SIMATIC
Press Safety Blocks

SIMATIC S7-F/P for Distributed Safety

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Ingenuity for life

siemens.com/metalforming

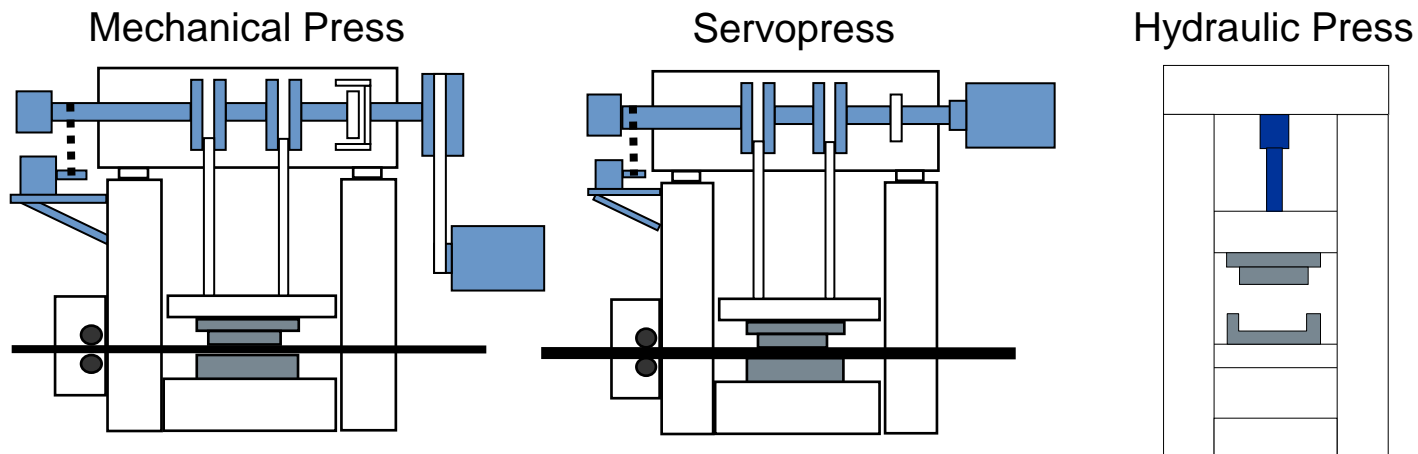# SIMATIC S7 Press Safety Function Blocks
- Overview

Press Safety Blocks (V2.0.5):   38 software blocks for mechanical, hydraulic and servopresses

Block Description: certified description of the function blocks

Sample Projects (V2.0.5):   for mechanical, hydraulic and servopresses

Application Manual: description of the sample projects

Mechanical Press   Servopress   Hydraulic Press

SIMATIC S7 Press Safety Function Blocks
- Overview

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Ordering

Starting license (version 2.0.X):   MLFB 6AU1837 0EA10 0DX1

Machine license (version 2.0.X):   MLFB 6AU1837 0EA10 0DX2

Contact

Sales: Georg König, DF FA PMA BR 3-2

Techn. support: Richard Dorsch, DF FA PMA APC 1

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Page 3   09.01.2017   Richard Dorsch / DF FA PMA APC 1

SIMATIC S7 Press Safety Function Blocks
- properties

- Developed with Distributed Safety (F-FBD/ F-LAD) as a failsafe application software
- „Know How"-protected -> code can not be modified
- Have a unique CRC checksum
- Parameterizable by the user
- Identification inputs
- Applicable as single modules or for whole concepts for mechanical or hydraulic presses
- Minimizes the programming effort
- Additional safety program can be done around the function blocks
- create safety programs for different types of presses, e.g. mechanical, hydraulic presses, pneumatic, press brakes …

Simatic_S7_F_P_V2_0 -- C:\Program Files\Siemens\Step7\S7libs\S7FP

Objektname	Symbolischer Name	Erstellsprache	Größe im Arbeitsspei...	Typ	Name (Header)
FB10	MODE_SEL	F-FUP	802	Funktionsbaustein	MODE_SEL
FB12	MODE_2_6	F-FUP	1112	Funktionsbaustein	MODE_2_6
FB20	EM_OFF	F-FUP	46	Funktionsbaustein	EM_OFF
FB21	EM_OFF_Q	F-FUP	92	Funktionsbaustein	EM_OFF_Q
FB32	DOOR_LCK	F-FUP	572	Funktionsbaustein	DOOR_LCK
FB33	DOOR_1CH	F-FUP	222	Funktionsbaustein	DOOR_1CH
FB42	2H_PL	F-FUP	528	Funktionsbaustein	2H_PL
FB43	2H_EN	F-FUP	230	Funktionsbaustein	2H_EN
FB50	SEN2V2	F-FUP	200	Funktionsbaustein	SEN2V2
FB62	FOOT_EN	F-FUP	102	Funktionsbaustein	FOOT_EN
FB63	FOOT_PL	F-FUP	272	Funktionsbaustein	FOOT_PL
FB70	LCU_CLCK	F-FUP	1220	Funktionsbaustein	LCU_CLCK
FB71	LCU_SAFE	F-FUP	554	Funktionsbaustein	LCU_SAFE
FB72	DAMP	F-FUP	192	Funktionsbaustein	DAMP
FB74	SP_MON	F-FUP	630	Funktionsbaustein	SP_MON
FB76	DYN_VALV	F-FUP	398	Funktionsbaustein	DYN_VALV
FB78	AND4	F-FUP	178	Funktionsbaustein	AND4
FB80	F_SUM_1	F-FUP	1050	Funktionsbaustein	F_SUM_1
FB81	F_SUM_2	F-FUP	1050	Funktionsbaustein	F_SUM_2
FB90	EN_1_MAN	F-FUP	298	Funktionsbaustein	EN_1_MAN
FB100	EN_4_MAN	F-FUP	452	Funktionsbaustein	EN_4_MAN
FB106	UDC_OVL	F-FUP	82	Funktionsbaustein	UDC_OVL
FB108	CAM_MON	F-FUP	456	Funktionsbaustein	CAM_MON
FB110	VALVE_ME	F-FUP	186	Funktionsbaustein	VALVE_ME
FB112	VALVE_HY	F-FUP	592	Funktionsbaustein	VALVE_H
FB120	VA_CHECK	F-FUP	262	Funktionsbaustein	VA_CHECK
FB130	CARTR	F-FUP	178	Funktionsbaustein	CARTR
FB140	CONTACT	F-FUP	288	Funktionsbaustein	CONTACT
FB150	STAT_CMD	F-FUP	462	Funktionsbaustein	STAT_CMD
FB160	OVERTR	F-FUP	422	Funktionsbaustein	OVERTR
FB170	EN_SW1	F-FUP	284	Funktionsbaustein	EN_SW1
FB171	EN_SW2	F-FUP	360	Funktionsbaustein	EN_SW2

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closed function blocks for implementation of press safety functions,

certificated by the german employer's liability insurance association

(Berufsgenossenschaft)

Following general standards were applied:

DIN EN 62061 (up to SIL 3),

EN ISO 13849-1 (up to PL e)

Following press-specific standards were applied:

- DIN EN 692 "Mechanical Presses – Safety"

- DIN EN 693 "Machine Tools – Safety – Hydraulic Presses"

- DIN EN 12622 "Safety of Machine Tools – Hydraulic Press Brakes"

- DIN EN 13736 "Safety of Machine Tools – Pneumatic Presses"

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Type Test Certificate

Name and address of the holder of the certificate: (customer):	Siemens AG Frauenauracher Straße 80 91056 Erlangen
Name and address of the Manufacturer:	see above
Product designation:	Press safety library Simatic S7_F_P
Type:	see Annex 1 and Annex 2
Intended purpose:	The press safety library "Simatic S7-F/P" contains programmed, complete function blocks which can be called, parameterized and interconnected with each other in the user programme of the safety-related automatization system "SIMATIC S7 Distributed Safety". Compliance with the listed, or applicable, resp., standards presupposes application of the safety-related automatization system "SIMATIC S7 Distributed Safety", a correct interconnection and integration of the function blocks in the user programme.
Testing based on:	• DIN EN 62061, version 2005 • EN ISO 13849-1, version 2006 • EN 692:2005+A1:2009 • EN 693:2001+A2:2011 • EN 12622:2009 • EN 13736:2003+A1:2009 • Principles for the testing and certification of electrical, electronic, programmable control systems and bus systems (GS-HSM-30), version 02/2012, where applicable
Test report:	No. 017/2006 dated 22.05.2006, no. 014/2004 dated 14.09.2005
Remarks:	The testing did not include applications and assessment of hardware (encoders, converters, etc.). Follow-up certificate of MHHW 06 051 dated 01.08.2009.

The type tested complies with the test basis specified above.

The present certificate is valid until: **23.10.2015.**

The type test certificate is not entitled to use a test mark.

