Schaedler yesco EXPO 2014

THE ROARING TWENTIES

Celebrating **90** *Years!*

Rockwell Automation

A·B QUALITY | Authorized Distributor

Allen-Bradley · Rockwell Software

What's New from Allen-Bradley in Safety Products

-PRESENTED BY

Chuck McLamb – Schaedler Yesco

LISTEN.
THINK.
SOLVE.®

GUARDMASTER 440G-LZ
PLE RATED ACCESS CONTROL FOR PARTIAL BODY

AB *Allen-Bradley* · *Rockwell Software*

**Rockwell Automation**

GUARDMASTER 440G-LZ

- Safety certified to PLe and Cat. 4
  - EN/ISO 13849-1
  - EN/ISO 14119:2013
- Solid state design and monitored outputs
- Scalable protection with Unique or Standard coded RFID actuators
- High holding force of 1300N (Fzh)
- Energy Efficient "**Green**" Device: only uses 2.5W
- IP69K and hygienic design
- Power-to-Release and Power-to-Lock versions
- Compact design optimized for ease of mounting
- Diagnostic info provided with 2 bright 270° LEDs

Actuator

Metal holding bolt (inserts into the metal bracket and sensor assembly)

Bar code with URL link to user manual

LEDs (both sides)

Global approvals

Slim, clean design, sealed body (IP69k)

SOLID-STATE SAFETY OUTPUTS AND DESIGN

- With the 440G-LZ solid state design it can be connected in series with other devices such as Light Curtains and SensaGuard™ switches while maintaining a PLe rating

    - Exceeds requirements of ISO TR 24119 referenced in the new EN/ISO 14119:2013 standard

- Short circuit protection

- Overload protection

- Cross fault (channel to channel) detection

- Designed to switch DC powered devices

    - Supports switching of up to 200 mA
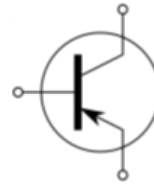
SCALABLE PROTECTION

- RFID technology is used to prevent the guard lock from functioning when attempts are made to defeat or bypass the safety switch
  - Requirements against defeat are in EN/ISO 14119:2013 Clause 7.2
- Choice of **"Standard"** or **"Unique"** coded actuators
  - **Standard coded actuators**
    - Defined as "Low Level" coding in EN/ISO14119:2013
    - Use with other measures to prevent defeat: mounting the switch out of reach or hidden, physical obstruction/ shielding…
  - **Unique coded actuators**
    - Defined as "High Level" coding in EN/ISO14119:2013
    - Needs no other measures needed to prevent defeating
    - Automatic learn process at unit power up
    - During commissioning, there is the option to select if the switch can learn a new actuator up to eight times or to lock the switch so it can not learn another actuator

MOUNTING

- Compact design optimized for mounting to aluminum profile

- Supports both hinged and sliding guard doors

- Multi Hole Actuator mounting bracket

    - Supports all directions of approach

- Supports mounting on framed and unframed guard doors

- Optional right-angled mounting bracket

Mounting bracket 440G-LZAM2

Four directions of approach
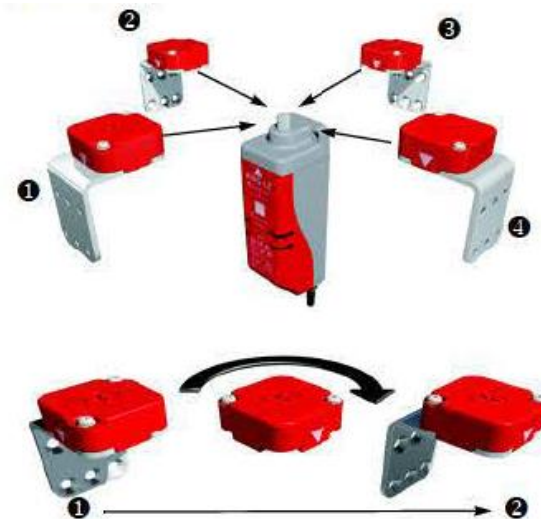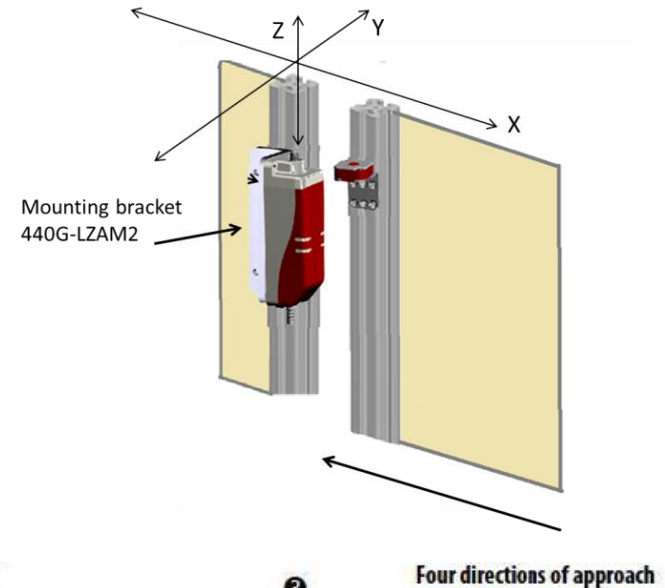
DIAGNOSTICS

- Two bright wraparound LED's

    - 270 Degree viewable

    - One LED for lock and OSSD status

    - One LED for diagnostics to aid troubleshooting

        - Actuator not in range

        - Trying to lock/unlock but actuator not aligned

        - Failed to lock/unlock

        - OOSD fault (Shorted to Ground or +24Vdc)

        - General faults

        - Serial connected switch issues
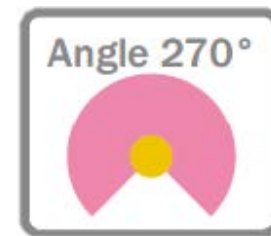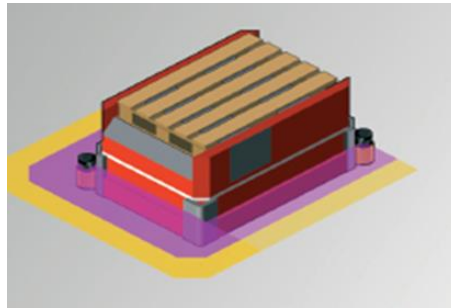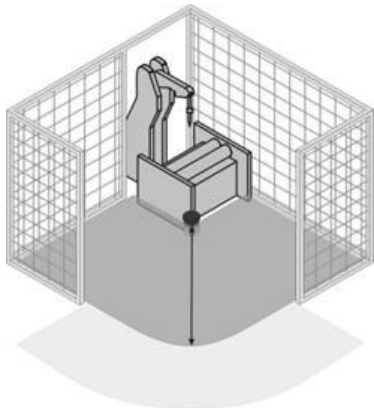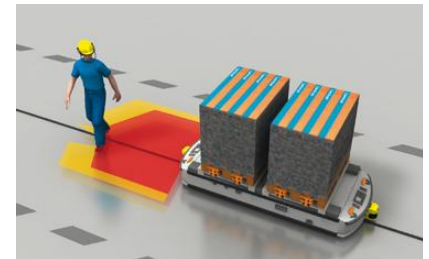
SAFEZONE™ MINI

Safety Laser Scanner

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Rockwell Automation

- The SafeZone™ Mini is a smaller safety laser scanner which allows it to better fit in machine frames and on AGVs

- Two warning fields can slow the movement of a transfer cart, AGV or any device transporting a load.

- The 270^0 scan angle of the SafeZone™ Mini provides a greater detection area than the 190^0 scan angle of the current SafeZone™ scanners, reducing the number of scanners required to provide 4 sided protection around an AGV or work cell.
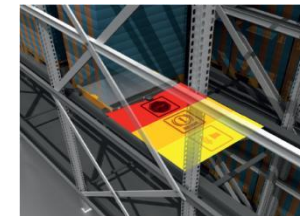
Rockwell Automation

- 270^0 area protection in a work cell

  - More area coverage than 190º solution

  - 1 or 2 Warning Fields, replaces safety mats

Stationary – Horizontal 270°

- Applications which require a vehicle with material to slow before a complete stop

  - Two Warning Zones allow load to be slowed in two stages providing for better control of the load as it slows

- Safety Mat Replacement in front of a Machine

  - One or Two Warning Zones, two meter configurable safety field.

  - Irregular shapes and configurations

- Mobile applications for personnel detection or collision avoidance

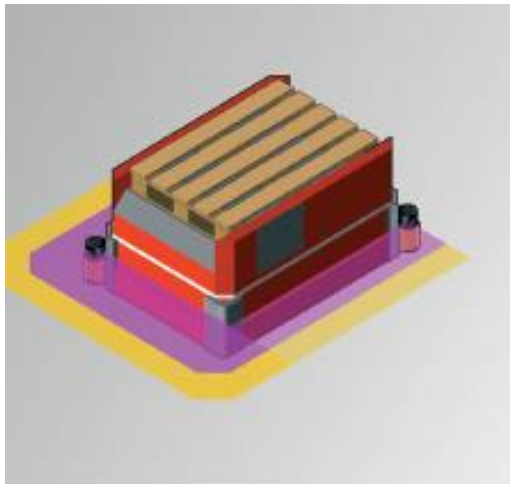 - One or Two Warning Zones slows the vehicle in two stages reducing brake wear
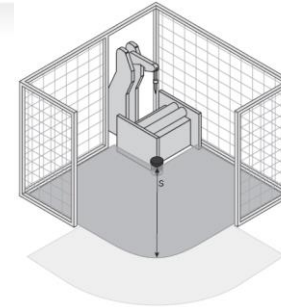
- ## Horizontal - Stationary
  - Single field set (Warning and Safety)
  - Ideal in a work cell as a safety mat replacement configured for 70mm resolution to detect an person's leg

Stationary – Horizontal 270°

Mobile - 4 sided detection coverage

- ## Horizontal - Mobile
  - Single Safety and Two Warning Fields – Slows AGV in two stages before stop
  - Configurable resolution of 70mm (2.76 in) for leg detection
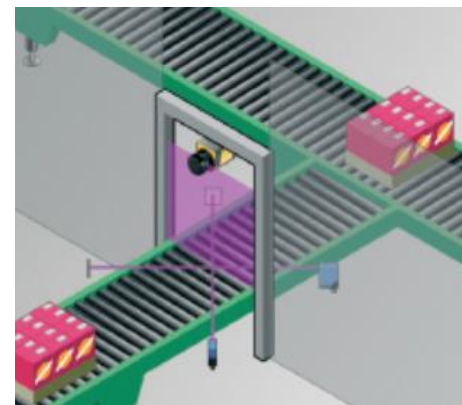 - Collision avoidance for over head cranes and AGVs

SAFEZONE™ MINI – VERTICAL APPLICATIONS

- ## Vertical Mounting –

  - 2 meter (6.6 ft) safety field set at 70mm (2.76in) resolution for maximum safety field range
  - Must be configured with contour as a reference.
 - No Warning field required.

