**Solenoid Helium Alarms**

B\_SOL:LHe:C14ASY\_DT\_MAX

 This alarm is normally used during cool down and currently has no alarm value.

B\_SOL:LHe:C5BOB\_DT\_MAX

 This is the differential temperature between coil 5 and the bobbin. Currently this is set as a major alarm at 20K. We are not likely to see this alarm, if we do you are already dealing with other issues.

B\_SOL:LHe:CM\_DT\_MAX

 This is the maximum differential temperature of the 4K cold mass.

Generally used during cool down it currently has no set alarm value.

B\_SOL:LHe:EV8611CD

 This is the Solenoid Cool Down valve. It is currently in manual mode and closed. There are no alarm values set on this signal at this time.

B\_SOL:LHe:EV8611JT

 This is the JT valve that supplies the Solenoid lead reservoir. It controls on the liquid level of the reservoir and has a secondary PID controlling its minimum using the return temperature of the Solenoid. It currently has no set alarm values.

B\_SOL:LHe:EV8612

 EV8612 is the supply valve to the magnet reservoir. It is fed from the lead reservoir. Currently there are no alarm values set for this valve.

B\_SOL:LHe:EV8670BY

 Helium gas from the top of the magnet reservoir is used to cool the shields. This valve regulates pressure of that flow by way of opening to the quench header. Currently there are no alarms set on this valve.

B\_SOL:LHe:HE\_CP\_CD\_DT2

 This is the differential temperature of the solenoid He supply in the DBX and the LHe channel in the solenoid magnet. Currently there is a major alarm set at -80K. Supply to the solenoid is normally ~5K and the LHe channel temp runs ~4.5K. The temperature at the button in the LHe channel would have to reach 85K when the supply is at ~5K for you to see this alarm. If that happens it’s most likely that you have already been working on other problems for some time.

B\_SOL:LHe:PT8670

 This is the pressure in the SOL magnet reservoir. It currently has alarms set at LOLO = 1.05, HIGH = 1.45 and HIHI = 1.55 atm. This alarm is often associated with a fast dump of the magnet. Currently there is a 5 sec delay on this alarm for the alarm handler but there is a 10 minute delay for the paging system. That means if the counting house is staffed, they will acknowledge the alarm and call us. If the counting house is un-manned it will be ten minutes before we see a page. If this pressure climbs above the HIHI you will have blown reliefs and emptied the magnet reservoir at a minimum, such is the case in a fast dump.

**Solenoid PLC/COMM’s Alarms**

B\_SOL:PLC:CryoCon1

B\_SOL:PLC:CryoCon2

B\_SOL:PLC:CryoCon3

 These three alarms are PLC comms. Currently they have a 5 second delay in the alarm handler with a 10 minute page delay. Guidance will be provided for shift workers on resetting these alarms. If the reset doesn’t take they will call, in which case we would call for further guidance. If the counting house is not staffed and we receive this alarm it means that comms have been down for 10 minutes already and we will need to reset and check on the Solenoid (we will likely see other problems arise from an outage of 10 minutes). To reset the PLC comms you must open the GUI in the css menu by clicking on SOLENOID then COMMs. Here you will find interlocks for the DBX, Solenoid and Torus. Green blocks are good red blocks are bad. The Cryocon’s are at the bottom of each and there is a reset button to the right of each set. Click the reset for the red ones, if it doesn’t take we will call for further instruction.

B\_SOL:COMM:UPS\_On\_Battery

B\_SOL:COMM:FAULT\_24VDC

B\_SOL:COMM:FAULT\_24VDC2

B\_SOL:COMM:FAULT\_PWRLOSS

B\_SOL:COMM:FAULT\_IO

B\_SOL:COMM:FAULT\_EXE

B\_SOL:COMM:FAULT\_HANDLER

B\_SOL:COMM:FAULT\_WATCHDOG

B\_SOL:COMM:FAULT\_STACK

B\_SOL:COMM:FAULT\_MODECHG

B\_SOL:COMM:FAULT\_MOTION

 These are all PLC related alarms. They currently have the standard 5 second delay and a 10 minute page delay. The counting house staff will acknowledge the alarm and start calling unless they have been given guidance on resetting these interlocks. If the counting house is not staffed we will receive these after 10 minutes, which may have already caused other issues. We can attempt to reset these from the Solenoid/COMMs GUI if we see no other problems. If the reset doesn’t work we will need to call a system expert for further instruction.

