**HHT System Datalog Channel Descriptions**

**Date & Time**

Format MM/DD/YYYY HH:mm:ss (e.g. 10/06/2015 07:30:18)

**61602 Freq Hz**

Frequency (Hz) alternating current outputted by the Chroma 61602 AC supply. Is zero when power supply output relay is off or voltage is zero.

**Active Alarm Bits**

**ARGON GAS PURGE VALVE VA9**

Logical (1/0) for valve VA9 as indicated on system flow diagram

**ARGON GAS ROUTER VALVE VA6**

Logical (1/0) for valve VA6 as indicated on system flow diagram. Feeds Argon into core.

**ARGON GAS SOURCE VALVE VA5**

Logical (1/0) for valve VA5 as indicated on system flow diagram. In series with VA6. Feeds Argon into core

**ARGON JACKET FILL VALVE VA8**

Logical (1/0) for valve VA8. Feeds Argon into the jacket to maintain argon pressure. This valve is controlled by jacket by jacket pressure control loop

**ARGON PUMP EN**

Logical (1/0) for Argon pump on/off.

**BAND HEATER EN**

Logical (1/0) for band heater on/off.

**CHROMA 61602 OUTPUT**

Logical (1/0) for relay in series with Chroma 61602 power supply, which powers all Q pulse electronics.

**Cooled Core Gas**

Temperature (deg C) measurement, thermocouple (TC5, n-type) located after the gas comes out of the core and through the heat exchanger.

**Core Ar Makeup LPM**

Flow rate (Liters per minute) of Ar into the core. Sierra Air MFC, 0-1 LPM.

**CORE GAS HEATER EN**

Logical (1/0) for core gas heater on/off. Located inline before gas enters the core, after the pressure sensor (CH5) and before the thermocouple (TC4). Powered by Chroma 61702 Ch 2 .

**Core Gas Htr Cur**

Current (Amps) in the core gas heater. Chroma 61702 Ch2.

**Core Gas Htr Pow**

Power (Watts) used in the core gas heater. Chroma 61702 Ch2.

**Core Gas Htr Volt**

Voltage (Volts) in the core gas heater. Chroma 61702 Ch2.

**Core Gas In**

Temperature (degC) from thermocouple after the core gas heater , and just before the tee into the core. TC4, k-type.

**CORE GAS LOOP VL7 VALVE**

Logical (1/0) for valve VA7 as indicated on system flow diagram. Inapplicable in current stopped flow configuration

**Core Gas Out**

Temperature (degC) from thermocouple after the gas exits the core, and just before the heat exchanger. TC1.

**Core Htr Cur**

Current (Amps) into the core heater. Chroma 61702 Ch1.

**Core Htr Pow**

Power (Watts) into the core heater. Chroma 61702 Ch1.

**Core Htr Volt**

Voltage (Volts) into the core heater. Chroma 61702 Ch1.

**Core In Ar**

Mass Spec measurement in mbar of Argon going into the core.

**Core In H2**

Mass Spec measurement in mbar of H2 going into the core.

**Core In H2O**

Mass Spec measurement in mbar of H2O going into the core.

**Core In He**

Mass Spec measurement in mbar of He going into the core.

**Core In M3**

Mass Spec measurement in mbar of ?? going into the core.

**Core In N**

Mass Spec measurement in mbar of N going into the core.

**Core In O**

Mass Spec measurement in mbar of O going into the core.

**Core In O2**

Mass Spec measurement in mbar of O2 going into the core.

**Core In Press**

Pressure (PSI) of gas going into the core. Measured before core gas heater. Analog input Ch5

**Core Out Ar**

Mass Spec measurement of Ar leaving the core. Taken after the gas is cooled.

**Core Out H2**

Mass Spec measurement of H2 in gas leaving the core. Taken after the gas is cooled.

**Core Out H2O**

Mass Spec measurement of H2O in gas leaving the core. Taken after the gas is cooled.