- Can connect the SafeZone Mini's OSSD's to the MSR22LM or the MSR42 muting modules

SafeZone™ Mini as a Safety Mat Replacement

- The SafeZone™ Mini is a single part number solution compared to a safety mat system which consists of multiple mats, uniting trim, perimeter trim and a Mat controller to make up a mat system.

- Setting up a detection area with the SafeZone™ Mini is as simple as opening the SCD software and using the drawing tool to create the required shape and then transmitting the configuration to the scanner

Controller · Active Uniting Trim · Mats · Perimeter trim
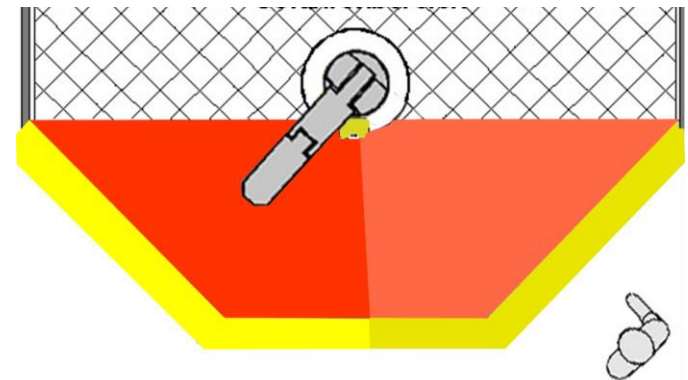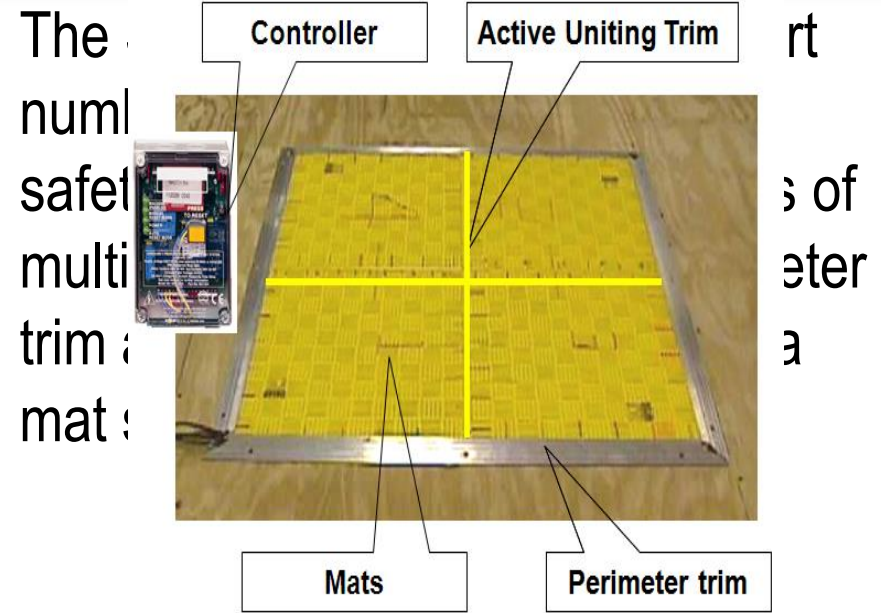
SafeZone™ Safety Laser Scanner Family Positioning Overview

Price (vertical axis)

Common Functionality

- **Restart delay** – configurable from 2 sec to 60 sec delay allows machine or AGV to start automatically after field is clear for specified amount of time

- **Configurable resolutions** of 30mm, 40mm, 50mm, 70mm,

- **7-segment diagnostic display and status LEDs**

- **Application diagnostic output** – configurable to signal front window contamination or OSSD faults or both

- **Integrated EDM**

- **Restart interlock**

- **Field replaceable front window**

SafeZone™ Mini 270⁰ Single field set 2 meter safety field

SafeZone™ Singlezone 190⁰ Single field set, 4 meter safety field

SafeZone™ Multizone 190⁰ Four field sets, 5 meter safety field

Operating Range / Field Sets

GUARDMASTER® SAFETY RELAYS

LISTEN. THINK. SOLVE.®

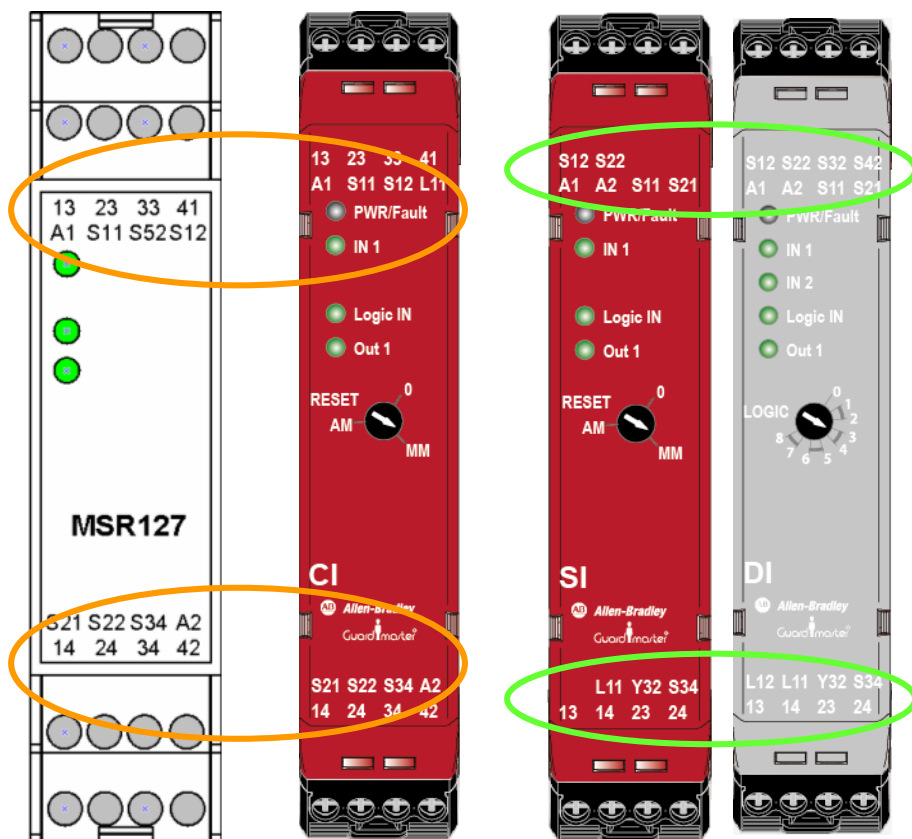Allen-Bradley • Rockwell Software

Rockwell Automation

SINGLE INPUT DUAL CHANNEL DEVICES

MSR127 **CI** **SI**

Single Input Dual Channel (SI)

Most basic unit of core family

- Same terminal layout as DI (but only has one set of safety inputs)
- One dual channel input
- Single Wire Safety Output
- Configurable for reset
- 24V DC supply voltage
- 2 N/O safety outputs and 1 PNP aux. Output

Compatible Input Dual Channel (CI)

- For MSR conversions when customer does not want to deal with moving terminals
- Layout does not align with rest of family consistent housings

- One dual channel input
- Configurable for Reset
- 24V DC supply voltage
- Single wire link output only
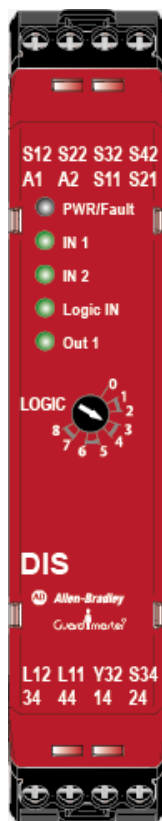 - configurable as aux. PNP output
- 3 N/O safety outputs, 1 N/C aux.

DUAL INPUT DUAL CHANNEL DEVICES
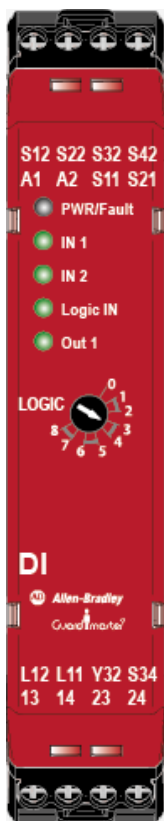
DI   **DIS**

DI

- 2 safety inputs
- Configurable for Reset and logic
- 24V DC supply voltage
- Full single wire cascading capability
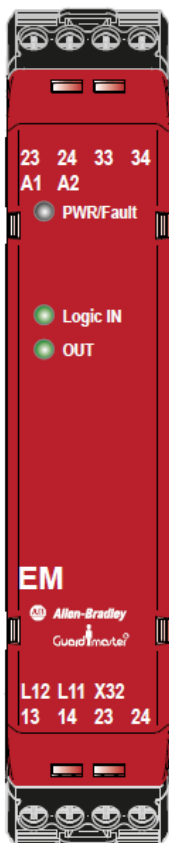- **2 N/O safety outputs**, 1 PNP aux.

DIS

- 2 safety inputs
- Configurable for Reset and logic
- 24V DC supply voltage
- Full single wire cascading capability
- **4 PNP safety outputs** (most applications use one pair or the other), 1 PNP aux.

