



## General Service

## CVHE-SB-58

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Product	Centrifugal Liquid Chillers
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### Subject: CVHE/F/G, CVHF/G and CVGF Current Transformers

#### **Introduction:**

Since the introduction of the UCP2 control system there have been several minor changes made to the selection and application of the Current Transformers (CTs) that are installed with CVHE/F/G chillers. Because of these changes it is important that the start-up or servicing technician fully understand the proper set-up procedure for whatever Current Transformers he may find to be installed.

#### **Discussion:**

As an example of a change, in mid-year of 2000 the Trane Low Voltage supplied starters listed below were changed to allow the use of a new larger single CT per phase. These applications originally would have required two CTs per phase in a cascaded arrangement. Previously, a single CT per phase could only be applied up to a maximum motor RLA of 935 amps. The new larger CT sizes now allow a single CT per phase to be applied up to a maximum motor RLA (Rated Load Amperage) of 1620 amps.

#### **Starters Affected:**

Model # CVSF starters (used on CVHE/F/G units with electromagnetic starters) where the 10<sup>th</sup> digit of the starter model # is "K" or later.

Model # CVSG starters (used on CVHE/F/G and CVGF units with solid state starters) where the 10<sup>th</sup> digit of the starter model # is "B" or later.

Model # CVSH starters (used on CVGF units with electromagnetic starters) where the 10<sup>th</sup> digit of the starter model # is "B" or later.

Regardless of the CTs that are installed, it is critical that the proper UCP2 setup procedure is followed or a current sensing error is possible. Follow the procedure below when setting the Current Overload Setting #1 and Current Overload Setting #2 in older or newer UCP2 equipped chillers.

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### **Recommended Action:**

Follow the steps outlined below to select current overload settings for UCP2 control system.

### **Procedure for Selecting Current Overload Settings for UCP2**

1. Determine the design condition rated load amps (RLA) from the unit nameplate or sales order information. Visually inspect the starter and confirm the actual ratio of the CTs, and if one or two CTs per phase are installed. Also, if the primary CTs require multiple turns, ensure that the correct number of turns are correctly looped through the primary CT.

2. Refer to Table 1 or Table 2 as follows:

Select Table 1 if any of the following conditions are met:

- a. The unit has a Trane supplied starter (unit or remote mounted) and is less than 600 volts.
- b. The starter has a single CT per phase, wired directly to the Starter module.

Select Table 2 if any of the following conditions are met:

- a. The unit has a starter that was not supplied by Trane.
- b. The unit voltage is 600 volts or higher.
- c. The starter has two CTs per phase wired to the Starter module.

Using Table 1 or Table 2 (as determined in step 2), determine the CT Meter Scale Rating based on the motor RLA from step 1 and/or on the CT ratio that is actually installed.

3. Calculate the CT Factor using one of the following two equations:

If Table 1 was used: (single CT per phase)

$$\text{CT Factor} = (\text{motor RLA/CT Meter Scale Rating}) \times 100$$

If Table 2 was used: (two CTs per phase)

$$\text{CT Factor} = (\text{motor RLA/CT Meter Scale Rating}) \times 139$$

A CT Factor result that is between 66 and 99 is acceptable for use. A CT Factor that is less than 66 or more than 99 is a strong indication that the incorrect CT has been installed or that this proper setup procedure has not been followed.

4. Refer to Table 3. Determine Current Overload Settings #1 and #2 based on the CT Factor that was calculated in step 4 above.

Enter and verify the correct Current Overload Setting # 1 and Current Overload Setting #2 in the unit control menus.

**TABLE 1**  
**CT Factor = (Motor RLA/CT Meter Scale Rating) X 100**

Motor RLA	CT Part #	Extension	CT Meter Scale Rating
34 - 50 A	x13580253 or x13580269	09	50 A
51 - 67 A		10	75 A
68 - 100 A		01	100 A
101 - 134 A		02	150 A
135 - 184 A		03	200 A
185 - 267 A		04	275 A
268 - 334 A		05	400 A
335 - 467 A		06	500 A
468 - 667 A		07	700 A
668 - 935 A		08	1000 A
936 - 1260A		11	1400A
1261 - 1620A		12	1800A

Note: CTs with the X-number X13580253-xx are constructed with wire leads for connection to the UCP2 system. CTs with X13580269-xx are constructed with 1/4-inch quick connects instead of the wire leads. Regardless of the connection method used the CTs will have the same performance characteristics.

