TRANE

General Service Bulletin

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Subject: UCP695/SCP699 Sensor Identification and Locations

Introduction:

This service bulletin clarifies the proper identification of sensors used with CenTraVac UCP695 and SCP699 control panels.

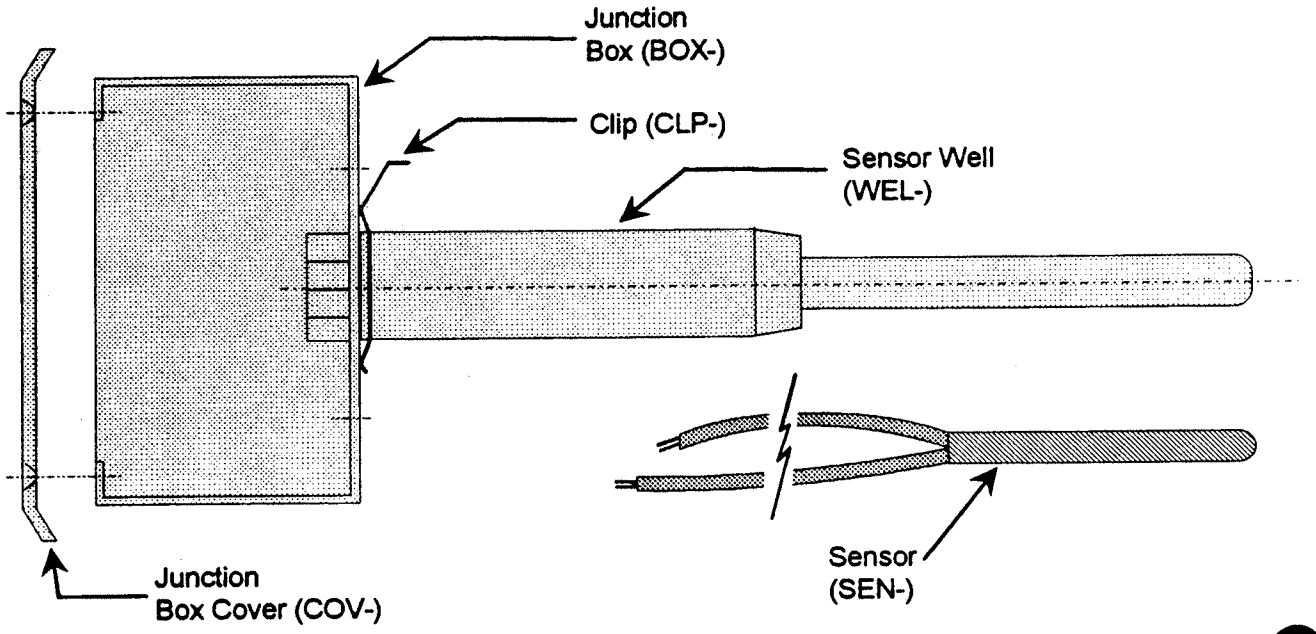
Discussion:

Based on the number of similar questions regularly received from the field, it is apparent that there is some confusion about the sensors used with both UCP695 chiller control panels and SCP699 system control panels. Most of these questions pertain either to sensor identification or sensor location in the chiller system.

Tables 1 and 2--along with Figures 1 and 2--specifically identify each sensor in the UCP/SCP control system by the characteristics listed below. The relative location of each UCP695 and SCP699 temperature sensor is illustrated in Figures 3 and 4, respectively.

a. sensor description (e.g., "leaving evaporator water temperature sensor")
b. Trane mnemonic part number (e.g., "SEN-132")
c. vendor code number (e.g., "X13790057-01")
d. electrical designation (e.g., "4RT1")
e. installed location (e.g., "connecting 'water-out' piping from evaporator")
f. control panel terminal connections

Figure 1
Original-Style Sensor
Used w/UCP695 Chiller Control Panels



Notes:
1. See Table 1 for sensor characteristics and part numbers.
2. Apply heat-conductive resin (RSN-2) to the end of the sensor before inserting it into the well.
3. Mnemonic abbreviations for each component are enclosed in parentheses.
4. Not shown: conduit locknut Nut-20.

