



Quick Start Guide

AC & Refrigeration

Models 556 & 560



i. Preface

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WARNING

Information contained is only for use by formally trained competent technicians practicing within the HVAC/R community. The manufacturers' installation, operation, and service information should always be consulted, and should be considered the first and best reference for installing, commissioning and servicing equipment. The author and publisher assume no liability for typographical errors or omissions of information in this guide.

CAUTION

EPA-Approved Section 608 certification is legally required to service building air conditioning and refrigeration systems containing CFC and HCFC (Class 1 and 2 refrigerants). This includes the connection of analog refrigerant pressure gauges or digital refrigeration system analyzers to any stationary AC or refrigeration system/appliance.

For additional information please contact:

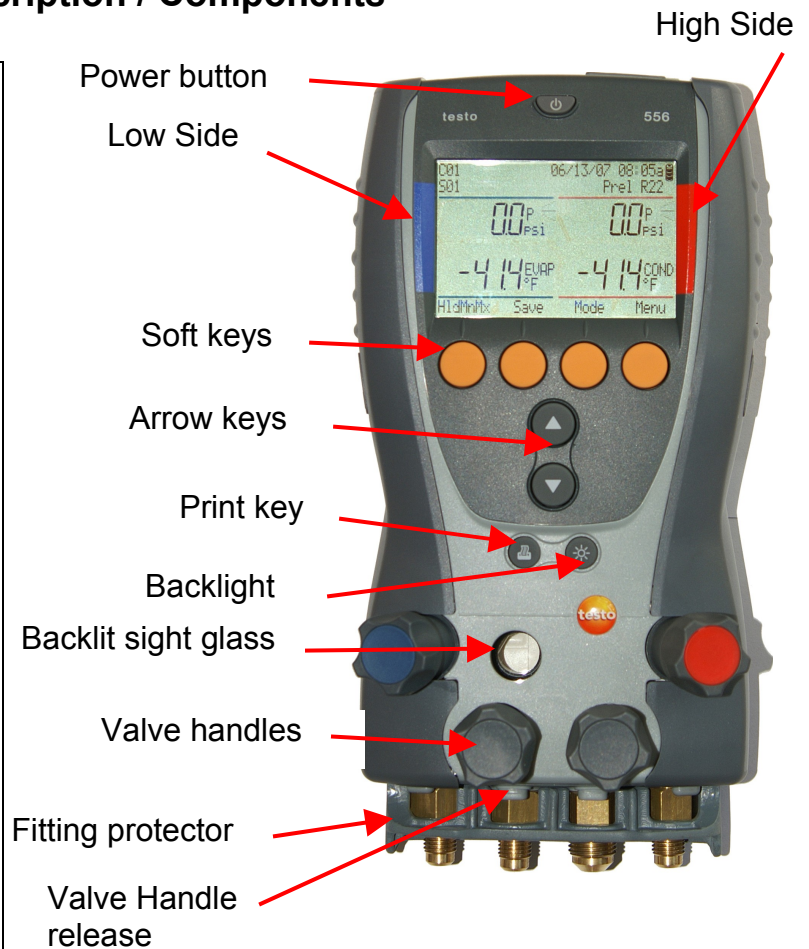
Testo, Inc.
35 Ironia Rd.
Flanders, NJ 07836
+1 800-227-0729
+1 973 252 1720
Fax +1 973 252 1729
www.testo.com
info@testo.com

Author:
James L. Bergmann
HVAC/R Technical Specialist
Testo, Inc.

Product Description / Components

- **Power Button:** On/Off
- **Low/High Side:** Shows pressures, temperature, superheat and subcooling.
- **Soft Key:** (4X) Shows relevant function on the display
- **Arrow Keys:** Up/Down, changes display view.
- **Print Key:** Prints measured information to wireless printer if equipped.
- **Back Light Key:** Switches on/of back light and sight glass light.
- **Back Light Sight Glass:** Common port to all hose fittings
- **Valve Handles:** Low (Blue) High (Red) Left black refrigerant, Right black evacuation port. Low and high read pressure if opened or closed.
- **Fitting Protector:** Provides protection of fittings against drops or other physical damage
- **Valve handle release:** (4X) Extends valve handles, push in to retract.

