YORK
BY JOHNSON CONTROLS
Service Information

File In/With: 160.54-O1 (308) 160.54-M1 (308)	SI0201 New 1008
Equipment Affected: YK Centrifugal Chillers	
YK Centrifugal Chillers - Software Enhancements (Ver 19)	

General

Beginning October 2008, enhanced software will be supplied in new production YK chillers and replacement microboard kit 331-02430-601. This software is backward compatible to all previous chillers equipped with microboard 031-02430-000 or 031-02430-001. The enhancements are listed below.

The version and Program Card part number is:

- NEMA 1-4 and CE chillers: C.OPT.01.19.307 (031-02474-001)

ACC and Surge Detection Display Enhancements

With the integration of the Variable Speed Drive Adaptive Capacity Control (ACC) function into the Microboard (in software version C.OPT.01.16.307), it is necessary to add screens and LED indicators and additional parameters to certain screens to compensate for the loss of ACC Board indicators.

The parameters displayed on the following screens now vary according to the selection made for the Motor Communications Protocol Setpoint on the SETUP Screen. It is set to either YORK or MODBUS, as determined by the existing hardware/interface. The correct selection must be made in order for the microboard to communicate with the drive, as explained below. Service technicians should refer to Optiview Service Manual 160.54-M1 to determine existing hardware/interface configuration.

In new production chillers prior to March 2007, the Microboard communicates with the VSD Logic Board via the ACC board using YORK protocol serial communications. In this configuration, the ACC function is performed by the ACC Board. The Motor Communications Protocol Setpoint must be set to YORK in this configuration. This configuration is referred to below as “York protocol configuration”. After this date, the Microboard communicates directly with the VSD Logic Board using MODBUS protocol serial communications and the ACC Board is not present. In this configuration, the ACC function is performed by the Microboard. The Motor Communications Protocol Setpoint must be set to MODBUS in this configuration. This configuration is referred to below as “MODBUS protocol configuration”. All MV VSD applications use MODBUS protocol. Due to service parts replacement, early production chillers could be in the MODBUS configuration.

With the integration of the ACC function into the microboard, there are now two surge detection features. Although they use the same detection logic, each has its own Sensitivity setpoint and each one performs detection based on the starter type.

1. The existing Surge Protection feature detects surges for Surge Avoidance and Hot Gas Bypass and uses the Surge Sensitivity setpoint on the Surge Protection Screen. If equipped with a Solid State Starter or Electro-mechanical starter, this feature detects all surges. If equipped with a VSD (in YORK or MODBUS protocol configuration) or MV VSD, it only detects those surges that occur while the drive is running at maximum frequency. The Surge Avoidance Surge Count increments each time a surge is detected by the Surge Protection feature.

2. The ACC function in the microboard (in Modbus protocol configuration) uses the Sensitivity setpoint on the ACC Details Screen and detects only those surges that occur while the VSD or MV VSD is running at less than maximum frequency. When these surges are detected, the ACC Surge Count is incremented. This surge detection is used to determine if the VSD can reduce speed.

VSD Tuning Screen

This screen is now as shown in Figure 1. The following data boxes are added:

- "% Full Load Amps" – Displays the motor current as a percentage of chiller full load amps as calculated by the microboard from current values returned from the drive Logic Board.
- "Command Frequency" – In MODBUS protocol configuration, this is the speed command being sent to the Drive Logic Board in either AUTO or MANUAL speed control mode. In YORK protocol configuration, it is only displayed in manual speed control mode and it is the speed command being sent from the Microboard to the ACC Board in Manual Speed Control mode.

The "Incr Amount" key is renamed "Manual Increment". This key now only applies to manual speed control mode. It defines the amount by which the manual Raise and Lower commands will change the Command Frequency to the VSD in manual speed control mode.

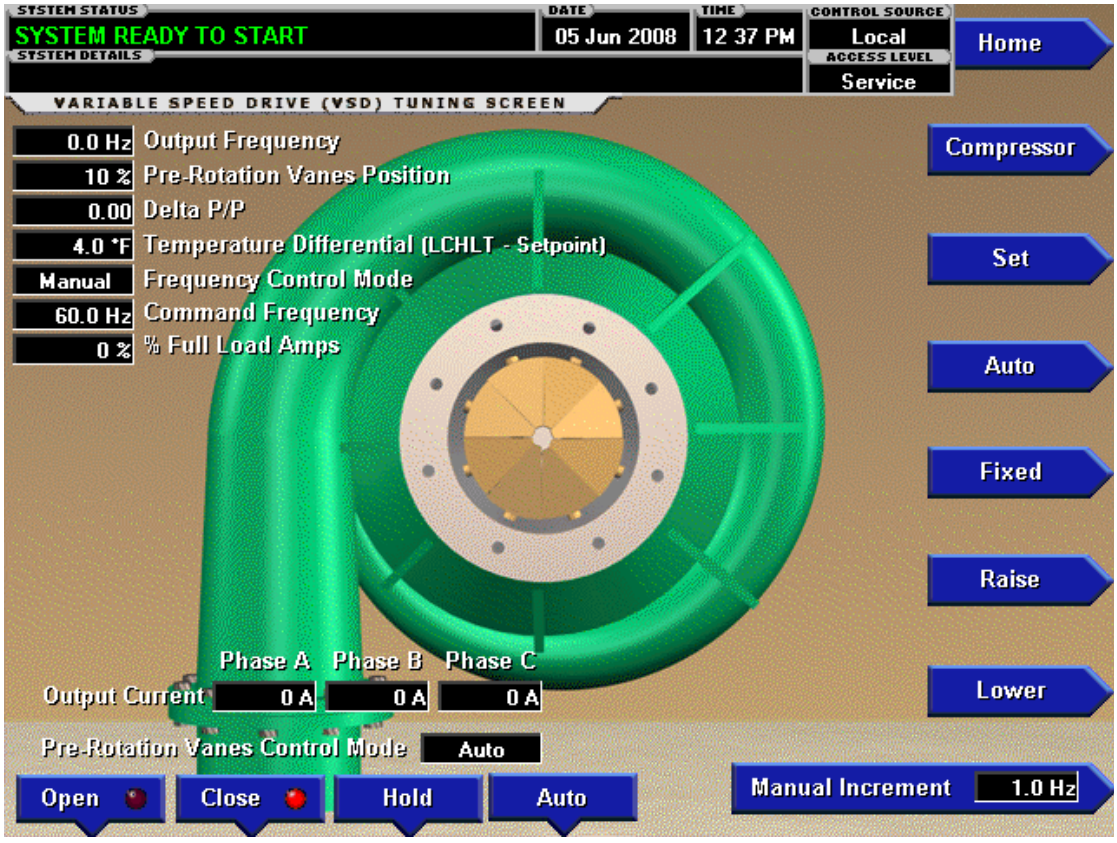

FIGURE 1 - VSD TUNING SCREEN

Adaptive Capacity Control Details Screen

Figure 2 shows this screen in MODBUS Protocol configuration. The following data boxes are added:

- "Temperature Differential (LCHLT – Setpoint)" - Displays the difference between the Leaving Chilled Liquid Temperature and the Leaving Chilled Liquid Temperature Setpoint
- "Command Frequency" – Displays the speed command being sent to the Drive Logic Board in either AUTO or MANUAL speed control mode.
- "Surge Map Point Count" – Displays the total number of data points contained in the surge map
- "ACC Surge Count" – Increments when a surge is detected while the drive is running at less than maximum frequency.

The following LED indicators are added:

- "Speed Decrease Inhibit – Surge Map Point" – Illuminates when the ACC function in the microboard is unable to reduce speed due to a mapped surge point. Otherwise, it is extinguished.
- "Mapping Inhibited" – Illuminates while the ACC function in the microboard is not allowed to map (i.e., not allowed to slow down as well) points due to unstable leaving chilled liquid temperature, manual speed control or current limit (chiller FLA only). Otherwise, it is extinguished. The logic to control this is the same as used for the VPT LED (CR8) on the ACC Board. Refer to 160.00-M4.
- "ACC Surge Detected" – Illuminates momentarily when a surge is detected by the ACC function in the microboard, while the drive is running at less than maximum frequency.
- "Surge Avoidance Surge Detected" – Illuminates momentarily when a surge is detected by the Surge Protection feature. This feature only detects surges that occur while the drive is running at maximum frequency.

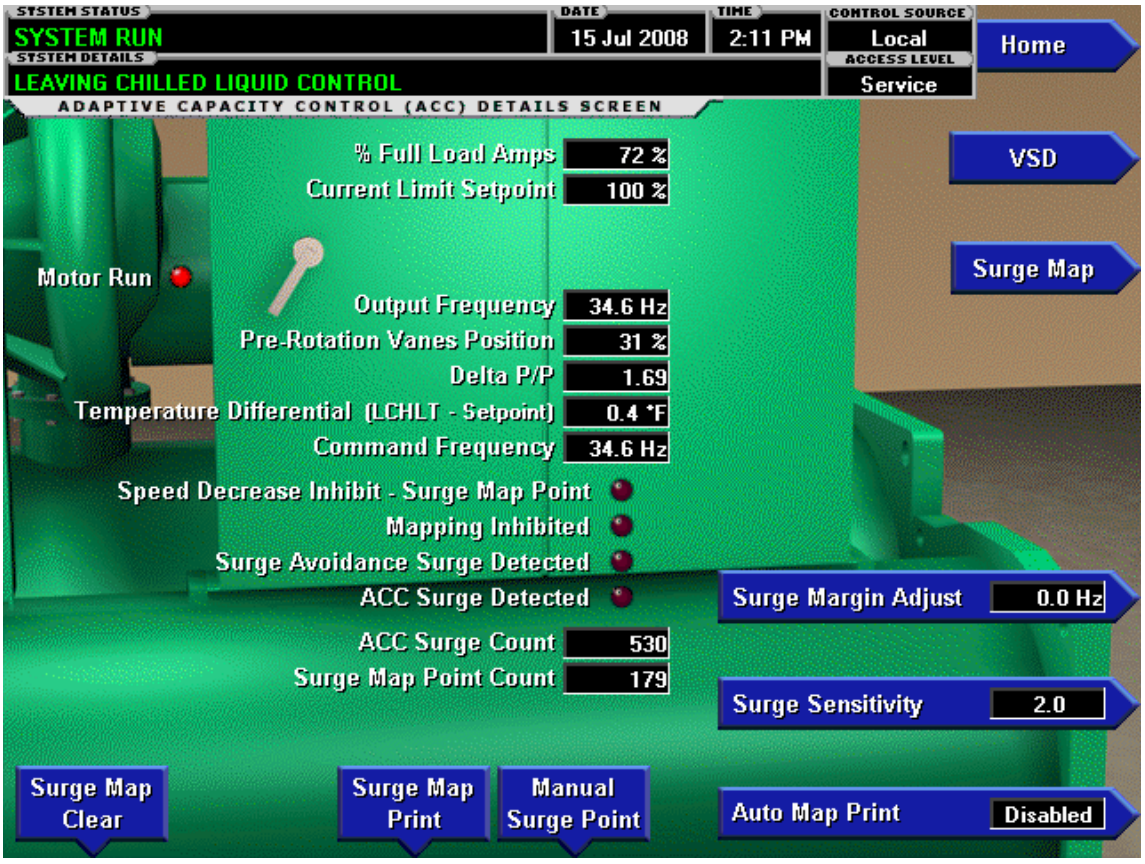

FIGURE 2 - ADAPTATIVE CAPACITY CONTROL DETAILS SCREEN (MODBUS CONFIGURATION)

The following Setpoint Keys are removed from this screen:

- Local Motor Current Limit
- Pulldown Demand Limit
- Pulldown Demand Time

The following navigation keys are added:

- Surge Map – Move to the sub-screen that displays the surge map. Only appears at Service (or higher) Access Level.

The Manual Surge Point Key

When this key is pressed, a dialog box appears that asks for a password. Once password 0 3 6 8 has been entered and the Enter key has been pressed, the present operating condition is logged into the surge map as a valid surge point. The chiller must be running to enter the point.