  - 14, 24 up to 1.5A

  - 34, 44 up to 500mA - special filters on output to prevent false trips in applications with high capacitive loads (eg. Drives)
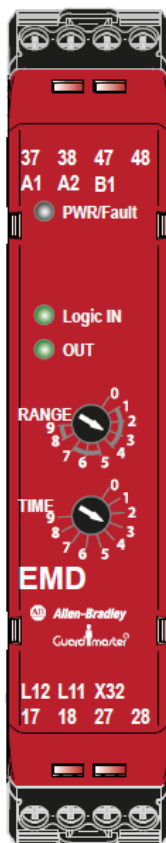
EXPANSION MODULES

EM   **EMD**

EM

- 24V DC supply voltage

- Full single wire cascading capability

- 4 N/O safety outputs, 1 PNP aux.

EMD

- 24V DC supply voltage

- Full single wire cascading capability

- Timer functions (TM, EMD):

  - delay-on energization,

  - delay-on de-energization,

  - jogging (single pulse for teach-in)

- Selectable time delays

  - Time x Factor = 0...300s

- 4 N/O delayed safety outputs, 1 PNP aux.
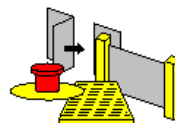
NEXT GENERATION SAFETY RELAYS
CONCEPT & INNOVATIONS

Universal Input – automatic input type detection

- A single catalog number to support all types of safety components
  - e-stops
  - switches
  - mats
  - light curtains
- 6 part numbers will cover a majority of safety applications with consistent wiring.

N/C type, 24VDC OSSD type

Dual Input = 2 safety inputs each two channels

Twice the functionality of a single input dual channel relay in a 22.5mm housing. Reduced wiring for commissioning and multiple inputs can have logic configured simply in a single relay.

Single-Wire Safety Connection – maintains PL e, SIL 3

- (Single Chanel Safety Input) TÜV approved concept of one-wire connection to expand and cascade safety functions to SIL3
  - Simplifies wiring
  - Increases number of I/O on terminal
 - Maintains PLe , SIL3 rating
  - Dynamic signal

SWS

Single Rotary Switch – setting of Logic Functions, Reset, Timing

- TÜV approved concept to eliminate double switches. Unique validation method.
  - Expedite configuration
  - Single device can address a broader range of reset modes, time delays, etc.

Scalable platform to address single- and multi-zone applications for a variety of standard and special functional requirements
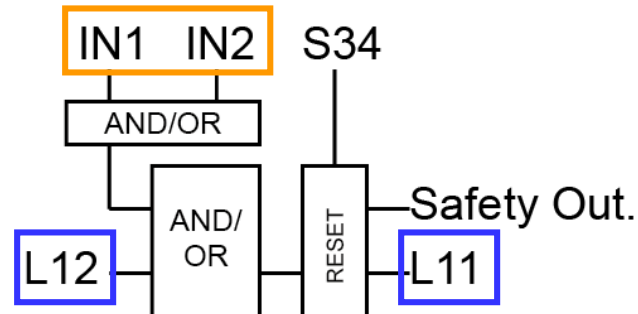
THE NEXT GENERATION

Two 2-Ch. Inputs

Logic

Rotary Switch Configuration

Logic and zoning
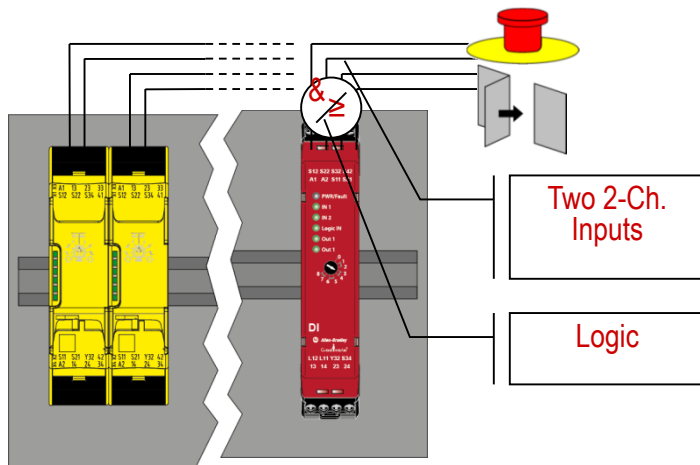
- ❑ Consolidates functionality
  - ❑ Supports broad range of safety sensor types
  - ❑ A single unit monitors two dual channel safety devices

- ❑ Flexibility of a software configurable safety relay
  - ❑ Single rotary switch for logic & reset configuration
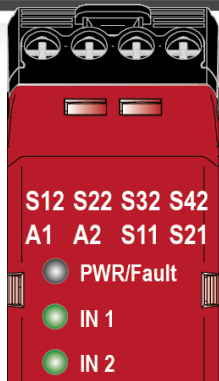 - ❑ &/OR logic can be used for zoning
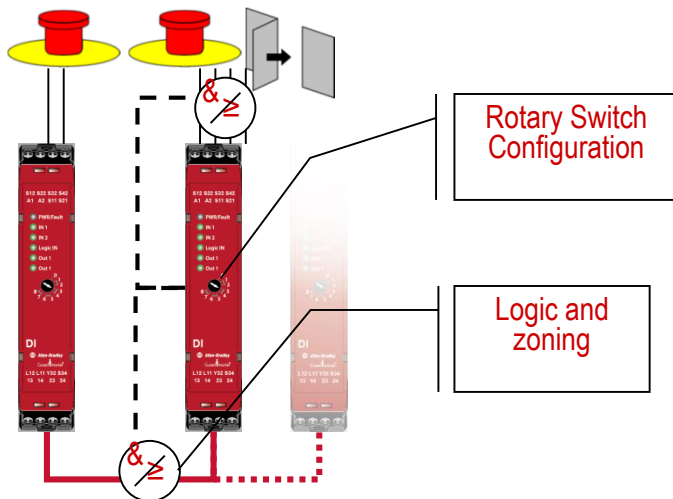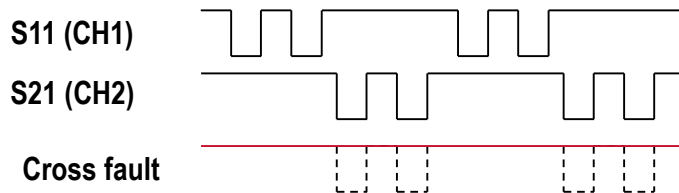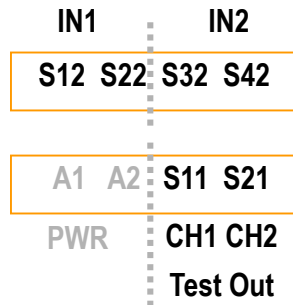
Logical Functional Block

Configurable devices = More applications with fewer part numbers

UNIVERSAL INPUTS

Safety Inputs

IN1		IN2	
S12	S22	S32	S42
A1	A2	S11	S21
PWR		CH1 CH2	
		Test Out	

Module terminals:
S12 S22 S32 S42
A1 A2 S11 S21
PWR/Fault
IN 1
IN 2

S11 (CH1)
S21 (CH2)
Cross fault

Universal Input

- All sensor types go to same terminals

- Automatic cross-loop monitoring – no configuration by switch setting or hardwired-jumper required

- Supports both single-channel and two dual-channel safety inputs

- Two dual-channel inputs on DI models configured by logic switch

- All Faults including Cross-Loop are detected by test outputs S11 and S21

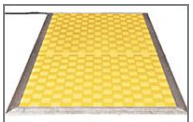**Cable Pull Switches**   **E-Stops**   **Light Curtains**   **Laser Scanners**   **Contact Interlocks**   **Hinge Switches**   **Non Contact Interlocks**   **Grip Switches**   **Safety Mats**
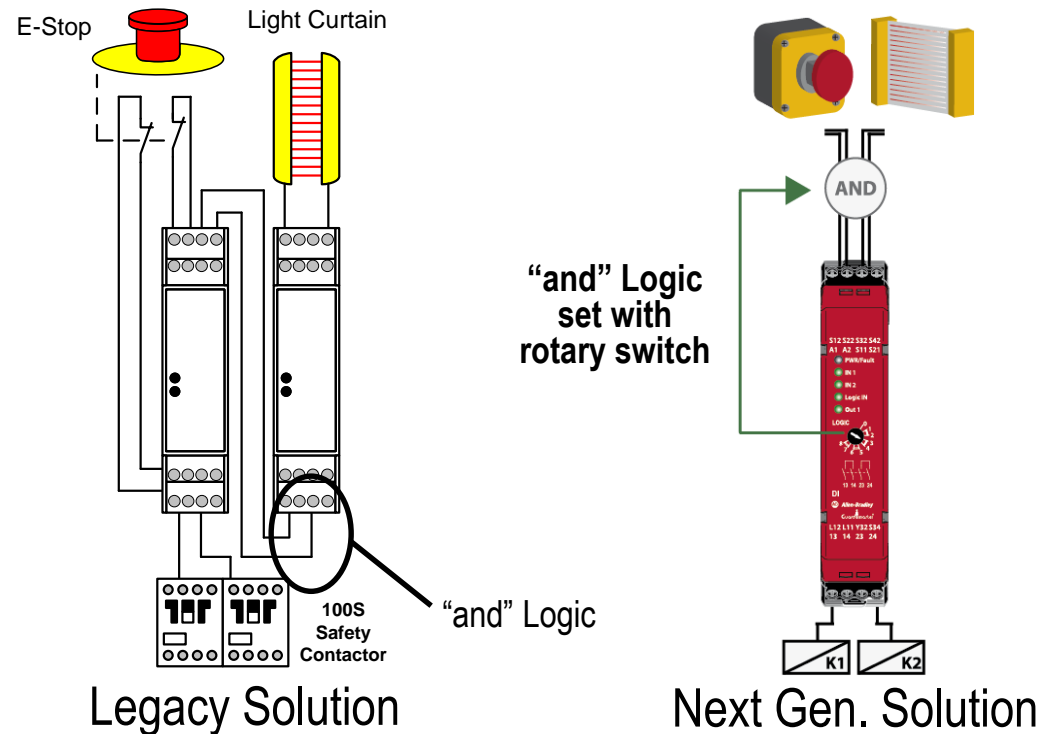
DIVERSE INPUTS

