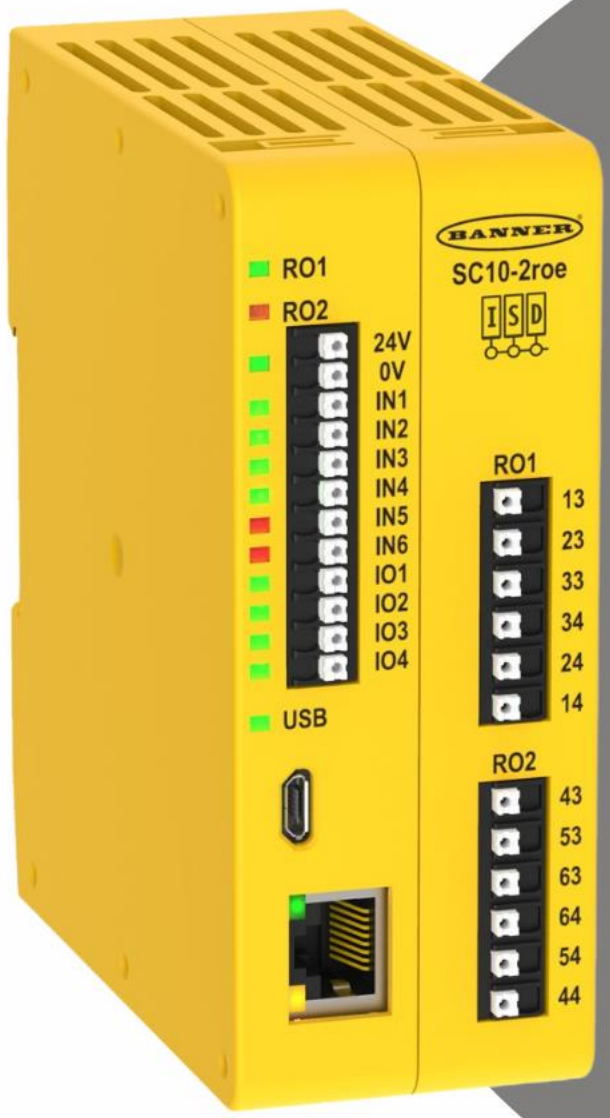
Code </> Compile
presents

Safety controller SC10-2roe



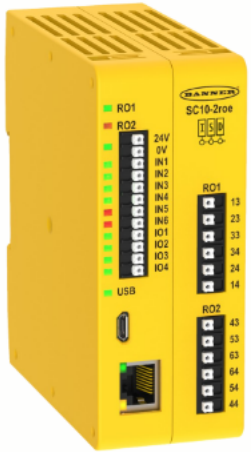
Sponsored by:

BANNER

Code </> Compile
learning made easy

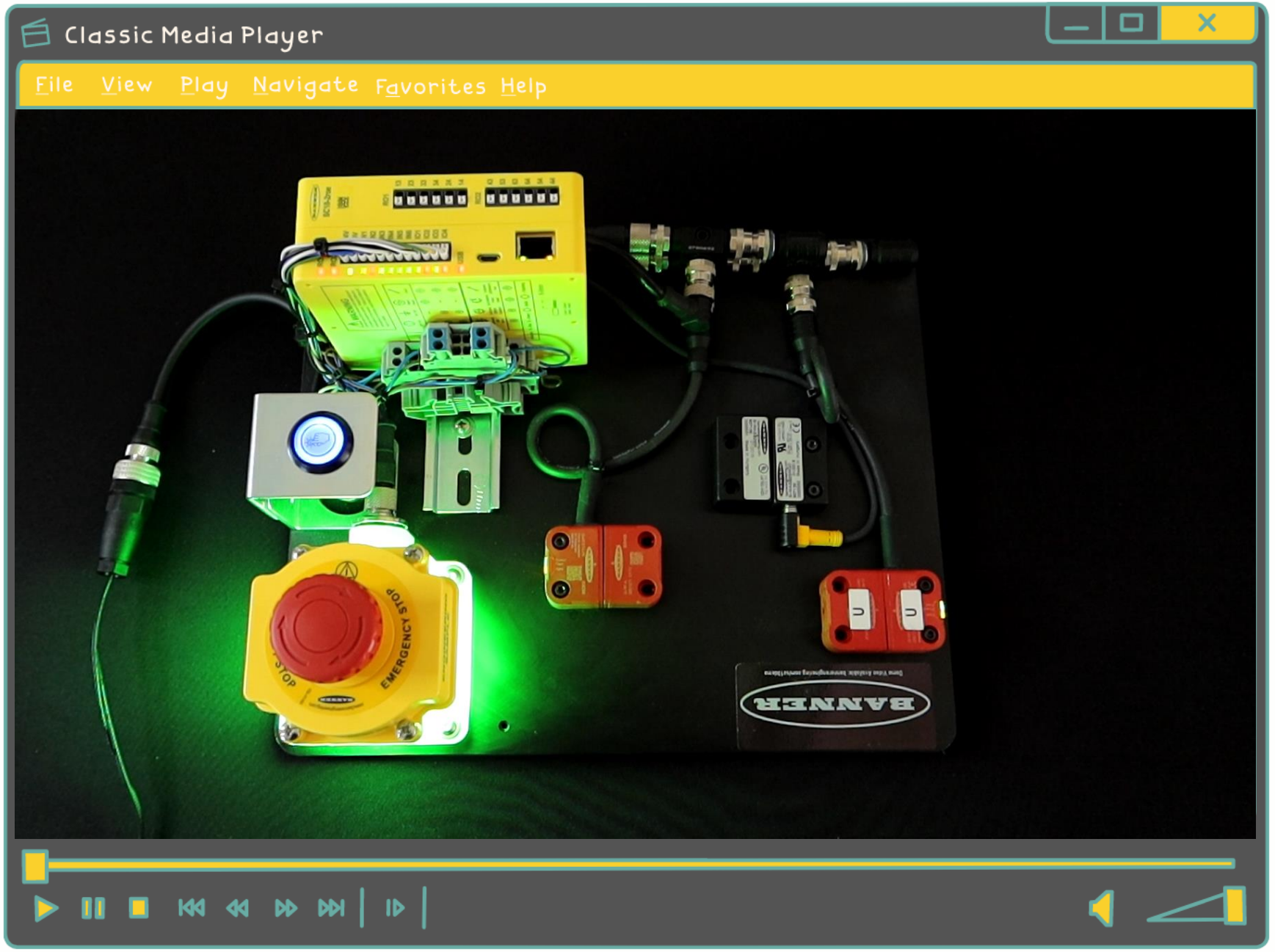
Unboxing

Safety controller SC10-2roe



Sponsored by:

BANNER



Code </> Compile
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BANNER

Terminals:

Power LED

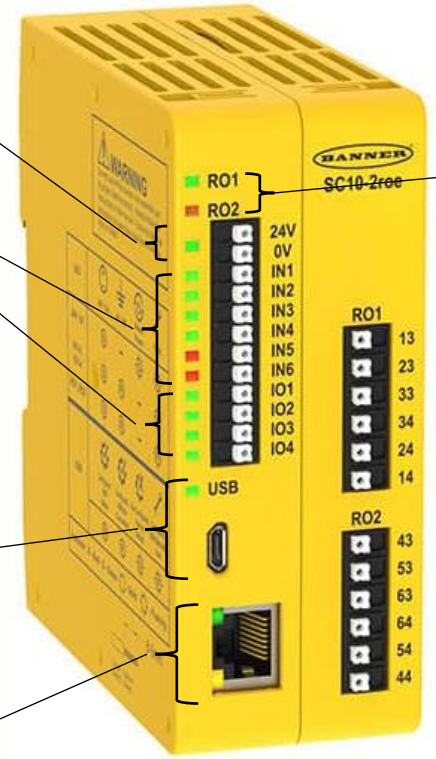
6 Safe Inputs and LEDs

4 Safe Inputs or

4 Non-Safe Outputs & LEDs

Micro USB and LED

Ethernet Port



RO1 and RO2 LEDs

Relay Output 1 (RO1)

3 NO sets of Contacts

Relay Output 2 (RO2)

3 NO sets of Contacts

Safety outputs with on/off delay

Functional Stops

Category 0:
an uncontrolled stop with immediate removal of power

Category 1:
a controlled stop with a delay before power is removed

Code </> Compile
learning made easy

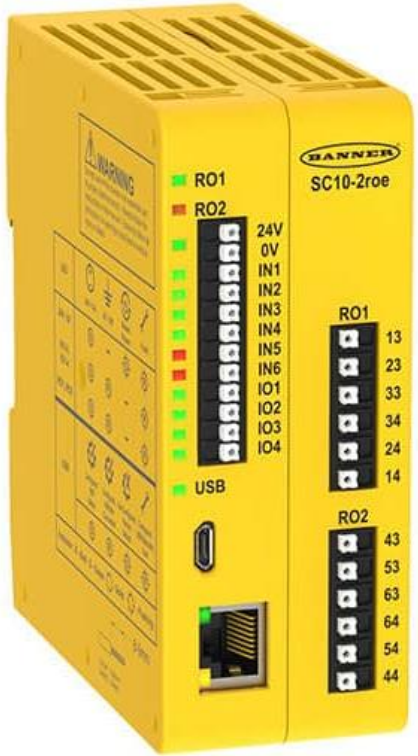
BANNER

Key features:

In series diagnostic

Cat 4 safety ratings

Icon based easy Programming



256 virtual non-safe status output

80 virtual non-safe inputs

Supports

EtherNet/IP

Modbus TCP/IP

PROFINET

Status Outputs and Virtual Status Outputs are not safety outputs and can fail in either the On or the Off state.

www.codeandcompile.com

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BANNER

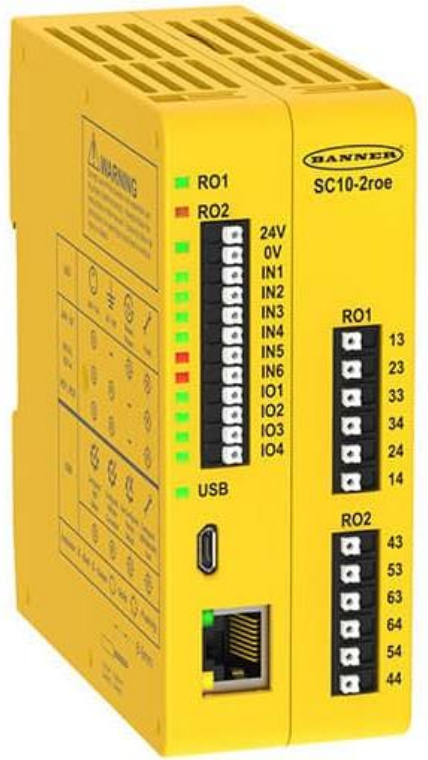
Safety Inputs

SSA-EB1PLx-0Dx Series
Emergency Stop Button with ISD

Reed contact technology
SI-Mag Non-contact Magnetic safety Interlock switch

With Unique coding
SI-RF Non-contact RF Safety switch

Programmable multicolor
S22 Pro Touch button



Code </> Compile
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BANNER

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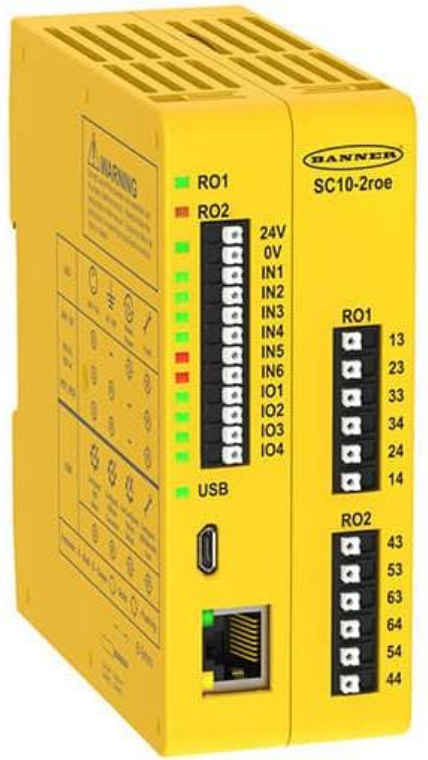