Drwgs. 4532-6154,
X13790002

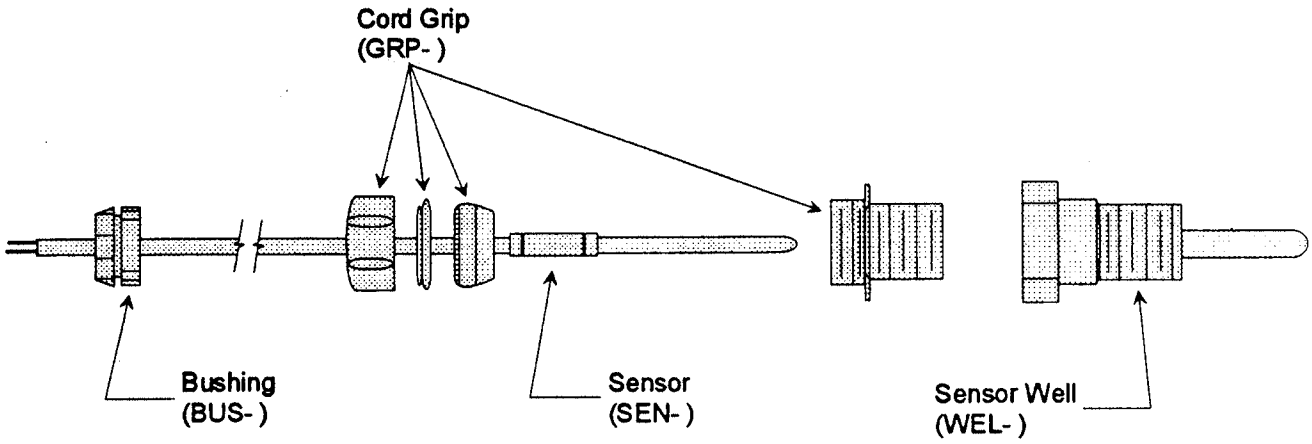
Table 1
Original-Style Sensors Used w/CVHE UCP695 Chiller Control Panels (See Figure 1)

Sensor Part Nos. (See Notes 1 and 4)		Sensor Characteristics			Elec. Connections	
Trane Mnemonic	Vendor Code	Description	Elec Desig.	Physical Location	Wire Nos.	Cont. Panel Terminations
SEN-113	X13790002-02	Standard Leaving Evaporator Water Temperature Sensor Only (Note 2)	4RT1	Insert in bulbwell in connecting water piping (water out)	104 105	1TB3-1 1TB3-2
		Condenser Refrigerant Temp. Sensor (UCP Tracer Monitoring Package, Option)	n/a	Epoxy to condenser refrigerant line between condenser and condenser/economizer flange	127 128	1TB3-14 1TB3-15
		Optional UCP Ambient Temp. Sensor (Ambient-Based CWR)	4RT6	Fresh air intake or north wall of building	127 128	1TB3-14 1TB3-15
SEN-96	X13790002-03	Evaporator Refrigerant Temperature Sensor	4RT5	Lower evaporator well	102A 103A	1TB3-12 1TB3-13
SEN-114	X13790002-05	Oil (Sump) Temperature Sensor	4RT7	Oil sump well	110A 111A	1TB4-13 1TB4-14
		Optional "Inboard" Bearing Temperature Sensor	4RT8	Install in well (if present) in compressor end oil return line, or epoxy to underside of line	133 134	1TB4-19 1TB4-20
		Optional "Outboard" Bearing Temperature Sensor	4RT9	Install in well (if present) in opposite compressor-end oil return line, or epoxy to underside of line	135 136	1TB4-21 1TB4-22
SEN-118 (Note 3)	X13790002-06	Entering Evaporator Water Temperature Sensor	4RT2	Insert in well in connecting water piping (water in)	121 122	1TB3-3 1TB3-4
		and				
		Leaving Evaporator Water Temperature Sensor	4RT1	Insert in well in connecting water piping (water out)	104 105	1TB3-1 1TB3-2
		Optional Entering Condenser Water Temperature Sensor	4RT3	Insert in well in connecting water piping (water in)	123 124	1TB3-5 1TB3-6
		and				
		Optional Leaving Condenser Water Temperature Sensor	4RT4	Insert in well in connecting water piping (water out)	125 126	1TB3-7 1TB3-8