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 of August 2012.

signed Heinke

(Dipl.-Ing. Heinke)

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5. Annex 2: Press safety library S7_F_P V2.0.5

FB	Header-Name	Vers.	CRC	Date	Description	EN 692 (2009)	EN 693 (2011)	EN 12622 (2009)	EN 13736 (2009)
10	MODE_SEL	0.4	81BF	12.04.2006	Mode selection 1 of n	X	X	X	X
12	MODE_2_6	0.4	D043	25.04.2006	Mode selection 2 of 6	X	X	X	X
20	EM_OFF	0.3	2A2B	29.03.2006	EMERGENCY STOP without restart inhibit	X	X	X	X
21	EM_OFF_Q	0.5	92CD	20.04.2006	EMERGENCY STOP with restart inhibit	X	X	X	X
32	DOOR_LCK	0.5	FA80	25.04.2006	Guard gate with guard locking	X	X	X	X
33	DOOR_1CH	0.4	D802	20.04.2006	Guard gate with and without manual acknowledgment	X	X	X	X
42	2H_PL	0.3	1D18	26.04.2006	Two-hand pluggable with enable	X	X	X	X
43	2H_EN	0.2	DCD4	30.03.2006	Two-hand with enable	X	X	X	X
50	SEN2V2	0.5	DE5F	27.09.2007	Evaluation of antivalent and equivalent two-channel encoders	X*	X*	X*	X*
62	FOOT_EN	0.3	6320	12.04.2006	Foot pedal pluggable with enable	X	X	X	X
63	FOOT_PL	0.4	ACF9	12.04.2006	Foot pedal with enable	X	X	X	X
70	LCU_CLCK	0.9	9C03	27.09.2007	Light curtain (protection, single break, double break, Off)	X	X	X	X
71	LCU_SAFE	0.3	EA5A	04.04.2006	Light curtain (protection, Off)	X	X	X	X
72	DAMP	0.4	A317	12.04.2006	Damping of the brake in mechanical presses	X			
73	ENC_MON	0.2	8A5F	18.03.2013	Shaft break monitoring / operation sensor with Profisafe encoder	X			
74	SP_MON	0.5	4E8B	12.04.2006	Shaft break monitoring / operation sensor with pulse encoder via CM	X			
75	SP_MO_DI	0.1	6DA5	29.07.2013	Shaft break monitoring / operation sensor with pulse encoder via DI	X			
76	DYN_VALV	0.3	456	29.03.2006	Dynamic valve control	X	X	X	X
78	AND4	0.4	E726	20.04.2006	Quadruple AND connection with restart inhibit	X*	X*	X*	X*
80	F_SUM_1	0.6	4C86	29.03.2006	Classification of faults into categories and acknowledgment	X*	X*	X*	X*
81	F_SUM_2	0.6	C44F	29.03.2006	Classification of faults into categories and acknowledgment	X*	X*	X*	X*
90	EN_1_MAN	0.6	677F	29.03.2006	Enable for one-person operation	X	X	X	X
100	EN_4_MAN	0.6	31EB	13.04.2006	Enable for multi-person operation	X	X	X	X
104	SW_CAM	0.5	76D	21.03.2013	Safe software cam controller	X			
105	SW_CAM_P	0.1	8B16	18.03.2013	Safe software cam controller for reciprocating operation	X			
106	UDC_OVL	0.3	9AD9	29.03.2006	Dynamic TDC switch-off and overload	X			
108	CAM_MON	0.6	2600	06.08.2010	Cam switching unit control	X			
110	VALVE_ME	0.5	34A8	29.07.2013	Valve actuation, mechanical presses	X			

Annex 1 / 2
EC-Type test certificate: 06 051
Page 6 of 7

Version 4.1
11.11.2013

SIMATIC S7 Press Safety Function Blocks
- international standards and certificates

112	VALVE_HY	0.5	1205	06.06.2006	Valve actuation, hydraulic presses		X	X	
120	VA_CHECK	0.4	230A	12.04.2006	Modules for monitoring of valves or relays, respectively	X*	X*	X*	X*
130	CARTR	0.3	A2B7	12.04.2006	Monitoring of cartridge valves during de-activation		X	X	
140	CONTACT	0.4	D5F2	12.04.2006	Actuation and monitoring of actuators	X*	X*	X*	X*
150	STAT_CMD	0.4	C625	16.11.2011	Actuation and static monitoring of actuators	X*	X*	X*	X*
160	OVERTR	0.2	CC4B	16.08.2010	Overrun monitoring in linear-operated presses	X			
170	EN_SW1	0.1	DFC0	29.03.2006	3-position enabling switch with 2 operating contacts	X*	X*	X*	X*
171	EN_SW2	0.1	EE5D	29.03.2006	3-position enabling switch with 2 operating contacts and 1 auxiliary contact	X*	X*	X*	X*
175	BRK_TEST	0.2	1E06	29.07.2013	Brake test on a servo press	X**			
176	EN_SERVO	0.3	BEB9	27.03.2013	Safe setup mode and single stroke mode of a servo press	X**			

* general function block (not press-specific)
** general function block (at the time being, standardized requirements for servo presses are not available)

signed HEINKE

(Dipl.-Ing. Heinke)

Düsseldorf, den 11.11.2013
HSM 612.1:612.28-UB tsz

In any case, the German original shall prevail.

Annex 1 / 2
EC-Type test certificate: 06 051
Page 7 of 7

Version 4.1
11.11.2013

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Operation mode selector

FB10 –   „MODE_SEL" Operation mode selector 1 out of n → up to 8 modes

FB12 –   „MODE_2_6" Operation mode selector 2 out of 6 → up to 15 modes

Emergency off

FB20 –   „EM_OFF" Monitoring of Emergency off devices without restart inhibit
FB21 –   „EM_OFF_Q" Monitoring of Emergency off devices with restart inhibit

Safety doors

FB32 –   „DOOR_LCK" Safety door with locking

FB33 –   „DOOR_1CH" Safety door with or without manual acknowledgement

Two-hand consoles

FB42 –   „2H_PL" Operation and monitoring of a pluggable two-hand console

FB43 –   „2H_EN" operation and monitoring of a two-hand console

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2 out of 2 evaluation

FB50 –   „SEN2V2" Auswertung anti- und äquivalenter 2-kanaliger Geber

Foot switches

FB62 –   „FOOT_EN" Evaluation of antivalent, 2-channel foot switches

FB63 –   „FOOT_PL" Evaluation of antivalent, 2-channel foot switches (pluggable)

Light curtain

FB70 –   „LCU_CLCK" Operation of a light curtain in safety and clock mode

FB71 –   „LCU_SAFE" Monitoring of a light curtain in safety mode

Brake damping

FB72 –   „DAMP" Damping the brake on mechanical presses

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Speed and encoder monitoring

FB73 –   „ENC_MON" Block to implement shaft breakage and encoder connection
monitoring when using a PROFIsafe encoder

FB74 –   „SP_MON" Monitoring a mechanical cam switch gear
(proximity switch and toothed gear) – with counter module

FB75 –   „SP_MO_DI" Monitoring a mechanical cam switch gear
(proximity switch and toothed gear) – with digital input module

Valve monitoring

FB76 –   „DYN_VALV" Dynamic control of up to 4 valves

Quadruple AND

FB78 –   „AND4" Quadruple AND link with restart inhibit and error variable

Fault handling

FB80 –   „F_SUM_1" Classification in error categories and acknowledgement

FB81 –   „F_SUM_2" Classification in error categories and acknowledgement

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Enable blocks

FB90 – „EN_1_MAN" Enable for single-operator function

FB100 – „EN_4_MAN" Enable for multi-operator function

Output cam blocks

FB104 – „SW_CAM" Block to implement a software cam switchgear
        with overtravel monitoring

FB105 – „SW_CAM_P" Block to implement a software cam switchgear
        in the "pendulum" mode

TDC switch off

FB106 – „UDC_OVL" Dynamic TDC switch-off and de-energizing the safety valves
        in the event of ram overload

Cam monitoring

FB108 – „CAM_MON" Control of the mechanical cam switchgear the dynamic
        TDC switch-off and of the overtravel

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Valve control

FB110 – „VALVE_ME" Energizing the press safety valves on mechanical presses
(clutch/brake combination)

FB112 – „VALVE_HY" Energizing the press safety and directional valves
on hydraulic presses

Valve and relay monitoring

FB120 – „VA_CHECK" Component for monitoring valves / relays

FB130 – „CARTR" Switching time for cartridge valves on de-energizing

FB140 – „CONTACT" Energizing 1 or 2 actuators (contactor/valve)
and monitoring (feedback circuit)

FB150 – „STAT_CMD" Energizing and static monitoring of valves/contactors

Overtravel monitoring

FB160 – „OVERTR" Monitoring of the overtravel of linear presses

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SIMATIC S7 Press Safety Function Blocks
- list of blocks (part 6)

Enabling buttons

FB170 - „EN_SW1" Three-stage enabling button for two contacts

FB171 - „EN_SW2" Three-stage enabling button for two NC contacts
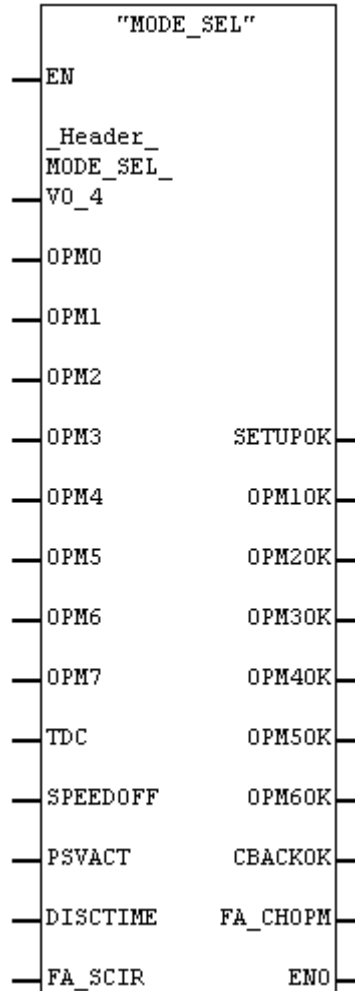and one auxiliary contact

Blocks for servopresses

FB175 – „BRK_TEST" Block to conduct a brake test for a servo press

FB176 – „EN_SERVO" Safe setting-up operation
and single-stroke operation of a servo press

