



Solutions for Press Safety

SIMATIC Press Safety Library

LPrSafe

SIMATIC Press Safety Library - LPrSafe

Features and benefits

Reduced period acceptance test and validation

Due to certificate of German BG

Reduced engineering time

Through field-proven and modular function blocks

Software based failsafe

flexible und certified

Full scalability

Across all SIMATIC Failsafe Controllers

(Basic – Advanced - SW-Controller)

Installation-routine

Plug-and-Play into TIA Portal

Future proofed

Already with additional logging function – important with regard to the Machinery Regulation 2023/1230

Modular concept

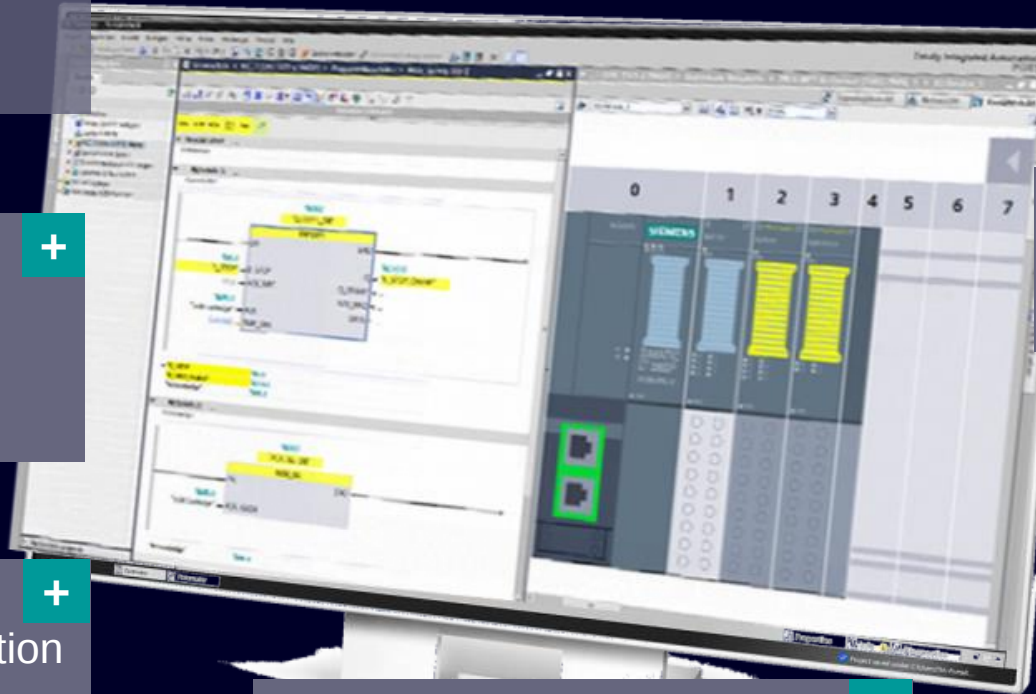
With multi-instance programming

Online-help

Activate directly from TIA Portal (SHIFT+F1)

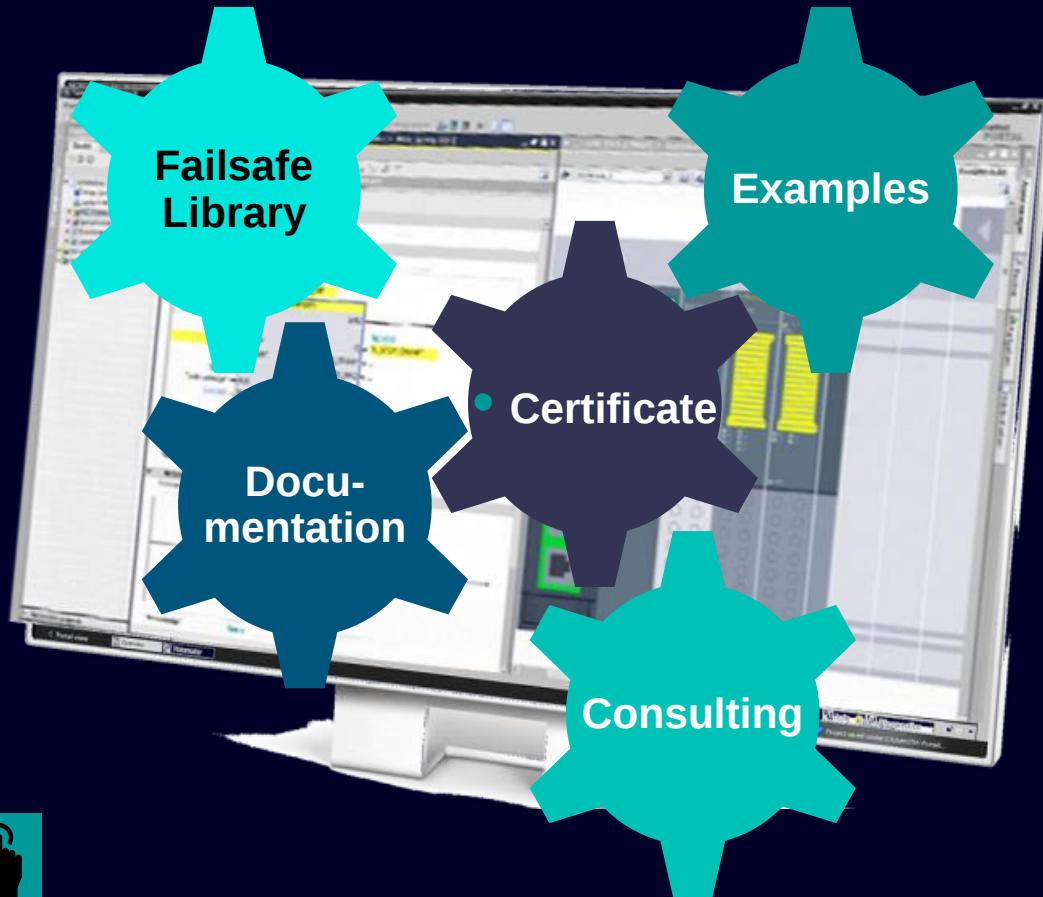
Fully documented

Manual + complete, executable example projects



SIMATIC Press Safety Library - LPrSafe

Failsafe library for the press shop



Failsafe library consists of more than 40 failsafe, know-how protected function blocks

Executable solution examples

Functional solutions for mechanical-, hydraulic- and servo presses

Documentation and Online Help

of all function blocks and solution examples

Consulting

by Siemens safety experts via application support

Certified

by German BG following actual international standards

Failsafe function blocks for implementation of all press safety functions, expert consulting and certification by German BG

SIMATIC Press Safety Library - LPrSafe

Following all terms and standards

General standards

EN ISO 13849-1 +

- Up to PLe and Kat.4

DIN EN 62061 +

- Up to SIL3

EN IEC 61508-3 +

- Up to SIL3

2006/42/EG +

- According Machinery Directive

GS-HSM-30 +

- Principles of testing...

certificate
no. HM 240037
dated 2024-03-17


certifikat mit
Zeichnung Nr. prüfen

DGUV Test
Prüf- und Zertifizierungsstelle
Fachbereich Holz und Metall
European notified body
Identification number: 0697

Translation In any case, the German original shall prevail.

EC Type-Examination Certificate

Name and address of the holder of the certificate (customer): Siemens AG
Frauenauracher Str. 80
91056 Erlangen
GERMANY

Product designation: **Press safety library**

Type: • S7-F/P TIA for S7-300F, S7-400F, IM151F, IM154F, WinAC RTX (F)
• S7-F/P TIA for S7-1200F, S7-1500

Testing based on: See Annex 1 and 2

Test Report: No. 2023-0075-01 dated 15.03.2024

Further details: Intended use: The failsafe library LPrSafe with the product name SIMATIC S7-F/P contains programmed, complete function blocks which can be called, parameterized and interconnected with each other within the user programme of the SIMATIC Safety System.

Compliance with the listed and/or applicable standards presupposes use of the failsafe SIMATIC Safety system in acc. with SIL 3 of IEC 61508-1 to -3 and IEC 62061, and with PL e, cat. 4 of ISO 13849-1 (TUV Certificate no. Z10 067803 0020), a correct interconnection and integration of the function blocks listed in cl. 5 into the user programme.

Remarks: See Annex 1 and 2

Follow-up certificate of HSM 21011 dated 17.03.2021.

The type tested complies with the provisions laid down in the directive 2006/42/EC (Machinery).
The present certificate is valid until: **2029-03-16**
Further provisions concerning the validity, the extension of the validity and other conditions are laid down in the Rules of Procedure for Testing and Certification.


Dipl.-Ing. Jan Stegmann
Head of Certification Body


Deutsche
Akkreditierungsstelle
D-53117 Bonn

Deutsche Gesetzliche Unfallversicherung (DGUV) e.V.
Spitzenverband der gewerblichen Berufsgenossenschaften
und der Unfallversicherungsgeber der öffentlichen Hand
Verwaltungsstelle: VR 751 II, Amtsgericht Charlottenburg

DGUV Test Prüf- und Zertifizierungsstelle
Fachbereich Holz und Metall
Isaac-Kuhle-Allee 16 • 51524 Mainz • Deutschland
Telefon: +49 631 802-14 293 • Fax: +49 631 802-24 293

Specific standards

ISO 16092-1 +

- “Part 1 General safety requirements”

ISO 16092-2 +

- „Part 2 Safety requirements for mechanical presses “

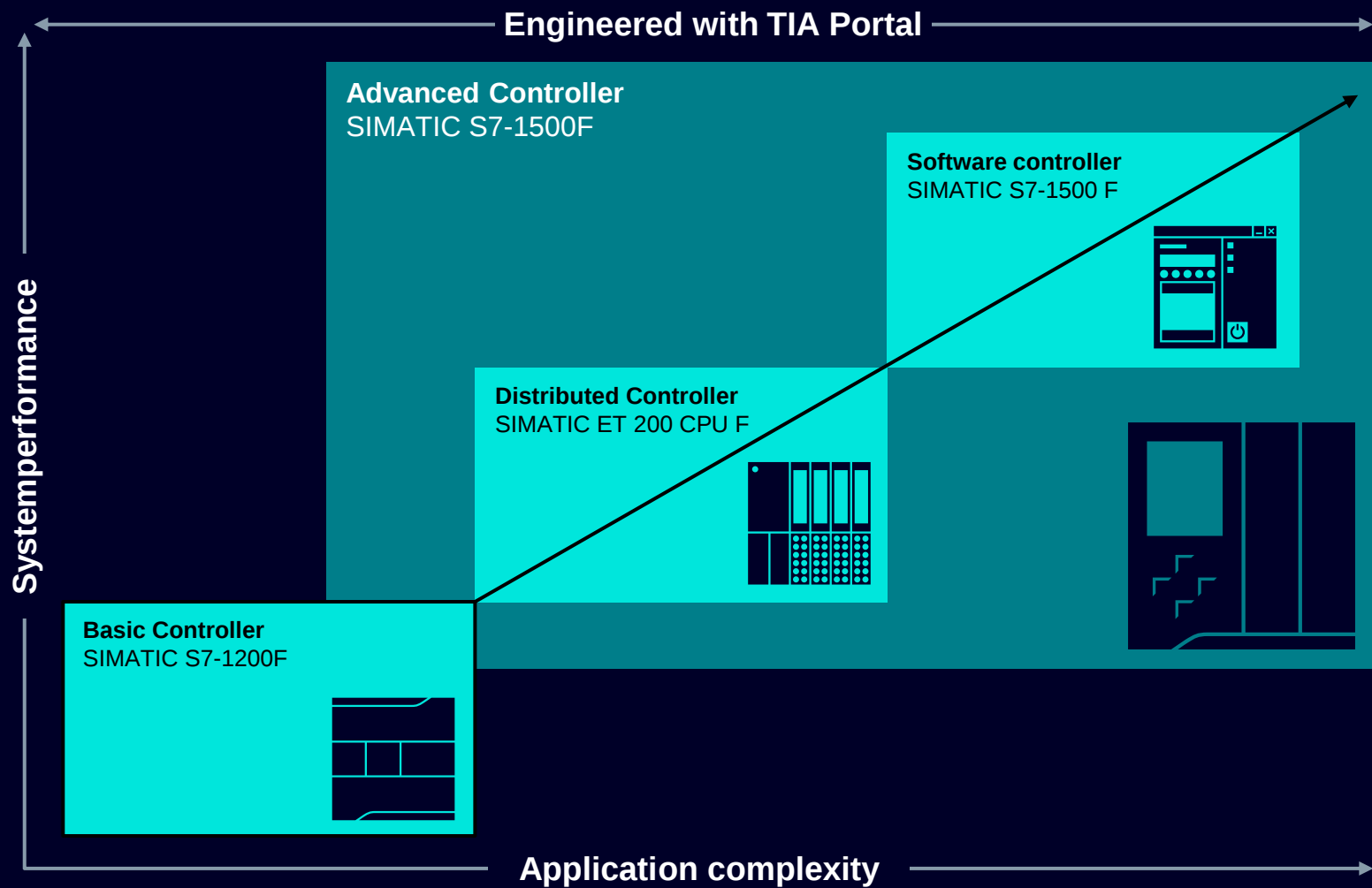
ISO 16092-3 +

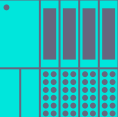
- „Part 3 Safety requirements for hydraulic presses “

ISO 16092-4 +

- „Part 4 Safety requirements for pneumatic presses “

SIMATIC Press Safety Library - LPrSafe – Full scalability across all SIMATIC F-Controller



	Functionality	+++
	Reaction time	+++
	Program code	+++
	Functionality	+++
	Reaction time	++
	Program code	++
	Functionality	+++
	Reaction time	++
	Program code	+

SIMATIC Press Safety Library - LPrSafe

the right solution for all applications

Results and suggestions

	Mechanical press CPU 1215F SM1226 F-DI and F-DQ 	Mechanical press CPU 1512P F ET200SP F-DI and F-DQ 	Mechanical press CPU 1516F ET200MP F-DI and F-DQ 
Clamp-Clamp reaction time	++	++	+++
Program code	+	++	+++
Reaction time F-Module	++	+	+++
Price	+++	++	+