- **Carbineer:** Shown stowed, instrument hanger with eyelet for padlock
- **Battery door:** Compartment for batteries, button cell and wireless module
- **Model and Serial Numbers:** Record these numbers incase of theft or required service
- **Rubber protective boot:** Integrated protective boot can be removed for cleaning.
- **Hose Connections:** 3) 1/4" ports for charging and testing and 1) 3/8" for evacuation



Commissioning the Instrument

Installing batteries / rechargeable batteries / button cell / radio module:



Battery compartment located under carabineer, Remove battery compartment door, insert batteries and wireless card (if equipped) as shown.

Note: When installing the button cell, hold the meter with the carabineer toward you, (upside down). This will prevent the battery from accidentally falling into the wireless card slot.

- 1) Insert button cell (included, 1 CR2032) in the battery compartment (+) side up. This is a buffer battery to hold memory when batteries are changed.
- 2) If equipped, insert wireless radio module ribbed side up, contacts up, label down until module engages.
- 3) Insert 4 type AA alkaline batteries, or 4 rechargeable into the battery compartment, observe polarity. Do not mix battery types
- 4) Close the battery compartment. Push until a click is felt.

Note: When not using for a long period of time, upload the memory to a PC and remove the AA batteries. Do not remove the button cell.

Note: When operating the unit with an external

Switching the Instrument on:

The first time a new instrument is powered or when the batteries are replaced, the unit requires a general configuration including the language, battery type and date and time. After these parameters are set, they will not need to be adjusted until the batteries expire.

First time power up or after batteries are replaced.

- Press the power button
 - Initialization phase:
 - All segments are displayed for 2 seconds.
 - Instrument model, firmware version and serial number are displayed for 2 seconds.
- 1) Set the language using the arrow keys and confirm the entry with the **OK** function key (Soft Key) **English users select "English US"**
 - i. Set battery type is displayed
 - 2) Set the battery type. Using the **arrow keys** select the battery type and confirm using the **OK** soft key.

- i. Set date/time displayed
- 3) Set the time and date. Set the blinking number with the **arrow keys**. Change to the next number using the left or right **soft keys**. Confirm entry with the **OK** soft key
 - i. The configuration menu is opened.

Normal Power Up

- Press the power button
- Initialization phase:
- All segments are displayed for 2 seconds.
- Instrument model, firmware version and serial number are displayed for 2 seconds.
- The measurement view is opened

Initial Unit configuration

The 556/560 requires initial configuration of the units of measure. Once configured, these parameters are stored in memory and will not need to be changed again unless the button cell is removed for an extended period of time. Changing the main batteries will not affect these settings.

Setting Relative or Absolute Pressures and Nulling (zeroing the sensor)

Use this menu to configure for relative or absolute pressure measurement. Relative pressure refers to standard atmospheric pressure, 0 psig at sea level; absolute pressure is 14.7 psia at sea level. After the pressure type has been selected, remove any hoses if installed and null the pressure sensor

From the measurement menu

- 1) Press the **Menu** key
- 2) Menu: Pressure Nulling (Zeroing) relative/absolute is displayed
- 3) Using the arrow keys scroll up to select relative or absolute pressure
 - a. US users will select relative pressure (Prel)
- 4) Confirm entry with the **OK** soft Key
- 5) Press Menu
- 6) Menu: Pressure Nulling (Zeroing) relative/absolute is displayed
 - a. The p=0 is displayed
- 7) Confirm entry with the **OK** soft Key
 - a. The pressure sensors have now been nulled or zeroed.
 - b.

Note it is not possible to null the sensors with over 14.7 psi (rel) on the sensors.

Configuring the Units of Measure

The Units configuration menu allows the user to select the units of measure desired. Selectable units are for pressure, temperature, altitude, mass, and in the 560 vacuum. Units can be selected in metric or U.S. Once configured, the selections are stored and will not normally need to be reconfigured.

