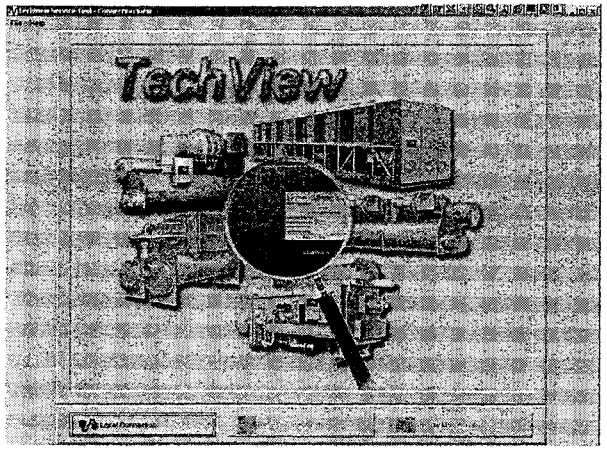
CTV CH530



TechView
Startup Configuration and Setpoints
Help Information

The purpose of this information is to answer questions an experienced CTV Service Technician may have regarding CH530 configuration and setpoint selections accessible via TECHVIEW SERVICE TOOL.
(For Instructions on installation of TechView see "CH530 Service Tool Fundamentals Training" On LBU Tech Service IntraNet Site)

Introduction

Startup

- This document is designed to support TechView Startup configuration and setpoint setting selections. Settings are completely factory set from the end of line (EOL) tester however for units without unit mounted starter and units with the outdoor temperature sensor some field startup settings will have to be made. In all cases we recommend that these configuration questions and unit setpoints be checked/ verified and documented prior to startup.
  - This document provides information in the order to be used;
    - Configuration View first –to define unit type and variables.
    - Setpoints View to set all setpoints for the application and job site conditions
    - Manual override view to provide access to manual overrides. (Oil Pump, Starter Dry run , IGV)
    - Then Status view for reference.

Reference materials

- Use the Chiller Installation manuals to assure proper installation.
- Use the Chiller Operation maintenance manual for reference, and use the forms in the rear of the manual to assure readiness for startup, and the startup log sheet. Have the appropriate log sheets. Check LBU Tech Service Site for latest Startup Log sheet.
- Use the AFD Operation Maintenance manual to reference as appropriate, and use the included AFD startup check sheet and Log.
- TechView online help at LBU Tech Services at TRANENET.com

TechView

- Laptop PC meeting minimum requirements as defined at Trane.Com.
- Have your PC programmed from www.trane.com with the most current with TechView (CTV) prior to going to the job. [We recommend you download from the Service or Sales office for fastest downloads rates.]
- TechView is designed to provide the same look and feel across product lines (CTV and RTAC).
- Many Views such as Connection View and Diagnostics view will look the same, and others such as Unit View are very similar.

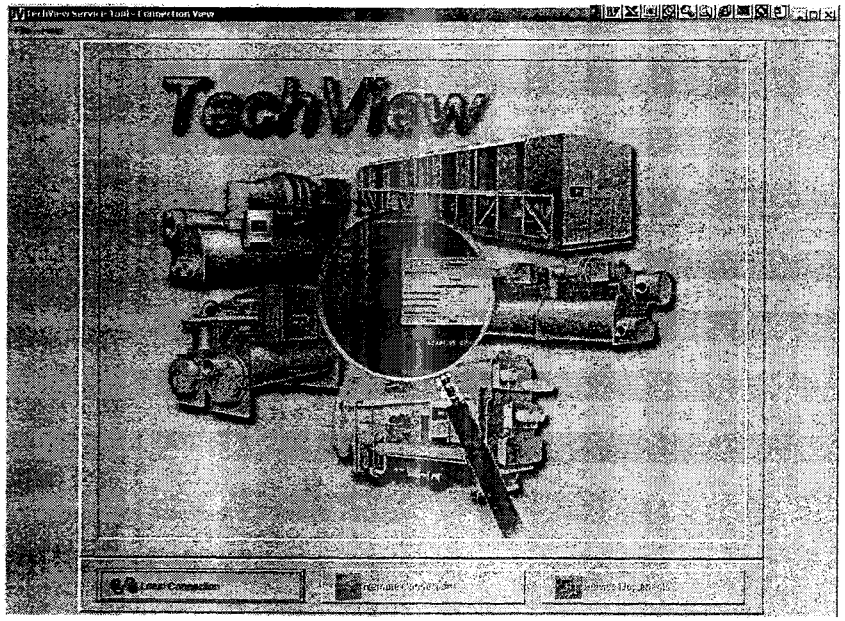
Equipment

- Cable to connect DV to PC. The Radio Shack part number for a proper cable is 26-117B. RS-232 male DB9 to female DB9 pin to pin serial cable. Cable must not be a "null-modem" cable.
- South pole screwdriver (TOL01343).

Powering up the controls for checkout:

- **Non-AFD starters:** With Main STARTER POWER OFF, Remove Control power transformer ground from 120 load X2 terminal. (Aux power "Ground fault" may occur if neutral and ground remain connected) Remove the 2F2 40 amp control power fuse. In the UCP connect aux power to 1X1-5(L1) to 1X1-17(L2), and Ground. Turn 120vac supply ON and DV should boot up to MAIN Screen within less than a minute. (Duplex Chillers require both panels to be powered up same way.)
- **AFD starter:** Pull the AFD Water pump branch fuse. The AFD bus requires power for the controls to interface during binding, therefore with the starter door closed proceed to power up the starter line voltage. If the starter Communications LLID requires binding,after confirming starter powers up OK proceed to power down and reapply power with the starter door open to access the AFD LLID for binding.

- POWER UP the controls and have the oil heater online for 24 hours prior to startup, or until oil is up to temperature.



Δ WARNING

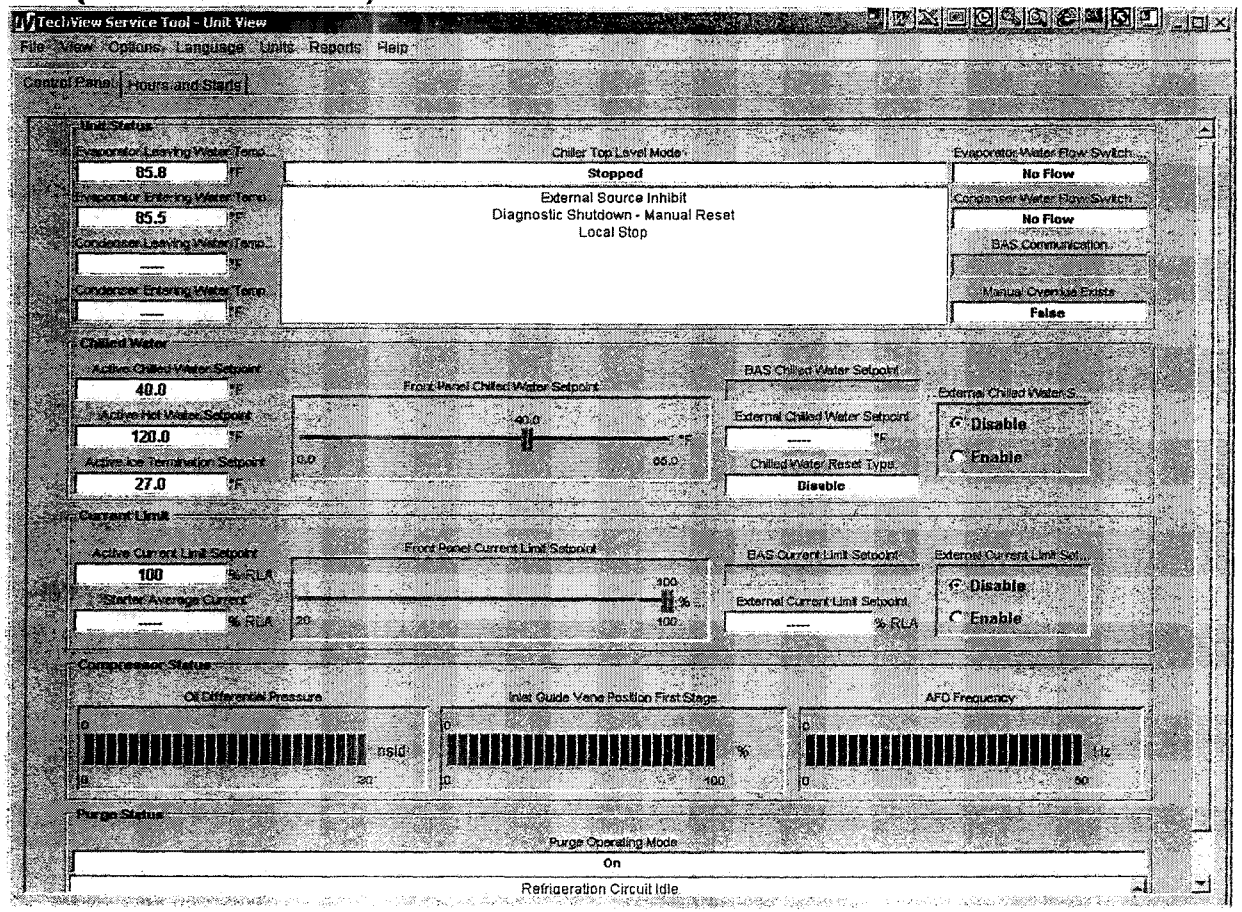
HAZARDOUS VOLTAGE!

Use extreme caution when measurements, adjustments, or other service-related work is performed with power on. Failure to use caution could cause death or serious injury.

Upon successful Local Connect Tech View will display UNIT VIEW for the appropriate product type. CVHE,F,G Unit View is shown below.

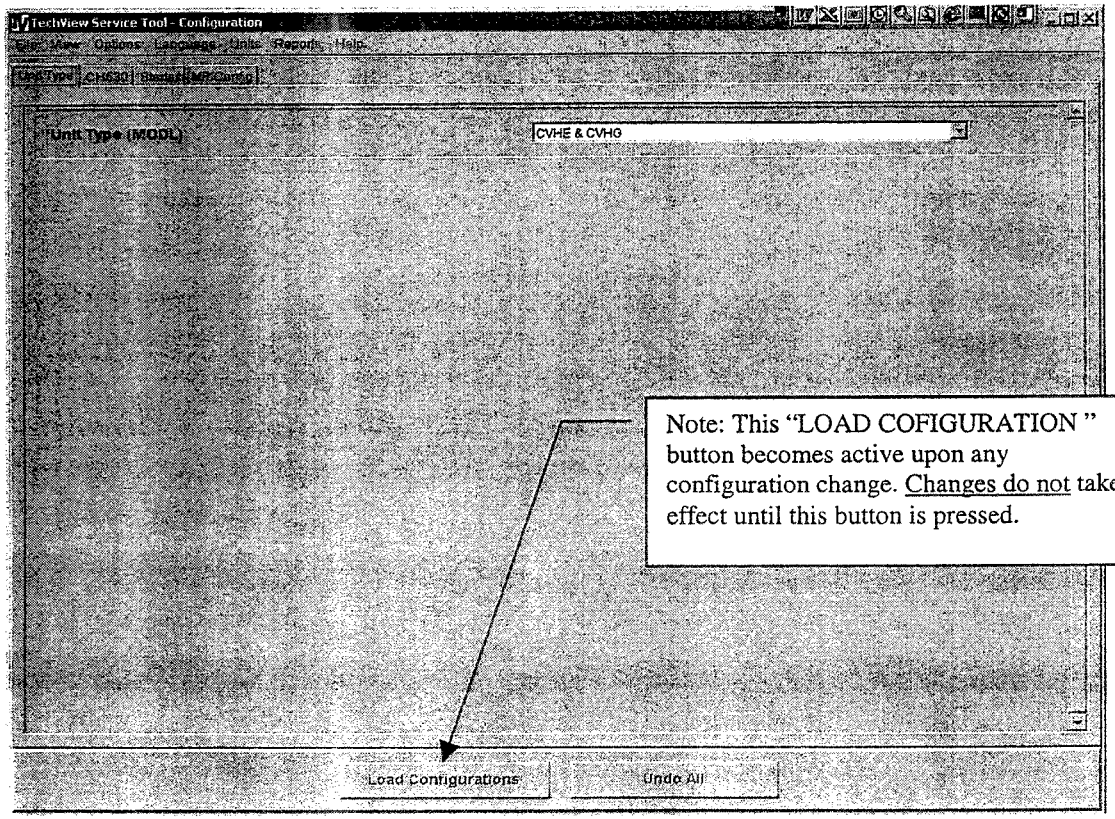
1) Unit View is designed to maintain a common "look and feel" for the use of Tech View across product lines.

Unit View (CTV: CVHE-F-G)



CONFIGURATION VIEW; Machine Configuration, CH530, Starter configuration

- Use the "View pull down menu" to select "Configuration View" as shown below.
- Select the "Unit Type" tab, which appears on a separate tab. After a unit type is selected the rest of the questions will appear based on that selection.
- **IF ANY CHANGES ARE MADE THE LOAD CONFIGURATION BUTTON BECOMES PRESENT. CHANGES WILL NOT TAKE EFFECT UNLESS THIS BUTTON IS PRESSED AFTER ALL ENTRIES ARE CHANGED TO YOUR SATISFACTION**
- Document all items on the startup test log form 1-23.45.



Note: This "LOAD COFIGURATION " button becomes active upon any configuration change. Changes do not take effect until this button is pressed.

MP Config tab is only shown with Level 4 Tech View installed. MP Config displays the information that is actually written to the Main Processor. Recommend that this TAB be avoided.

Machine Configuration - The following table defines main processor settings to be verified at machine startup however were configured by the end of line tester [EOL] Factory Tester for sales order specific machine configuration based on MDP FCAT (VCAT) and FCODs.