Figure 2A shows the ACC details screen in YORK protocol configuration. The following data boxes are added:

- "Temperature Differential (LCHLT – Setpoint)" - Displays the difference between the Leaving Chilled Liquid Temperature and the Leaving Chilled Liquid Temperature Setpoint
- "Command Frequency" - It is only displayed in manual speed control mode and it is the speed command being sent from the Microboard to the ACC Board in Manual Speed Control mode.
- "ACC Surge Count" – Count is provided by the ACC Board and it increments when any surge is detected by the ACC Board, whether running at maximum or less than maximum frequency.

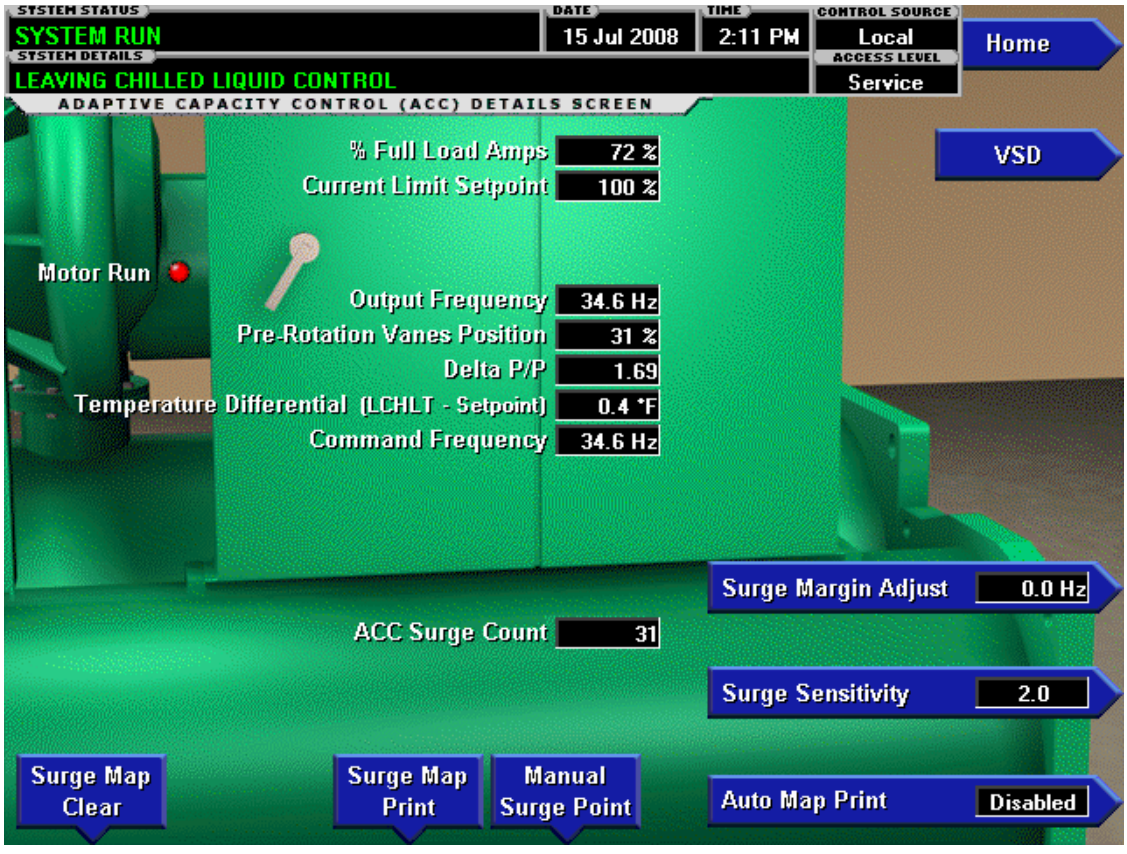

FIGURE 2A - ADAPTATIVE CAPACITY CONTROL DETAILS SCREEN (YORK PROTOCOL)

The following Setpoint Keys are removed from this screen:

- Local Motor Current Limit
- Pulldown Demand Limit
- Pulldown Demand Time

The Manual Surge Point Key
When this key is pressed, a dialog box appears that asks for a password. Once password 0 3 6 8 has been entered and the Enter key has been pressed, the present operating condition is logged into the surge map as a valid surge point. The chiller must be running to enter the point.

Surge Map Screen

When in MODBUS protocol configuration, there is now a Surge Map Screen that displays the surge map in either TABLE or LIST form, as selected with the MAP VIEW key on the Surge Map Screen.

With the MAP VIEW set to TABLE, as shown in figure 3 and 3A, the map is shown graphically. The X-axis is Delta P/P and the Y-axis is PRV position. Each VSD frequency point is represented by an "X" in the table. The Present Operating conditions are indicated with an "*" and are detailed at the bottom of the screen under PRESENT, as shown in figure 3. If the present condition is the same as a mapped point, the "*" will be replaced by an "O", as shown in figure 3A. To view the details of any mapped point, position the green box (□) over the desired "X" using the keypad arrow keys (▲▼◄►). The VSD Output Frequency, Pre-rotation Vanes Position and Delta P/P of the selected point is displayed at the bottom of the screen under SELECTED. The default position for the green box is in the upper left corner of the view window. Once moved, it will remain at the last position. The Speed Decrease Inhibit-Surge map Point LED, Mapping Inhibited LED and ACC Surge Detected LED are also on this screen. They function the same as the duplicate LED's on the ACC Details Screen

