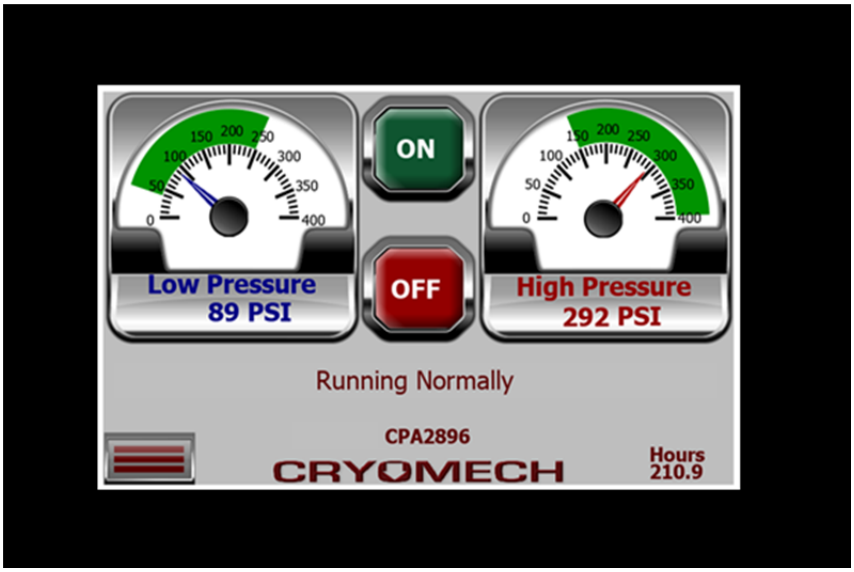
CPA (Series) Digital Panel User Manual



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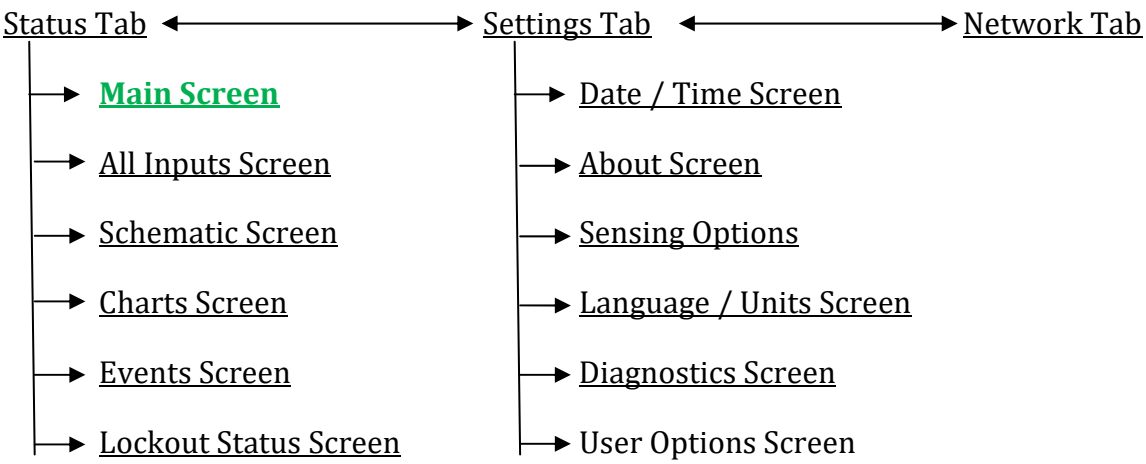
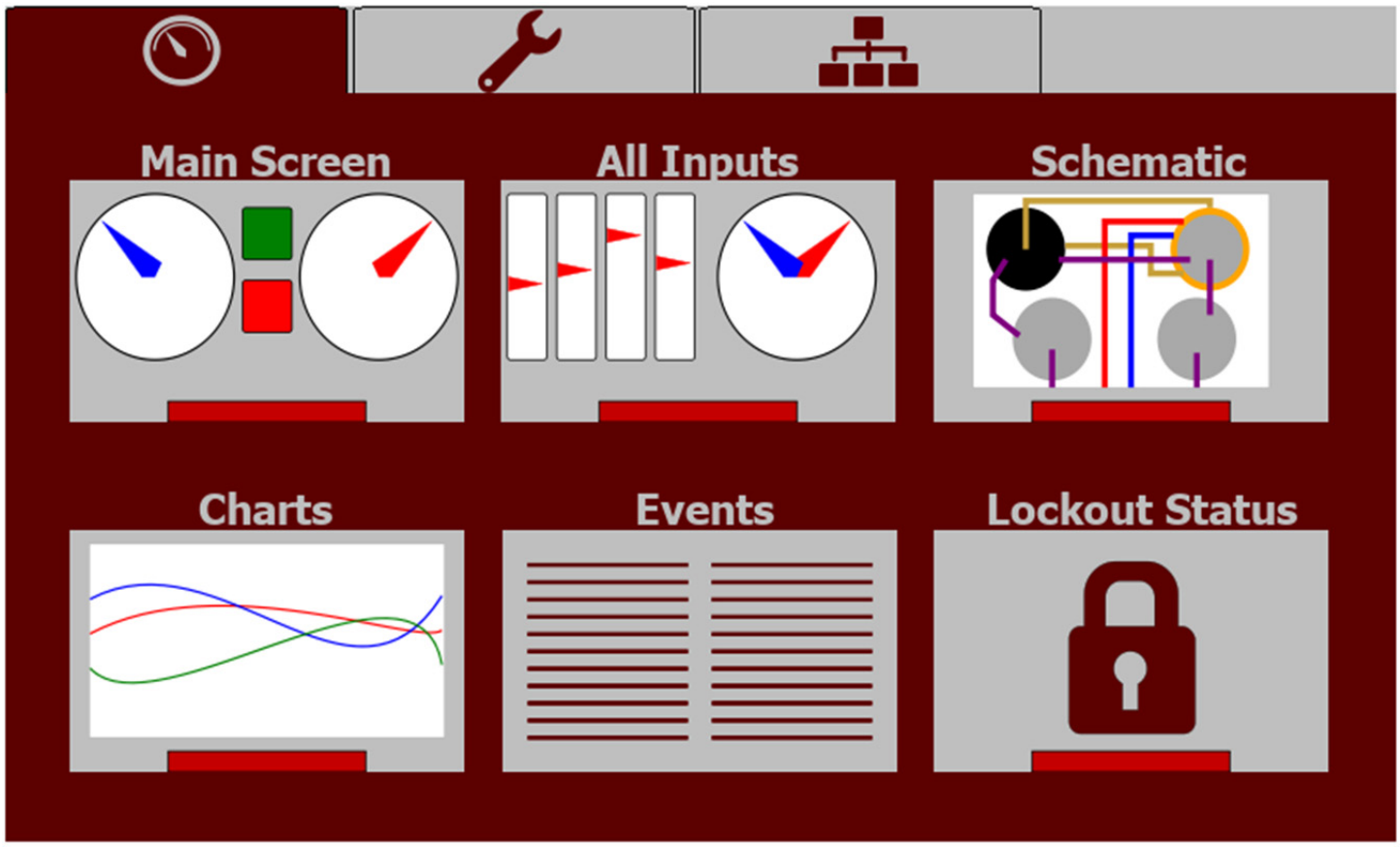
Screen Flow Diagram

This is a general flow diagram of the screens available. The green colored "Main Screen" is the default starting screen. The blue "Sensing Options Screen" will only be available if logged in as an OEM user.