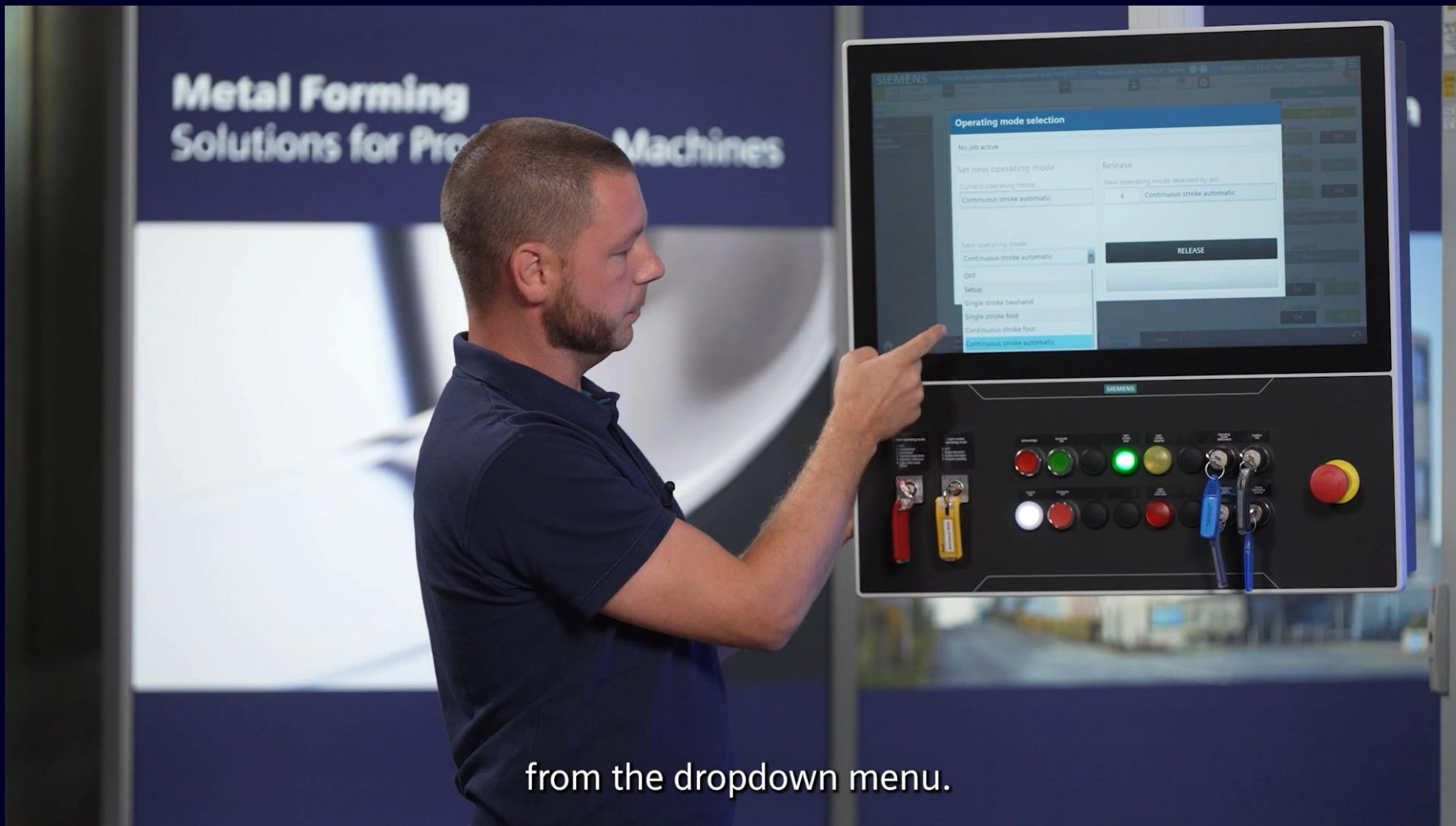
S7-1200F, the cheap alternative for all stand-alone safety functions—without any functional restrictions to S7-1500F

Distributed Failsafe Controller for all flexible press applications in mid-range press area – additional space for standard automation tasks

High performant S7-1500F for easy integration and combination of standard and failsafe functionality – full scalability with distributed IO's

SIMATIC Press Safety Library - LPrSafe News in V3.0.0 – General overview

NEW



from the dropdown menu.

SIMATIC Press Safety Library - LPrSafe

News in V3.0.0 – General

NEW

Requirements from ISO 16092

- New styleguide over all function blocks
- Readable new function block names
- Optimized functionality
- New features

State of the art

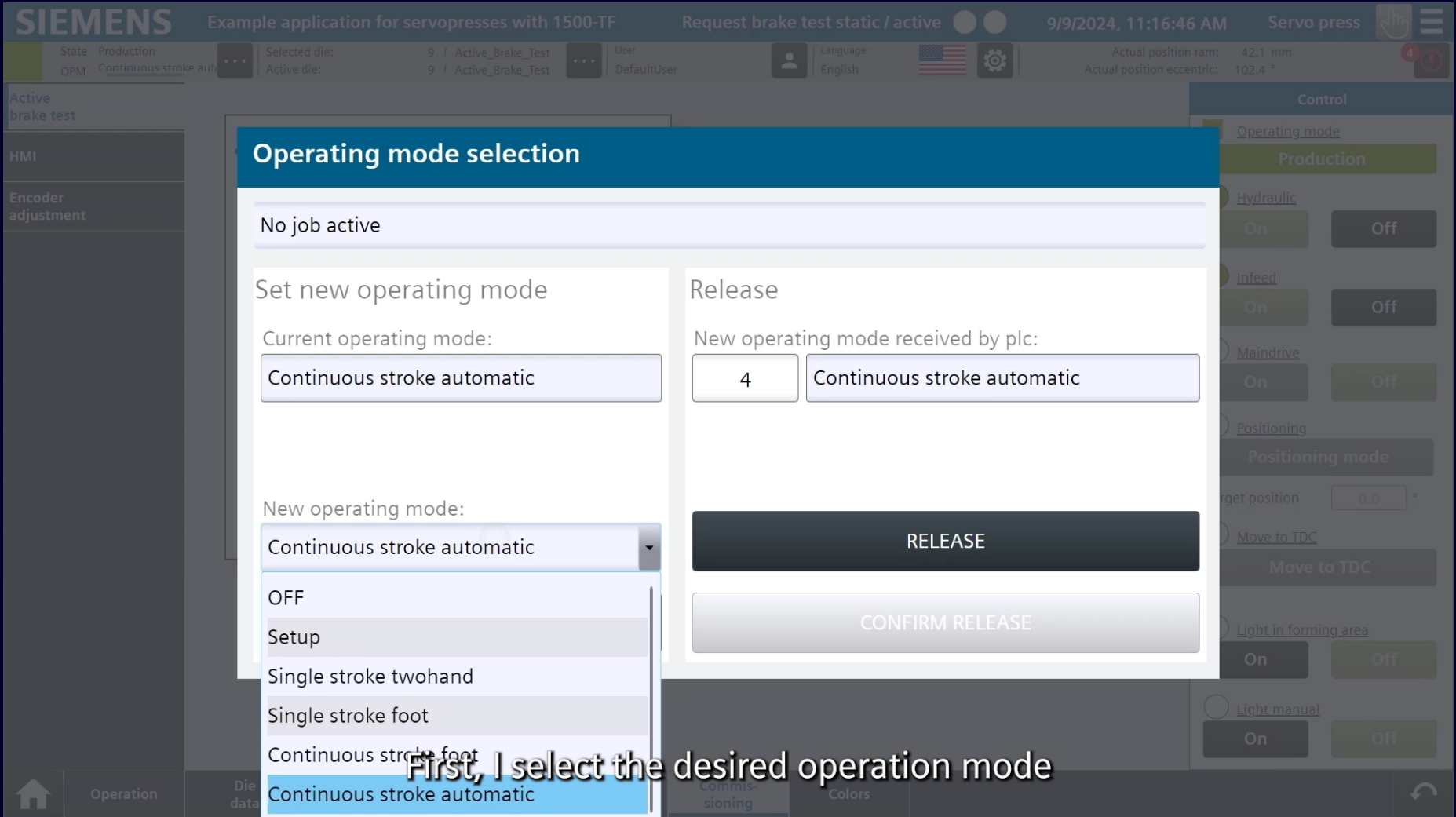
- „LPrSafe_ModeHMI“– safe operating mode change via HMI
- „LPrSafe_Logging“– Log-file of condition changes with timestamp
- „LPrSafe_OvertravelMeasuring “ – Measurement of overtravel distance and time at excenter presses
- „LPrSafe_BrakeTestTimer“ – Generation of a safe time duration between static brake tests
- „LPrSafe_BrakeTestActive“ – Active brake test function block
- „LPrSafe_ SingleStrokeMon“ – Monitoring Single stroke mode
- „LPrSafe_BrakeRampMon“ – Monitoring of Emergency stop brake ramp „LPrSafe_DriveMon“ – Monitoring of standstill and max. speed

Usability

New styleguide

SIMATIC Press Safety Library - LPrSafe

News in V3.0.0 – Safe operating mode change via HMI

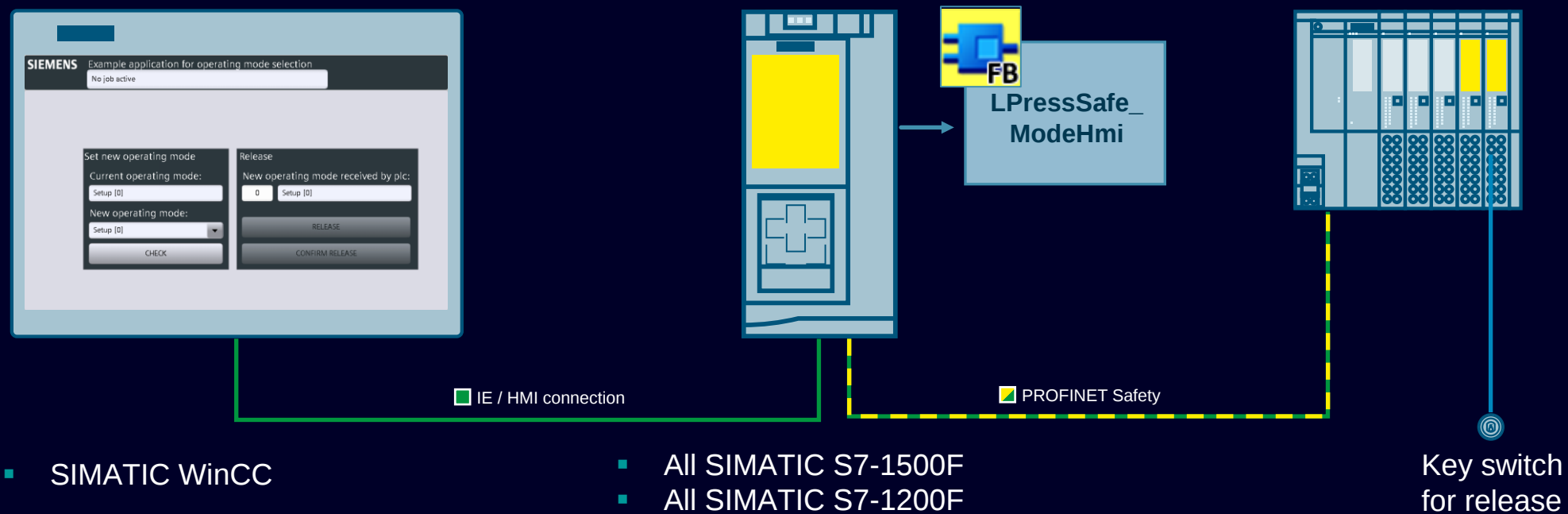


First, I select the desired operation mode

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News in V3.0.0 – Safe operating mode change via HMI

NEW



New requirements from Machinery Regulation (EU) 2023/1230

News in V3.0.0 - Logging functionality



Requirements in Annex III clause 1.2.1.

Shall be constructed in such a way that:

- **No actions beyond its defined task** and movement space;
- **Recording of data on the safety related decision-making** process for one year after its collection, to demonstrate the conformity to a competent national authority;
- It shall be possible at all times to **correct the machinery** to maintain it is **"inherent"** safety.

Logging functionality



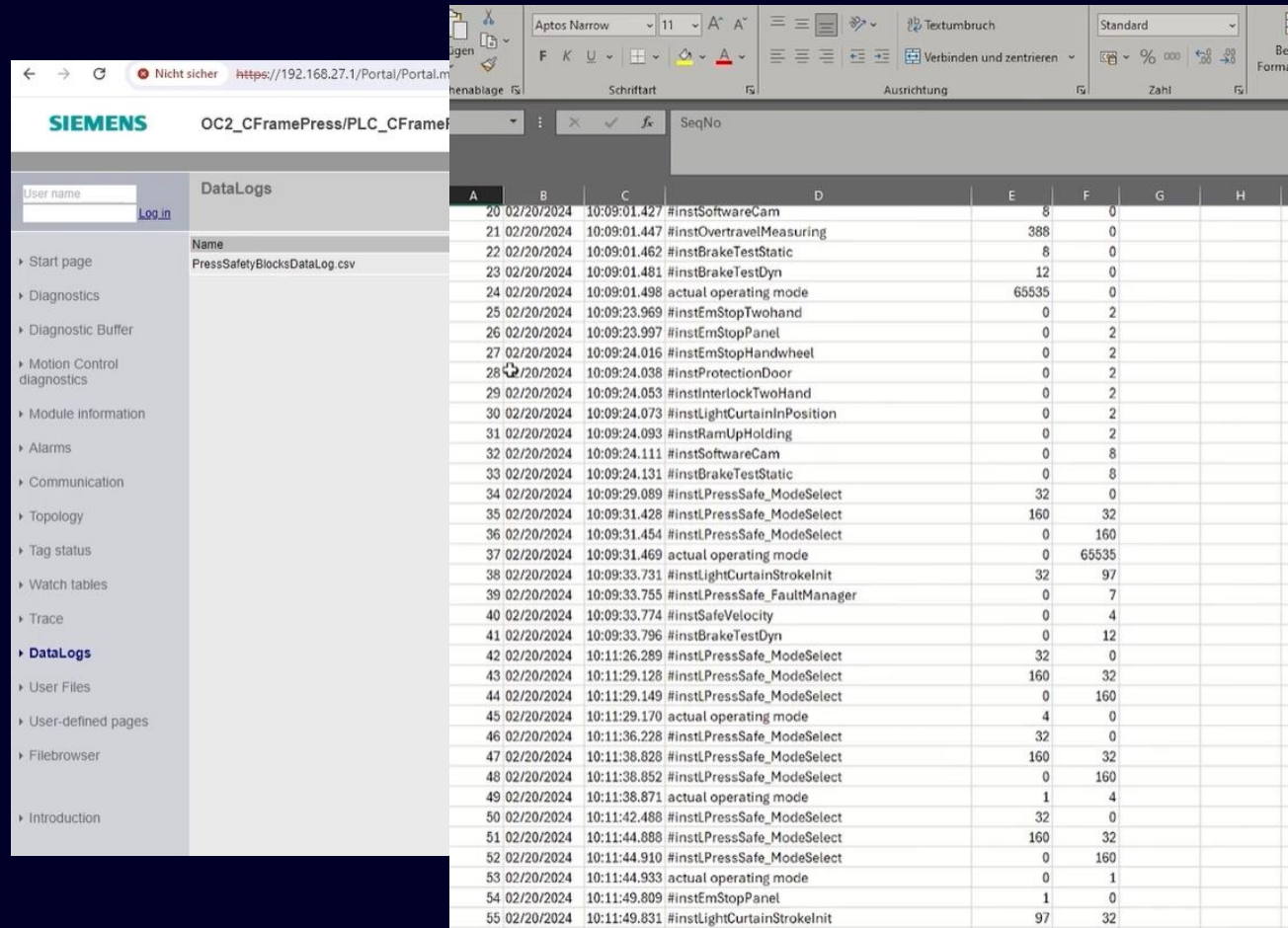
NEW

SIMATIC Press Safety Library - LPrSafe News in V3.0.0 - Logging functionality

NEW

What to do if, despite all precautions and safety measures, something happens...