Application Example: Light Curtain & E-stop

- Simple system where breaking a light curtain beam or hitting an e-stop stops a machine

- Universal input allows various types of safety devices to be connected to the relay
- Dual input relay can handle 2 dual-channel devices, simplifying wiring and commissioning
- Rotary switch on front of device configures reset mode and logic between two devices ("AND" logic shown)

E-Stop   Light Curtain

"and" Logic set with rotary switch

100S Safety Contactor

"and" Logic

Legacy Solution   Next Gen. Solution

The new generation relay's ability to communicate with a broad range of safety devices reduces hardware and simplifies wiring needed to configure systems.
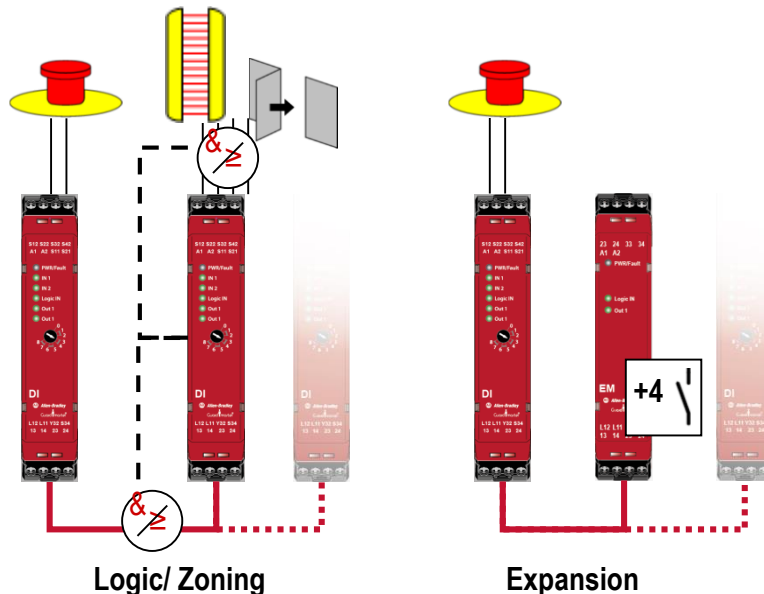
SINGLE WIRE SAFETY (SWS) CONNECTION

Logic		Feedback/ Reset
IN	OUT	
L12	**L11**	Y32 S34

L11 – dynamic test pattern

- A <u>single wire safety connection</u> is used to expand and cascade multiple relays while maintaining a PLe / SIL3 rating

- A dynamic signal with specific test patterns is transmitted through a single wire which is the only signal the input will recognize. (Any other signal will be a fault)
    - Terminal L11 – sends the Logic signal (output)
    - Terminal L12 – receives the Logic signal (input)

- Single Wire Safety input (L12) can be configured with safety inputs of device using AND/OR logic
    - Safety functions can be cascaded through multiple zones
    - Expansion modules are easily added to a base relay while leaving all safety outputs of base module available for use


Logic/ Zoning   **Expansion**

CONFIGURATION

Selectable functions

- 4 Logic conditions for safety inputs and the Single Wire Safety input (L12)

- Reset modes – automatic/manual and manual monitored reset

- Timing configuration (EMD) – Time needs to be configured before operation.

- Easy to configure:

  1. Set Device to "0"

  2. Power Up device. Relay is now in configuration mode

  3. Turn rotary switch to desired logic & reset value (see table). Power LED will glow green and Input 1 LED will provide feedback of position.

  4. Cycle power to lock in configuration.

  5. Relay maintains setting until configuration process is repeated.

SI/CI

RESET AM MM 0

MM: Manual monitored Reset
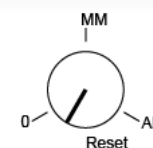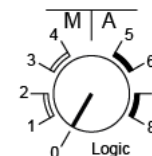
AM: Automatic/manual Reset

0: Configuration Mode

Single input devices only need reset mode configured

DI/DIS

LOGIC

M: Manual monitored Reset
1: L12 OR (IN1 OR IN2)
2: L12 OR (IN1 AND IN2)
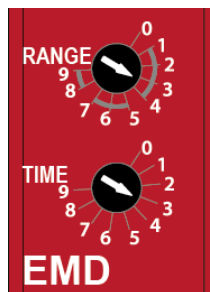3: L12 AND (IN1 OR IN2)
4: L12 AND (IN1 AND IN2)

A: Automatic/manual Reset
5: L12 OR (IN1 OR IN2)
6: L12 OR (IN1 AND IN2)
7: L12 AND (IN1 OR IN2)
8: L12 AND (IN1 AND IN2)

0: Configuration Mode

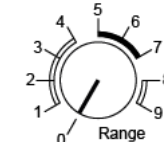Dual input devices configure logic between inputs and reset mode.

EMD

RANGE

TIME

Off-Delay
1: 0.1..1s
2: 0.3..3s
3: 3..30s
4: 30..300s

On-Delay
5: 0.3..3s
6: 3..30s
7: 30..300s

Jogging
5: 0.3..3s
6: 3..30s

0: Configuration Mode
x10 % of max.
1: 10%
2: 20%
3: 30%
4: 40%
5: 50%
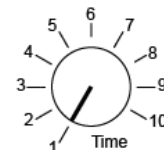
6: 60%
7: 70%
8: 80%
9: 90%
10: 100%

Time delay expansion modules configure output type and time delay.

GLOBAL E-STOP

Application Example: Printing Machine

- Global E-Stop through multiple zones
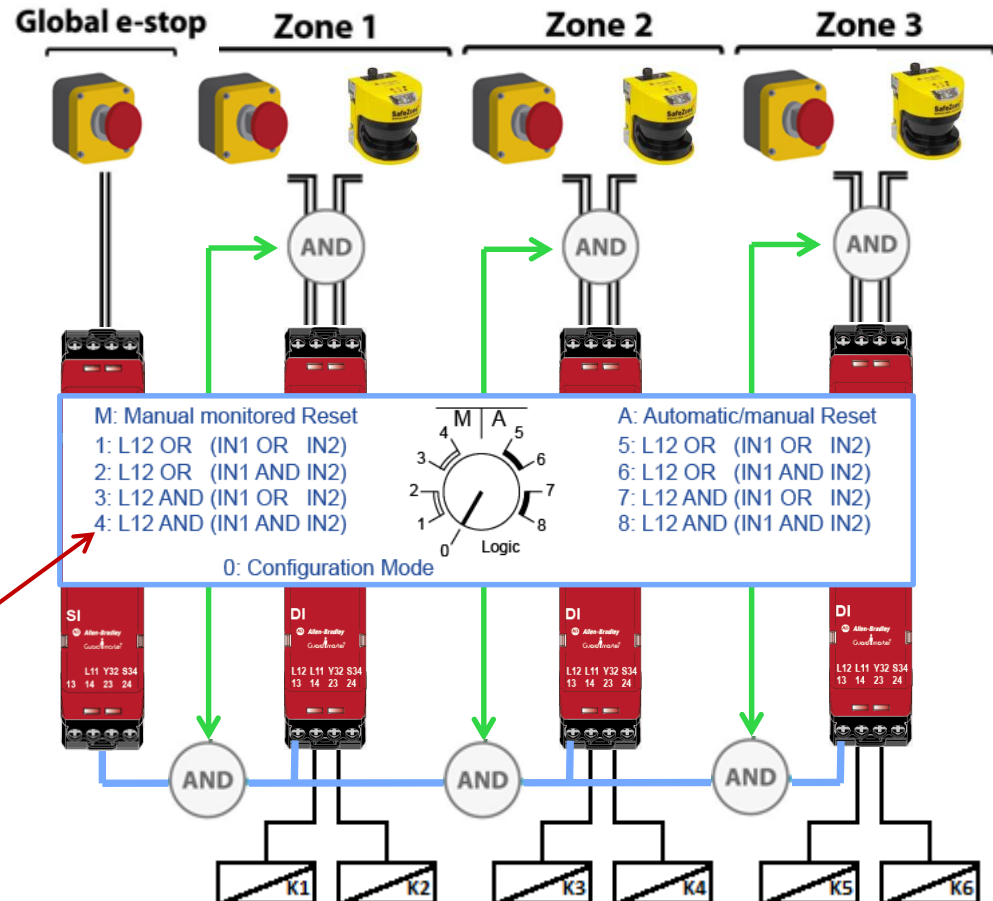

- The SI relay controls the global e-stop which distributes its signal over the single-wire safety output which is wired to all zones in parallel, maintaining PL e, SIL3
- Multiple devices dedicated to one zone through dual input relays.
- Each DI relay is dedicated to a zone which is supporting multiple devices through "AND/OR" configuration (here single wire input is "AND" with safety inputs which are also "AND")

Global e-stop | **Zone 1** | **Zone 2** | **Zone 3**

M: Manual monitored Reset
1: L12 OR (IN1 OR IN2)
2: L12 OR (IN1 AND IN2)
3: L12 AND (IN1 OR IN2)
4: L12 AND (IN1 AND IN2)

A: Automatic/manual Reset
5: L12 OR (IN1 OR IN2)
6: L12 OR (IN1 AND IN2)
7: L12 AND (IN1 OR IN2)
8: L12 AND (IN1 AND IN2)

0: Configuration Mode

Single wire safety connection wired in parallel provides fast integration of a global e-stop to multiple zones

Guardmaster Safety Relay GLP

September 2012

Allen-Bradley · Rockwell Software

Rockwell Automation

GUARD LOCKING WITH SPEED MONITORING

Line Extension to the new family of Guardmaster Safety Relays
GSR for application with guard locking functions

GLP – _G_uard _L_ocking with _P_rox. Input
440R-GL2S2P

Case 1: Unlock door as soon as motor has stopped
Machine must be stopped e.g. to change work pieces
or to adjust machine settings

Standstill

Case 2: Operate machine at safe speed
The machine must sometimes be operated for
irregular operations, such as maintenance.