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```
        "MODE_SEL"

  — EN

    _Header_
    MODE_SEL_
  — VO_4

  — OPM0

  — OPM1

  — OPM2

  — OPM3        SETUPOK —

  — OPM4        OPM1OK —

  — OPM5        OPM2OK —

  — OPM6        OPM3OK —

  — OPM7        OPM4OK —

  — TDC         OPM5OK —

  — SPEEDOFF    OPM6OK —

  — PSVACT      CBACKOK —

  — DISCTIME    FA_CHOPM —

  — FA_SCIR        ENO —
```

Function block for selecting the operating mode

- One channel operation mode switch
- 8 operation modes parameterizable
- Multi selection and cross circuit is recognized
- Time for multi selection is parameterizable

Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB12 „MODE_2_6"

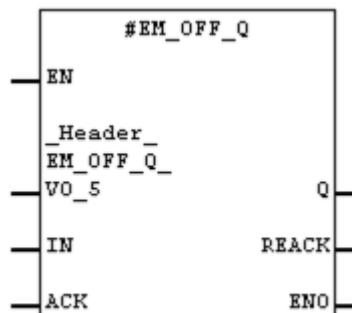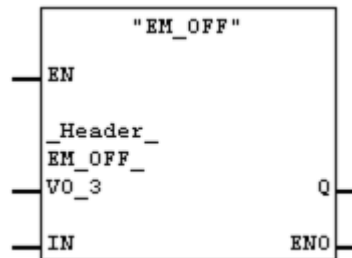## Function block for selecting the operating mode

- Up to 6 inputs are pluggable
- Activation unequal 0 or 2 is been detected
  ➤ wire breakage or cross circuit
- One or none from 15 signal combinations must be active
- Tolerance time of a false activation is parameterizable

Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB20 „EM_OFF" and FB21 „EM_OFF_Q"

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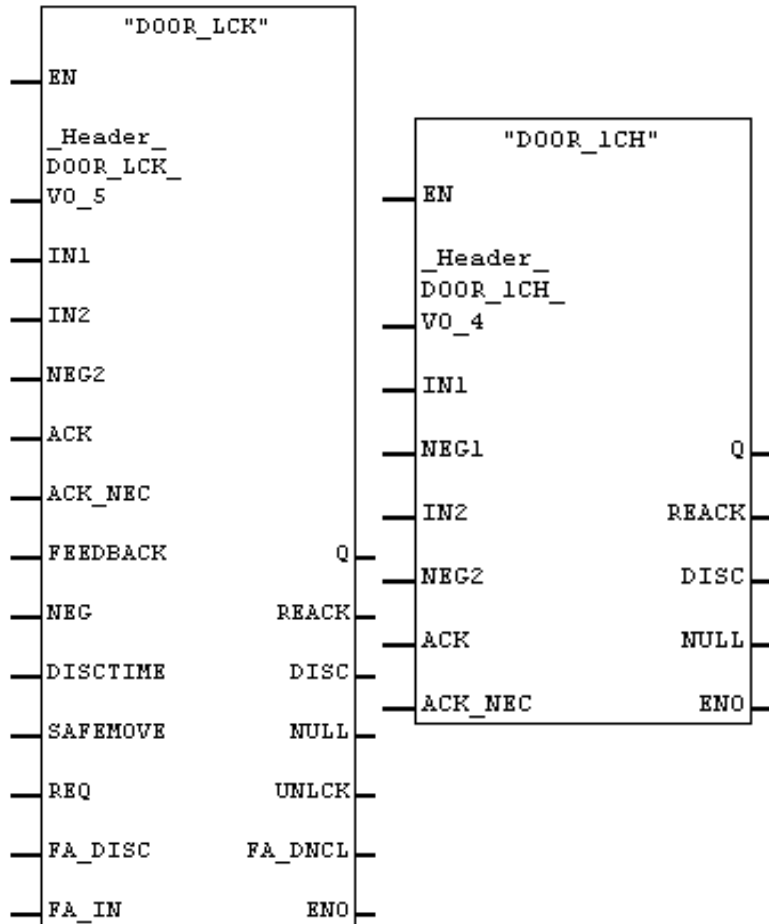## Function blocks for emergency off with and without restart inhibit

- 2 channel equivalent evaluation
- 2 of 2 evaluation in the F-HW module
- Indicate the acknowledgement request

```
            "EM_OFF"
    EN

    _Header_
    EM_OFF_
    VO_3                    Q

    IN                    ENO
```

```
            #EM_OFF_Q
    EN

    _Header_
    EM_OFF_Q_
    VO_5                    Q

    IN                  REACK

    ACK                   ENO
```

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Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB32 „DOOR_LCK" and FB33 „DOOR_1CH"

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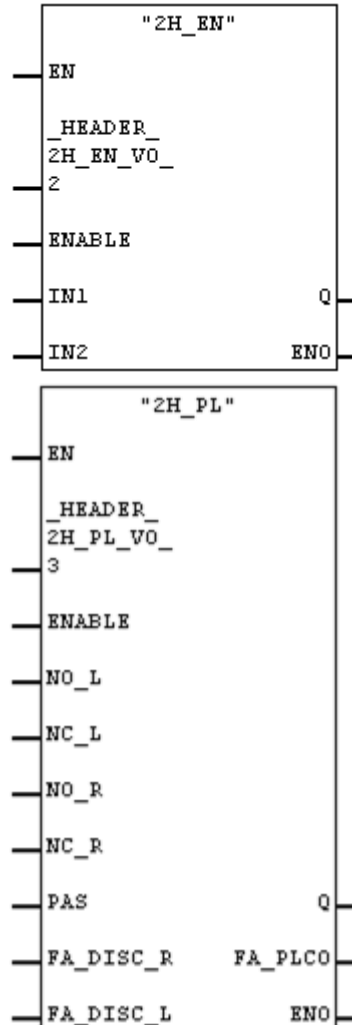

Function blocks for monitoring of a safety door

- Read in 2 channels
- Equivalent and non-equivalent evaluation of the sensors possible
- With or without manual acknowledgement possible
- DOOR_LCK: Function block activates locking function and monitors this actuation

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```
          "2H_EN"
  EN
  _HEADER_
  2H_EN_V0_
  2
  ENABLE
  IN1              Q
  IN2             ENO
```

```
          "2H_PL"
  EN
  _HEADER_
  2H_PL_V0_
  3
  ENABLE
  NO_L
  NC_L
  NO_R
  NC_R
  PAS              Q
  FA_DISC_R    FA_PLCO
  FA_DISC_L       ENO
```
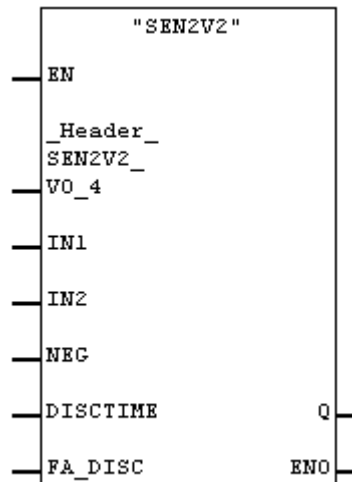
Function blocks for 2-hand consoles

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

2H_PL

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

Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB50 „SEN2V2"

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```
         "SEN2V2"

   EN

   _Header_
   SEN2V2_
   VO_4

   IN1

   IN2

   NEG

   DISCTIME        Q

   FA_DISC        ENO
```
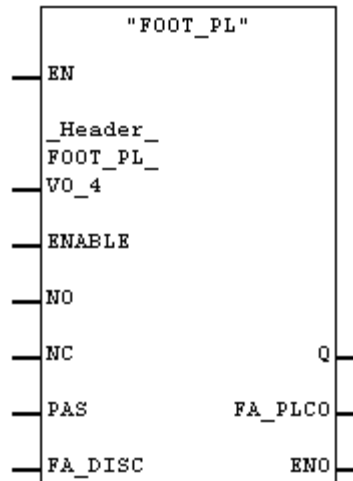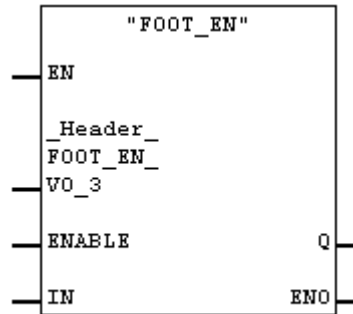
Function block to evaluate 2 channel sensors

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

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```
        "FOOT_EN"
 EN
 _Header_
 FOOT_EN_
 VO_3
 ENABLE          Q
 IN             ENO
```

```
        "FOOT_PL"
 EN
 _Header_
 FOOT_PL_
 VO_4
 ENABLE
 NO
 NC              Q
 PAS        FA_PLCO
 FA_DISC        ENO
```
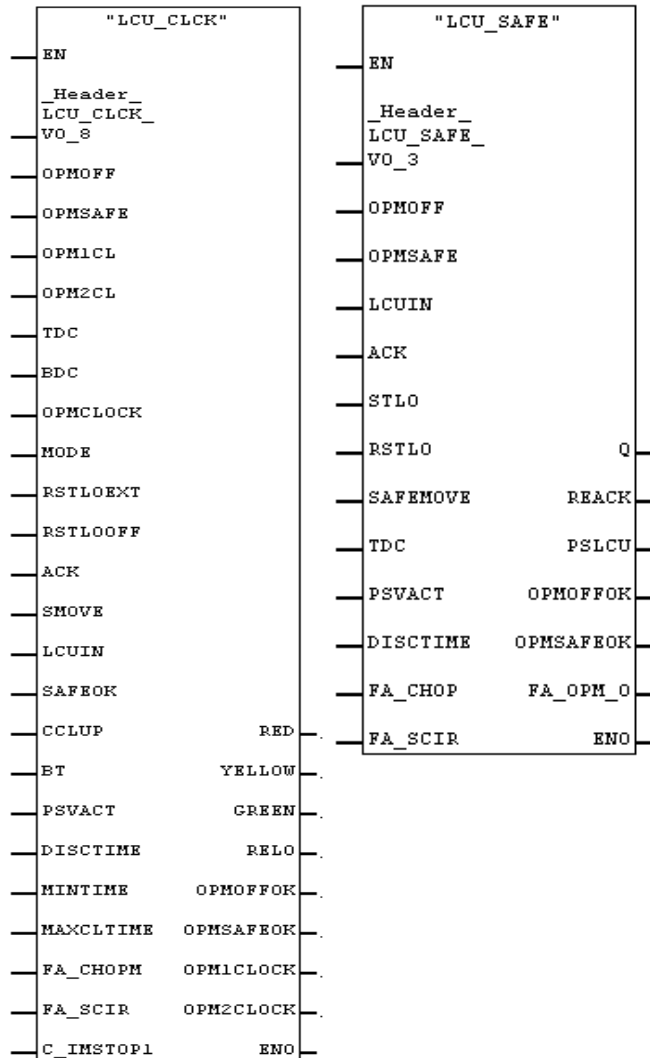
Function blocks for foot switches and pluggable foot switches

