



# Centrifugal Liquid Chillers

## MODEL YT Design Level J



00613VIP

**150 THROUGH 850 TONS**  
**(527 through 2989 kW)**  
**Utilizing HCFC-123**



Metric Conversions



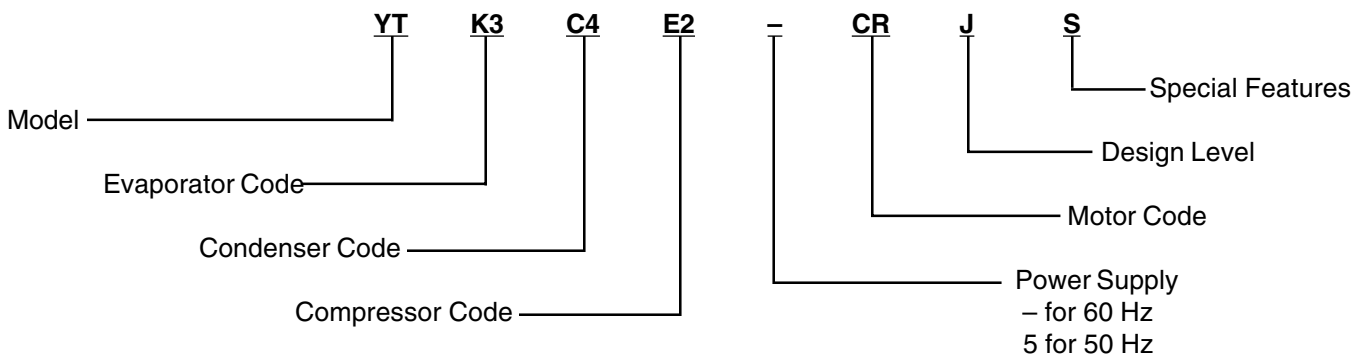
Rated in Accordance  
with the latest edition of  
ARI STANDARD 550/590

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## NOMENCLATURE

The model number denotes the following characteristics of the unit.



# Introduction

The YORK MaxE™ YT Chillers offer a complete combination of features for total owner satisfaction.

## **MATCHED COMPONENTS MAXIMIZE EFFICIENCY**

Actual chiller efficiency cannot be determined by analyzing the theoretical efficiency of any one chiller component. It requires a specific combination of heat exchanger, compressor, and motor performance to achieve the lowest system kW/Ton. YORK MaxE chiller technology matches chiller system components to provide maximum chiller efficiency under actual – not just theoretical – operating conditions.

## **REAL-WORLD ENERGY PERFORMANCE**

YORK pioneered the term “Real-World Energy” to illustrate the energy-saving potential of focusing on chiller performance during off-design conditions. Off-design is not only part load, but full load operation as well, with reduced entering condenser water temperatures (ECWTs). This is where chillers operate 99% of the time, and where operating costs add up.

The YK MaxE chillers are the only chillers designed to operate on a continuous basis with cold ECWT and full condenser flow at all load points, taking full advantage of Real-World conditions. This type of operation benefits the cooling tower as well; reducing cycling of the fan motor and ensuring good coverage of the cooling fill.

YORK MaxE chillers offer the most efficient Real-World operation of any chiller, meaning lower operating costs and an excellent return on your chiller investment.

## **OPEN DRIVE DESIGN**

Hermetic-motor burnout can cause catastrophic damage to a chiller. The entire chiller must be cleaned, and the refrigerant replaced. YORK MaxE centrifugal chillers eliminate this risk by utilizing air-cooled motors. Refrigerant never comes in contact with the motor, preventing contamination of the rest of the chiller.

Insurance companies that offer policies on large air conditioning equipment often consider air-cooled motors a significant advantage over hermetic refrigerant-cooled units.

## **HIGH-EFFICIENCY HEAT EXCHANGERS**

MaxE chiller heat exchangers offer the latest technology in heat transfer surface design to give you maximum efficiency and compact design. Water-side and refrigerant-side design enhancements minimize both energy consumption and tube fouling.

## **SINGLE-STAGE COMPRESSOR DESIGN AND EFFICIENCY PROVEN IN THE MOST DEMANDING APPLICATIONS**

Designed to be the most reliable chillers we've ever made, YORK MaxE chillers incorporate single-stage compressor design. With fewer moving parts and straight-forward, efficient engineering, YORK single-stage compressors have proven durability records in hospitals, chemical plants, gas processing plants, the U.S. Navy, and in other applications where minimal downtime is a crucial concern.