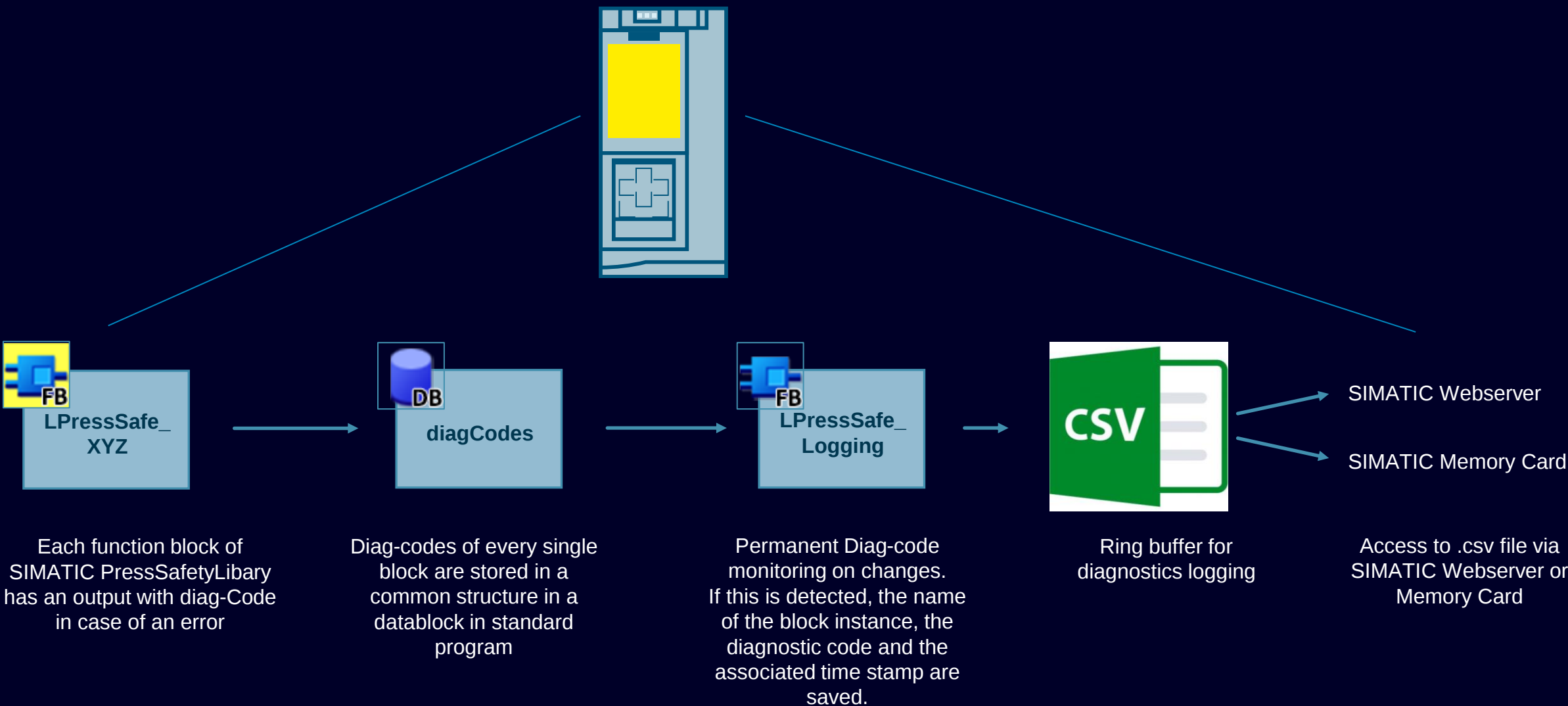
- What happened in the moment before the incident?
- Which operating mode was selected?
- Which signals were present at the failsafe-module



Date	Time	Signal	Value
20	02/20/2024	10:09:01.427	#InstSoftwareCam
21	02/20/2024	10:09:01.447	#InstOvertravelMeasuring
22	02/20/2024	10:09:01.462	#InstBrakeTestStatic
23	02/20/2024	10:09:01.481	#InstBrakeTestDyn
24	02/20/2024	10:09:01.498	actual operating mode
25	02/20/2024	10:09:23.969	#InstEmStopTwohand
26	02/20/2024	10:09:23.997	#InstEmStopPanel
27	02/20/2024	10:09:24.016	#InstEmStopHandwheel
28	02/20/2024	10:09:24.038	#InstProtectionDoor
29	02/20/2024	10:09:24.053	#InstInterlockTwoHand
30	02/20/2024	10:09:24.073	#InstLightCurtainInPosition
31	02/20/2024	10:09:24.093	#InstRamUpHolding
32	02/20/2024	10:09:24.111	#InstSoftwareCam
33	02/20/2024	10:09:24.131	#InstBrakeTestStatic
34	02/20/2024	10:09:29.089	#InstLPressSafe_ModeSelect
35	02/20/2024	10:09:31.428	#InstLPressSafe_ModeSelect
36	02/20/2024	10:09:31.454	#InstLPressSafe_ModeSelect
37	02/20/2024	10:09:31.469	actual operating mode
38	02/20/2024	10:09:33.731	#InstLightCurtainStrokeInit
39	02/20/2024	10:09:33.755	#InstLPressSafe_FaultManager
40	02/20/2024	10:09:33.774	#InstSafeVelocity
41	02/20/2024	10:09:33.796	#InstBrakeTestDyn
42	02/20/2024	10:11:26.289	#InstLPressSafe_ModeSelect
43	02/20/2024	10:11:29.128	#InstLPressSafe_ModeSelect
44	02/20/2024	10:11:29.149	#InstLPressSafe_ModeSelect
45	02/20/2024	10:11:29.170	actual operating mode
46	02/20/2024	10:11:36.228	#InstLPressSafe_ModeSelect
47	02/20/2024	10:11:38.828	#InstLPressSafe_ModeSelect
48	02/20/2024	10:11:38.852	#InstLPressSafe_ModeSelect
49	02/20/2024	10:11:38.871	actual operating mode
50	02/20/2024	10:11:42.488	#InstLPressSafe_ModeSelect
51	02/20/2024	10:11:44.888	#InstLPressSafe_ModeSelect
52	02/20/2024	10:11:44.910	#InstLPressSafe_ModeSelect
53	02/20/2024	10:11:44.933	actual operating mode
54	02/20/2024	10:11:49.809	#InstEmStopPanel
55	02/20/2024	10:11:49.831	#InstLightCurtainStrokeInit

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News in V3.0.0 - Logging functionality



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News in V3.0.0 – Active brake test



SIEMENS

Example application for servopresses with 1500-TF

Request brake test static / active

9/9/2024, 11:09:58 AM

Servo press

State

Production

OPM

Continuous stroke auto

Selected die:

9 / Active_Brake_Test

Active die:

9 / Active_Brake_Test

User

DefaultUser

Language

English

Actual position ram:

100.0 mm

Actual position eccentric:

0.0 °

Active brake test

HMI

Encoder adjustment

Active brake test

Cam profile OK

Strokerate OK

Unit mode OK

State OK

Set request

Start brake test

Test active

Test successful

Stopping time

156.00 ms

Stopping angle

7.50 °

Control

Operating mode

Production

Hydraulic

On

Off

Infeed

On

Off

Maindrive

On

Off

Positioning

Positioning mode

Target position

0.0 °

Move to TDC

Move to TDC

Light in forming area

On

Off

Light manual

On

Off

Home

Operation

Die data

Machine data

Diagnostics

Temperature

Commissioning

Colors

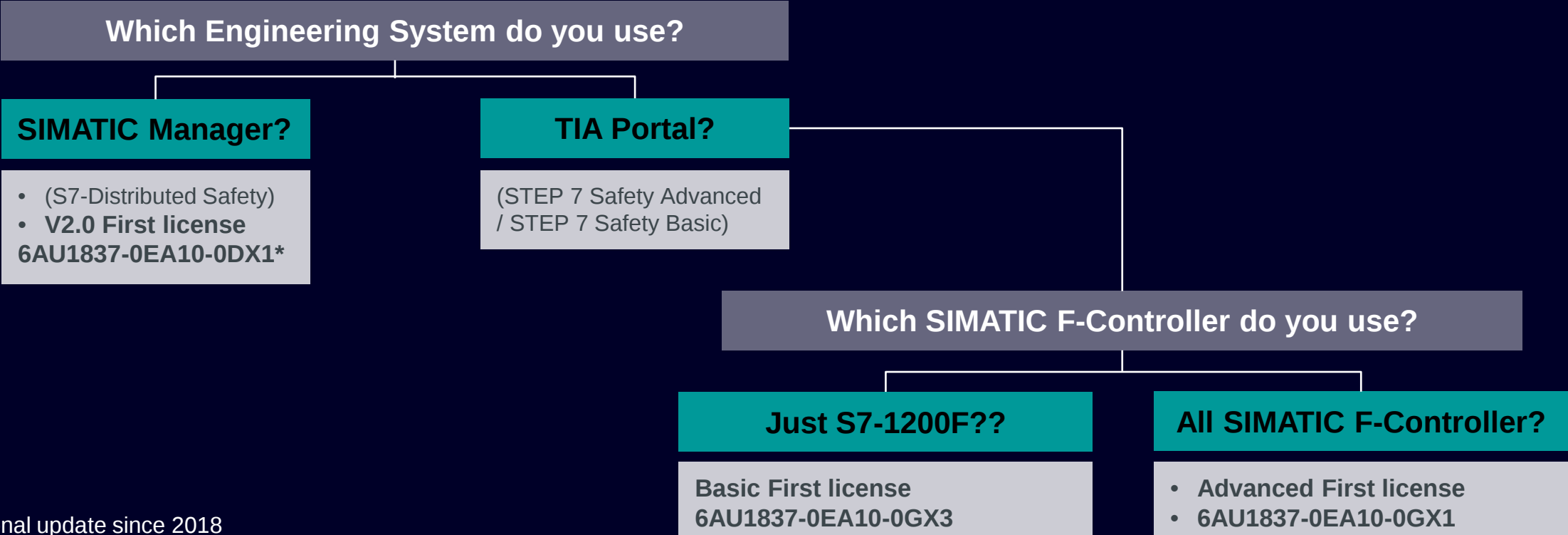
Refresh

SIMATIC Press Safety Library - LPrSafe

Select your First license

You want to use all advantages of Press Safety Library for the first time...
...a **First License** is your choice.

Included: certified Function block library, three certified example projects, Manual, Online help,...



* No functional update since 2018

SIMATIC Press Safety Library - LPrSafe

Select your Upgrade- and Machine licenses

...and you implement another machine

You are already Press Safety Library user in S7-Distributed Safety...

V2.0 Machine license **6AU1837-0EA10-0DX2**

Paper license as certificate for the proven use of function blocks for this machine

...and you implement another machine

You are already Press Safety Library user in TIA Portal...

Basic/Advanced Machine license **6AU1837-0EA10-0GX2**

Paper license used as certificate for the operation of one machine

...and S7-1200F is not enough, you want to use all F-Controller

Basic Upgrade license **6AU1837-0EA10-0EX2**

Identically content like Advanced First license (Full functionality, all F-Controllers, complete documentation,...)

SIMATIC Press Safety Library - LPrSafe

License overview

	Name	Order number	
SIMATIC Press Safety Library - LPrSafe V2.0.X (Distributed Safety)	First License	6AU1837 0EA10 0DX1	
	Machine License	6AU1837 0EA10 0DX2	
SIMATIC Press Safety Library - LPrSafe (TIA Portal)	Basic – First License	6AU1837 0EA10 0GX3	
	Advanced - First License	6AU1837 0EA10 0GX1	
	Machine License (Basic/Advanced)	6AU1837 0EA10 0GX2	
	Upgrade License (Basic)	6AU1837 0EA10 0EX2	



- Library, application, manual, certificate,
- Online help



- Paper license required
- Per F-PLC

SIMATIC Press Safety Library - LPrSafe

List of blocks (part 1)

Operating mode selector



“LPrSafe_ModeSelect” Operating mode selector 1 out of n → up to 8 modes



“LPrSafe_ModeSwitch” Operating mode selection via button



“LPrSafe_ModeHMI” Safe operating mode selection via HMI

Emergency off



“LPrSafe_EmergencyOff” Monitoring of Emergency off devices with or without restart inhibit

Safety doors



“LPrSafe_SafeDoorLock” Safety door with locking



“LPrSafe_SafeDoor” Safety door with or without manual acknowledgement

SIMATIC Press Safety Library - LPrSafe

List of blocks (part 2)

Two-hand consoles

 “LPrSafe_TwoHand” Operation and monitoring of a two-hand console

 “LPrSafe_TwoHandPlug” Operation and monitoring of a pluggable two-hand console

2 out of 2 evaluation

 “LPrSafe_Sensor1oo2” Evaluation of anti- and equivalent 2-channel sensors

Foot switches

 “LPrSafe_Foot” Evaluation of antivalent, 2-channel foot switches

 “LPrSafe_FootPlug” Evaluation of antivalent, 2-channel foot switches (pluggable)

Light curtain

 “LPrSafe_LightCurtainStrokeInit” Operation of a light curtain in safety and clock mode

 “LPrSafe_LightCurtain” Operation of a light curtain in safety mode

SIMATIC Press Safety Library - LPrSafe

List of blocks (part 3)

Speed and encoder monitoring



“LPrSafe_EncoderMon” Block to implement shaft breakage and encoder connection monitoring when using a PROFIsafe



“LPrSafe_PulseMonCount” Monitoring a mechanical cam switch gear (proximity switch and toothed gear)
– with counter module



“LPrSafe_PulseMonDI” Monitoring a mechanical cam switch gear (proximity switch and toothed gear)
– with digital input module

Valve monitoring



“LPrSafe_DynValveMon” Dynamic control of up to 4 valves

Quadruple AND



“LPrSafe_And4” Quadruple AND link with restart inhibit and error variable

SIMATIC Press Safety Library - LPrSafe

List of blocks (part 4)

Fault handling

 “LPrSafe_FaultManager“ Classification in error categories and acknowledgement

Logging (Logging function in standard program)

 “LPrSafe_Logging“ Save diag-code of the blocks incl. timestamp

Enable blocks

 “LPrSafe_Enable1Operator“ Enable for single-operator function

 “LPrSafe_Enable4Operators“ Enable for multi-operator function

Output cam blocks

 “LPrSafe_SoftwareCam“ Block to implement a software cam switchgear with overtravel monitoring

 “LPrSafe_SoftwareCamPendulum“ Block to implement a software cam switchgear in the “pendulum“ mode with variable end points

SIMATIC Press Safety Library - LPrSafe

List of blocks (part 5)

TDC switch off



“LPrSafe_StopDynamic“ Dynamic TDC switch-off and de-energizing the safety valves in the event of ram overload

Cam monitoring / TDC stop



“LPrSafe_CamMon“ Monitoring of the mechanical cam switchgear the dynamic TDC switch-off and of the overtravel



“LPrSafe_StopStatic“ Monitoring the dynamic TDC stop and the static TDC stop

Valve control



“LPrSafe_ValveMechPress“ Energizing the press safety valves on mechanical presses (clutch/brake combination)



“LPrSafe_ValveHydPress“ Energizing the press safety and directional valves on hydraulic presses

SIMATIC Press Safety Library - LPrSafe

List of blocks (part 6)

Valve and relay monitoring



“LPrSafe_Feedback” Monitoring of valves and relays



“LPrSafe_Cartridge” Switching time for cartridge valves on de-energizing



“LPrSafe_Contact” Energizing 1 or 2 actuators (contactor/valve) and monitoring (feedback circuit)