Code </> Compile
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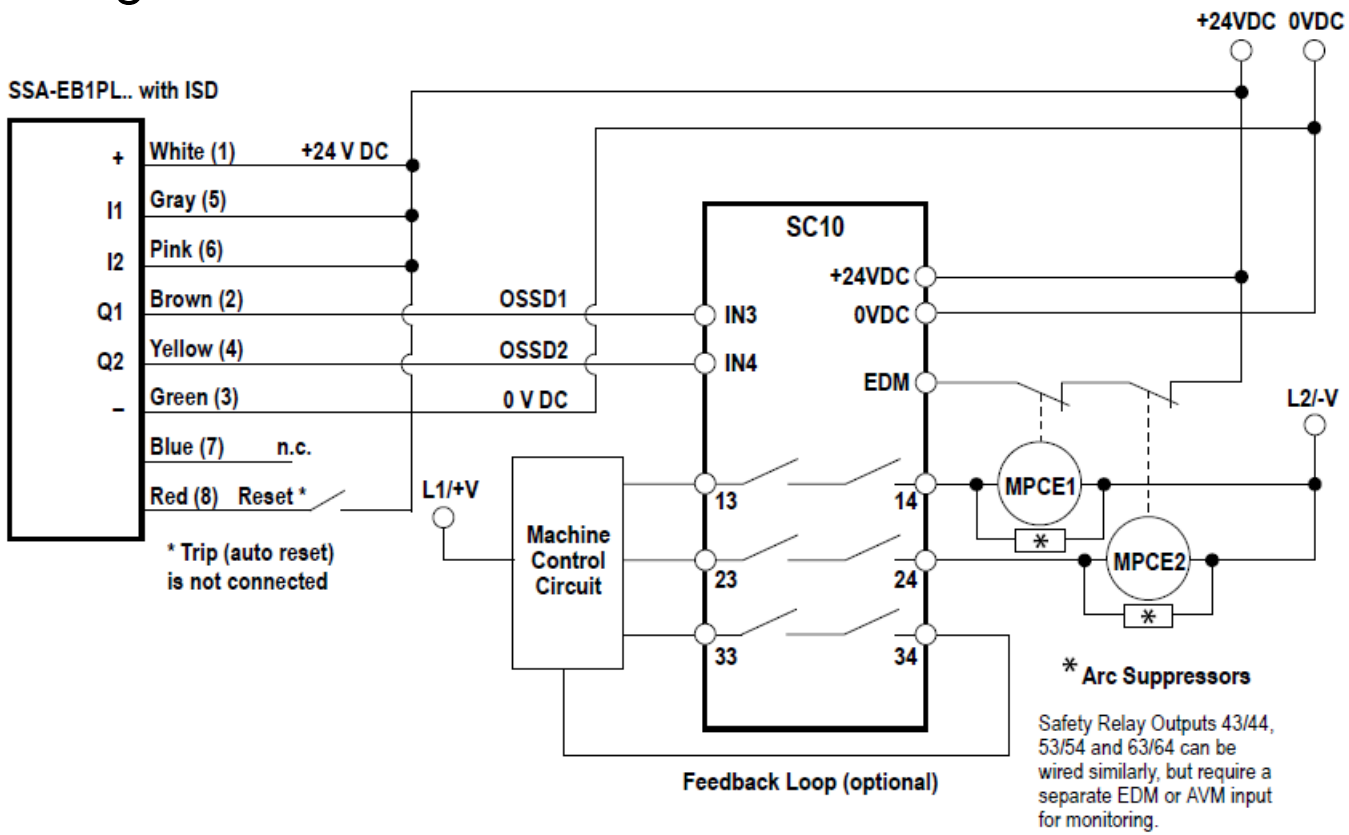
BANNER

SSA-EB1PLx-0Dx Series

Emergency Stop Button

Wiring with SC10 controller



Code </> Compile
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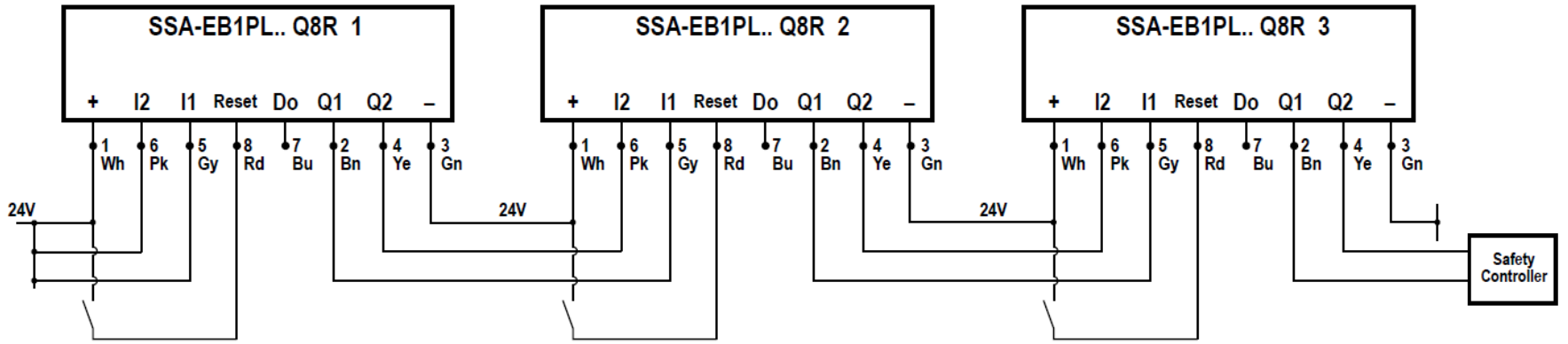
BANNER

SSA-EB1PLx-0Dx Series

Emergency Stop Button

Series connection without ISD



Code </> Compile
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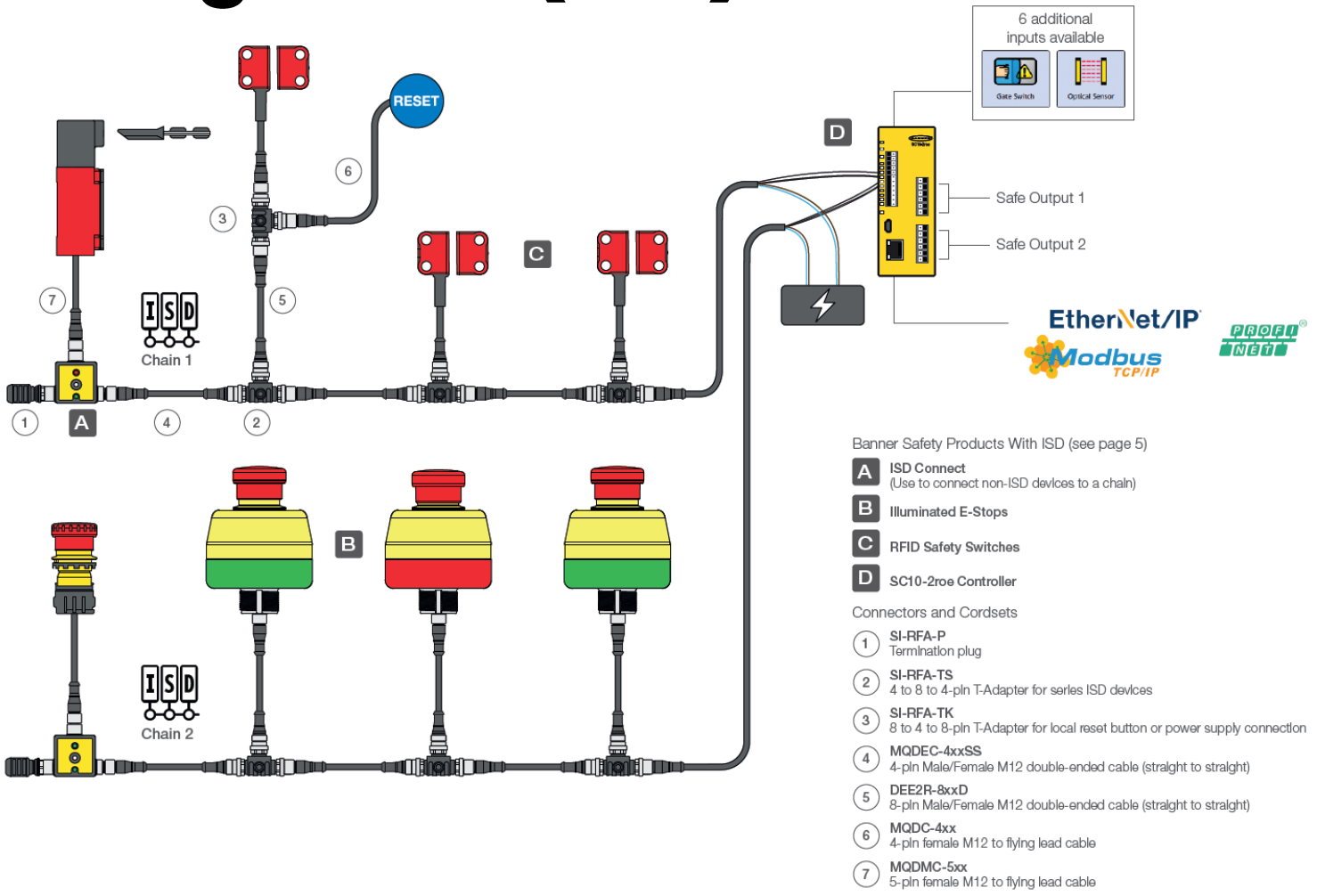
BANNER

In Series Diagnostic (ISD)

Reduce and simplify wiring

Diagnostic information:

- Wrong order of devices in the chain
- Under voltage in the series connection



Intuitive setup and PLC integration

Code Compile
learning made easy

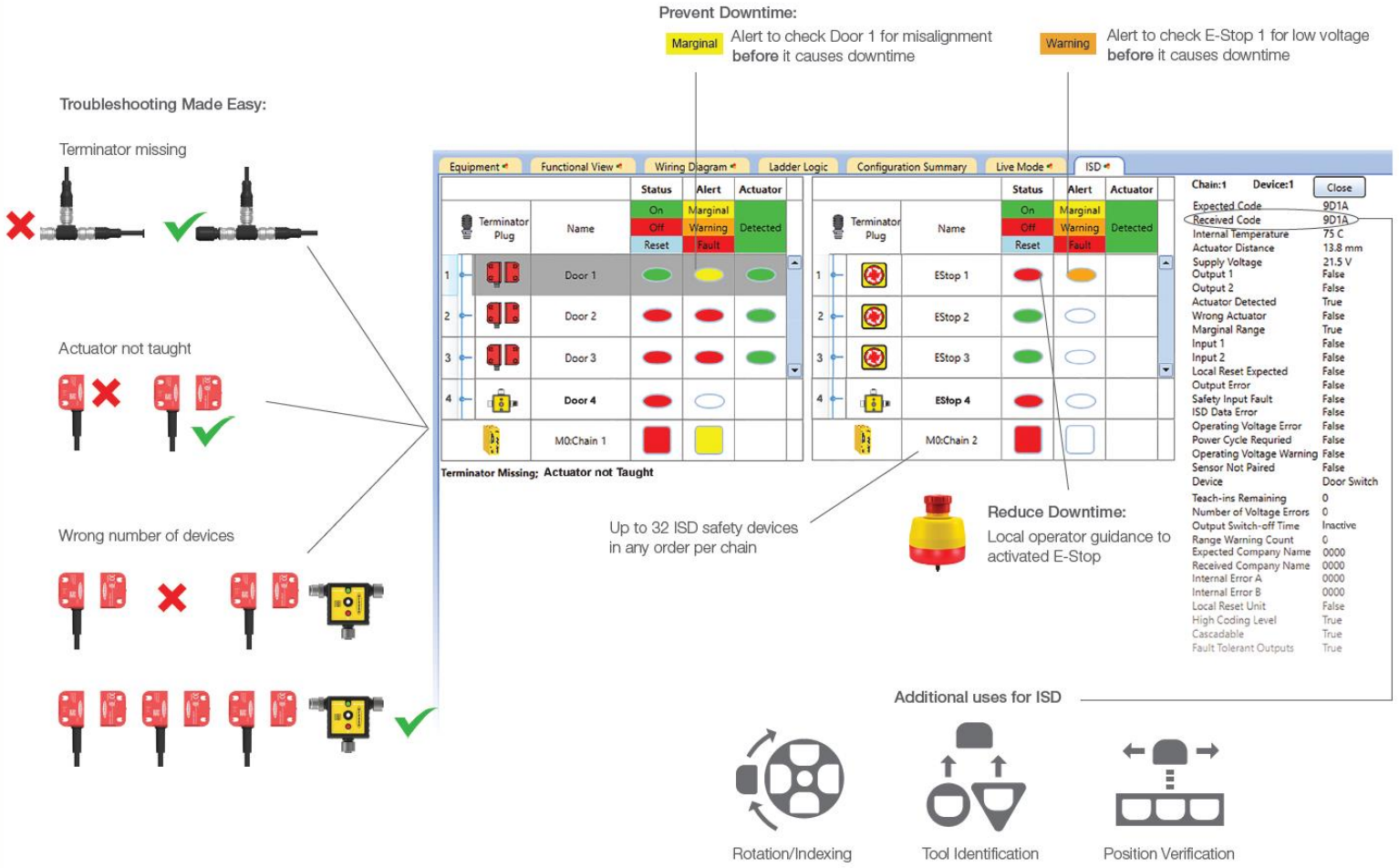
BANNER

In Series Diagnostic (ISD)

Prevent or reduce downtime

Diagnostic information:

- Button status (Armed, off, faulted)
- Attempt to remove device from the chain



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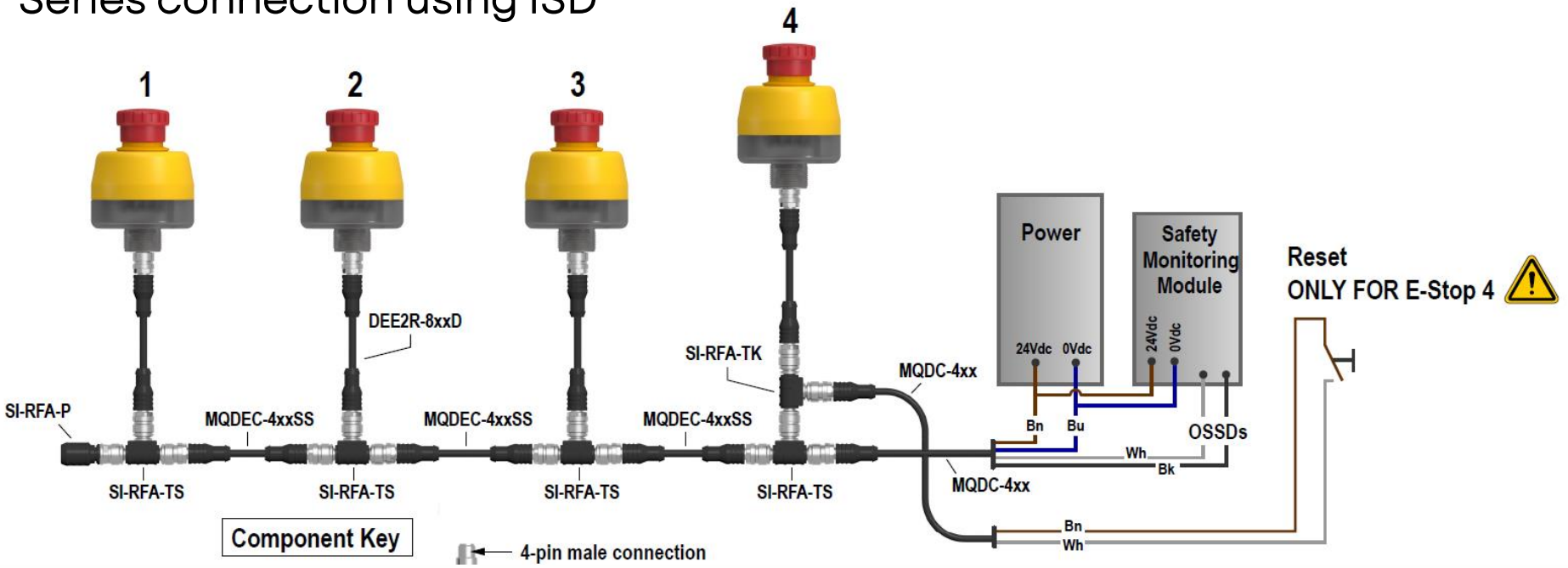
BANNER