In thousands of installations worldwide, YORK single-stage compressors are working to reduce energy costs. Lightweight, high strength aluminum compressor impellers feature backward-curved vanes for high efficiency. Airfoil shaped pre-rotation vanes minimize flow disruption for the most efficient part-load performance. Precisely positioned and tightly fitted they allow the compressor to unload smoothly from 100% to minimum load for minimum air conditioning applications.

## **FACTORY PACKAGING REDUCES FIELD LABOR COSTS**

YORK MaxE centrifugal chillers are designed to keep installation costs low. Where installation access is not a problem, the unit can be shipped completely packaged, requiring minimal piping and wiring to complete the installation.

For those units utilizing Variable Speed Drive or a factory installed Solid-State Starter, the three power leads provide all power to the chiller and its auxiliaries.

## **TAKE ADVANTAGE OF COLDER COOLING TOWER WATER TEMPERATURES**

YORK MaxE centrifugal chillers have been designed to take full advantage of colder cooling tower water temperatures, which are naturally available during most operating hours. Considerable energy savings are available by letting tower water temperature drop, rather than artificially holding it above 75°F (23.9°C), especially at low load, as some chillers require.

## **U.L. ACCEPTANCE – YOUR ASSURANCE OF RELIABILITY**

YORK MaxE centrifugal chillers are approved for listing by Underwriter's Laboratories for the United States and Canada. Recognition of safety and reliability is your assurance of trouble-free performance in day-today building operation.

# Ratings



Rated in accordance with the latest issue of ARI Standard 550/590.

## ARI CERTIFICATION PROGRAM

The performance of YORK MaxE chillers has been certified to the Air Conditioning and Refrigeration Institute (ARI) as complying with the certification sections of the latest issue of ARI Standard 550/590. Under this Certification Program, chillers are regularly tested in strict compliance with this Standard. This provides an independent, third-party verification of chiller performance.

## COMPUTERIZED PERFORMANCE RATINGS

Each chiller is custom-matched to meet the individual building load and energy requirements. A large number of standard heat exchangers and pass arrangements are available to provide the best possible match.

It is not practical to provide tabulated performance for each combination, as the energy requirements at both full and part-load vary significantly with each heat exchanger and pass arrangement. Computerized ratings are available through each YORK sales office. These

ratings can be tailored to specific job requirements, and are part of the ARI Certification Program.

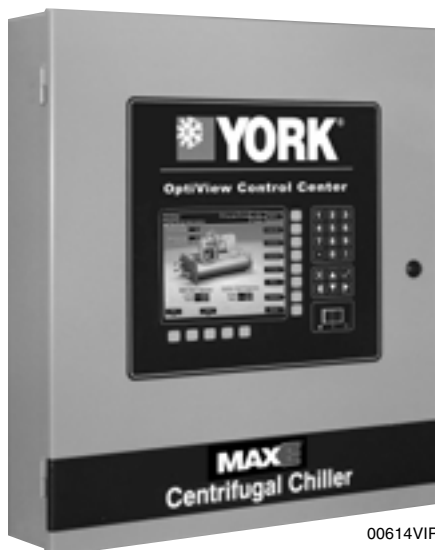
## OFF-DESIGN PERFORMANCE

Since the vast majority of its operating hours are spent at off-design conditions, a chiller should be chosen not only to meet the full-load design, but also for its ability to perform efficiently at lower loads and lower tower water temperatures. It is not uncommon for chillers with the same full-load kW/TON to have an operating cost difference of over 10% due to part-load operation.

Part-load information can be easily and accurately generated by use of the computer. And because it is so important to an owner's operating budget, this information has now been standardized within the ARI Certification Program in the form of an Integrated Part-Load Value (IPLV), and Non-Standard Part-Load Value (NPLV)

The IPLV / NPLV formulas from ARI Standard 550/590 much more closely track actual chiller operations, and provide a more accurate indication of chiller performance than the previous IPLV / APLV formula. A more detailed analysis must take into account actual building load profiles, and local weather data. Part-load performance data should be obtained for each job using its own design criteria.