- FOOT_EN: Realization of the 2 out of 2 evaluation in the safety Hardware
- FOOT_PL: Plug control and contact control with the NO and NC contacts
➤ No additive contact necessary

```
        "LCU_CLCK"                    "LCU_SAFE"
   ─── EN                        ─── EN
       _Header_                      _Header_
       LCU_CLCK_                     LCU_SAFE_
   ─── VO_8                      ─── VO_3
   ─── OPMOFF                    ─── OPMOFF
   ─── OPMSAFE                   ─── OPMSAFE
   ─── OPM1CL                    ─── LCUIN
   ─── OPM2CL                    ─── ACK
   ─── TDC                       ─── STLO
   ─── BDC                       ─── RSTLO              Q ───
   ─── OPMCLOCK                  ─── SAFEMOVE       REACK ───
   ─── MODE                      ─── TDC            PSLCU ───
   ─── RSTLOEXT                  ─── PSVACT       OPMOFFOK ───
   ─── RSTLOOFF                  ─── DISCTIME     OPMSAFEOK ───
   ─── ACK                       ─── FA_CHOP       FA_OPM_O ───
   ─── SMOVE                     ─── FA_SCIR            ENO ───
   ─── LCUIN
   ─── SAFEOK
   ─── CCLUP            RED ───
   ─── BT           YELLOW ───
   ─── PSVACT        GREEN ───
   ─── DISCTIME       RELO ───
   ─── MINTIME    OPMOFFOK ───
   ─── MAXCLTIME  OPMSAFEOK ───
   ─── FA_CHOPM   OPM1CLOCK ───
   ─── FA_SCIR    OPM2CLOCK ───
   ─── C_IMSTOP1       ENO ───
```

Function blocks for operation and supervision

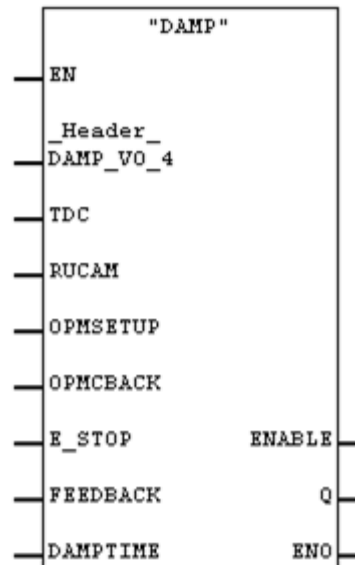- Detection of multi selection and cross circuit at the operation mode switch

LCU_CLCK:
- safety and clock mode possible
- Indicates the state of the light curtain
- Clock mode in standard mode and sweden mode
- Muting signal

LCU_SAFE:
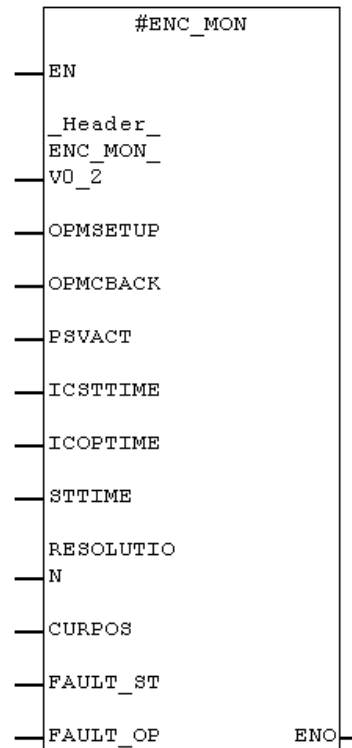- Only for safety mode

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Function block for brake damping on mechanical presses

- Inactive at certain conditions e.g. certain operating modes, only at single stroke or at EM-OFF activity (parameterizable)

```
            #ENC_MON
  EN
  _Header_
  ENC_MON_
  V0_2
  OPMSETUP
  OPMCBACK
  PSVACT
  ICSTTIME
  ICOPTIME
  STTIME
  RESOLUTIO
  N
  CURPOS
  FAULT_ST
  FAULT_OP            ENO
```

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 parameterizable

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```
          "SP_MON"
   EN

   _Header_
   SP_MON_
   VO_5

   OPMSETUP

   OPMCBACK

   PSVACT

   CV0

   CV1

   STS_LOAD

   CVSTTIME           LV0

   CVOPTIME           LV1

   STTIME         SW_GATE

   OPTIME        LOAD_VAL

   FAULT              ENO
```
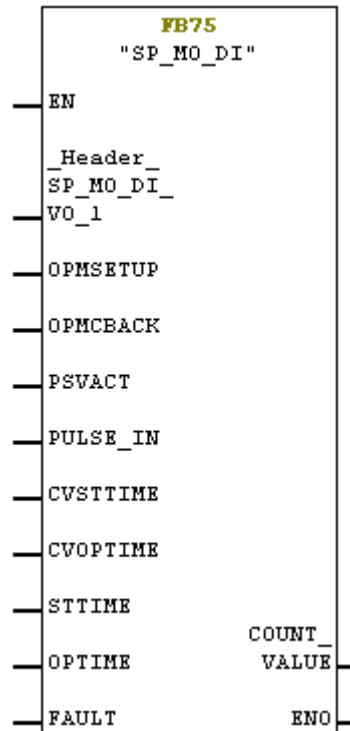
Function block for monitoring of a mechanical cam switchgear (speed monitor)

- Encoder (toothed gear with inductive proximity switch) necessary
- Evaluation of a defect at the shaft or the cam switch-gear
- Start up phase and operating phase
- Passivation (e.g. at setting up)
- Detection with counter module (1 Count 24V/100kHz)

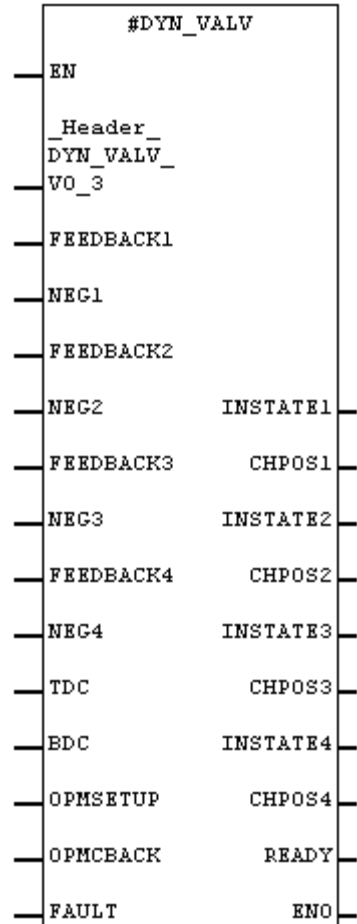# Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB75 „SP_MO_DI"