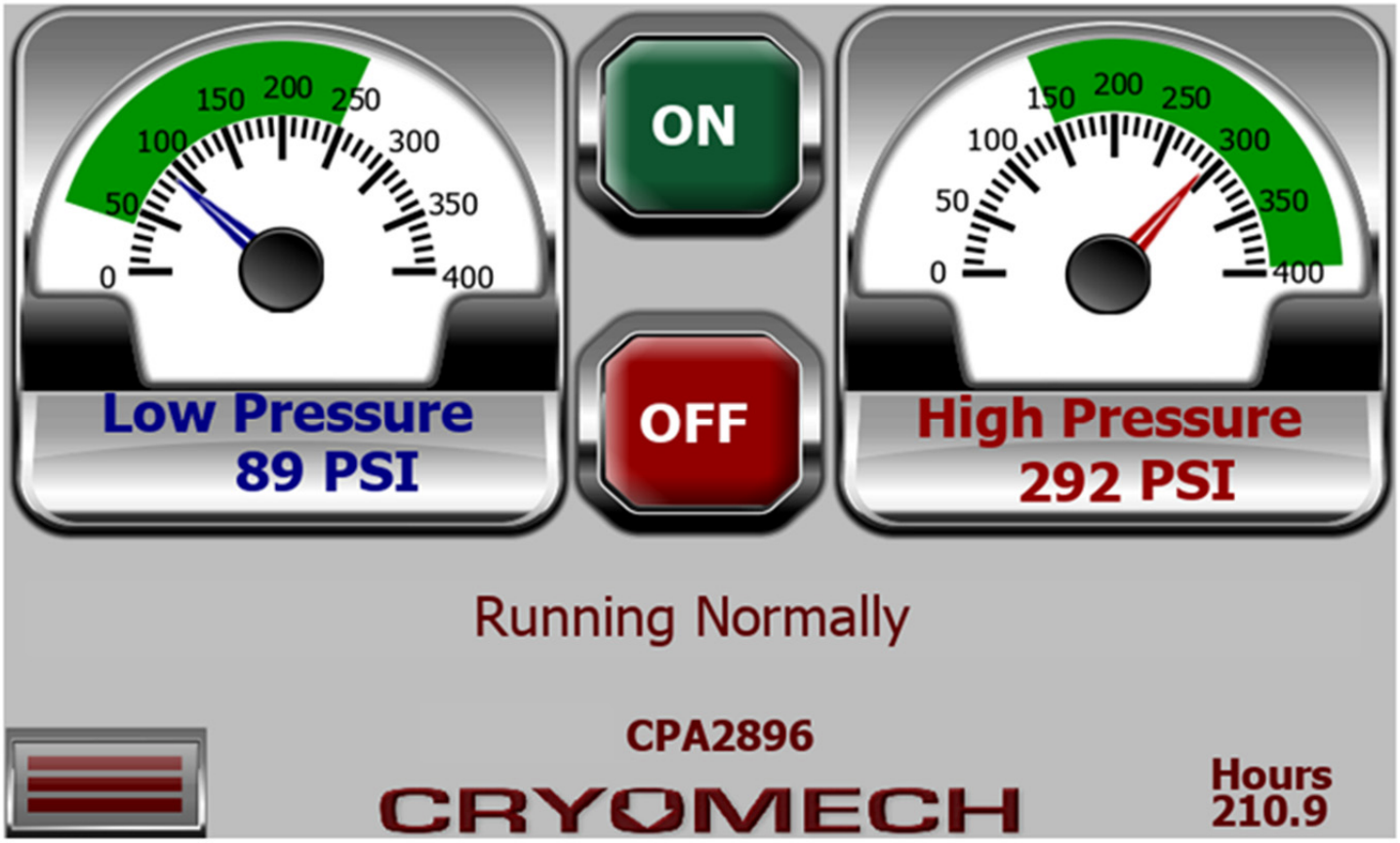


Status Menu Tab



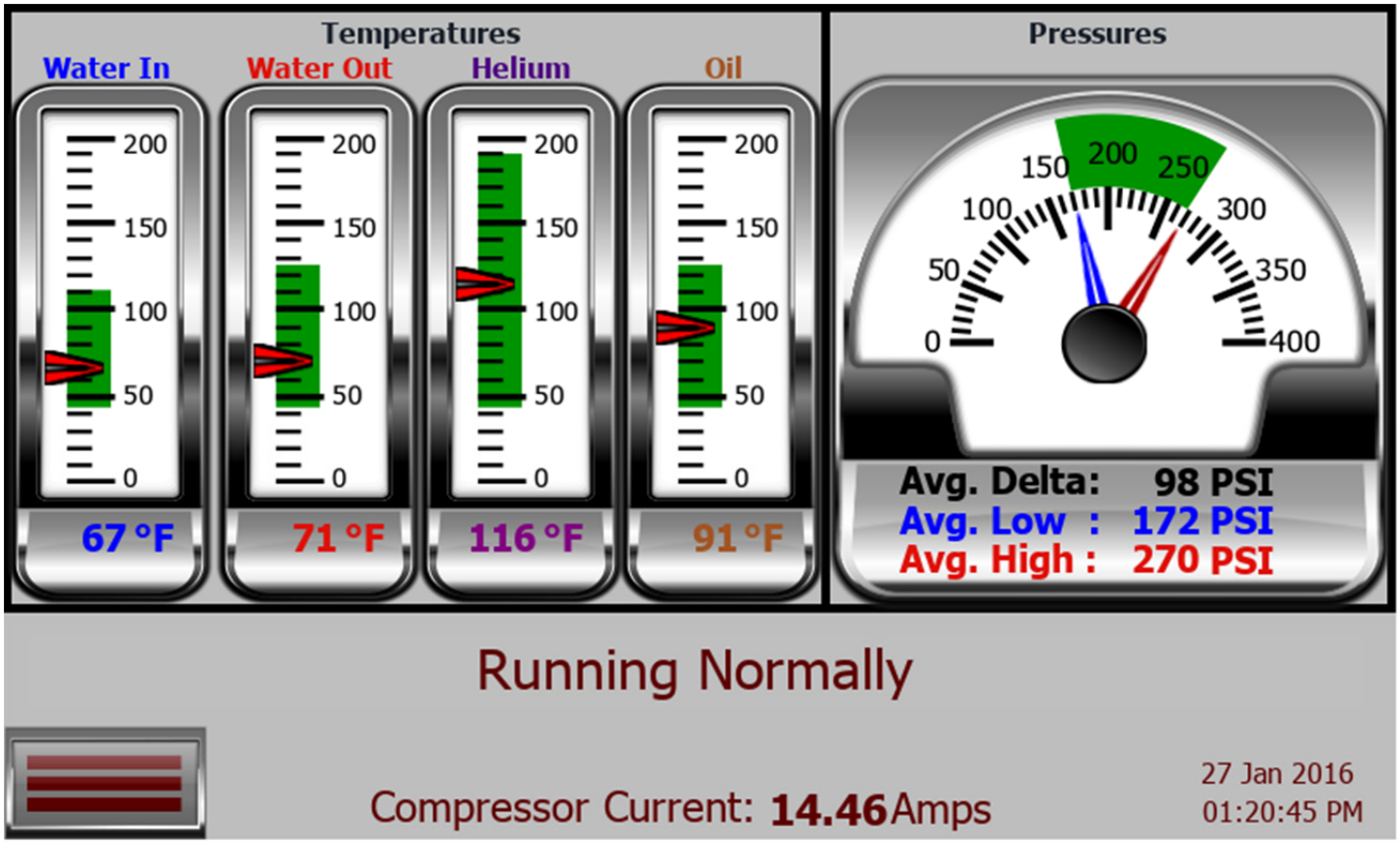
This screen allows the operator to navigate between various status screens or to adjacent menu screens.

