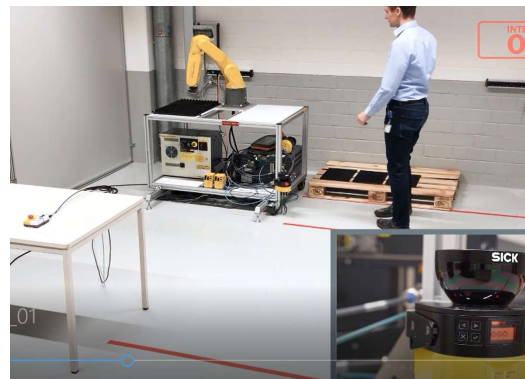
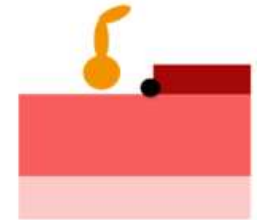
# SBOT SPEED CIP - FA

Principle of operation – purpose of the THIRD PROTECTIVE field

The third protective field, directly in front of the hazardous area, provides protection in the event of presence detection

- When this protective field is infringed, our system triggers the robot stop immediately
  - A manual reset/restart is requested in that case

The third protective field makes it possible for **more than one person to access** the robot safely

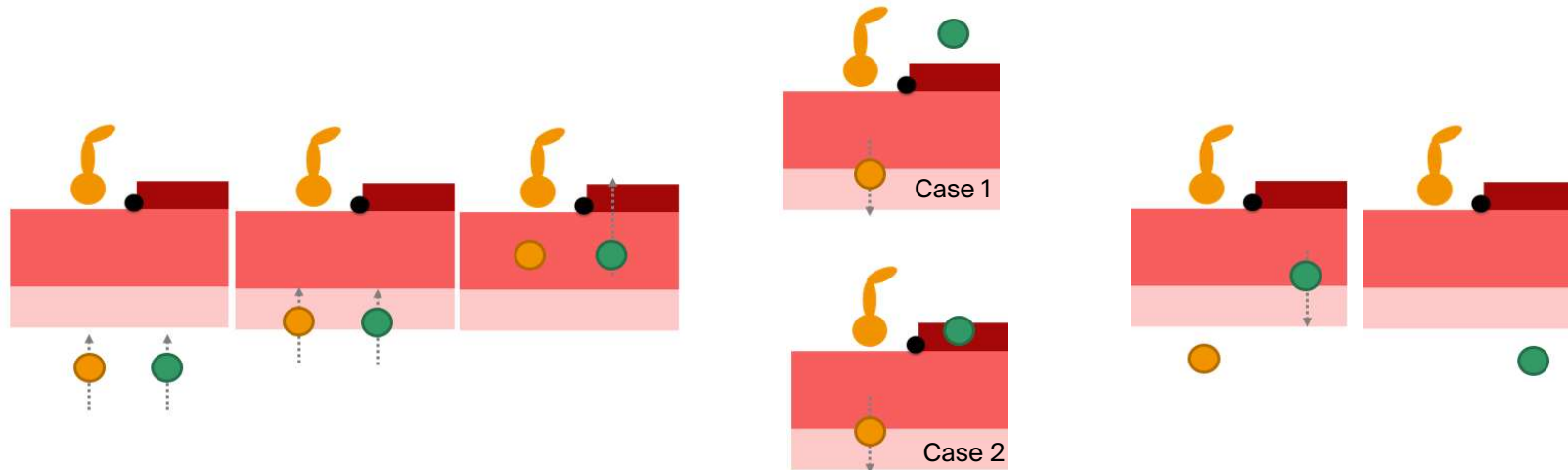


# SBOT SPEED CIP - FA

## Principle of operation – multiple person access

When more than one worker moves toward the robot, even if one worker is stepping behind the safeguarded area (case 1) or only infringing the third field (case 2), a manual reset/restart is requested.