Safe limited speed

Reduces down time by standstill monitoring
Operates machine at safe speed

CASE 1: UNLOCK AT STANDSTILL

PL d, Cat 3

Door and Lock Monitoring

Remove motor power

Rotation Monitoring

Unlock Req.

Stop

Unlock Door

Safe Off *at standstill*
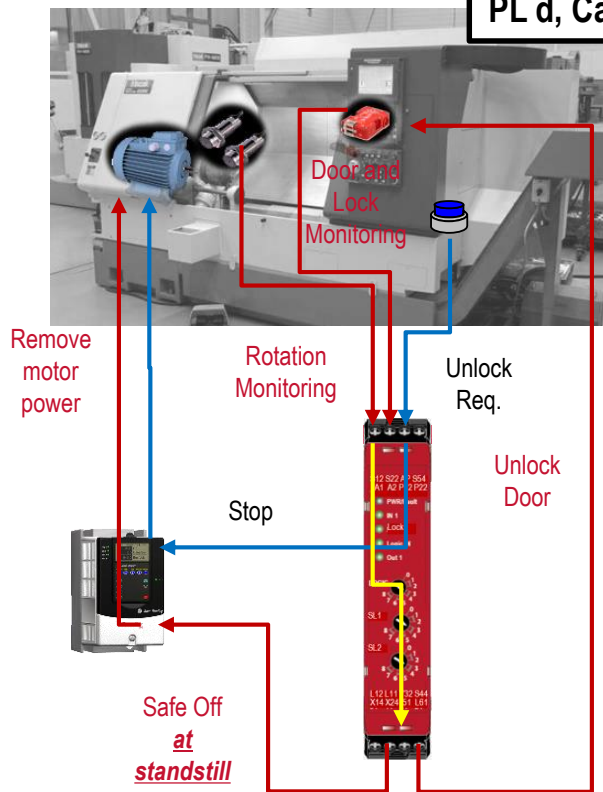
Operation mode: Stop Cat 1
Rotary switch logic: Position 1, 3

Case 1: Unlock door as soon as motor has stopped machine must be stopped e.g. to change work pieces or to adjust machine settings
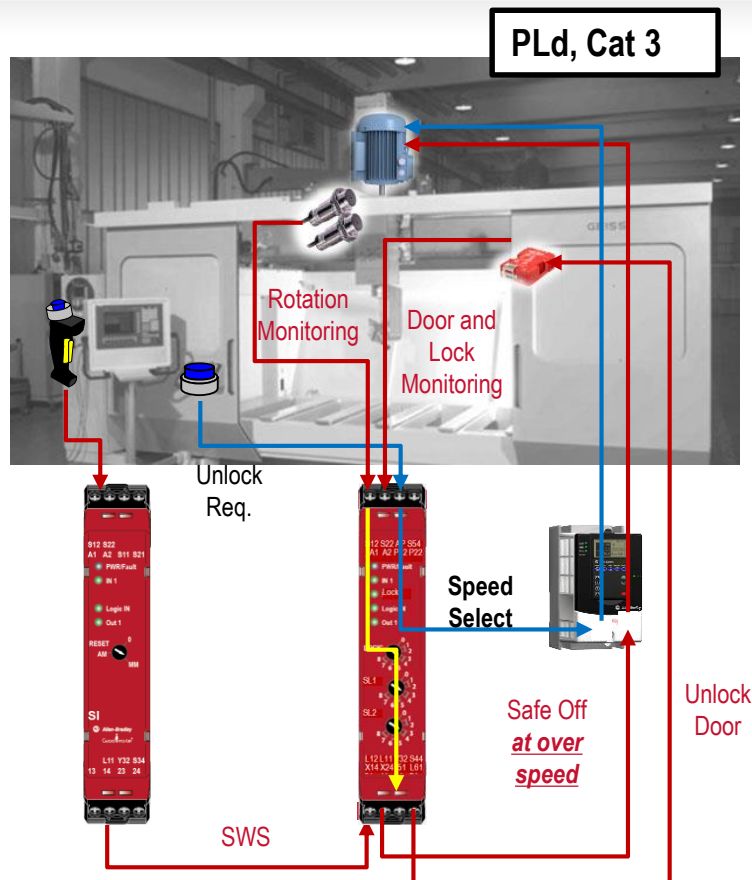
- **When a hazardous part has long inertia, door lock control using off-delay timer results in extra waiting**
- **time monitoring the motor's movement and unlock the door at standstill reduces extra waiting time**

speed

Unlock request

=0

Max Speed SL2

Standstill SL1

t
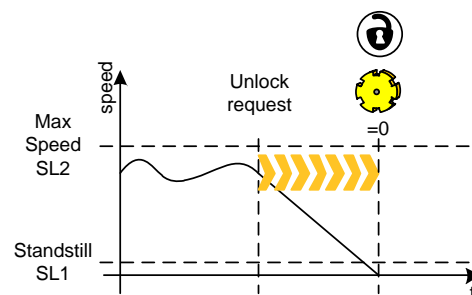
GLP – stand alone solution for Lock control and machine stop

CASE 2: OPERATE MACHINE AT SAFE SPEED

PLd, Cat 3

Rotation Monitoring

Door and Lock Monitoring

Unlock Req.

Speed Select

Safe Off *at over speed*

Unlock Door

SWS

Operation mode: Safe limited speed
Rotary Switch Logic: Position 2, 4

Case 2: Operate machine at safe speed
The machine must sometimes be operated for irregular operations, such as maintenance.

- **Achieving Safety during maintenance work**
- **Operate machine with enabling switch**
- **Monitor that the machine is operating below the preset speed**
- **If speed exceeds speed limit, machine is stopped immediately – safe off**
- **GLP will unlock door when speed is below speed limit**

speed

Unlock request

<SL1

Max Speed SL2

SLS SL1

t
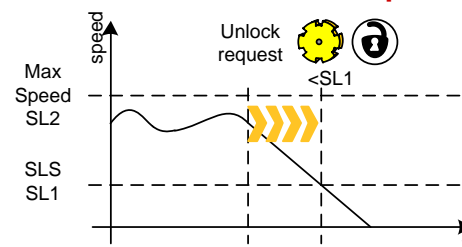
Easy extension of safety functions via Single Wire Safety

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Safety Inputs for Door Monitoring/ Lock Monitoring

TLS PL e
TLSZR
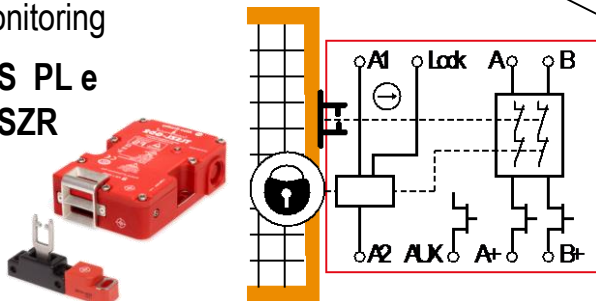
2 Single Wire Safety Outputs - Lock command and Safe Off

2 Multifunction Safety Outputs
- Configurable for test outputs and safety outputs

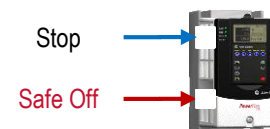Lock control – Various Lock types supported
- Solenoid controlled Lock
- TLS PL e – Safety Input for Lock
- Dual channel cascading of Lock command
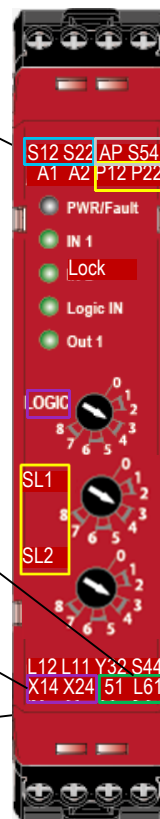
Speed Monitoring w/ 2 Proximity Switches (PNP)

Machine Stop and Safe Stop

Stop

Safe Off

Two operation modes:
- Stop Cat 1
- Stop Cat 2 resp. Safe Limited Speed

Adjustable speed limits
- Two speed limits (SL1 and SL2)
- Operator safety: safe speed limit/standstill speed : 0.5 and 10 Hz
- Machine Safety: Max Speed from 10Hz to 3k Hz

Supports latest Lock release TLS PL e
Leverages GSR technologies – Single wire safety

GUARDMASTER®
ETHERNET/IP™ NETWORK
INTERFACE

Allen-Bradley · Rockwell Software

Rockwell Automation
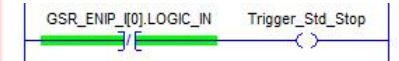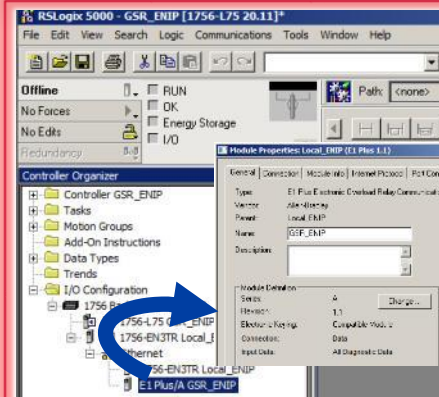
Guard Door 3 Open

- 2-port embedded switch supports linear, star, and ring EtherNet/IP network topology:

  - Linear topologies save on the costs of cabling and a centralized switch

  - Ring topologies offer these benefits and high availability

EASE OF USE
PREMIER LOGIX INTEGRATION

1.

Set Private IP address with rotary switches (192.168.1.xxx)

2.

Plug-in to EtherNet/IP Network

3.

Add Module Profile in Studio 5000 Logix Designer software

4.