Status / Home



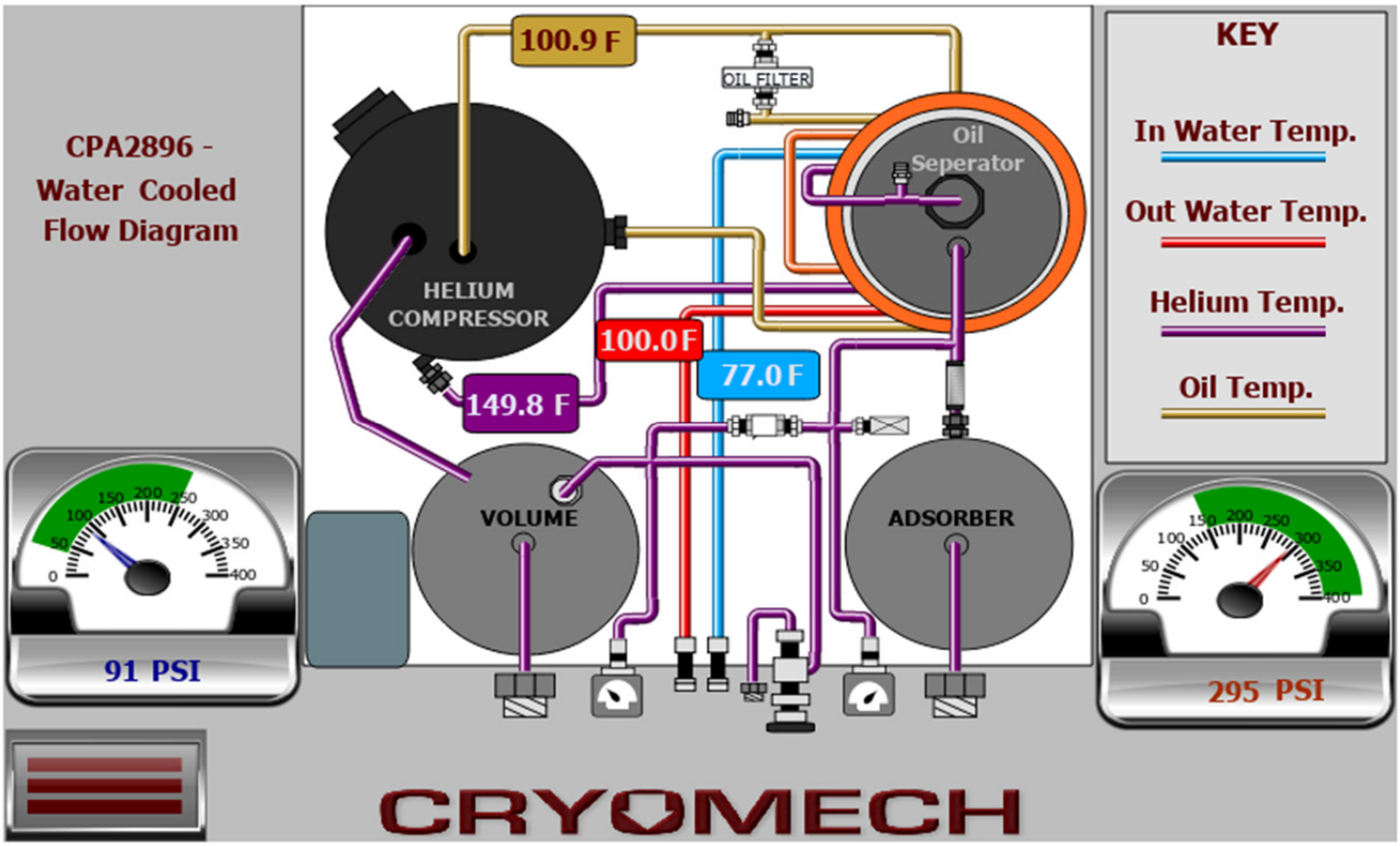
The "Home" screen is the default starting up screen. It is assumed that most facilities will have this screen up and running over the life of the compressor. The left dial indicates the low or gas input pressure and the right dial indicates the high or output pressure. Status about the running state of the compressor will be displayed on the Feedback Label. The bottom right Hours number tracks the total hours of operation the compressor has been running.

Status / All Inputs



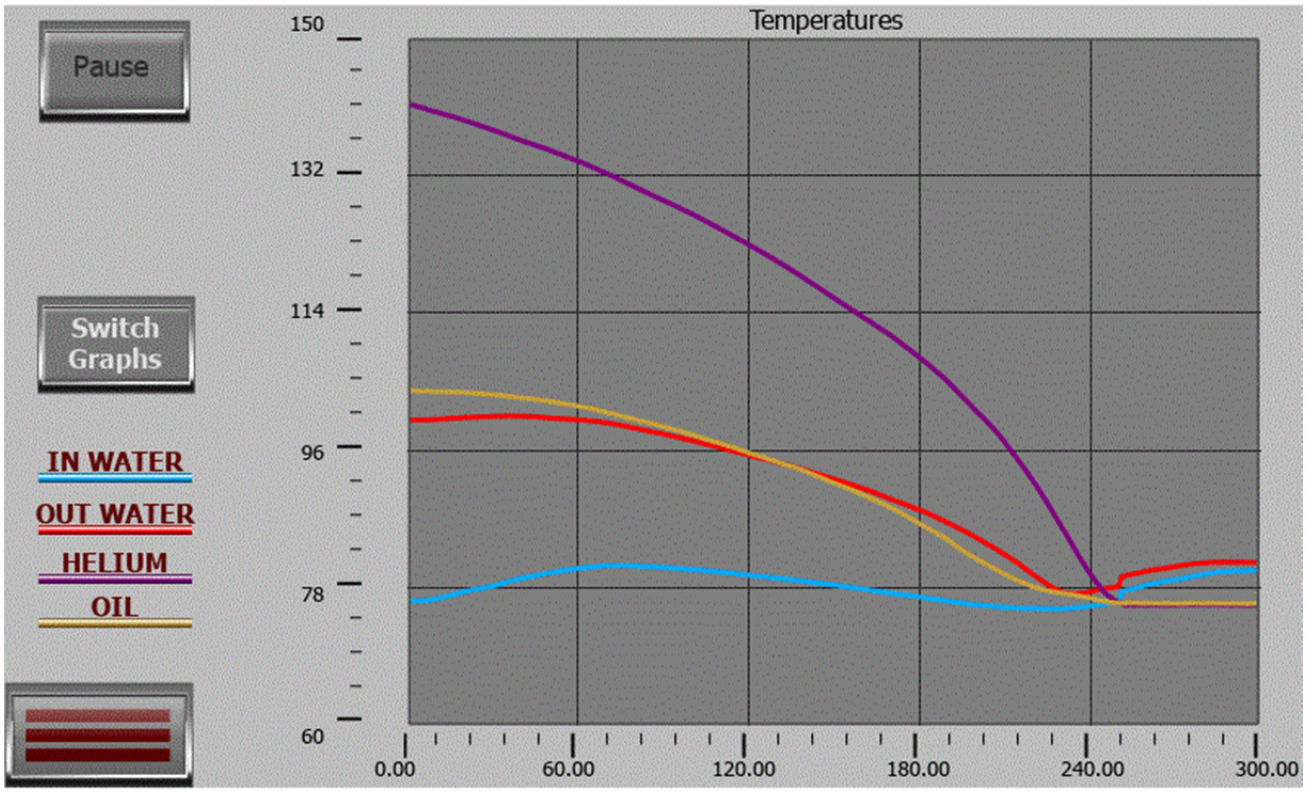
The "All Inputs" screen is designed to give the user a complete picture of all the temperatures and pressures being monitored by the system. The Coolant In & Out gauges will have the word "Water" or "Air" depending on the system attached. The gauge on the right has two needles to indicate both the "Low" or inlet pressure and the "High" or outlet pressure. Bottom middle indicates the current draw on a single leg of the three phase power used to run the compressor motor. This reading isn't to show over all power consumption, merely to monitor if the motor is failing and not drawing any current. Note that other circuitry in the system draws power from this phase so when the system is idling it will show a low amount of power use. The averaging is from data over a 20 second period of time.

Status / Schematic



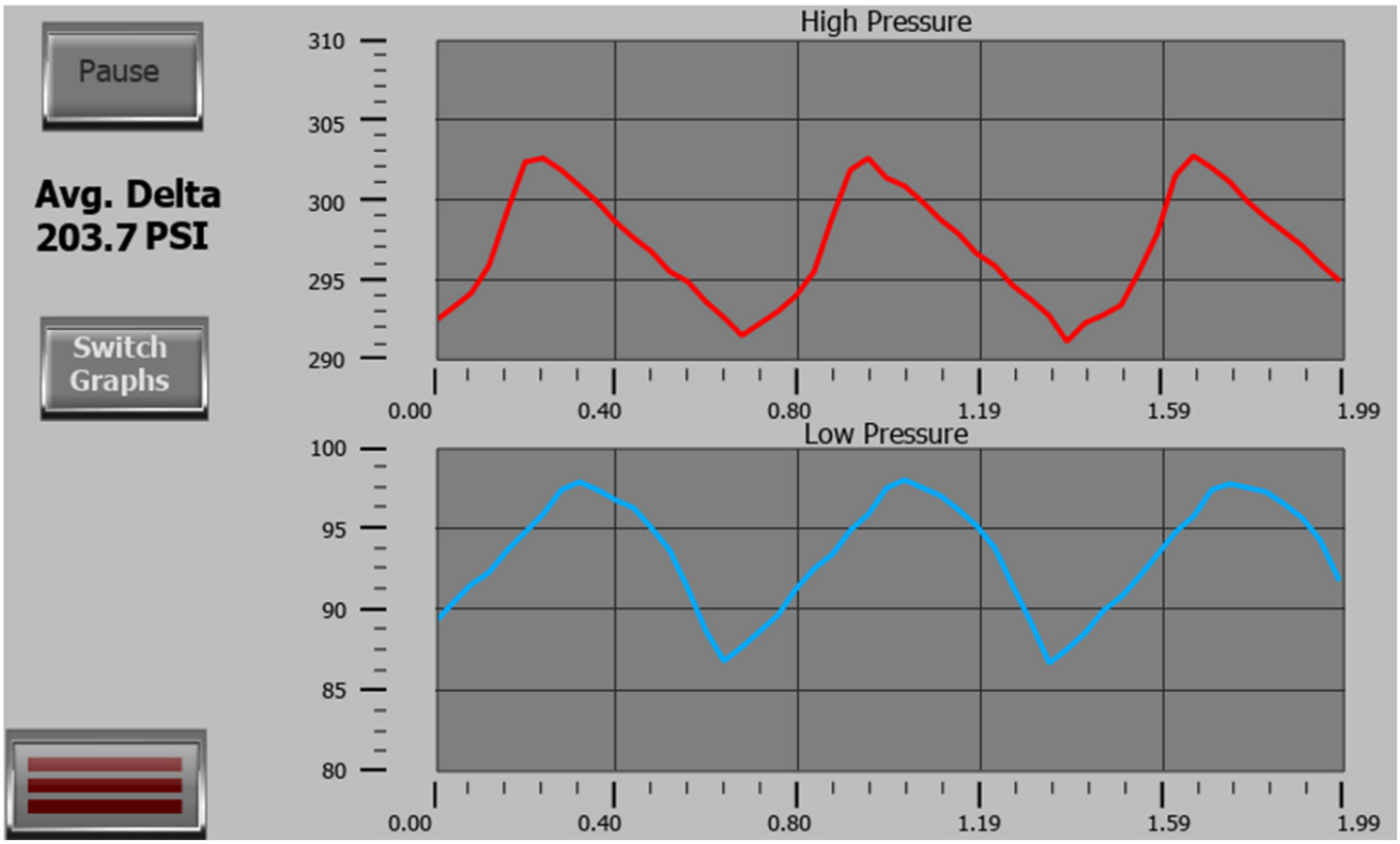
The "Schematic" screen is designed to give the general idea of how all the components are connected together. It also indicates the current temperature readings for the various parts of the system. To the left and right of the schematic are the "Low" or Inlet and "High" or outlet pressures.