Notes:

1. Trane's mnemonic part number appears on the outside of the box containing the sensor(s); the vendor code number is stamped on the sensors.
2. Do not order this sensor to replace one of a matched sensor pair (e.g., entering and leaving water temperature sensors for the evaporator or condenser).
3. Ordering SEN-118 yields a matched pair of sensors. Sensors used as a matched pair must be replaced as a pair; do not replace an individual sensor from a pair!
4. Other components required to install each sensor are listed below (and identified in Figure 1):
   a. For SEN-113 and SEN-118 used for water temperature applications (4RT1 thru 4RT4):
      BOX-802, CLP-158, COV-91, RSN-2 and WEL-46.
   b. For SEN-114 used for oil sump temperature applications (4RT7):
      BOX-802, CLP-158, COV-91, RSN-2 and WEL-46.
   c. For SEN-114 used for bearing temperature applications (4RT8, 4RT9), unless epoxied to oil return lines:
      BOX-802, COV-91, NUT-20, RNG-178, RSN-2 and WEL-30.
   d. For SEN-96 used for evaporator refrigerant temperature applications (4RT5):
      BOX-802, CLP-158, COV-91, RSN-2 and WEL-46.

Figure 2
Current-Style Sensor Used w/UCP695 Chiller Control Panels and SCP699 System Control Panels



Notes:
1. See Table 2 for sensor Characteristics and part numbers.
2. Mnemonic abbreviations for each component are enclosed in parentheses.

Drwgs. 4533-1710, X13790057

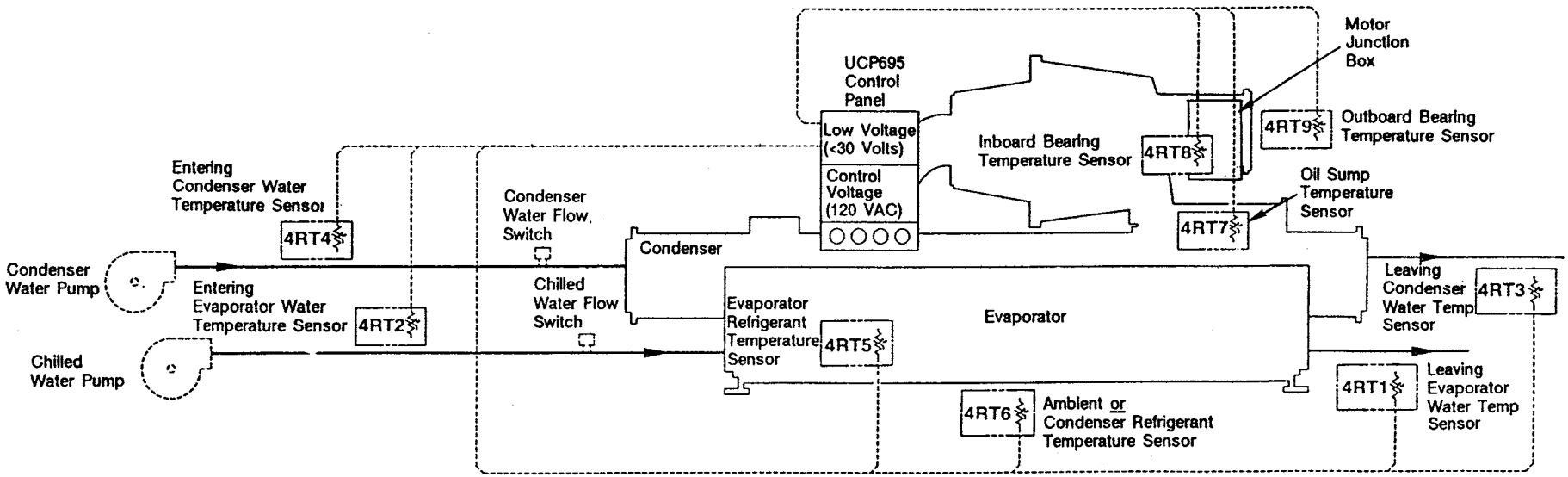
Table 2
Current-Style Sensors Used w/UCP695 Chiller Control Panels and SCP699 System Control Panels (See Figure 2)