Monitor with logically named tags and structures!
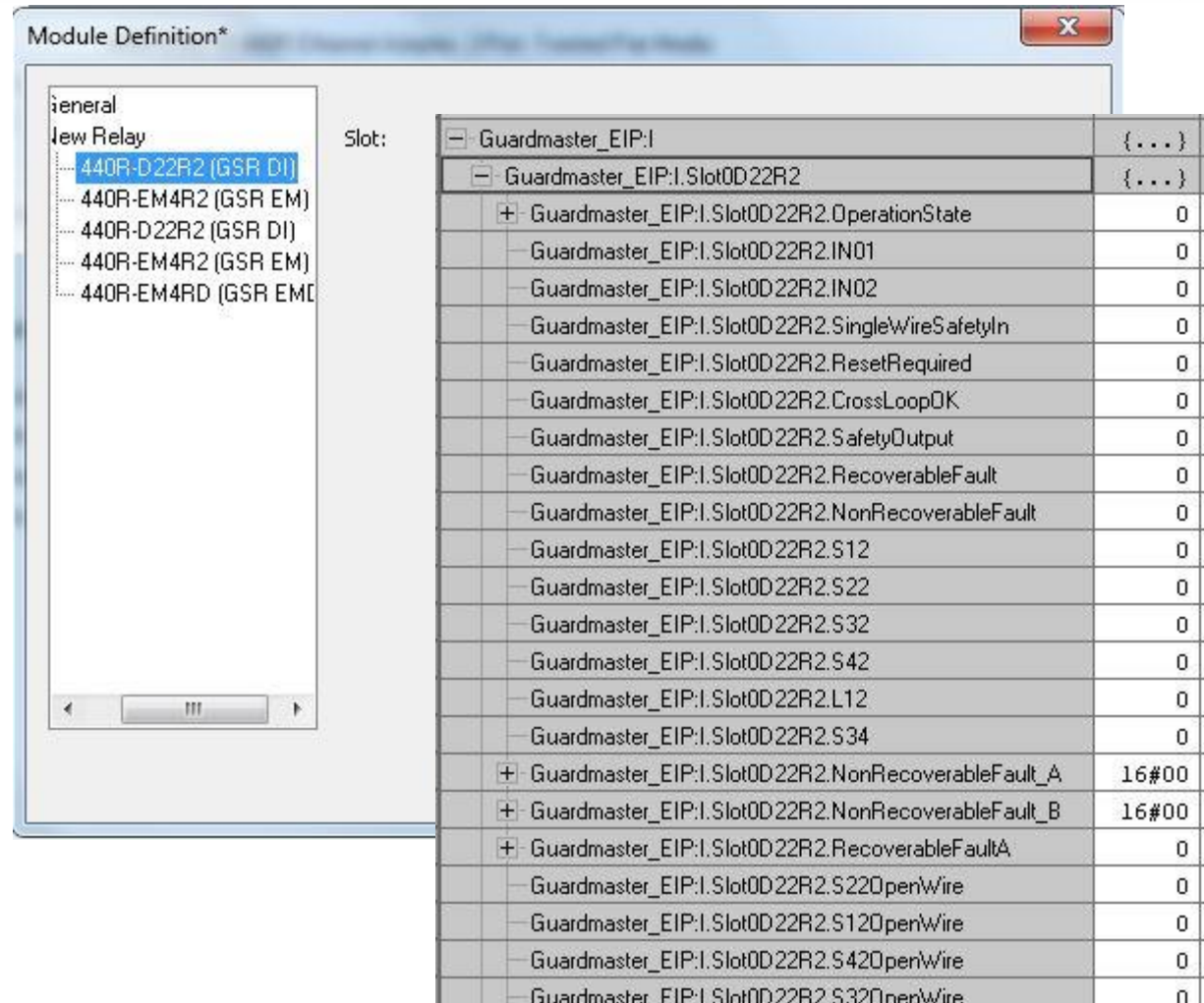
Configuration in one software package, Logix Designer!

EASE OF USE
DETAILED TAG NAMES FROM LOGIX DESIGNER ADD-ON PROFILE

Rockwell Automation

- Add-on profile offers meaningfully named tags for all GSR safety relays in the system:

  - Terminal Level Status

  - Operation States

  - Fault codes for major/minor faults
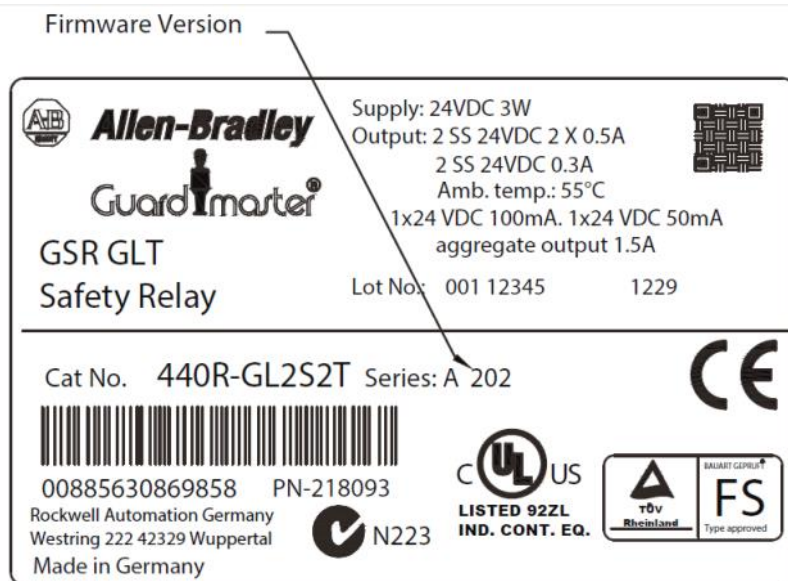
Rockwell Automation

- 5 models of Guardmaster Safety Relays supported at launch:

    - **Must be Firmware Rev 2 which supports the enhanced optical bus**

    - **Coordinated Launch, FW 2 available with GSR EIP**

440R-D22R2	GSR DI	FW 2 or later
440R-D22S2	GSR DIS	FW 2 or later
440R-EM4R2	GSR EM	FW 2 or later
440R-EM4R2D	GSR EMD	FW 2 or later
440R-GL2S2P	GSR GLP	FW 2 or later
440R-GL2S2T	GSR GLT	FW 2 or later

Coming Soon!

Firmware Version

Allen-Bradley
Guardmaster®
GSR GLT
Safety Relay

Supply: 24VDC 3W
Output: 2 SS 24VDC 2 X 0.5A
2 SS 24VDC 0.3A
Amb. temp.: 55°C
1x24 VDC 100mA. 1x24 VDC 50mA
aggregate output 1.5A

Lot No: 001 12345   1229

Cat No. 440R-GL2S2T Series: A 202   CE

00885630869858   PN-218093
Rockwell Automation Germany
Westring 222 42329 Wuppertal   N223
Made in Germany

c UL us LISTED 92ZL IND. CONT. EQ.   TÜV Rheinland   FS Type approved

- Firmware version 2 indicated on Product Label

GUARDMASTER® 440C-CR30

Software Configurable Safety Relay

LISTEN.
THINK.
SOLVE.®

Allen-Bradley • Rockwell Software

Rockwell Automation

WHY CHOOSE GUARDMASTER 440C-CR30
SOFTWARE CONFIGURABLE SAFETY RELAY

Safety made Simple & Flexible

- Supports f**our to ten safety input circuits** and up to **five safety output zones**

- Flexible configuration allows you to re-engineer and rapidly integrate application without having to incur high costs of rewiring

- Innovative safety logic editor reduces the friction involved in setting up a safety configuration and reduces manual input, making for a "best-in-class" configuration experience

Safety & Productivity

- Embedded serial port for direct diagnostic communications to PanelView Component terminals or Micro800 controllers

- 16 user configured status LEDs allow you to tailor indication to your application
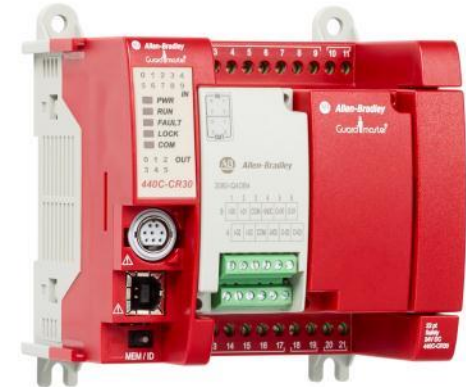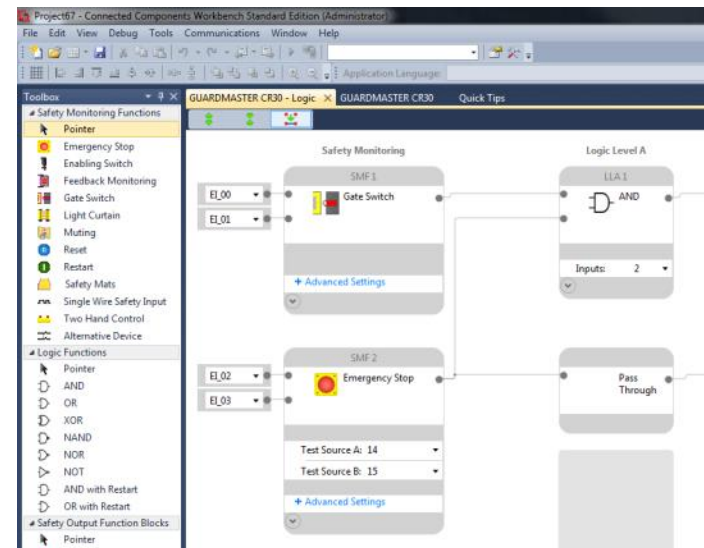
Optimize Panel Space

- 22 Safety I/O in a compact 110mm wide housing

- Expand by up to 16 standard I/O using front mounted plug-in slots that allow you to maintain the 110mm horizontal footprint