Table Notes:

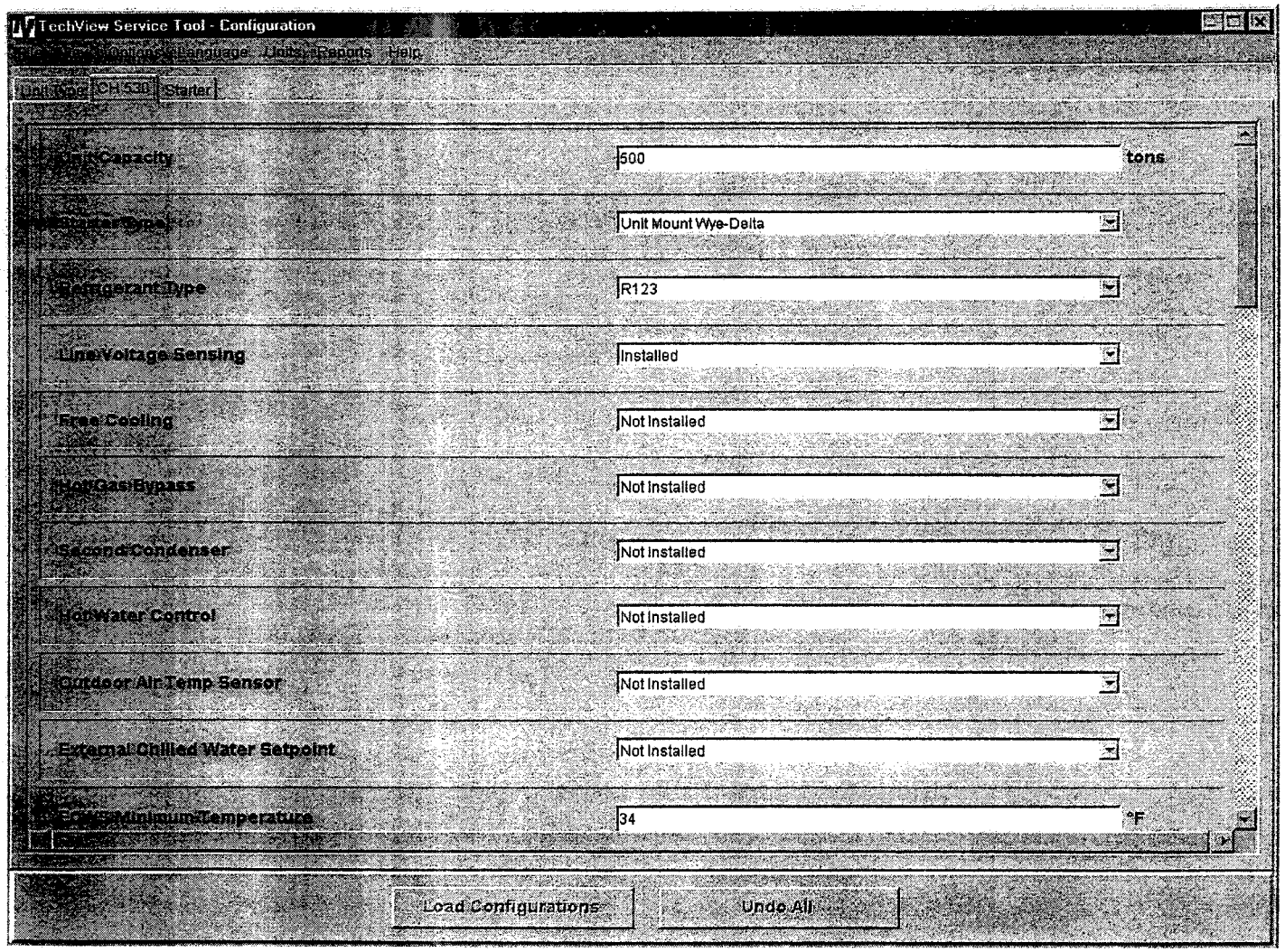
- Column 1 (left) identifies the TechView menu Item.
- Column 2 provides the TechView selection choices and identifies the "Default" value.
- Column 3 instructs the user how to determine the correct TechView selection. (See Column 4 for help information)
  - If the item is *(type)* then use the value as found on the unit control panels printed nameplate, whereas if the table provides a defined number or value then simply enter that number as provided (i.e. Refrigerant type REFG= R123 , always select R123 for LaCrosse Shipped CVHE,F,G)
- Column 4 provides help information about the menu selection item, and instructs what modules are required when the item is "installed".
- Column 5 illustrates what will be found within the Report Nameplate field found in the service tool TechVIews

Configuration View: Select the UNIT TYPE tab and check model selection.

1	2	3	4	5
TV Configuration menu Item	**Choices and default**	**Factory Control Package option [UCP Nameplate], or set to defined setting if "=", or calculate setting per instructions.**	**Help Information**	**TechView: Nameplate Tab [FCAT]**
1. Unit Type	**CVHE [default],** CVHG, CVHF	MODL (type)	Select Unit Type from Model Number	MODL
2. Control Sequence	**1 default**	TVSQ 1	TechView Sequence. Determines what LLIDs are required in the BV device list. CHVE-F-G with • 1A5 Dual Binary LLID=TVSQ 1 • 1A5 Quad then select =TVSQ 2. All CDHF-G are TVSQ 1.	TVSQ

NOTE: Configuration selections alter the list of SETPOINT menu items in SETPOINT VIEW.

Configuration View: *CH530 TAB Configuration Items: Check the Selections.*



Starter Type selection within the CH530 Tab determines the content of the Starter Tab. [Selection of AFD will change the Starter Tab items.]

TV Configuration menu Item	Range of item	Factory Control Package option [UCP Nameplate]	Help Information	TechView: Nameplate Tab [FCAT]
3. Unit Capacity	0 – 3000, **[500 default]**	NTON (value)	Programs the Chiller software to the chiller nominal tons. Enter Unit Nominal Ton Size from UCP Nameplate. (If unit has Water Flow sensing option, then set this to the sales order selection tons.)	NTON
4. Starter Type	**USTR [default],** RSTR, CSTR, UXL , RXL , CXL, PIR,CPIR, RATR , CATR,USID, FSID, WSID, CSOL , UAFD	SRTY (value)	Programs the Chiller software to the correct starter type. Select Unit Starter Type: USTR (Unit mount Wye-Delta), RSTR (Remote mount Wye-Delta), CSTR (Customer supplied Wye-Delta), UXL (Unit mount Across Line), RXL (Remote mount Across Line), CXL (Customer supplied Across Line), RPIR (Remote mount Primary Reactor), CPIR (Customer supplied Primary Reactor), RATR (Remote mount Auto Transformer), CATR (Customer supplied Auto Transformer), USID (Unit mount non-comm Solid State), FSID (Floor mount non-comm Solid State), WSID (Wall mount non-comm Solid State), CSOL (Customer supplied non-comm Solid State), UAFD (Unit mount AFD)	SRTY
5. Refrigerant Type	**123 [default]**	REFG = 123	Selects the chiller refrigerant Type. Select R123 for all CVHE, F, and G with factory CH530 controls.	REFG
6. Line Voltage Sensing	**YES [default]**	Not on Nameplate	Select Yes for Line voltage sensing option being Installed. This must be installed on all units. "INSTALLED" requires potential transformers 2T17, 2T18, and 2T19 present	WVUO
7. Free Cooling	YES [Installed], **NO [Not Installed, default]**	FRCL YES	Installs Free cooling option into the software. Nameplate will indicate FRCL YES when installed on unit. Select installed if unit has Free Cooling Valves 4M12 and 4M13 and binary input 1A20 and output 1A11 module are present.	FRCL

8. Hot Gas Bypass	WITH [Installed], **WO [Not Installed default]**	HGBP WITH	Installs the HGBP function into the Chiller controls. Nameplate will indicate HGBP WITH when installed on unit. Select installed if unit has HGBP Valve 4M5 and output module 1A12 and 1A4 HGBP valve closed input modules, and 4R16 Compressor Discharge refrigerant temperature sensor are present.	HGBP
9. Second Condenser	YES [Installed]' **NO [Not Installed default]**	ACOS YES	Installs the second condenser temperature sensors. Nameplate will indicate ACOS YES when installed on unit. Select Installed with second condenser and entering 4R14 and 4R15 leaving water temperature sensors.	ACOS
10. Hot Water Control	INST [Installed[, **NIST [Not Installed default]**	Not on nameplate	Select INSTALLED to enable hot water control within the software. Enables Hot Water Algorithms and menu features. 1A18 External Hot Water control module required.	HWCT
11. Outdoor Air Temp Sensor	INST [Installed], **NIST [Not Installed default]**	CWR YES	Installs Outdoor air temp sensor. Nameplate will indicate CWR YES when installed on unit. Local outdoor air temperature sensor 4R13 required when INSTALLED is selected. Used for chilled water reset outdoor type reset.	OATS
12. External Chilled Water Setpoint [ECWS]	INST [4-20mA], INSA [2-10VDC], **NIST [Not Installed default]**	GBAS YES	Installs ECWS feature. Nameplate will indicate GBAS YES when factory installed on unit. Analog input Module 1A16 required for this input. Setpoint input is J2-5 (+) to 6(Grd). Part of the GBAS factory package	ECWS
13. ECWS Minimum Temperature	0 – 49 F **[34F default]**	WMNT = 34 if GBAS YES	• Minimum setting for the ECWS analog signal. • 2 vdc or 4mA will equal to this value.	WMNT
14. ECWS Maximum Temperature	50 – 65, **[65 deg F default]**	WMXT = 65 if GBAS YES	• Maximum setting for the ECWS analog signal. 10 vdc or 20mA will equate to this value.	WMXT
15. External Current Limit Setpoint	INST (4-20mA), INSA (2-10VDC), **NIST (Not Installed default)**	GBAS YES	Installs the ECLS 1A16 feature. Nameplate will indicate GBAS YES when factory installed on unit. Analog input Module 1A16 required for this input. Setpoint input is J2-2 (+) to 3(Grd). Part of the GBAS factory package	ECLS
16. ECLS Minimum %RLA	20 – 69 **[40 default]**	LMNT = 40 if GBAS YES	Used with External Current Limit Setpoint. • ECLS Minimum setting for the analog signal. • 2 vdc or 4mA will equal to this value.	LMNT

17. ECLS Maximum %RLA	70 – 100 **[100 default]**	LMXT = 100 if GBAS YES	Used with External Current Limit Setpoint. • ECLS Maximum setting for the analog signal. • 10 vdc or 20mA will equate to this value.	LMXT
18. Ice Building	INST [Installed with hardware], INSA [Installed without hardware] **NIST [Not Installed default]**	ICEB INST or NIST	Nameplate will indicate ICEB INST or INSA when factory installed on unit. Only install if freeze protection evaporator fluid is installed. INSA for front panel control. NIST for external binary input control modules. WILL BE NOT INSTALLED AS Shipped. Service must enable at startup. 1A10 Ice Build status relay output, and 1A19 external Ice Building Command input modules required when selected "With Hardware".	ICEB
19. EHWS Minimum Temperature	80 – 100, **80 deg F default**	EXOP YES	Used with External Hot Water Setpoint. • Nameplate will indicate EXOP YES when factory installed on unit. EHWS Minimum setting for the analog signal. • 2 vdc or 4mA will equal to this value. Default is 80F.	HMNT
20. EHWS Maximum Temperature	101 – 140 **140 deg F default**	EXOP YES	Used with External Hot Water Setpoint. • Nameplate will indicate EXOP YES when factory installed on unit. EHWS Maximum setting for the analog signal. • 10 vdc or 20mA will equate to this value. Default is 140.	HMXT
21. Refrigerant Monitor Type	INST (4-20 mA, 0-100 PPM), INSA (4-20 mA, 0-1000 PPM), INSB (2-10V, 0-100 PPM), INSC (2-10VDC, 0-1000 PPM), **NIST (Not Installed default)**	EXOP YES	Installs the Refrigerant monitor input feature, defines the input type, and range. Nameplate will indicate EXOP YES when factory installed on unit. Module 1A17 required for this option. Install with appropriate range and signal type if external refrigerant monitor is panel wired to at module 1A17 J2-5 to 6.	RMTP
22. Condenser Pressure Sensor	INST (Installed), **NIST (Not Installed default)**	EPRO YES	Installs the Condenser pressure Transducer 4R22. Nameplate will indicate EPRO YES when factory installed on unit. Select with 4R22 Transducer device installed.	CPSO
23. Evap. Diff. Water Press Sensing	INST (Installed), **NIST (Not Installed default)**	WPSR WFC	Installs Evaporator Water differential pressure sensing feature which: 1)Displays GPM/Ton., 2) Provides control input to the LWT control Algorithm Flow Compensation feature (Feature settings Item 132). Nameplate will indicate WPSR WFC when factory installed on unit. Install when 4B1 Evaporator 4-20 mA pressure sensing transducer and 1A21 analog input module are installed.	EDWS

24. Cond. Diff. Water Pressure Sensing	INST (Installed), **NIST (Not Installed default)**	WPSR WFC	Installs Condenser differential pressure sensing feature. Nameplate will indicate WPSR WFC when factory installed on unit. Install when 4B2 Condenser 4-20 mA pressure sensing transducer and 1A21 analog input module are installed.	CDWS
25. Enhanced Oil Temperature Protection	**INST (Installed default)**	Not on Nameplate	Selects the Enhanced oil protection feature. Select Installed, as this is normal mode for units with refrigerant pump. Enables restart inhibit until oil temperature reaches the higher of 100 F (fixed) or the saturated evaporator temperature (F) plus 30F. If not installed then the restart inhibit temp is default to 95F and adjustable from CH530 settings view. When enabled the Oil temp control is 143F.	EOTP
26. Discharge Temperature Sensors	INST (Installed), **NIST (Not Installed default)**	EPRO YES, or HGBP WITH	Installs the Compressor discharge temperature sensor 4R16. Nameplate will indication of EPRO YES, or, HGBP WITH when factory installed on unit. Install requires Compressor discharge temperature sensor 4R16 will be present.	DTSO
27. Bearing Temperature Sensors	INST (Installed), **NIST (Not Installed default)**	EPRO YES	Installs the 4R1 Inboard and 4R2 Outboard Bearing temperature sensors. Nameplate will indicate EPRO YES when factory installed on unit. Install requires 4R1 and 4R2 bearing temperature sensors.	BTSO
28. High Pressure Cutout	-5 to 500 **[15 psig default]**	CDTY STD , CDTY ASME	Sets the HPC setting. Nameplate will indicate CDTY = STD for 15 setting or CDTY = ASME for 25 setting. No additional modules.	HPCO
29. Impeller Diameter	220 – 330 **[275 default]**	CPIM (value)	Sets the compressor impeller diameter. This is utilized in control algorithms. Nameplate will indicate CPIM (Value). See UCP nameplate value.	CPIM
30. IGV Actuators	**SNGL (Single default),** DUAL	IGVA = SNGL if NTON L.T. 1470, IGVA = DUAL if NTON G.T. or E.Q. 1470	Installs the second actuator for extended capacity units. See nameplate NTON (value). Select Single for units nominal tons of less than 1470 (with one vane actuator). Select Dual for Nominal tons 1470 or larger (with two vane actuators).	IGVA
31. Non-Latching Alarm, Limit Warning, Latching Alarm, and Compressor Running Relays	INST (Installed), **NIST (Not Installed default)**	OPST YES	Installs the output status relays of module 1A8. Nameplate will indicate OPST YES when factory installed on unit. Installed requires Module 1A8 OPST Quad relay output module	STAT

32. Max Capacity, Head Relief Request, Purge Alarm, And Purge Running Relay	INST (Installed), **NIST (Not Installed default)**	OPST YES	Installs the output status relays of module 1A9. Nameplate will indicate OPST YES when factory installed on unit. Installed requires Module 1A9 OPST Quad relay output module	MCHD
33. Tracer Interface(TRMM TRM4)	INST (Installed), **NIST (Not Installed default)**	TRMM TRM4	Installs the Comm4 module 1A14 for Tracer Summit. Nameplate will indicate TRMM TRM4 when factory installed on unit. Tracer Summit module 1A14 required.	TRI4
34. Tracer LCI-C (TRMM TRM5)	INST (Installed), **NIST (Not Installed default)**	TRMM TRM5	Comm board with TRMM TRM5 Tracer LCI-C LonTalk Comm5; available on CTV MP 5.0	TRI5