“LPrSafe_CheckStatic” Energizing and static monitoring of valves/contactors

Overtravel monitoring



“LPrSafe_OvertravelMon” Monitoring of the overtravel of linear presses



“LPrSafe_OvertravelMeasuring” Measurement of the overtravel distance and the overtravel time

SIMATIC Press Safety Library - LPrSafe

List of blocks (part 7)

Functions for servo presses



“LPrSafe_BrakeTestStatic“ Function for static brake test



“LPrSafe_BrakeTestTimer“ Generation of the requirement for static brake test



“LPrSafe_BrakeTestActive“ Function for active brake test



“LPrSafe_SafeSetupSingle“ Safe setup operation and single-stroke operation



“LPrSafe_SingleStrokeMon“ Ensuring single-stroke operation



“LPrSafe_BrakeRampMon“ Monitoring of Emergency stop ramp



“LPrSafe_DriveMon“ Monitoring for standstill and maximum speed

SIMATIC Press Safety Library - LPrSafe

LPrSafe_ModeSelect

Selecting operating mode by rotary switch



- One channel operating mode switch
- Up to 8 operating modes configurable
- Multi selection and cross circuit is recognized
- Time for multi selection is configurable



"LPrSafe_ModeSelect"			
...	EN		
FALSE	opmSetup	opmSetupActive	FALSE
FALSE	opm1	opm1Active	FALSE
FALSE	opm2	opm2Active	FALSE
FALSE	opm3	opm3Active	FALSE
FALSE	opm4	opm4Active	FALSE
FALSE	opm5	opm5Active	FALSE
FALSE	opm6	opm6Active	FALSE
FALSE	opmBackwards	opmBackwardsActive	FALSE
FALSE	tdc	opmActive	-1
FALSE	standstillMaindrive	diag	16#0
FALSE	psvState	errorChangeOpm	FALSE
T#0ms	discrepancyTime	ENO	
FALSE	errorShortCircuit		

SIMATIC Press Safety Library - LPrSafe

LPrSafe_ModeSwitch

Selecting operating mode by button



- One channel operating mode buttons
- Up to 8 operating modes configurable
- Multi selection and cross circuit is recognized
- Time for multi selection is configurable
- Enable changing with switch



"LPrSafe_ModeSwitch"			
...	EN		
FALSE	enableOpmChange		
false	opmOff	opmSetupActive	FALSE
FALSE	opmSetup	opm1Active	FALSE
FALSE	opm1	opm2Active	FALSE
FALSE	opm2	opm3Active	FALSE
FALSE	opm3	opm4Active	FALSE
FALSE	opm4	opm5Active	FALSE
FALSE	opm5	opm6Active	FALSE
FALSE	opm6	opmBackwardsActive	FALSE
FALSE	opmBackwards	opmActive	-1
FALSE	tdc	opmChangeTimeAct	T#0ms
FALSE	standstillMaindrive	diag	16#0
FALSE	psvState	errorChangeTimeOver	FALSE
T#0ms	opmChangeTime	errorChangeOpm	FALSE
FALSE	errorTwoSwitches	ENO	

SIMATIC Press Safety Library - LPrSafe

LPrSafe_ModeHMI

Selecting operating mode by HMI



- Up to 8 operating modes configurable
- Release of operating mode change via key switch or similar at safe input
- Selection of operating mode via drop-down menu on the HMI
- Confirmation of the operating mode read back on the HMI
- Plausibility check of the selected operating mode in the function block



"LPrSafe_ModeHMI"		
		opmSetupActive — FALSE
		opm1Active — FALSE
		opm2Active — FALSE
		opm3Active — FALSE
...	EN	opm4Active — FALSE
FALSE	execute	opm5Active — FALSE
-1	newOpm	opm6Active — FALSE
0	opmModTypeA	opmBackwardsActive — FALSE
0	opmModTypeB	opmToRelease — -1
FALSE	enableSwitch	opmActive — -1
FALSE	release	diag — 16#0
FALSE	tdc	error — FALSE
FALSE	standstillMaindrive	ENO —
FALSE	psvState	

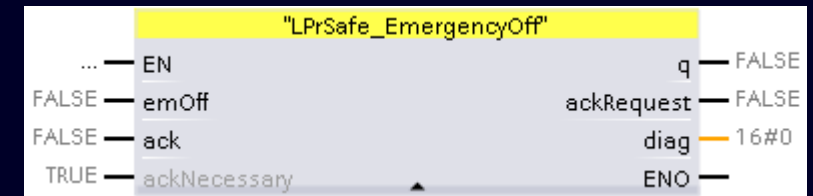
SIMATIC Press Safety Library - LPrSafe

LPrSafe_EmergencyOff

Emergency stop with and without restart inhibit



- 2 channel equivalent evaluation
- 2 of 2 evaluation in the F-HW module
- Restart interlock can be parameterized
- Indicate the acknowledgement request

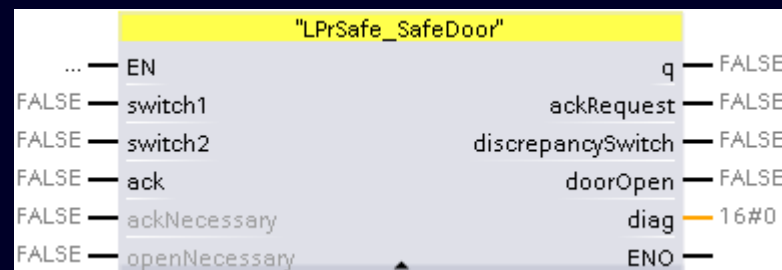


SIMATIC Press Safety Library - LPrSafe

LPrSafe_SafeDoor and LPrSafe_SafeDoor Lock

Monitoring of a safety door

- Read in 2 channels
- With or without manual acknowledgement possible
- SafeDoorLock: Function block activates locking function and monitors this actuation



SIMATIC Press Safety Library - LPrSafe

LPrSafe_TwoHand and LPrSafe_TwoHandPlug

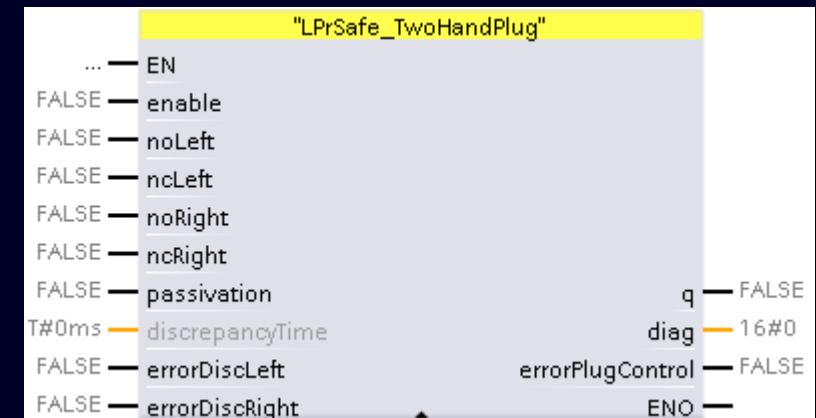
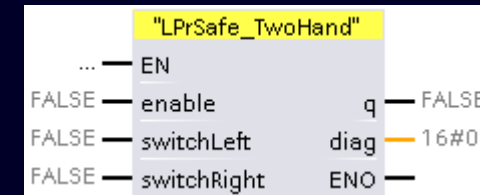
Two-hand consoles



- For 2 NC contact / NO contact combinations
- Monitoring of discrepancy time and correct actuation
- wire breakage and cross circuit detection

TwoHandPlug:

- For plug-in 2-hand consoles
- Plug control
- Possibility of wiring the contacts to different modules/ assembly



SIMATIC Press Safety Library - LPrSafe

LPrSafe_Sensor1oo2

Evaluate two-channel sensors

- Evaluation of discrepancy with software possible
- Possibility of wiring the contacts to different modules/ assembly

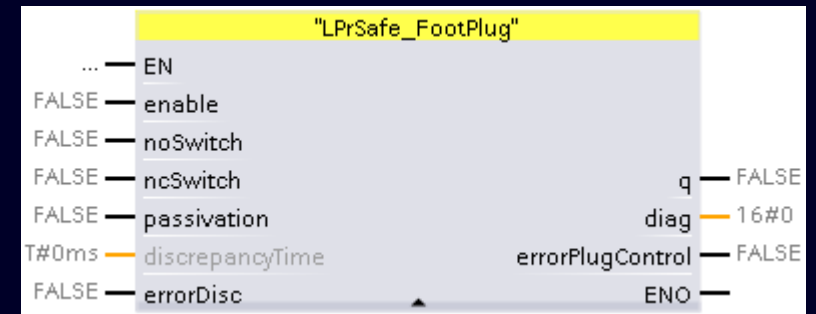
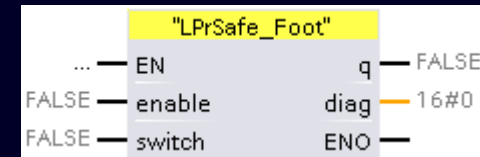


SIMATIC Press Safety Library - LPrSafe

LPrSafe_Foot und LPrSafe_FootPlug

Foot switches and pluggable foot switches

- LPrSafe_Foot: Realization of the 2 out of 2 evaluation in the safety Hardware
- LPrSafe_FootPlug: Plug control and contact control with the NO and NC contacts; No additive contact necessary



SIMATIC Press Safety Library - LPrSafe

LPrSafe_LightCurtain

Operation and supervision safety light curtain



- Detection of multi selection and cross circuit at the light curtain operating mode switch
- Only for safety mode or deactivated light curtain



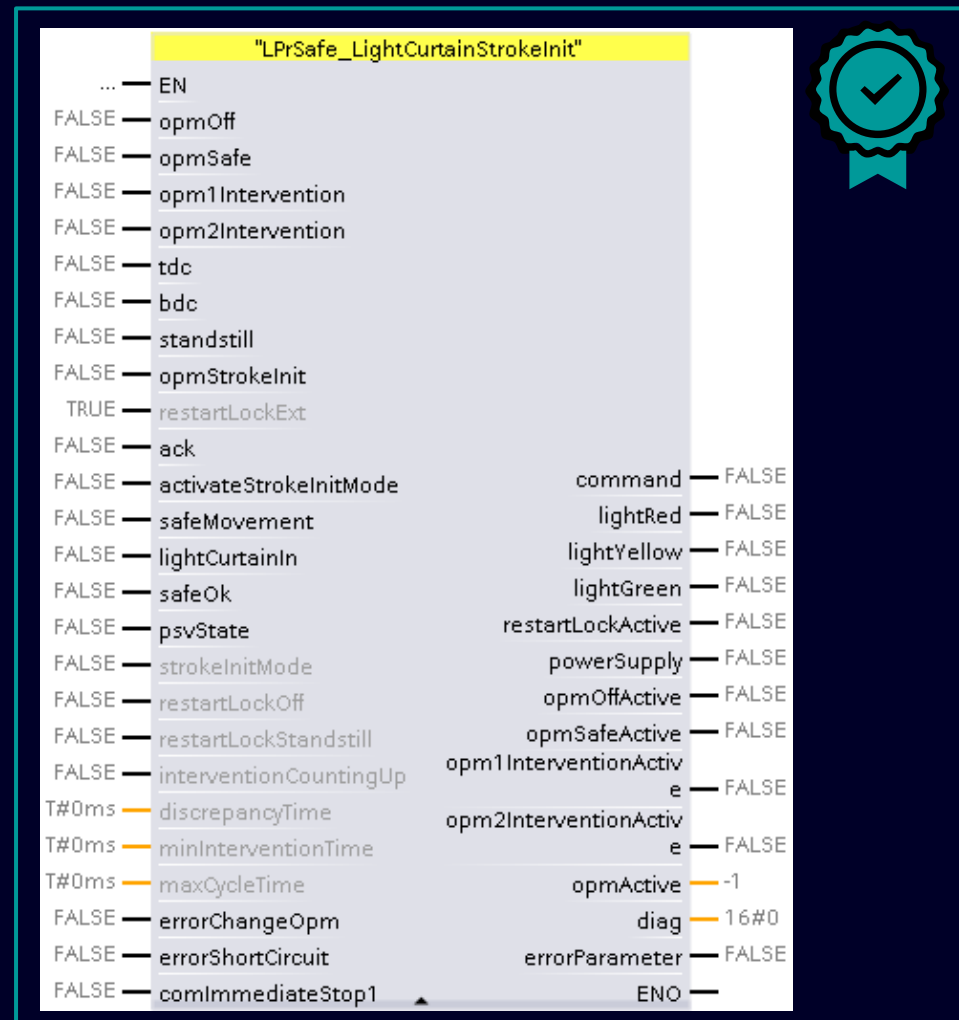
"LPrSafe_LightCurtain"			
...	EN		
FALSE	opmOff		
FALSE	opmSafe		
FALSE	tdc		
FALSE	ack		
FALSE	safeMovement	q	FALSE
FALSE	lightCurtainIn	ackRequest	FALSE
FALSE	psvState	powerSupply	FALSE
FALSE	startingLock	opmOffActive	FALSE
FALSE	restartLock	opmSafeActive	FALSE
T#0ms	discrepancyTime	diag	16#0
FALSE	errorChangeOpm	errorInputSignal	FALSE
FALSE	errorShortCircuit	ENO	

SIMATIC Press Safety Library - LPrSafe

LPrSafe_LightCurtainStrokeInit

Operation and supervision safety light curtain

- Detection of multi selection and cross circuit at the light curtain operating mode switch
- Safety and clock mode possible
- Indicates the state of the light curtain
- Clock mode in standard mode and sweden mode
- Switching off the power supply when deactivated



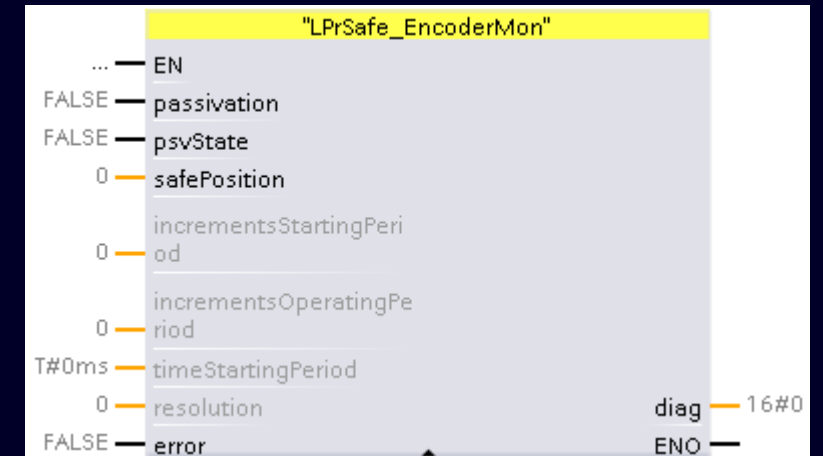
SIMATIC Press Safety Library - LPrSafe

LPrSafe_EncoderMon

Shaft breakage and encoder connection monitoring



- Use of a PROFIsafe-encoder instead of a mechanical cam switchgear
- Monitoring position change of the encoder while press safety valves are energized
- Startup period and operation period configurable