**Solenoid Power supply interlocks**

B\_SOL:MPS:IntlkCtrlRampSum

B\_SOL:MPS:IntlkFastDumpSum

B\_SOL:MPS:IntlkInternalSum

 These three alarms are part of the Solenoid Power supply interlocks. They all indicate that the magnet has ramped down for some reason. They are found by clicking the solenoid button on the clascss menu and then clicking on “Magnet power supply” in the sub menu. This will bring up the power supply GUI, in the upper left corner click on the “[…]” button and select “interlock status” from the pop-up menu. Green blocks are good and red blocks are bad, this will give you some indication of the root cause and we can proceed from there. Again these are on a 5 second delay with a 10 minute page delay.

**Solenoid Vacuum Alarms**

B\_SOL:VAC:CG8606

 This is the vacuum gauge on the Solenoid service tower. Current active alarms are 2E-5 = MINOR and 1E-4 = MAJOR. If the turbo pump is at full speed and the gate valve is open it would indicate a faulty gauge head. If the gate valve is closed and the turbo is not at 100% we have other problems.

B\_SOL:VAC:TB8600

 This is the current speed of the Solenoid turbo pump. Alarms are currently set at MINOR = 95 and MAJOR = 90. Check the gate valve position and the vacuum in the Solenoid. Likely a trip of some kind but if the vacuum is bad and the pump has tripped we will likely have to investigate further.

**Torus Nitrogen Alarms**

B\_TORUS:LN2:SHLDOUT\_T\_AVG

B\_TORUS:LN2:SHLDOUT\_T\_MAX

 These two alarms, unlike previous alarms, have no delay on paging. When these trip you may get them before anyone else, the alarm handler still has a 5 second delay. These are the average and maximum outlet temperatures of the Torus shields. Under normal conditions the Torus shields are ~80K. If we lose LN2 these will increase. Currently the alarms are set as follows.

SHLDOUT\_T\_AVG MINOR=90K, MAJOR=100K

SHLDOUT\_T\_MAX MINOR=110K, MAJOR=120K

Look at the DBX and Torus nitrogen GUI’s in the clascss menu.

B\_TORUS:LN2:EV8553

 This is the LN2 supply valve to the reservoir in the Torus Service Tower (TST). Currently there is no active alarm on this valve.

B\_TORUS:LN2:EV8555T

 This is the LN2 supply valve on the distribution box. It can be found on both the DBX GUI and the Torus nitrogen GUI. Currently there are no active alarms set on this vale.

B\_TORUS:LN2:LL8152CP

B\_TORUS:LN2:LL8152DP

 These signals are the liquid levels in the Torus LN2 reservoir. The “DP” and “CP” designation identify the type of probe being used, differential pressure and conductive. They are reading the same volume and can be found on the Torus Liquid Nitrogen GUI. Currently there are no active alarms set on either of these signals.

B\_TORUS:LN2:TP8152

 This is the return temperature from the Torus LN2 reservoir. It can be found on the Torus nitrogen GUI at the top of the reservoir. This temp normally reads ~80K, It is set with a MAJOR alarm at 90K.

**Torus Helium Alarms**

B\_TORUS:LHe:EV8111BY

 This is the Torus LHe supply bypass valve. It is in manual mode and closed. Currently there are no active alarms set on this valve.

B\_TORUS:LHe:EV8111CD

 This is the Torus cool down valve. It is always slightly open to compensate for a small leak in the system. Its PID control is regulated by the liquid level in the reservoir. This valve has a small range of operation, MAX 14% and MIN 9.3%. Currently there are no active alarms set on this valve.

B\_TORUS:LHe:EV8115JT

 This is the LHe supply JT valve. It has a cascading PID control that sets its minimum at 41% and its maximum at 65%. Its main PID loop controls off of liquid level in the reservoir at a set point of 80% full.

Currently there are no active alarms on this valve.

B\_TORUS:LHe:LL8120DP

 This is the LHe level in the Torus reservoir, it is currently set with a major alarm at 40%. It is another alarm that has a 5 second delay to the alarm handler but 10 minutes to page, so the counting house will acknowledge the alarm and call us. If the counting house is un-manned it will have been 10 minutes since this threshold was crossed before you get a call. Find this on the Torus helium screen and investigate the cause i.e... ESR trip, etc.