→ In case 1, even when the worker who stepped behind the safeguarded area moves away from the robot using the right exit sequence, the robot will remain stopped and require a manual reset/restart to resume its activities

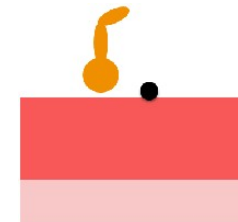


# SBOT SPEED CIP - FA

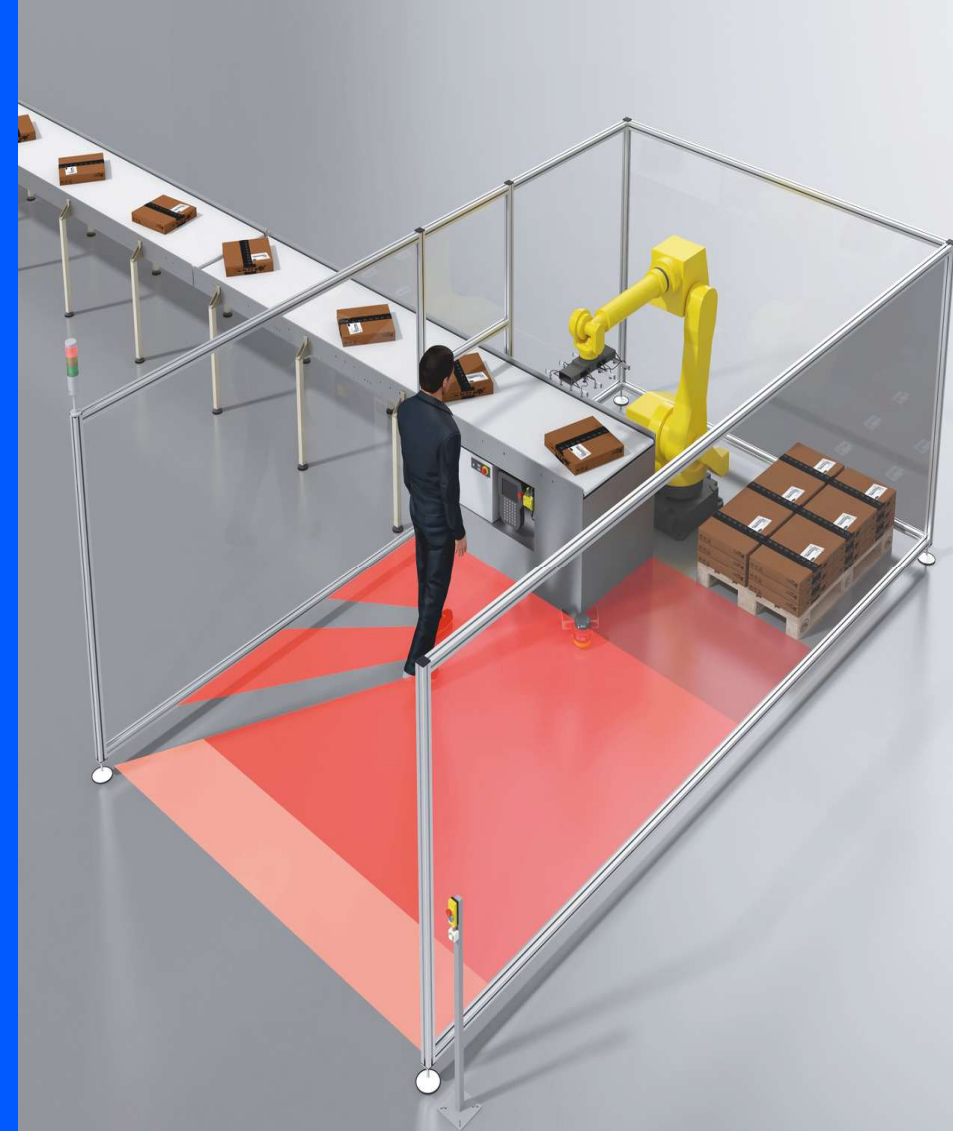
Principle of operation – possible option with two fields

Depending on the application and the risk assessment, it is possible to configure the system with only two protective fields: protective fields 1 and 2.