SSA-EB1PLx-0Dx Series

Emergency Stop Button

Series connection using ISD



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BANNER

Safety Inputs

SSA-EB1PLx-0Dx Series

Emergency Stop Button with ISD

Reed contact technology

SI-Mag Non-contact Magnetic safety Interlock switch

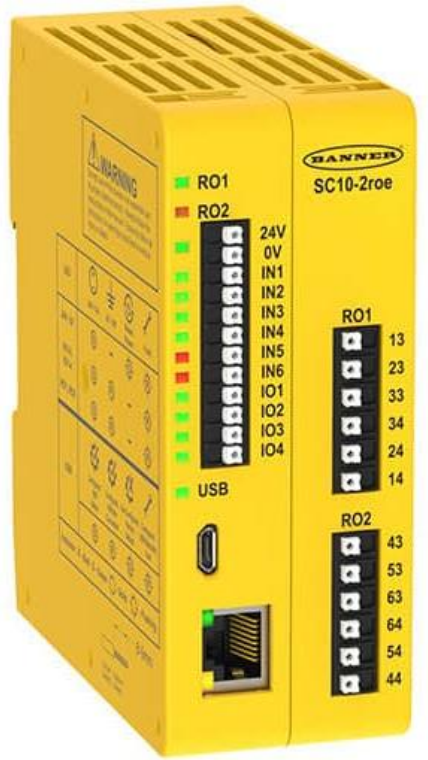
With Unique coding

SI-RF Non-contact RF Safety switch

Programmable multicolor

S22 Pro Touch button

Non-Safey input device



Code </> Compile
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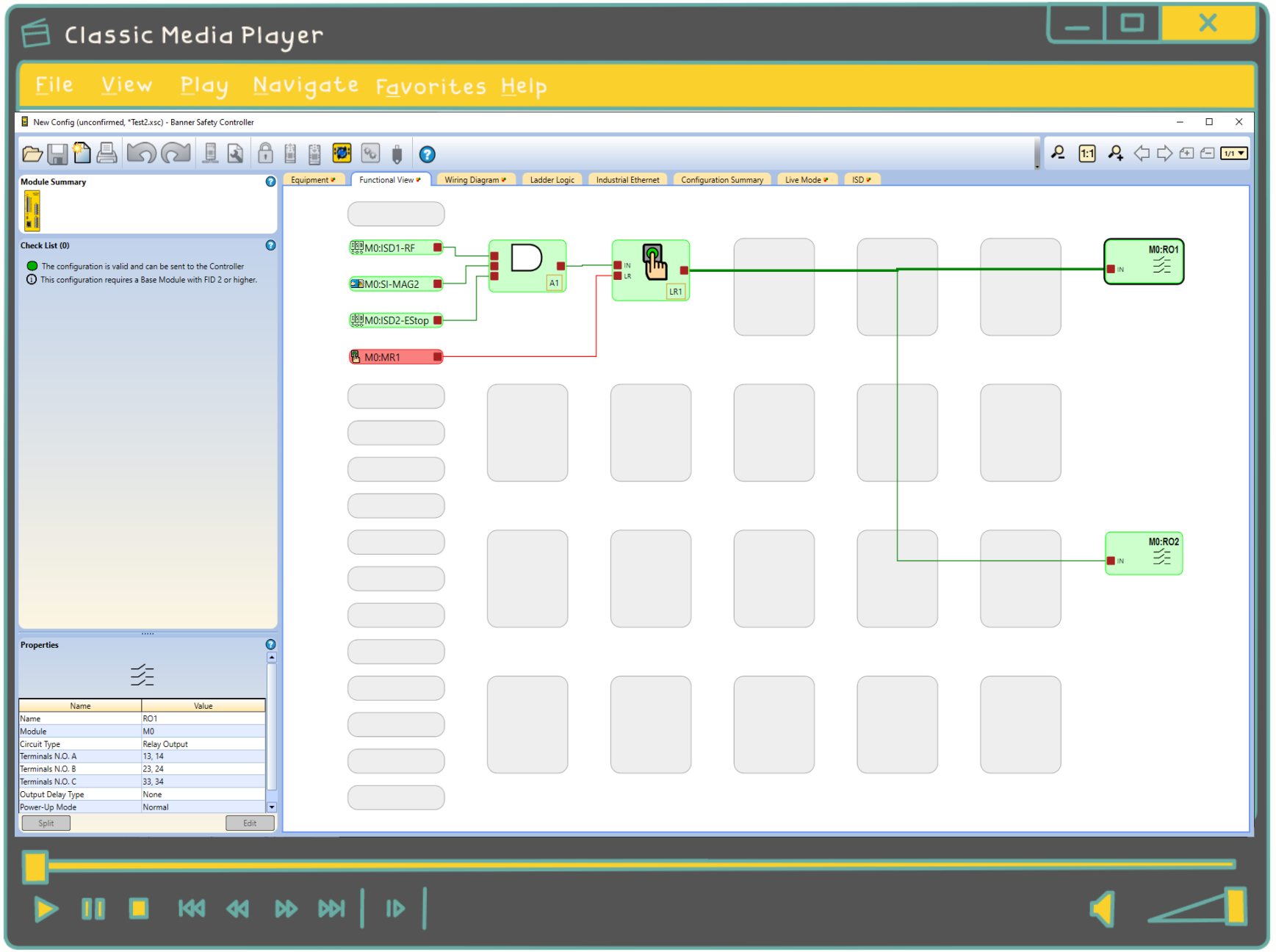
Interfacing

SC10 Safety Controller with PC

Sponsored by:

BANNER



Code </> Compile
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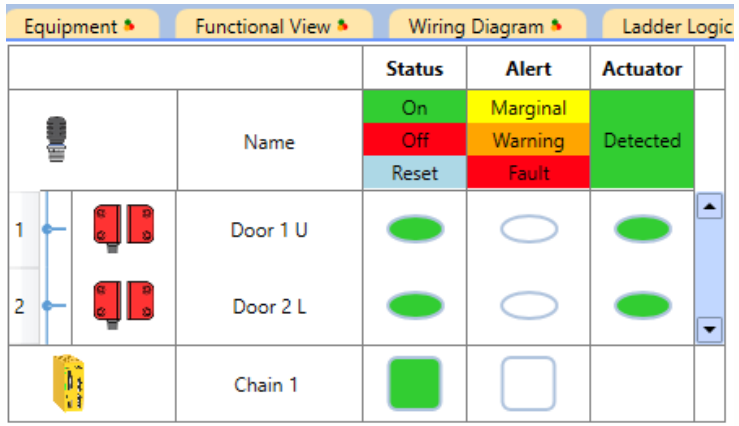
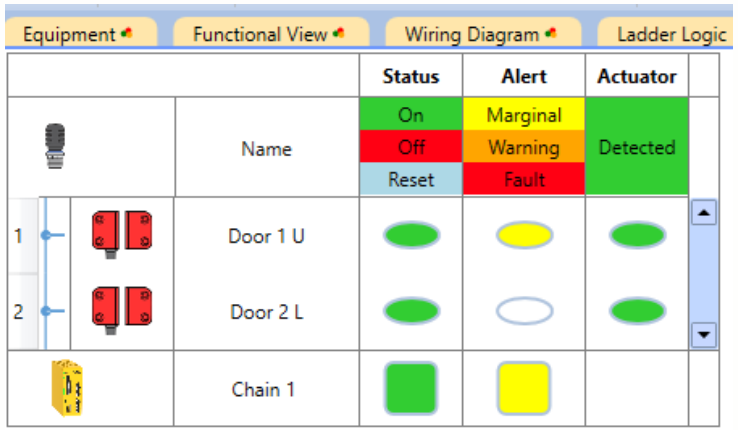
BANNER

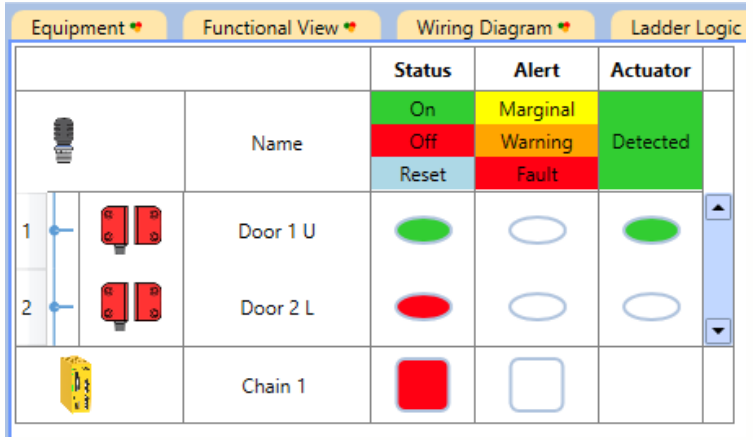
OK Signal

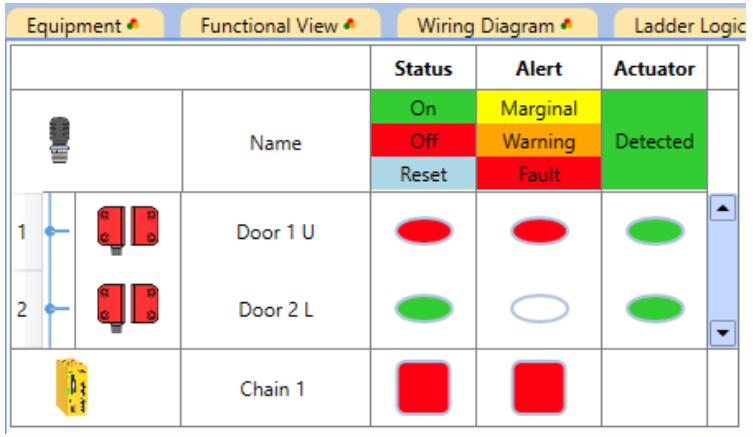


Marginal Signal



NOT OK Signal





Code </> Compile
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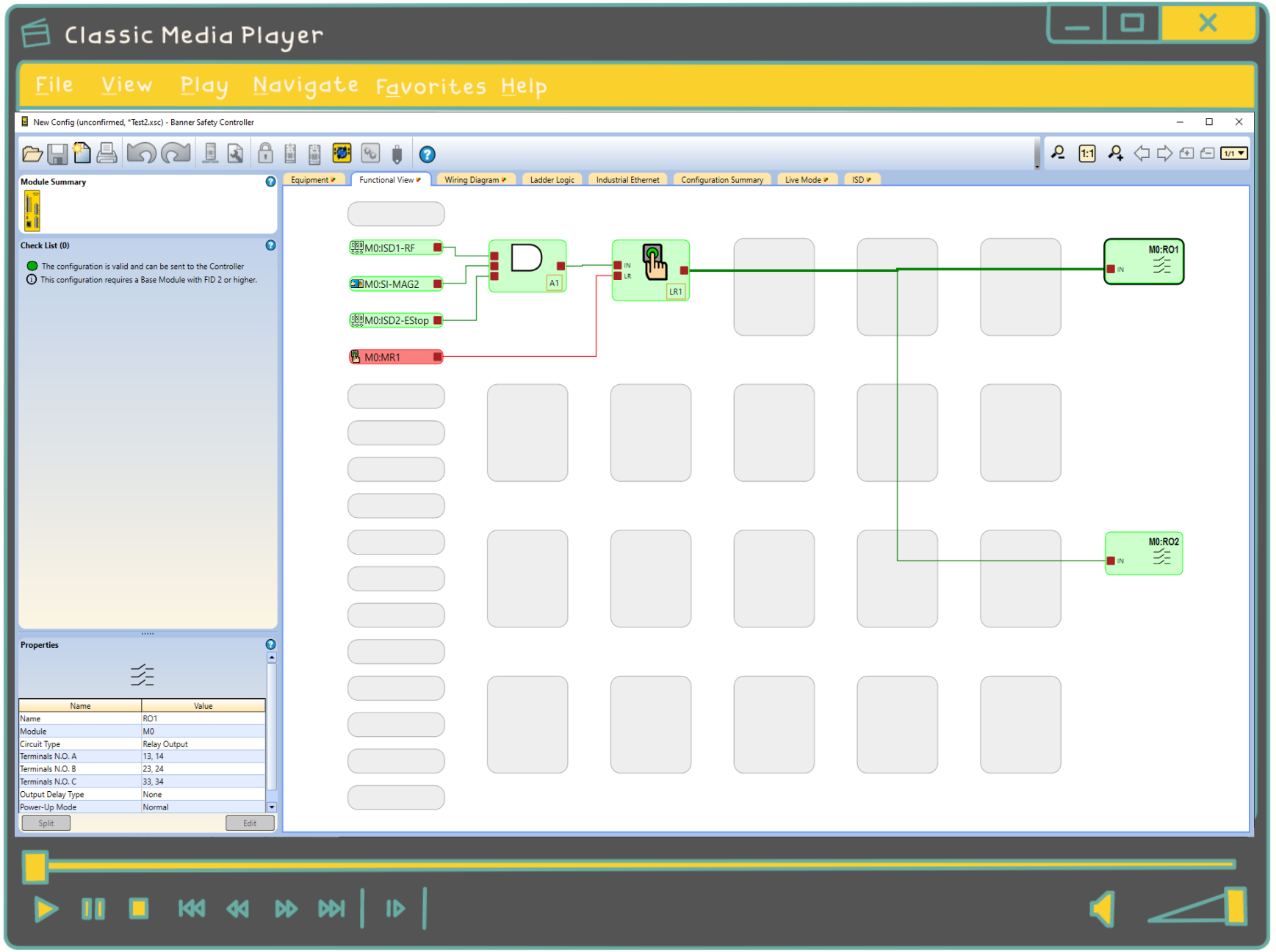
Programming

