Robots move fast, pose potential risks to people. Safety barriers (fences, cages, light curtains) intended to prevent people from walking into a robot cell.

- Passing barriers cause robots to stop; interrupts production.
- Disqualifies collaboration between humans and robots.
- Fast-moving robots can break barriers if mistakenly programmed.

SafeMove supply solutions to remove these bonds while maintaining production.
SafeMove2, ABB’s safety solution, ensures employee safety, revolutionizes safety commissioning times and reduces total investment by up to 30%.
SafeMove2

Product values

Values
– Saves floor space
– Facilitates human/robot collaboration
– Enables hazardous applications such as X-ray inspections, laser cutting..
SafeMove2
Customer benefits and key features

Benefits
- Enables lean, flexible and more economic robot solutions
- Designed to keep humans and equipment completely safe
- Facilitates human/robot collaboration

Features
- Fully integrated flexible software solution.
- Powerful configuration tools reducing commissioning times
- Flexible safety rated speed and position monitoring
SafeMove2

Functions

- **Safe Zones** enables cell size optimization and simplifies the safeguarding of installations. It protects operators and enhances machine and equipment.

- **Safe Axis Ranges** replaces electro-mechanical position switches, increases control and flexibility, and reduces maintenance requirements.

- **Safe Robot Speed** supervises speed at a defined level so an operator can work within the proximity of the robot.

- **Safe Standstill** supervises the stand-still of robot axes without having to switch the robot to Motors Off. It enables operators to perform tasks in the immediate vicinity of the robot.

- **Cyclic brake check** supervises that the brakes are checked periodically.
SafeMove2

Optimal balanced resources

– Space consuming SafeMove computer replaced with small PCIe extension board into main computer
– The optimal balance of hardware and software

• Functionality based of flexible software solutions allowing future functionality expansion
• Dedicated hardware to ensure performance of the safety system including fully reliable safety IO
• Independency of the application running on the main computer
- A key SafeMove2 feature is the built-in safety fieldbuses.
- Eliminating the need for dedicated hardware for communication with safety equipment such as safety PLC’s & light curtains.
- No need for additional hardware, fully flexible software solution
- Wide offering of protocols
  - PROFIsafe Device (slave)
  - PROFIsafe Controller (F-host, master)
  - CIP Safety Adapter (slave)
  - CIP Safety Scanner (master) (2018)

Largely reduced investments, increased flexibility & reliability
SafeMove2
Safe Communication Principles

Safety Fieldbuses

Controller

Device

Discrete I/O
SafeMove2
Safety fieldbus device

Direct connection to safety networks

- Direct communication with safety PLCs
- Reduced need for cabling in line installations
- Flexible software solution, no dedicated hardware needed
- Support for either PROFIsafe or CIP Safety
SafeMove2
Safety fieldbus controller

Direct control of safety equipment

• Possibility to connect safe I/O devices directly to the robot controller such as tool changers and I/O devices
• Reduced need for cabling
• Flexible software solution, no dedicated hardware needed
• Support for either PROFIsafe or CIP Safety* protocol
## SafeMove2
### Discrete safety IO´s

<table>
<thead>
<tr>
<th>Discrete safety IOs</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Connection of safety sensors like light curtains, laser scanners, safety mats, etc.</td>
<td>• No explicit need for safety PLC</td>
</tr>
<tr>
<td>• Directly to the SafeMove2 controller, for installations without safety fieldbus equipped PLC´s</td>
<td>• PROFIsafe F-host not needed.</td>
</tr>
<tr>
<td>• Prepared in terms of software support (i.e. no hardware, wiring etc.)</td>
<td>• Higher flexibility and productivity</td>
</tr>
<tr>
<td>• Intended to fill the gap of the discrete I/Os available in SafeMove1</td>
<td>• Smaller safety distances due to faster safety response times</td>
</tr>
<tr>
<td>• Exactly same functionality as F-Host, but limited to only use safe I/O devices from ABB Automation Products (Vendor Id)</td>
<td>** From ABB Automation Products</td>
</tr>
</tbody>
</table>
| • You will use the CI502 header module for Ethernet communication, but NOT the non-safe I/O:s on that unit | TU582-S
DI581 or DX581