Units Menu:

From the measurement menu

- 1) Press the **Menu** key
 - a. Menu: Pressure Nulling (Zeroing) relative/absolute is displayed
- 2) Using the soft arrow keys scroll left or right to Units
- 3) Confirm entry with the **OK** soft Key
 - a. **Units: Pressure** is displayed
- 4) Using arrow keys scroll up/down to desired pressure units
- 5) Press the soft **Apply** key
- 6) Scroll left (soft key)
 - a. **Units: Temperature** is displayed
- 7) Using arrow keys scroll up/down to desired temperature units
- 8) Press the soft **Apply** key
- 9) Scroll left (soft key)
 - a. **Units: Altitude** is displayed
- 10) Using arrow keys scroll up/down to desired altitude units
- 11) Press the soft **Apply** key
- 12) Scroll left (soft key)
 - a. **Units: Mass** is displayed
- 13) Using arrow keys scroll up/down to desired mass units
- 14) Press the soft **Apply** key
- 15) Press **OK**
 - a. Measurement screen is displayed

Congratulations, the initial configuration is complete!

Refrigerant Selection

The 556/560 has 30 (40 max) onboard temperature pressure charts that are adjustable for elevation. Additionally the user may install up to 10 additional refrigerants with Easy Kool software. The refrigerant type can be changed any time during operation. If changing refrigerant types, remove the hoses, and purge the manifold block of any remaining refrigerant. Testo recommends separate hoses for refrigerants the use mineral oil and POE although this is not required.

- 1) Press the **Menu** key
 - a. Menu: Pressure Nulling (Zeroing) relative/absolute is displayed
- 2) Using the soft arrow keys scroll right to **Menu: Refrigerant**
- 3) Use the up/down arrow keys to select the refrigerant
- 4) Confirm entry with the **OK** soft Key
 - a. Measurement Menu is displayed

Setting Working Altitude

For precise calculation of superheat and subcooling, elevation above sea level must be considered if a relative pressure sensor or bourdon tube is used. With mechanical gauges and most electronic manifolds, the error produced has just been accepted and not accounted for. This can easily result in 3-5° of superheat or subcooling error.



May Lake and Mount Hoffmann 9229' elevation

Precision measurement devices such as the 556/560 accounts for these errors in measurement. The closer you set the altitude to your elevation, the more precise your calculations will be as the 556 and 560 will compensate pressure changes above and below atmospheric pressure due to elevation. The principle is the same as a common high altitude pressure chart; the temperature pressure relationship is corrected for desired elevation. Altitude is adjustable to the foot or meter instead of standard 1000, 2500, or 5000-foot temperature pressure charts further reducing error. Elevation information is available online or can easily be obtained with a GPS.

- 1) Press the **Menu** key
 - a. Menu: Pressure Nulling (Zeroing) relative/absolute is displayed
- 2) Using the soft arrow keys scroll right or left to **Menu: Altitude**
- 3) To change the altitude, press the **Change** soft key
- 4) Using the left and right soft keys, move to the desired digit and adjust the altitude to the current elevation
- 5) Confirm entry with the **OK** soft Key
 - a. Measurement Menu is displayed

Configuring and Mapping Probes

The Testo 556/560 is capable of measuring 4 channels of temperature and 2 channels of relative humidity via two hard-wired and two wireless probes (if equipped). The probes can be mapped to perform superheat and or subcooling via wireless or hard-wired.

Because the 556/560 performs calculations of subcooling or superheat via the wired or wireless probes, the probes must be assigned to either the low or high side of the system. This will allow the calculation of superheat or subcooling using the desired wired or wireless probe. This feature can be useful in application where remote monitoring of superheat, subcooling, or temperature is desired.

Finding the temperature probes (hard-wired)

When the unit is powered on, the 556/560 looks for any temperature probes attached to the instrument. If probes are connected, using the up/down arrow keys will change the display to show temperature.

Manual Probe Search

From any measurement menu, press and hold the menu key for 2 seconds. This will initiate a probe search without working through the menus.

Note, if wireless probes have not been assigned, they will not show in the temperature measurement menu.

Testo wireless probes

TRANSMIT MODES

Testo wireless probes have two transmit modes:

- 1 transmit every 2 seconds (initiate by pushing the probe ON button briefly) (the blue LED on the probe handle will flash about every 2 seconds.)
- 2 transmit every 10 seconds (initiate by pushing **and HOLDING** ON button) (the blue LED on the probe handle will flash about every 10 seconds.)

Proper system performance tests are done when the probe is in the 2 second transmit mode.