```
              FB75
            "SP_MO_DI"
    ─── EN

        _Header_
        SP_MO_DI_
    ─── VO_1

    ─── OPMSETUP

    ─── OPMCBACK

    ─── PSVACT

    ─── PULSE_IN

    ─── CVSTTIME

    ─── CVOPTIME

    ─── STTIME
                        COUNT_
    ─── OPTIME          VALUE ───

    ─── FAULT             ENO ───
```

Function block for monitoring of a mechanical cam switchgear (speed monitor)

- Counting the impulses of a pulsing device (e. g. 30 impulses per pressing stroke)
- Monitoring the pulsing device/the mechanical cam switchgear on minimum pulses at energized press safety valves
- Startup period and operation period parameterizable
- Pulse recording via safe digital input
- No counter module required
- Only for "slow" presses applicable
  - ➢ otherwise use „SP_MON"

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Function Blocks of the library SIMATIC S7_F/P V2.0.5
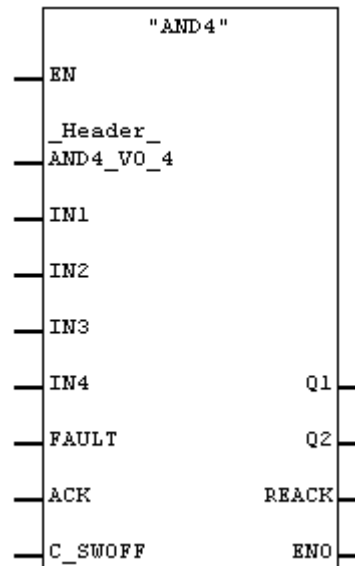# FB76 „DYN_VALVE"

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Function block for the dynamic monitoring of up to 4 valves

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

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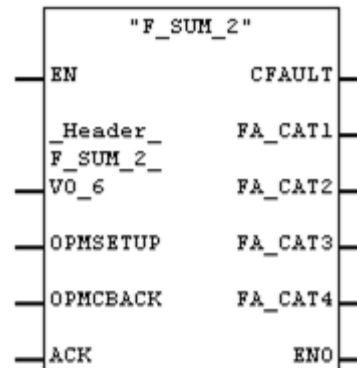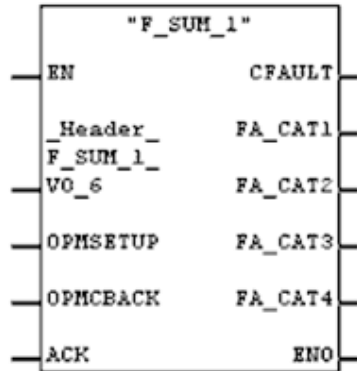# Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB78 „AND4"

Function block for a quadruple AND link and with one Error variable (negated)

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

Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB80 „F_SUM_1" and FB81 „F_SUM_2"

SIEMENS

```
         "F_SUM_1"
  EN                CFAULT
  _Header_          FA_CAT1
  F_SUM_1_
  VO_6              FA_CAT2
  OPMSETUP          FA_CAT3
  OPMCBACK          FA_CAT4
  ACK                  ENO
```

```
         "F_SUM_2"
  EN                CFAULT
  _Header_          FA_CAT1
  F_SUM_2_
  VO_6              FA_CAT2
  OPMSETUP          FA_CAT3
  OPMCBACK          FA_CAT4
  ACK                  ENO
```
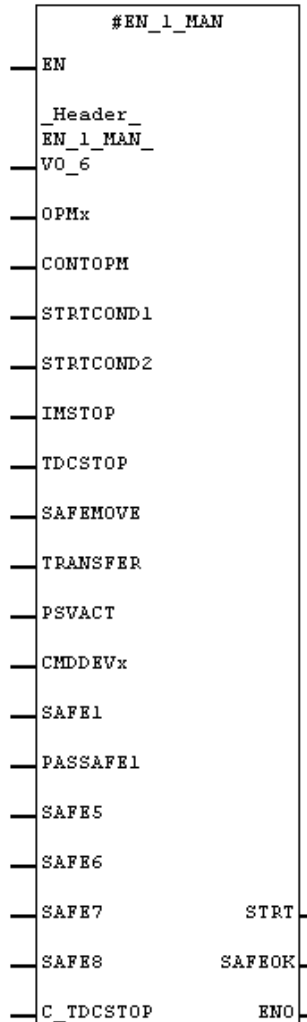
Function blocks for management of errors

- 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

F_SUM_1 → DB3, F_SUM_2 → DB4

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```
              #EN_1_MAN

  ──── EN

       _Header_
       EN_1_MAN_
  ──── VO_6

  ──── OPMx

  ──── CONTOPM

  ──── STRTCOND1

  ──── STRTCOND2

  ──── IMSTOP

  ──── TDCSTOP

  ──── SAFEMOVE

  ──── TRANSFER

  ──── PSVACT

  ──── CMDDEVx

  ──── SAFE1

  ──── PASSAFE1

  ──── SAFE5

  ──── SAFE6

  ──── SAFE7              STRT ────

  ──── SAFE8            SAFEOK ────

  ──── C_TDCSTOP           ENO ────
```

Function block for 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
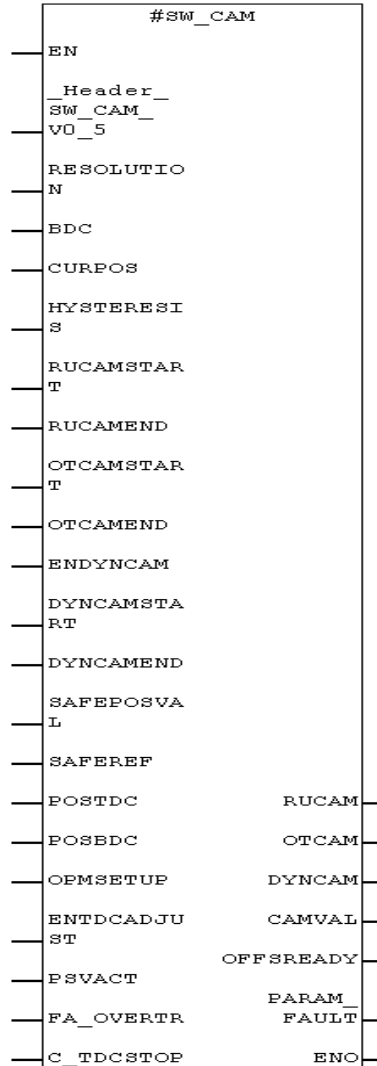- Evaluation of a safe movement (SAFEMOVE)

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Function block for 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 (SAFEMOVE)

```
              #SW_CAM
    EN
    _Header_
    SW_CAM_
    VO_5
    RESOLUTIO
    N
    BDC
    CURPOS
    HYSTERESI
    S
    RUCAMSTAR
    T
    RUCAMEND
    OTCAMSTAR
    T
    OTCAMEND
    ENDYNCAM
    DYNCAMSTA
    RT
    DYNCAMEND
    SAFEPOSVA
    L
    SAFEREF
    POSTDC               RUCAM
    POSBDC               OTCAM
    OPMSETUP            DYNCAM
    ENTDCADJU          CAMVAL
    ST               OFFSREADY
    PSVACT              PARAM_
    FA_OVERTR           FAULT
    C_TDCSTOP             ENO
```
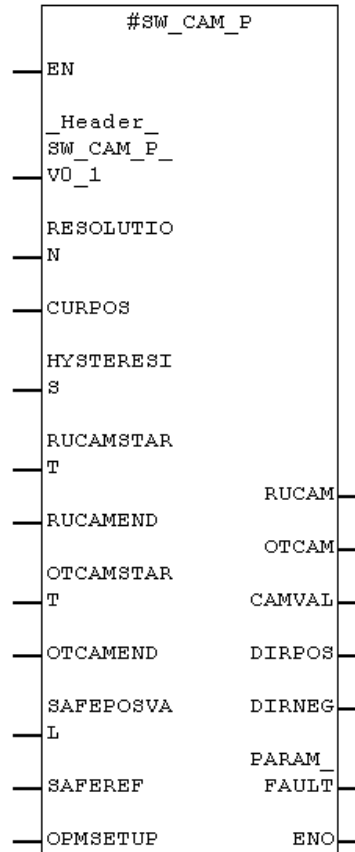
Software cam switchgear and overtravel control

- Cam generation based on actual 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
- Separate signal if cams are valid
- Overtravel monitoring at TDC stop

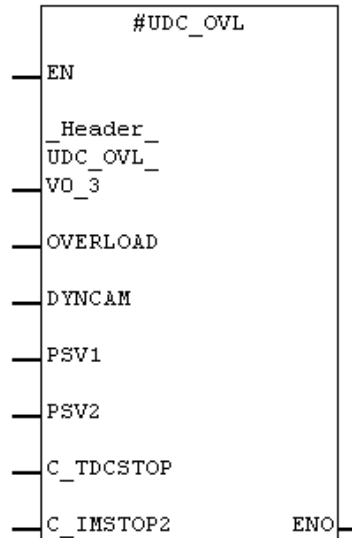# Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB105 „SW_CAM_P"

SIEMENS

```
          #SW_CAM_P
 ─EN
  _Header_
  SW_CAM_P_
 ─VO_1
  RESOLUTIO
 ─N
 ─CURPOS
  HYSTERESI
 ─S
  RUCAMSTAR
 ─T
 ─RUCAMEND         RUCAM─
  OTCAMSTAR        OTCAM─
 ─T               CAMVAL─
 ─OTCAMEND        DIRPOS─
  SAFEPOSVA       DIRNEG─
 ─L
                   PARAM_
 ─SAFEREF          FAULT─
 ─OPMSETUP           ENO─
```

Software cam switchgear in "pendulum" mode

- Designed for servopresses (adapted for standard application „Simopress")
- 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

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Page 33   09.01.2017   Richard Dorsch / DF FA PMA APC 1

Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB106 „UDC_OVL"

SIEMENS

```
        #UDC_OVL
───EN

   _Header_
   UDC_OVL_
───VO_3

───OVERLOAD

───DYNCAM

───PSV1

───PSV2

───C_TDCSTOP

───C_IMSTOP2      ENO───
```
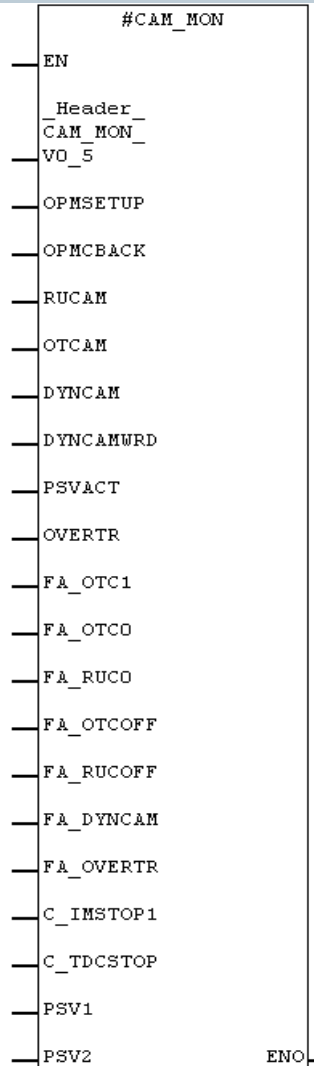
Function block for de-energizing the safety valves on dynamic TDC stop or on ram overload