35. ICS Address Comm 4	32-100 **[65 default]**	Not on UCP nameplate	Sets Tracer Summit address for 1A14 Comm module. Select in accordance with Site Tracer defined address. Default is 65	ICS4
36. ICS Address Comm 5	1-12 7 **[65 default]**	Not on UCP nameplate	Future Comm Address	ICS5
37. Purge Control	**INST (Installed default),** NIST (Not Installed)	Not on UCP nameplate	Installs the EarthWise Purge into the control system. All Factory shipped CVHE, F, G units have a factory-INSTALLED purge. Select Installed in all applications	PGCT
38. Compressor Power Source	YES (Engine/ Generator), **NO (Not Installed default)**	GENR YES	Selects special control Algorithms when power source is a generator. Select Not installed for Utility source power. *(Generator is a future item) If Yes then 2A7 Pilot relay for Start/stop, and 2A8 up to speed/ frequency and Starter Drive Fault, and 2A9 Speed signal output modules are required.*	GENR
39. Rfgt Press and Compr %RLA Output	INST (Installed), **NIST (Not Installed default)**	CDRP YES or GBAS YES	Installs the External Output module 1A15 for refrigerant pressure output [VDC only] signal. Nameplate will indicate CDRP YES or GBAS YES when factory installed on unit. Requires 1A15 Dual analog output module if installed. 1A15 J2- 1 to 3 (Grd) for percent RLA output. 1A15 J2-4 to 5 (Grd) for Refrigerant pressure output.	CAOA
40. Rfgt Pressure Analog Output Option Type	**HPC (Absolute Cond Press as %HPC default),** DELP (Delta P)	Not on UCP nameplate	Defines output of External output module module 1A15 above, selection determines whether the output corresponds to the Condenser (HPC) pressure, or the delta (DELP) pressure between the condenser and evaporator. Requires previous module 1A15 above	RPOT

41. Min Delta Rfgt Press Output Calibration	0 – 30 **[0 psid] default]**	Not on UCP nameplate	Defines output of External output module 1A15 when DELTA PRESSURE output type is selected. • This setting is the minimum setting value for the delta analog signal. • 10 vdc will equate to this value. Default is 0 psid	MDPA
42. Max Delta Rfgt Press Output Calibration (CDRP)	0 – 30 **[30 psid default]**	Not on UCP nameplate	Defines output of External output module 1A15 when DELTA PRESSURE output type is selected. • This setting is the maximum setting for the delta analog signal. • 10 vdc will equate to this value. Default is 30 Psid	XDPA
43. Max Capacity Relay Filter Time	1 –60, **[10 Minutes default]**	OPST YES	Defines time to energize or reenergize Maximum capacity relay once in or out of the condition. Nameplate will indicate OPST YES when factory installed on unit. Time to be in mode or time to be out of the mode before relay activates, or deactivates.	XRDT
44. Head Relief Request Filter Time	1 –60, **[10 Minutes default]**	OPST YES	Defines time to energize or de-energize Head Relief request relay once in or out of the condition. Nameplate will indicate OPST YES when factory installed on unit. Time to be in mode or time to be out of the mode before relay activates, or deactivates.	HRDT
45. Base Loading	INST (Installed), **NIST (Not Installed default)**	BSLD NIST	Installs the Base Loading feature into the chiller control system. Installed creates Base load features on human interface, and installs the external control modules 1A18 and 1A17 for external base load control	BSLD

STARTER CONFIGURATION [Non-AFD]– Select the starter configuration variables

TV Configuration menu Item	Range of item	Factory Control Package option [UCP Nameplate]	Help Information	TechView Nameplate Tab [FCAT]
46. Stop Delay Time(Contactor interrupt failure)	1-30 **[3 seconds default]**	SDTM = 3	Sets the time period for the main processor to look for current after the stop command is executed. Interpreted as a stuck contactor if current exists after this time period. Select "3" in all cases.	SDTM
47. Unit Line Voltage	180-6600 **[460 Volts default]**	VOLT (value)	Use UCP Nameplate Volts	VOLT
48. Voltage Transformer Ratio (Potential Transformer Ratio)	0-700 **[20 default]**	VTRA (value)	Use UCP Nameplate Value (For Starter by Others determine Overall Potential Transformer Ratio. [Need to know primary PT ratio in the starter by others]: ie if 4200/120 then 120/30 = 140) See PSOL Case # 2563 for additioanl information	VTRA
49. Rated Load Amps (RLA)	0-2500 **[500 Amps default]**	NMRA (value)	Use UCP Nameplate Rated Load Amps (design selection amps) **NOTE:** USE ONLY WHOLE NUMBERS (no decimals)	NMRA
50. 50. CT Meter Scale	0-2000 **[0 Amps default]**	CTMS (value)	Use UCP Nameplate Current Transformer Meter Scale for all but customer supplied starters. CTMS is determined as follows: **SINGLE CT with one pass:** The CTMS when one CT with one pass (primary turn) is utilized will be equal to the "CT rated AMPS" value. **SINGLE CT with multiple passes**: When 2,3,4 passes are used then the "CT rated AMPS" value is divided by the number of passes to create the CTMS value. **DUAL CT:** Dual CT's are not a TV menu choice. If dual CT's are used they must be considered with the above math. When dual CT's are present the CTMS value must be calculated considering the additional CT. In this case the ("CT rated AMPS / passes) is multiplied by 0.72 which is then correctly adjusted for the second CT **NOTE:** USE ONLY WHOLE NUMBERS (no decimals) See PSOL CASE # 2558 for additional CTMS information	CTMS

Trane Current Transformer rating (one pass) by ext

Ext 01 = 100 Amps
Ext 02 = 150
Ext 03 = 200
Ext 04 = 275
Ext 05 = 400
Ext 06 = 500
Ext 07 = 700
Ext 08 = 1000
Ext 09 = 50
Ext 10 = 75

Ext 10 with two passes = 38
Ext 09 with three passes = 17
Ext 09 with four passes = 13

NOTE: CH530 uses the RLA and CTMS to setup the current overload [See PSOL case #1564.] These two items are all that are required. [There is no overload setting 1 and 2 as in UCP2]

51. Current Unbalance Trip Point	15-100 **[30% default]**	CITP = 30	Set to 30. Allows individual phase current operation up to 30% unbalance from the Average 3 phase RLA. [100% will defeat this trip]. See also PSOL case # 2589	CITP
52. Current Unbalance Grace Period	10-255 **[90 Sec default]**		Time in seconds of unbalance allowed before trip occurs while in above unbalance condition	CIGP
53. Maximum Acceleration	6-64 **[6 Sec default]**	MACT (value)	Sets time in second in which current must drop below 85% of RLA? Setting dependent on starter type. See Nameplate MACT value.	MACT
54. Acceleration Time Out Action	**SHDN [Shutdown default],** TRAN (Transition)		Sets resulting action to occur upon exceeding maximum acceleration timer. Unit will shutdown upon exceeding maximum acceleration time	ACOA
55. Overload Type	**LINR [Linear default],** EXPO (Exponential)		Selects the overload algorithm type. Select Linear for all Centrifugal compressor applications	OVTY
56. Phase Reversal Protection Enable	**ENBL [Enable default],** DSBL (Disable)		Enables Phase reversal protection. Always select enable. (Disable could be allowed until miss wiring is corrected as long as rotation is correct.)	PRPE
57. Contactor Integrity Test	ENBL (Enable), **DSBL [Disable default]**		Enables Contactor integrity test. Disable unless requested to have contactor tested prior to each start.	CITT
58. Phase Reversal Grace Period	20-1000 **[700 Msec default]**	PRGT = 300	Sets Time period until trip on Phase reversal. Set to 300 milliseconds.	PRGT
59. Surge Protection Enabled	**ENBL [Enable default],** DSBL (Disable)	SRPR = ENBL	Enables Surge Detection.	SRPR
60. Momentary Power Loss Protection Enable	**ENBL [Enable default],** DSBL (Disable)	MPLP = ENBL	Enables Momentary Power Loss For help with troubleshooting MPL at startup : SEE PSOL 1580	MPLP
61. Restart Inhibit Stop to Start Time	0-255 **[7 Sec default]**	RISS = 7	Starter module configured minimum time between stop to start. Time delay to allow motor to demagnetize and to coast to stop. (Note: This is not the "Restart inhibit Timer" which is a CH530 Setpoint View item setpoint and has a 5 minute default setpoint)	RISS
62. Surge Sensitivity	0-100 **[20% default]**	SGSY = 20	Sets surge sensitivity. Example if surge sensitivity is set to 20%: The surge event has to be a single (or multiple) phase amps rise or drop greater than "20%" of the Average RLA.	SGSY
63. Power Loss Reset Time	0-255 **[15 Sec default]**	PLRT = 15	Second delay upon power restoration to clear diagnostic.	PLRT

AFD STARTERS: AFD Configuration variables (Replaces items 46-63 when AFD is selected)

NOTE THESE ARE ON DOCUMENTED THE AFD STARTUP LOG SHEET Starter Configurations. (Selections based on sales order variables.)

TV Item Description	Range	Factory Control Package option [UCP Nameplate]	Help information	TechView Nameplate Tab [FCAT]
1. Surge Detection	**ENBL [Enable default]** DSBL	SRPR = ENBL	Enables Surge DIAGNOSTIC upon 7 minutes of surge detection. Drive senses for repetitive surge events. Rapid increase of average current of more than the surge sensitivity (% of RLA setting) within approx. 1 second. With this feature enabled a surge diagnostic will be generated after 7 minutes of this condition.	SRPR
2. Surge Sensitivity	0-100 **[15% default]**	SGSY = 15	Example if surge sensitivity is set to 20%: The surge event has to be a single (or multiple) phase amps rise or drop greater than "20%" of the Average RLA. See also PSOL 2541	SGSY
3. Power Loss Reset Time	0-255. **[60 Sec default]**	PLRT = 60	Time Drive waits upon power restoration to clear power loss diagnostic.	PLRT
4. Unit Line Voltage	180-480 **[460 Vac default]**	VOLT (value)	Set to Nameplate Volt's	VOLT
5. Motor NP FLA (TVA)	0-1200 **[0 Amps default]**	TVA (value)	Set to max amps of CTV MOTOR.	TVA
6. Motor NP RLA	1-2000 [1 Amps default]	NMRA (value)	Set to Nameplate RLA at design 100% load conditions	NMRA
7. Motor NP Power	0-1000 [0 kW default]	CPKW (value)	Use Nameplate CPKW (Value) of MOTOR	CPKW
8. Motor NP Hertz	5-250 **[60 Hz default]**	HRTZ (value)	Use Nameplate Hertz Value	HRTZ
9. Motor NP RPM (TRPM)	60-24000 [3600 RPM default]	TRPM (value)	Use nameplate RPM	TRPM
10. Stator Resistance	0-10,000,000 **[0 MicroOhms default]**	SRES (value)	Use nameplate SRES value	SRES
11. Flux Current Ref.	0-1200 [0 Amps default]	FAMP (value)	Use nameplate FAMP value	FAMP
12. Acceleration Time	1-99 **[30 Sec default]**	MACT (value)	Set to 30 for AFD. Sets the rate of acceleration for all speed increases	MACT
13. Deceleration Time	1-99 **[30 Sec default]**	DCCT = 30	Set to 30 for AFD. Sets the rate of deceleration for all speed decreases	DCCT

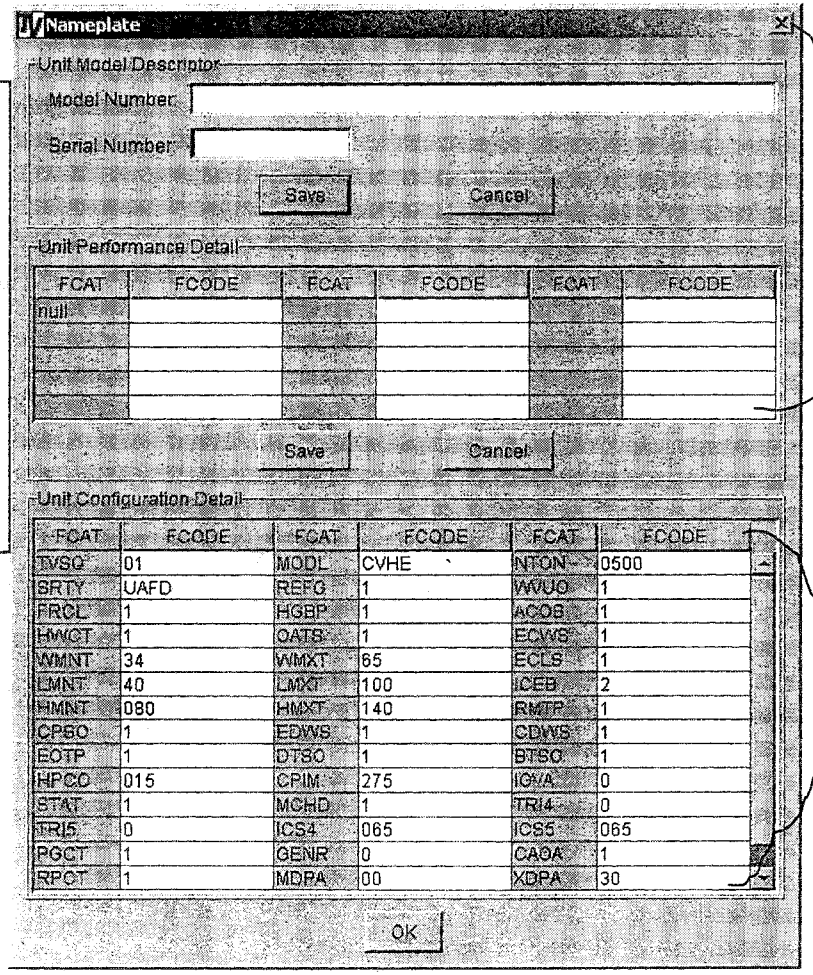
14. Current Limit	1-3200 [1 Amps default]	Calculate; STCL = NMRA multiplied by 1.12.	Defines the current limit value. Set to Factory definition setting for AFD type starters Current Limit (STCL) is STCL = NMRA multiplied by 1.12. [Where NMRA is the RLA at 100% design load.]	STCL
15. Current Limit Gain	0 – 5000 [**10 default]**	CRLG = 10	Sets the responsiveness of the current limit. Set to 10	CRLG
16. Power Loss Mode	COST (coast), **[decel default]]**	PWLM = DECL	Selects the action of the Drive upon a power loss	PWLM
17. Power Loss Time	0-25, **[0 Sec default]**	PWLT = 0	"Time the drive will remain in power loss mode before a fault is issued.	PWLT
18. Flying Start Enable	ENBL(Enable), **DSBL(Disable default)**	FLST = DSBL	Enables / Disables the function which reconnects to a spinning motor at actual RPM when a start command is issued. Default is Disabled	FLST
19. Flying Start Gain	20-32767, **[2000 default]**	FLSG = 2000	Sets the response of the flying start function. Default is 2000	FLSG
20. Use Trane Defaults	**YES [Yes default],** No	UTRD = YES	Select YES. Sets the remainder of all other ADF settings to Trane Defined Defaults.	UTRD

- ***REMINDER: IF ANY CHANGES ARE MADE THE LOAD CONFIGURATION BUTTON BECOMES PRESENT. CHANGES WILL NOT TAKE EFFECT UNLESS THIS BUTTON IS PRESSED AFTER ALL ENTRIES ARE CHAGED TO YPUR SEATIFACTION***
- ***Document settings on log sheet for future reference.***

REPORTS pull down menu item: Nameplate Tab

The Model Descriptor and Performance section are for Factory set and reference only; however, please note they can be altered for field replacement needs.
The Unit Configuration Detail reflects the results of the configuration question selections; FCODE will change when configuration items are altered.

PTIE	DESIGN:	Evap entering water temperature
PTOE	"	Evap Leaving Water Temperature
PGME	"	Evap Gallons Per Minute
PPDE	"	Evap Pressure Drop
ERST	"	Evaporation Refrigerant saturation Temperature
PTIC	"	Cond Entering Water temperature
PTOC	"	Cond Leaving Water temperature
PGMC	"	Cond Gallons Per Minute
PPDC	"	Cond Pressure Drop
CRST	"	Condenser refrigerant saturation te



End of line tester downloads these fields with sales order variables.