# OptiView Control Center



00614VIP

The YORK OptiView Control Center, furnished as standard on each chiller, provides the ultimate in efficiency, monitoring, data recording, chiller protection and operating ease. The control center is a factory mounted, wired and tested state-of-the-art microprocessor based control system for HCFC-123 centrifugal chillers. The panel is configured with a 10.4-in. diagonal color Liquid Crystal Display (LCD) surrounded by “soft” keys, which are redefined with one keystroke based on the screen displayed at that time. This revolutionary development makes chiller operation quicker and easier than ever before. Instead of requiring keystroke after keystroke to hunt for information on a small mono-chrome LCD screen, a single button reveals a wide array of information on a large, full-color illustration of the appropriate component, which makes information easier to interpret. This is all mounted in the middle of a keypad interface and installed in a locked enclosure.

LCD display allows graphic animated display of the chiller, chiller sub-systems and system parameters; this allows the presentation of several operating parameters at once. In addition, the operator may view a graphical representation of the historical operation of the chiller as well as the present operation. A Status Bar is displayed at all times on all screens, it contains the System – Status Line and Details Line, the Control Source, Access Level, Time and Date. All date representations and calculations use four digits for the year to provide Year 2000 compliance.

During prelube and coastdown, the system status will include a countdown timer indicating the time remaining. The control panel is compatible with the YORK Solid State Starter (optional); YORK Variable Speed Drive (VSD) (Optional), Electro-Mechanical (E-M) starter or any customer supplied E-M starter that complies with the YORK R-1051 standard. The locations of various

chiller parameters are clearly marked and instructions for specific operations are provided on many of the screens. The panel verbiage is available in other languages as an option with English always available. Data can be displayed in either English or Metric units plus keypad entry of setpoints to 0.1 increments.

Security access is provided to prevent unauthorized changes of setpoints. This is accomplished with three different levels of access and passwords for each level. There are certain screens, displayed values, programmable setpoints and manual controls not shown that are for servicing the chiller. They are only displayed when logged in at service access level. Included in this is the Advanced Diagnostics and troubleshooting information for the chiller and the panel.

The control center is supplied through a 1-1/2 KVA transformer in the compressor motor starter to provide individual over-current protected power for all controls. Numbered terminal strips for wiring such as Remote Start/Stop, Flow Switches, Chilled Water Pump and Local or Remote Cycling devices are provided. The Panel also provides field interlocks that indicate the chiller status. These contacts include a Remote Mode Ready-To-Start, a Cycling Shutdown, a Safety Shutdown and a chiller Run contact. Pressure transducers sense system pressures and thermistors sense system temperatures. The output of each transducer is a DC voltage that is analogous to the pressure input. The output of each thermistor is a DC voltage that is analogous to the temperature it is sensing.

Setpoints can be changed from a remote location via 0-10VDC, 4-20mA, contact closures or through serial communications. The adjustable remote reset range [up to 20°F (11.1°C)] provides flexible, efficient use of remote signal depending on reset needs. Serial data interface

# OptiView Control Center (continued)

to the YORK ISN Building Automation System (BAS) is through the optional General Protocol Interface Card (GPIC), which can be mounted inside the control center.

This printed circuit board requests the required data from the Micro Board and makes it available for the YORK ISN network. This optional board is available through the YORK BAS group. The operating program is stored in non-volatile memory (EPROM) to eliminate chiller failure due to AC power failure/battery discharge. Programmed setpoints are retained in lithium battery-backed RTC memory for 11 years minimum.

Smart Freeze Point Protection will run the chiller at 36°F (2.22°C) leaving chilled water temperature, and not have nuisance trips on Low Water Temperature. The sophisticated program and sensor will monitor the chiller water temperature to prevent freeze up. Every programmable point has a pop-up screen with the allowable ranges, so that the chiller can not be programmed to operate outside of its design limits.

When the power is applied to the chiller the **HOME** screen is displayed. This screen displays a visual representation of the chiller and a collection of data detailing important operations and parameters. When the chiller is running, the flow of chilled liquid is animated by the alternating shades of color moving in and out of the pipe nozzles. The primary values that need to be monitored and controlled are shown on this screen. They are as follows:

## Display Only

- Chilled Liquid Temperature – Leaving
- Chilled Liquid Temperature – Return
- Condenser Liquid Temperature – Return
- Condenser Liquid Temperature – Leaving
- Motor Run (LED)
- % Full Load Amps
- Operating Hours
- Input Power (kW) (VSD Only)

With the “soft” keys the operator is only one touch away from the 8 main screens that allow access to the major information and components of the chiller. The 8 screens are the **SYSTEM, EVAPORATOR, CONDENSER, COMPRESSOR, OIL SUMP, MOTOR, SETPOINTS** and the **HISTORY**. Also on the Home screen is the ability to **Log IN, Log Out** and **Print**. Log In and Log Out is the means by which different security levels are accessed.