Status / Charts - Temps



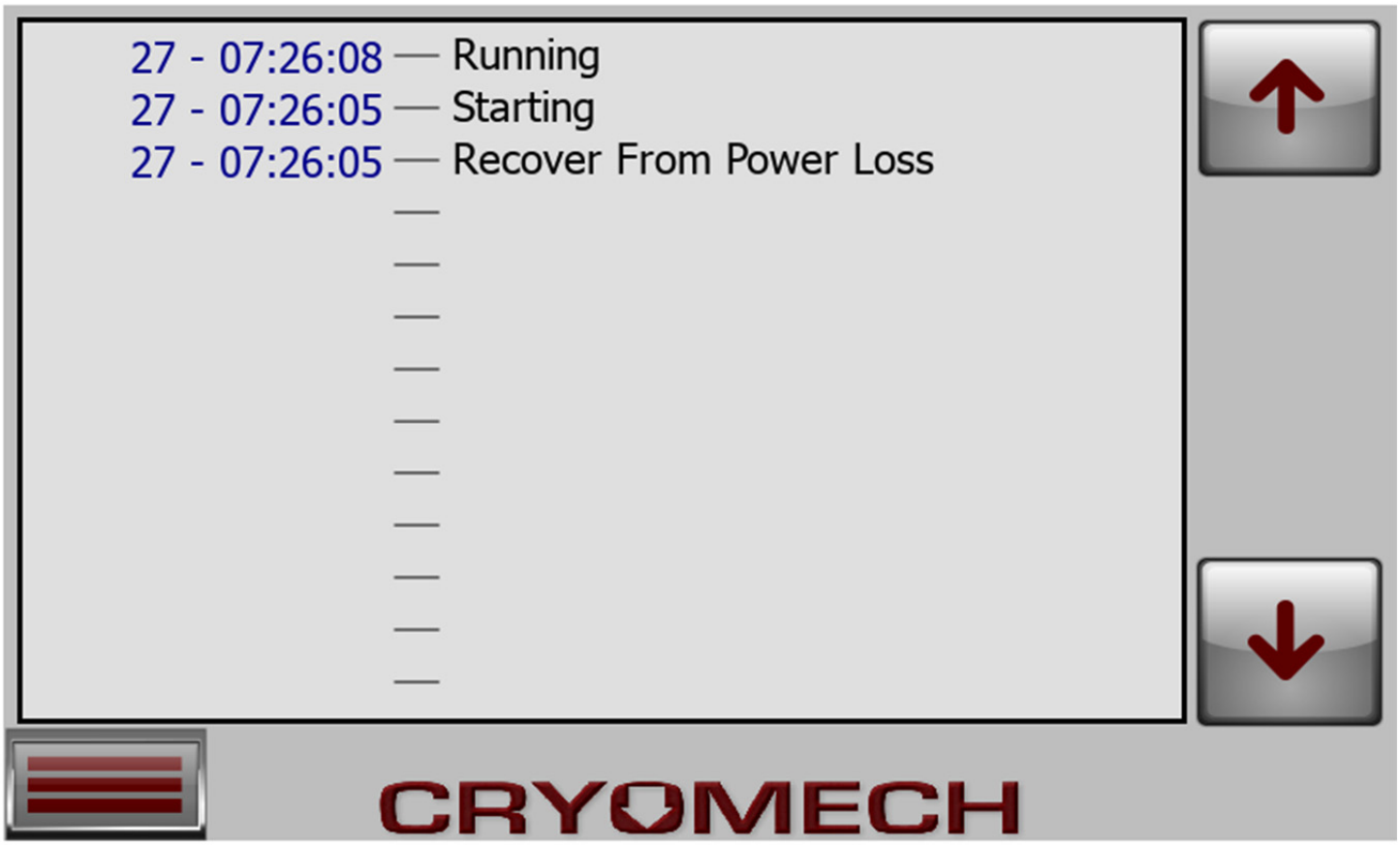
The charts screen has two modes. One is the temps reading mode and the alternate is pressure monitoring. When the temps mode is selected the time span is 5 minutes. Temp data is collected in 1 second intervals and is displayed with the newest data on the right hand side of the chart. The scales will auto adjust based on the data displayed.

Status / Charts - Pressures



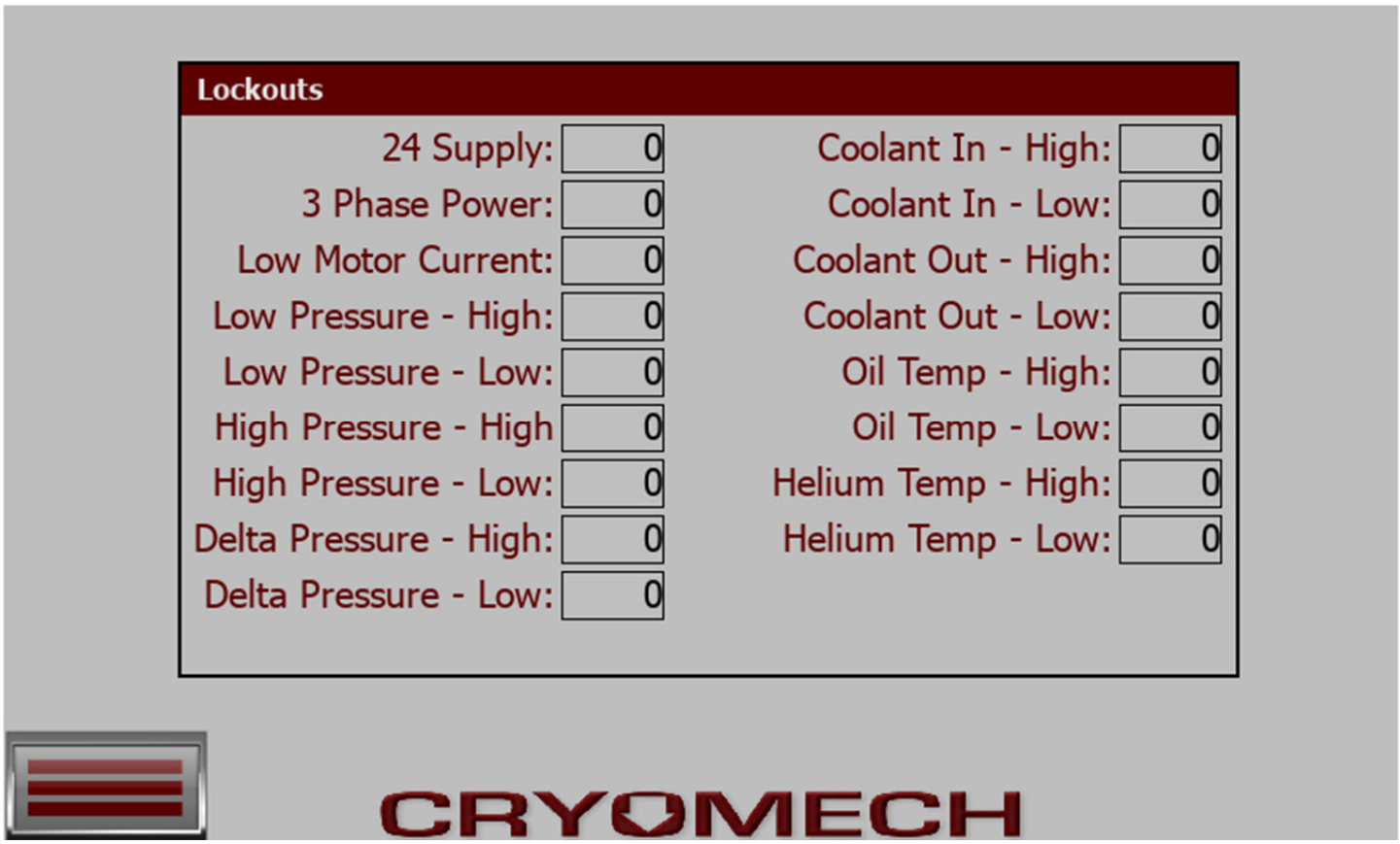
The pressure monitoring mode has a time span of 2 seconds. The high and low pressures scales are independent and auto adjust based on captured data. A pause button is provided to allow closer examination of the charts.