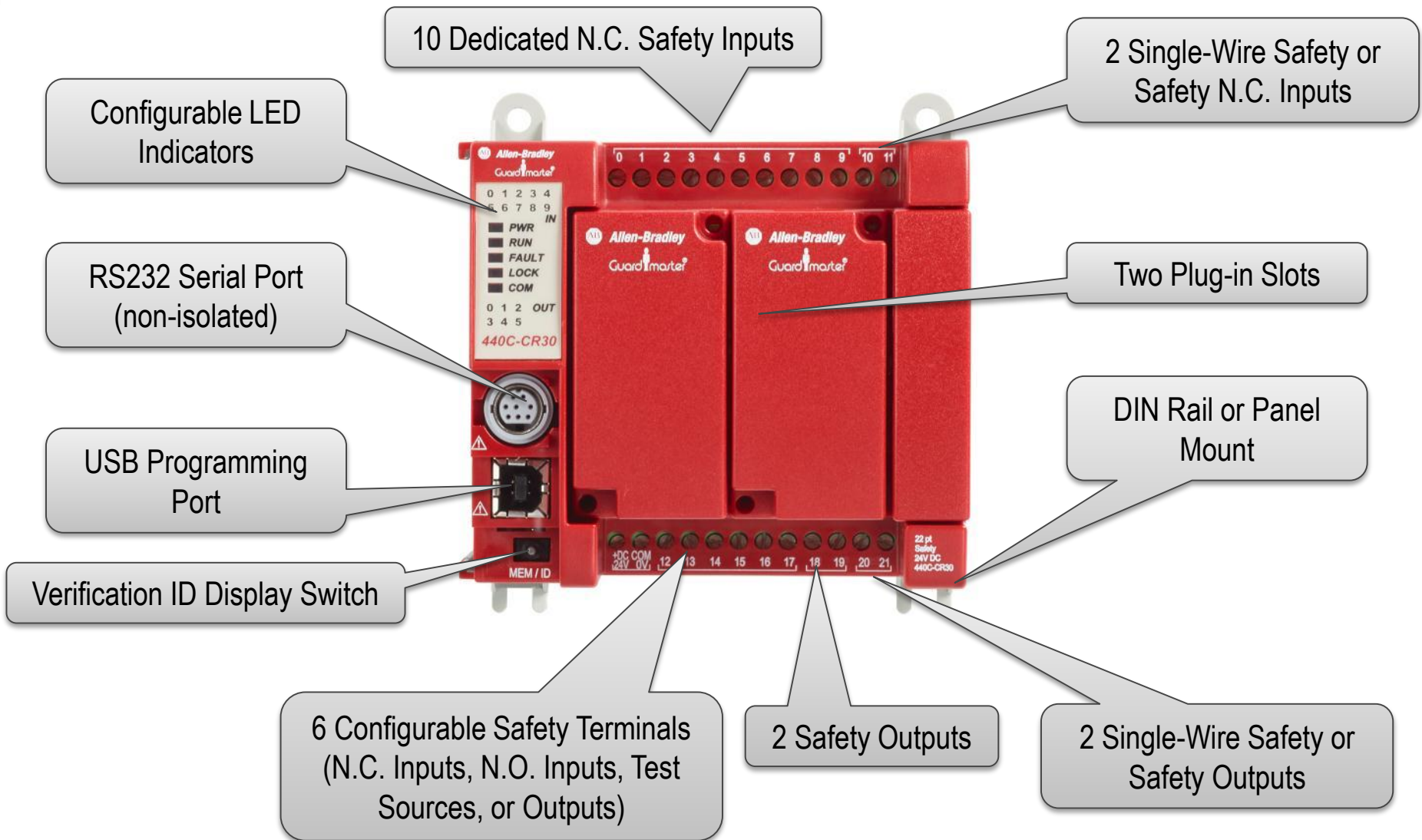## Part of the Connected Components Bundle

- Preferred compatibility within the bundle

- Reduced supply chain costs

- One software supports Guardmaster 440C-CR30, Micro800, PowerFlex, and PanelView Component

GUARDMASTER 440C-CR30 ANATOMY
BLOCK-STYLE SAFETY RELAY – 22 PTS
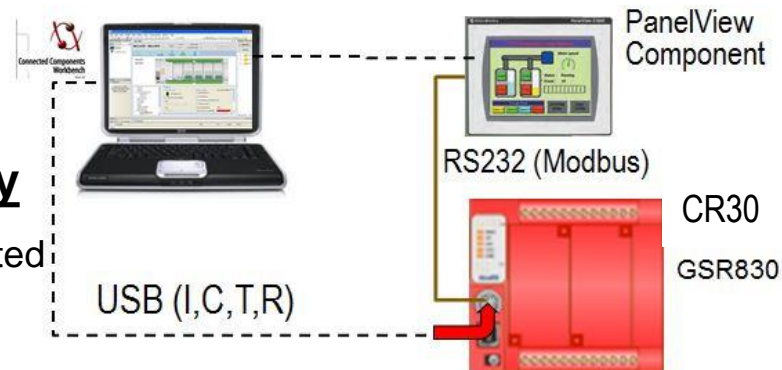
Rockwell Automation

10 Dedicated N.C. Safety Inputs

2 Single-Wire Safety or Safety N.C. Inputs

Configurable LED Indicators

RS232 Serial Port (non-isolated)

USB Programming Port

Verification ID Display Switch

Two Plug-in Slots

DIN Rail or Panel Mount

6 Configurable Safety Terminals (N.C. Inputs, N.O. Inputs, Test Sources, or Outputs)

2 Safety Outputs

2 Single-Wire Safety or Safety Outputs

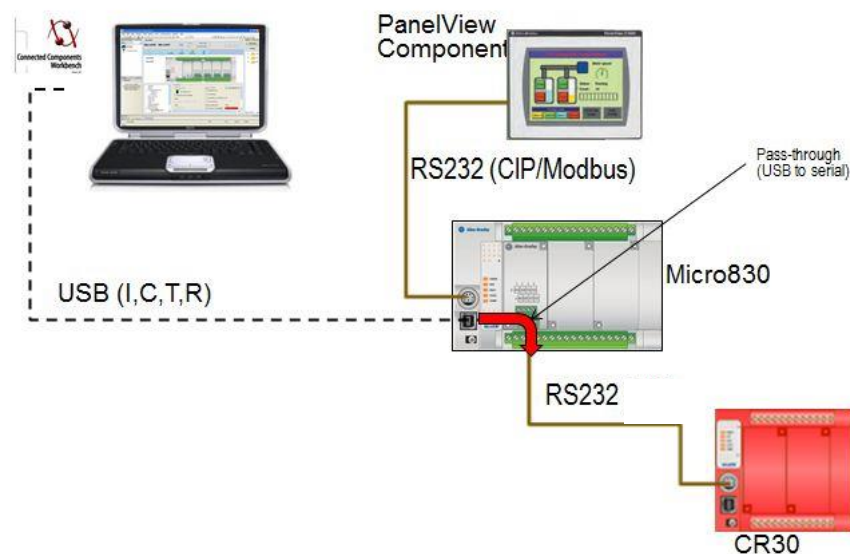- **Share diagnostics with HMI or controller:**

Direct PanelView Component Connectivity

- Embedded Serial Port on CR30 can be directly connected to a PanelView Component terminal
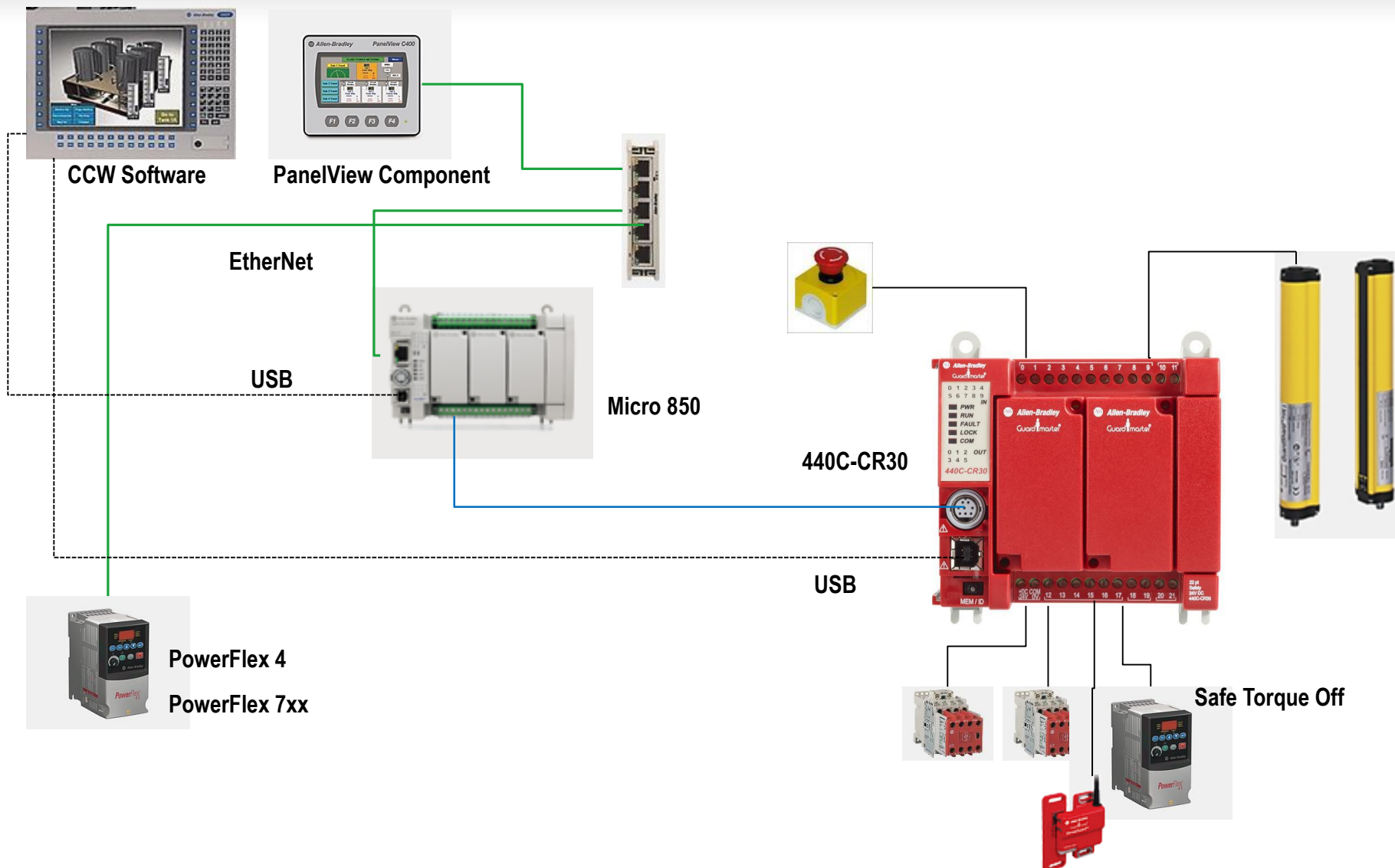