- If there are only two fields, our system cannot safely detect when a worker steps behind the safeguarded area in all applications
  
- But if one of the following criteria can be met, the configuration with two fields can be used:
  - It is not possible to step behind the protective device
  - The safeguarded area can only be accessed by one person at a time



# FEATURES AND BENEFITS



# SBOT SPEED CIP – FA FEATURES

## HARDWARE

- Preselected hardware components suitable for the sBot Speed CIP – FA software package
- Comprehensive documentation including wiring diagram and operating instructions
- Standard Ethernet cable for connecting to the robot controller
- Compact Flexi Soft safety controller and safeHDDM® scanning technology
- As the originator, Flexi Soft triggers relevant safety functions

## SOFTWARE

### Safety Functions:

- Triggering of an emergency stop
- Prevention of unexpected restart
- Automatic reset and restart with safe sequence monitoring
- Initiate manual reset and restart
  - Optional manual reset with third protective field
  - Error in the sequence monitoring for automatic restart
- Triggering of safety-rated monitored speed

Performance Level PL d (ISO 13849-1)

# SBOT SPEED CIP - FA

## Benefits

### Simple and low-cost integration

Thanks to preselected hardware, software package consisting of functional logic software, CIP safety communication settings, pre-configuration file for safety laser scanners, SISTEMA file, FANUC-specific settings and operating instructions



### Reduced cabling effort thanks to EtherNet/IP™ CIP Safety™ interface

One standard Ethernet cable to the robot controller

### Safe & high Productivity: Reduced downtime & Increased efficiency during robot operation

Available safety functions such as automatic restart and safe sequence monitoring

By means of seamless 275° monitoring provided by safeHDDM® scanning technology, which ensures less downtime thanks to its high reliability towards environmental influences



### Reliable safety for your plant

Proven safety logic, developed by SICK experts

### Flexible safety system

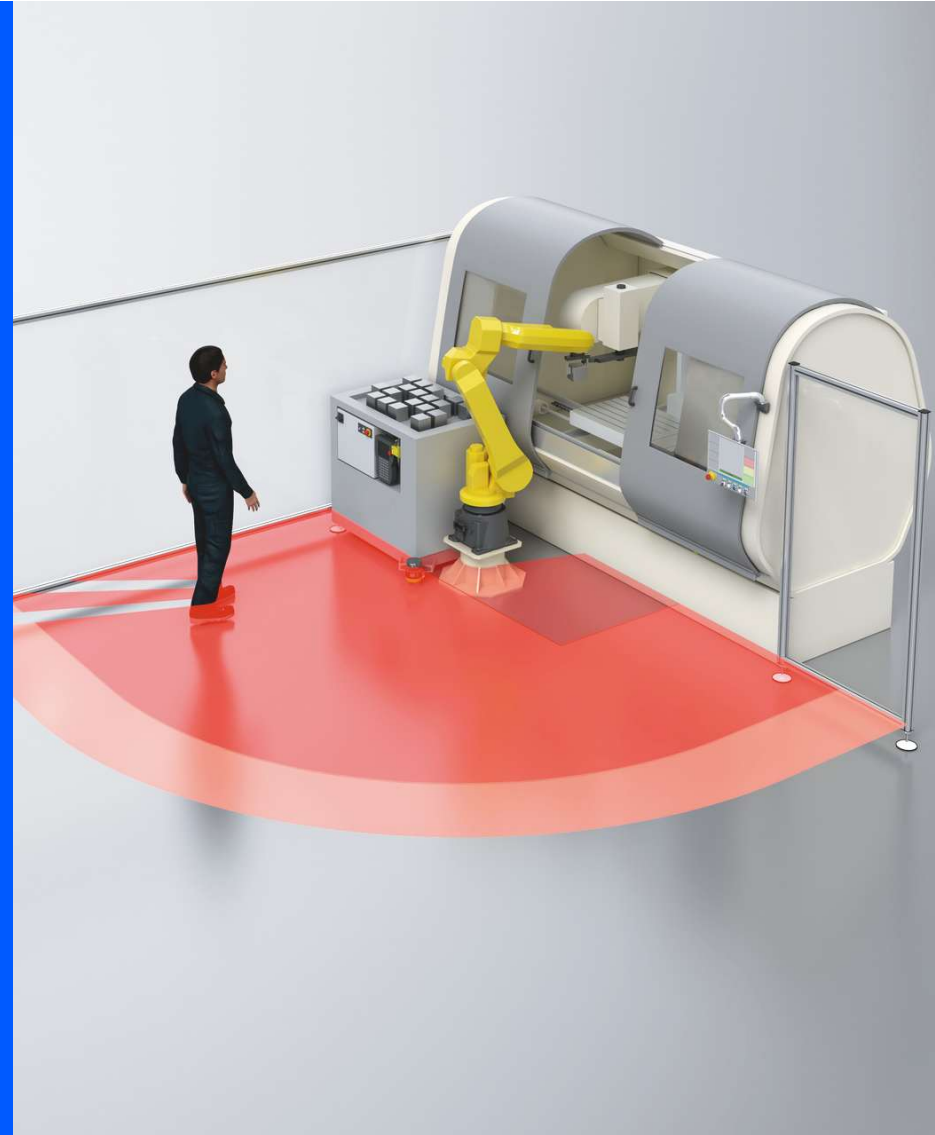
The fields of the safety laser scanner can be adapted to the application environment and new system functions can be added



