

PLC2 - SC Linac Stopper Controls PLC

Magnets are referred to as these groups:

PPS Name	Magnets included MAD/PV name from Oracle db
SC HXR Kicker	BKYSP1H/KICK:SPH:110 BKYSP2H/KICK:SPH:115 BKYSP3H/KICK:SPH:120
SC HXR Septum/Merge	BLXSPH/BEND:SPH:170 BXSP1H/BEND:SLTH:435
SC SXR Kicker	BKYSP1S/KICK:SPS:385 BKYSP2S/KICK:SPS:390 BKYSP3S/KICK:SPS:395
SC SXR Septum	BLXSPS/BEND:SPS:470 BXSP1S/BEND:SPS:610 BXSP2S/BEND:SPS:800 BXSP3S/BEND:SPS:950
BYKIK	BYKIK1/KICK:LTUH:320 BYKIK2/KICK:LTUH:340
BYKIKS	BYKIK1S/KICK:LTUS:350 BYKIK2S/KICK:LTUS:360
CL-Merge	BRCUS1/BEND:CLTS:765

Signal descriptions

Description	PV name	PV type	Signal values 0, 1	PLC's I/O type	Modbus Address	PLC register name	Notes
Reset Interlocks/Latches	PLC: BSY0:2: Interlock Reset	bo	Off, Reset	REQ	7	a0.i0	This PLC is referred to as PLC2 in "LCLS-II BSY Beam Switching & Stopper Permit Controls Specification", and PLC1-5 all have equivalent signals
Pause Heartbeat	PLC: BSY0:2: PAUSE_ HB	bo	True, False	REQ	6	a0.i1	
HW Enable	PPS: BSY0:2: HW_ENA BLE	bi	Disabled (MAJOR), Enabled (NO_ALARM)	RT-IN	7	a0.o0	