SC10 Safety Controller with PC

Sponsored by:

BANNER



Code </> Compile
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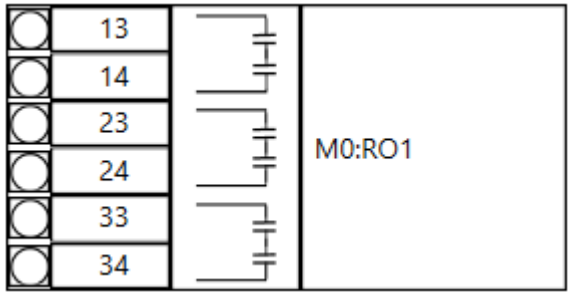
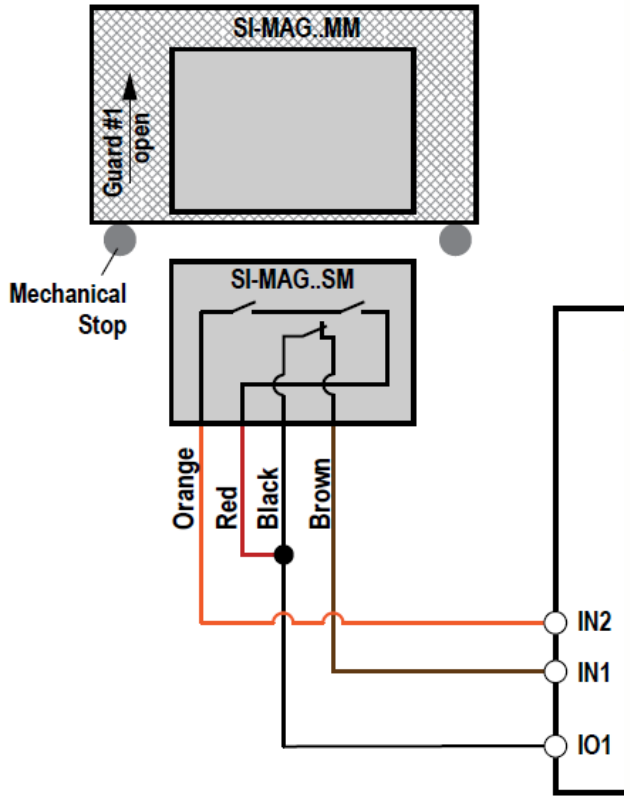
BANNER

Task 1

Use a magnetic door switch to create a safety circuit for RO1





Code </> Compile
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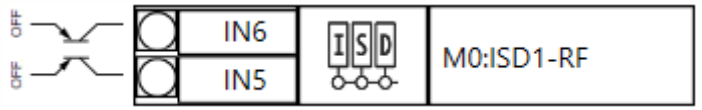
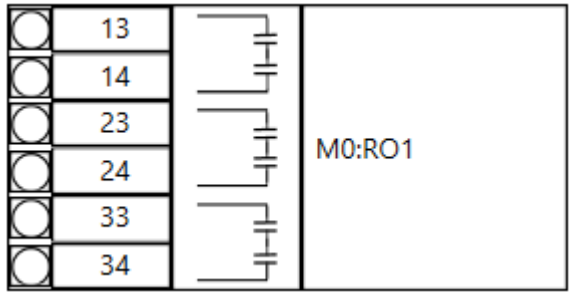
BANNER

Task 2

Add RF switches in series to the magnetic door switch to create a safety circuit for RO1



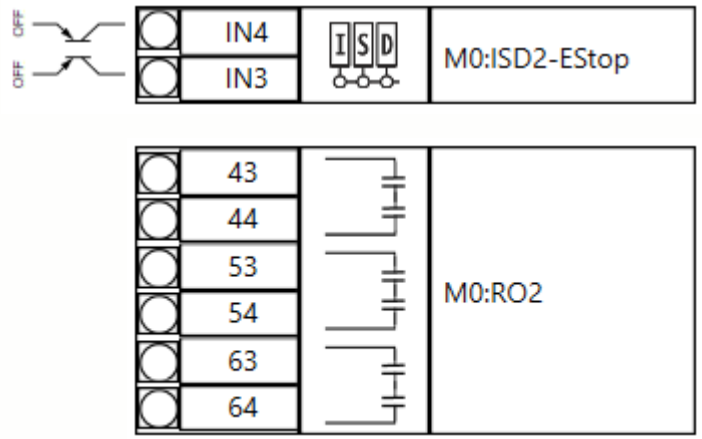


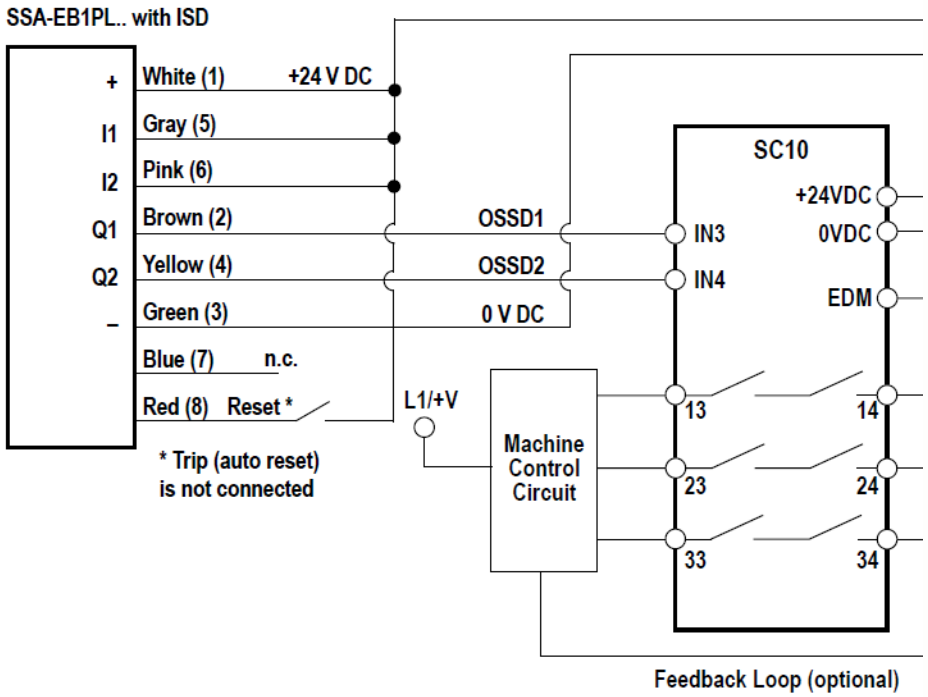
Code </> Compile
learning made easy

BANNER

Task 3

Use EM-Stop switch to create a safety circuit for RO2





Task 4

Add LR block to the safety circuit and use manual reset switch to reset the LR block.

Add an indication to the manual switch when reset operation is ready

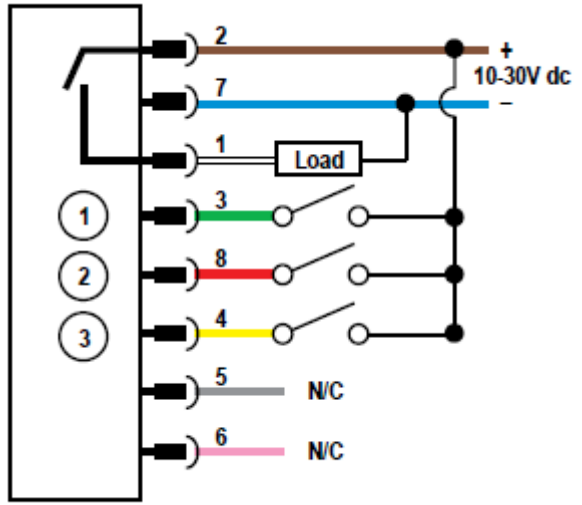


Table 1: RGB Multicolor Color/Function Definition

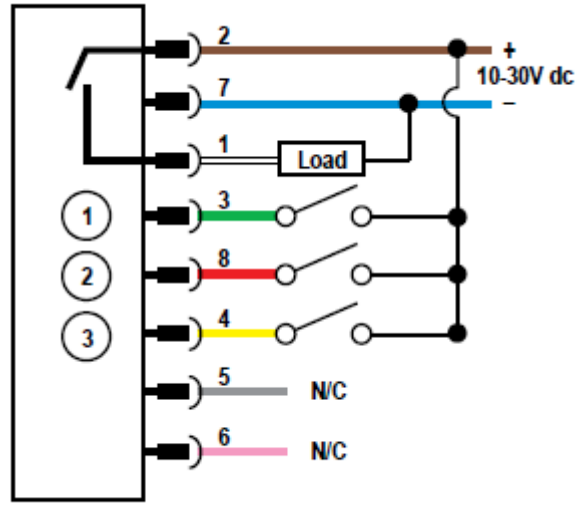
	Red	Yellow	Green	Cyan	Blue	Magenta	White
Input 1	X	X				X	X
Input 2		X	X	X			X
Input 3				X	X	X	X

Task 5

Indicate the fault of any inputs by red color indication on the manual reset switch

Table 1: RGB Multicolor Color/Function Definition

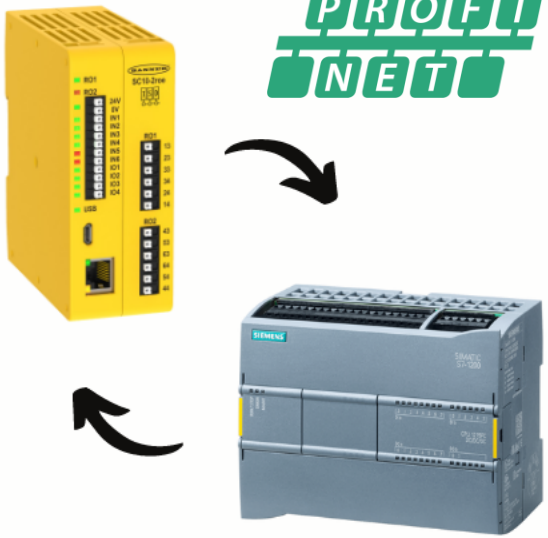
	Red	Yellow	Green	Cyan	Blue	Magenta	White
Input 1	X	X				X	X
Input 2		X	X	X			X
Input 3				X	X	X	X



Code </> Compile
learning made easy

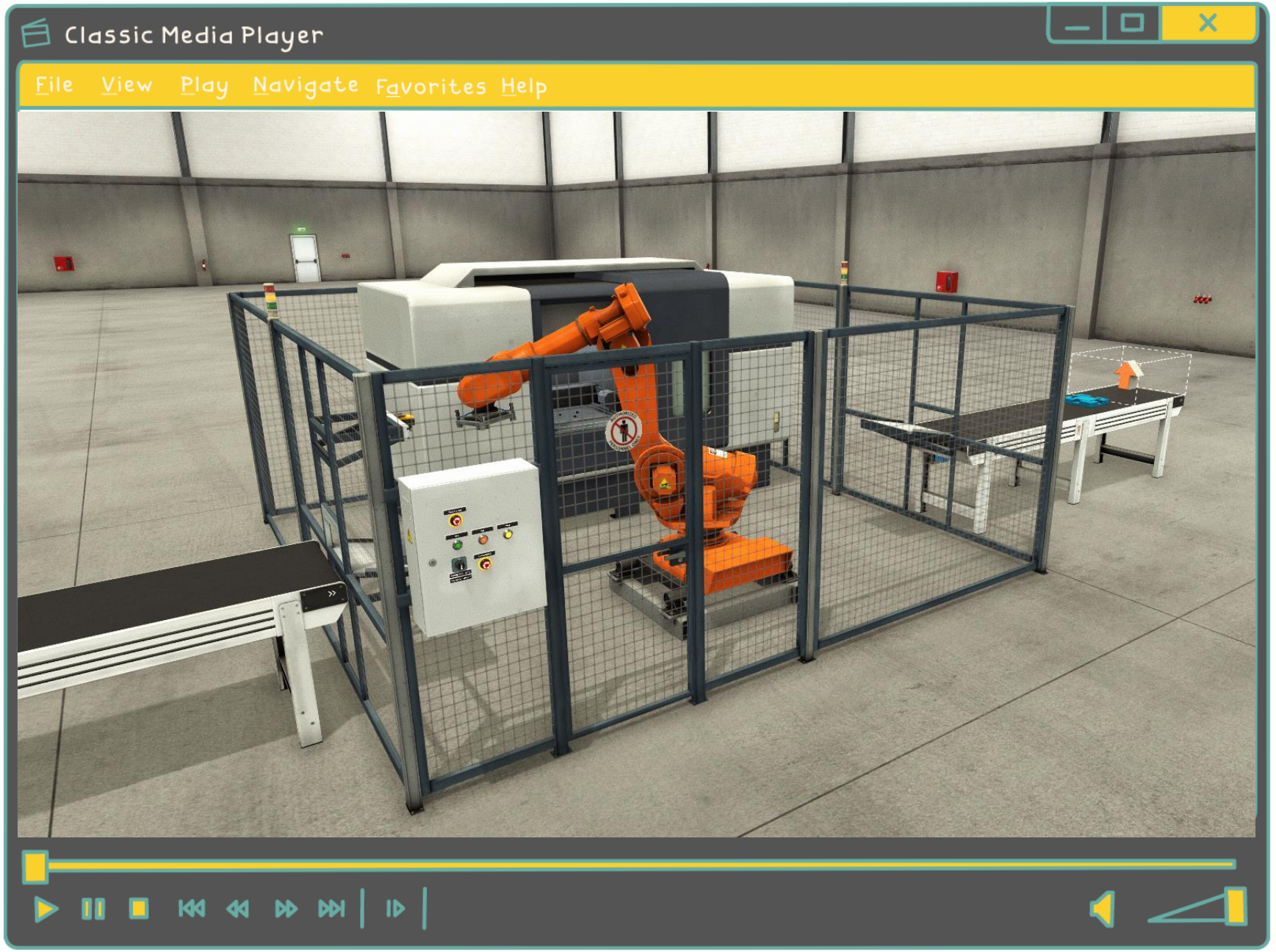
Interfacing with

S7-1200 PLC Controller



Sponsored by:

BANNER



Code </> Compile
learning made easy

BANNER

Task 1

Setup the PROFINET communication with S7-1200 PLC and organize the information to be read/write in the S7-1200 PLC

192.168.0.128

PROFINET

1. Install GSD file
2. Assign IP Address
3. Assign PROFINET name
4. Read/write the data

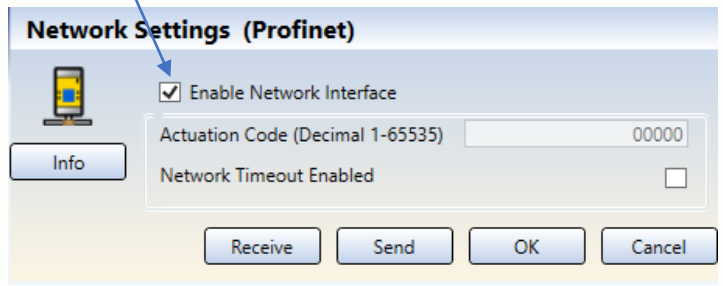
192.168.0.146

Solution

Step 1

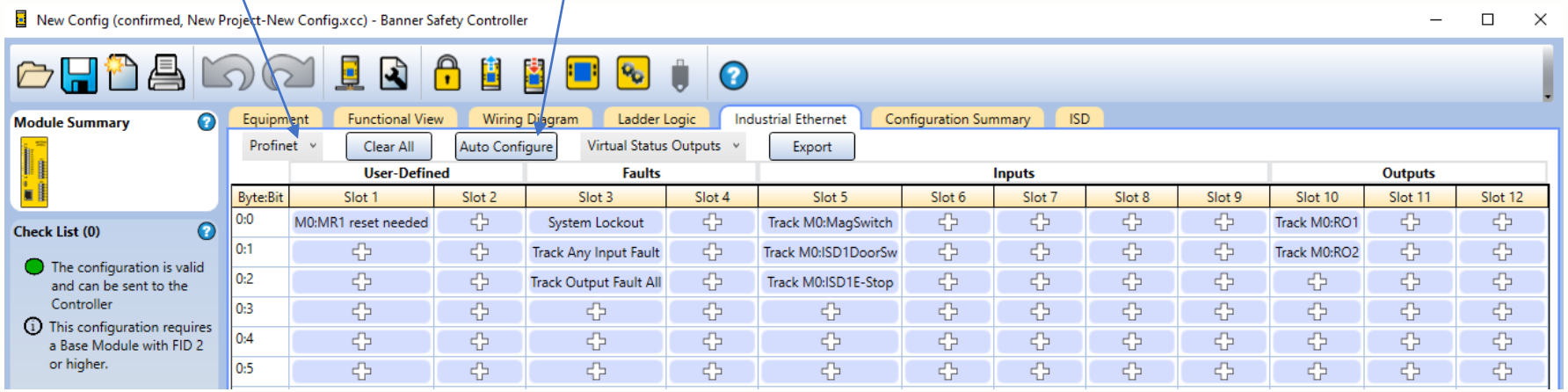
Configure the SC10 controller with network settings and download the program to the SC10 controller

Enable the network



Select PROFINET as communication interface

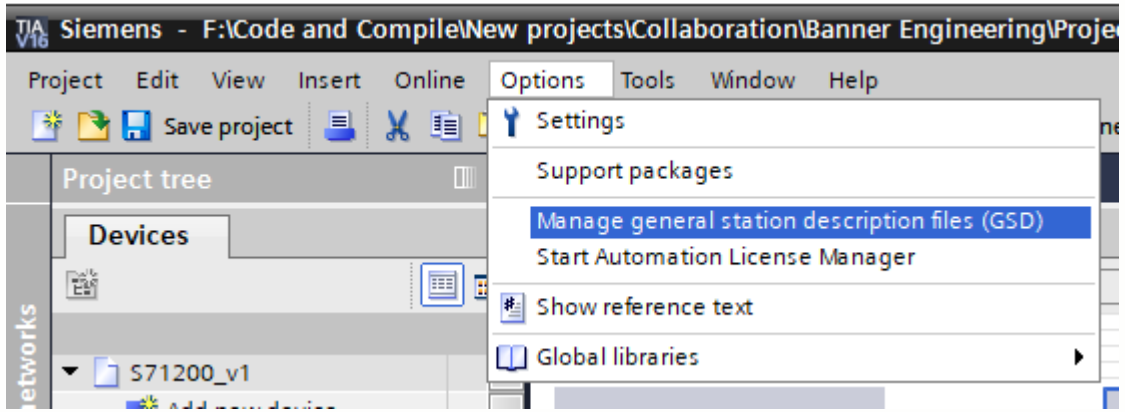
Use Auto-Configure option to select the memory location automatially (optional)



Solution

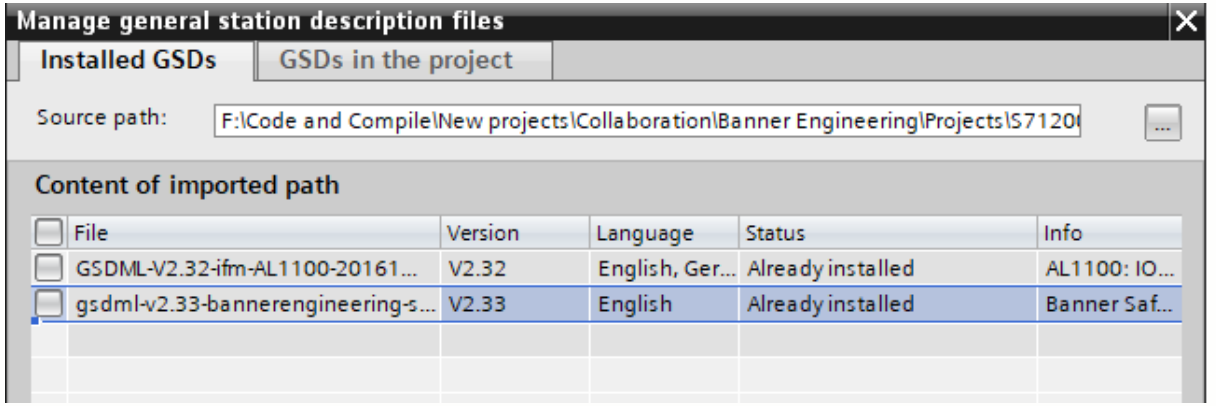
Step 2

Open TIA Portal and
Install GSD file



The GSD file can be installed from this link:
https://www.bannerengineering.com/de/de/products/part.806222.html

Once installed, you can see the status as below



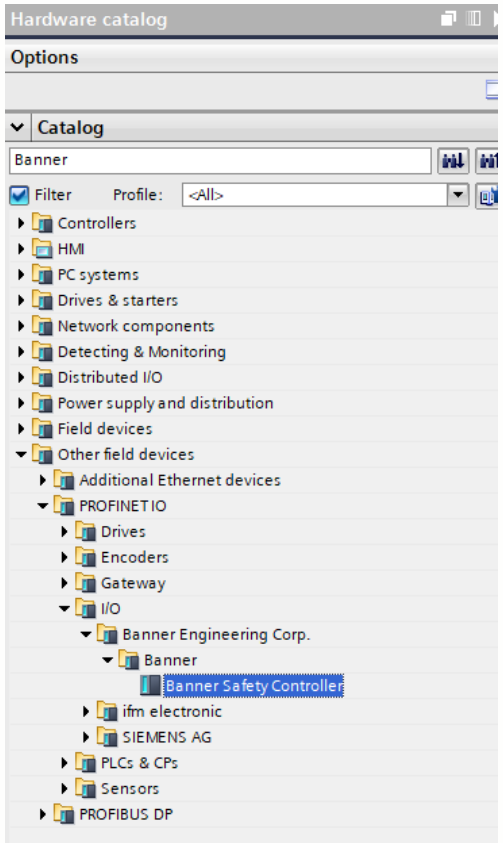
Code </> Compile
learning made easy

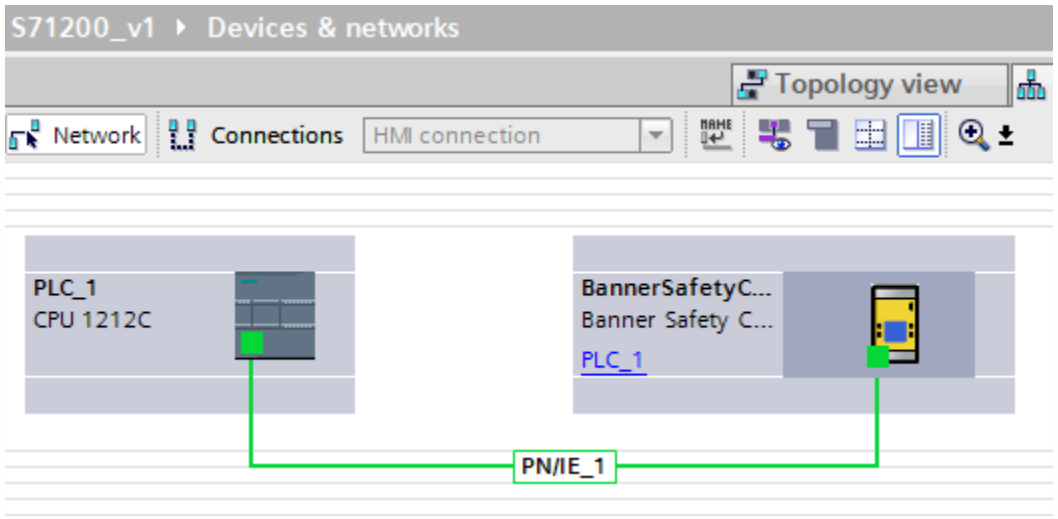
BANNER

Solution

Step 3

Navigate the hardware catalog to insert SC10 controller in the networks





Code </> Compile
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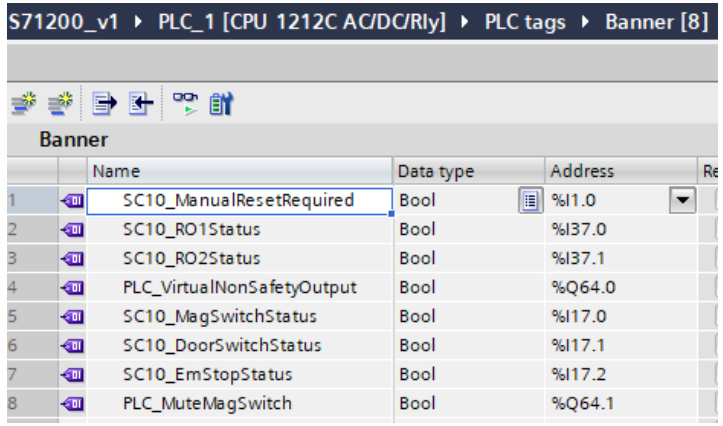
BANNER