- dynamic cam is not monitored
- Switch off for different stroke speed

SIEMENS

```
              #CAM_MON
    EN
    _Header_
    CAM_MON_
    V0_5
    OPMSETUP
    OPMCBACK
    RUCAM
    OTCAM
    DYNCAM
    DYNCAMWRD
    PSVACT
    OVERTR
    FA_OTC1
    FA_OTC0
    FA_RUC0
    FA_OTCOFF
    FA_RUCOFF
    FA_DYNCAM
    FA_OVERTR
    C_IMSTOP1
    C_TDCSTOP
    PSV1
    PSV2                 ENO
```
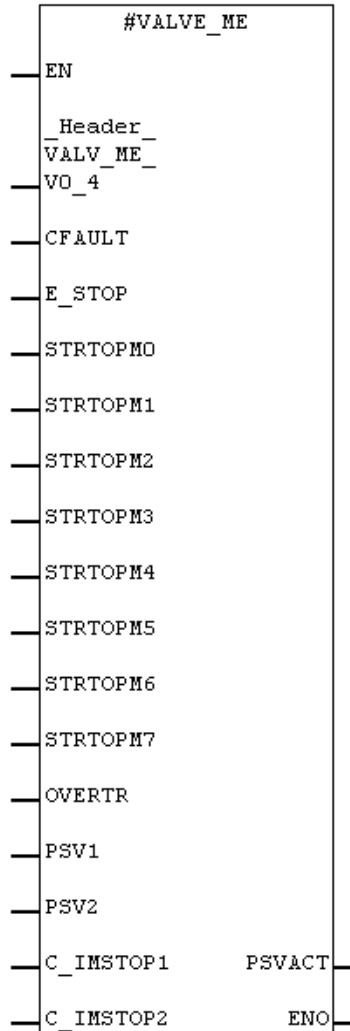
Function block for monitoring the cams at a mechanical press

- Nachlaufwegüberwachung
- 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

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```
            #VALVE_ME
  ─ EN
     _Header_
     VALV_ME_
  ─ VO_4

  ─ CFAULT

  ─ E_STOP

  ─ STRTOPM0

  ─ STRTOPM1

  ─ STRTOPM2

  ─ STRTOPM3

  ─ STRTOPM4

  ─ STRTOPM5

  ─ STRTOPM6

  ─ STRTOPM7

  ─ OVERTR

  ─ PSV1

  ─ PSV2

  ─ C_IMSTOP1        PSVACT ─

  ─ C_IMSTOP2           ENO ─
```
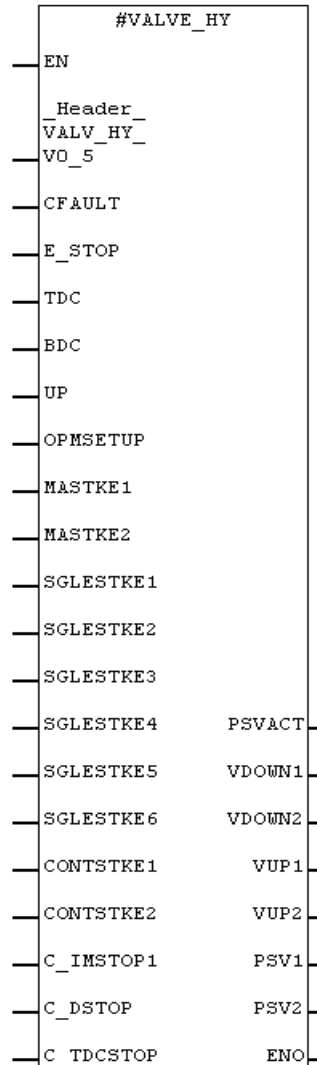
Function block to energize the press safety valves on a mechanical press

- Energizing depend on the start signal, EM-OFF signal and collective error signal
- Generating the signal to restart the overtravel monitoring

SIEMENS

```
         #VALVE_HY
── EN
  _Header_
  VALV_HY_
── VO_5
── CFAULT
── E_STOP
── TDC
── BDC
── UP
── OPMSETUP
── MASTKE1
── MASTKE2
── SGLESTKE1
── SGLESTKE2
── SGLESTKE3
── SGLESTKE4        PSVACT ──
── SGLESTKE5        VDOWN1 ──
── SGLESTKE6        VDOWN2 ──
── CONTSTKE1          VUP1 ──
── CONTSTKE2          VUP2 ──
── C_IMSTOP1          PSV1 ──
── C_DSTOP            PSV2 ──
── C_TDCSTOP           ENO ──
```

Function block to 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
  - ➢ MANUELL (2)
  - ➢ SINGLE STROKE (6)
  - ➢ CONTINUOS STROKE (2)
- Safe upward motion

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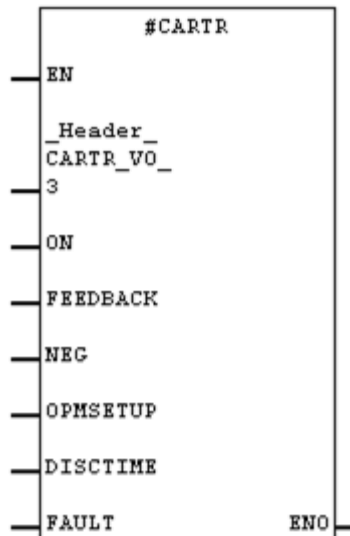## Function block for monitoring of valves/relays

- Monitoring of 2 valves / relays
- accordance of the feedback with the energizing command within a set time
- Deactivation of the monitoring is possible
- Non-equivalent or equivalent check of the feedback is parameterizable
- Message of a „false" feedback

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Function block for monitoring of cartridge valves

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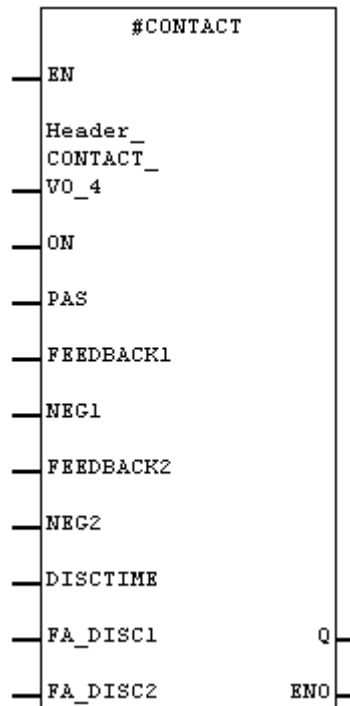- Deactivation of the monitoring is possible

```
          #CONTACT

—  EN

   Header_
   CONTACT_
—  VO_4

—  ON

—  PAS

—  FEEDBACK1

—  NEG1

—  FEEDBACK2

—  NEG2

—  DISCTIME

—  FA_DISC1          Q  —

—  FA_DISC2          ENO  —
```
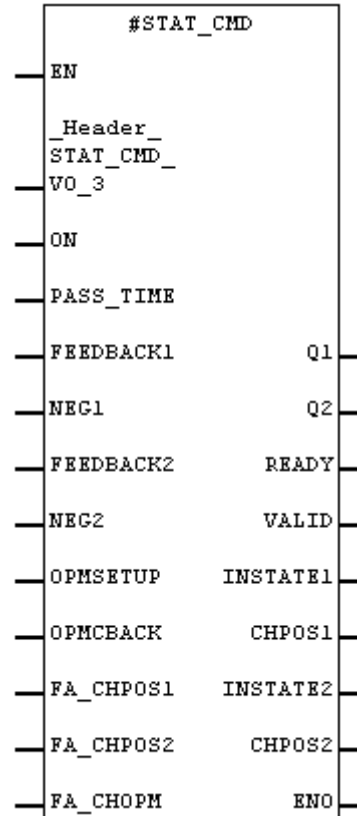
Function block for energizing and controlling of 2 valves/relays

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

Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB150 „STAT_CMD"