The **SYSTEM** screen gives a general overview of common chiller parameters for both shells. This is an end view of the chiller with a 3-D cutaway of both the shells. From this screen you can view the following:

## Display Only

- Discharge Temperature
- Chilled Liquid Temperature – Leaving
- Chilled Liquid Temperature – Return
- Chilled Liquid Temperature – Setpoint
- Evaporator Pressure
- Evaporator Saturation Temperature
- Condenser Liquid Temperature - Leaving
- Condenser Liquid Temperature - Return
- Condenser Pressure
- Condenser Saturation Temperature
- Oil Sump Temperature
- Oil Pressure
- % Full Load Amps
- Current Limit

The **EVAPORATOR** screen displays a cutaway view of the chiller evaporator. All setpoints relating to the evaporator side of the chiller are maintained on this screen. Animation of the evaporation process indicates whether the chiller is presently in RUN condition (bubbling) and liquid flow in the pipes is indicated by alternating shades of color moving in and out of the pipes. Adjustable limits on the low water temperature setpoints allows the chiller to cycle on and off for greater efficiency and less cycling. The chiller cycles off when the leaving chilled water temperature is below setpoint and adjustable from 1°F (.55°C) below to a minimum of 36°F (2.2°C). Restart is adjustable from setpoint up to a maximum of 80°F (44.4°C). The Panel will check for flow to avoid freeze up of the tubes. If flow is interrupted, shutdown will occur after a minimum of two seconds. From this screen you can perform the following:

## Display Only

- Chilled Liquid Flow Switch (Open/Closed)
- Chilled Liquid Pump (Run/Stop)
- Evaporator Pressure
- Evaporator Saturation Temperature
- Return Chilled Liquid Temperature
- Leaving Chilled Liquid Temperature
- Evaporator Refrigerant Temperature

- Small Temperature Difference
- Leaving Chilled Liquid Temperature Setpoints – Setpoint
- Leaving Chilled Liquid Temperature Setpoints – Shutdown
- Leaving Chilled Liquid Temperature Setpoints – Restart

### Programmable

- Local Leaving Chilled Liquid Temperature – Range
- Local Leaving Chilled Liquid Temperature – Setpoint
- Leaving Chilled Liquid Temperature Cycling Offset – Shutdown
- Leaving Chilled Liquid Temperature Cycling Offset – Restart

The **CONDENSER** screen displays a cutaway view of the chiller condenser. The liquid flow is animated to indicate flow through the condenser. All setpoints relating to the condenser side of the chiller are maintained on this screen. With the proper access level this screen also serves as a gateway to controlling the Refrigerant Level. From this screen you can view the following:

### Display Only

- Leaving Condenser Liquid Temperature
- Return Condenser Liquid Temperature
- Condenser Pressure
- Condenser Saturation Temperature
- Small Temperature Difference
- Drop Leg Refrigerant Temperature
- Sub-Cooling Temperature
- High Pressure Switch (Open/Closed)
- Condenser Liquid Flow Switch
- Condenser Liquid Pump (Run/Stop)

The **PURGE** screen displays a cutaway view of the purge tank, where all setpoints relating to the purge system are maintained on this screen. LEDs depict the state of the Float switches, Oil Valve solenoid, Air Valve solenoid and the Purge exhaust count is displayed. From this screen you can view the following:

### Display Only

- Air Valve Solenoid (LED)
- Top Float Switch (LED)
- Bottom Float Switch (LED)
- Oil Valve Solenoid (LED)
- Pressure

- Exhaust Count
- Exhaust Window
- Bypass Time Left

### Programmable

- Maximum Purges/Hour

The **COMPRESSOR** screen displays a cutaway view of the compressor, this reveals the impeller and shows all the conditions associated with the compressor. When the compressor impeller is spinning this indicates that the chiller is presently in RUN condition. With the proper access level, the pre-rotation vanes may be manually controlled. This screen also serves as a gateway to sub-screens for calibrating the prerotation vanes, the proximity probe, configuring the Hot Gas By-Pass, or providing advanced control of the compressor motor Variable Speed Drive. From this screen you can view the following:

### Display Only

- Oil Pressure
- Oil Sump Temperature
- Discharge Temperature
- Superheat Temperature
- Vane Motor Switch (LED)
- Vent Line Solenoid (LED)