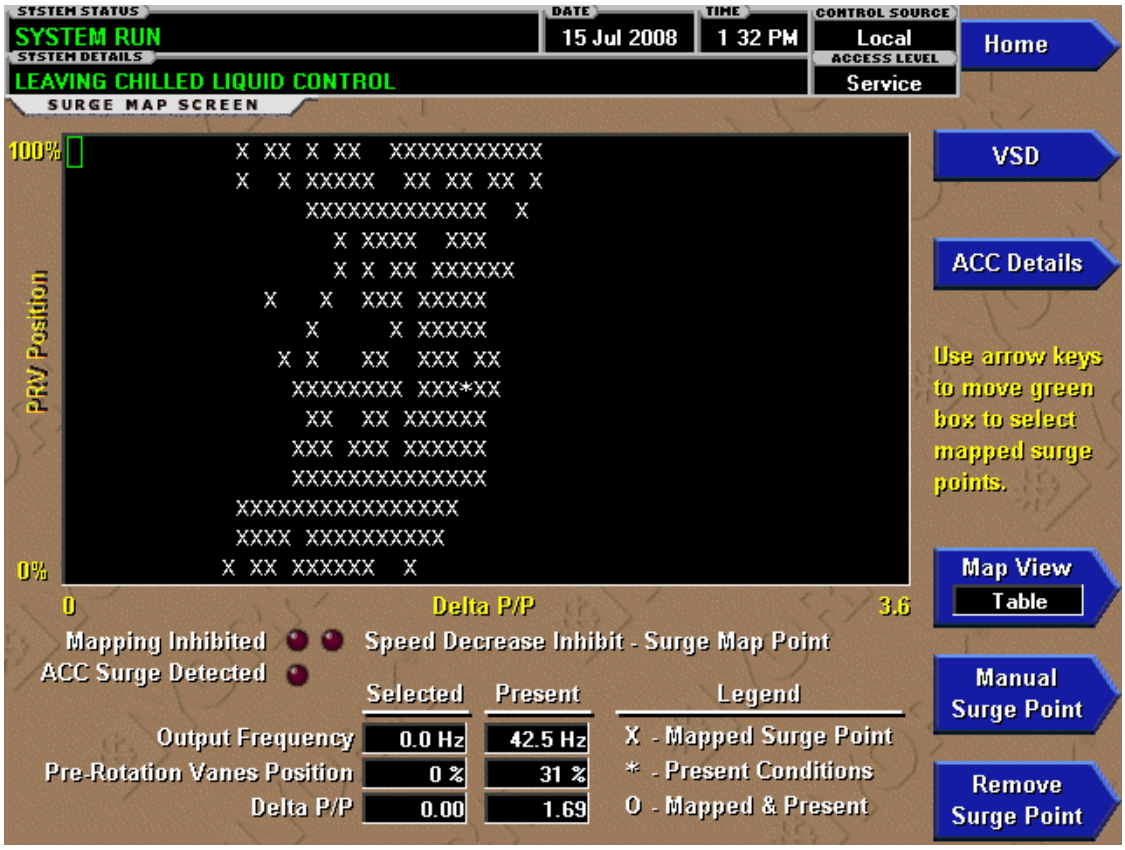

FIGURE 3 - SURGE MAP SCREEN (TABLE VIEW)

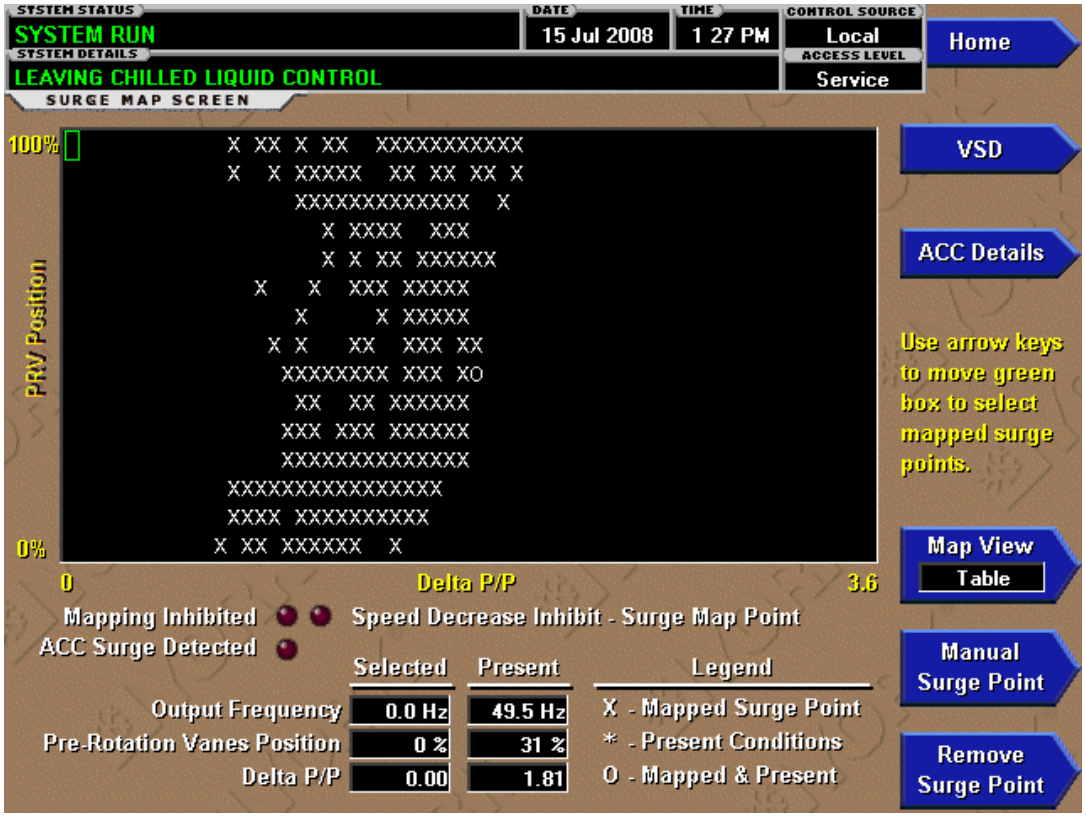

FIGURE 3A - SURGE MAP SCREEN (TABLE VIEW)

With the MAP VIEW set to LIST, as shown in figure 4, the Delta P/P, PRV Position and VSD Output Frequency of each mapped point are listed in rows. This is the same report that is generated when the surge map is sent to a printer. Therefore, this view cannot be selected while a print is in process. The PAGE UP and PAGE DOWN keys are used to scroll to the previous or next listing.