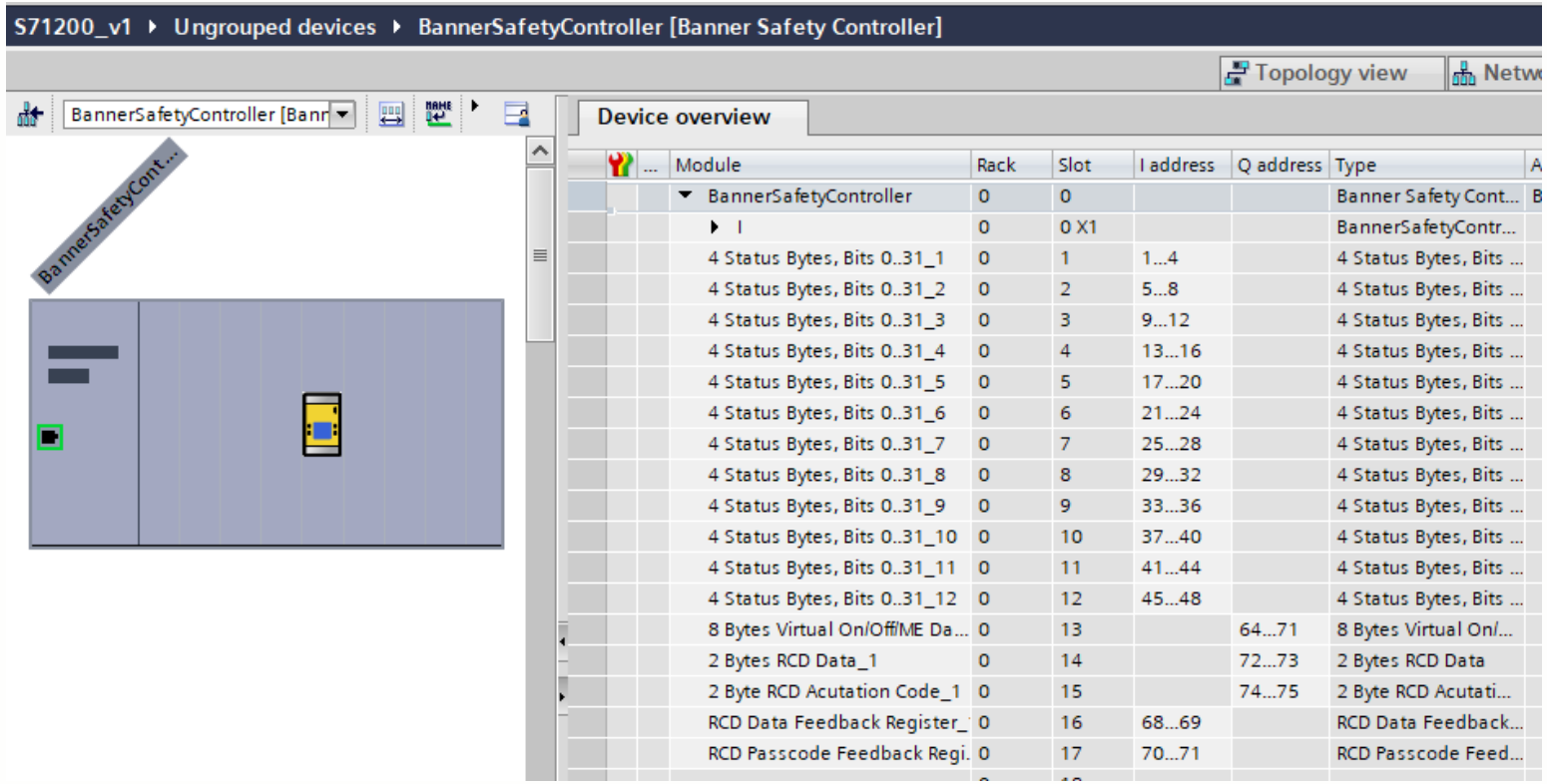
Solution

Step 4

Make PLC tags from the IO of SC10 controller



	Name	Data type	Address
1	SC10_ManualResetRequired	Bool	%I1.0
2	SC10_RO1Status	Bool	%I37.0
3	SC10_RO2Status	Bool	%I37.1
4	PLC_VirtualNonSafetyOutput	Bool	%Q64.0
5	SC10_MagSwitchStatus	Bool	%I17.0
6	SC10_DoorSwitchStatus	Bool	%I17.1
7	SC10_EmStopStatus	Bool	%I17.2
8	PLC_MuteMagSwitch	Bool	%Q64.1



	Module	Rack	Slot	I address	Q address	Type
	BannerSafetyController	0	0			Banner Safety Cont...
	I	0	0 X1			BannerSafetyContr...
	4 Status Bytes, Bits 0..31_1	0	1	1...4		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_2	0	2	5...8		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_3	0	3	9...12		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_4	0	4	13...16		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_5	0	5	17...20		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_6	0	6	21...24		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_7	0	7	25...28		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_8	0	8	29...32		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_9	0	9	33...36		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_10	0	10	37...40		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_11	0	11	41...44		4 Status Bytes, Bits ...
	4 Status Bytes, Bits 0..31_12	0	12	45...48		4 Status Bytes, Bits ...
	8 Bytes Virtual On/Off/ME Da...	0	13		64...71	8 Bytes Virtual On/...
	2 Bytes RCD Data_1	0	14		72...73	2 Bytes RCD Data
	2 Byte RCD Acutation Code_1	0	15		74...75	2 Byte RCD Acutati...
	RCD Data Feedback Register_	0	16	68...69		RCD Data Feedback...
	RCD Passcode Feedback Regi.	0	17	70...71		RCD Passcode Feed...

Solution

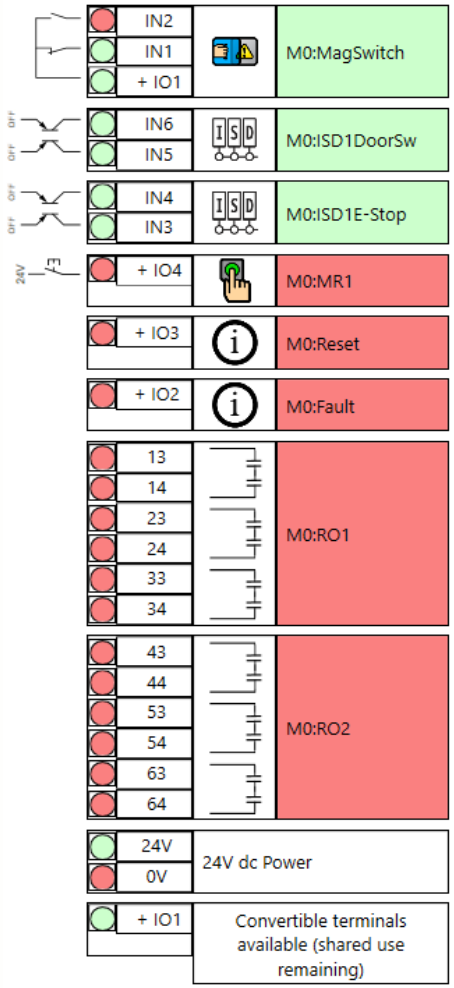
Step 5

Go Online and verify the signals

S71200_v1 ▸ PLC_1 [CPU 1212C AC/DC/Rly] ▸ PLC tags ▸ Banner [8]

Banner

	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...	Monitor value
1	SC10_ManualResetRequired	Bool	%I1.0		☑	☑	☑	FALSE
2	SC10_RO1Status	Bool	%I37.0		☑	☑	☑	FALSE
3	SC10_RO2Status	Bool	%I37.1		☑	☑	☑	FALSE
4	PLC_VirtualNonSafetyOutput	Bool	%Q64.0		☑	☑	☑	FALSE
5	SC10_MagSwitchStatus	Bool	%I17.0		☑	☑	☑	TRUE
6	SC10_DoorSwitchStatus	Bool	%I17.1		☑	☑	☑	TRUE
7	SC10_EmStopStatus	Bool	%I17.2		☑	☑	☑	TRUE
8	PLC_MuteMagSwitch	Bool	%Q64.1		☑	☑	☑	FALSE
9	<Add new>				☑	☑	☑	



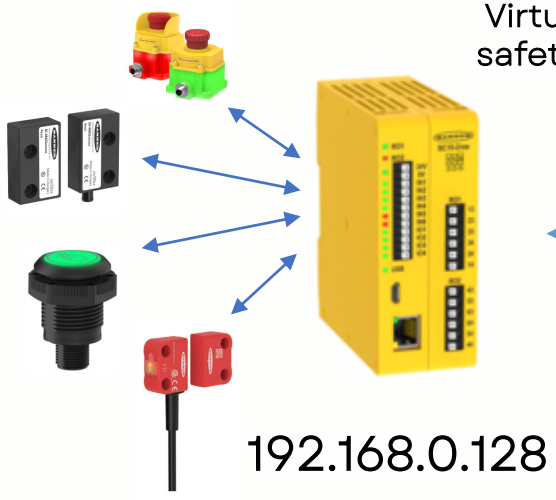
Code </> Compile
learning made easy

BANNER

Task 2

Read the PLC output in the SC10 controller as Virtual Non safety inputs . Integrate this signal in the SC10 controller‘s program

PROFINET

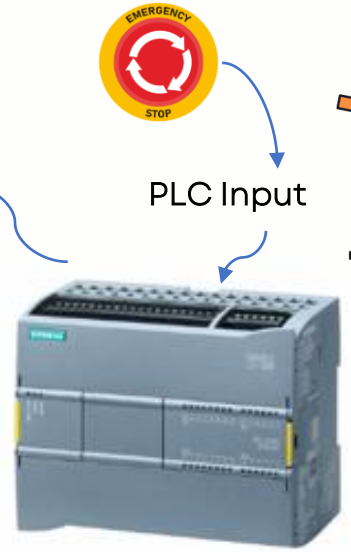


192.168.0.128

Virtual Non safety input

PLC output

1. Install GSD file
2. Assign IP Address
3. Assign PROFINET name
4. Read the safety sensor and relay status



192.168.0.146

PLC Input

E-Stop is pressed!

Gate switch is false

Reset is required!

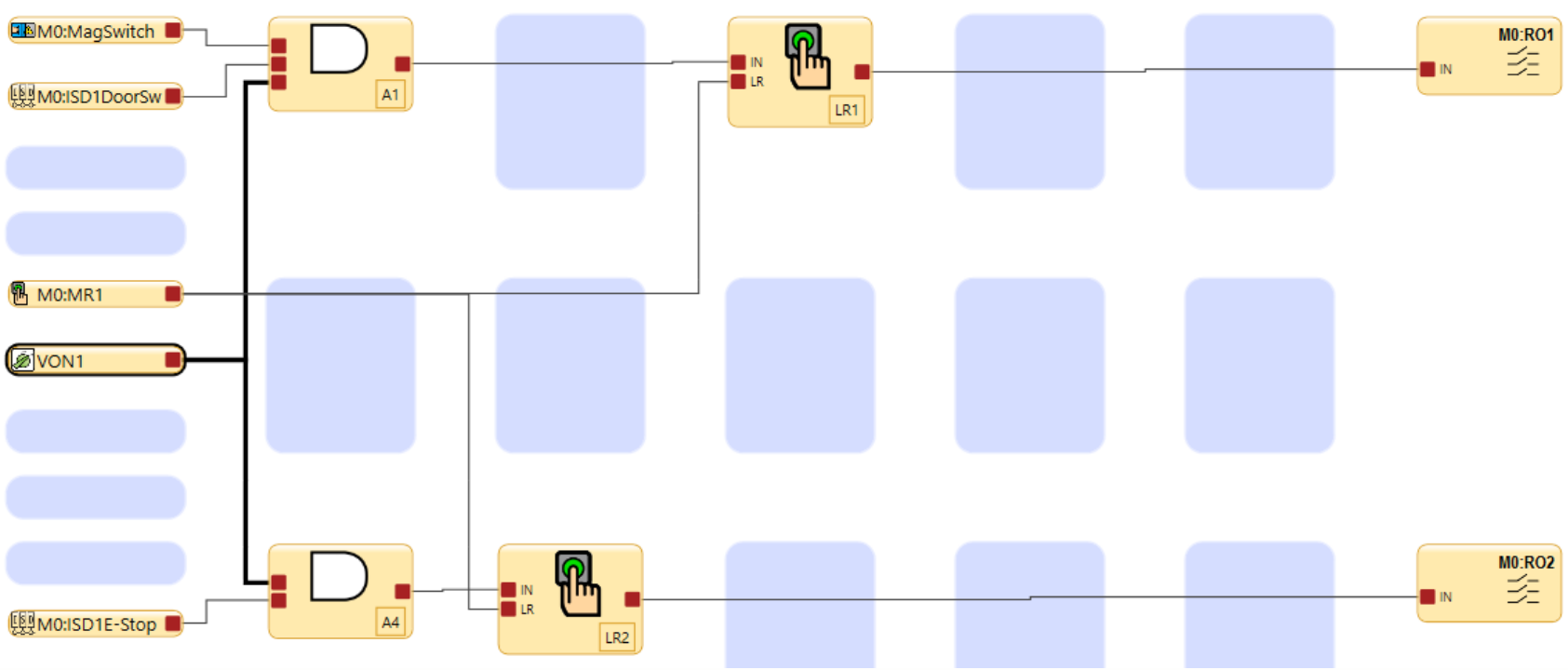
Safety circuit is broken

Solution

Step 1

Add virtual non safety signal in the SC10 program and add it as in series with A1 and A4 and blocks

Download the test the circuit



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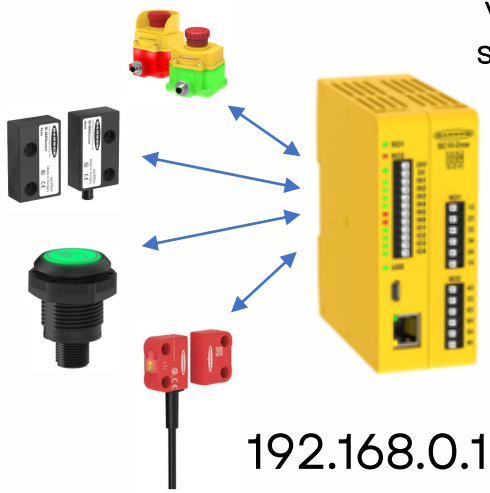
Task 3

Add a bypass signal from the PLC such that it should bypass the magnetic door switch of SC10 controller

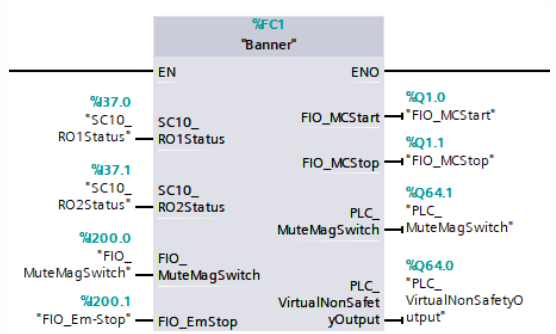
PROFINET



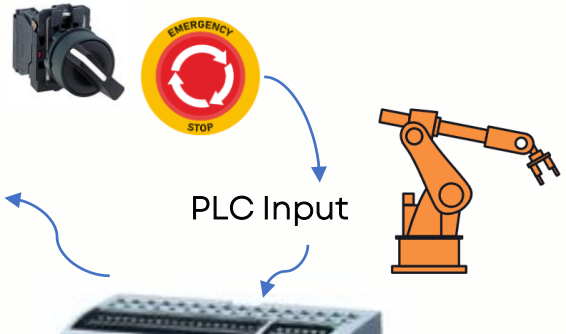
192.168.0.128

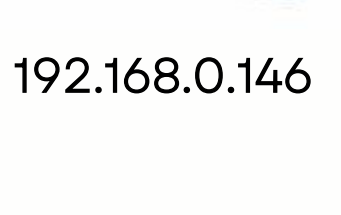
Virtual Non safety input

PLC output



PLC Input





192.168.0.146

E-Stop is pressed!