**Table 2**  
**CT Factor = (Motor RLA/CT Meter Scale Rating X 139)**

Line CT Part No.	Ext .	Line CT Ratio	CT Terminal Connection	No. of Primary Turns	RLA Ranges	Meter Scale	
X13580272 ↓	-01	50:5	X1 to X2	3	8.0 - 11.9	16.7	
				2	12.0 - 17.9	25.0	
	-02	75:5		2	18.0 - 23.9	37.5	
	-01	50:5			24.0 - 35.9	50.0	
	-02	75:5			36.0 - 47.9	75.0	
X13580271	-01 ↓	100:5		1 ↓	48.0 - 72.0	100.0	
X13580048		150:5			72.0 - 86.3	150.0	
		180:5	X1 to X3		86.4 - 95.9	180.0	
		200:5	X1 to X4		96.0 - 119.9	200.0	
		-02	250:5		X1 to X2	120.0 - 143.9	250.0
			300:5		X1 to X3	144.0 - 167.9	300.0
			350:5		X1 to X4	168.0 - 191.9	350.0
		-03	400:5		X1 to X2	192.0 - 239.9	400.0
			500:5		X1 to X3	240.0 - 287.9	500.0
			600:5		X1 to X4	288.0 - 335.9	600.0
		-04	700:5		X1 to X2	336.0 - 383.9	700.0
			800:5		X1 to X3	384.0 - 479.9	800.0
			1000:5		X1 to X4	480.0 - 575.9	1000.0
		-05	1200:5		X1 to X2	576.0 - 719.9	1200.0
			1500:5		X1 to X3	720.0 - 863.9	1500.0
X13580047	-01 ↓	1800:5	X1 to X2	864.0 - 1007.9	1800.0		
		2100:5	X1 to X3	1008.0 - 1199.9	2100.0		
		2500:5	X1 to X4	1200.0 - 1800.0	2500.0		
		-02	1000:5	X1 to X2	480.0 - 575.9	1000.0	
			1200:5	X1 to X3	576.0 - 719.9	1200.0	
			1500:5	X1 to X4	720.0 - 863.9	1500.0	

**Table 3**  
**CT Factor, Current Overload Settings #1 and #1**

CT Factor	Current Overload Setting #1	Current Overload Setting #2	CT Factor	Current Overload Setting #1	Current Overload Setting #2	CT Factor	Current Overload Setting #1	Current Overload Setting #2
66	00	255	77	11	244	88	22	233
67	01	254	78	12	243	89	23	232
68	02	253	79	14	241	90	24	231
69	03	252	80	15	240	91	25	230
70	04	251	81	26	239	92	25	230
71	06	249	82	17	238	93	26	229
72	06	249	83	18	237	94	27	228
73	07	248	84	19	236	95	28	227
74	08	247	85	20	235	96	28	227
75	09	246	86	21	234	97	29	226
76	10	245	87	22	233	98	30	225
						99	30	225

Example:

Step 1: A CVHE unit that is being commissioned is observed to have a motor RLA of 330 amps. It is also rated for operation on 480 volts. It is observed to have a single CT per phase installed, and the CTs are X13580253-05 (they will be marked with the extension number, in this case "05" or "5").

Step 2: Because the unit is observed to have a single PT per phase installed, use of Table 1 is required. This is also confirmed by the fact that the unit is rated for less than 600 volts.

Step 3: In Table 1 it is observed that a CT Meter Scale of "400" is obtained.

Step 4: Calculate the CT factor. Because we used Table 1 we should now apply the formula:

$$\text{CT Factor} = (\text{Motor RLA} / \text{CT Meter Scale}) \times 100$$

$$\text{CT Factor} = (330 / 400) \times 100$$

$$\text{CT Factor} = 82.5$$

If a CT Factor result is not a whole number, it is preferred to round down to the next value. A CT Factor of 82.5 would become 82.

Step 5: Use Table 3 and the CT Factor result to determine the correct Current Overload settings. In this example the CT Factor of 82 would provide a Current Overload Setting #1 of "17" and a Current Overload Setting #2 of "238".

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### **Parts Order Information**

This bulletin is informational only and does not authorize parts or labor.

### **Production Changes**

There are no production changes made per the procedure described in this bulletin.

### **Units Affected**

CVHE, CVHF, CVHG, CDHF, CDHG and CVGF centrifugal machines.