Sensor Part Nos. (See Notes 1 and 4)		Sensor Characteristics			Elec. Connections	
Trane Mnemonic	Vendor Code	Description	Elec Desig.	Physical Location	Wire Nos.	Cont. Panel Terminations
SEN-132	X13790057-01	Standard UCP Leaving Evaporator Water Temperature Sensor Only (Note 2)	4RT1	Insert in bulbwell in connecting water piping (water out)	104 105	1TB3-1 1TB3-2
		Optional SCP Free Cooling Temperature Sensor (Thermostatic FC Control)	n/a	Inset in bulbwell in common condenser water return line, or outside air	217 218	TB2-1 TB2-2
		Optional SCP Condenser Water Temperature Sensor (SCP Condenser Limit Option)	n/a	Insert in bulbwell in common condenser water return line	227 228	TB5-1 TB5-2
		Optional UCP Ambient Temp. Sensor (Ambient-Based CWR)	4RT6	Fresh air intake or north wall of building; discard remaining sensor from pair	127 128	1TB3-14 1TB3-15
		Optional UCP Condenser Refrigerant Temperature Sensor (SCP Cond. Limit or UCP Tracer Monitoring Package Option)	n/a	Epoxy to condenser refrigerant line between condenser and condenser/economizer flange	127 128	1TB3-14 1TB3-15
SEN-136	X13790057-02	UCP Evaporator Refrigerant Temperature Sensor	4RT5	Lower evaporator well	102A 103A	1TB3-12 1TB3-13
SEN-137	X13790057-03	Oil (Sump) Temperature Sensor	4RT7	Oil sump well	110A 111A	1TB4-13 1TB4-14
		Optional "Inboard" Bearing Temperature Sensor	4RT8	Install in well (if present) in compressor end oil return line, or epoxy to underside of line	133 134	1TB4-19 1TB4-20
		Optional "Outboard" Bearing Temperature Sensor	4RT9	Install in well (if present) in opposite compressor-end oil return line, or epoxy to underside of line	135 136	1TB4-21 1TB4-22
SEN-205 (Note 3)	X13790057-04	UCP Entering Evaporator Water Temperature Sensor	4RT2	Insert in well in connecting water piping (water in)	121 122	1TB3-3 1TB3-4
		and				
		UCP Leaving Evaporator Water Temperature Sensor	4RT1	Insert in well in connecting water piping (water out)	104 105	1TB3-1 1TB3-2
		Optional UCP Entering Condenser Water Temperature Sensor	4RT3	Insert in well in connecting water piping (water in)	123 124	1TB3-5 1TB3-6
		and				
		Optional UCP Leaving Condenser Water Temperature Sensor	4RT4	Insert in well in connecting water piping (water out)	125 126	1TB3-7 1TB3-8
		SCP System Chilled Water Temperature Sensor	n/a	Insert in well in common system chilled water line (to system load)	219 220	TB2-3 TB2-4
		and				
		SCP System Return Water Temperature Sensor	n/a	Insert in well in common system return water line (from system load)	221 222	TB2-5 TB2-6

Notes:

1. Trane's mnemonic part number appears on the outside of the box containing the sensor(s); the vendor code number is stamped on the sensors.
2. Do not order this sensor to replace one of a matched sensor pair (e.g., entering and leaving water temperature sensors for the evaporator or condenser).
3. Ordering SEN-205 yields a matched pair of sensors. Sensors used as a matched pair must be replaced as a pair; do not replace an individual sensor from a pair!
4. Other components required to install each sensor are listed below (and identified in Figure 2):
   a. For SEN-205 and SEN-132 used for water temperature applications (4RT1 thru 4RT4): BUS-21, GRP-46 and WEL-48.
   b. For SEN-136 used for evaporator refrigerant temperature applications (4RT5): GRP-46 and WEL-49
   c. For SEN-137 used for oil sump temperature applications (4RT7): GRP-46 and WEL-50 (CVHEs) or WEL-48 (CVHBs).
   d. For SEN-137 used for bearing temperature applications (4RT8, 4RT9), unless epoxied to oil return lines: BUS-6 and WEL-48.