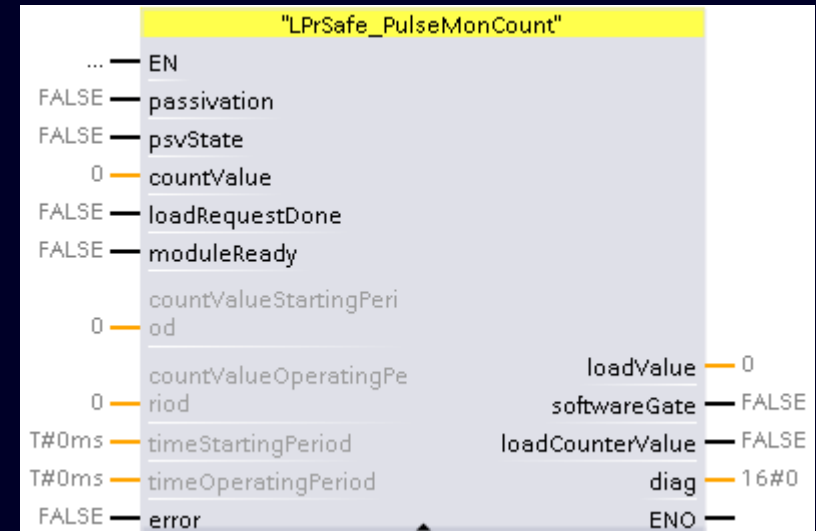
SIMATIC Press Safety Library - LPrSafe

LPrSafe_PulseMonCount

Monitoring of a mechanical cam switchgear with a counter module



- Recording the pulses of a pulse generator (e.g. 30 pulses per press stroke)
- Monitors the pulse generator / cam switch unit for minimum pulse count with activated press safety valves
- Evaluation of a defect at the shaft or the cam switch-gear
- Startup period and operation period parameterizable
- Passivation possible (e.g. at setting up)
- Detection with counter module (TM Count 1x24V)



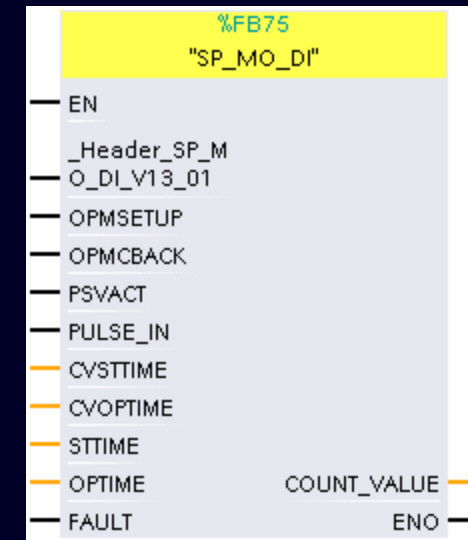
SIMATIC Press Safety Library - LPrSafe

LPrSafe_PulseMonDI

Monitoring of a mechanical cam switchgear (speed monitor)



- Recording the pulses of a pulse generator (e.g. 30 pulses per press stroke)
- Monitors the pulse generator / cam switch unit for minimum pulse count with activated press safety valves
- Startup period and operation period parameterizable
- Passivation possible (e.g. at setting up)
- Pulse recording via safe digital input
- No counter module required
- Only for “slow” presses applicable
 - otherwise use „LPrSafe_PulseMonCount“



SIMATIC Press Safety Library - LPrSafe

LPrSafe_DynValveMon

Dynamic monitoring of up to 4 valves



- Monitoring of position change during a full stroke
- Passivation e.g. at certain operating modes



"LPrSafe_DynValveMon"			
...	EN		
FALSE	passivation	allValvesInInitState	FALSE
FALSE	feedback1	valve1ChangedPos	TRUE
FALSE	feedback2	valve2ChangedPos	TRUE
FALSE	feedback3	valve3ChangedPos	TRUE
FALSE	feedback4	valve4ChangedPos	TRUE
FALSE	tdc	ready	FALSE
FALSE	bdc	diag	16#0
FALSE	error	ENO	

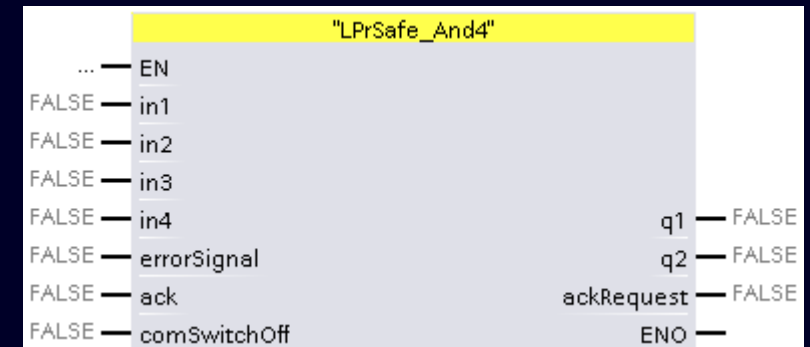
SIMATIC Press Safety Library - LPrSafe

LPrSafe_And4

4-signals AND link and with one Error variable
(negated)



- Manually acknowledgement for restart necessary
- Possible Application: Enable of safety zones or of a load voltage



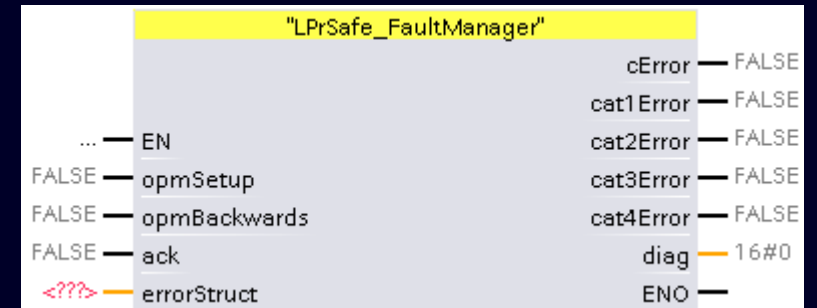
SIMATIC Press Safety Library - LPrSafe

LPrSafe_FaultManager

Error handling



- Function blocks for management of errors
- Triggering of a collective error
- Classification of the errors in categories:
 - 1: automatic reset
 - 2: Acknowledge in operating mode set up or control backwards
 - 3: Acknowledge in every operating mode
 - 4: Reset by restart of the control system
- error variables are set in a data block
access via F-UDT to freely chosen DB



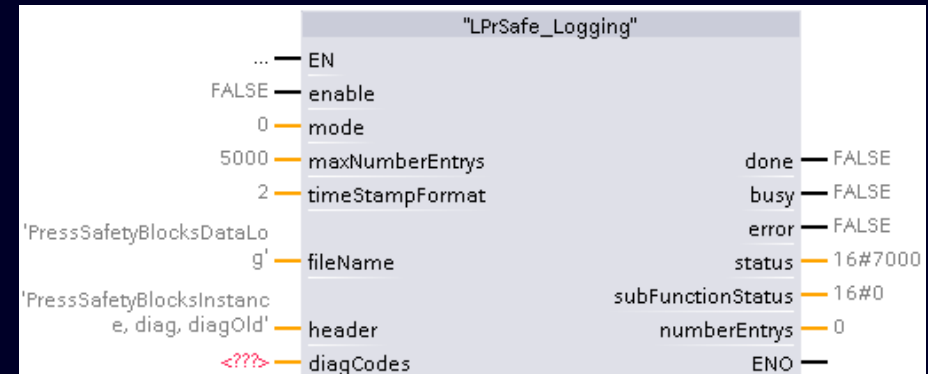
SIMATIC Press Safety Library - LPrSafe

LPrSafe_Logging

Status backup with time stamp



- Diagnostic codes of all instantiated blocks are checked for changes
- If this is detected, the name of the block instance, the diagnostic code and the time stamp are saved in a ring buffer



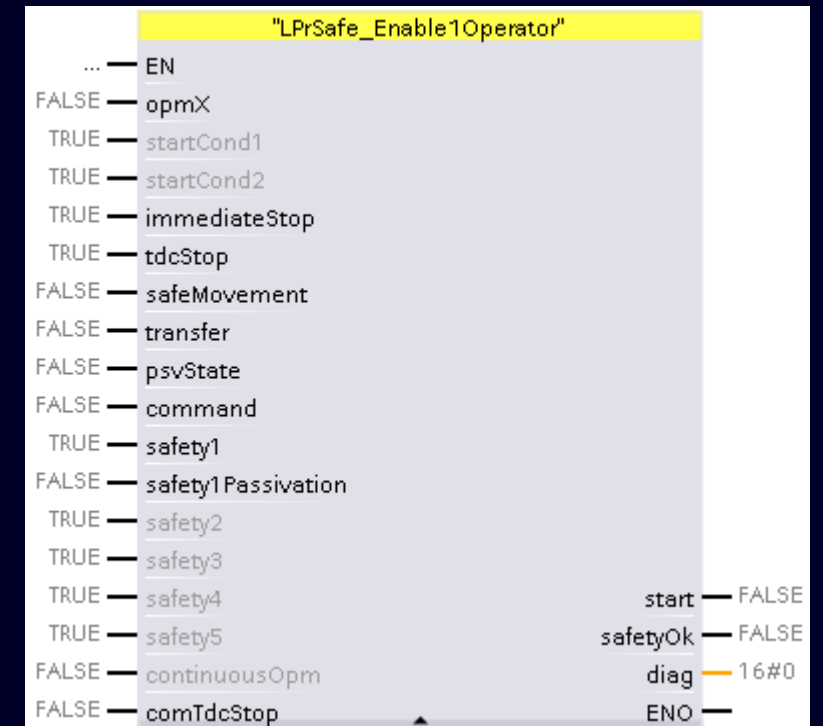
SIMATIC Press Safety Library - LPrSafe

LPrSafe_Enable1Operator

Enable of single operator function



- Starting the press with only one command device
- One safety device can be bypassed, 4 safety devices can't be bypassed
- Generates the start signal from the state of the command device and safety devices
- Transfers the start signal to the block which energizes the valves
- Evaluation of a safe movement (safeMovement) possible

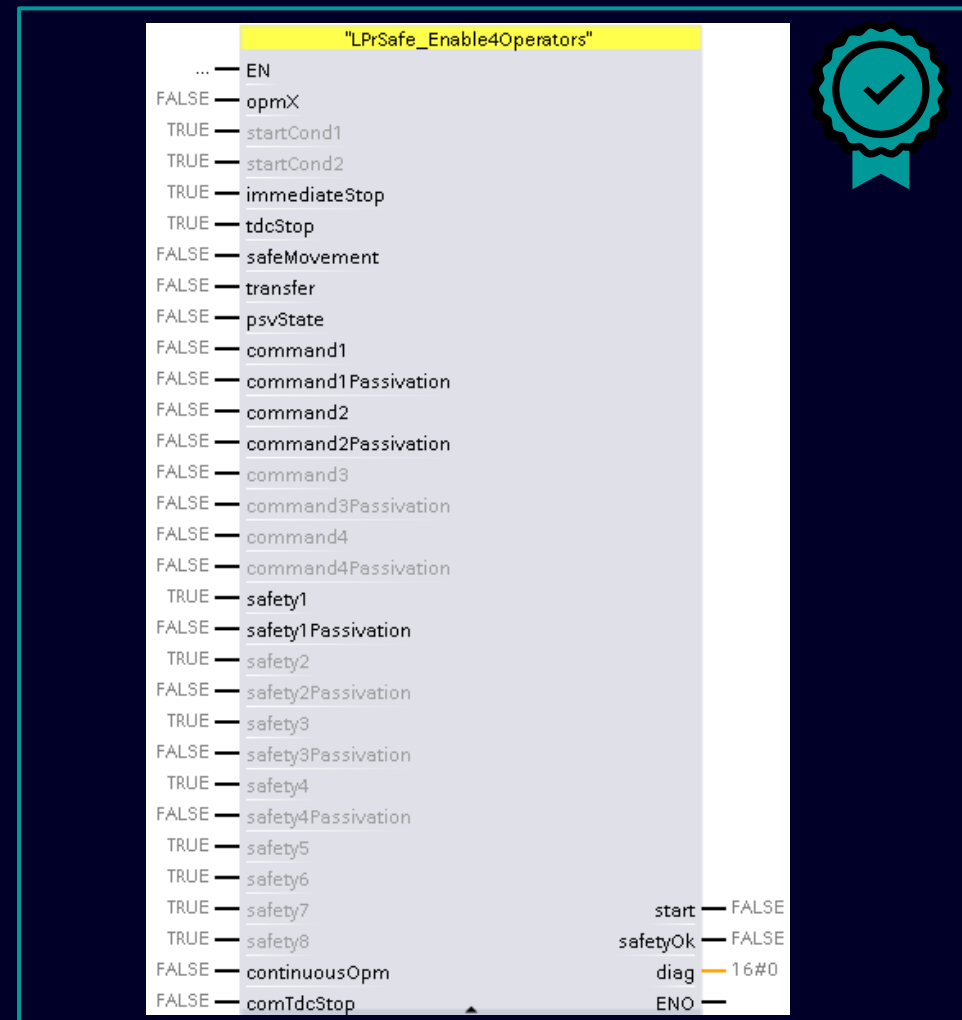


SIMATIC Press Safety Library - LPrSafe

LPrSafe_Enable4Operators

Enable of multi-operator function

- Handling of the press with up to 4 command devices
- 4 safety devices can be bypassed and 4 safety devices can't be bypassed
- Generates start signal from the state of the command devices and safety devices
- Transfers the start signal to the block which energizes the valves
- Evaluation of a safe movement (safeMovement) possible



SIMATIC Press Safety Library - LPrSafe

LPrSafe_SoftwareCam

Software cam switchgear and overtravel monitoring

- Cam generation based on actual safe position
- Position can be received by PROFIsafe-encoder
- Position can be received by PROFIsafe telegram 901 (safety integrated function Safe Position)
- Parameterization of a hysteresis possible
- Unit takes stroke height adjustment into account
- Possibility to save the position adjustment remanently
- Separate signal if cams are valid
- Release after position adjustment
- Overtravel monitoring at TDC stop



"LPrSafe_SoftwareCam"			
...	EN		
0	safePosition		
FALSE	safePositionValid		
FALSE	safeReferenced		
FALSE	strokeHeightChanged		
FALSE	teachTdc		
FALSE	teachBdc	rampUpCam	FALSE
FALSE	opmSetup	overtravelCam	FALSE
FALSE	psvState	camsValid	FALSE
-999	retainSubsValue	teachingNeeded	FALSE
-999	retainPositionOffset	testStrokeNeeded	FALSE
TRUE	retainError	risEdgeRampUpCamNe	FALSE
0	resolution	eded	FALSE
0	bdc	falEdgeRampUpCamNe	FALSE
0	hysteresis	eded	FALSE
0	rampUpCamStart	risEdgeOvertravelCam	FALSE
0	rampUpCamEnd	Needed	FALSE
0	overtravelCamStart	falEdgeOvertravelCam	FALSE
0	overtravelCamEnd	Needed	FALSE
FALSE	enableAdjustment	confirmingNeeded	FALSE
FALSE	error	adjustmentDone	TRUE
FALSE	comTdcStop	positionOffset	0
		diag	16#0
		ENO	