Status / Events



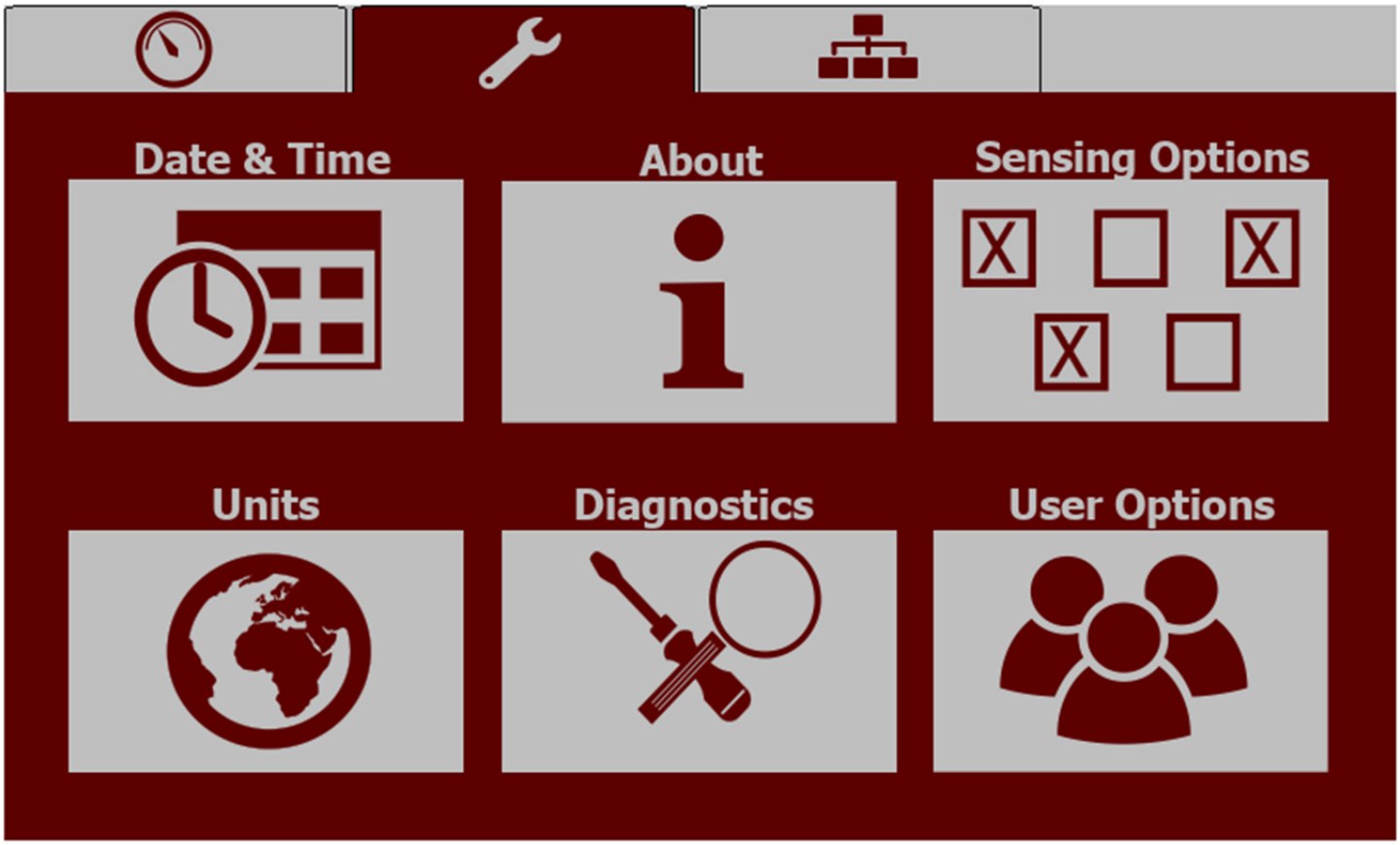
The "Events" is an event logging window. It will hold up to 200 events but will not retain the events if there is a power loss. The format of the time stamping is Day - Time.

Status / Locked Outs

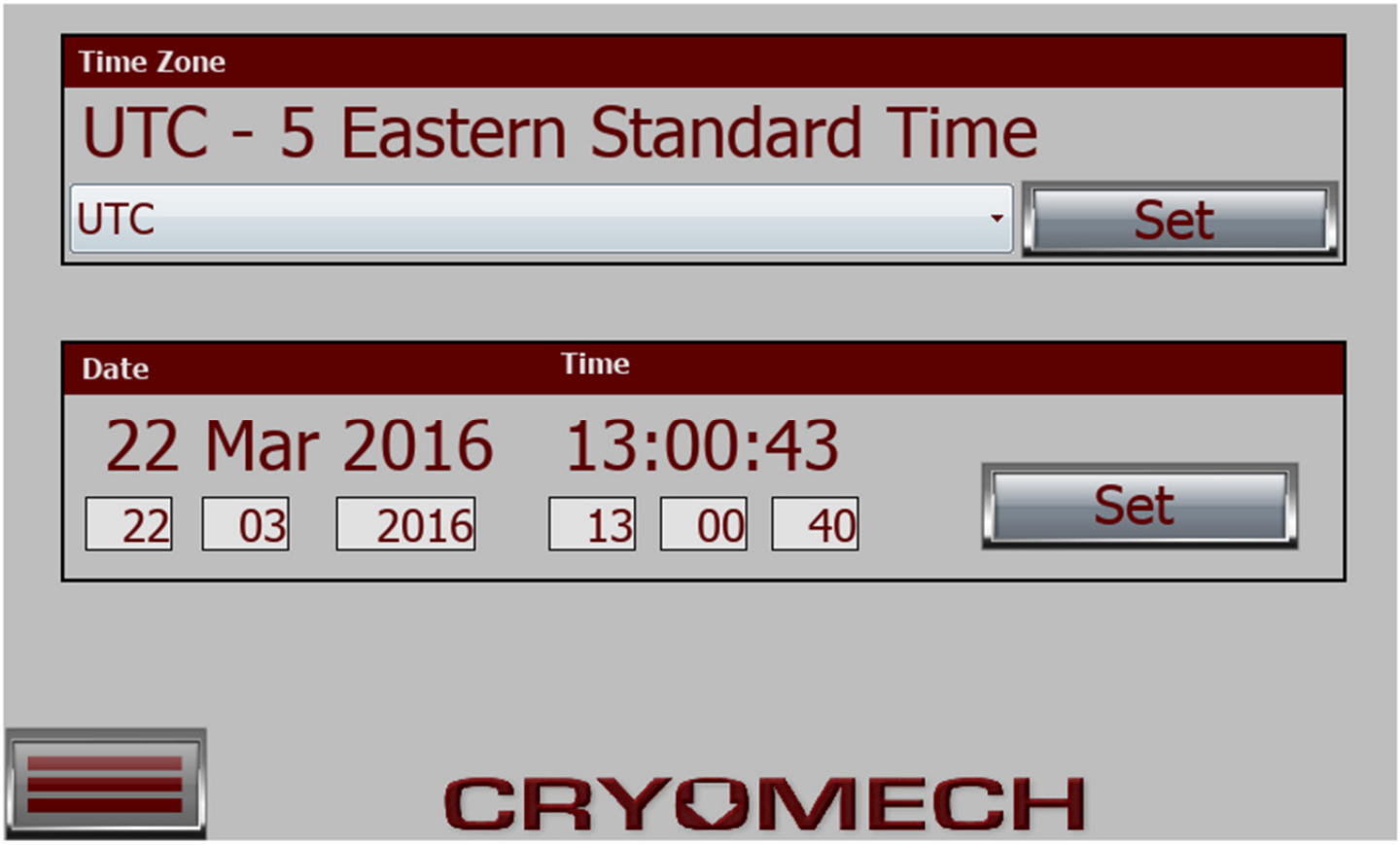


If the compressor experiences 6 or more errors in under an hour, it will shut down and begin a cooling timer. This screen will show you what issues have occurred over the last hour.