B\_TORUS:LHe:PT8111

 This is the LHe supply pressure to the Torus, nominally 3 atm. It is currently set with a MAJOR LOLO alarm of 1.9 atm. There is a 5 sec delay on this signal for the alarm handler and a 10 min delay on paging. The counting house staff will acknowledge the alarm and call us, if the counting house is un-manned it will take 10 minutes for us to get a page. Find this signal on the Torus helium GUI.

B\_TORUS:LHe:PT8115

 This is a pressure sensor between the coils and the EV8115JT valve that supplies the LHe reservoir. Currently there is no active alarm on this sensor.

B\_TORUS:LHe:TP8121A

B\_TORUS:LHe:TP8121B

 These are the temperature sensors on the vapor cooled leads (VCL’s). They have four alarms each that are all set as follows,

HIHI, MAJOR = 340K

HIGH, MINOR = 325K

LOW, MINOR = 280K

LOLO, MAJOR = 250K

These alarms can indicate problems such as faulty heaters or blown fuses.

**BUFFER DEWAR ALARMS**

TD8210.VAL

 This is the LHe supply temperature to the Buffer Dewar. Currently there are no active alarms on this signal.

LL8210.VAL

 This is the liquid level in the buffer Dewar which supplies cryogens to the target. Currently the alarm values are, LOLO/MAJOR = 40 and HIHI/MAJOR = 90.

**Torus PLC/COMM’s Alarms**

B\_TORUS:PLC:CryoCon1

B\_TORUS:PLC:CryoCon2

B\_TORUS:PLC:CryoCon3

B\_TORUS:DBX:CryoCon1

B\_TORUS:DBX:CryoCon2

 These alarms are all related to the PLC’s. Shift workers will acknowledge these and will either follow guidance to reset them or call us. If we get these alarms on the phone then it has already been down for 10 minutes and you will likely be dealing with more than just this. You will find these by clicking “Solenoid” in the clascss menu and then “COMM’s” in the pop-up window. Green blocks are good, red blocks are bad. Click the “reset” button to the right of the red blocks. If that doesn’t solve the problem we will call the system expert for further instruction.

**Torus Vacuum Alarms**

B\_TORUS:VAC:CG8103

 This is a cold cathode gauge readout on top of the Torus chimney. It is normally reading in the mid -5 torr range and is has a MAJOR alarm set at 2E-4. If you receive this alarm check the turbo pump speed (TB8100) and the gate valve read back.

B\_TORUS:VAC:TB8100

 This is the read back on the speed of the upper Torus turbo pump. It should read 100% or better. It is currently set with a MINOR alarm at 90% and a MAJOR alarm at 80%. Alarms from this signal would indicate that the pump has possibly tripped off and the gate valve is likely closed. If that is the case the backup roots system should be running. Controls for this system are located on the top of the space frame so a hall access will be required.

**Drift Chamber Gas Alarms**

**CO2 supply**

B\_DET\_DC\_GAS\_CO2\_PRESS

 This is the supply pressure of CO2 at the inlet of the Mass Flow Controllers. It is currently set with a MAJOR LOLO alarm at 90 psi. This alarm means the CO2 Dewar’s are not supplying enough pressure.

B\_DET\_DC\_GAS\_CO2\_SUP1\_PRESS (UPPER)

B\_DET\_DC\_GAS\_CO2\_SUP2\_PRESS (LOWER)

 We have four CO2 Dewar’s online at all times. An alarm from the first signal in this DC gas list (B\_DET\_DC\_GAS\_CO2\_PRESS) would indicate that all four of those Dewar’s were empty or too low in pressure. These two signals were added to let us know that the Dewar’s are getting low early enough to avoid the CO2 press alarm. The four Dewar’s are setup on two manifolds as a differential pressure pair, meaning when the higher pressure Dewar of the two gets lower than its pair the other takes over. Each manifold is set up the same way with one pair regulated to a higher pressure than the other. These signals are on the manifolds before the regulators, giving us Dewar readings pre-regulator. Currently these alarms are both set with LO/MINOR = 150psi and LOLO/MAJOR = 125psi. Either of these would indicate that the CO2 Dewar’s need attention.

**MIX #1 ALARMS**

B\_DET\_DC\_GAS\_MIX1\_Ar\_FLOW

 This signal is the flow of Argon to the #1 mixing TCU, in LPM, that supplies region one and three drift chambers. There are currently no active alarms for this signal.