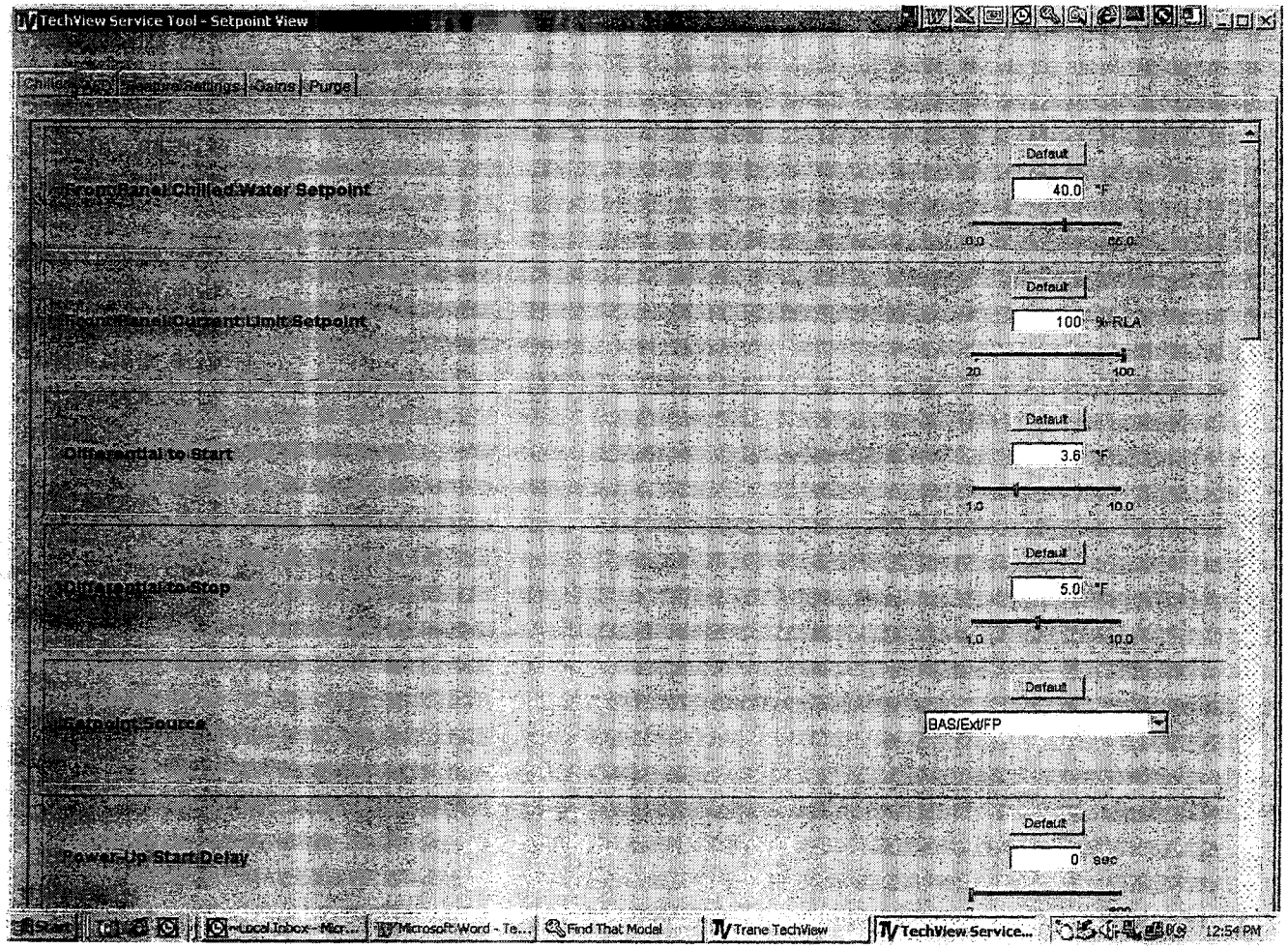
These can be field entered and saved for cases of replacement MP

These items reflect the configuration view selections. They can only be changed from configuration view.

Hint: Simultaneously pressing the "Alt + PRINT SCREEN" keys on your laptop will "copy" the view to the clipboard and allow you to " PASTE" the view into a word doc for future reference. Note that if the "Unit Config. Details "contents are large than the view the scroll bar appears and a second "copy" maybe required to capture the last line item.

SETPOINT VIEW (CTV)

Using the View Pull down menu selection of Setpoint View provides the following view:
Note this example illustrates "AFD" tab as it reflects an AFD starter configuration, and the "Gains" are illustrated with level four TechView access installed.



AFD Tab Appears when AFD starter type is configured.

Gains shown when Level 4 TechView is installed. AFDTab content grows with Level 4 TechView installed.

Setpoint View Content

- Selection of the Chiller Tab provides the following items.
- Note: Min, Max and Default values are shown in SI units

Setpoint	(Min, Max), Default	Units	Help Information
Chiller Tab			
64. Front Panel Chilled Water Setpoint	(-17.78C / 0F, 18.33 C / 65F), **6.67 °C/ 44F**	Temperature	Set to sales order / Job requirements
65. Front Panel Current Limit Setpoint	(20, 100), **100 %RLA**	Percent RLA	Use 100% unless otherwise specified
66. Front Panel Heating or Cooling Mode	(Chiller water, Hot water), **Chiller water**	Enum	Optional item, shown when installed
67. Front Panel Hot Water Setpoint	(37.78C / 100F, 60.0C/ 140F), **54.44 °C/ 130F**	Temperature	Optional item, shown when installed
68. Front Panel Base Loading Command	(On, Auto), **Auto**	Enum	Optional item, shown when installed
69. Front Panel Base Load Setpoint	(20, 100), **50 %**	Percent	Optional item, shown when installed
70. Front Panel Free Cooling Command	(On, Auto), **Auto**	Enum	Optional item, shown when installed
71. Front Panel Ice Building Command	(On, Auto), **Auto**	Enum	Optional item, shown when installed
72. Front Panel Ice Termination Setpoint	(-6.67C / 20F, 0.0C/ 32F), **-2.78 °C/ 27F**	Temperature	Optional item, shown when installed
73. Ice To Normal Cooling Timer	(0-10), **5 min**	Minutes	Optional item, shown when installed
74. Differential to Start Setpoint	(0.55C/ 1F , 5.55C/10F), **2.78 °C/ 5F**	Diff Temperature	Set to sales order/ Job requirements
75. Differential to Stop Setpoint	(0.55C/ 1F , 5.55C/10F), **2.78 °C/ 5F**	Diff Temperature	Set to sales order/ Job requirements
76. Setpoint Source	(BAS / Ext /FP, Ext / Front Panel, Front Panel), **BAS / Ext/ FP**	Enum	Sets hierarchy of commands ; Building Automation system, External signals , front panel See Also PSOL Case # 2567
77. Power Up Start Delay	(0, 600), **0 sec**	Seconds	Time delay to start upon power restoration. Allows multiple chillers to be staggered after a power outage.
78. Evaporator Pump Off Delay	(0, 30), **1 min**	Minutes	Time chilled water pump will remain on after post lube terminates. (Cooling mode use only)
79. Condenser Pump Off Delay	(0, 30), **1 min**	Minutes	Time Condenser water pump will remain on after post lube terminates. (Heating mode use only)

80. Evaporator Design Delta Temp	(2.22C/ 4F, 22.22C/40F), **5.56 °C / 10F**	Diff Temperature	Set to the Evaporator design delta temp in F/C (typically 10F). Control algorithm use entering temp in feed forward logic. (Cooling mode use only)
81. Condenser Design Delta Temp	(2.22C/ 4F, 22.22C/40F), **5.56 °C / 10F**	Diff Temperature	Set to the Condenser design Delta temp in F/C. Control algorithm use entering temp in feed forward logic. (Heating mode use only)
82. Evaporator Leaving Water Temp Cutout	(-23.33C/-10F/ , 2.22C/36F), **2.22 °C/ 36F**	Temperature	Safety trip point for low temp water.
83. Inlet Guide Vane Max Steps first stage	(0, 60000), **50000 steps**	Steps	Set to equal number of steps for full vanes stroke (90 degrees rotation). (factory set, advise to document this value)
84. Inlet Guide Vane Max Steps second stage	0, 60000), **50000 steps**	Steps	(ext capacity only) Set to equal number of steps for full vanes stroke (90 degrees rotation). (factory set, advise to document this value)
85. Low Refrigerant Temp Cutout	(-37.22C/-35F, 2.22C/36F), **0.0 °C/32F**	Temperature	Safety trip point for low refrigerant temp.
86. Condenser Limit Setpoint	(80, 120), **93 %HPC**	Percent HPC	Reference point (% of HPC setting) for condenser limit control.
87. Evaporator Water Flow 1	(0, 40000), **1000 lpm/ 264 gpm**	Flow	WFC Option; GPM Flow at point 1. (**design GPM**, factory set) See "Tracer CH530 Water Flow Sensing Setpoints" on LaCrosse CTV Tech service Intranet site for factory settings for setpoint items # 87 to 97. See PSOL Case # 2170
88. Evaporator Pressure Drop 1	(0, 175), **10 kPa / 1.45 PSI**	Diff Pressure	WFC Option; Pressure at flow point 1. (**design PD** in PSID, factory set)
89. Evaporator Water Flow 2	(0, 40000), **1600 lpm/ 423 gpm**	Flow	WFC Option; GPM Flow at point 2. (second point on same flow curve, factory set)
90. Evaporator Pressure Drop 2	(0, 175), **30 kPa / 4.35 PSI**	Diff Pressure	WFC Option; Pressure at flow point 2. (second flows PD in PSID, factory set)
91. Evaporator Fluid Specific Gravity	(0, 2), **1**	None	WFC Option; Use **"1.00" for 100% water**
92. Evaporator Fluid Specific Heat	(0, 2), 1	None	WFC Option; Use **"1.00" for 100% water**
93. Evaporator Low Water Flow Warning Setpoint	(0.0, 15.14), **4.54 lpm/ton, / 1.2 gpm/ton**	Flow / Capacity	WFC Option; Use Default
94. Condenser Water Flow 1	(0, 40000), **1000 lpm / 264 gpm**	Flow	WFC Option; GPM Flow at point 1. (**design GPM**, factory set)

95. Condenser Pressure Drop 1	(0, 175), **10 kPa / 1.45 PSI**	Diff Pressure	WFC Option; Pressure at flow point 1. (**design PD** in PSID, factory set)
96. Condenser Water Flow 2	(0, 40000), **1600 lpm/ 423 gpm**	Flow	WFC Option; GPM Flow at point 2. (second point on same flow curve, factory set)
97. Condenser Pressure Drop 2	(0, 175), **30 kPa / 4.35 PSI**	Diff Pressure	WFC Option; Pressure at flow point 2. second flows PD in PSID, factory set)
98. Oil Temp Setpoint	(37.78C/ 100F, 71.11C/ 160F), **61.67 °C/143F**	Temperature	Oil temperature control point w/comp off
99. Low Oil Temp Inhibit	(26.67C/ 80F, 60.0C/ 140F), **35.0 °C/ 95F**	Temperature	Setting with Enhanced oil protection feature set to Disabled.
100. Low Differential Oil Pressure Cutout	(62.06, 241.32), **82.74 kPa/ 12PSI**	Diff Pressure	Oil Pressure setting
101. Check Oil Filter Diagnostic	(Enable, Disable), **Disable**	Enum	Use disabled.
102. Check Oil Filter Setpoint	(62.06, 413.7), **103.43 kPa / 15 PSI**	Diff Pressure	
103. Restart Inhibit Free Starts	(1-5), **3**	Enum	# of free starts allowed before Restart Timer begins
104. Restart Inhibit Timer	(10-30min), **20min**	Minutes	Restart Time
105. Restart Inhibit Start to Start	(5, 60), **30 min**	Minutes	Timed mode inhibit time
106. Time Permitted at Minimum Capacity	(1, 480), **30 min**	Minutes	Time allowed at minimum capacity , until normal shutdown occurs
107. HGBP Mode, Vane Target Cprsr	(0, 30), **5 %**	Percent	Optional item, shown when installed
108. Maximum HGBP Time	(1, 480), **30 min**	Minutes	Optional item, shown when installed
109. High Discharge Temp Cutout	(76.67, 104.44), **93.33 °C/ 200F**	Temperature	Optional item, shown when installed
110. Local Atmospheric Pressure	(68.95, 110.32), **101.36 kPa 14.7 PSIA**	Pressure	Set to Jobsite conditions.
111. Minimum Capacity Limit	(0, 100), **0 %**	Percent	Creates a minimum boundary of the Compressor Load signal. (Used to decrease chillers unloading level.) See PSOL case 2248 for Compressor Signal information
112. Maximum Capacity Limit	(0, 100), **100 %**	Percent	Creates a maximum boundary of the Compressor Load Signal. See PSOL case 2248 for Compressor Signal information

113. Start Sequence Type [Level 4]	(Normal, No Load) **Normal**		• Selection of [Normal] means the chiller will begin the start sequence when the evaporator leaving water temperature is equal to or greater than the chilled water setpoint plus the differential to start. • Selection of [No load] means the chiller will begin the start sequence when the evaporator leaving water temperature is greater than the chilled water setpoint minus the differential to stop. USE **NORMAL** unless approved by LaCrosse Technical Service. See also PSOL case # 2245
114. Evaporator Pump Control Type [Level 4]	(Normal, Delayed) **Normal**		• Selection of [Normal] means when given a 'stop-to-auto' command, the evaporator water pump will be energized and flow confirmed. • Selection of [Delayed] means that the evaporator water pump will be energized and flow confirmed after prelube is complete but before the compressor is started. The Evaporator Pump Control Type Setpoint of [Delayed] will only be allowed for Start Sequence Type setpoint set to [No Load]. All other combinations may be set. USE **NORMAL** unless approved by LaCrosse Technical Service. See also PSOL case # 2245

Feature Settings Tab			
115. Chilled Water Reset	(Constant, Outdoor, Return, Disable), **Disable**	Enum	See Operation Maintenance detail
116. Return Reset Ratio	(10, 120), **50 %**	Percent	"

117. Return Start Reset	(2.22, 16.67), **5.56 °C ,10F**	Diff Temperature	"
118. Return Max Reset	(0.0, 11.11), **2.78 °C, 5F**	Diff Temperature	"
119. Outdoor Reset Ratio	(-80, 80), **10 %**	Percent	"
120. Outdoor Start Reset	(10, 54.44), **32.22 °C, 90F**	Temperature	"
121. Outdoor Max Reset	(0.0, 11.11), **2.78 °C , 5F**	Diff Temperature	"
122. External Chilled Water Setpoint	(Enable, Disable), **Enable**	Enum	Front Panel E/D of option
123. External Current Limit Setpoint	(Enable, Disable), **Enable**	Enum	Front Panel E/D of option
124. Ice Building Feature Enable	(Enable, Disable), **Disable**	Enum	Front Panel E/D of option
125. Hot Gas Bypass Feature	(Enable, Disable), **Disable**	Enum	
126. Hot Gas Bypass Maximum Timer Enable	(Enable, Disable), **Enable**	Enum	
127. Hot Gas Bypass Maximum Timer Setpoint	(1-480), **30 min**	Enum	
128. Hot Gas Bypass Compressor Control Command	(0-90), **10 %**	Enum	
129. Hot Gas Bypass Valve Travel Time	(5-300), **19 seconds**	Enum	
130. External Base Loading Setpoint Enable	(Enable, Disable), **Disable**	Enum	Front Panel E/D of option
131. Capacity Control Softload Time	(0, 7200), **900 sec**	Seconds	Time for at start or change of water temp setpoint to reach setpoint target. Note: If using "No LOAD" start sequence, Item 113, setting the softload time to 180 provides the fastest start time. See also PSOL Case # 2245