### Future-proof

The system can be expanded with additional networkable microScan3 Core EFI-pro safety laser scanners and system functions as well as flexibly adapted to individual customer requirements

# GENERAL LIMITS AND REQUIREMENTS



# APPLICATION REQUIREMENTS

## Application limits

The safety system can only be used to protect against mechanical hazards caused by the movement of the robot.

Typical applications that this safety system is suitable for(\*)

- Applications with cooperative human robot interaction
  - Operator and robot share the same workspace at different times
  
- Applications using small or medium-sized FANUC industrial robots
  - Applications where tasks are executed in a clean environment or even in challenging ambient conditions
  - Indoor applications

(\*) A risk assessment according to ISO 12100 must be performed

# APPLICATION REQUIREMENTS

## Application limits

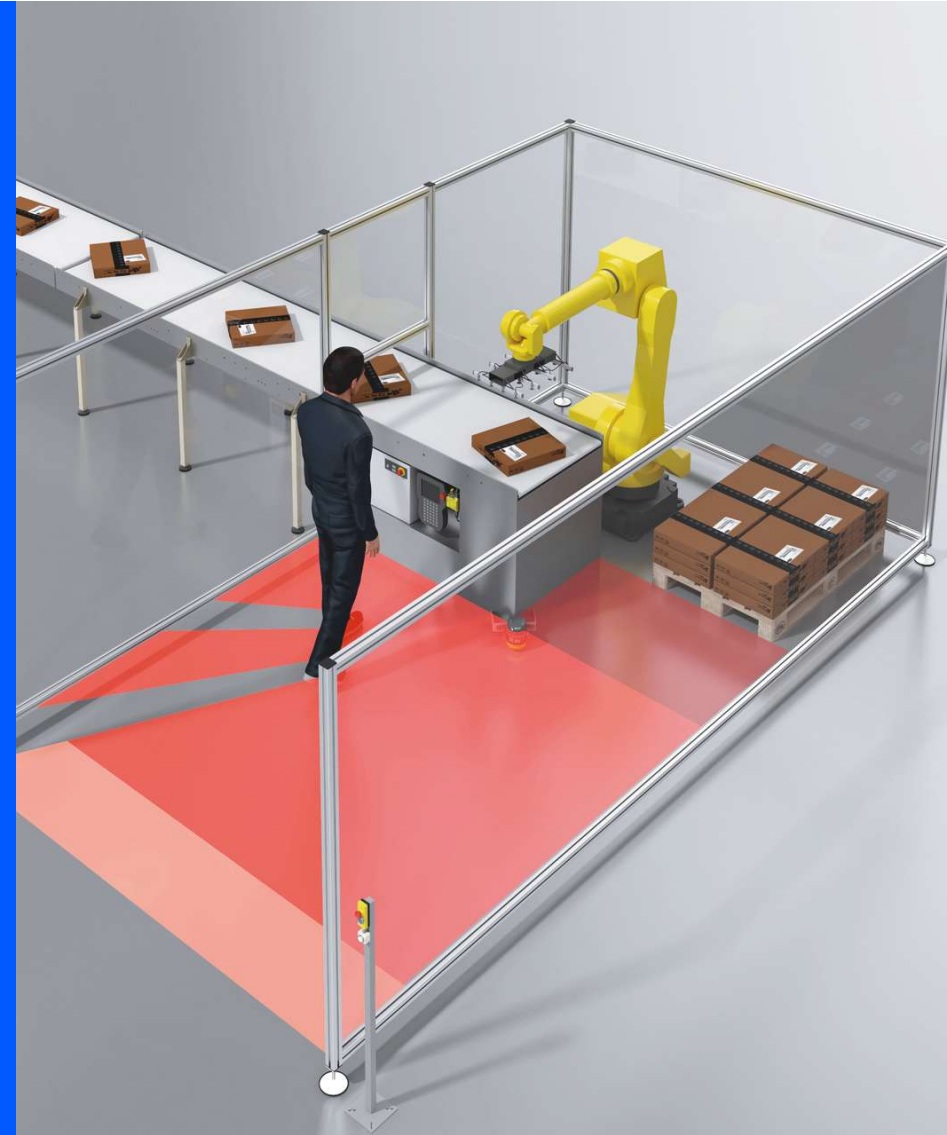
Typical applications that this safety system is suitable for Applications with industrial robot systems that:

- Do NOT eject materials or component parts
  - e.g. paint guns
- Do NOT emit radiation
  - e.g. lasers
- Do NOT present a danger when at a standstill
  - e. g. hazard caused by the end effector or tool itself

OR, if these applications are covered, the additional hazards need to be addressed with other risk reduction measures



# THE UNIQUE SAFETY SYSTEM SBOT SPEED CIP - FA



# SBOT SPEED CIP - FA

What makes our safety system unique?

Our system offers you [safe productivity](#)

- Automatic restart – less downtime
- Allows the worker to move close to or to pass by the robot without stopping it

Our system enables you to safeguard your application in a [cost-efficient way](#)

- With one laser scanner even when the worker can step behind the safeguarded area

Our system includes [safe sequence monitoring](#) as a function block, which is essential for the [automatic restart](#)

Our system covers the automatic and manual modes of the FANUC robot

- In manual mode the protective stop and safety-rated monitored speed signals are bypassed to allow you to move the robot

# SBOT SPEED CIP - FA

What makes our safety system unique?

Our FANUC-specific software package **makes integration easy**

- The laser scanner **pre-configuration file**
  - Simply adapt the field size and geometry to your application
- The EtherNet/IP™ CIP Safety™ **communication settings already configured in SD project file**
  - No problems with setting up communication
- The **FANUC settings** that you need to select in the FANUC robot controller
  - Just follow the steps described in our operating instructions
- The **software logic** that triggers the required safe and non-safe functions of the FANUC robot to get it running safely
  - SICK has developed and tested it for you

A **suitable compact hardware set**, which acts as **the originator/master**, connected via one cable to your FANUC robot controller

- This set efficiently meets your current requirements and can be easily expanded, depending on your environment and application
  - Additional functions
  - Additional networkable safety laser scanners via EFI-pro\*