Settings Menu Tab

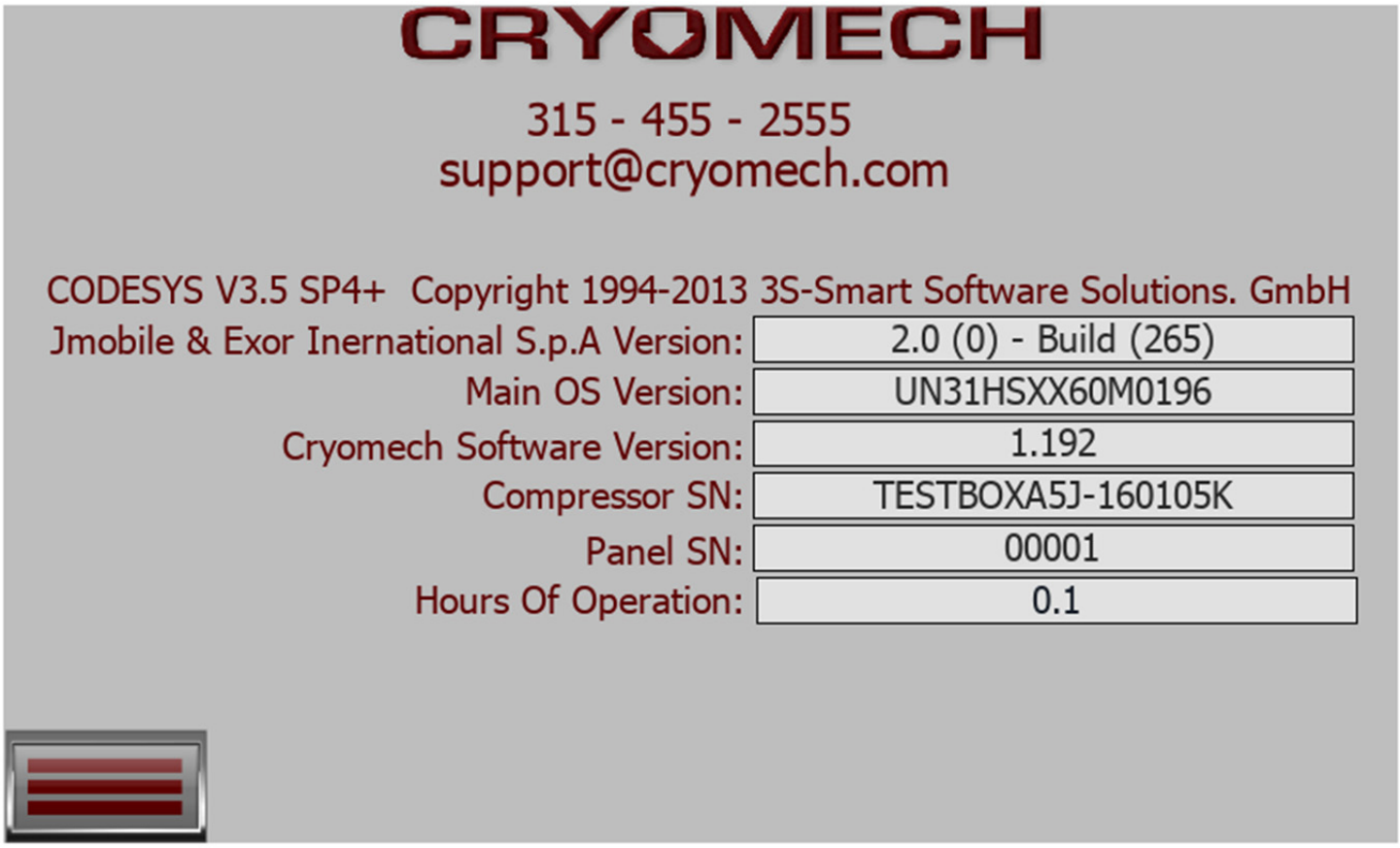


Settings / Date Time



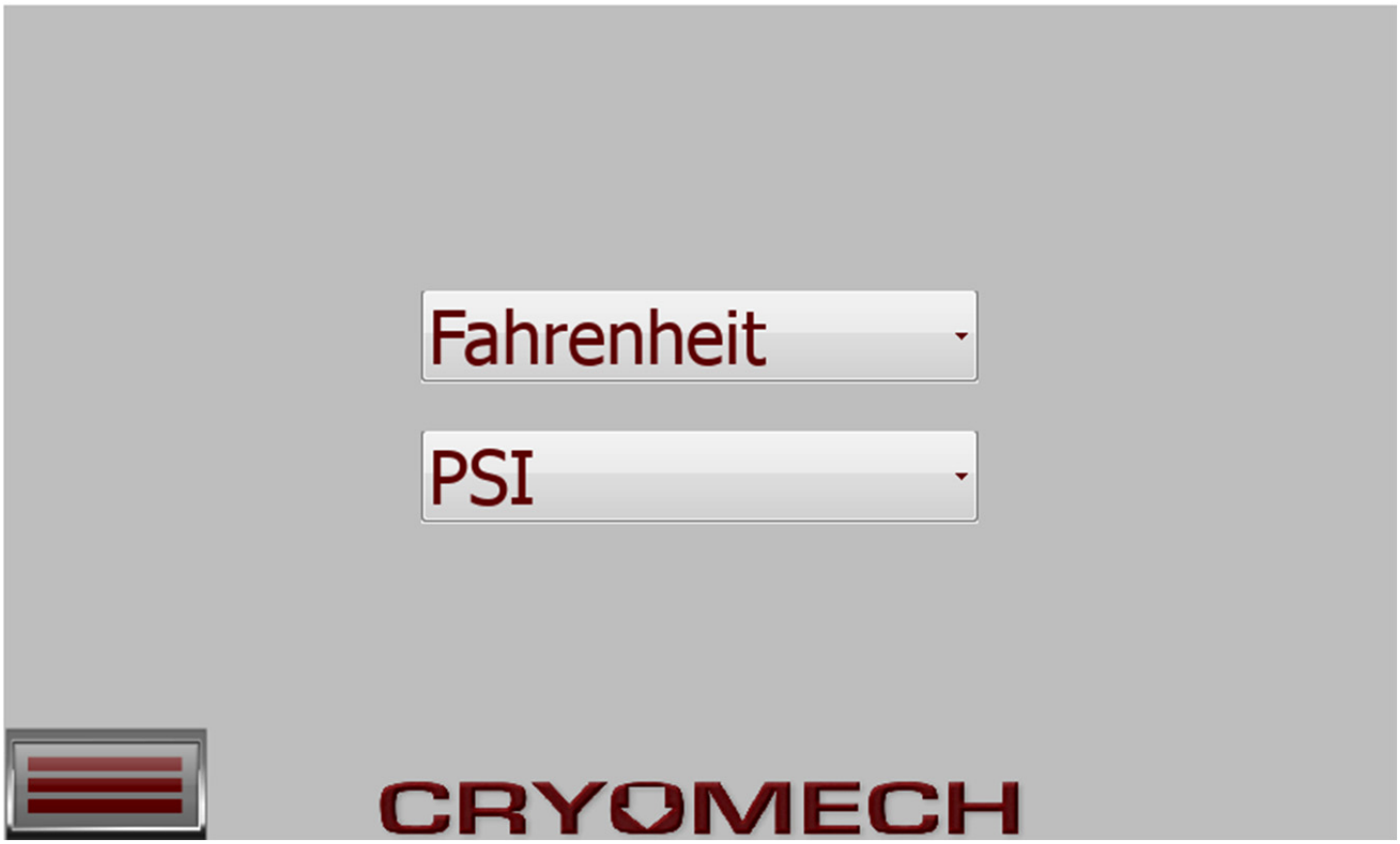
Click on the text box below the portion of the date time that you wish to fix. After making proper adjustments, click the appropriate 'Set' button.