Gate switch is false

Reset is required!

Safety circuit is broken

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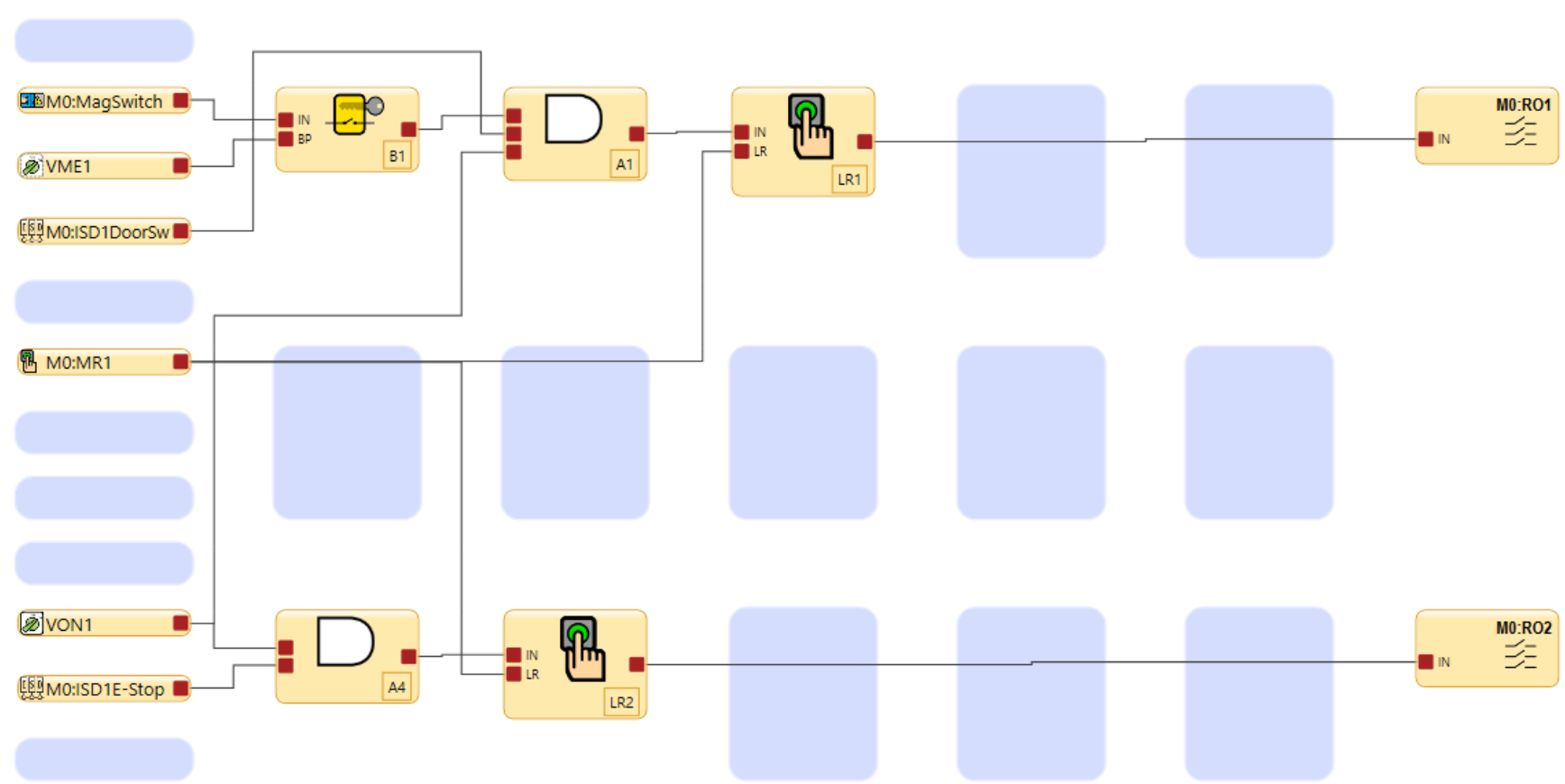
Solution

Step 1



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Monitoring SC10 on **Node-RED** dashboard

Modbus

Node-RED

Sponsored by:

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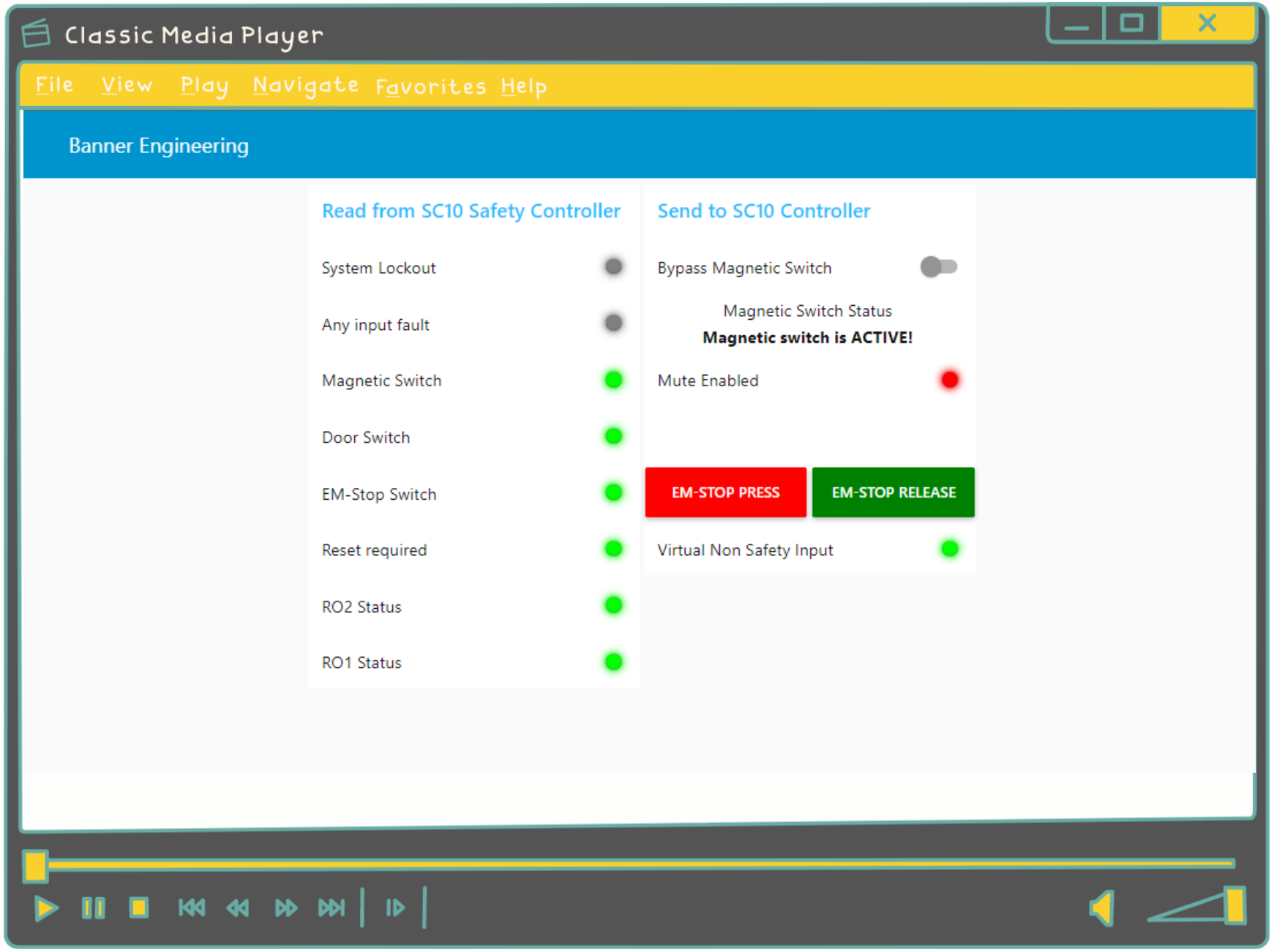

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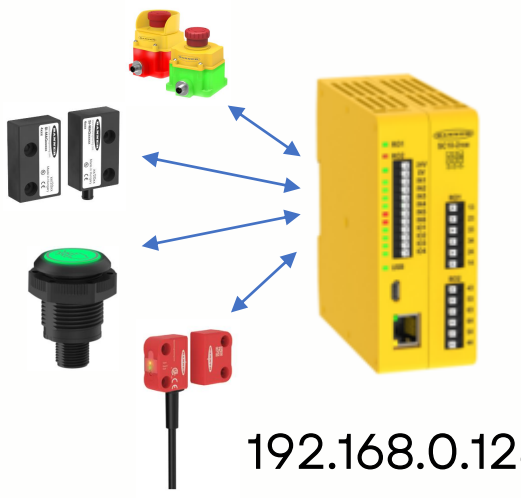
Task 1

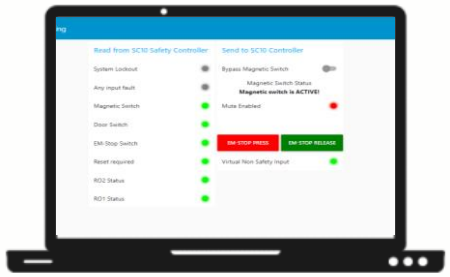
Setup the MODBUS communication with Node-RED and read the virtual status outputs of SC10 controller on the dashboard. Simulate the EM-Stop operation and send the bypass magnetic switch command from the dashboard

Modbus



192.168.0.128

1. Configure MODBUS address in Banner Safety Controller software
2. Connect to the Node-RED via MODBUS TCP/IP



E-Stop is pressed!

Gate switch is false

Reset is required!

Safety circuit is broken

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Solution

Step 1

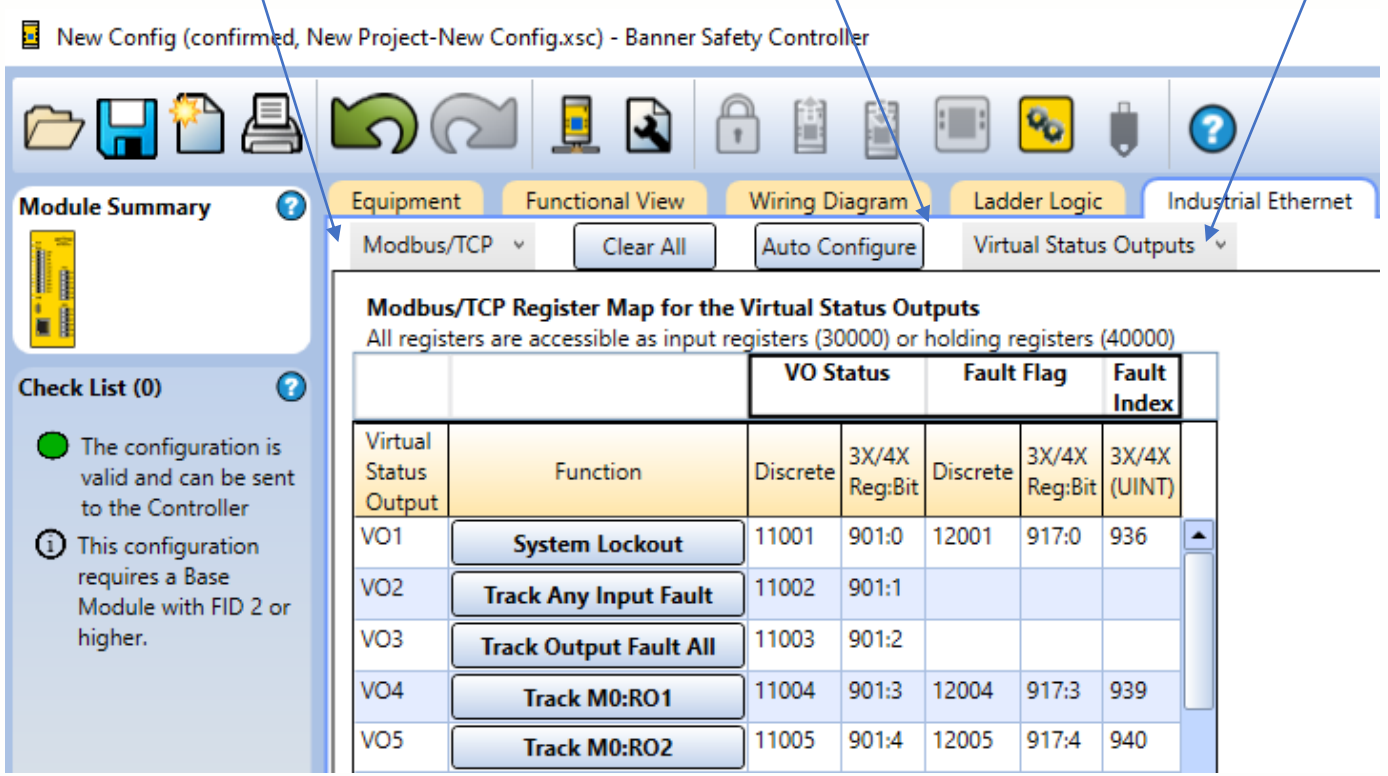
Connect the MODBUS addresses with function to send over via MODBUS communication.