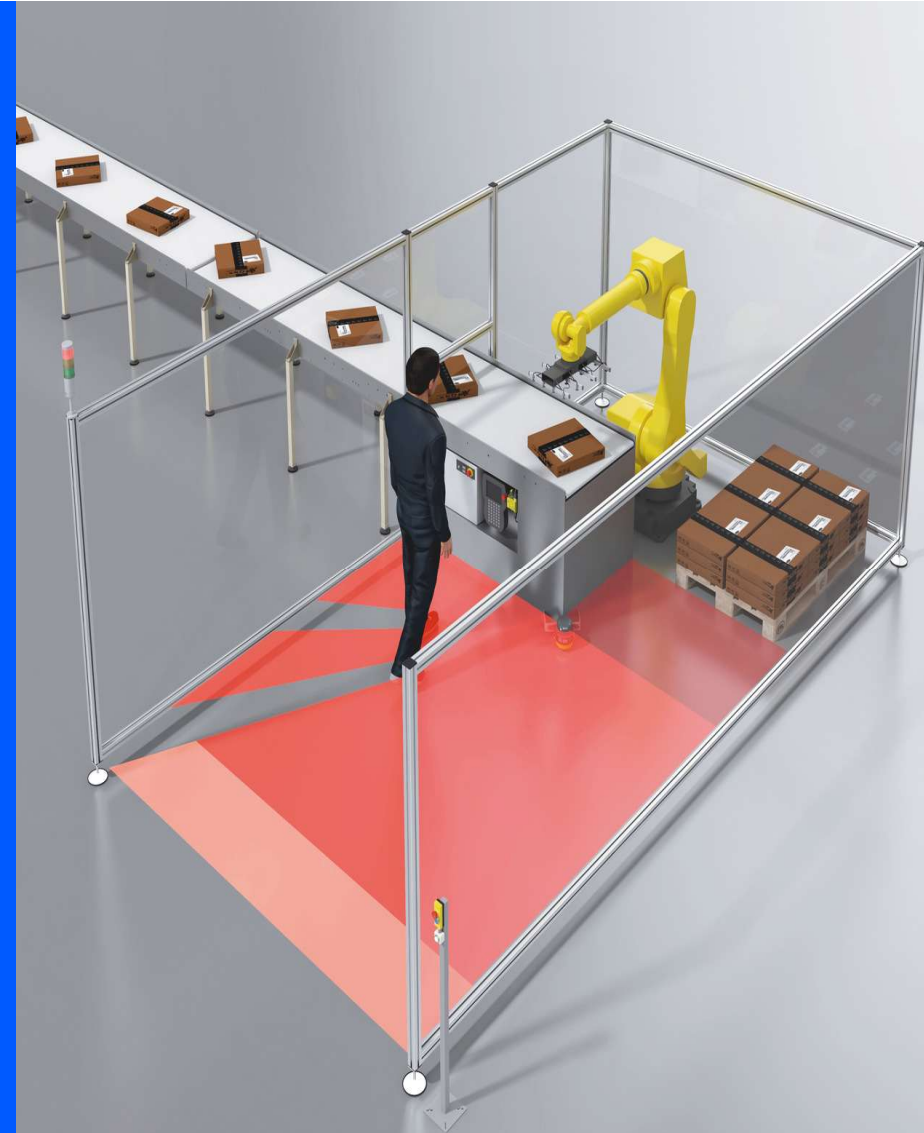
Our system allows you to run your innovative and efficient freely accessible robot application in **only a few hours**

```
DCS Cartesian speed check 1/13
No. 1 Status:DSBL
1 Comment: [VRED]
2 Enable/Disable: ENABLE
3 Direction: ALL
4 Group: 1
5 Tool frame: 0
(0:FacePlate, -1:Current tool)
6 Base frame: User Frame : 0
Speed of the direction(mm/sec):
Current: 0.000
7 Limit: 400.000
8 Stop type: Stop Category 1
9 Speed control: OVERRIDE
10 Override limit: 10%
11 Delay time: 1000 msec
12 Disabling input: SIR[ 2:VRED ]
13 Permissible distance(mm): 0.0
```

Source: FANUC robot pendant



# ORDERING INFORMATION



# SBOT SPEED CIP - FA

Ordering information and content



## Software package

Part number: 1614143

Safety Designer project file

- SW safety logic based on simultaneous field monitoring with sequence monitoring
- Pre-configuration of microScan3 Core EFI-Pro included in the project file
- EtherNet/IP™ CIP Safety™ settings for the communication
- FANUC-specific settings
- ePlan wiring diagram
- SISTEMA values
- Detailed operating instructions
  - To guide you through the safeguarding process
  - To guide you through the commissioning of the overall system
  - e.g. required configurations, settings and validation table



## Hardware set

Part number:

1105347 (with a 5m mS3 laser scanner)

1151557 (with a 9m 5m mS3 laser scanner)

Suitable hardware to run the software in one set

- > microScan3 Core EFI-Pro
- > Flexi Soft CPU0
- > Flexi Soft Systemstecker FX3-MPLO
- > Flexi Soft EFI-Pro Gateway
- > Flexi Soft XTIO



For further information:  
[www.sick.com/Safe\\_Robotics\\_Area\\_Protection](http://www.sick.com/Safe_Robotics_Area_Protection)



# INDUSTRIES AND APPLICATIONS



# TYPICAL INDUSTRIES

## Industries and Applications

### Industries in focus

→ Automotive, electronics, consumer goods and machine manufacturing

### Typical applications

- Machine tending
- Loading and unloading
- Material handling
- Pick and place, packaging
- Palletizing
- Assembly lines where robots perform
  - Screwdriving and gluing tasks
  - Polishing, laser marking and body inspection (electronics) tasks



For further information:  
[www.sick.com/Safe\\_Robotics\\_Area\\_Protection](http://www.sick.com/Safe_Robotics_Area_Protection)

# THANK YOU FOR YOUR ATTENTION!

Business Unit Safety Solutions  
Integrated Automation