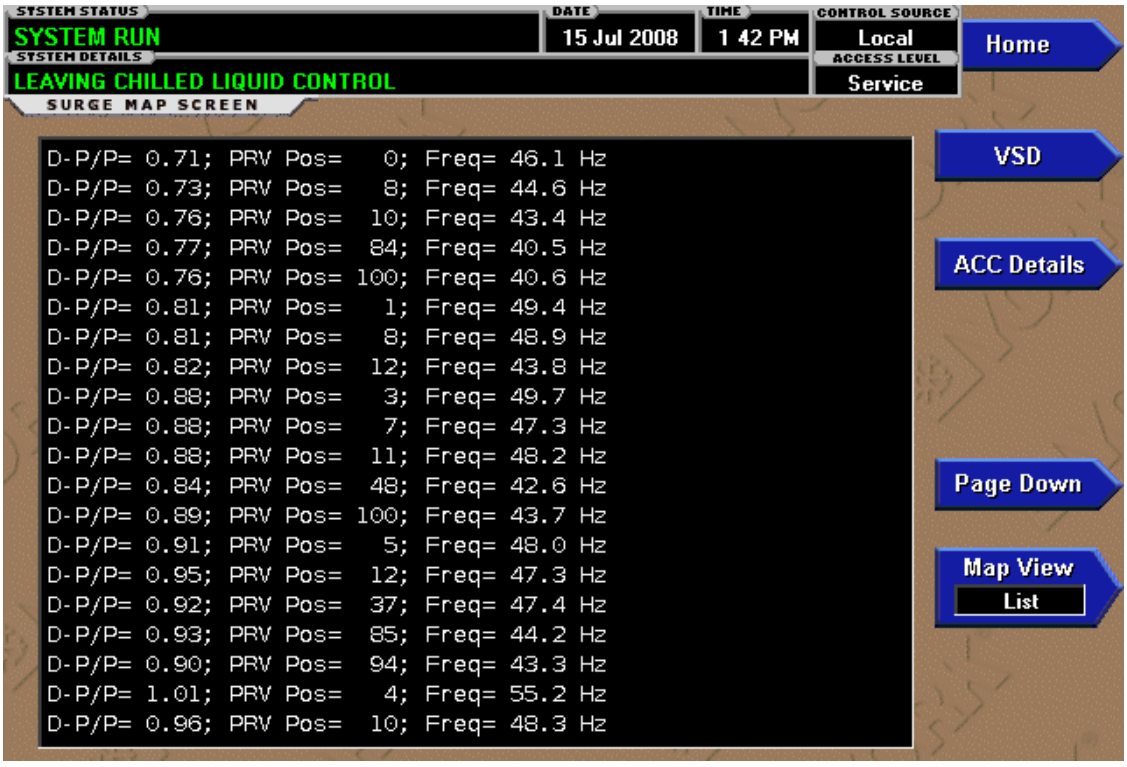

FIGURE 4 - SURGE MAP SCREEN (LIST VIEW)

Hot Gas Bypass Screen

The Hot Gas Bypass Control Mode data box on this screen now displays “Minimum Load”, “VSD Override” or “VGD Override” based on the actual override in effect. Previously, “Override” was displayed as a general message for any of these conditions. Refer to override descriptions in Optiview Service Manual 160.54-M1.

In previous software versions, when the drive was running less than full speed, normal hot gas operation, including the “Minimum Load” operation was overridden and the hot gas bypass valve was driven to the fully closed position. In this version, the “Minimum Load” function is allowed to operate even when the VSD is at less than full speed. The “Minimum Load” function opens the hot gas bypass valve to the maximum allowed by the MAXIMUM OPEN setpoint (25% to 100%) when the Leaving Chilled Liquid Temperature decreases to less than the MINIMUM LOAD Setpoint, programmed as an offset below the Leaving Chilled Liquid Temperature Setpoint. Refer to 160.54-M1.

The “Surge Detected” LED is replaced by a “Surge Avoidance Surge Detected” LED. It illuminates momentarily when a surge is detected by the Surge Protection feature (see below). If equipped with a VSD (YORK or MODBUS protocol configuration) or MV VSD, this feature only detects surges that occur while the drive is running at maximum frequency.

An “ACC Surge Detected” LED is added to this screen when in MODBUS protocol configuration. It illuminates momentarily when a surge is detected by the ACC function in the microboard. These are surges that are detected while the drive is running at less than maximum frequency.

The SURGE AVOIDANCE SURGE COUNT is the total surges accumulated by the Surge Protection feature. If equipped with a Liquid Cooled Solid State Starter or Electro-mechanical starter, it is the total surges detected. If equipped with a VSD (YORK or MODBUS protocol configuration) or MV VSD, it is only the surges detected while the drive is running at maximum frequency.

Figure 5 shows this screen in MODBUS Protocol configuration. Figure 5A shows this screen in YORK Protocol configuration.

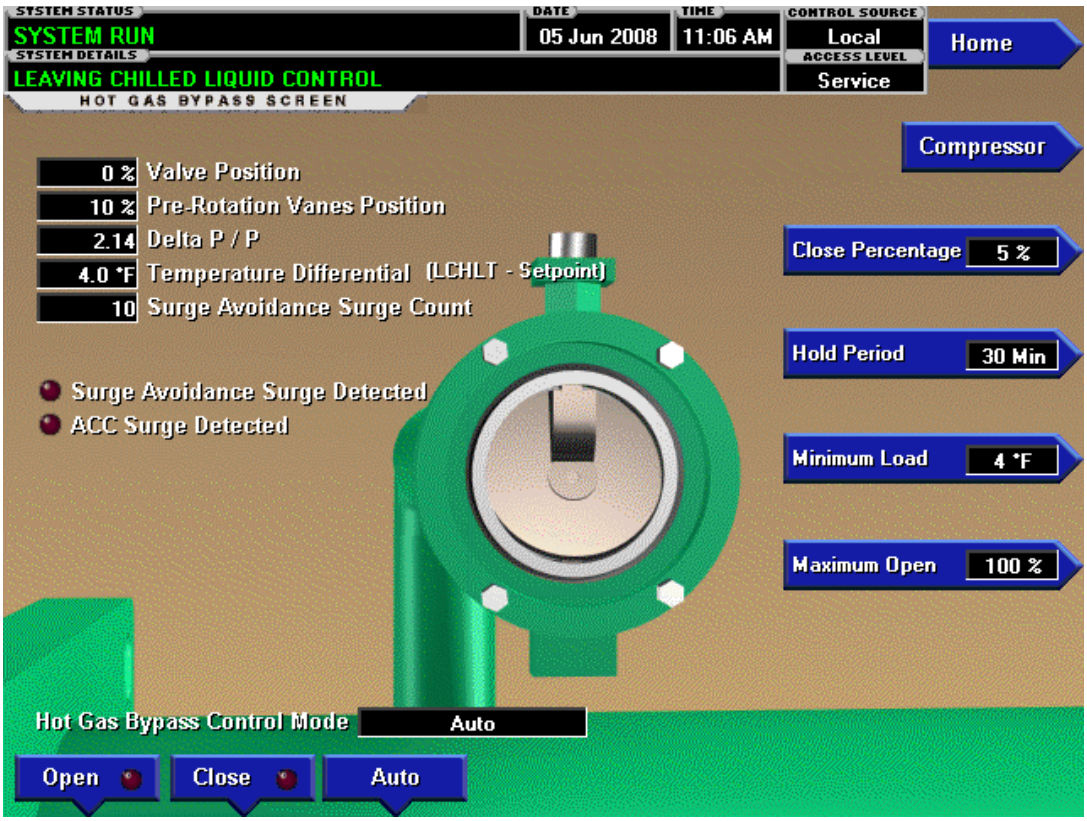

FIGURE 5 - HOT GAS BYPASS SCREEN (MODBUS CONFIGURATION)