132. Current Limit Control Softloading Time	(0, 7200), **600 sec**	Seconds	Time for at start or change of current limit setpoint to reach setpoint target. Note: If using "No LOAD" start sequence, Item 113, setting the Current Limit softload time to 0 provides the fastest start time. See also PSOL Case # 2245
133. Current Limit Softload Start Point	(20, 100), **40 %RLA**	Percent RLA	Current control setpoint will go to this XX% RLA setpoint at startup then soft load to active current limit setpoint. Note: If using "No LOAD" start sequence, Item 113, setting the Current Limit softload Start point to 100 provides the fastest start time. See also PSOL Case # 2245
134. Phase Unbalance Limit Protection	(Enable, Disable), **Enable**	Enum	When Enabled, the chiller capacity limit feature is active and will de-rates the chiller capacity when the unbalance of one phase is greater than 20%.The limit feature can be disabled however current unbalance protection and ultimate trip, Starter config. Items, remain active as configured. See also PSOL case # 2589
135. Over/Under Voltage Protection	(Enable, Disable), **Disable**	Enum	Enables / disables the under/over voltage protection. Potential Transformers inputs remain required at the Starter module (non-AFD) and MPL remains active, only U/o Voltage protection is selectable by this setpoint. See also PSOL case # 2589 Must hold +/-10%, Must Trip +/- 15%
136. Control Algorithm Flow Compensation	(Enable, Disable) **Enable**	Enum	(Default of Enabled when water flow option is not installed has no control effect). Used only with **Evap water Differential pressure sensing (GPM/Tons)** installed from CH530 tab (item 22) in configuration

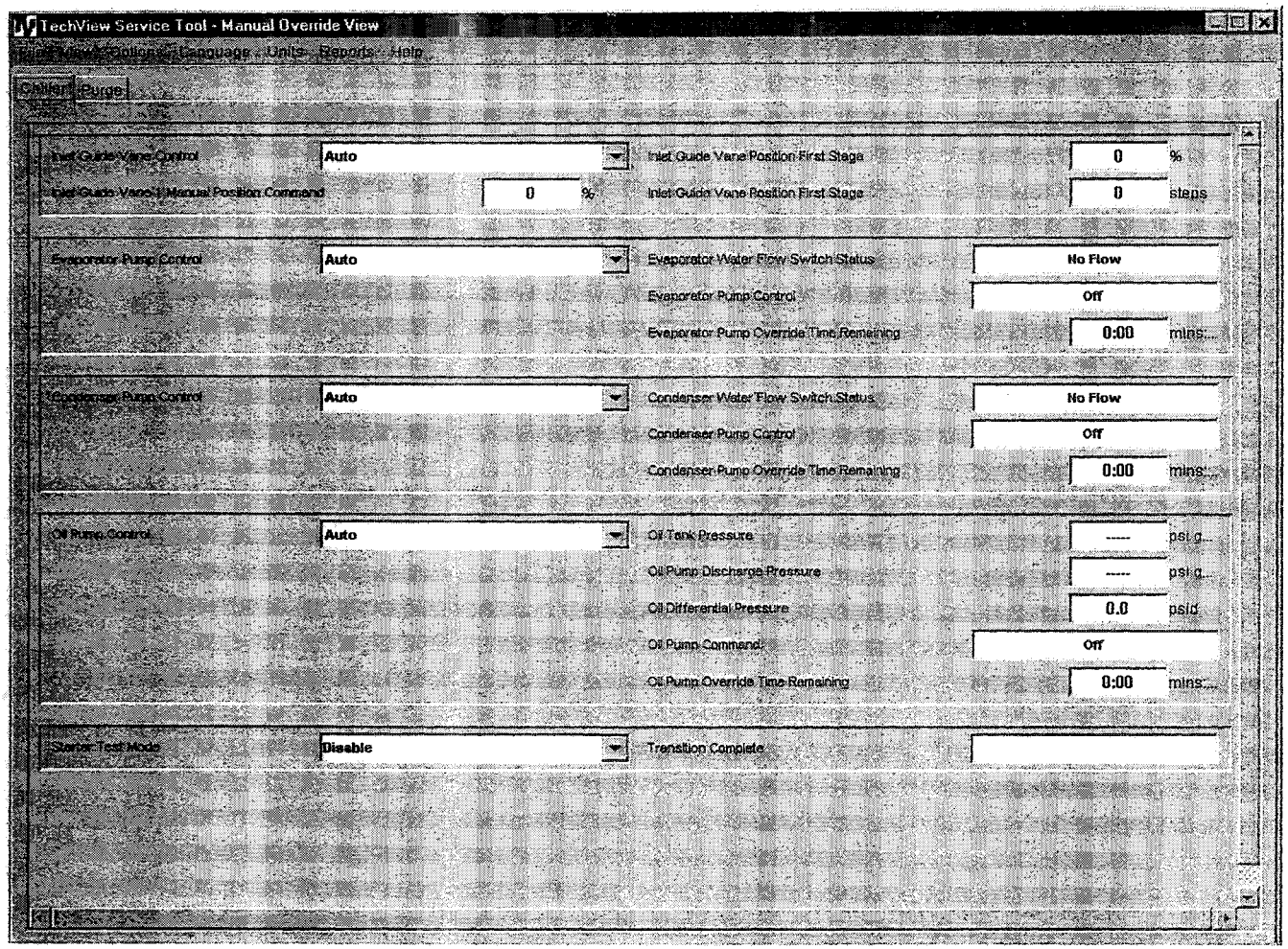
			view. Enabled: Allows sensed evaporator water flow changes to adjust [compensation] the LWT control when enabled. *Therefore when enabled (default) it is imperative that the water flow sensing option is set up properly. See Items 87 to 97.* Disabled: Disables the compensation input to the LWT controls.

Purge Tab			**Help Information**
1. Purge Operating Mode	(Auto, On, Off, Adaptive), **Adaptive**	Enum	Reference Purge Operation Maintenance manual for mode explanations.
2. Daily Pumpout Limit	(1, 50), **10 minutes**	Minutes	This is used to set the allowable amount of daily pumpout time.
3. Disable Daily Pumpout Limit	(0, 72), **0 hrs**	Hours	For the specified time the user can disable alarms associated with exceeding the daily pumpout limit. Moving this from "0" during a regen cycle will terminate the regen cycle.
4. Purge Liquid Temperature Inhibit	(Enable, Disable), **Enable**	Enum	Allows user to disable the inhibit feature that prevents purge pumpout if the sensed purge liquid temp. is less than the pumpout inhibit temp.
5. Purge Liquid Temperature Limit	(0, 10), **7.22 °C / 45F**	Temperature	Defines the setpoint for the purge liquid temp inhibit feature.
6. Purge Run Time	(0, 4) hrs	Hours	Purge Run time
7. Refrigerant Type	(0=R123, 1=R11, 2=R113), **0=R123**	Enum	Refrigerant type of chiller. (Factory mounted purges are on R123 chillers)

Gains Tab (level 4)			
1. Chilled Water Control Proportional Gain (Kp)	(0.0, 180.0), **75 default w TV 4.03** **50 default w TV 5.0**	None	Proportional Gain =Kp (error of distance from setpoint) **Help Note:** Looks at how far from setpoint and how fast move the compressor load signal (vanes, and AFD). Higher the value the faster. *Note: experience has shown that 50 provides better stability for the majority of sites.*
2. Chilled Water Control Reset Time	(0, 1000) **120 sec**	Seconds	Reset time =[Kp / Ki] in seconds. Where Ki is the integral value which "weights" the proportional error by measuring how long the Kp has been off the target. Time it takes integral for to match the proportional **Help Note:** Higher number results in longer time (Slower) to converge on the setpoint.
3. Chilled Water Control Derivative Gain (Kd)	(0.0, 18.0), **0.0**	None	Kd = rate of change from, or towards, the target. **Help Note**: Rate of Change. Higher number settles out an oscillating system.
4. Chilled Water Feed Forward Control Gain	(0, 200), **100 default w TV 4.03** **80 default w TV 5.0**	Percent	FF Gain = Forward information from an increasing or decreasing Evap delta temp as compared to the Evap Delta T setpoint setting. **Help Note:** High number means increased reaction to changes in entering evaporator water temperature. *Note: experience has shown that 80 provides better stability for the majority of sites.*
5. Evap/Cond Lift Corrections	(0, 100), **25 %**	Percent	Main purpose of this item is to adjust the algorithm for cool tower water. Adjustment (%) made to the chiller water control algorithm gain when operational conditions are not at nominal 44F/85F. (beneficial with leaving chilled water temps above 44 and/or when cooler tower water below 85) **Help Note:** Larger the number the more

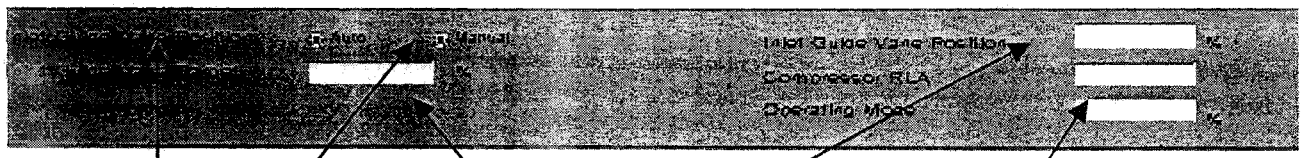
			effect when operating at off nominal conditions.
AFD Control Settings Tab			See also PSOL 2541 for AFDD/AFDE Surge information
1. AFD Control	(Auto, Fixed), **Auto**	ENum	**Help Note:** Allows AFD to be disabled and forced drive to run at 60 Hz., and utilize std LWT control algorithm.
2. AFD Re-Optimization Timer [level 4]	(1,255), **12 hrs**	Hours	Continuous run time to next re-optimization sensing. (Remaining time shown in Motor report.)
3. AFD Re-Optimization Sensitivity	(0-100), **10%**	Percent	Upon re-optimization time elapsing the vanes position will be reviewed • if within the sensitivity setpoint (10% default) no re-optimization • If vanes position is greater that the allowed sensitivity setpoint then re-optimization will occur. • See also PSOL 2541
4. AFD Boundary Pressure Coefficient Y Intercept [level 4]	(0.01, 2.00), **0.40**	None	Y-intercept point of the pressure coefficient surge boundary. The present value at shutdown is stored for the next startup intercept point. The controls are constantly and automatically adjusting this value during operation therefore this value will be changing from this starting point and the value will be changing. Tech View allows user to temporarily change this item.
5. AFD Boundary Pressure Coefficient Y Intercept Max - Cprs [level 4]	(0.01, 2.00), **2.00**	None	Maximum operating value of the pressure coefficient Y-intercept point for the surge boundary. This is a maximum Y-intercept boundary point, which it will not be allowed to exceed. Allows the user the ability to limit the boundary.
6. Minimum Surge Boundary Coefficient [level 4]	(0.0 to 1.0) TV **default 0.3**		
7. AFD Maximum Frequency [level 4]	(38-60), **60 Hz**	Hz	Maximum Operating frequency setpoint
8. AFD Minimum Frequency [level 4]	(38-60), **38 Hz**	Hz	Minimum Operating frequency setpoint

Manual Override View



Manual Override View is a combined presentation of setpoint (override) and status values. Each manual override item has an "Auto / On" (or Off) for binary control values or an "Auto/Manual" and an analog target value. Additionally, each item has a monitor value that the user will track the effect of an override.

The panel contents are described as follows:



Description Override enableTarget Present Setting and Monitor Value(s)

Description: Text that labels the specific override attribute spec.
Override enable: Setting to set the mode of control from Auto to Manual (or Enable/Disable) depending on the specific attribute.
Target: The setpoint that will determine analog output values (when in override).
Present: The "present" value must reflect the current state or value of the attribute.
Monitor Value(s): An override value may have one or more monitor values, which are just status values for other related attributes in the system.

Manual Override View Notes

1) Requires an additional "View" designation in Service Tool Database. Attributes must be able to be set to "display in Manual Override View". Additionally, there may be an advantage to allowing a link to be established between setpoint (override) and monitor values.
2) Subsystems shall be Chiller and Purge.

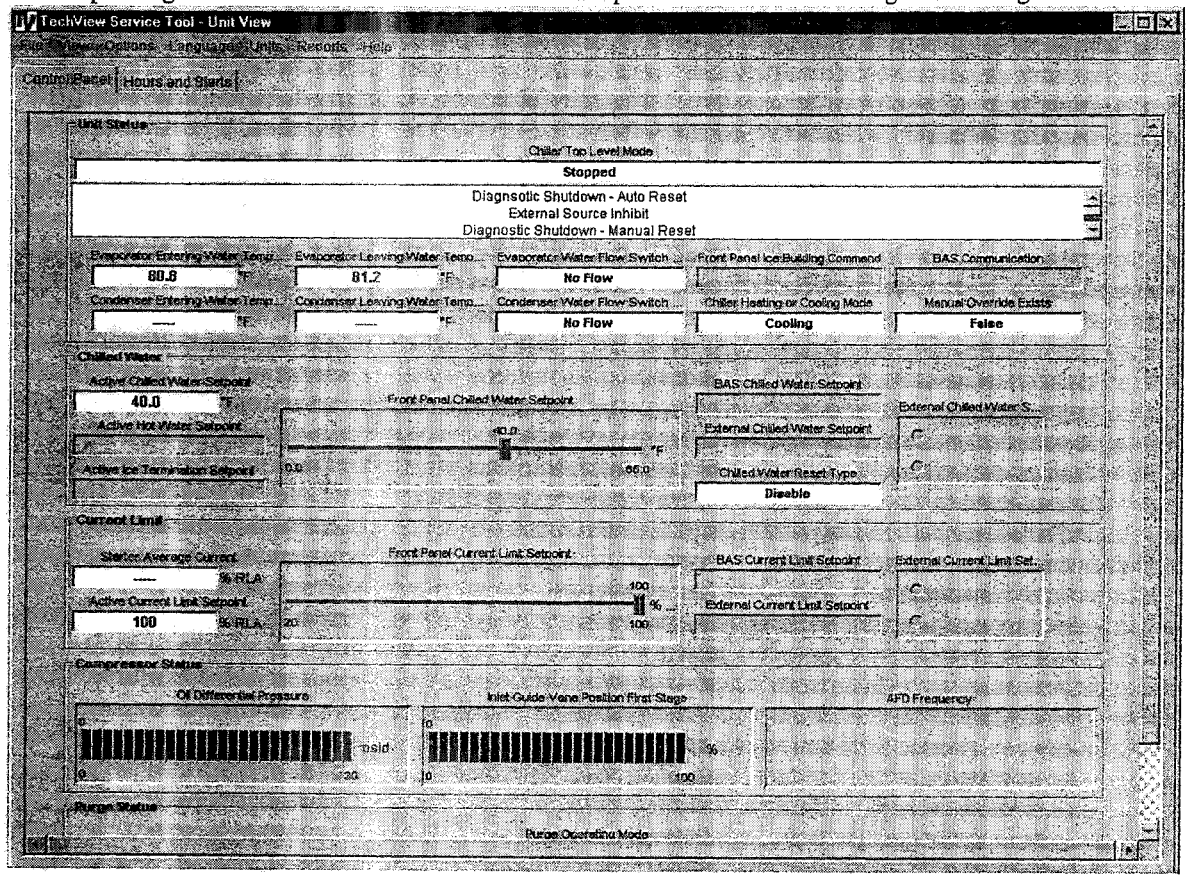
Manual Override View Content

Description	Radio 1	Radio 2	Units		Monitor Value(s):
Chiller TAB					
1. Inlet Guide Vane Control	Auto	Manual *Target*	*IGV %*		IGV Position First Stage (%): IGV Position First Stage (steps):
2. Evap Water Pump Control	Auto	On			Evap Water Flow Switch Status: Evap Pump Control: Evap Diff Water Press: Approx. Evap Water Flow: Evap Pump Override Time Remaining:
3. Cond Water Pump Control	Auto	On			Cond Water Flow Switch Status: Cond Pump Control: Cond Diff Water Press: Approx. Cond Water Flow: Cond Pump Override Time Remaining:
4. Oil Pump Control	Auto	On			Pump Status: Oil Tank Pressure: Oil Discharge Pressure: Oil Differential Pressure: Oil Pump Override Time Remaining:
5. IGV and AFD Control	Auto	Manual *Targets*	*IGV %* *AFD Hz*		IGV Position First Stage (%): IGV Position First Stage (steps): AFD Speed: AFD Frequency:
6. Starter Test Mode	Disable	Enum (many)			Transition Complete Input Status:
7. AFD Relay [oil /refrig pump relay & wiring test]	Auto	On		Future Phase 1A	Starter Status: [i.e. disabled –default (Disabled if unit is ON, Note: unit must be in local stop to execute) Relay status -oil pump: on/off Diff Oil Pressure; xxx psid
8. AFD Relay [shunt trip relay &wiring test]	Auto	On		Future Phase 1A	Starter Status: [i.e. disabled –default (Disabled if unit is ON, Note: unit must be in local stop to execute) relay status Circuit breaker shunt: on/off)
9. Clear Restart inhibit timer		Clear			Clears restart inhibit timer