Settings / About



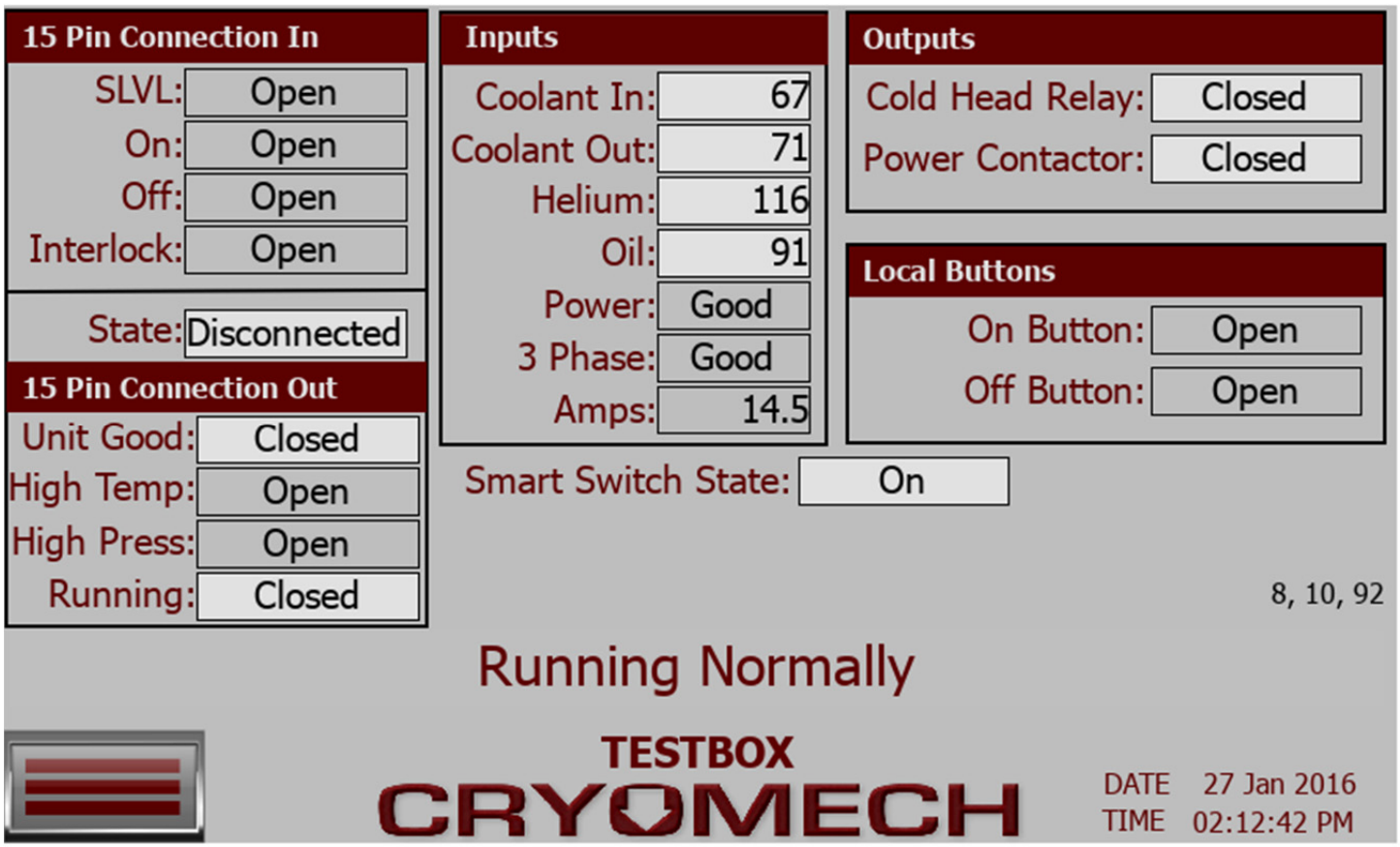
All pertinent version info is stored here.

Settings / Units of Measure



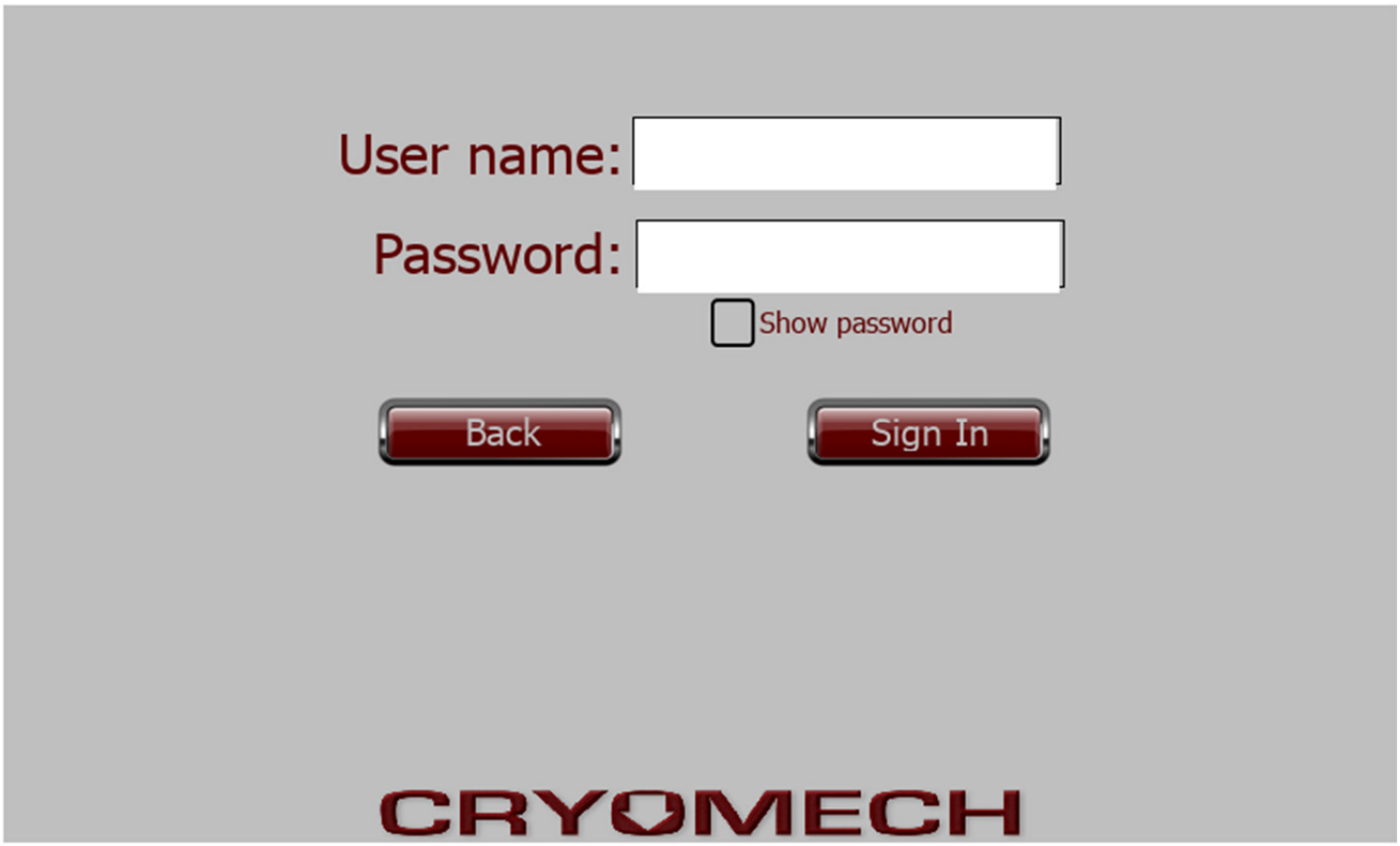
The "Unit of Measures" screen is used to set what sorts of units we wish to display on the screen. For temperature you can select between Celsius, Fahrenheit or Kelvin. For pressure you can select between PSI, BAR & KPSA. Making a selection here will affect most other screens.