The **OIL SUMP** screen displays a close-up view of the chiller oil sump and provides all the necessary setpoints for maintaining the Variable Speed Oil Pump (VSOP). This screen also allows manual control of the Frequency Command sent to the VSOP. From this screen you can perform the following:

### Display Only

- Oil Sump Temperature
- Oil Pressure
- Oil Pump Run Output (LED)
- Manual Oil Pump Operation Time Left

### Programmable

- Manual Pump

1. The MOTOR “soft” key on the Home screen when pressed, shows a picture of either a YORK Electro-Mechanical Starter, Solid State Starter or a Variable Speed Drive Screen depending on chiller configuration. Programmable pulldown demand to automatically limit motor loading for minimizing

# OptiView Control Center (continued)

building demand charges. Pulldown time period control over four hours, and verification of time remaining in pulldown cycle from display readout. Separate digital setpoint for current limiting between 30 and 100%.

The **ELECTRO-MECHANICAL STARTER** – (E-M) screen displays a picture of the starter and the following values. The ones below are common among all three offerings and the values will be displayed on all types of starter screens. From this screen you can perform the following:

## Display Only

- Motor Run (LED)
- Motor Current % Full Load Amps
- Current Limit Setpoints
- Pulldown Demand Time Left

## Programmable

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

The **SOLID STATE STARTER** – (SSS) screen displays a picture of the starter and following values that are displayed in addition to the common ones listed above.

## Display Only

- Input Power
- kW Hours
- Starter Model Voltage – Phase A, B, C
- Current – Phase A, B, C
- Temperature – Phase A, B, C

The **VARIABLE SPEED DRIVE** – (VSD) screen displays a picture of the VSD and the following values that are in addition to the common ones listed above. From this screen you can view the following:

## Display Only

- Output Voltage
- Output Frequency
- Current – Phase A, B, C
- Input Power
- kW Hours
- Pre-Rotation Vane Position

- Harmonic Filter Data (Filter option only)
  - Supply KVA
  - Total Power Factor
  - Voltage Total Harmonic Distortion – L1, L2, L3
  - Supply Current Total Demand Distortion – L1, L2, L3

There are two additional screens (Sub-Screens) that have further VSD information. From these screens you can view the following:

## 1) Variable Speed Drive Details

### Display Only

- Water Pump Output (LED)
- Precharge Relay Output (LED)
- Trigger SCR Output (LED)
- DC Bus Voltage
- DC Inverter Link Current
- Internal Ambient Temperature
- Converter Heatsink Temperature
- Heatsink Temperature – Phase A, B, C
- Motor HP
- 100% Full Load Amps

## 2) Harmonic Filter Details (Filter option only)

### Display Only

- Operating Mode (Run/Stop)
- DC Bus Voltage
- Supply Contactor (LED)
- Precharge Contactor (LED)
- Phase Rotation
- Total Supply KVA
- Heatsink Temperature (Harmonic Filter)
- Voltage Peak (N-L1, N-L2, N-L3)
- RMS Voltage (L1, L2, L3)
- Voltage Total Harmonic Distortion (L1, L2, L3)
- RMS Filter Current (L1, L2, L3)
- Supply Current Total Demand Distortion
- RMS Supply Current (L1, L2, L3)

The **SETPOINTS** screen provides a convenient location for programming the most common setpoints involved in the chiller control. The Setpoints are shown on other individual screens but to cut down on needless searching they are on this one screen. This screen also serves as a gateway to a sub-screen for defining the setup of general system parameters. From this screen you can perform the following:



### Display Only

- Leaving Chilled Liquid Temperature – Setpoint
- Leaving Chilled Liquid Temperature Cycling – Shut-down
- Leaving Chilled Liquid Temperature Cycling – Restart
- Current Limit Setpoint

### Programmable

- Local Leaving Chilled Liquid Temperature – Range
- Local Leaving Chilled Liquid Temperature – Setpoint
- Leaving Chilled Liquid Temperature Cycling Offset – Shutdown
- Leaving Chilled Liquid Temperature Cycling Offset – Restart
- Remote Analog Input Range
- Local Motor Current Limit
- Pulldown Demand Limit
- Pulldown Demand Time
- Print

The **SETUP** is the top level of the general configuration parameters. It allows programming of the time and date, along with specifications as to how the time will be displayed. In addition, the chiller configuration as determined by the micro board program jumpers and program switches is displayed. From this screen you can perform the following.