AUTO OFF FEATURE

If the left DIP switch is set UP (DIP switch is found under the battery cover), the wireless probe will turn off at 10 minutes

If the left DIP switch is set the wireless probe will remain on until turned off. *Proper system performance tests are done when the probe is this position.*

HIGH/LOW BIT for RFID:

If the right DIP switch is set UP (DIP switch is found under the battery cover), the wireless probe will transmit a HIGH bit after its RFID. (Shown as an "H: following the RFID in the Radio Probe select screens.)

If the right DIP switch is set DOWN wireless probe will transmit a LOW bit after its RFID number. (Shown as an "H: following the RFID in the Radio Probe select screens.

The HIGH/LOW bit feature is to cover the outside chance that you own two radio probes with the same base –RFID number.

Wireless Probe Selection and Configuration

- 1) Turn on the wireless probe or probes you wish to connect to the instrument, and note the RFID number on the back of the probe at the bottom of the label. If



both probes have the same RFID, follow the directions above under **HIGH/LOW BIT for RFID**

- 2) Press the **Menu** key
 - a. Menu: Pressure Nulling (Zeroing) relative/absolute is displayed
- 3) Using the soft arrow keys scroll right or left to **Menu: Probe select, Pick Wireless probe**
- 4) Press OK,
 - a. A Wireless probe search will commence
- 5) Using the up/down arrows, select the wireless probe RFID you wish to assign to the low side.
- 6) Press **Apply** on the low side to map the probe to the correct side of the system
- 7) Using the up/down arrows, select the wireless probe RFID you wish to assign to the high side.
- 8) Press **Apply** on the high side to map the probe to the correct side of the system
 - a. Probe assignment menu will display

Probe Mapping (Assignment):

- 1) Use the right soft arrow key to assign low side wireless or hard wired probe to measure vapor line temperature and calculate superheat. (**Tev**, Temperature evaporator suction line)
- 2) If prompted, press **Apply** to assign the probe. If not prompted the probe is already assigned
- 3) Using the up arrow key, Assign the high side probe desired in the same manner that will be used to measure liquid line temperature and calculate subcooling. (**Tcn** Temperature condenser liquid line)
- 4) Confirm entry with the **OK** soft Key
 - a. Measurement Menu is displayed

Note: the four temperature probes can be used for any purpose of temperature measurement within their rating, for calculation purposes however, only the probes assigned superheat and subcooling are used in their respective calculations. If wireless humidity probes are used, %rh and probe temperature will also be shown on the display.

Performing System Measurements:

- 1) Make sure the 556/560 commissioning procedures have been completed
- 2) Attach the hoses to the manifold connections
- 3) Using the refrigerant type of the system you will be checking, purge the manifold with virgin refrigerant from a virgin bottle. This will reduce refrigerant loss in the system you are servicing.
- 4) Attach the gauges and probes to the refrigerant system in their required locations.
- 5) Use the up/down arrow keys to toggle through the menus and observe the readings.

Probe Locations:

- 1) **Total superheat:** Superheat that is measured at suction inlet of a split type system with a fixed type metering device. Both the pressure and temperature should be read at the condenser suction service valve
- 2) **Evaporator superheat:** Superheat measured at the evaporator outlet. Both the temperature and pressure should be read at the evaporator outlet.

***Note:** If a wireless probe is used to measure line temperature at the evaporator outlet, and pressure is measured at the condenser suction service valve, the calculated superheat will have a slight error due to the pressure drop in the suction line. The nominal pressure drop for an R-22 system is 3 psig. The actual superheat will be about 2° lower at the evaporator if the drop is nominal.*

- 3) **Liquid subcooling:** Subcooling should be measured at the condenser liquid line. Both the temperature and pressure are normally measured at the liquid service valve.

***Note:** With zeotropic refrigerants the evaporation temperature (Evap) is displayed after the complete evaporation of the refrigerant. (Cond) refers to the complete condensation. **When critical pressure of refrigerant is reached, Reading and display illumination will blink.** The critical temperature of a refrigerant is the maximum temperature at which the refrigerant can be condensed from a vapor to a liquid. Above this temperature the refrigerant cannot be condensed regardless of the pressure applied and is considered to be a gas.*

Selecting Installation (Customer)

Measurements can be stored in the customer log as a snapshot or a series of readings. There are 5 factory installed customer entry points (C01-C05) with 5 systems (S01-S05) each. Additional customers and/or more detailed descriptions can be added with Easy-Kool software. An (*) after the customer or the system indicates information has been stored for that customer.