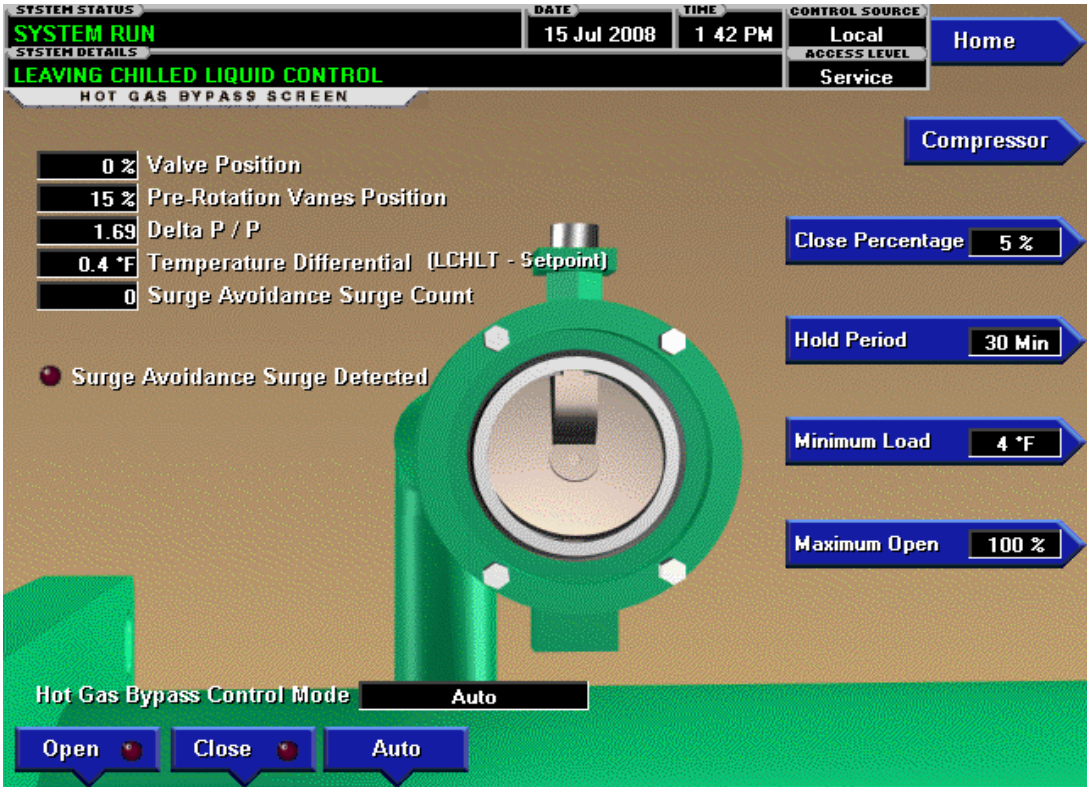

FIGURE 5A - HOT GAS BYPASS SCREEN (YORK PROTOCOL CONFIGURATION)

Surge Protection Screen

The CLEAR SURGE COUNT key was removed in the previous software version. It is re-instated in this version. It clears the Surge Avoidance Surge Count of the Surge Protection feature using an ADMIN password. If equipped with a Liquid cooled Solid State Starter or Electro-mechanical Starter, these are the total surges detected. If equipped with a VSD (YORK or MODBUS protocol configuration) or MV VSD, these are the total surges detected while the drive was running at maximum frequency.

The "Surge Detected" LED is replaced by a "Surge Avoidance Surge Detected" LED. It illuminates momentarily when a surge is detected by the Surge Protection feature. If equipped with a VSD (YORK or MODBUS protocol configuration) or MV VSD, this feature only detects surges that occur while the drive is running at maximum frequency.

An "ACC Surge Detected" LED is added to this screen when in MODBUS protocol configuration. It illuminates momentarily when a surge is detected by the ACC function in the microboard. These are surges that are detected while the drive is running at less than maximum frequency.

The SURGE AVOIDANCE SURGE COUNT is the total surges accumulated by the Surge Protection feature. If equipped with a Liquid Cooled Solid State Starter or Electro-mechanical starter, it is the total surges detected. If equipped with a VSD (YORK or MODBUS protocol configuration) or MV VSD, it is only the surges detected while the drive is running at maximum frequency.

The SURGE SENSITIVITY key allows the Service Technician to adjust the sensitivity of the surge detection of the Surge Protection Feature (Surge Avoidance Surge Detection). Programmable over the range of 0.3 (default) to 1.3. Smaller values increase the sensitivity. If equipped with a Liquid Cooled Solid State Starter or Electro-mechanical starter, these are the total surges detected by this feature. If equipped with a VSD (YORK or MODBUS protocol configuration) or MV VSD, these are the surges that are detected while the drive is running at maximum frequency.

Figure 6 shows this screen in MODBUS Protocol configuration. Figure 6A shows this screen in YORK Protocol configuration.