### Display Only

- Chilled Liquid Pump Operation: (Displays Standard or Enhanced)
- Motor Type: (Displays Fixed Speed or Variable Speed)
- Refrigerant Selection: (Displays R-123)
- Anti-Recycle: (Displays Disable or Enabled)
- Power Failure Restart: (Displays Manual or Automatic)
- Liquid Type: (Water or Brine)
- Coastdown: (Displays Standard or Enhanced)
- Pre-Run: (Displays Standard or Extended)
- Power Line Frequency (VSD only): (Displays 60 Hz or 50 Hz)

### Programmable

- Set Date
- Set Time
- Clock (Enabled/Disabled)
- 12/24 Hr.

The following 6 sub-screens can be accessed from the setup screen:

The **SCHEDULE** screen contains more programmable values than a normal display screen. Each programmable value is not linked to a specific button; instead the select key is used to enable the cursor arrows and check key to program the Start/Stop times for any day of the week up to **6 weeks** in advance. The user has the ability to define a standard set of Start/Stop times that are utilized every week or specify exceptions to create a special week.

### Programmable

- Exception Start/Stop Times
- Schedule (Enable/ Disabled)
- Repeat Sunday Schedule
- Standard Week Start/Stop Times
- Reset All Exception Days
- Select
- Print

The **USER** screen allows definition of the language for the chiller to display and defines the unit of measure.

### Programmable

- System Language
- English / Metric Units

The **COMMS** screen allows definition of the necessary communications parameters.

### Programmable

- Chiller ID
- Com 2 Baud Rate
- Com 2 Data Bit(s)
- Com 2 Parity Bit(s)
- Com 2 Stop Bit(s)
- Printer Baud Rate
- Printer Data Bit(s)
- Printer Parity Bit(s)
- Printer Stop Bit(s)

The **PRINTER** screen allows Definition of the necessary communications Parameters for the printer.

### Display Only

- Time Remaining Until Next Print

# OptiView Control Center (continued)

## Programmable

- Log Start Time
- Output Interval
- Automatic Printer Logging (Enabled/Disabled)
- Print Type
- ACC Auto Map Print (Enable/Disabled)
- ACC Map Report
- Print Report
- Print All Histories

The **SALES ORDER** screen allows definition of the order parameters. Note: This information is loaded at the factory or by the installation/service technician.

## Display Only

- Model Number
- Panel Serial Number
- Chiller Serial Number
- YORK Order Number
- System Information
- Condenser and Evaporator Design Load Information
- Nameplate Information

The **OPERATIONS** screen allows definition of parameters having to do with operation of the chiller. What is defined is whether the control of the chiller will be Local, Digital Remote, Analog Remote, Modem Remote or ISN Remote.

## Programmable

- Control Source

The **HISTORY** screen allows the user to browse through the last ten faults; either safety or cycling shutdowns with the conditions while the chiller is running or stopped. The faults are color coded for ease in determining the severity at a glance, recording the date, time and description. **(See Display Messages for Color Code meanings.)**

## Display Only

- Last Normal Shutdown
- Last Fault While Running
- Last Ten Faults

## Programmable

- Print History
- Print All Histories

By pressing the **VIEW DETAILS** key you will move to the **HISTORY DETAILS** screen. From these screens you are able to see an on-screen printout of all the system parameters at the time of the selected shutdown.

## Display Only

- History Printout

## Programmable

- Page Up
- Page Down
- Print History

Also under the **History** screen is the **TRENDING** screen, accessible by the key marked the same. On this screen up to 6 operator-selected parameters selected from a list of over 140, can be plotted in an X/Y graph format. The graph can be customized to record points once every second, up to once every hour. There are two types of charts that can be created: a single or continuous screen. The single screen collects data for one screen width (450 data points across the x-axis) then stops. The continuous screen keeps collecting the data but the oldest data drops off the graph from left to right at the next data collection interval. For ease of identification, each plotted parameter, title and associated y-axis labeling is color coordinated.

## Display Only

- This screen allows the user to view the graphical trending of the selected parameters and is a gateway to the graph setup screens.

## Programmable

- Start
- Stop
- y-axis
- x-axis

The **TREND SETUP** screen is used to configure the trending screen. The parameters to be trended are selected from the Trend Common Slots Screen accessed from the Slot #s button or the Master Slot Numbers List found in the operating manual. The interval at which all the parameters are sampled is selected under the Collection Interval button. The data point minimum and maximum values may be adjusted closer within the range to increase viewing resolution.

## Programmable

- Chart Type (select Continuous or One Screen)
- Collection Interval