<i>LCLS Secure</i> : The LCLS Secure Loop for the BTH through FEH is completed and the latching interlock has been reset (i.e., all downstream areas are searched, secure, in No Access, and A/V timeout has completed successfully without EO interruption).	PPS: BSY0:2: LCLS_S ECURE	bi	Not_Secure (MAJOR), Secure (NO_ALA RM)	RT-IN	6	a0.o1	
<i>RSY Secure</i> : The research yard fenced area is rad ready and the latching interlock has been reset (i.e., all areas searched, secure, in No Access, and A/V timeout has completed successfully without EO interruption).	PPS: BSY0:2: RSY_SE CURE	bi	Not_Secure (MAJOR), Secure (NO_ALA RM)	RT-IN	5	a0.o2	
BSY BSOICs OK (AKA BSOIC Group-C)	BSOC: BSY0:2: Sumy	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-IN	4	a0.o3	
<i>PLC2 panel Stopper-Enable Keyswitch</i> : Local keyswitch on the hardware panel used as a "LOTO" style permit interrupt mechanism and personnel safety token. Keyswitch physically interrupts control circuit permit to HXR/SXR stoppers.	PPS: BSY0:2: STOPPE R_ENAB LE	bi	Not_Enabl ed (MAJOR), Enabled (NO_ALA RM)	RT-IN	3	a0.o4	
Heartbeat IN (from opposite chain)	PLC: BSY0:2: HRTBT_I NP	bi	Zero (NO_ALA RM), One (NO_ALA RM)	RT-IN	2	a0.o5	
<i>Cross-Interlock input HX Permit (test-switched A or B)</i> : "Raw" stopper permit signal from opposite chain, used for cross-interlocking safety output. When PLCs are cross-interlocked, a fault in either isolated safety chain will result in both chains responding. When PLCs are not cross-interlocked, they operate in isolation of each other, only according to their own individual inputs and logic.	PLC: BSYH:2: XInterloc kln	bi	NotReady (MAJOR), Ready (NO_ALA RM)	RT-IN	1	a0.o6	
<i>Cross-Interlock input SX Permit (test-switched A or B)</i> : "Raw" stopper permit signal from opposite chain, used for cross-interlocking safety output. When PLCs are cross-interlocked, a fault in either isolated safety chain will result in both chains responding. When PLCs are not cross-interlocked, they operate in isolation of each other, only according to their own individual inputs and logic.	PLC: BSYS:2: XInterloc kln	bi	NotReady (MAJOR), Ready (NO_ALA RM)	RT-IN	0	a0.o7	
<i>Safety Relay Feedback – HX Summary OFF</i> : The PLC calculates summary off signals for both HXR and SXR, which drive two independent external safety relays, used by other systems. One contact is monitored on each relay by the PLC to confirm proper relay operation. If the feedback signal "disagrees" with the PLC output driving the external relay, a fault is triggered. The feedback signal is inverted from the relay drive signal.	PPS: BSYH:2: SRIn	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-IN	15	a0.o8	These inputs have corresponding outputs below, called Out.
<i>Safety Relay Feedback – SX Summary OFF</i> : The PLC calculates summary off signals for both HXR and SXR, which drive two independent external safety relays, used by other systems. One contact is monitored on each relay by the PLC to confirm proper relay operation. If the feedback signal "disagrees" with the PLC output driving the external relay, a fault is triggered. The feedback signal is inverted from the relay drive signal.	PPS: BSYS:2: SRIn	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-IN	14	a0.o9	
Test Mode Keyswitch status	PLC: BSY0:2: TestMode	bi	Test (MAJOR), Normal (NO_ALA RM)	RT-IN	13	a0.o10	
<i>STP-D2 Summary OUT</i> : This signal is required as part of the conditions for Cu beam to HXR. It is the logical sum of STP-D2, STP-60, STP-61 and DM60 "OUT" limit switch statuses.	STPR: BSYH:1: D2: OutSum	bi	Test (MAJOR), Normal (NO_ALA RM)	RT-IN	8	a0.o15	
<i>HX-Kicker Magnet OFF</i> : Magnet status from SC beamline power supplies.	KICK: SPH:110: PPSOFFSt atus	bi	NotOff (MAJOR), Off (NO_ALA RM)	RT-IN	23	a0.o16	
<i>HX-SepMrg Magnet OFF</i> : Magnet status from SC beamline power supplies.	BEND: SPH:170: PPSOFFSt atus	bi	NotOff (MAJOR), Off (NO_ALA RM)	RT-IN	22	a0.o17	
<i>BYKIK OFF</i> : Magnet status from SC beamline power supplies.	KICK: LTUH: 320: PPSOFFSt atus	bi	NotOff (MAJOR), Off (NO_ALA RM)	RT-IN	21	a0.o18	
FEE/NEH H1.3 Stopper ST1L0 IN	PPS: BSY0:2: ST1L0In	bi	NotIn (NO_ALA RM), On (MAJOR)	RT-IN	20	a0.o19	Check NEH name for conflicts
<i>HX-Kicker Admin enable</i> : Input deriving as a summary from multiple administrative keyswitches (from ACR and NEH) , for allowing beam into the BSY. Operates similar to the "beam enable keyswitch", but control is solely via PLC software, instead of interrupting physical circuit.	KICK: SPH:110: AcrEnable	bi	NotEnabl ed (MAJOR), Enabled (NO_ALA RM)	RT-IN	19	a0.o20	