Purge TAB			***Monitor Items***	Help information
1. Regen. Cycle	Disable	Enable	Purge Liquid Temp Carbon Tank Temp:	Refer to Purge Operation/ maintenance manual. (Allows user to manual initial a regen cycle. Does not disable a partially completed regen cycle in process. See purge setpoint "Disable pumpout limit Setpoint)
2. Exhaust Circuit Pumpout Test	Disable	Enable	Pumpout Relay:	"
3. Exhaust Circuit Pressure out Test	Disable	Enable		"
4. Exhaust Circuit Vacuum Test	Disable	Enable		"

Tech View Unit View content and notes:

- Unit View is designed to maintain a common "look and feel" for the use of TechView across product lines.
- Operating mode list box list the "top level" mode, then allow user to drop down a list box of sub level modes.
- Manual Override list box list the presence of an override "exists", then allow a user to drop down a list of the possible override modes in effect.
- Compressor Operating Mode to include ADF Status when AFD option installed. Also Average LineVoltage-If AFD installed

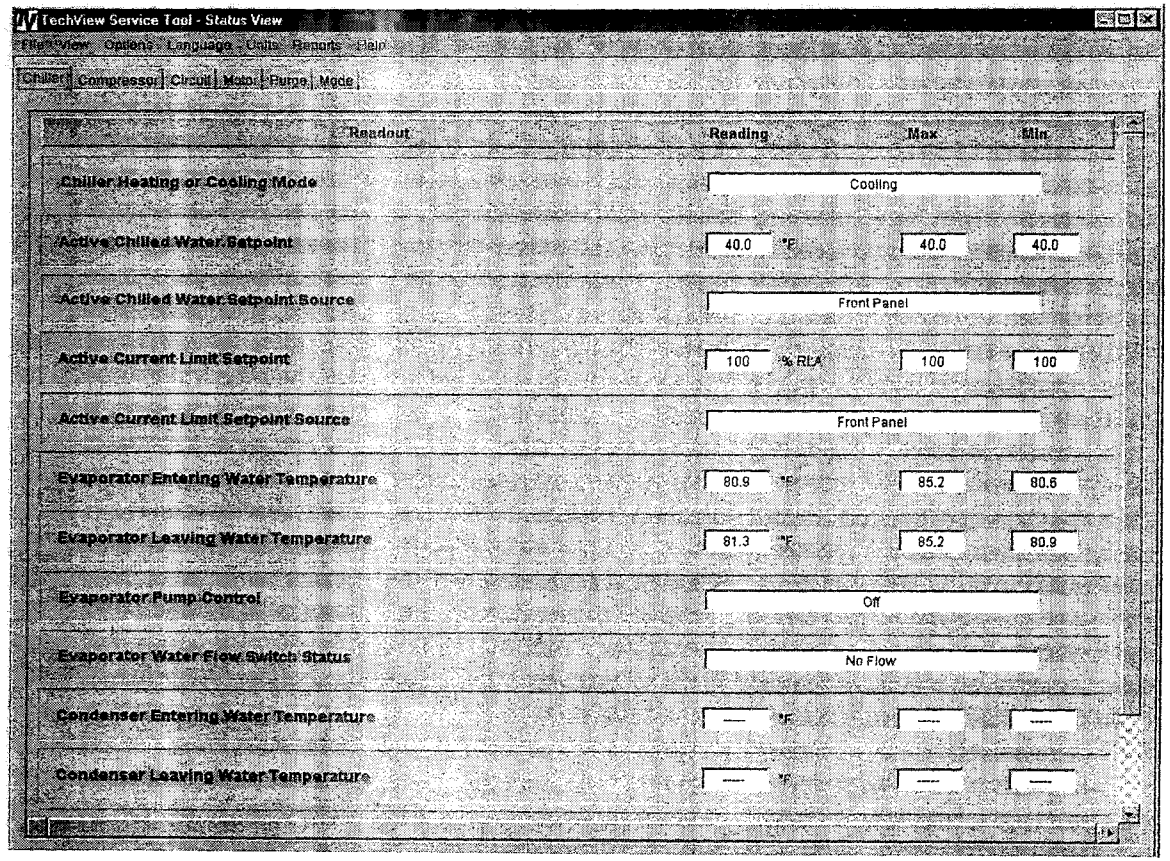


Ref #	Unit View Item Description
1.	Chiller Top Level Mode
2.	Chiller Sub Mode
3.	Evaporator Entering Water Temp
4.	Evaporator Leaving Water Temp
5.	Condenser Entering Water Temp
6.	Condenser Leaving Water Temp
7.	Evaporator Water Flow Switch
8.	Condenser Water Flow Switch
9.	Front Panel Ice Building Command
10.	Chiller Heating or Cooling Mode
11.	BAS Communication
12.	Manual Override Exists
13.	Active Chilled Water Setpoint
14.	Active Hot Water Setpoint
15.	Active Ice Termination Setpoint
16.	Front Panel Chilled Water Setpoint
17.	BAS Chilled Water Setpoint
18.	External Chilled Water Setpoint
19.	Chilled Water Reset Type
20.	External Chilled Water Setpoint Enable

Ref #	Unit View Item Description
21	Starter Average Current
22	Active Current Limit Setpoint
23	Front Panel Current Limit Setpoint
24	BAS Current Limit Setpoint
25	External Current Limit Setpoint
26	External Current Limit Setpoint Enable
27	Compressor Status
28	Oil Differential Pressure. Shown as bar gauge, range of bar set to 30 psig/207 kPa
29	Inlet Guide Vane Position First Stage. Shown as bar gauge, range of bar set to 0-100%
30	AFD Frequency. Shown as bar guage, range of bar set to 0-60Hz.
31	Purge Status
32	Purge Top Level Mode
33	Hours and Starts
34	Compressor Starts
35	Compressor Hours
36	(Purge) Refrigeration-Life
37	(Purge Pumpout-Life

STATUS VIEW (CTV)

Using the View pull down menu to select Status View will provide the following View. Use the TAB 's to select Submenu screens.



Status View Content

	Chiller Tab
1.	Chiller Operating Mode
2.	Chiller Heating or Cooling Mode
3.	Active Chilled Water Setpoint / Source
4.	Active Hot Wtr Setpoint / Source
5.	Active Current Limit Setpoint / Source
6.	Active Base Loading Setpoint / Source
7.	Active Ice Termination Setpoint / Source
8.	Evaporator Entering Water Temp
9.	Evaporator Leaving Water Temp
10.	Evaporator Pump Control
11.	Evaporator Water Flow Switch Status
12.	Evaporator Differential Water Pressure
13.	Approximate Evaporator Water Flow

14	Approximate Condenser Water Flow
15	Approximate Chiller Capacity
16	Condenser Entering Water Temp
17	Condenser Leaving Water Temp
18	Condenser Pump Control
19	Condenser Water Flow Switch Status
20	Condenser Differential Water Pressure
21	Second Condenser Entering Water Temp
22	Second Condenser Leaving Water Temp
23	Outdoor Air Temperature
24	Starter Average Current
25	Refrigerant Monitor

	Circuit Tab
1.	Saturated Evaporator Refrigerant Temperature
2.	Evaporator Refrigerant Pressure
3.	Evaporator Approach Temperature[Diff.]
4.	Saturated Condenser Refrigerant Temperature
5.	Condenser Refrigerant Pressure

6	Condenser Approach Temperature [Diff.] Temperature
7	High Pressure Cutout(On/Off)
8	Head Relief Request Relay(On/Off)
9	Maximum Capacity Relay(On/Off)

	Compressor Tab
1.	Compressor Running Status(On/Off)
2.	Compressor Starts
3.	Compressor Run Time [Hrs:mins]
4.	Compressor Discharge Temp
5.	Oil Tank Pressure
6.	Oil Discharge Pressure
7.	Oil Differential Pressure [Diff]
8.	Oil Tank Temperature
9.	Oil Pump Command(On/Off)

10	Oil Heater Command(On/Off)
11	Inboard Bearing Temp
12	Outboard Bearing Temp
13	Inlet Guide Vane Actuator Position First Stage [Percent]
14	Inlet Guide Vane Actuator Position First Stage [Steps]
15	Inlet Guide Vane Actuator Position Second Stage[Percent]
16	Inlet Guide Vane Actuator Position Second Stage[Steps]
17	HGBP Time [hrs:mins]

	Motor Tab
1.	Restart Inhibit Time (MP) sec
2.	Restart Inhibit Time (solid-state starter) sec
3.	Restart Inhibit Time (Electro-mechanical starter) sec
4.	Starter Current L1, L2, L3 Percent RLA
5.	Starter Current L1, L2, L3 amps
6.	Starter Phase Voltage AB BC CA volts
7.	Starter Average Current [percent RLA]
8.	Starter Average Current[amps]
9.	Starter Max Current [Percent RLA]
10.	Starter Average Phase Voltage [volts]
11.	Starter Load Power Factor [None]
12.	Starter Power Consumption [kW]
13.	AFD Output Power [kW]

14	Winding Temp 1
15	Winding Temp 2
16	Winding Temp 3
17	AFD Transistor Temperature
18	AFD Speed [rpm]
19	AFD Frequency [Hz]
20	AFD Frequency Command [Hz]
21	AFD Boundary Pressure Coefficient [None]
22	AFD Pressure Coefficient [None]
23	AFD Re-Optimization Time Remaining- [hrs:mins] *Note; Will be 0 during startup period, then after first optimization will start decreasing time of the RE-optimization timer (default 12 hours level 4 AFD setpoint). This is continuous run time. A stop and restart resets timer.*
24	AFD DC Bus Voltage
25	AFD Last Diagnostic Code (decimal)

Purge Tab
1. Purge Operating Mode (status, i.e. on, off, adaptive, auto))
2. Purge Status (status, i.e. refrigeration ckt on, idle, pumping out, pumpout inhibited, regenerating, etc.)
3. Time Until Next Purge Run
4. Daily Pumpout – 24 Hours
5. Avg. Daily Pumpout – 7 Days
6. Chiller On – 7 Days [Percent]
7. Pumpout Chiller On – 7 Days [Percent]
8. Pumpout Chiller Off – 7 Days [Percent]
9. Pumpout – Life [mins:secs]
10. Refrigeration – Life [hrs:mins]

11	Purge Refrigerant Compressor Suction Temp
12	Purge Liquid Temp (Chllr Cond Sat Rfgt Temp)
13	Purge Carbon Tank Temperature
14	Pumpout Time Since Last Regeneration [mins:secs]
15	Time at Last Regeneration [Date Stamp]
16	Pumpout Total at Last Regeneration [mins:secs]
17	Daily Pumpout Limit / Alarm
18	Absorptive Capacity [Percent]
19	Carbon Regen Cycles

Modes Tab
1. Chiller Top Level Mode
2. Chiller Sub Modes
3. Chiller Mode at Time of Last Diagnostic
4. Chiller Sub Modes at Time of Last Diagnostic

Instructions for First Time Tracer CH530 Users (These instructions are on line at Trane.Com)

1. **Create a folder called "CH530" on your C:\ drive.** You will select and use this folder in subsequent steps so that downloaded files are easy to locate.
2. **Download the Java Runtime installation utility file** onto your PC in the CH530 folder (please note that this does not install Java Runtime, it only downloads the installation utility).
   - Click on the latest version of Java Runtime shown in the TechView Download table.
   - Select "Save this program to disk" while downloading the files (do not select "Run this program from its current location").
3. **Download the TechView installation utility file** onto your PC in the CH530 folder (please note that this does not install TechView, it only downloads the installation utility).
   - Click on the latest version of TechView shown in the TechView Download table.
   - Select "Save this program to disk" while downloading the files (do not select "Run this program from its current location").
4. **Remember where you downloaded the files (the "CH530" folder).** You will need to locate them to finish the installation process.
5. **Proceed to "Main Processor Software Download" page** and read the instructions to download the latest version of main processor installation files.
   Note: you will first select the chiller type to obtain the available file versions.
6. **Select the product family.** A table with the download link will appear for that product family.
7. **Download the main processor software** onto your PC in the CH530 folder (please note that this does not install the main processor, it only downloads the installation utility).
   - To do this, click on the latest version of the main processor.
   - Select "Save this program to disk" while downloading the files (do not select "Run this program from its current location").
8. **Remember where you downloaded the files (the "CH530" folder).** You will need to locate them to finish the installation process.
9. **To complete the installation process,** locate the installation utilities you downloaded into the CH530 folder. If necessary, use your PC's file manager to locate the downloaded files.
10. **Install the applications in the following order** by double-clicking on the install program and following the installation prompts:
    - Java Runtime Environment (JRE_VXXX.exe)
      Note: During the Java Runtime Environment installation, you may be prompted to "select the default Java Runtime for the system browsers...". Do ***not*** *select any system browsers at this step. There should be no default browsers selected for proper operation.*
      Note: If prompted to "install Service Pack 2 before proceeding to install JAVA 1.4.1 select Continue. We have found that JAVA runs TECHVIEW fine w/o the service pack 2 installation. Please note this recommendation to install service Pack 2 and inform your office computer personnel.
    - TechView (6200-0347-VXXX.exe)
    - The main processor (6200-XXXX-XX-XX.exe).
      The main processor program will self extract to the proper folder within the TechView program directory, provided the TechView program is properly installed on the C:\ drive.
11. **Connect your PC** to the CH530 main processor using a standard 9-pin male/9-pin female RS-232 cable.
12. **Run the TechView software** by selecting the TechView icon placed on your desktop during the installation process. The "Help...About" menu can be viewed to confirm proper installation of latest versions.