B\_DET\_DC\_GAS\_MIX1\_CO2\_FLOW

 This signal is the flow of CO2 to the #1 mixing TCU, in LPM, that supplies region one and three drift chambers. There are currently no active alarms for this signal.

B\_DET\_DC\_GAS\_MIX1\_CO2\_PRESS

 This is the pressure in the #1 mixing tank that supplies regions three and one drift chambers. Currently it has all four alarm values active and they are as follows.

HIHI/MAJOR = 120 psi.

HI/MINOR = 100 psi

LO/MINOR = 50 psi

LOLO/MAJOR = 10 psi

Either of these alarms will require the attention of the gas systems expert.

B\_DET\_DC\_GAS\_MIX1\_TCU

 This is a calibration value for the #1 TCU and currently has no active alarm set.

**MIX #2 ALARMS**

B\_DET\_DC\_GAS\_MIX2\_Ar\_FLOW

 This signal is the flow of Argon to the #2 mixing TCU, in LPM, that supplies region two drift chambers. There are currently no active alarms for this signal.

B\_DET\_DC\_GAS\_MIX2\_CO2\_FLOW

 This signal is the flow of CO2 to the #1 mixing TCU, in LPM, that supplies region one and three drift chambers. There are currently no active alarms for this signal.

B\_DET\_DC\_GAS\_MIX1\_CO2\_PRESS

 This is the pressure in the #2 mixing tank that supplies regions three and one drift chambers. Currently it has all four alarm values active and they are as follows.

HIHI/MAJOR = 120 psi.

HI/MINOR = 100 psi

LO/MINOR = 50 psi

LOLO/MAJOR = 10 psi

Either of these alarms will require the attention of the gas systems expert.

B\_DET\_DC\_GAS\_MIX2\_TCU

 This is a calibration value for the #1 TCU and currently has no active alarm set.

**DC GAS PRESSURE AND FLOW**

B\_DET\_DC\_GAS\_R12\_MAN\_PRESS

 Region 1 and 2 manifold pressure. Currently there is no active alarm for this signal.

B\_DET\_DC\_GAS\_R12\_PRESS

 This signal is region 1&2 drift chamber pressure. Currently the alarms are set as HI/MINOR = .17 iwc, HIHI/MAJOR = .20 iwc.

Iwc = inches of water column.

B\_DET\_DC\_GAS\_R12\_RTN\_FLOW

 This is the return flow from region 1&2 drift chambers. Currently there are no active alarms set on this signal.

B\_DET\_DC\_GAS\_R12\_RTN\_H2O

 This is the H2O, in ppm, of the return from regions 1&2. Currently there are no active alarms for this signal.

B\_DET\_DC\_GAS\_R1\_SUP\_FLOW

 Like the name says this is the supply flow to the region 1 drift chambers. On average this is about 9 lpm. A LOLO/MAJOR alarm is set at 1 Lpm.

B\_DET\_DC\_GAS\_R2\_SUP\_FLOW

 This is the supply flow to the region 2 drift chambers. Average flow is about 18 Lpm. There is a LOLO/MAJOR alarm set on this signal at

5 Lpm.

B\_DET\_DC\_GAS\_R2\_SUP\_H2O

B\_DET\_DC\_GAS\_R2\_SUP\_O2

 These two signals are the H2O and O2 content of the region 2 gas supply, measured in ppm. Currently there are no active alarms set for these signals.

B\_DET\_DC\_GAS\_R3\_MAN\_PRESS

 This is pressure in the region 3 return manifold. Currently there are no active alarms for this signal.

B\_DET\_DC\_GAS\_R3\_PRESS

 This is the pressure in the region 3 drift chambers. Measured in inches of water column it nominally runs about .1 iwc. Alarms are set as follows.

HI/MINOR = .17 iwc.

HIHI/MAJOR = .20 iwc.

B\_DET\_DC\_GAS\_R3\_RTN\_FLOW

 This is the return flow from the region 3 drift chambers which is measured in Lpm. Currently there are no active alarms on this signal.

B\_DET\_DC\_GAS\_R3\_RTN\_H2O

 H2O content of the return flow from the region 3 drift chambers, measured in ppm. Currently there are no active alarms set for this signal.

B\_DET\_DC\_GAS\_R3\_SUP\_FLOW

 Gas supply to the region 3 drift chambers, measured in Lpm’s.