Settings / Diagnostics



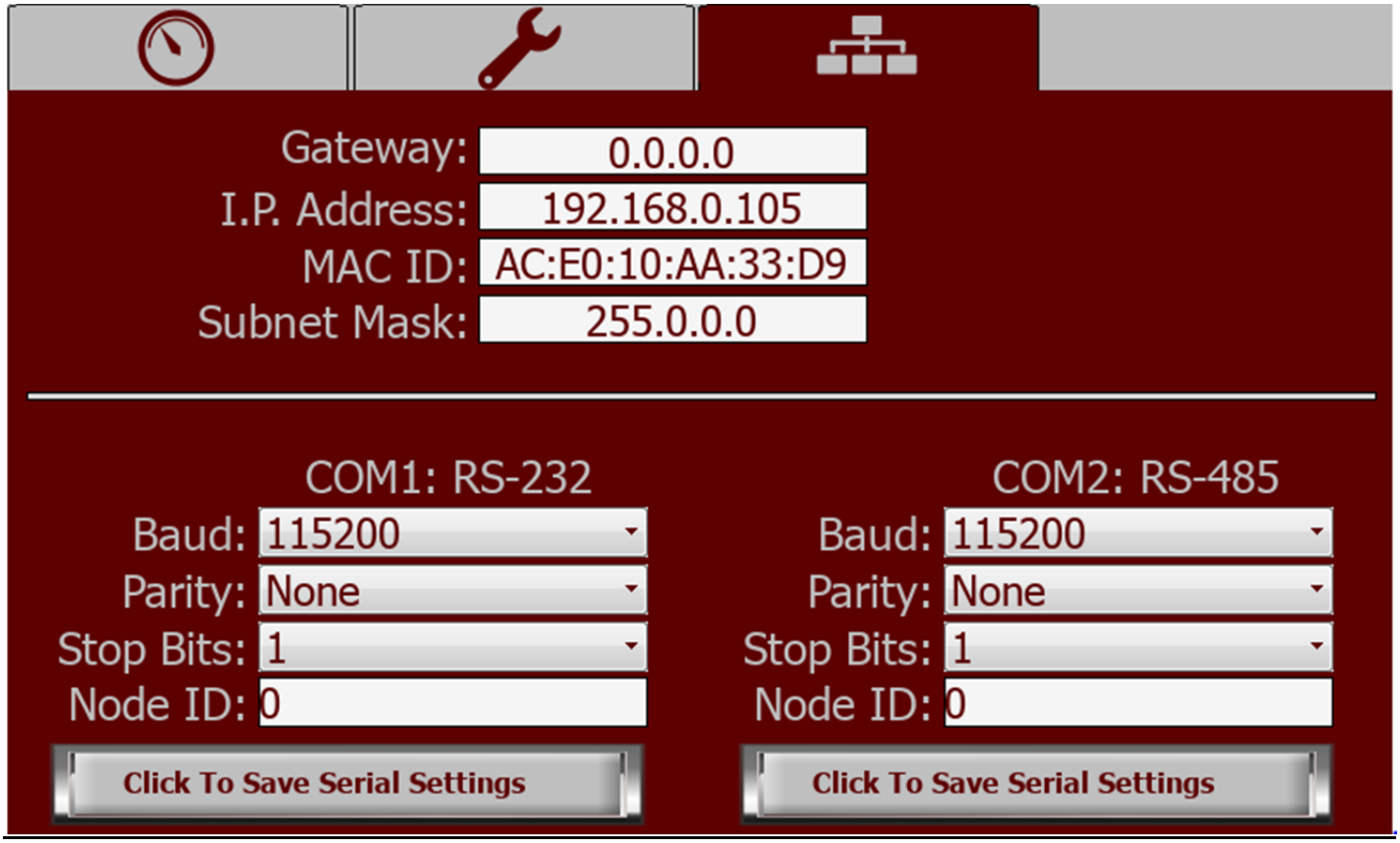
The diagnostics screen is used to indicate the status of the different digital inputs and outputs. This screen is useful for diagnosing running issues if they arise.

Settings / User Options



Different operator levels provide access to special features. The general user should be logged in as "user" with no password.

Networking Tab



This page shows the IP data that gets assigned to the device by its network. By connecting to the compressor via serial port or by Ethernet it is possible to remotely monitor and operate the compressor. Compressors with a single DB-9 port only support RS-232. Compressors with two DB-9 ports also provide an RS-485 port.

Communications Protocols

The serial port uses Modbus RTU protocol and the Ethernet port uses ModbusTCP. More information about these protocols can be found here:

http://modbus.org/docs/PI_MBUS_300.pdf

The registers used for this protocol are as follows:

- 30,001 - Operating State
- 30,002 - Compressor Running
- 30,003 - Warning State
- 30,005 - Alarm State
- 30,007 - Coolant In Temp
- 30,009 - Coolant Out Temp
- 30,011 - Oil Temp
- 30,013 - Helium Temp
- 30,015 - Low Pressure
- 30,017 - Low Pressure Average
- 30,019 - High Pressure
- 30,021 - High Pressure Average
- 30,023 - Delta Pressure Average
- 30,025 - Motor Current
- 30,027 - Hours Of Operation
- 30,029 - Pressure Scale
- 30,030 - Temp Scale
- 30,031 - Panel Serial Number
- 30,032 - Model Major + Minor numbers
- 40,001 - Enable / Disable the compressor

The first two 'Input' registers and the only 'Holding' register are 16 bit integer registers and the rest of the input registers are in 32bit floating point format. The PLC code is written in Structured Text and the data stored is a REAL value. This means two Input registers are used to hold the value and the bytes will have to be rearranged before

converting them to floating format on the system. Below is a sample of C# code that successfully converts one of the registers to a floating point value. The Holding register 40,001 is used to signal the compressor to turn on and off.

```
byte[] data = (data returned)
byte[] arbyWorker = new byte[4];

arbyWorker[3] = data[2];
arbyWorker[2] = data[3];
arbyWorker[1] = data[0];
arbyWorker[0] = data[1];

float myFloat = BitConverter.ToSingle(arbyWorker, 0);
```

Values To Use:

Holding register 40001:

0x00FF - turn the compressor OFF

0x0001-Turn the compressor ON

Input Register 30001: (operating state)

0: Idling - ready to start
2: Starting
3: Running
5: Stopping
6: Error Lockout
7: Error
8: Helium Cool Down
9: Error-Power Related
16: Error Recovery

Input Register 30002: (Compressor Energized)

0: Off
1: On

Input Register 30003: (Warnings)

0: No warnings
-1: Coolant IN running High
-2: Coolant IN running Low
-4: Coolant OUT running High
-8: Coolant OUT running Low

-16: Oil running High
-32: Oil running Low
-64: Helium running High
-128: Helium running Low

-256: Low Pressure running High
-512: Low Pressure running Low
-1024: High Pressure running High
-2048: High Pressure running Low

-4096: Delta Pressure running High
-8192: Delta Pressure running Low

-131072: Static Pressure running High
-262144: Static Pressure running Low

-524288: Cold head motor Stall

Input Register 30005: (Errors)

0: No Errors
-1: Coolant IN High
-2: Coolant IN Low
-4: Coolant OUT High
-8: Coolant OUT Low

-16: Oil High
-32: Oil Low
-64: Helium High
-128: Helium Low

-256: Low Pressure High
-512: Low Pressure Low
-1024: High Pressure High
-2048: High Pressure Low

-4096: Delta Pressure High
-8192: Delta Pressure Low

-16384: Motor Current Low
-32768: Three Phase Error
-65536: Power Supply Error

-131072: Static Pressure High
-262144: Static Pressure Low

Input Register 30029: (Pressure)

0:PSI

1: Bar

2: KPA

Input Register 30030: (Temperature)

0:Fahrenheit

1: Celsius

2: Kelvin

Input Register 30032: Model Numbers

The upper 8 bits contain the Major model number and the lower 8 bits contain the Minor model number.

Major Model Numbers consist of

1: 800 Series
2: 900 Series
3: 1000 Series
4: 1100 Series
5: 2800 Series

Minor Model Numbers consist of:

1: A1	13: 07
2: 01	14: H7
3: 02	15: I7
4: 03	16: 08
5: H3	17: 09
6: I3	18: 9C
7: 04	19: 10
8: H4	20: 1I
9: 05	21: 11
10: H5	22: 12
11: I6	23: 13
12: 06	24: 14

Example: A 289C compressor will give a Major of 5 and a Minor of 18.

15 Pin Remote Control

The 15 pin control port documentation is available on request.