**Core Out He**

Mass Spec measurement of He in gas leaving the core. Taken after the gas is cooled.

**Core Out M3**

Mass Spec measurement of M3 in gas leaving the core. Taken after the gas is cooled.

**Core Out N**

Mass Spec measurement of N in gas leaving the core. Taken after the gas is cooled.

**Core Out O**

Mass Spec measurement of O in gas leaving the core. Taken after the gas is cooled.

**Core Out O2**

Mass Spec measurement of O2 in gas leaving the core. Taken after the gas is cooled.

**Core Out Press**

Pressure (in PSIG) measured after gas leaves the core, and the heat exchanger.

**Core Pump Inlet Press**

Inapplicable in current stopped flow configuration. Was measuring inlet pressure in PSIG of pump that circulated gas in core loop

**Core Pump Out Gas LPM**

inapplicable in current stopped flow configuration

**Core Pump Press**

In previous configuration with circulating core gas, measured pressure at exit of core circulation pump. Now just measures core pressure because it is in stopped flow configuration

**CORE PUMP PRV VALVE**

logical value (1/0) indicating status of core pump pressure relieving valve. When system was in circulating flow configuration, its purpose was to relieve vacuum at inlet of core pump allowing pump to start instead of stalling

**Core Reactor Temp**

Temperature reported by thermocouple embedded in copper block that holds core. TC0 type K

**Cube H2**

Hydrogen concentration reported by MKS Mass Spectrometer when it is sampling from port 4 of rotary valve, which is connected to plexiglass box surrounding the reactor apparatus

**Cube N**

Nitrogen concentration reported by MKS Mass Spectrometer when it is sampling from port 4 of rotary valve, which is connected to plexiglass box surrounding the reactor apparatus

**Exit Gas LPM**

When HHT was in circulating core flow configuration, it measured gas exiting core when the core circulation valve VL7 was not on

**H GAS ROUTER VALVE VH4**

Logical state of valve VH4, lets Hydrogen or Helium into core. Should be renamed

**H GAS SOURCE VALVE VH3**

Logical state of valve VH3, lets Hydrogen into tee upstream of VH4.

**H2 Makeup LPM**

Flow rate of Hydrogen or Helium in SLPM going into core

**Inner Core Temp**

Temperature measured by thermocouple inserted into center of core tube. TC9, type K

**Jacket Ar**

Mass Spectrometer reading of Argon concentration in gas leaving the argon cooling jacket surrounding core

**Jacket Case Temp**

temperature of jacket metal casing in degrees C. TC7, ype K

**JACKET GAS HEATER EN**

logical value (1/0) indicating status of relay wired into output of Chroma 61702 power supply phase 3. There is no longer a Jacket gas heater in use but channel can still be used for other purpose

**Jacket Gas In**

Temperature of gas entering the Argon cooling jacket in deg C. TC3, type K

**Jacket Gas Out**

Temperature of gas entering the Argon cooling jacket in deg C, TC2 type N

**Jacket H2**

Mass Spectrometer reading of Hydrogen concentration in gas leaving the Argon cooling jacket

**Jacket H2O**

Mass Spectrometer reading of H2O concentration in gas leaving the Argon cooling jacket

**Jacket He**

Mass Spectrometer reading of Helium concentration in gas leaving the Argon cooling jacket

**Jacket In Press**

Pressure of gas entering Argon Jacket in PSI

**Jacket M3**

Mass Spectrometer reading of Mass 3 concentration in gas leaving the Argon cooling jacket

**Jacket N**

Mass Spectrometer reading of Nitrogen concentration in gas leaving the Argon cooling jacket

**Jacket O**

Mass Spectrometer reading of Monoatomic Oxygen concentration in gas leaving the Argon cooling jacket

**Jacket O2**

Mass Spectrometer reading of Diatomic Oxygen concentration in gas leaving the Argon cooling jacket

**Jacket Out Press**

Pressure of gas exiting argon jacket in PSI

**JACKET PUMP PRV VALVE**

logical value (1/0) indicating status of digital output that drives the pressure relief valve that equalizes the pump inlet and outlet pressure before pump startup

**Jckt Ar Makeup LPM**

Flowrate in standard liter per minute of Argon entering Jacket cooling loop to make up gas lost to leaks.