Instructions for Second Time, [and subsequent] Tracer CH530 Users (These instructions are on line at Trane.Com)

1. **Detect the version of TechView run on your PC.** To do this,
   - Open TechView.
   - Select "Help," in the menu bar, then scroll to "About."
   - Installed versions for TechView and Java Runtime Environment will be displayed.

   You may also determine the last version of TechView loaded on your PC by the checkmark indicators located on the table with the download links.
2. **Update the Java Runtime Environment and TechView applications as needed.**
   - **Download Java Runtime** onto your PC in the CH530 folder (please note that this does not install Java Runtime, it only downloads the installation utility).
     - Click on the latest version of Java Runtime shown in the TechView Download table.
     - Select "Save this program to disk" while downloading the files (do not select "Run this program from its current location").
   - **Download TechView** onto your PC in the CH530 folder (please note that this does not install TechView, it only downloads the installation utility).
     - Click on the latest version of TechView shown in the TechView Download table.
     - Select "Save this program to disk" while downloading the files (do not select "Run this program from its current location").
3. **Remember where you downloaded the files (the "CH530" folder).** You will need to locate them to finish the installation process.
4. **Proceed to "Main Processor Software Download" page** and read the instructions to download the latest version of main processor installation files.
   Note: you will first select the chiller type to obtain the available file versions.
5. **Select the product family** on the main processor download page. A table with the download link will appear for that product family.
6. **If necessary, download the main processor software** onto your PC in the CH530 folder (please note that this does not install the main processor, it only downloads the installation utility).
   - To do this, click on the latest version of the main processor.
   - Select "Save this program to disk" while downloading the files (do not select "Run this program from its current location").
7. **Remember where you downloaded the files.** You will need to locate them to finish the installation process.
8. **To complete the installation process,** locate the installation utilities you downloaded into the CH530 folder. If necessary, use your PC's file manager to locate the downloaded files.
9. **Install the applications you need to update** in the following order by double-clicking on the on the install program and following the installation prompts:
   - Java Runtime Environment (JRE_VXXX.exe).
     Note: During the Java Runtime Environment installation, you may be prompted to "select the default Java Runtime for the system browsers...". Do ***not*** *select any system browsers at this step. There should be no default browsers selected for proper operation.*
   - TechView (6200-0347-VXXX.exe).
   - The main processor (6200-XXXX-XX-XX.exe).
     The main processor program will self extract to the proper folder within the TechView program directory, provided the TechView program is properly installed on the C:\ drive.
10. **Connect your PC** to the CH530 main processor using a standard 9-pin male/9-pin female RS-232 cable.

11. **Run the TechView** software by selecting the TechView icon placed on your desktop during the installation process. The "Help...About" menu can be viewed to confirm proper installation of latest versions.

TechView Level 4 Access

When TechView is installed it is installed at a Level 3 installation. This is adequate for almost all users, however there is another TechView level called Level 4. Level 4 provides access to some additional set points and features.
To turn on TechView access level four do the following:

- Close TechView first.
- To do this left click your START button. select SETTINGS
- Then Select CONTROL PANEL
- Then select ADD / REMOVE Programs (double click)
- Then Select TechView(Use scroll bar to find TRANE TechView in the list. (one Click)
- Press the CHANGE/REMOVE button
- Select MODIFY
- Select LEVEL 4
- Select NEXT
- Select Finish
- Close Add / remove window.

Run TechView. When connected to DynaView you now will find some new features.

The setpoint view will contain a GAINs tab.

Also if the unit has an AFDD there will be more items shown in the AF tab with Level 4.

The level 4 will remain turned on on this PC until next installation of TechView , or until you modify it back to level 3 .
DO Not use the MP CONG tab now present on the configuration view.

Misc NOTES:

AFDD LLID

The AFDD has the only LLID without a magnetic selectable service switch. It has a service select button. Also the Drive power has to be applied to power up the Drive communications with the LLID.

Binding Sequence common error

Remember to select the TechView bind button first then second physically select LLID device with a magnet or push button. Selection of LLID first does not work.

Configuration Sequence common error

After any configuration change you must PRESS the LOAD CONFIGURATION button for the changes to be entered.

TECH VIEW and MP installation error

After downloading from Trane.Com remember to RUN the files from the ch530 folder.

To Determine software version on a PC

Use TV "Help About" to determine what versions are running.

To determine what version of Main Processor applications are on the PC check the Techview / BIN / CTV folder contents; the 6200-0344-XX-XX.msr file(s) are the application files where the XX's represent the revision of the applications software.

To replace a LLID:

1) Unbind if possible. 2) Power down, then disconnect from BUSS; If panel mounted then unplug ribbon connector, if unit mounted cut Existing LLID four wire bus to remove from the remaining unit wiring. (Leave some lead length ion the sensor for factory testing if returned for analysis). If possible, remove buss connector from the unit wiring. 3) Install new LLID. 4) If panel mounted then connect ribbon connector to LLID, if unit mounted connect using NEW CONNECTOR. Never reuse a connector and long term corrosion can occur. 5) Power up and LLID LED should Blink as 24vdc is applied. 6) select Binding view and Bind in new LLID. Select Bind on TechView first , then select LLID with Screwdriver southpole magnet (or push button AFDD) . Then answer Yes to TechVIew. LLID will indicate Green Face when propperly installed.

To add another device (LLID) onto the BUSS;

Install new LLID. 1) If panel mounted then connect ribbon connector to LLID, if unit mounted connect using NEW CONNECTOR. Never reuse a connector and long term corrosion can occur. 2) Power up and LLID LED should Blink as 24vdc is applied. 3) From Configuration View INSTALL the unit option . This will make the device part of the required device list. Press LOAD CONFIGURATION. 4)) From Binding view and Bind in new LLID. Select Bind on TechView first , then select LLID with Screwdriver southpole magnet (or push button AFDD) . Then answer Yes to TechView. LLID will indicate Green Face when properly installed.

- ***Second Power Supply*** : When Additional LLIDs are added to an existing unit with one power supply, be sure to not exceed the Power supply amp rating. If the sum of the LLIDS exceeds the amp rating of one power supply a second will be necessary.

TECHVIEW DATA

During a TechView connection to a Main Processor all machine data is captured (unless Disabled by user from OPTIONS / disable data log) This data is saved in the TECHVIEW/DATALOGS folder on the PC. There are always five datalog_.log files and five datareport_.txt type files maintained in this location. The oldest file is over written with each new session. Using the saved date you can determine the most recent file. Therefore when you have a data set you desire to save you must copy it to another file before if is over written by subsequent TechView Sessions. For convenience we suggest you name the file with the chiller serial numbers to assure that the data is saved. This file also may be zipped to e-mail.

Main Processor 4.0 software (6200-344-04-00) This information applies to: CVHE, CVHF, CVHG

See PSOL Case # 1526

1. **Chiller :**
   a. Corrected the Main Processor lockups as seen in the field. (Root cause was discovered to be caused by a purge control function. See Purge item a)
   b. Add new restart inhibit function.
- Added new setpoints for Restart Inhibit Free Starts, Restart Inhibit Start to Start and, Restart Inhibit Diagnostic enable/disable.
   a. Added gauge/absolute switch to pressure display for DynaView
   b. Added Amps and Volts to the ASHRAE Chiller Log menu.
   c. Added a new sub-mode for min capacity time remaining.
   d. Change HGBP Valve Travel Time setpoint max to 180 seconds.

2. **Purge:**
   a. Fixed the handling of the Purge Liquid Level switch transitions. This corrects the MP lockups seen in the field.
   b. Corrected the nuisance Purge Liquid Level Too High diagnostics being seen in the field by changing;
- Purge Liquid Level Too High Warning diagnostic being called out from 30 seconds to 20 minutes
- Purge Liquid Level Too High Continuously diagnostic being called out from 15 minutes to 20 minutes.

- Purge Liquid Level Too High Continuously diagnostic being called out with four warnings in 2 hours to four warnings in 4 hours.
  a. Auto carbon regeneration is no longer allowed in Purge stop mode. Previously it was allowed in all modes. Manual carbon regeneration while in the Purge stop mode can be initiated from TechView.
  b. The Purge Carbon Regeneration Temperature Not Satisfied diagnostic is now called out at the Carbon Regeneration Temp setpoint – 30 F and lower after 4 hours. It used to be called out at the Carbon Regeneration Temp setpoint and lower. If the Purge Carbon Regeneration Temperature Not Satisfied diagnostic occurs , regeneration cycle will now continue as if it met the setpoint. Regeneration cycle used to stop upon occurrence of the diagnostic.

3. AFD/IGV Control:

a. AFDD Chillers- AFD/IGV Control: These items will correct the "hunting" issue being seen in the field on AFD chillers.

- Implemented scaling factor between IGV/AFD Control.
- Filtered the IGV/AFD speed change in response to field data.
- Added filter to slow down AFD speed changes. This allows time for the IGV to position before the speed suddenly changes.
- Surge recovery algorithm now increases speed 1 Hz every 5 seconds.
- Added minimum pressure coefficient setpoint to TechView. Compressor in not allowed to drop below minimum pressure coefficient at startup.

TechView software 5.01 (6200-0347-5.01) CTV CH530 Service tool :

See PSOL Case # 2081

- Eliminates emGateway from installation procedure.
- Requires update to Java Runtime Environment Version 1.4.0.

Changes to CTV TechView application

1. **Reports:**
   a. Adds a separate folder for reports as default location (\TechView\Reports\). This allows a user to organize files separately from the program directory.
   b. Model Number and Serial Number as loaded by the factory tester are properly displayed in the report section for chiller configuration. Note: TechView Version 4.02 showed only a derived model number that was not comparable to the value loaded by the factory tester.
   c. User defined information (name, sales order, etc.) is retained during the connected session which allows a user to generate additional reports without re-keying redundant information.
   d. Adds support for CenTraVac Duplex.(CTVD)
2. **Setpoint View:**
   a. The Hot Gas Bypass range for the "Hot Gas Bypass Compressor Control Command" range is corrected to be 0 - 90%,with default 5%.
   b. "AF Control", in AF 1&2 tabs, is corrected for default of "Auto" default.
   c. Adds support for CenTraVac Duplex.
3. **Status View:**
   a. Adds support for CenTraVac Duplex.
4. **Trend View:**
   a. Removed Trend View datalog file calculation of "duration" from file selection dialog (the calculation was not consistently accurate across product types of varied attribute id content).
   b. Strip Charts are no longer limited to qty three per tab. Any number of strip charts may be populated within a tab, and viewed by scrolling the vertical bar control. Note: the strip charts will auto size to fill the screen, to a maximum visibility of three charts.

c. "Save Tab Template" and "Load Tab Template" consists of any number of tabs defined in the workspace. The save/load feature retains the tab name and point (subsystem and attribute) selections. Axis scaling is not saved.
d. Adds support for CenTraVac Duplex.

5. **Software Download:**
   a. (CTVD) Adds support for CenTraVac Duplex.
6. **Configuration View:**
   a. (CTVD) Adds support for CenTraVac Duplex.
7. **Binding View:**
   a. (CTVD) Adds support for CenTraVac Duplex.