SIMATIC Press Safety Library - LPrSafe

LPrSafe_SoftwareCamPendulum

Software cam switchgear in “pendulum” mode



- Designed for servopresses (adapted for standard applications)
- Cam generation based on actual position and direction
- Position can be received by PROFIsafe-encoder
- Position can be received by PROFIsafe telegram 901 (safety integrated function Safe Position)
- Parameterization of a hysteresis possible
- Separate signal if cams are valid
- Separate signals for identification of the press direction
- Variable pendulum end points (learnable remanently savable)



"LPrSafe_SoftwareCamPendulum"			
...	EN		
0	safePosition		
FALSE	safePositionValid		
FALSE	safeReferenced		
FALSE	teachTdc		
FALSE	opmSetup		
0	pendulumStartPosition		
0	pendulumEndPosition	rampUpCam	FALSE
-999	retainSubsValue	overtravelCam	FALSE
-999	retainTeachedPosition	camsValid	FALSE
TRUE	retainError	directionPositive	FALSE
0	resolution	directionNegative	FALSE
0	bdc	teachingNeeded	FALSE
0	tdcCamArea	adjustmentDone	FALSE
0	tolerance	teachedPosition	0
0	hysteresis	diag	16#0
FALSE	error	ENO	

SIMATIC Press Safety Library - LPrSafe

LPrSafe_StopDynamic

De-energizing the safety valves on dynamic TDC stop or on ram overload



- Dynamic cam is not monitored
- Dynamic stopping at TDC depending on the falling edge of the dynamic cam
- Realization of changing stroke rates



SIMATIC Press Safety Library - LPrSafe

LPrSafe_CamMon

Monitoring the cams at a mechanical press



- Overtravel monitoring
- Monitoring of the mechanical cam switchgear, the dynamic TDC switch-off and of the over run
- TDC switch-off with rising edge of overtravel cam, if no dynamic TDC switch off
- Static `0` or `1` and loss of the cams is detected



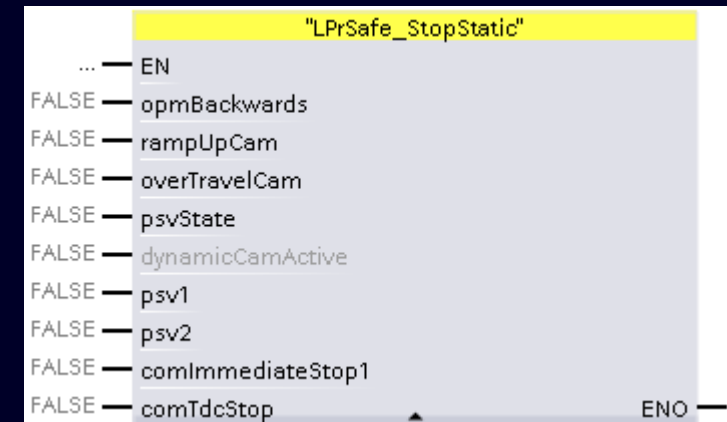
SIMATIC Press Safety Library - LPrSafe

LPrSafe_StopStatic

Monitoring the dynamic TDC stop and the static TDC stop



- Responsible for TDC stop if a dynamic cam is not used
- Realizes the TDC stop if dynamic standard output cam was missing
- Is used instead of the "LPrSafe_CamMon" function block if the software cam function block is used



SIMATIC Press Safety Library - LPrSafe

LPrSafe_ValveMechPress

Energize the press safety valves on a mechanical press



- Energizing of two press safety valves depending on start signal common error and emergency stop



SIMATIC Press Safety Library - LPrSafe

LPrSafe_ValveHydPress

Energize the press safety valves of a hydraulic press

- Energizing of two press safety valves, DOWN valves and UP valves
- 3 groups of start up signals
 - MANUAL (2)
 - SINGLE STROKE (6)
 - CONTINUOUS STROKE (2)



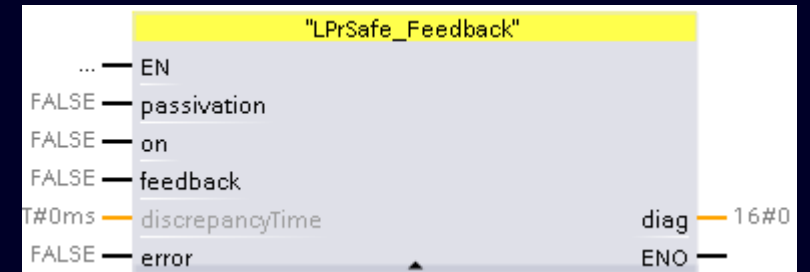
SIMATIC Press Safety Library - LPrSafe

LPrSafe_Feedback

Monitoring of valves/relays



- Monitoring of 2 valves / relays
- accordance of the feedback with the energizing command within a set time
- Deactivation of the monitoring is possible
- Message of a „false“ feedback



SIMATIC Press Safety Library - LPrSafe

LPrSafe_Cartridge

Monitoring of cartridge valves

- Monitoring only when shutting off the valves
- Accordance of the feedback with the energizing command within a set time
- Deactivation of the monitoring is possible

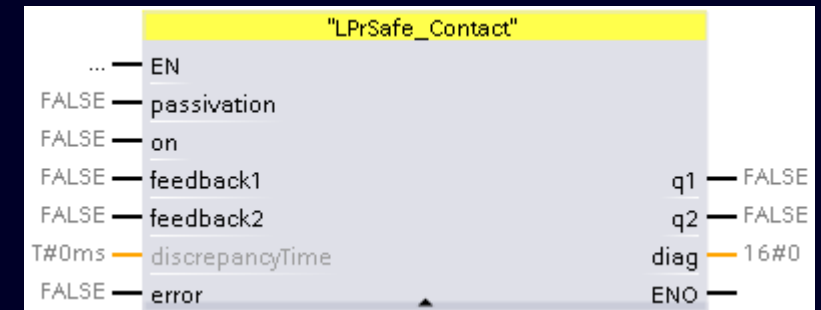


SIMATIC Press Safety Library - LPrSafe

LPrSafe_Contact

Energizing and controlling of 2 valves/relays

- Energizing of the valve / relay combination
- accordance of the feedback with the energizing command within a set time
- Energizing only possible if the valves/ relays are in base position



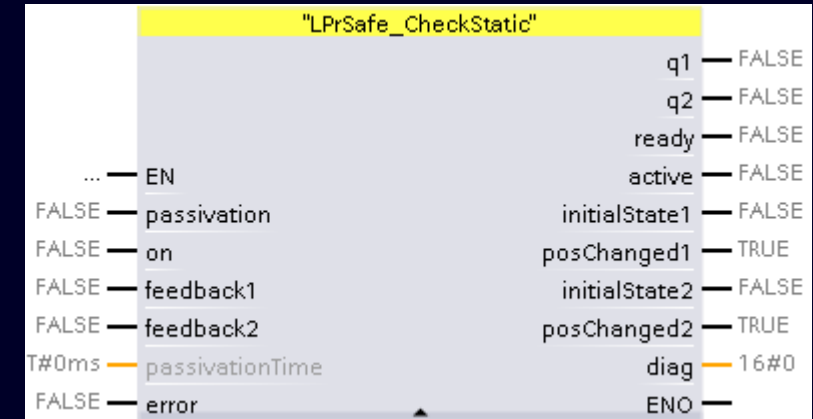
SIMATIC Press Safety Library - LPrSafe

LPrSafe_CheckStatic

Energizing and controlling of 2 valves/relays



- Energizing of the valve / relay combination
- Feedback signals monitored for signal change between activation and deactivation
- A time in which the monitoring of the feedback is passivated can be parameterized
- Energizing only possible if the valve s/ relays are in base position



SIMATIC Press Safety Library - LPrSafe

LPrSafe_OvertravelMon

Monitoring of overtravel at linear presses

- Deactivation of the monitoring in operating mode OPMSETUP
- Start of press only in base position
- Overtravel time parameterizable



"LPrSafe_OvertravelMon"			
...	EN		
FALSE	passivation		
FALSE	on		
FALSE	restart	q	FALSE
FALSE	cam	overtravelOk	FALSE
FALSE	tdc	overtravelNotOk	FALSE
FALSE	psvState	ready	FALSE
T#0ms	overtravelTime	diag	16#0
FALSE	error	ENO	

SIMATIC Press Safety Library - LPrSafe

LPrSafe_OvertravelMeasuring

Measurement of the overtravel distance and the overtravel time

- Uses the safe position and safe speed
- Measures and monitors the stopping distance and stopping time
- Checks the starting speed
- Does not output a control signal for the brake
- Outputs the last measured stopping distance and stopping time
- Can be used for modulo and linear axes

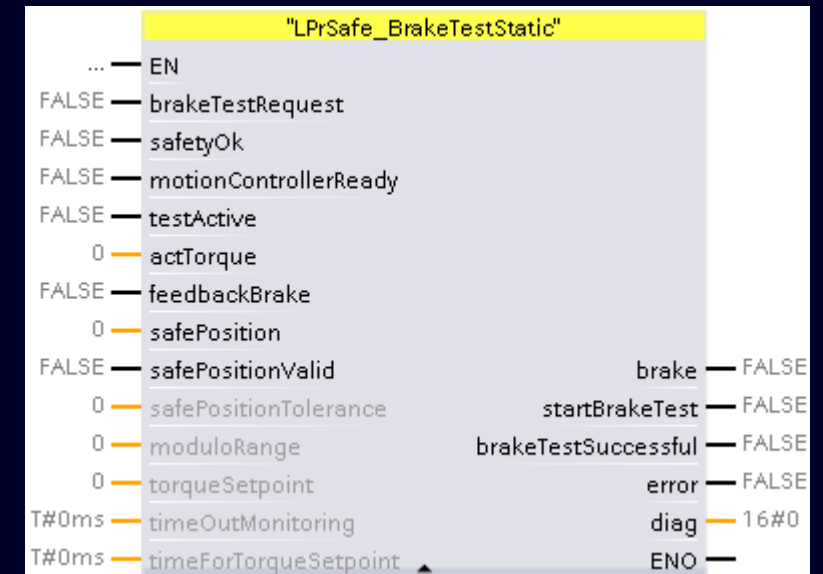


SIMATIC Press Safety Library - LPrSafe

LPrSafe_BrakeTestStatic

Static brake test of a servopress

- Designed for servopresses (adapted to standard applications)
- Accepts the brake test request
- Is monitoring the torque against the brake in the given time
- Monitors for standstill during the test
- Outputs control signal for the brake



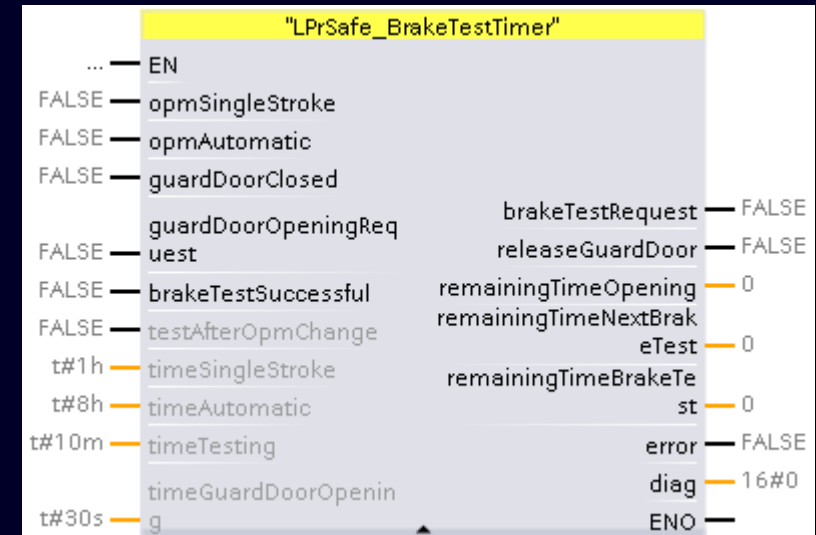
SIMATIC Press Safety Library - LPrSafe

LPrSafe_BrakeTestTimer

Timer for static brake test of a servopress



- Monitors the time from the last successful brake test
- Issues the request for a new test
- Monitors the time from request to successful test. If the time elapses without a successful test, a stop is initiated.
- Differentiation between single stroke, automatic or other operating mode
- Open safety gate request in automatic mode
- Displays the time until the next brake test, until the forced stop, or how long is left to open the safety gate

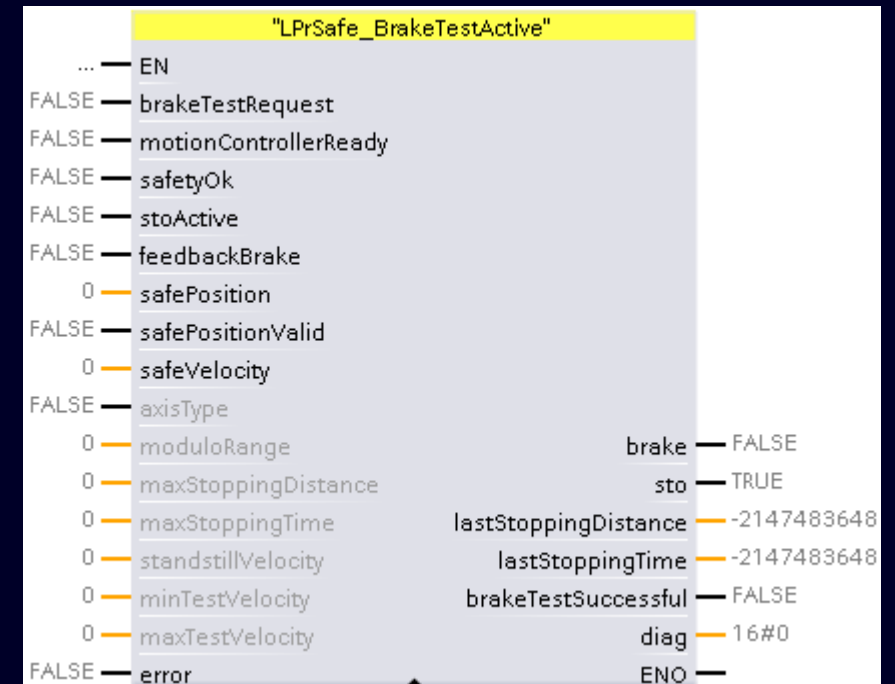


SIMATIC Press Safety Library - LPrSafe

LPrSafe_BrakeTestActive

Active brake test of a servopress

- Specially for servo presses (adapted to standard applications)
- Records the brake test request
- Monitors stopping distance and stopping time
- Checks the starting speed
- Outputs the control signal for the brake
- Evaluates request to open safety gate in automatic mode
- Outputs the last measured stopping distance and stopping time



SIMATIC Press Safety Library - LPrSafe

LPrSafe_SafeSetupSingle

Safe setup mode and single stroke mode of a servo press



- Designed for servopresses (adapted to standard applications)
- Check of the selected operating mode
- Reaction to two-hand push buttons
- Reaction to handwheel enable button
- Reaction to current state of safety devices (light curtain, safety door, laser scanner, output cams)
- Control of safety integrated functions in the drive (SOS, SLS, SLS_limit)
- Brake control
- Delay times configurable