Figure 3
UCP695 Sensor Locations



Notes:
1. See Tables 1 and 2 for additional sensor information.
2. For sensor installation instructions, refer to the installation manual that shipped with the chiller, or with the UCP695 retrofit kit, as applicable.

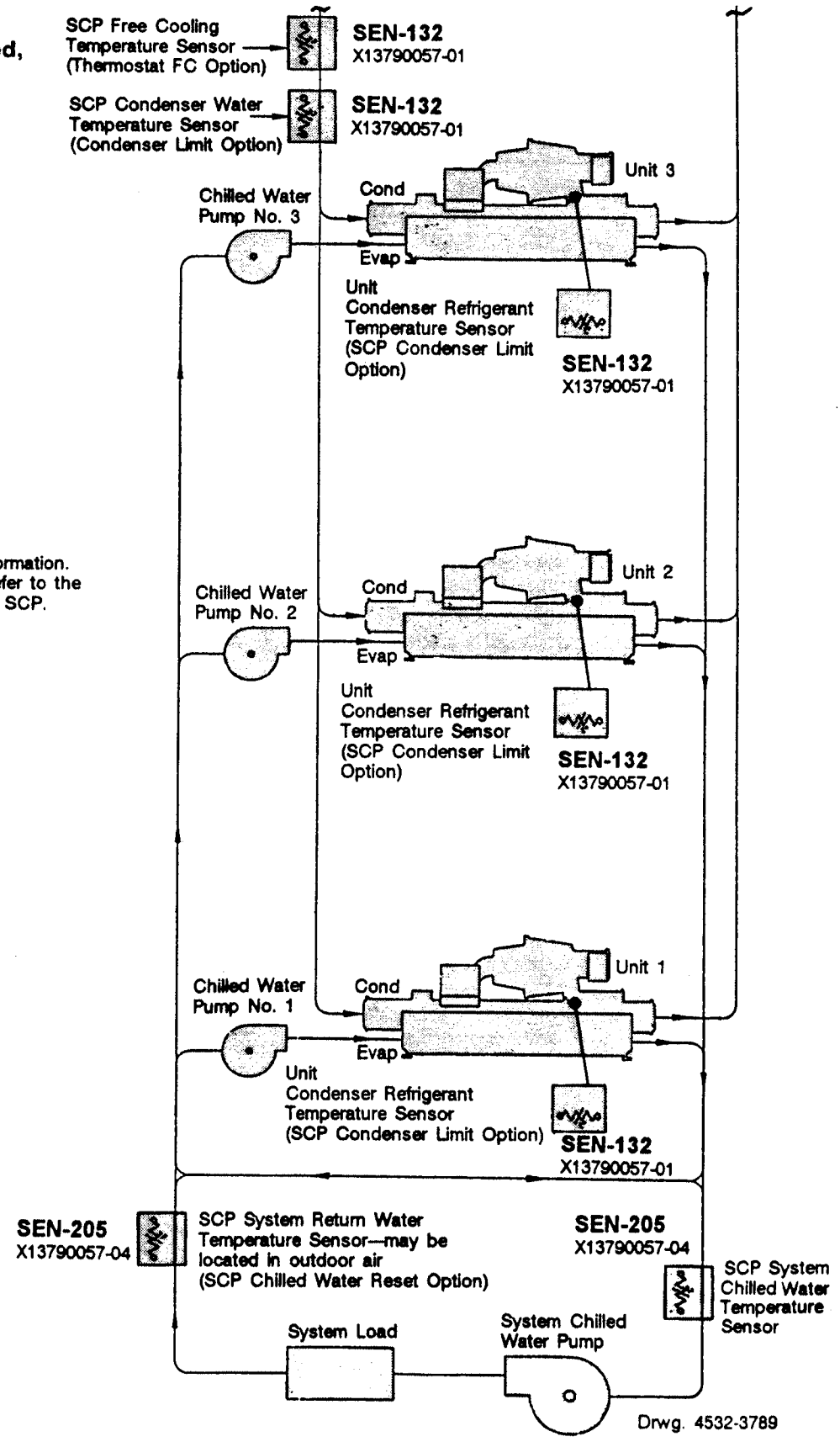
Sensor Selection—
"Old"-Style Sensors (Figure 1)