```
            #STAT_CMD
    ─ EN

      _Header_
      STAT_CMD_
    ─ VO_3

    ─ ON

    ─ PASS_TIME

    ─ FEEDBACK1        Q1 ─
    ─ NEG1             Q2 ─
    ─ FEEDBACK2     READY ─
    ─ NEG2          VALID ─
    ─ OPMSETUP    INSTATE1 ─
    ─ OPMCBACK      CHPOS1 ─
    ─ FA_CHPOS1   INSTATE2 ─
    ─ FA_CHPOS2     CHPOS2 ─
    ─ FA_CHOPM         ENO ─
```
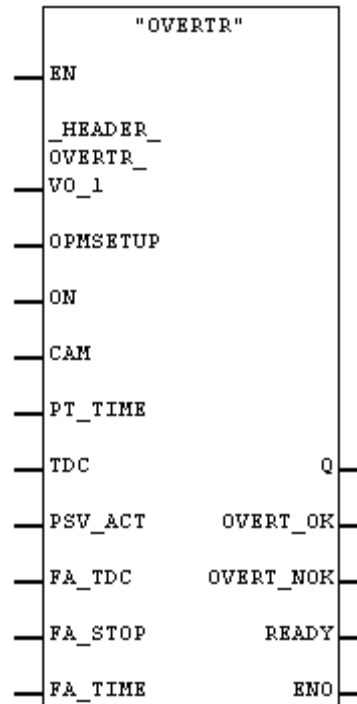
Function block for energizing and controlling of 2 valves/relays

- Energizing of the valve / relay combination
- accordance of the feedback with the energizing command within a set time
- Non-equivalent and equivalent feedback is possible
- Energizing only possible if the valves/ relays are in base position
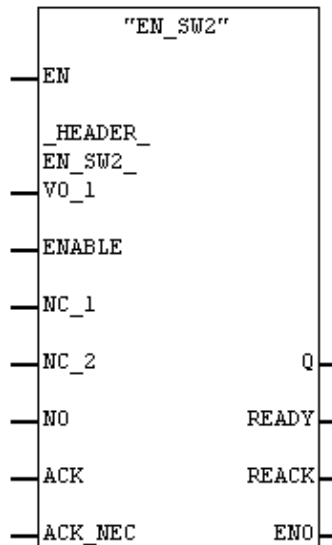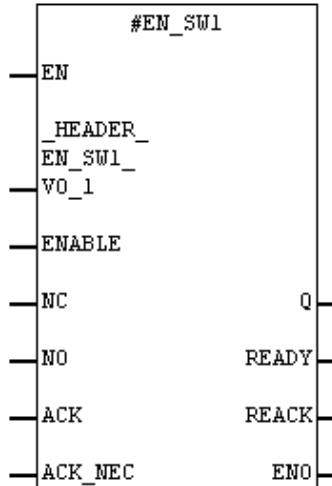
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Function block for monitoring of overtravel

- On linear presses
- Deactivation of the monitoring in operation mode OPMSETUP
- Start of press only in base position
- Overtravel time parameterizable

```
        "OVERTR"

 ─ EN

   _HEADER_
   OVERTR_
 ─ VO_1

 ─ OPMSETUP

 ─ ON

 ─ CAM

 ─ PT_TIME

 ─ TDC              Q ─

 ─ PSV_ACT    OVERT_OK ─

 ─ FA_TDC    OVERT_NOK ─

 ─ FA_STOP       READY ─

 ─ FA_TIME         ENO ─
```

Function Blocks of the library SIMATIC S7_F/P V2.0.5
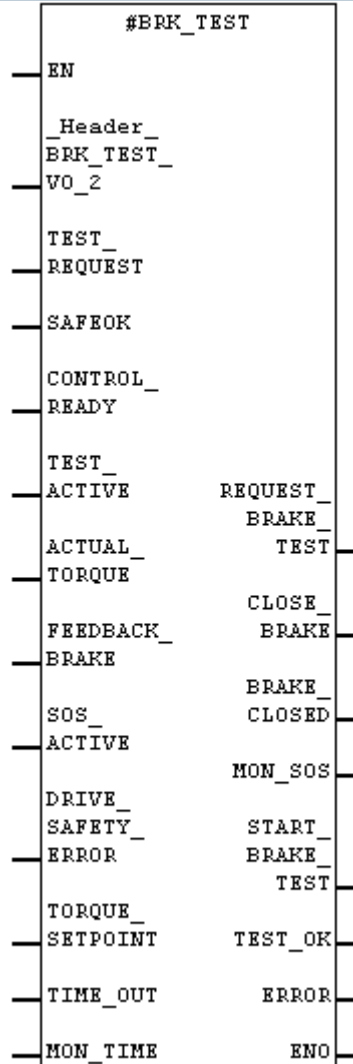# FB170 „EN_SW1" and FB171 „EN_SW2"

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Function block for evaluation of an enable switch

- Restart inhibit parameterizable
- EN_SW1: Evaluation of the signals of a three-stage enable switch with two contacts
- EN_SW2: Evaluation of the signals of a three-stage enable switch with to contacts and an auxiliary contact

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```
         #BRK_TEST
  EN

  _Header_
  BRK_TEST_
  VO_2

  TEST_
  REQUEST

  SAFEOK

  CONTROL_
  READY

  TEST_
  ACTIVE            REQUEST_
                     BRAKE_
  ACTUAL_              TEST
  TORQUE
                     CLOSE_
  FEEDBACK_          BRAKE
  BRAKE
                     BRAKE_
  SOS_               CLOSED
  ACTIVE
                    MON_SOS
  DRIVE_
  SAFETY_            START_
  ERROR              BRAKE_
                      TEST

  TORQUE_
  SETPOINT          TEST_OK

  TIME_OUT            ERROR

  MON_TIME             ENO
```
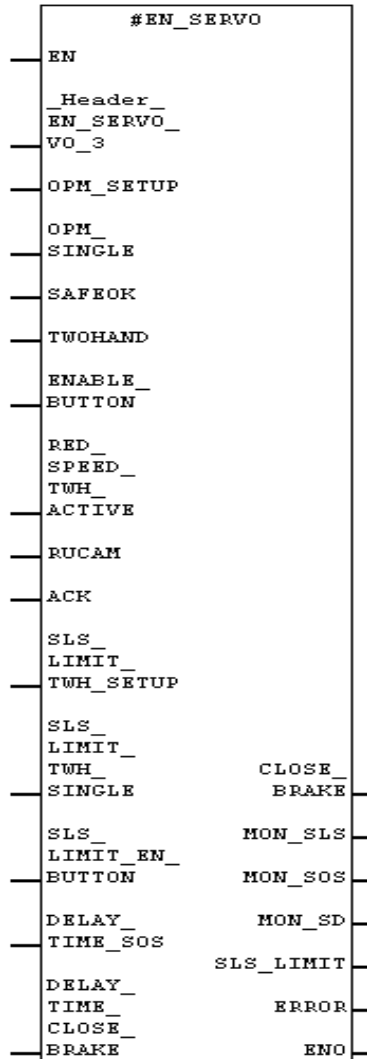
Brake test of a servopress