* From ABB Robotics:
996-1 Safety Module
1241-1 Prepared for CI502
888-2 Profinet m/s

** From ABB Automation Products
TU508-ETH
CI502-PNIO

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July 24, 2017 | Slide 12
SafeMove2 – Discrete I/Os

Communication module

- Communication interface module CI502-PNIO
  - PROFINET RT fieldbus connectivity for safety I/O modules
  - Decentralized/remote safety I/Os
- DIN rail or wall mounting with TU508-ETH terminal unit
- Up to 10 DI581-S and DX581-S safety I/O modules can be connected
- Extreme condition (-XC) modules are available (-40 to +70°C, high vibration and shock requirements, etc.)
SafeMove2 – Discrete I/Os
Safety IO modules

- DX581-S safety digital I/O module with
  - 8 safety output channels
  - 8 safety input channels
  - 4 test pulse outputs for 8 safety digital input channels

- DI581-S safety digital input module with
  - 16 safety input channels
  - 8 test pulse outputs for 16 safety digital input channels

- One TU582-S terminal unit suitable for both DI581-S and DX581-S modules

- SIL3 (IEC 62061, IEC 61508:2010) and PL e (ISO 13849-1) certified by TÜV Süd
SafeMove2

Keyless mode selector

FlexPendant mode selector instead of physical key selector

- Increased ease of access
- No need for external control panels
SafeMove2

New and improved functions and features

- Certified PLd cat. 3 in accordance with ISO13849
- Extensive improvements in ease-of-use
- Increased number of zones, ranges, tools
- Improved precision and less sensitivity
- Zones inside zones functionality
- Support for combining safety functions
- Improved support for track based applications
SafeMove2
Intuitive and effective commissioning

- Intuitive tools for setup and validation
  - Based on RobotStudio® 3D models and simulations
  - I/O configurator with built in signal logic
- Effective workflow for commissioning
  - Safe control of safety function in manual mode
  - Validation support tools
  - Single restart

Significant reduced time to operation!
SafeMove2

SafeMove configuration

Intuitive tools for setup and validation based on RobotStudio

- Robot application programming
- Safety configuration
- I/O system configuration
- Simulation including safety system
- Automatic creation of safety zones based on simulation

- RobotStudio Basic - No license required
SafeMove2

Take full advantage of RobotStudio environment

Automatic zone generation

3D editing

Proven UI concepts

Supports both Online and Offline

No RobotStudio license required!
SafeMove2

Visual SafeMove online monitor

Violation!!!
SafeMove2

SafeMove Visualizer

- SafeMove Visualizer shows graphical representations of SafeMove configurations.
- Perfectly illustrates safety zones for fast and precise analysis of a zone or axis violation.
## SafeMove2

<table>
<thead>
<tr>
<th>Feature</th>
<th>SafeMove Pro</th>
<th>SafeMove Basic</th>
<th>SafeMove 1&lt;sup&gt;st&lt;/sup&gt; generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe Zones</td>
<td>16</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Tool Changer Support</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Safe Axis Ranges</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Tool Orientation Supervision</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Safe Robot Speed</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Safe Stand Still</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Contact Application Support</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Safe fieldbus connectivity</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Keyless mode switch</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Discrete safety signals</td>
<td>0</td>
<td>0</td>
<td>8DI/8DO</td>
</tr>
<tr>
<td>Visual Safety configuration</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Commissioning modes</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
</tbody>
</table>
SafeMove2
Supported robots and controllers

- SafeMove supports majority of IRC5 controllers.
  - IRC5 Single
  - IRC5 Compact
  - IRC5 Paint
- IRC5 PMC planned for later release
- SafeMove supports majority of ABB current robot range.
  - IRB910SC, IRB120, IRB360 and YuMi not supported
- Support for any mounting angle, for example floor mounted, tilted and inverted.
SafeMove2

External axes support

- Supports all ABB track motion units.
- SafeMove supports single axis positioners.
- Positioners with several axes are treated as multiple single axes.

- Non ABB track motion units, non ABB positioners, and other additional axis may be supported by SafeMove but needs to be verified case by case.