Memory:

- 1) Press the Menu key
 - b. Menu: Pressure Nulling (Zeroing) relative/absolute is displayed
- 2) Using the soft arrow keys scroll right or left to **Menu: Memory**
 - a. Select installation is displayed
- 3) Confirm selection by pressing **OK**
- 4) Use Up/Down arrows to select customers and the right and left soft keys to select the system.

Note: You may want to record these numbers on a work order to refer to later when data is accessed or field print a hard copy of the results.

- 5) Confirm customer selection by pressing **OK**
- 6) Set refrigerant type for the customer and system selected. (See setting refrigerant type if needed.)

Data from 25 systems can be recorded under 5 customers with the factory settings. Using Easy-Kool additional customers and systems can be added. Data can be exported to Easy-Kool or printed via the wireless printer. Single shot readings or a series of readings can be printed if desired.

Printing, Saving Readings, and Data Logging

The printer accessory provides a quick way to document service and commissioning and is configurable through Easy-Kool if desired. The 555/560 detects what is attached to it and prints results for any configured probes or accessories. Results can be printed as a single snap shot or a series of data logged readings.

The Print out can display the following:

- Testo 556/560 model number*
- Testo 556/560 serial number*
- Firmware version*
- Date*
- Time*
- 3 custom lines of information (Configured through Easy-Kool)
- Refrigerant type*
- Evaporation and condensing pressure*
- Evaporation and condensing temperature*
- Superheat (if probes are attached)
- Subcooling (if probes are attached)
- 4 Probe temperatures (if probes are attached)
- 2 relative humidity channels (if probes are attached)
- Oil Pressure (if oil pressure probe is attached)
- Compressor Current (if current probe is attached)
- Weight of refrigerant added or removed (if scale is attached)

*Non-configurable item

Printing (accessory)

The wireless printer operates via an IR (Infrared) signal from the 556/560 to the printer. In order to print, a line of sight is required from the printer to the top of the 556/560. Align the orange Testo logo on the printer with the main power button



on the 556/560 for best results. All Testo printers will work with any Testo instrument with a print function. The printer has a burst mode that sends all of the data to the printer buffer.

- 1) Turn on printer
- 2) Align 556/560 and printer
- 3) Press print key on 556/560
- 4) When print bar disappears, information has been sent to the printer

Field Data Logging

Readings can be recorded at anytime during testing. Readings can be recorded as a serial or series, or as a single shot. Any recorded reading can be viewed in the 556/560, printed, or uploaded and viewed in the Easy-Kool software.

Data logging a single snap shot:

- 1) Assure proper customer and system are selected
- 2) From measurement menu, press **Save**
- 3) Confirm "Save actual measured values by pressing **OK**
 - a. (*) Next to a customer name or system indicates a reading has been stored. Multiple readings (such as a pre and post) can be stored if desired.

Data logging a series of readings:

The data logging frequency (cycle) can be set from 2 seconds to 60 minutes. Data logging duration can be set from 1 minute to 999 hours.

Example if a cycle of 2 seconds is selected for a duration of 1 minute (60 sec), 30 readings will be stored. (60 seconds / 2 seconds = 30 readings)

This allows the user monitor system operation without supervising the instrument. If an equipment lockout occurs, the readings can be viewed on the 556/560 in the field, or they can be uploaded into a PC and viewed graphically in Easy-Kool.

Saving a Series of Readings:

- 1) Assure proper customer and system are selected
- 2) From measurement menu, press **Save**
- 3) Confirm a series of measurements by pressing **Serial?**
- 4) Adjust the cycle using the Up/Down arrow keys
- 5) Toggle right (soft key) Select min/sec using Up/Down arrows
- 6) Toggle right (soft key) select duration (000, hours)
- 7) Toggle right (soft key) select duration (00, minutes)
- 8) Confirm entries by pressing **OK**
- 9) Start measurement by pressing **Start**
- 10) Abort measurement by pressing the **Escape** key

- 11) Once started, to abort the measurement or shorten the time, press the **Abort Key**
- 12) When finished "Finish, Values Saved" will be displayed
- 13) Press **OK** to exit

Evacuation (Testo 560 only)