- Designed for servopresses (adapted for standard application „Simopress")
- Generation of request signal for brake test
- Is monitoring the torque against the brake in the given time
- Control of "Safe Operating Stop" (SOS) in the drive
- Control of the brake
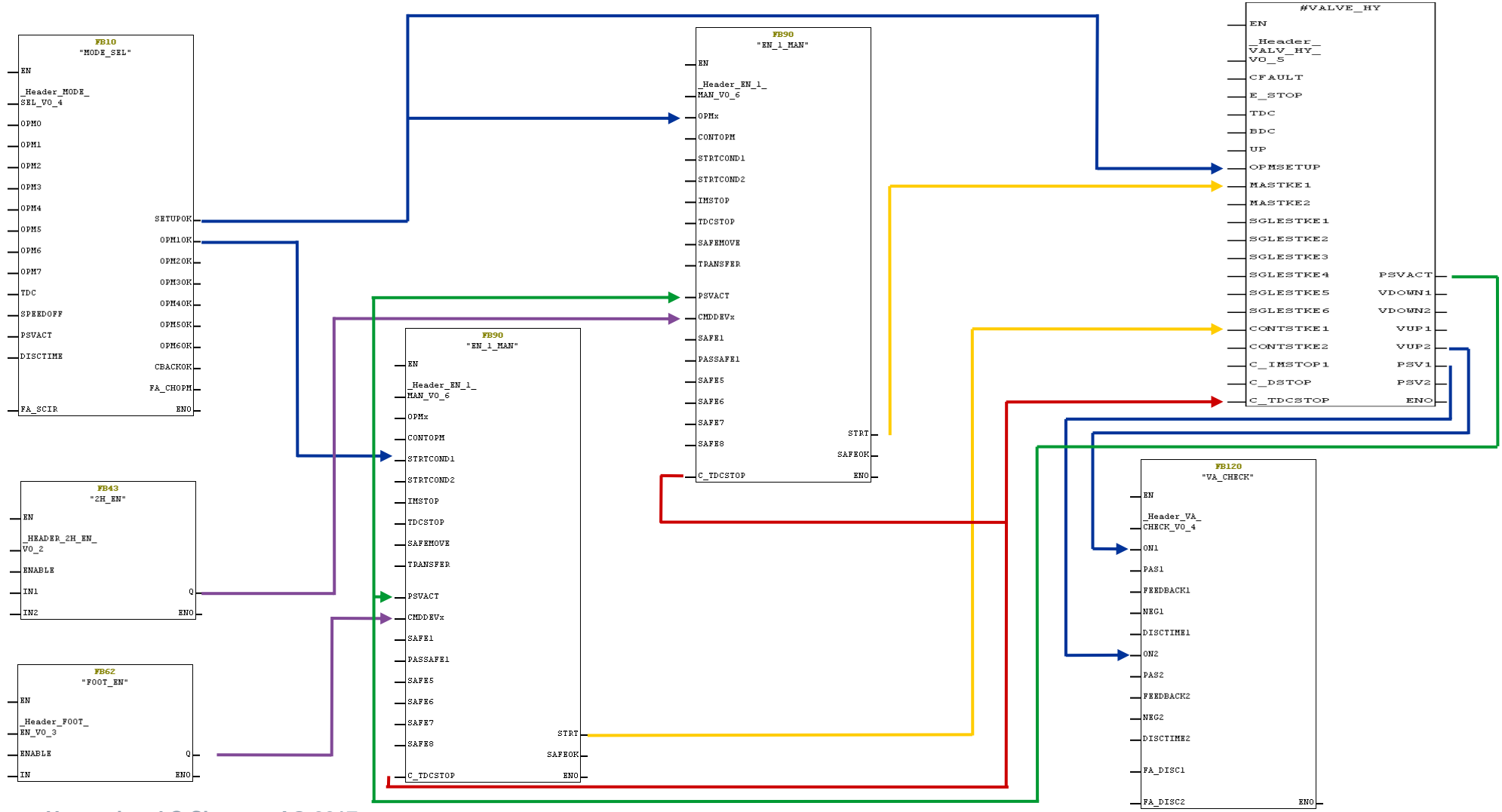
Function Blocks of the library SIMATIC S7_F/P V2.0.5
FB176 „EN_SERVO"

```
              #EN_SERVO
  — EN

    _Header_
    EN_SERVO_
  — VO_3

  — OPM_SETUP

    OPM_
  — SINGLE

  — SAFEOK

  — TWOHAND

    ENABLE_
  — BUTTON

    RED_
    SPEED_
    TWH_
  — ACTIVE

  — RUCAM

  — ACK

    SLS_
    LIMIT_
    TWH_SETUP

    SLS_
    LIMIT_
    TWH_                      CLOSE_
  — SINGLE          BRAKE —

    SLS_                    MON_SLS —
    LIMIT_EN_
  — BUTTON                  MON_SOS —

    DELAY_                   MON_SD —
  — TIME_SOS
                          SLS_LIMIT —
    DELAY_
    TIME_                     ERROR —
    CLOSE_
    BRAKE                       ENO —
```
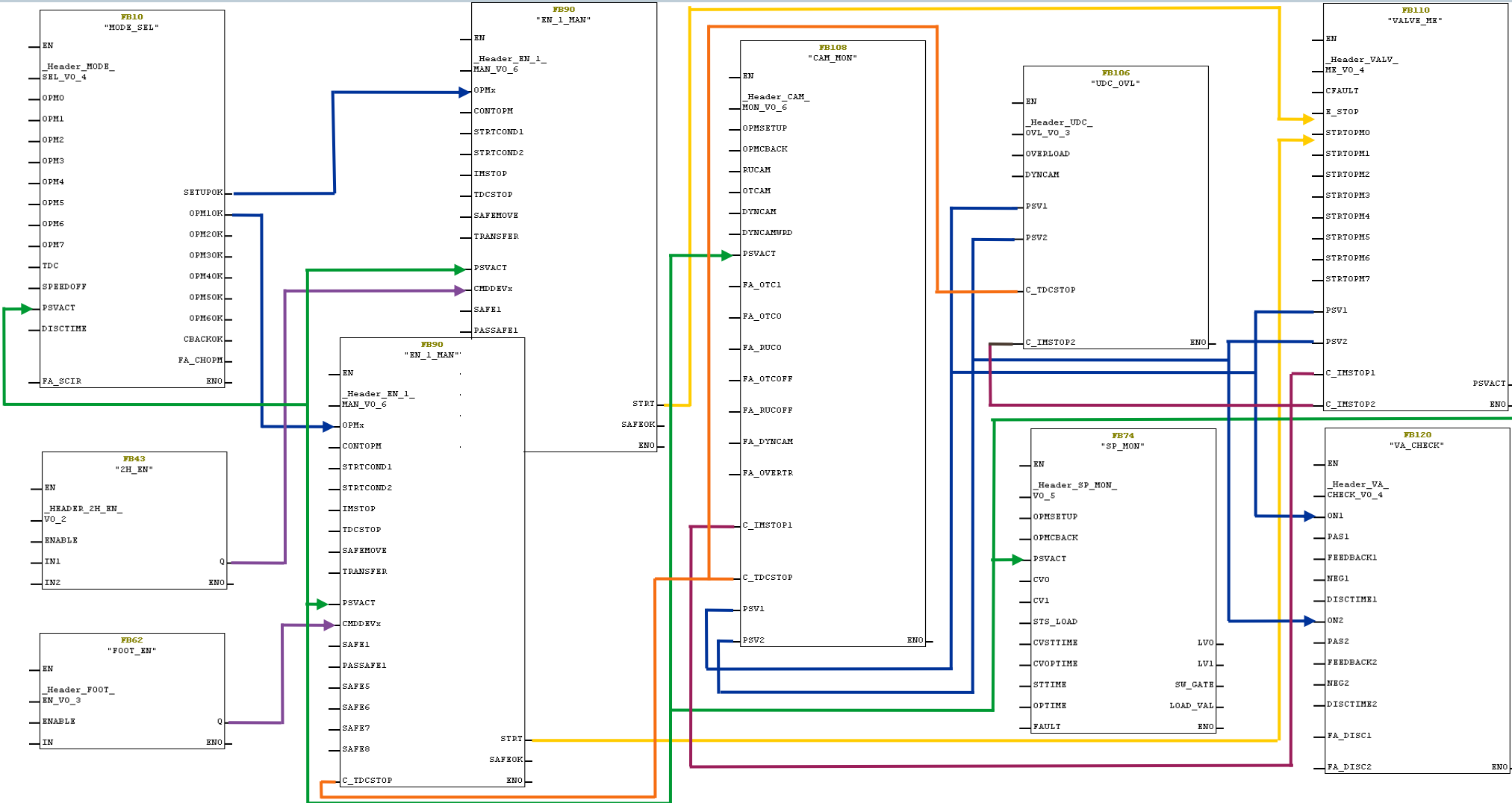
Safe setup mode and single stroke mode of a servopress

- Designed for servopresses (adapted for standard application „Simopress")
- Check of the selected operation 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, SDI, SLS, SLS_limit)
- Brake control
- Delay times parameterizable

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Function Blocks of the library SIMATIC S7_F/P V2.0.5
general structure/overview – mechanical press

SIEMENS

Function Blocks of the library SIMATIC S7_F/P V2.0.5
notes

Function blocks of Distributed Safety library

general, it's not possible to rename the blocks of the Distributed Safety library.

If they are used in the press safety library, it's also not allowed to renumber them.

Following blocks are used by S7 F/P:

FB 181 (F_CTU – failsafe counter)

FB 184 (F_TP – failsafe pulse)

FB 185 (F_TON – failsafe switch-on delay)

FB 186 (F_TOF – failsafe switch-off delay)

Function blocks of press safety library

It's allowed to rename and renumber the blocks of the press safety library.

The DBs for the fault handling are an exception, they must not be renumbered.

The structure of the blocks must not be changed, but the parameter names and comments can be changed.

Following data blocks have this restriction:

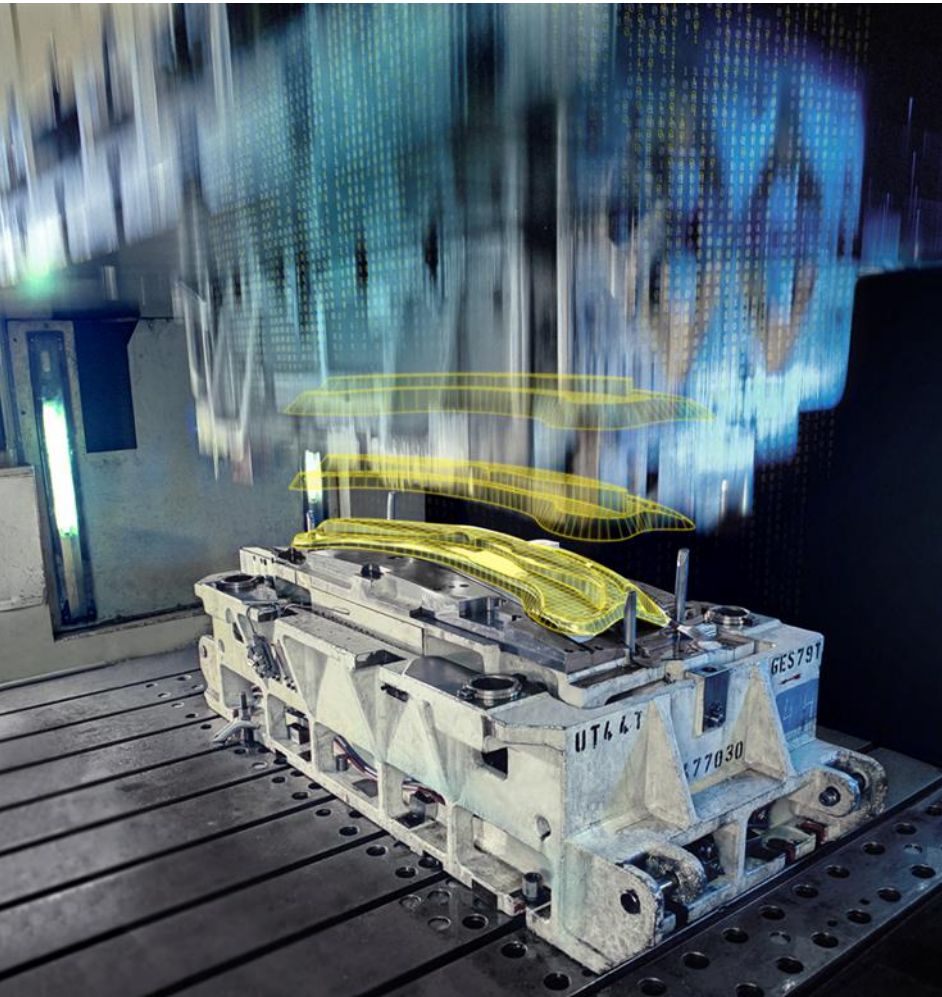>   DB 3 (FAULT_1)
>   DB 4 (FAULT_2)

If there are used more blocks of the press safety library, must be considered the following:

Dependent on the used block, the call order must be the same as in the example project!

More information is in the documentation.

Thank you for your attention!

DF FA PMA APC 1

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