Direct Micro800 Controller Connectivity

- Embedded Serial Port on CR30 can be directly connected to a Micro800 controller

Rockwell Automation

CCW Software

PanelView Component

EtherNet

USB

Micro 850

440C-CR30

USB

PowerFlex 4

PowerFlex 7xx

Safe Torque Off

Rockwell Automation

SOLENOID INTERLOCK SWITCHES

CABLE PULL SWITCHES

SAFETY SENSORS

SAFETY MATS

RFID INTERLOCKS

LASER SCANNERS

CONTACTORS

VFD'S W/SAFE OFF

LIGHT CURTAINS

GUARDMASTER 440C-CR30 SAFETY RELAY
EASY TO USE

Configure Device

- *Same Mimic as for Micro 800 device configuration*

Configure Safety Function

- *Simply select Safety component*
- *Assign safety Function via Drag and Drop*
- *No programming language required*

Validate and Verify

- *Checklist to walk through validation and verification process*

Select Safety Component

Safety Function Automatic via Drag'n'Drop

Logic on 2 Levels

Assign Output

DONE!
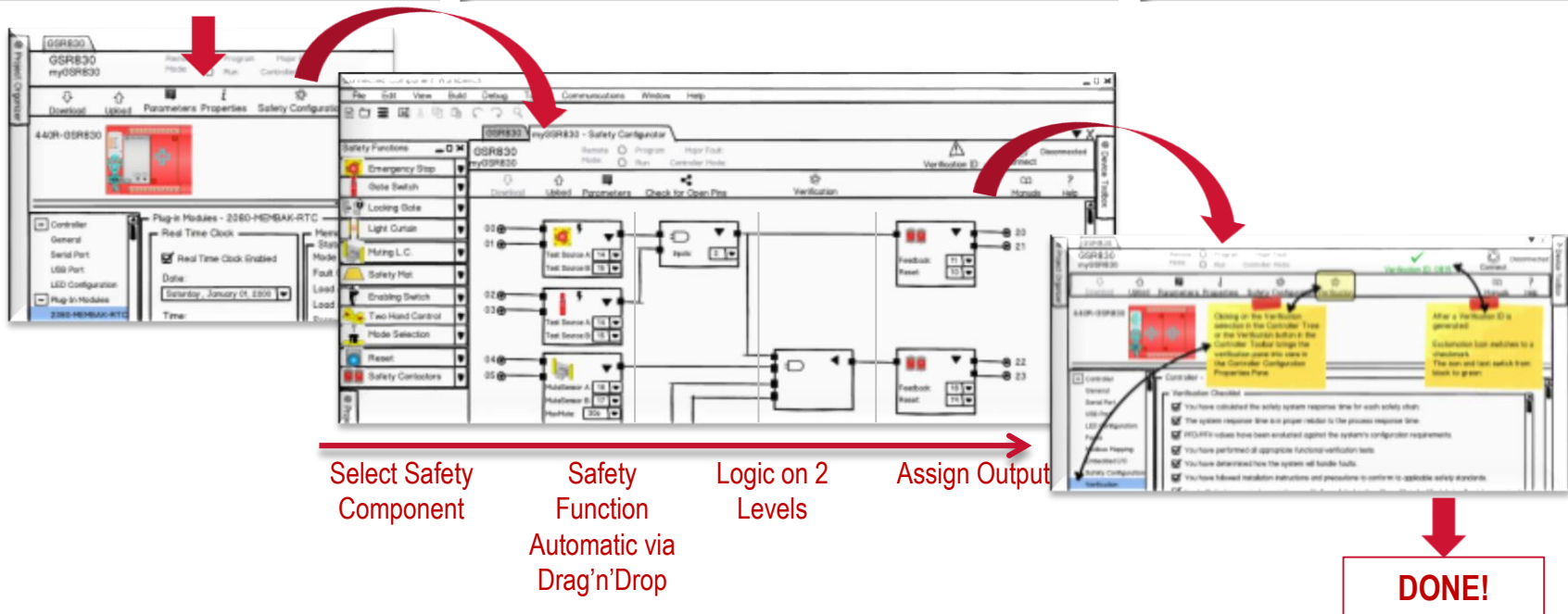
Assigned safety function via Drag 'n' Drop

Ease of configuration – No previous programming skills required
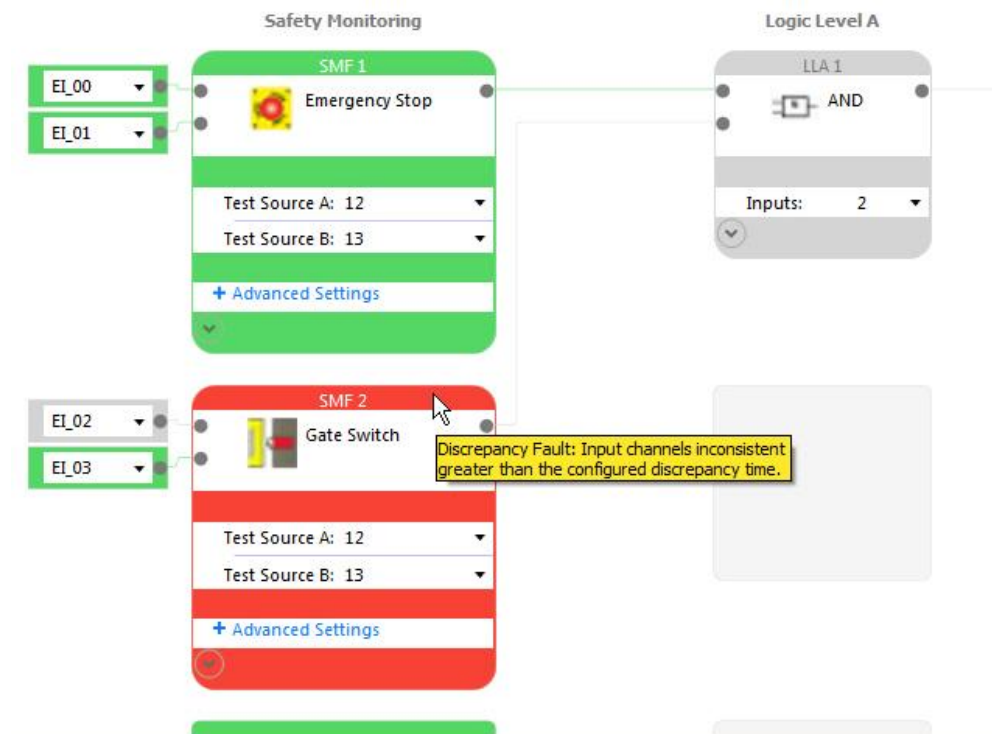
Easy to Use:

Online Monitoring

- Color-coded online monitoring helps troubleshoot code

- Diagnostic tooltips provide natural language fault descriptions

Diagnostic tooltips for application troubleshooting
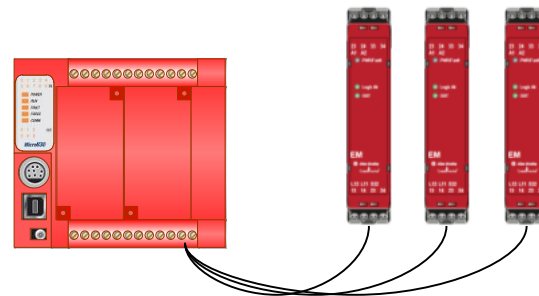
- **Supports Single Wire Safety for easy integration of GSR relays**:
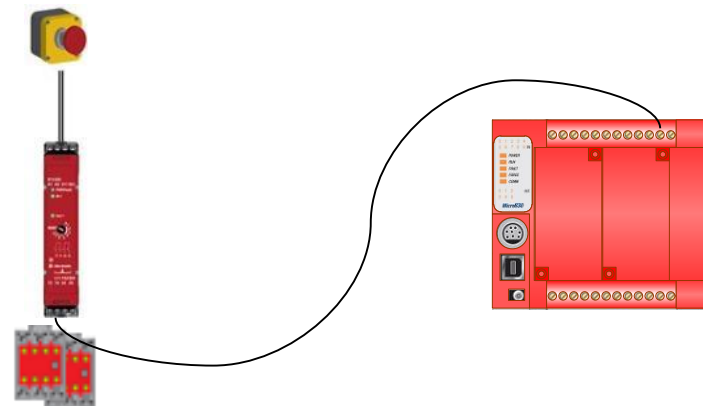
Add Safety Relay Outputs

- Add multiple dry contact outputs by utilizing GSR EM (Expansion module) while only consuming a single safety output configured for Single-Wire Safety

Connect Upstream GSR Relays

- Expand inputs and functionality using GSR relays by connection through Single-Wire Safety

2080-IQ4OB4 plug-in for expansion I/O:

Standard Input Expansion

- Use standard inputs for standard signals such as circuit resets, feedback monitoring or mute sensors
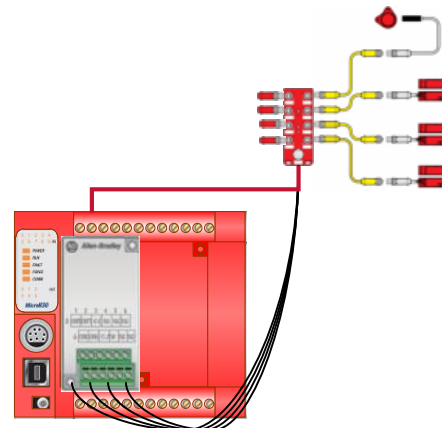
Reset

Feedback Monitoring

Mute Sensors

Standard Diagnostics

- Land auxiliary contacts of series wired safety devices and share with PanelView Component

- Use standard outputs to drive indicator LEDs or send gate unlock commands

Expansion I/O with no impact to panel footprint

The End.

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Please complete your survey!

Schaedler Yesco Expo 2014

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A Two-day, Jam-Packed Schedule!

Over 100 Booths from **Leading Manufacturers**!