**Jckt Ar Total**

Totalized (integrated / summed) Argon passed through valve VA8, the jacket argon gas makeup valve.

**Jckt Gas Circ LPM**

Flowrate in Standard Liter/minute of Argon in the jacket gas loop

**Jckt Htr Cur**

RMS Current in Amps going through jacket gas heater. Chroma 61702 Ch3.

**Jckt Htr Pow**

Power in Watts dissipated in jacket gas heater. Chroma 61702 Ch3.

**Jckt Htr Volt**

RMS Volts across jacket gas heater. Chroma 61702 Ch3.

**Jckt HX Water LPM**

Flow of water in LPM going through heater exchanger that cools the Argon gas circulating through jacket. Most heat of jacket argon seems to be not lost in heat exchanger, but in tubing

**JCKT XC H2O IN**

Temperature of water entering the jacket gas to cooling water heat exchanger. RTD2

**JCKT XC H2O OUT**

Temperature of water exiting the jacket gas to cooling water heat exchanger. Measured by an RTD3

**Pow In**

sum of all heater powers (all outputs of Chroma 61702) and Q power measured at Pi filter.

Power in = Core Heater Pow+ Core Gas Heater Power + Jacket Gas Heater Power +Q power

**Pow Out**

Sum of Jacket Thermal Power and Termination Thermal Power

**Press Ctrl Feedback**

Pressure in PSI measured by the electronic backpressure regulator.

**Press Ctrl Setpoint**

Setpoint in PSI of the electronic backpressure regulator regulating core pressure

**Q Cur**

Current in Amps measured at Pi Filter

**Q kHz**

Rep rate of q pulse in Kilohertz

**Q N Pulses**

Number of Q pulses fired between pauses if Q pulse Pulse Delay (s) is greater than 0. Does not matter if Q Pulse Delay (s) is 0.

**Q Occurred?**

Logical value (1/0) indicating whether a Q pulse has occurred within the last second

**Q Pow**

Q pulse Power in Watts measured at Pi Filter. The power that is going into the Q pulse board and termination.

**Q Pulse Delay (s)**

if greater than 0, a number of pulses equal to “Q N pulses” will be fired, then no pulses will be fired for a time equal “Q Pulse Delay (s)” .

**Q Pulse Length (ns)**

length of Q pulse as generated at the CompactRIO digital output card, in nanoseconds.

**Q Pulse Volt**

Voltage of Q pulse measured at the Pi Filter

**Q Supply Power**

Power measured at the Chroma 61602 supply.

**Q Supply Volt**

Q pulse voltage generated at the Chroma 61602 supply. This is AC voltage.

**Room Temp**

Room temperature in degrees C

**Termination HX Water LPM**

Flow rate in liter per minute of water flowing through termination heat sink. Heat dissipated by Q pulse in the termination.

**Termination Therm Pow**

Cwater=4.186;% Specific heat of water => 1 calorie/gram °C = 4.186 joule/gram °C

DT = TERMINATIONXCH2OOUT - TERMINATIONXCH2OIN; %C

Tflow = TerminationHXWaterLPM; %L/min = (1000/60) cc/sec = 0.0167 g/sec

TTP = 4.184 \* (Tflow\*(1000/60) .\* DT); %J/sec

**TERMINATION XC H2O IN**

Temperature in degrees C of water entering termination heatsink. RTD0

**TERMINATION XC H2O OUT**

temperature in degrees C of water entering termination heatsink. RTD1

**WATER PUMP EN**

Logical value (1/0) of relay controlling water pump circulating cooling water