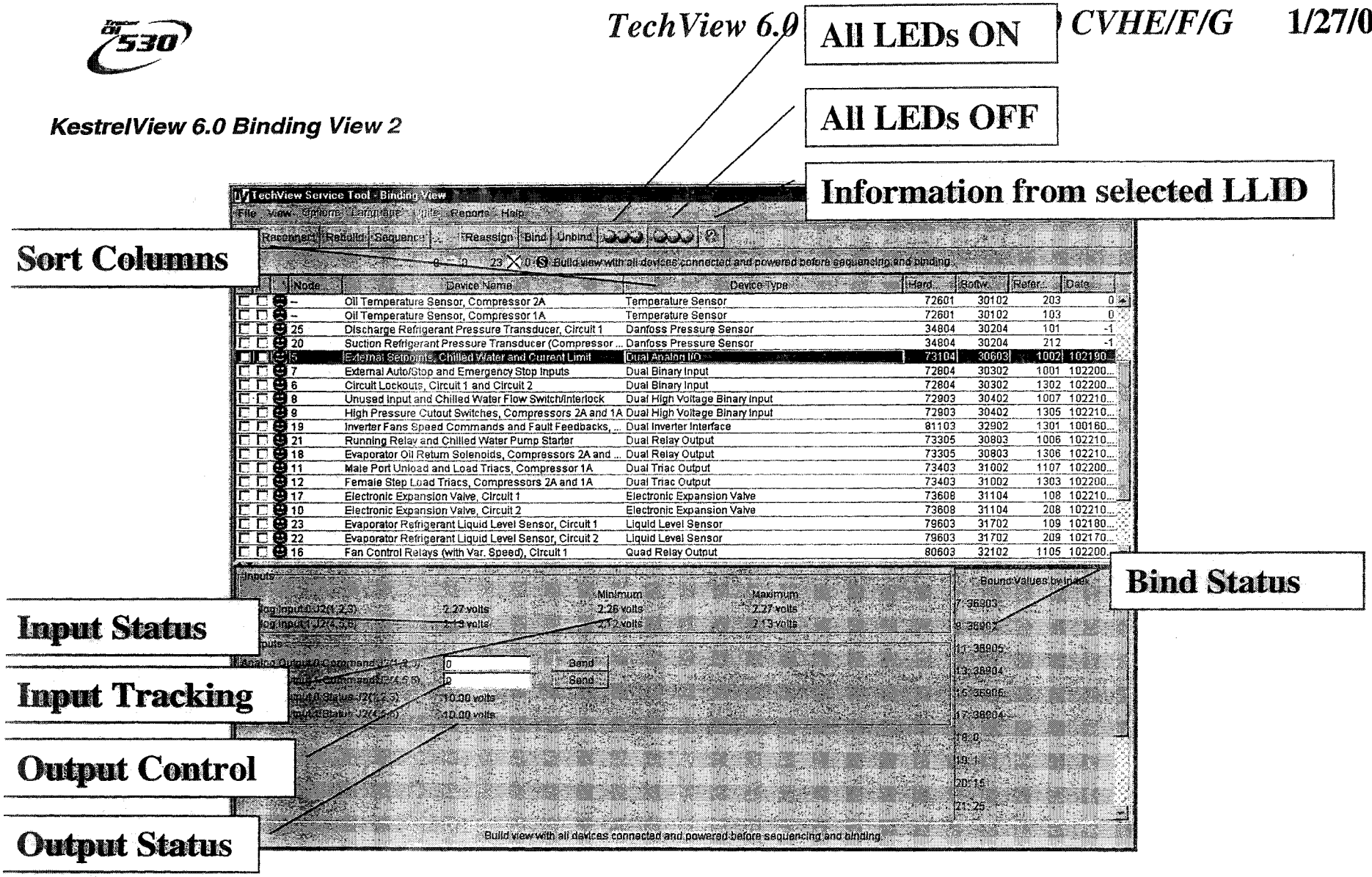
CTV MP 5.0

See PSOL Case # 2249

CTV TV 6.0

See PSOL Case # 2250

KestrelView 6.0 Binding View 2

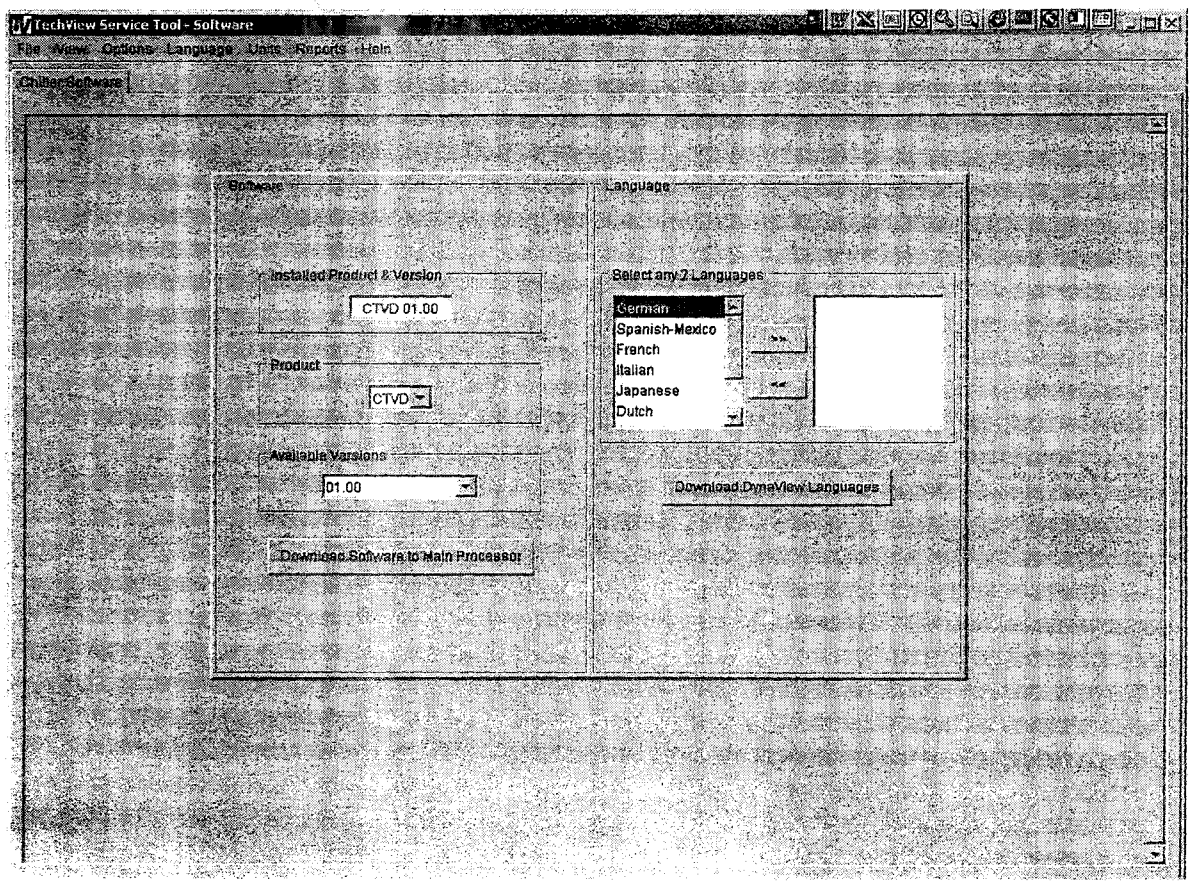


DUPLEX

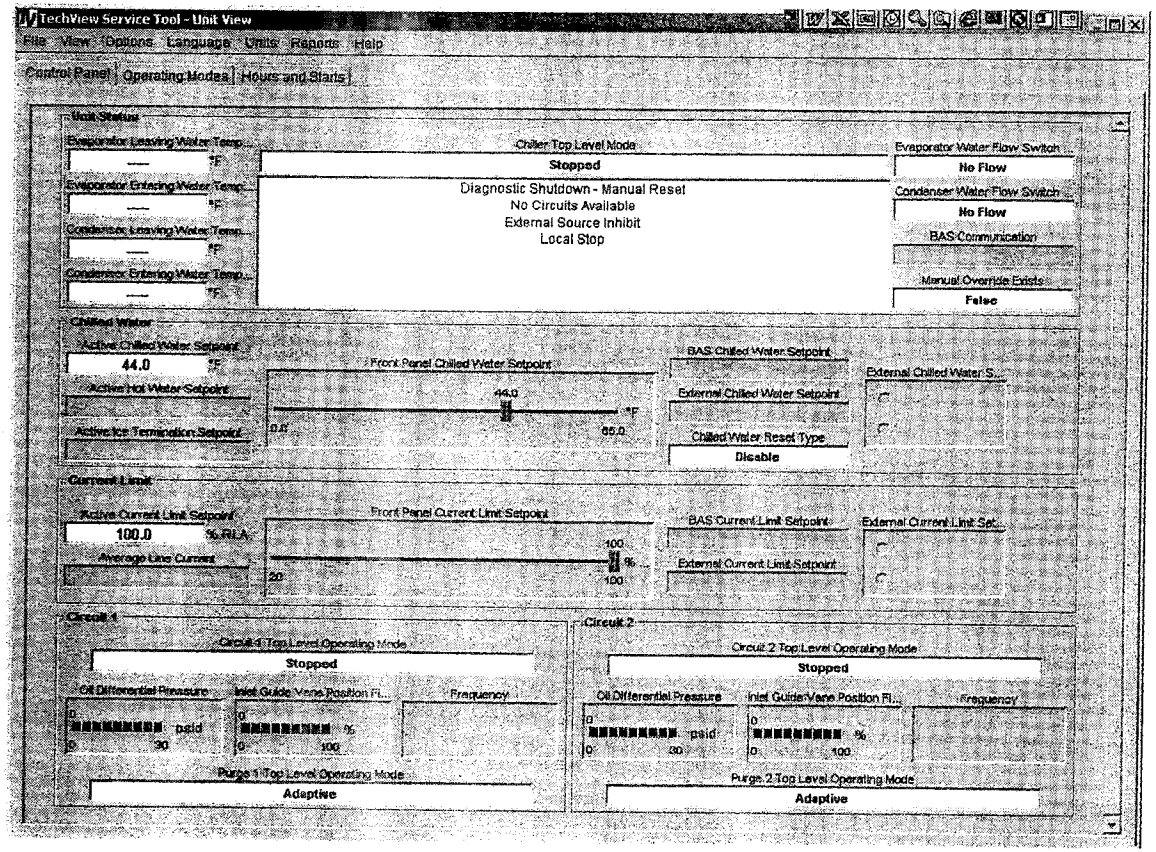
TechView 5.01, or later, required for Duplex version 1.0 MP software.

Software View Duplex

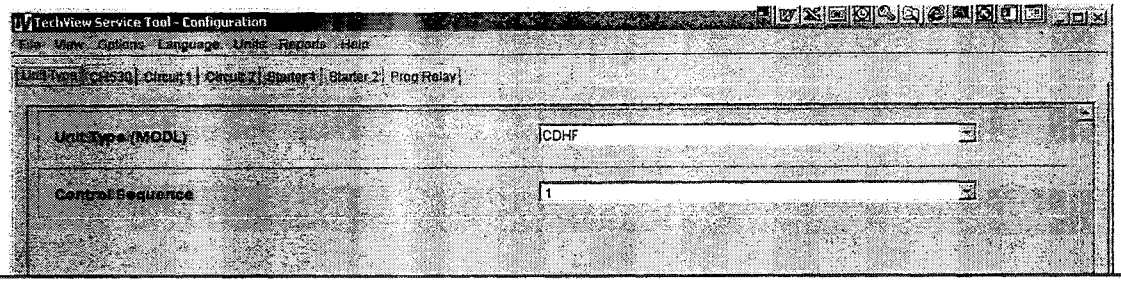
Duplex DV uses CTVD MP software. Version 1.0 is the first release



Unit View Duplex (CDHF-G)



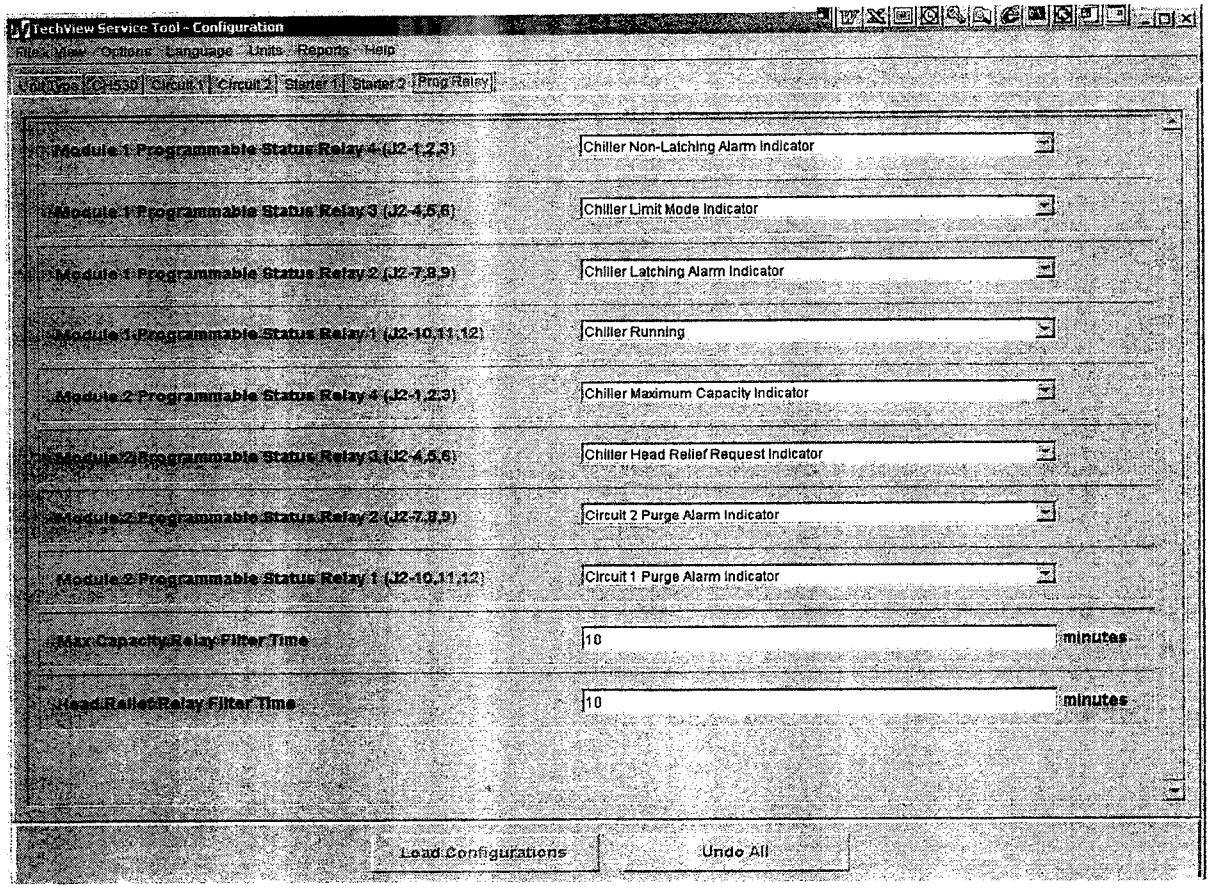
Configuration View; Duplex



- Configuration, Duplex changes/items:
  - Unit type tab
    - Select Duplex unit type CDHF; CDHG
    - Control Sequence-see unit nameplate [TVSQ= X] (defines CH530 device/ LLID list)
  - CH530 tab
    - Same Content/choices as CVHE-F-G
  - Circuit 1, and Circuit 2; For each circuit select;
    - Starter type, CPIM, Power source
    - All others items same content/choices as CVHE-F-G
  - Starter 1 and Starter 2; For each circuit select;
    - Same content/choices as CVHE,F,G

Configuration View; Programmable relays (OPST)

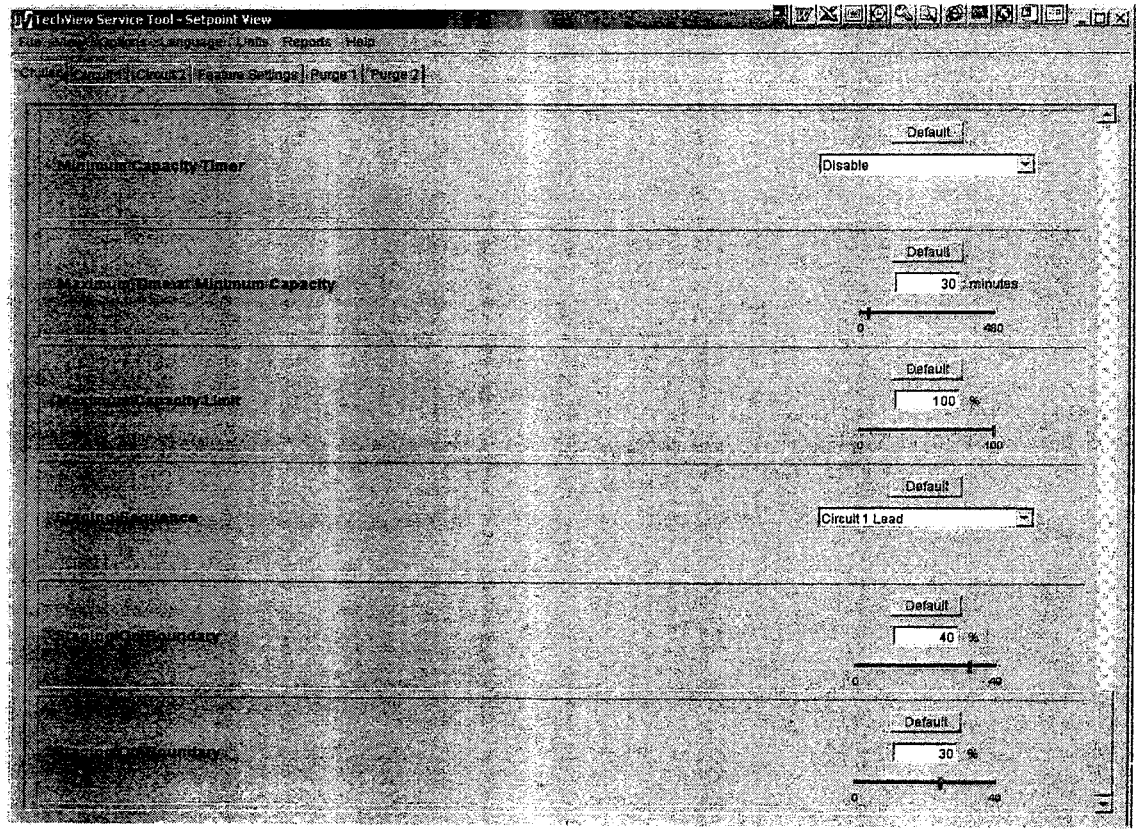
New for Duplex; Eight outputs from two Quad relay LLIDS. Use defaults or Select any 8 of twelve choices.



Defaults are ;
Chiller Running indicator
Chiller Latching Alarm
Chiller Limit mode
Chiller Non-Latching Alarm
Circuit 1 Purge Alarm
Circuit 2 Purge Alarm
Chiller Head Relief
Chiller Maximum Capacity

Other choices:
Circuit 1 Running
Circuit 2 Running
Chiller Alarm
Circuit 1 alarm
Circuit 2 Alarm
Purge Alarm

Setpoint View Duplex



- Setpoint view; Duplex additions:
  - Staging Sequence; 1-2, 2-1, Balanced, combined
  - Staging On Boundary (40% default)
    - % of total chiller load 0-50%
  - Staging Off Boundary (30% default)
    - % of total chiller load 0-50%

See PSOL case # 1581 Duplex Compressor Sequencing CDHF,CDHG with Tracer CH530 Controller