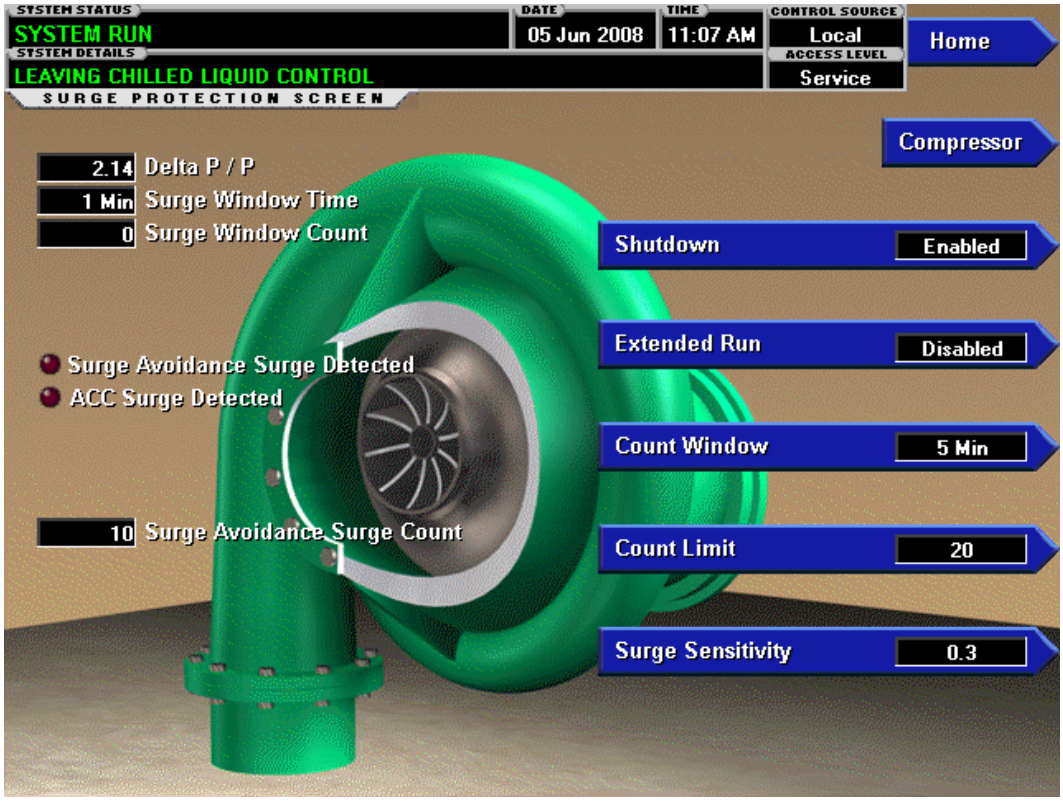

FIGURE 6 - SURGE PROTECTION SCREEN (MODBUS CONFIGURATION)

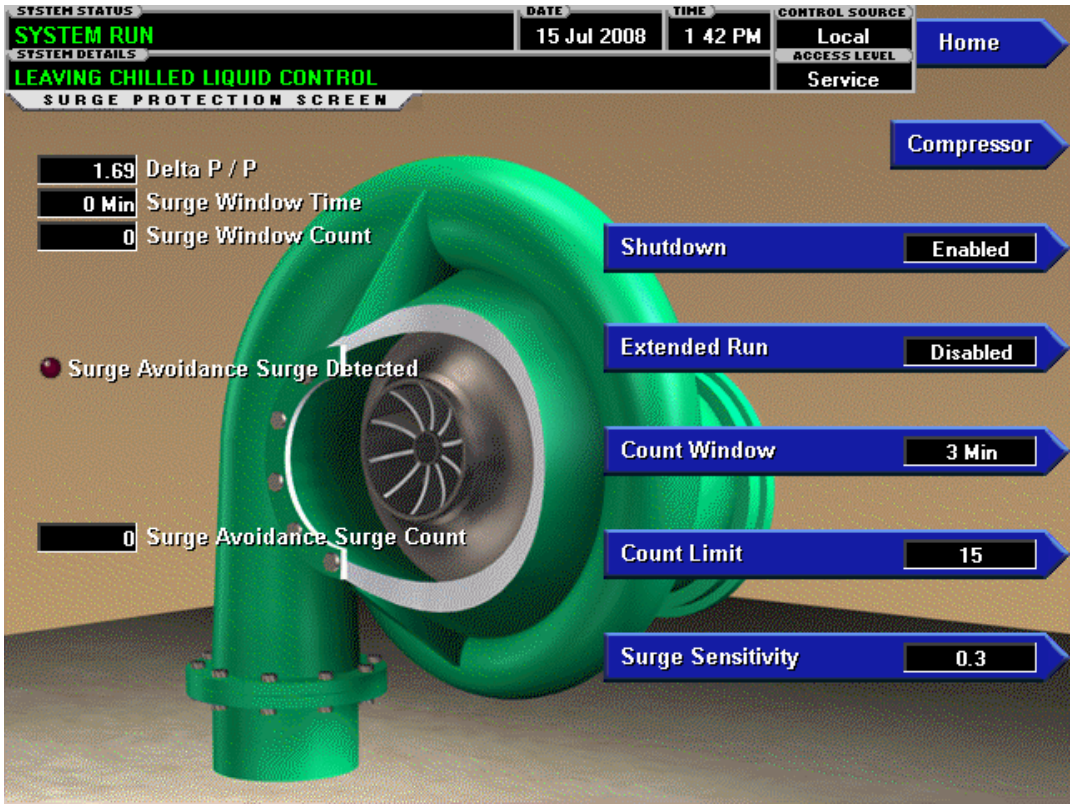

FIGURE 6A - SURGE PROTECTION SCREEN (YORK PROTOCOL CONFIGURATION)

Trending
In previous software versions, the Evaporator Small Temperature Difference and Condenser Small temperature Difference were both labeled “Small Temperature Difference”. In this version, they are labeled as “Evaporator Small Temperature Difference” and “Condenser Small Temperature Difference”

There are now always a maximum of 20 divisions on the Y-axis, regardless of Access Level. In previous software versions, there was sometimes a maximum of 23 in Service Mode and sometimes 20 divisions in View Mode.

Italian Language Corrections
The Italian translations of the following messages have been corrected in this software version: “Condenser-Pressure Transducer out Of Range”, “VSD-Low Converter Heatsink Temperature”, “Control Panel-Power Failure”, Refrigerant Level Control Screen-“Set Zone”, Setup Screen-“Change Settings”, History Screen “Vane Motor Switch Open”, Slots Screen “Small Temperature Difference”, History Screen-“Leaving Chilled Liquid – Flow Switch Open”

ACC Corrections/Enhancements
Frequency Command - In previous software versions, there were certain conditions (such current limit) under which an incorrect frequency command was sent to the VSD. This has been corrected in this version.