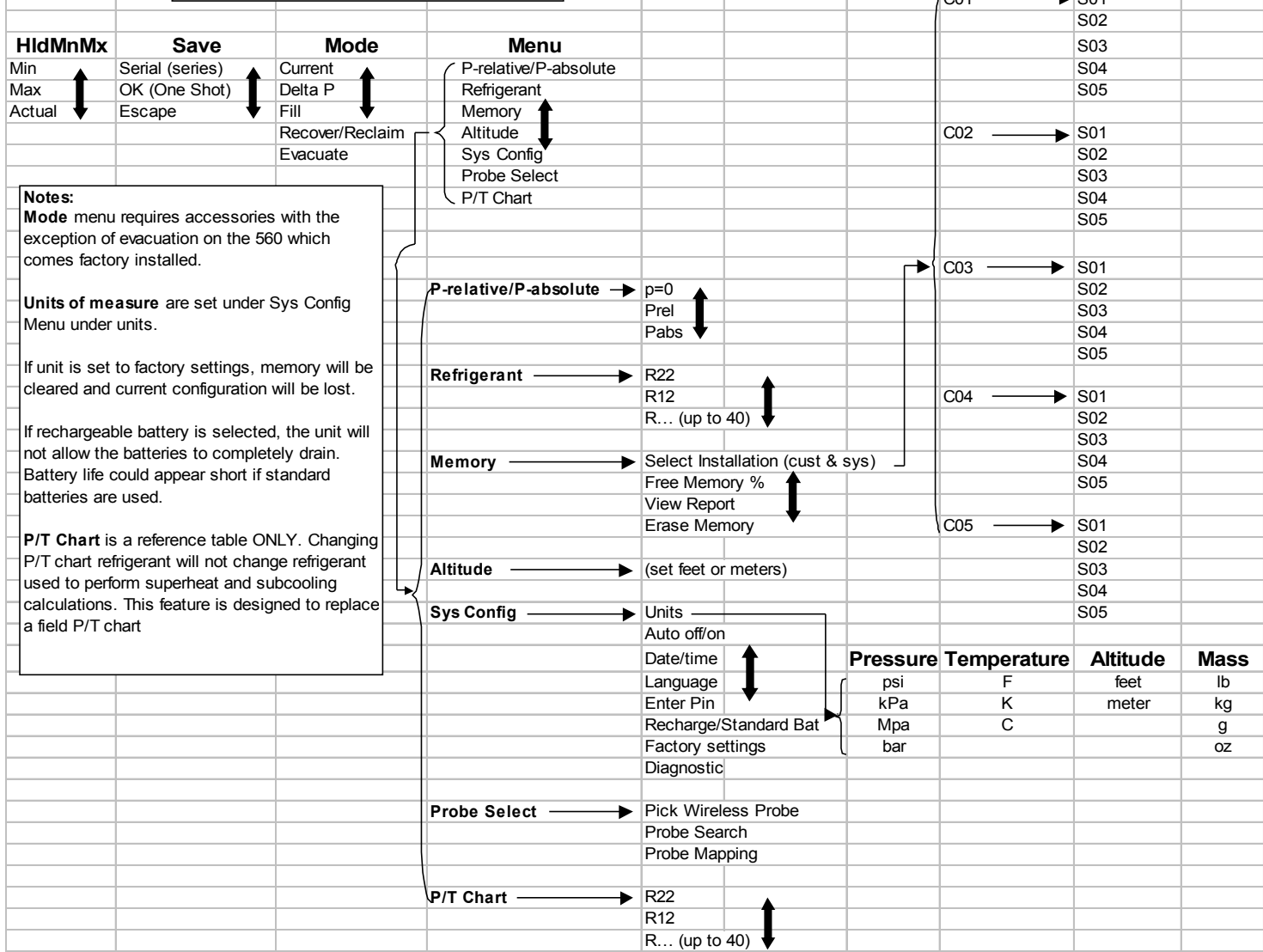
The Testo 560 contains a high-resolution vacuum sensor. Connect 3/8 port to vacuum pump, and connect low and high sides of the system. The high-resolution vacuum sensor is located next to the sight glass. If the 3/8 valve is closed, the system is isolated from the vacuum pump and the level of vacuum achieved can be measured. After isolating, the vacuum level may rise and level off. As the level increases, pay particular attention to the H₂O saturation temperature. If the level rises to the saturation temperature (saturation temperature and the ambient temperature of the coldest part of the system) and stops, there is liquid moisture in the system and the evacuation needs to continue. If the level continues to rise above the saturation temperature, a leak is indicated or the evacuation process needs to be continued. Most manufacturers recommend 500 microns or lower. A system should never be started if a micron level of at least 1000 has been achieved as the non-condensables left in the system will affect system performance and shorten equipment life.