"LPrSafe_SafeSetupSingle"			
...	EN		
FALSE	opmSetup		
FALSE	opmSingle		
FALSE	safetyOk		
FALSE	twohand		
	enableButtonHandwhe		
FALSE	el		
FALSE	safeMovement		
FALSE	feedbackBrake		
FALSE	sIsActive	startTwohandSetup	FALSE
FALSE	sosActive	startTwohandSingle	FALSE
FALSE	sIsWithTwohand	startHandwheel	FALSE
0	sIsLimitTwohandSetup	brake	FALSE
0	sIsLimitTwohandSingle	sIs	FALSE
0	sIsLimitHandwheel	sos	FALSE
T#0ms	delayTimeSos	sIsLimit	0
T#0ms	delayTimeBrakeClosing	diag	16#0
FALSE	error	ENO	

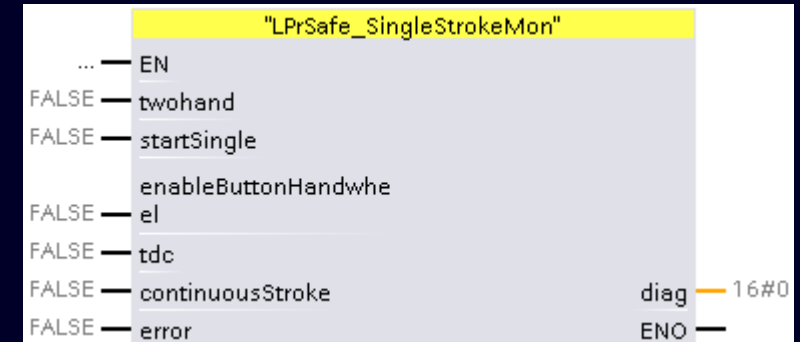
SIMATIC Press Safety Library - LPrSafe

LPrSafe_SingleStrokeMon

Guarantee the single stroke operation
of a servo press



- Specially for servo presses (adapted to standard applications)
- Monitors the command devices
- Expects the command devices to be released, at least once per press stroke, in non-continuous stroke operating modes

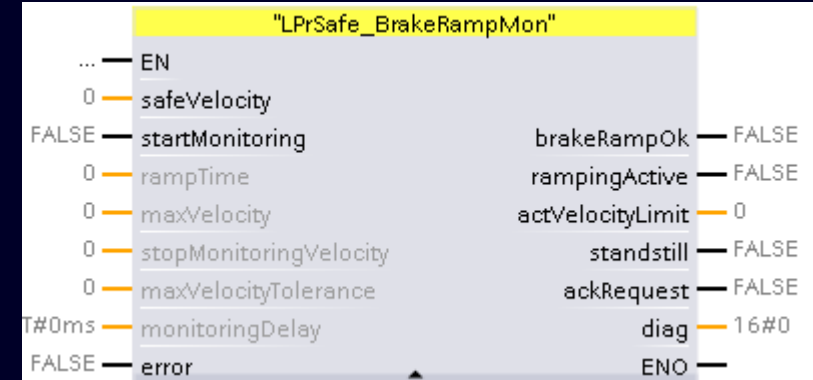


SIMATIC Press Safety Library - LPrSafe

LPrSafe_BrakeRampMon

Monitoring the emergency stop brake ramp

- Monitors observing a braking ramp
- Braking ramp is defined via time and speed
- Can trigger the stop reaction in the drive (e.g. STO)
- Can control the mechanical brake
- Indicates standstill
- Displays the active braking ramp



SIMATIC Press Safety Library - LPrSafe

LPrSafe_DriveMon

Monitoring for standstill and maximum speed

- Especially for servo presses with non-safely mounted encoder systems and external safety encoders
- Uses the safe position and safe speed
- Monitors for standstill
- Monitors for maximum speed
- Outputs control signal for STO



SIMATIC Press Safety Library - LPrSafe

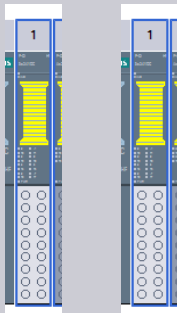
Use Case: Two-Hand-Control with Emergency Stop

How to reach SIL3/Plc with Two-Hand Control at a mechanical press

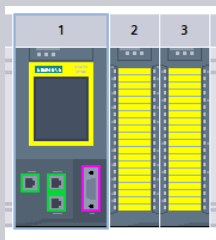
Two-Hand-Control incl.
Emergency Stop



Capture



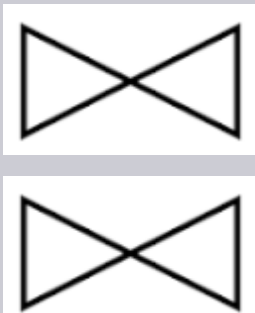
Evaluate



React



Press Safety valve
PSV



2-channel



I 12.0

2-channel



I12.1

- LPrSafe_LightCurtainStrokeInit [FB33516]
- LPrSafe_ModeSelect [FB33512]
- LPrSafe_SafeDoor [FB33505]
- LPrSafe_SoftwareCam [FB33525]
- LPrSafe_StopDynamic [FB33527]
- LPrSafe_StopStatic [FB33529]
- LPrSafe_TwoHand [FB33507]
- LPrSafe_ValveMechPress [FB33530]

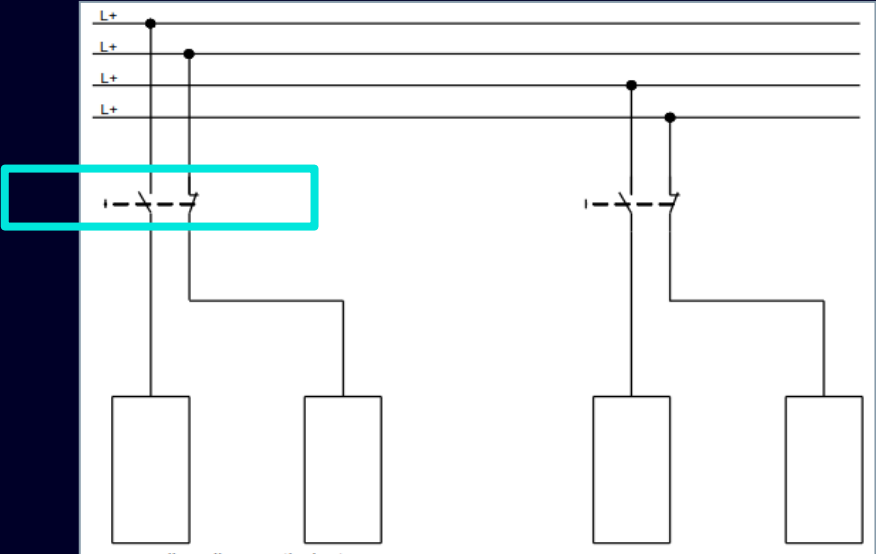
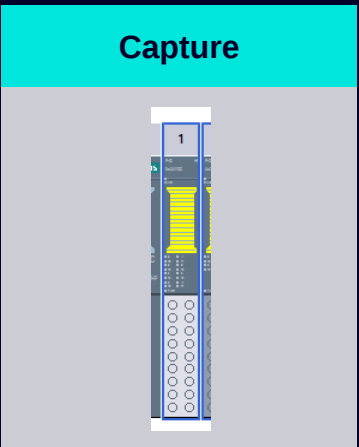
Q 24.0



2-channel

SIMATIC Press Safety Library - LPrSafe

Use Case: Two-Hand-Control with Emergency Stop



	name	type	address	tag table
	TwohandButton1	Bool	%I12.0	Default tag table
	TwohandButton2	Bool	%I12.1	Default tag table

2-channel _____ I 12.0

2-channel _____ I12.1

> Channel 0, 4

Sensor evaluation: 1oo2 evaluation, non-equivalent

Discrepancy behavior: Supply value 0

Discrepancy time: 500 ms

Reintegration after discrepancy error: Test 0-Signal not necessary

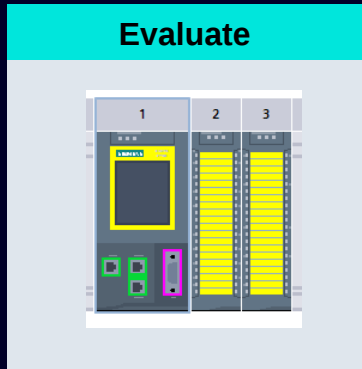
Electrical

Tag Declaration

F-Module configuration

SIMATIC Press Safety Library - LPrSafe

Use Case: Two-Hand-Control with Emergency Stop



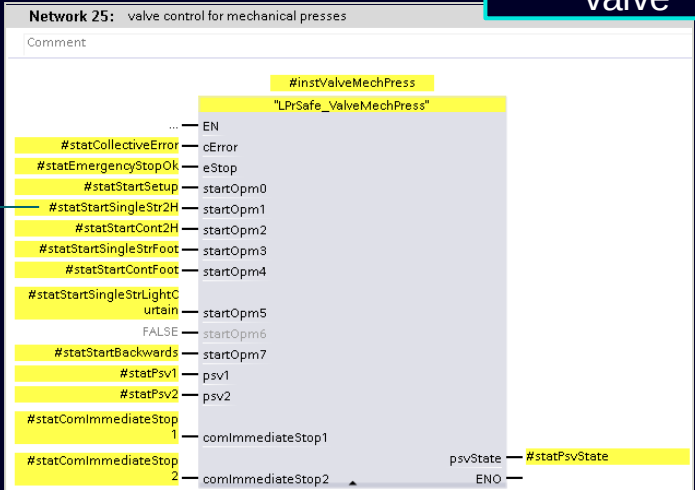
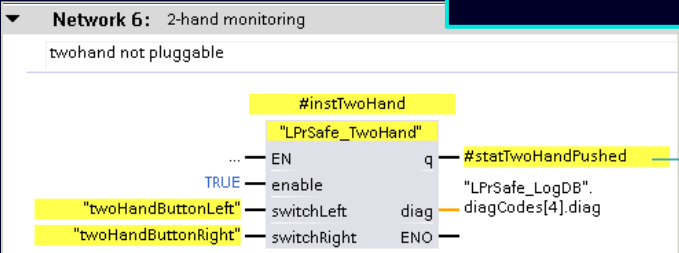
Programming

- LPrSafe_LightCurtainStrokeInit [FB33516]
- LPrSafe_ModeSelect [FB33512]
- LPrSafe_SafeDoor [FB33505]
- LPrSafe_SoftwareCam [FB33525]
- LPrSafe_StopDynamic [FB33527]
- LPrSafe_StopStatic [FB33529]
- LPrSafe_TwoHand [FB33507]
- LPrSafe_ValveMechPress [FB33530]

Set the command to the operating mode selection

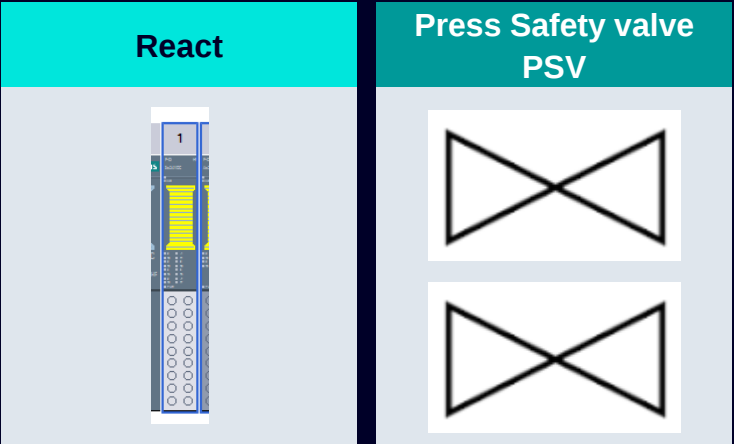
Control the press safety valve

Evaluate and check two-hand signals



SIMATIC Press Safety Library - LPrSafe

Use Case: Two-Hand-Control with Emergency Stop



Q 24.0  2-channel

	PressSafetyValve1	Bool	%Q24.1	Default tag table
	PressSafetyValve2	Bool	%Q24.2	Default tag table

F-DQ 4x24VDC/2A PM HF_1 [F-DQ 4x24VDC/2A PM HF]

GeneralIO tagsSystem constantsTexts

General

Potential group

Module parameters

F-parameters

DQ parameters

Channel 0

Channel 1

Channel 2

Channel 3

I/O addresses

Hardware identifier

Channel 0

☒ Activated

Max. readback time dark test:

1.0

☒ Activated light test

Max. readback time switch on test:

0.6

☒ Diagnosis: Wire break



Tag Declaration

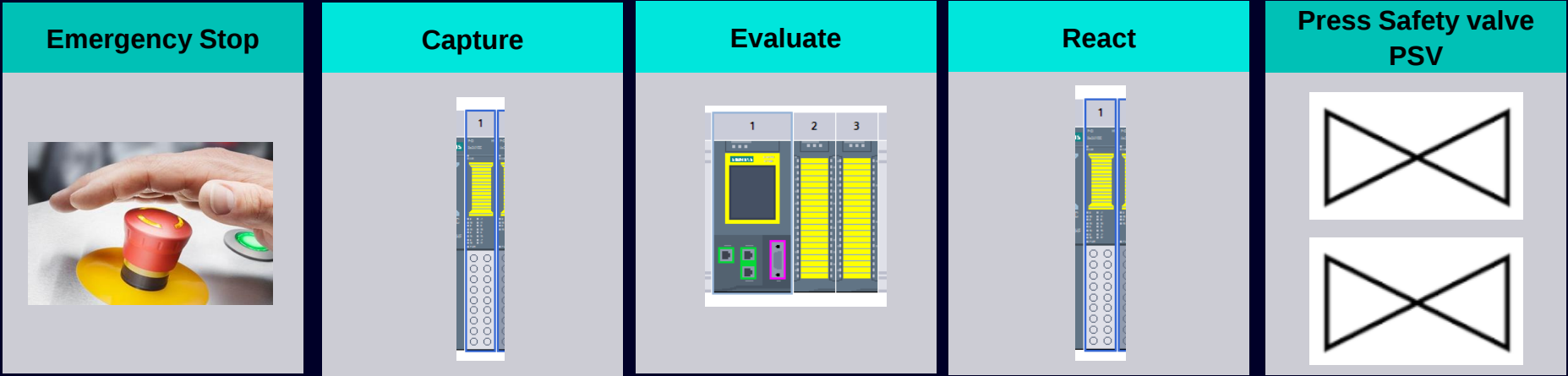
F-Module configuration

Electrical

SIMATIC Press Safety Library - LPrSafe

Use Case: Two-Hand control and reaction

How to reach SIL3/Ple with Emergency Stop at a mechanical press?