Spare (HX-Kicker interlock)	KICK: SPH:110: SpareBit 18	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-IN	18	a0.o21	Check with Eddie or ? if this does somethin g, should be on screens. If it doesn't need to be on a diag screen, delete.
<i>STP-34 Summary OUT:</i> This signal is required as part of the conditions for Cu beam to SXR. It is the logical sum of STP-34A and STP-34B "OUT" limit switch statuses.	STPR: BSYS:1: ST34: OutSum	bi	Test (MAJOR), Normal (NO_ALA RM)	RT-IN	95	a0.o64	
<i>SX-Kicker Magnet OFF:</i> Magnet status from SC beamline power supplies.	KICK: SPS:385: PPSOFFSt atus	bi	NotOff (MAJOR), Off (NO_ALA RM)	RT-IN	94	a0.o65	
<i>SX-Septum Magnet OFF:</i> Magnet status from SC beamline power supplies.	BEND: SPS:470: PPSOFFSt atus	bi	NotOff (MAJOR), Off (NO_ALA RM)	RT-IN	93	a0.o66	
<i>BYKIKS Magnet OFF:</i> Magnet status from SC beamline power supplies.	KICK: LTUS: 350: PPSOFFSt atus	bi	NotOff (MAJOR), Off (NO_ALA RM)	RT-IN	92	a0.o67	
<i>CL-Merge Magnet OFF:</i> Magnet status from SC beamline power supplies.	BEND: CLTS: 765: PPSOFFSt atus	bi	NotOff (MAJOR), Off (NO_ALA RM)	RT-IN	91	a0.o68	
<i>SX-Kicker Admin enable:</i> Input deriving as a summary from multiple administrative keyswitches (from ACR and NEH) , for allowing beam into the BSY. Operates similar to the "beam enable keyswitch", but control is solely via PLC software, instead of interrupting physical circuit.	KICK: SPS:385: ACREna ble	bi	NotEnable d (MAJOR), Enabled (NO_ALA RM)	RT-IN	90	a0.o69	
Spare (SX-Kicker interlock)	KICK: SPS:385: SpareBit 89	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-IN	89	a0.o70	see above spare
<i>HX-Kicker and HX-SeptMrg Permit:</i> Real-time HXR stopper permit status. Output drives both kicker and septum/merge power supply permits.	STPR: SPH:110: Permit	bi	NotPermitt ed (MAJOR), Permitted (NO_ALA RM)	RT-OUT	103	a0.o72	
<i>HX-Kicker and HX-SeptMrg Permit (RET):</i> This is a copy of the HXR permit output. For redundant HW safety, both (+) and (-) sides of stopper controls are interrupted.	STPR: SPH:110: PermitRet	bi	NotPermitt ed (MAJOR), Permitted (NO_ALA RM)	RT-OUT	102	a0.o73	
<i>HX-Kicker/SeptMrg Summary OFF to relay:</i> Real-time HXR stopper off status. Output drives independent safety relay providing multiple dry-contact summaries for use by other systems.	STPR: SPH:110: PPSOFFSt atus	bi	NotOff (MAJOR), Off (NO_ALA RM)	RT-OUT	101	a0.o74	
<i>HX "Kicker Conditions OK" to PLC1:</i> Real-time status of beamline conditions necessary for HXR kicker permit which is transmitted to 30-BSY (PLC1).	KICK: SPH:110: PPSRea dy	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-OUT	100	a0.o75	
<i>SX-Kicker and SX-Septum Permit:</i> Real-time SXR stopper permit status. Output drives both kicker and septum power supply permits.	STPR: SPS:385: Permit	bi	NotPermitt ed (MAJOR), Permitted (NO_ALA RM)	RT-OUT	99	a0.o76	
<i>SX-Kicker and SX-Septum Permit (RET):</i> This is a copy of the HXR permit output. For redundant HW safety, both (+) and (-) sides of stopper controls are interrupted.	STPR: SPS:385: PermitRet	bi	NotPermitt ed (MAJOR), Permitted (NO_ALA RM)	RT-OUT	98	a0.o77	