Using the Vacuum Sensor:

Note: The display will indicate 0000 until the system has started to achieve a vacuum level of 200hPa absolute. (6"hg is reached or approximately -3psi)

- 1) Press the **Mode** key
- 2) Using the left/Right soft keys, toggle to Vacuum Measurement
- 3) Confirm by pressing OK
 - a. Note the refrigerant will automatically switch to H₂O during the evacuation process.
- 4) Using the Up/Down arrows, set the customer and the system
- 5) Confirm by pressing OK
- 6) When desired vacuum level is achieved, close the 3/8 vacuum port *only* to isolate the pump, and allow the vacuum reading to stabilize. If the desired level is not achieved, Open the valve and allow to process to continue.

Testo Commonly Used 556/560 Softkey Menu Structure



**Areas highlighted fall within the normal safe charging zone.
Always consult manufacturers tables when charging!**

Wetbulb Conversion Table

Relative Humidity %

	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
D	50	34.6	35.6	36.5	37.4	38.4	39.3	40.2	41.1	41.9	42.8	43.6	44.5	45.3	46.1	46.9	47.7	48.8	49.2	50.0
	55	37.8	38.9	40.0	41.0	42.1	43.1	44.1	45.1	46.1	47.0	48.0	48.9	49.8	50.7	51.6	52.5	53.3	54.2	55.0
B	60	40.9	42.1	43.3	44.5	45.7	46.9	48.0	49.1	50.2	51.3	53.3	54.4	55.3	56.3	57.3	58.2	59.1	60.0	
	65	43.9	45.3	46.7	48.0	49.3	50.6	51.9	53.1	54.3	55.5	56.6	57.8	58.9	59.9	61.0	62.0	63.0	64.0	65.0
T	70	46.8	48.4	50.0	51.5	52.9	54.4	55.8	57.1	58.4	59.7	61.0	62.2	63.4	64.6	65.7	66.8	67.9	69.0	70.0
	75	49.7	51.5	53.2	54.9	56.5	58.1	59.6	61.1	62.5	63.9	65.3	66.6	67.9	69.2	70.4	71.6	72.8	73.9	75.0
M	80	52.5	54.5	56.4	58.3	60.1	61.8	63.5	65.1	66.7	68.2	69.6	71.1	72.4	73.8	76.1	76.4	77.6	78.8	80.0
	85	55.2	57.5	59.6	61.6	63.6	65.5	67.3	69.1	70.8	72.4	74.0	75.5	77.0	78.4	79.8	81.2	82.5	83.8	85.0
P	90	57.9	60.4	62.7	65.0	67.2	69.2	71.2	73.1	74.9	76.7	78.3	80.0	81.5	83.1	84.5	86.0	87.3	88.7	90.0
	95	60.6	63.3	65.9	68.4	70.7	72.9	75.1	77.1	79.0	80.9	82.7	84.4	86.1	87.7	89.3	90.8	92.2	93.6	95.0

Standard Operational Menus

Main measurement menu: Low and High pressure, and evaporation and condensing temperatures. Used to determine operating pressures and corresponding evaporator and condenser coil temperatures

Press down arrow to toggle to next menu



Temperature menu: Temperatures measured by each probe attached or found by the 556/560 are shown. Up to 4 probes can be seen in this menu, 2 hard wired and two wireless.

Press down arrow to toggle to next menu



Operational menu: Evaporation and condensing temperatures shown in conjunction with measured vapor line temperature (VLT) and liquid line temperature (LLT)

Press down arrow to toggle to next menu



Operational menu: Evaporation and condensing temperature shown in conjunction with measured vapor line superheat (SH °F) and liquid line subcooling (SC °F)

Note: (---- °F) indicates no subcooling is calculated.

This menu is most frequently used when refrigerant charging, as coil temperature, superheat and subcooling are shown simultaneously.