Nominal flow is about 36 lpm. There is a LOLO/MAJOR alarm set at 5 lpm.

**Beamline Vacuum Alarms**

hallb\_VCG2C21ATr

hallb\_VCG2C21Tr

These two signals come from gauges in the upstream alcove near the shield wall. If a vacuum event occurs that degrades vacuum in the beamline to the e-3, pneumatic valves on the beamline will close (fast valve, slow valve). The turbo pump set for this section of beamline is located in the upstream alcove about 15 ft. from the shield wall and between the beamline and wall. Currently the alarms for these signals are HI/MINOR = 7e-5 and HIHI/MAJOR = 1e-4.

hallb\_VCG2C24ATr

 This gauge is located in the upstream alcove at the upstream end of the Tagger magnet. When the beamline valves are closed it reads vacuum between the upstream end of the Tagger magnet and the downstream end of the collimator box. The turbo pump set for this volume is a small blue and white cube located on the beam left side of the collimator box. Current alarms on this volume are HI/MINOR = 1e-4 and HIHI/MAJOR = 1e-3.

hallb\_VCG2H00ATr

 This gauge is located on the downstream end of the collimator box. When the beamline valves are closed it reads the volume between the downstream end of the collimator box and the upstream end of the target insertion cart. The turbo pump for this volume is mounted directly to the beamline at the 2H00 girder. Current alarms are set at HI/MINOR = 1e-4 and HIHI/MAJOR = 1e-3.

hallb\_VCG2H01ATr

 This gauge is currently located on the bottom of the Saclay target can. When the beamline valves are closed it reads the vacuum between the upstream end of the target insertion cart and the target cell. The turbo pump associated with this volume is the CVP, CVS pump set mounted to the upstream end of the Saclay target can. The current alarm settings for this signal are

HI/MINOR = 1e-4 and HIHI/MAJOR = 1e-3.

NOTE: This pump set is operated through the Saclay target control system. The Saclay target expert should be contacted.

hallb\_VCG2H02ATr

 This gauge is located in the downstream alcove on the pump set just before the cave entrance. This pump set provides the vacuum for the entire downstream beamline, from the upstream end of the forward carriage bore to the farady cup. The current alarm is set at HIHI/MAJOR = 1e-3.

**Cryotarget Alarms**

B\_SACLAYTGT:TT\_T

 This is the temperature of the target cell. An alarm here would indicate that the target is not within nominal full target temperature ranges. The alarms change with target material. Currently there are two temperature alarms set for a liquid H2 target. Nominal temperature for a liquid H2 target is ~20K, lower temperatures will freeze the LH2 in the cell. Current alarm set points are, LO/MINOR = 19K and LOLO/MAJOR = 18K. Again these values will change with other target gases.

B\_SACLAYTGT:PT\_T

 This is the current pressure in the target cell. This alarm would indicate that the target pressure is outside of the range needed for a full target. The current alarms are set for a LH2 target and are currently set to, LO/MINOR = 1225mbar and LOLO/MAJOR = 1200mbar.

B\_SACLAYTGT:AL\_STOCK

 This is an alarm value set for the H2/D2 storage tanks. The system will send an alarm when any required condition changes i.e. reliefs blow.

B\_SACLAYTGT:AL\_SALLE

 This is an indicator for the alarm box in the counting house. This alarm is set up on target levels and pressures.

B\_SACLAYTGT:AL\_NIV\_C\_L

 Target level sensor alarm.

B\_SACLAYTGT:AL\_VIDE

 Vacuum chamber alarm. This would indicate degradation of vacuum in the Saclay can, look to see if the FV\_CVS gate valve has closed and whether or not the CVP/CVS pump set has tripped out.

B\_SACLAYTGT:ALARMEH2D2

 This alarm indicates that one, or both, of the flammable detectors on top of the target can and control racks has alarmed. Look for leaks in the target gas circuits.

B\_SACLAYTGT:AL\_NIV\_C\_P

 This is a target pressure alarm. The system will send this when pressure changes to anything outside of the set parameters in the target system.

B\_SACLAYTGT:TT\_ER1

 This is a temperature sensor on the returns of the cryogen circuits. An alarm here would indicate that the return lines are starting to frost, heaters have stopped working, cryostat is over filling, liquid level probe failure, etc... The current alarm values are LO/MINOR = 170K and LOLO/MAJOR = 165K.