<i>SX-Kicker/Septum Summary OFF to relay:</i> Real-time SXR stopper off status. Output drives independent safety relay providing multiple dry-contact summaries for use by other systems.	STPR: SPS:385: PPSOffSt atus	bi	NotOff (MAJOR), Off (NO_ALA RM)	RT-OUT	97	a0.o78	
<i>SX "Kicker Conditions OK" to PLC1:</i> Real-time status of beamline conditions necessary for SXR kicker permit which is transmitted to 30-BSY (PLC1).	KICK: SPS:385: PPSRea dy	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-OUT	96	a0.o79	
<i>Cross-Interlock HX Permit (RT to testswitch for test mode):</i> "Raw" stopper permit signal used for cross-interlocking safety output. This output is returned to the same PLC when the testmode switch is in TEST mode.	PLC: BSYH:2: XInterloc kTest	bi	NotReady (MAJOR), Ready (NO_ALA RM)	RT-OUT	111	a0.o80	
<i>Cross-Interlock HX Permit (RT to testswitch for other chain):</i> "Raw" stopper permit signal used for cross-interlocking safety output. This output is sent to the opposite chain PLC when the testmode switch is in NORMAL mode.	PLC: BSYH:2: XInterloc kOut	bi	NotReady (MAJOR), Ready (NO_ALA RM)	RT-OUT	110	a0.o81	
<i>Cross-Interlock SX Permit (RT to testswitch for test mode):</i> "Raw" stopper permit signal used for cross-interlocking safety output. This output is returned to the same PLC when the testmode switch is in TEST mode.	PLC: BSYS:2: XInterloc kTest	bi	NotReady (MAJOR), Ready (NO_ALA RM)	RT-OUT	109	a0.o82	
<i>Cross-Interlock SX Permit (RT to testswitch for other chain):</i> "Raw" stopper permit signal used for cross-interlocking safety output. This output is sent to the opposite chain PLC when the testmode switch is in NORMAL mode.	PLC: BSYS:2: XInterloc kOut	bi	NotReady (MAJOR), Ready (NO_ALA RM)	RT-OUT	108	a0.o83	
ACR Hardware alarm	PPS: BSY0:2: HwAlrm Warn	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-OUT	107	a0.o84	Check if N is because 2 is used elsewhere
Heartbeat OUT (to opposite chain)	PLC: BSY0:2: HRTBT_ OUTP	bi	Zero (NO_ALA RM), One (NO_ALA RM)	RT-OUT	106	a0.o85	
<i>BCS fault from PLC2:</i> Signal to BCS system to trigger a BCS fault when conditions described in 5.2.2 are met. Signal is OK=TRUE, Fault=FALSE.	PPS: BSY0:2: BCSFault	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-OUT	132	a0.o107	
<i>Heartbeat OK:</i> TRUE if Heartbeat OUT signal from other chain is received and cycling at 0.5 Hz frequency. This signal is OR'd with other signals to generate the BCS Fault from PLC2 signal.	PLC: BSY0:2: HRTBT_ OK	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-OUT	131	a0.o108	
<i>Magnet Status HX-Kicker/Septum Fault:</i> TRUE if the magnet permit is FALSE and magnet off is FALSE. A short delay is included to avoid race conditions. These signals are OR'd with other signals to generate the BCS Fault from PLC2 signal.	STPR: SPH:110: PPSFault	bi	Ok (NO_ALA RM), Fault (MAJOR)	RT-OUT	130	a0.o109	Fault PPSFault MGNT STPR
<i>Magnet Status SX-Kicker/Septum Fault:</i> TRUE if the magnet permit is FALSE and magnet off is FALSE. A short delay is included to avoid race conditions. These signals are OR'd with other signals to generate the BCS Fault from PLC2 signal.	STPR: SPS:385: PPSFault	bi	Ok (NO_ALA RM), Fault (MAJOR)	RT-OUT	129	a0.o110	
<i>Magnet Status BYKIK Fault:</i> TRUE if the magnet permit is FALSE and magnet off is FALSE. A short delay is included to avoid race conditions. These signals are OR'd with other signals to generate the BCS Fault from PLC2 signal.	KICK: LTUH: 320: PPSFault	bi	Ok (NO_ALA RM), Fault (MAJOR)	RT-OUT	128	a0.o111	
<i>Magnet Status BYKIKS Fault:</i> TRUE if the magnet permit is FALSE and magnet off is FALSE. A short delay is included to avoid race conditions. These signals are OR'd with other signals to generate the BCS Fault from PLC2 signal.	KICK: LTUS: 350: PPSFault	bi	Ok (NO_ALA RM), Fault (MAJOR)	RT-OUT	143	a0.o112	
<i>Safety Relay HX Summary OFF OK:</i> Because the relay feedback signal is inverted from the relay drive signal, the feedback "disagrees" with the drive when both signals are in the same state. A short delay is included to avoid race conditions. These signals are OR'd with other signals to generate the BCS Fault from PLC2 signal.	PPS: BSY0:2: SROut	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-OUT	142	a0.o113	
<i>Safety Relay SX Summary OFF OK:</i> Because the relay feedback signal is inverted from the relay drive signal, the feedback "disagrees" with the drive when both signals are in the same state. A short delay is included to avoid race conditions. These signals are OR'd with other signals to generate the BCS Fault from PLC2 signal.	PPS: BSY0:2: SROut	bi	Fault (MAJOR), Ok (NO_ALA RM)	RT-OUT	141	a0.o114	