2-channel



I 1.0

- LPrSafe_LightCurtainStrokeInit [FB33516]
- LPrSafe_ModeSelect [FB33512]
- LPrSafe_SafeDoor [FB33505]
- LPrSafe_SoftwareCam [FB33525]
- LPrSafe_StopDynamic [FB33527]
- LPrSafe_StopStatic [FB33529]
- LPrSafe_TwoHand [FB33507]
- LPrSafe_ValveMechPress [FB33530]

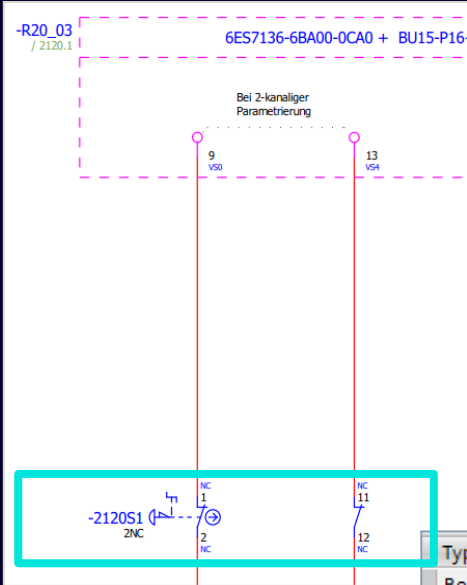
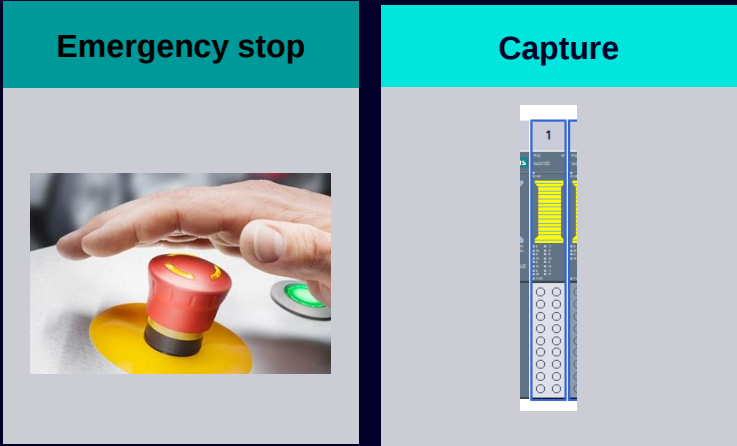
Q 2x.0



2-channel

SIMATIC Press Safety Library - LPrSafe

Use Case: Two-Hand control and reaction



Electrical

Tag Declaration

Typ	Adresse	Name	Variablentabelle
Bool	%I0.0	EmergencyStop	Default tag table

2-channel



I 1.0

F-DI 8x24VDC HF_1 [F-DI 8x24VDC HF]

GeneralIO tagsSystem constantsTexts

GeneralPotential groupModule parametersGeneralF-parametersDI parametersSensor supplyChannel parametersChannel 0, 4Channel 0Channel 4

Channel 0, 4

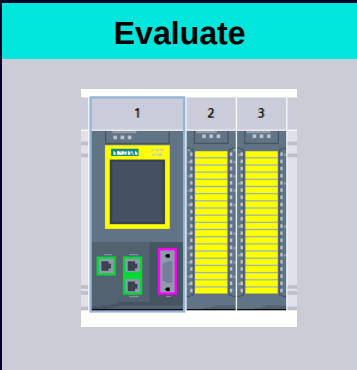
Sensor evaluation: 1oo2 evaluation, equivalentDiscrepancy behavior: Supply value 0Discrepancy time: 500 msReintegration after discrepancy error: Test 0-Signal not necessary

F-Module configuration

SIMATIC Press Safety Library - LPrSafe

Use Case: Two-Hand control and reaction

Programming

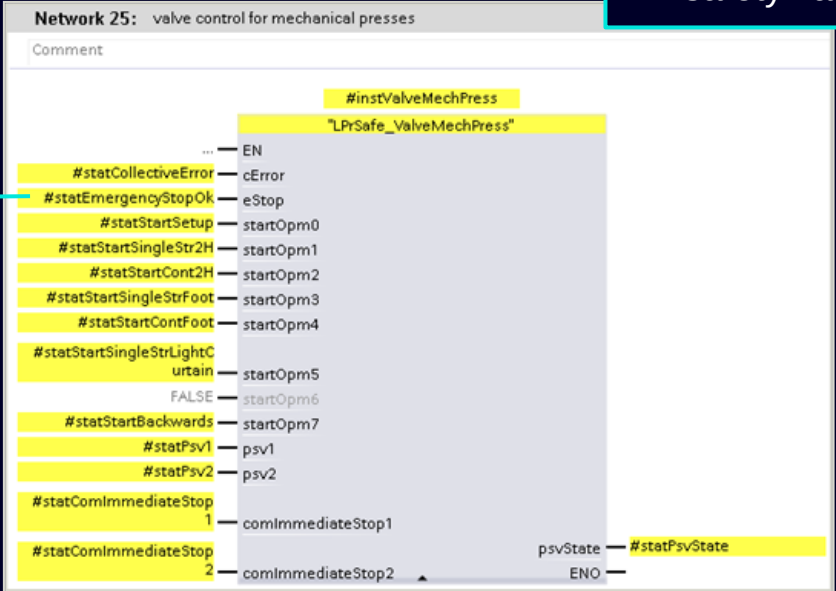
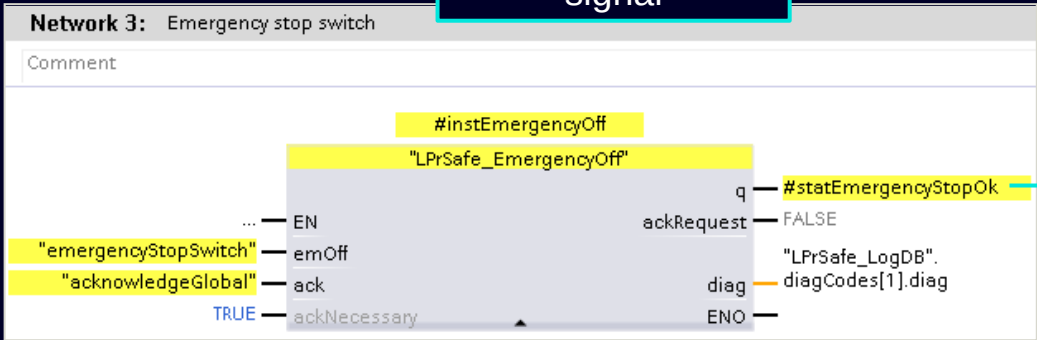


- LPrSafe_LightCurtainStrokeInit [FB33516]
- LPrSafe_ModeSelect [FB33512]
- LPrSafe_SafeDoor [FB33505]
- LPrSafe_SoftwareCam [FB33525]
- LPrSafe_StopDynamic [FB33527]
- LPrSafe_StopStatic [FB33529]
- LPrSafe_TwoHand [FB33507]
- LPrSafe_ValveMechPress [FB33530]

Set the command to the operating mode selection

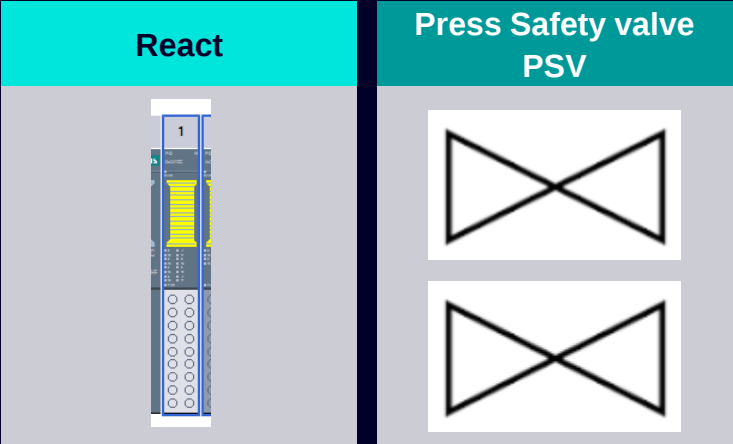
Control the press safety valve

Evaluate and check emergency stop signal



SIMATIC Press Safety Library - LPrSafe

Use Case: Two-Hand control and reaction



Q 24.0 2-channel

	PressSafetyValve1	Bool	%Q24.1	Default tag table
	PressSafetyValve2	Bool	%Q24.2	Default tag table

F-DQ 4x24VDC/2A PM HF_1 [F-DQ 4x24VDC/2A PM HF]

General

IO tags

System constants

Texts

General

Potential group

Module parameters

F-parameters

DQ parameters

Channel 0

Channel 1

Channel 2

Channel 3

I/O addresses

Hardware identifier

Channel 0

☒ Activated

Max. readback time dark test: 1.0

Max. readback time switch on test: 0.6

☒ Activated light test

☒ Diagnosis: Wire break



Tag
Declaration

F-Module
configuration

Electrical

SIMATIC Press Safety Library - LPrSafe

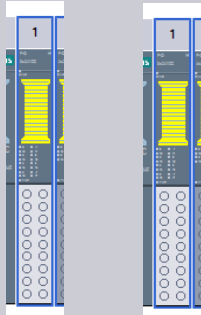
Use Case: Two-Hand-Control with Emergency Stop

How to reach SIL3/Ple with Two-Hand Control at a mechanical press

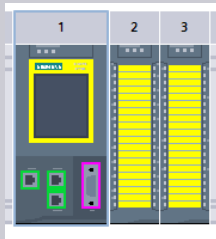
Two-Hand-Control incl.
Emergency Stop



Capture



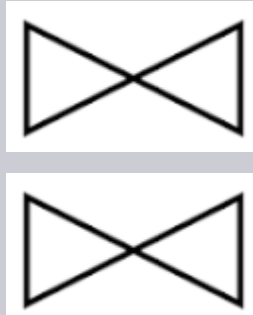
Evaluate



React



Press Safety valve
PSV



Certified according
SIL3/Ple

2-channel wired to F-DI (Module certified SIL3/Ple)

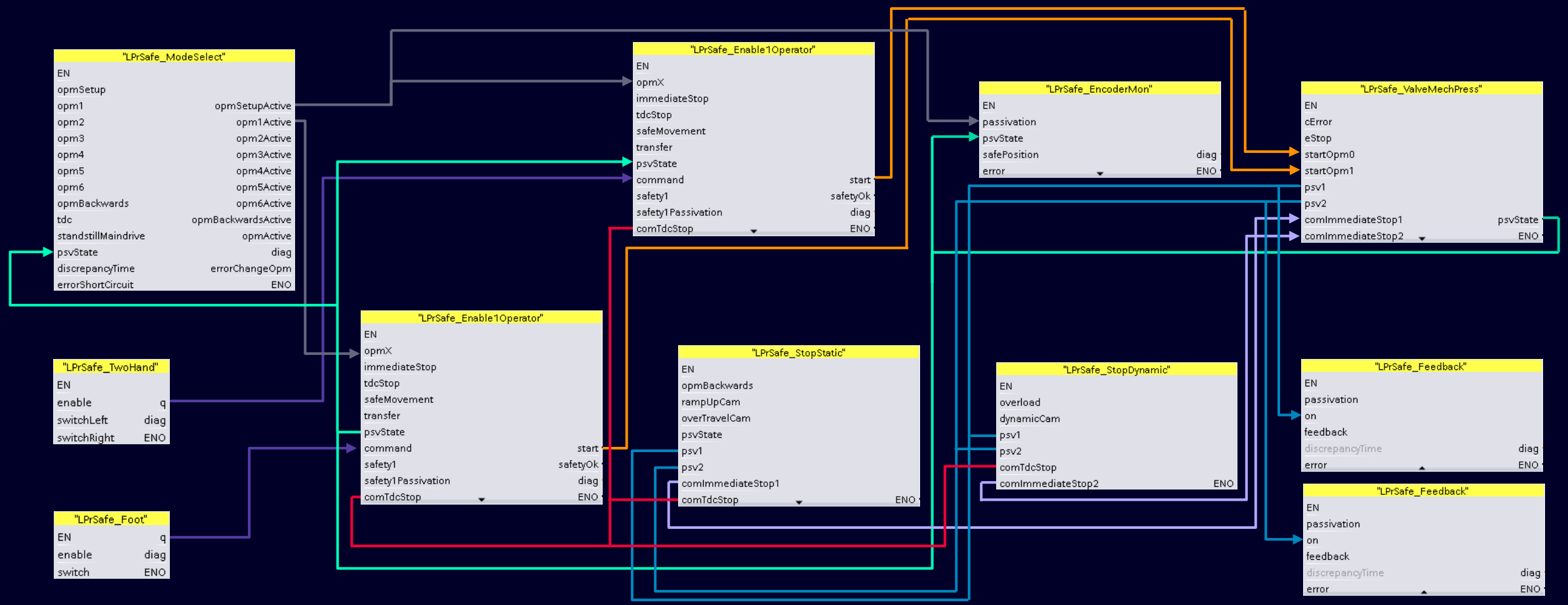
Safety blocks from Press Safety Library (PLC and F-block certified
SIL3/Ple)

2-channel wired F-DQ (Module certified SIL3/Ple)

SIMATIC Press Safety Library - LPrSafe

Typical application conventional mechanical press

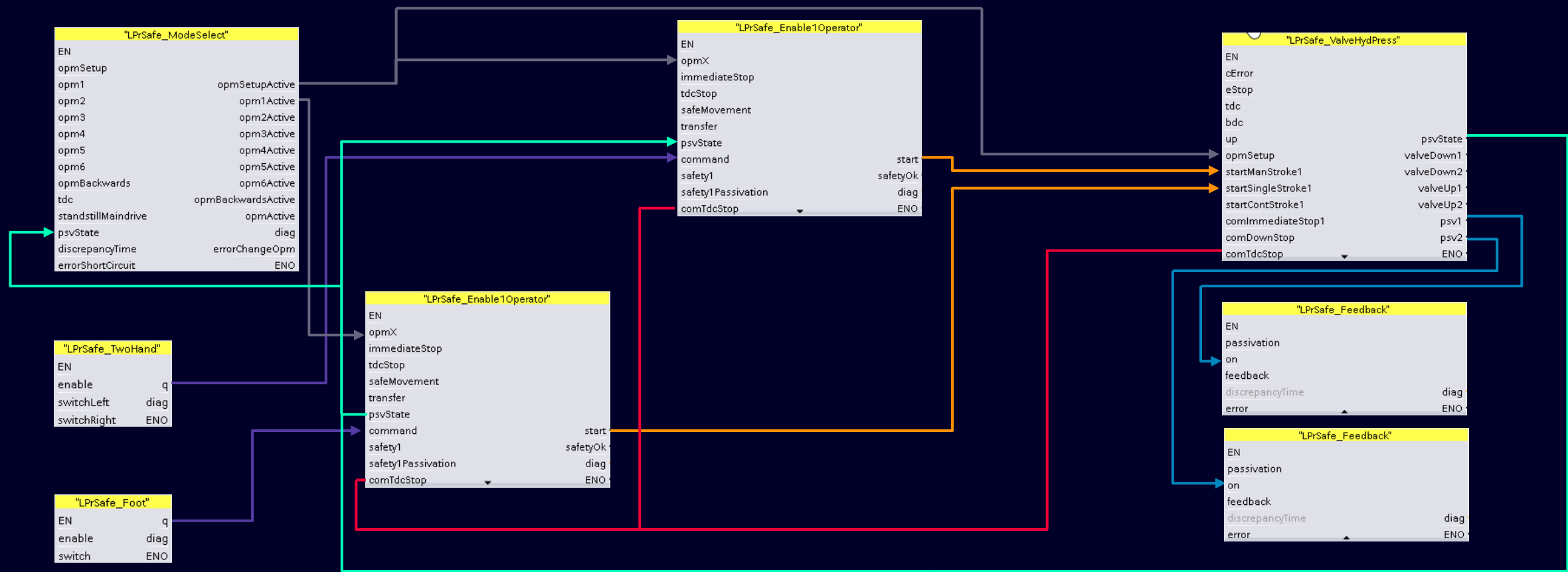
Schematic user code and signal exchange of a mechanical press



SIMATIC Press Safety Library - LPrSafe

Typical application hydraulic press

Schematic user code and signal exchange of a hydraulic press



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