4RT1	=	SEN-113 (X13790002-02) or SEN-118 (X13790002-06)
4RT2	=	SEN-118 (X13790002-06)
4RT3	=	SEN-118 (X13790002-06)
4RT4	=	SEN-118 (X13790002-06)
4RT5	=	SEN- 96 (X13790002-03)
4RT6	=	SEN-113 (X13790002-02)
4RT7	=	SEN-114 (X13790002-05)
4RT8	=	SEN-114 (X13790002-05)
4RT9	=	SEN-114 (X13790002-05)

Sensor Selection—
"Current"-Style Sensors (Figure 2)

4RT1	=	SEN-132 (X13790057-01) or SEN-205 (X13790057-04)
4RT2	=	SEN-205 (X13790057-04)
4RT3	=	SEN-205 (X13790057-04)
4RT4	=	SEN-205 (X13790057-04)
4RT5	=	SEN-136 (X13790057-02)
4RT6	=	SEN-132 (X13790057-01)
4RT7	=	SEN-137 (X13790057-03)
4RT8	=	SEN-137 (X13790057-03)
4RT9	=	SEN-137 (X13790057-03)

Figure 4
SCP Sensor Locations (Typical 3-Chiller, Parallel-Piped, Decoupled System Shown)



Notes:
1. See Table 2 for additional sensor information.
2. For sensor installation instructions, refer to the installation manual that shipped with the SCP.

Note: Sensor installation instructions are provided in the current editions of CVHE-IN-6, CVHB-IN-5, CVRA-IN-1 (UCP695 retrofit kit), and CVMA-IN-1 (SCP). However, there are a couple of important points to remember:

1. Evaporator Water Temperature Sensors. All CVHEs with UCP695 panels ship with the standard leaving evaporator water temperature sensor (SEN-113 or SEN-132), regardless of what other control options are ordered. Therefore, if either the chilled water reset (CWR) or matched-pair evaporator sensors are specified, the unit will ship with an extra evaporator water sensor.

If the chiller was ordered with the CWR option, install the extra sensor (i.e., the standard leaving evaporator sensor; SEN-113 or SEN-132) in the outside air and wire it to the micro module's ambient temperature input. See Tables 1 and 2.

If the chiller was ordered with the matched-pair evaporator sensors but does not include CWR, discard the extra sensor (i.e., the standard evaporator sensor).

2. Extending Sensor Leads. The leads on current temperature sensors may not reach all the way back to the UCP or SCP. If this is true of your installation, route the sensor leads to a junction box mounted in a convenient location. Splice the sensor leads inside the junction box; then route the length of wire back to the control panel in conduit. (Remember that jacketed cable can be cut to length.)

Note: To extend the leads of "new"- and "old"-style sensors, use 14-18 AWG, 600V wire. The wire added between the junction box and the control panel must be either shielded or run in conduit. If shielded cable is used, be sure to tape off the shield wire at the junction box and ground it at the control panel. If the wires added to extend the sensor leads will be run in conduit, do not run them in the same conduit with other circuits carrying 30 or more volts.

Caution: To prevent possible sensor malfunction due to electrical noise, never route low-voltage sensor leads with other conductors carrying 30 or more volts!

3. Matched-Pair Evaporator or Condenser Water Temperature Sensors. All of the water temperature sensors used in the UCP and SCP control systems are accurate to within ± 1.0 F, and are typically offered as "matched" pairs.

The term "matched sensor pair" indicates that both sensors in a given pair have the same accuracy. For example, a sensor that registers a temperature that is 0.5 F higher than the "actual" value is paired with another sensor that also registers 0.5 F high. If entering and leaving water temperature sensors are not replaced with another matched pair of sensors, the accuracy of the temperature readings displayed on the face of the control panel is reduced. (That is, if one sensor in a matched pair "reads" 1.0 F high and the other sensor "reads" 1.0 F low, the inaccuracy of the front panel display is 2.0 F.

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