Auto Configure option can be selected which will automatically read all the used function in the program

Select Modbus/TCP as communication interface

Use Auto-Configure option to select the memory location automatially (optional)

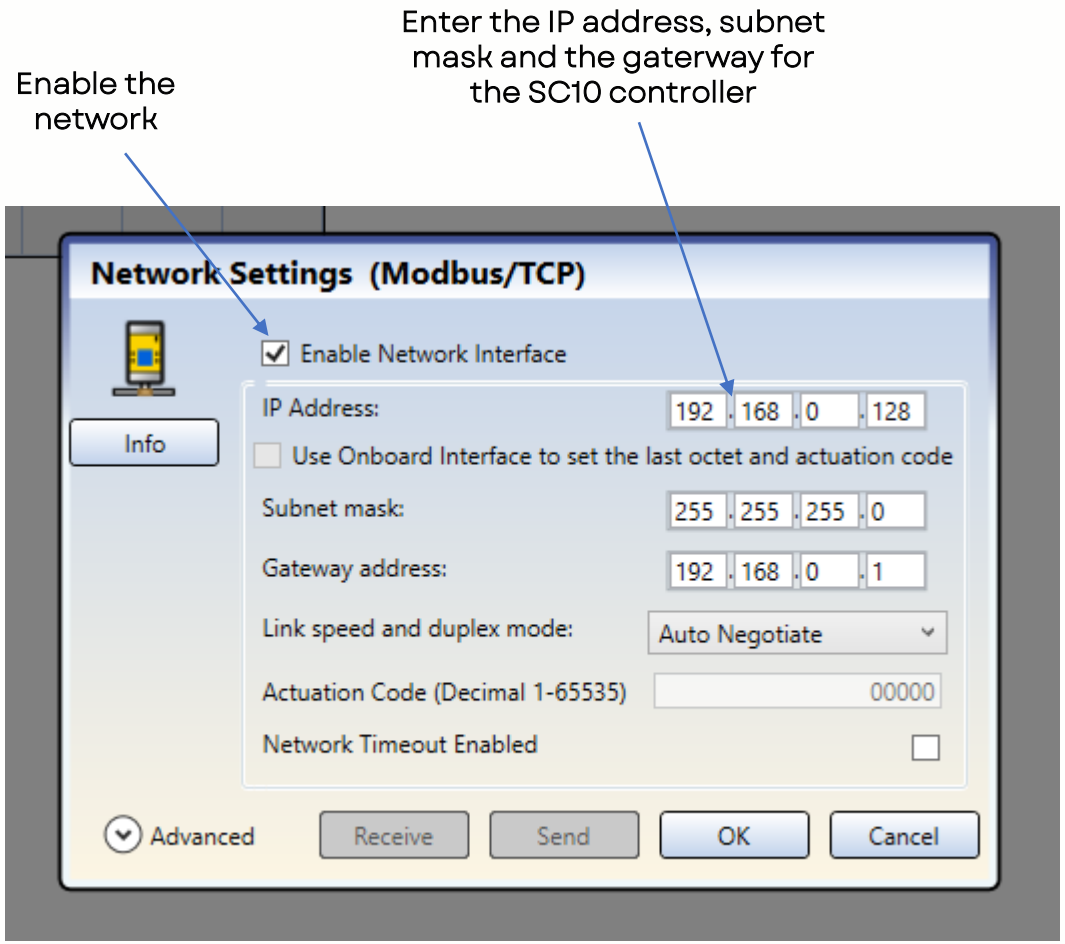
Using this drop-down to navigate to Virtual Non-Safety Inputs



Solution

Step 2

Configure the SC10 controller with network settings and download the program to the SC10 controller



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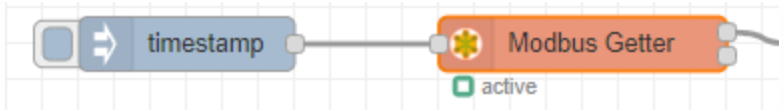
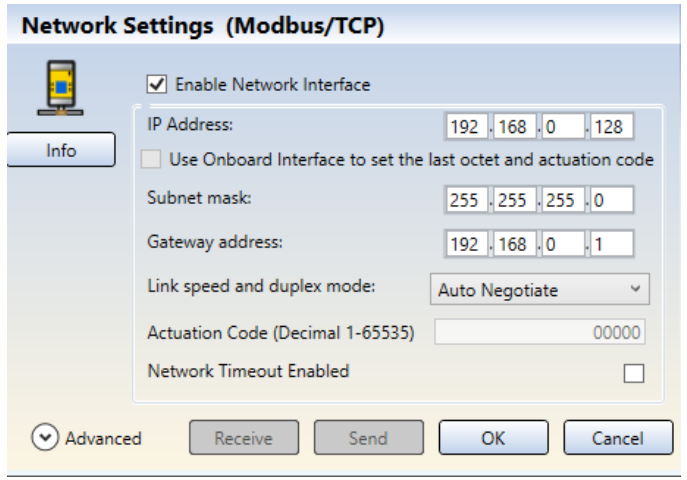
Solution

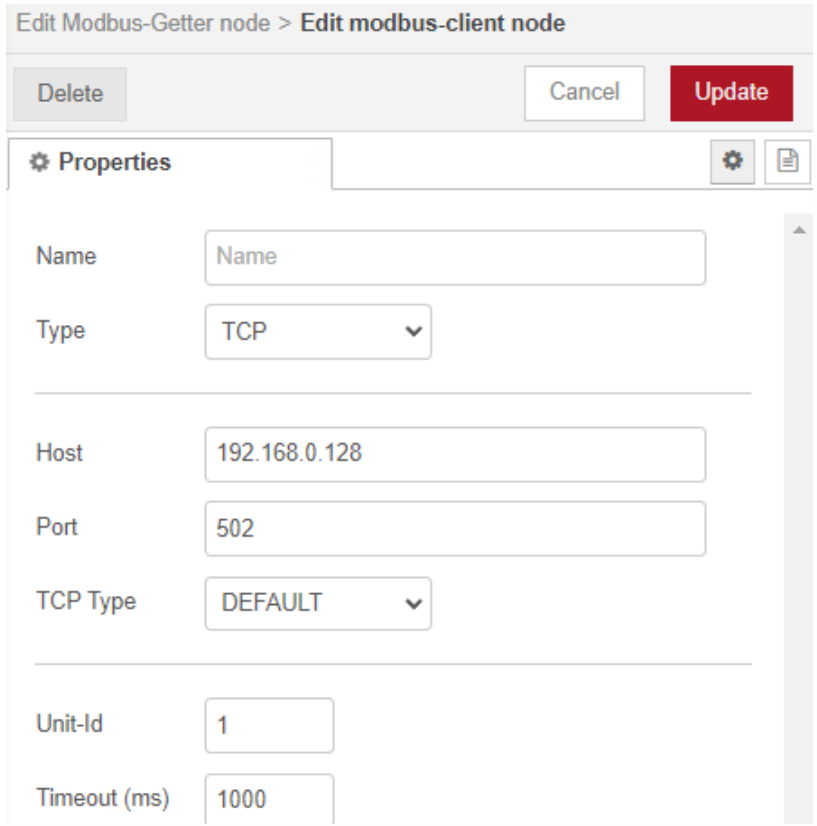
Step 3

Open **Node-RED** and connect to SC10 controller via MODBUS nodes

IP address: 192.168.0.128
Port: 502
Unit Id: 1







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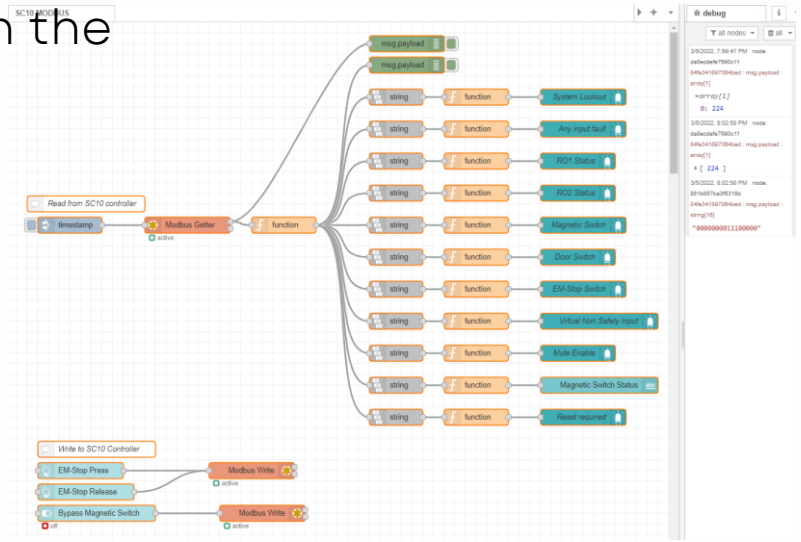
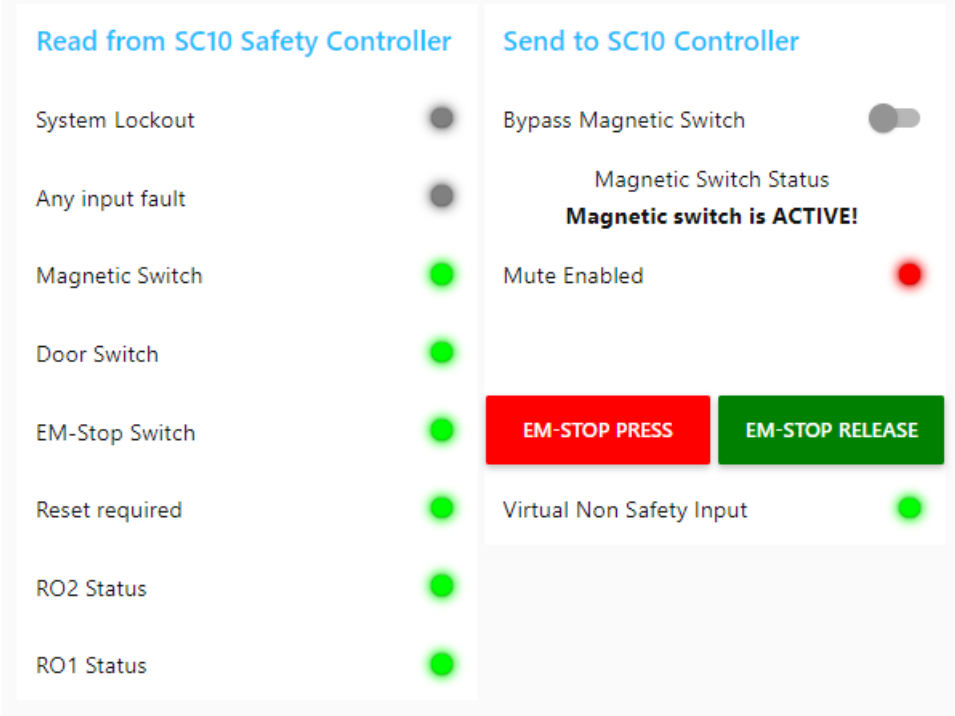
Solution

Step 4

Read the MODBUS addresses and design the dashboard in the Node-RED





Note:
MODBUS addressing in SC10 is 1-based addressing

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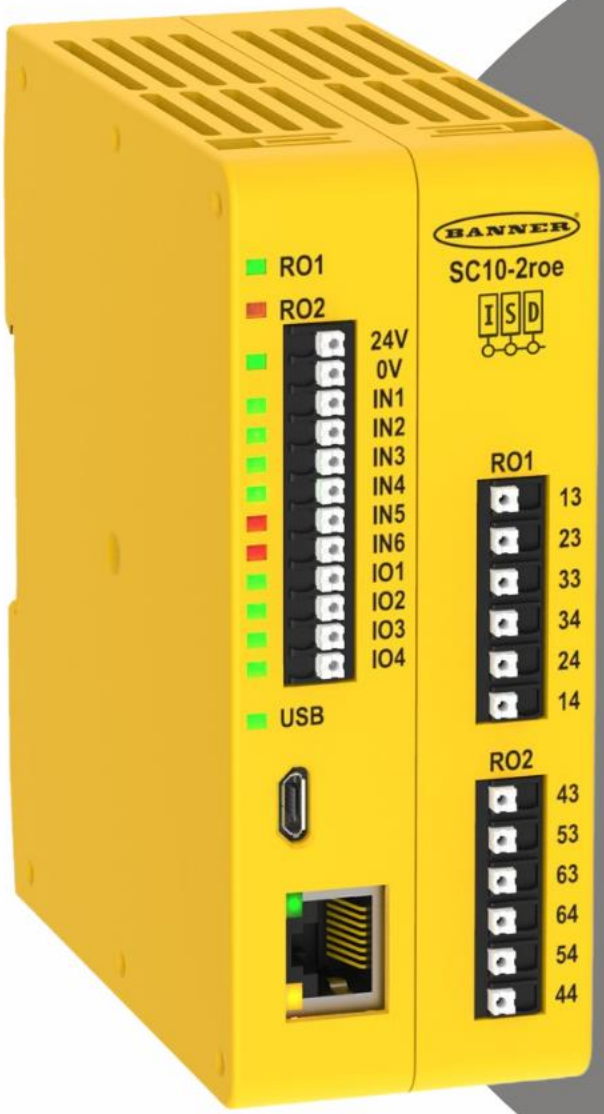
Secure your application now!
using Banner safety controller

Thank you



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