Frequency Command Increase - To assure that VSD or MV VSD frequency increases do not cause excessive motor current resulting in overload shutdowns, frequency increase limitations are imposed based upon how close the actual motor current is to the chiller full load amps.

In Automatic Frequency Control mode, anytime the microboard ACC function increases the VSD or MV VSD output frequency, the frequency increase is limited by the motor current as follows:

- When Motor Current <= 80% FLA: No Limiting
- When Motor Current > 80% FLA and <=98% FLA: Increase 0.1Hz every {2 + (%FLA-80)} seconds
- When Motor Current > 98% FLA: Increase 0.1Hz every 20 seconds

Although the incremental frequency increases can be less than allowed, they will never be greater than allowed. These limitations also apply to the frequency ramp that occurs at chiller start while ramping from start frequency 30Hz (60Hz applications) or 25Hz (50Hz applications) to maximum frequency. These limitations are not imposed in Manual Frequency Control.

Surge Detection and Reaction During Chiller Start - The surge detection and reaction routine is now disabled until 5 seconds after the start frequency (25Hz for 50Hz applications/30Hz for 60Hz applications) is achieved. This prevents false or transient surge conditions from being logged or reacted to.

Extended Condenser Temperature Range
Certain applications must operate at higher condenser temperatures. The maximum allowable condenser temperature is increased from 116°F to 128ºF. The resulting higher operating pressures require higher warning and safety shutdown thresholds than are in previous software versions.

To allow this software version to be used in both the standard and the higher temperature applications, a CONDENSER TEMPERATURE RANGE setpoint is added to the Setup Screen (Figure 7) to allow selection of either “Standard” (default) or “Extended”. This setpoint is set at the factory and requires an ADMIN password to change it. It is only visible when set to “extended”.

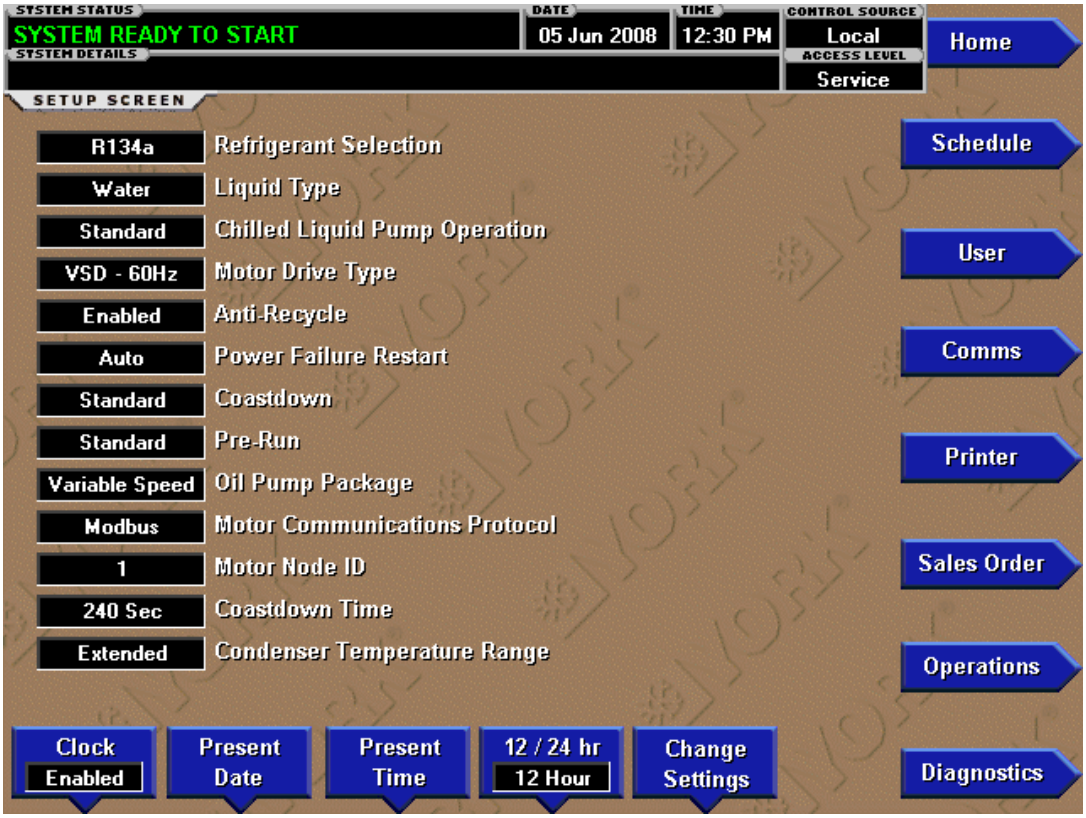

FIGURE 7 - SETUPSCREEN

When set to “Standard”, the following warning and safety shutdown thresholds are unchanged. When set to “Extended”, they are as follows:

- “Warning – High Pressure Limit” - Maximum allowable value is 193.0 PSIG, with no change to the default value
- “Condenser – High Pressure” - Trip/Reset threshold is 200/140 PSIG
- “Condenser – High Pressure – Stopped” – Trip/Reset threshold is 170 PSIG

To accommodate the higher temperatures, these chillers will be equipped with a different High Pressure Cutout Switch (HPCO) that can be set to trip at a higher pressure.

VGD Setpoint Defaulting Correction
In previous software versions, the PRV-VGD INHIBIT Setpoint (40% to 100%) would reset to its default value (95%) upon power-up following a power failure. This software version correctly maintains the last programmed value.

Refrigerant Level Control
The Level Control Setpoint default has been changed from 30% to 50%.

Trend Setup Screen
This software version fixes a problem that prevents the Y-Axis maximum allowed display values in all 6 data points to be set in Metric Mode.

Program Card Downloading
Although the procedure has not changed, the program downloading has been modified to reduce the download time.

Medium Voltage Variable Speed Drive – Variable Maximum Values
The following MVVSD variables are now allowed to be a maximum value of 65,535:

- MVVSD Bus Voltage
- MVVSD Output Current (3 phases)
- MVVSD Input Voltage
- MVVSD Output Voltage