UNITED TECHNOLOGIES CARRIER

SERVICE BULLETIN

Title: **NEW SOFTWARE CONFIGURATION GUIDE**

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Models Affected: **ALL SINGLE COMPRESSOR 17/19DM MACHINES WITH VERSION VII AND LATER SOFTWARE. ALL DUAL-COMPRESSOR 17/19DR(DM) MACHINES WITH BASIC EPROM P/N KH98EZ-035 AND LATER.**

PURPOSE:

To provide a practical description of the diffuser wall control functions in the new software.

FOREWORD:

The new diffuser wall control algorithm has virtually eliminated the trials and errors associated with setting up 19DM compressors. This software provides proper diffuser wall control when set "by the book" for most machines. If surge occurs, check for the following before changing the DIP switch settings.

1. Proper DIP switch settings based on service bulletin C8708 and the start-up, operation and maintenance manuals for the new software; i.e., 19DR-3SSM(DM), 19DR-4SSM(DK), 19DM-3SSM, 19DK-3SSM, 17DR-1SSM(DM), 17DR-2SSM(DK), 17DM-2SSM AND 17DK-3SSM.

2. Air in the machine (faulty purge operation).

3. Inadequate condenser water flow or condenser entering water temperature too high (check part load performance using the selection program).

4. Leaving cooler water temperature too low or suction temperature below design (low refrigerant charge).

If surge is encountered due to improper diffuser wall position, this guide is intended to help you understand how the DIP switches alter functions and how the functions affect diffuser wall position so that a logical approach can be used to achieve desired diffuser wall control. You will find that configuring for one size smaller impeller diameter will usually resolve the problem in those rare cases when surging is encountered.

Do not attempt to use DIP switches to compensate for compressors with inadequate lift (poorly selected; i.e., part load), cycle deficiencies or operating conditions outside of selected limits.

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19DM COMPRESSOR

DIP SWITCH CONFIGURATIONS (NEW DIFFUSER WALL ALGORITHM; INCLUDES ESP II)

The functional results of most dip switch settings are clearly understood because they program a discrete "either/or" operating condition; i.e., 19DK/19DM, water/brine, 50 Hz/ 60Hz, etc. However, a few dip switches have functions that produce interrelated results based on the settings of other switches. In essence, the setting of one switch may cause a "reset" in the functional results of other switch settings. This interrelationship occurs primarily in the switches that control diffuser wall position. In order to understand this interrelationship, one must first understand the intended function of each switch setting.

DIFFUSER WALL CONTROL FUNCTIONS

1. Diffuser width setting.
2. Compressor selection factor setting.
3. Impeller diameter multiplier setting.
4. Motor amperage correction factor setting.

The switch settings for each of the functions can either open or close the diffuser wall. However, each function has a unique effect on how the diffuser wall is controlled.

Diffuser Width - This setting limits the maximum distance the wall can travel during operation (not during the controls test). The distance is based on maximum compressor design tons (not selected compressor tons). In most cases, select tons will be less than maximum tons. With the new software, set this by the book. Change only as a last resort when the ultimate fine tune is required.

With the older software, an estimated (trial and error) setting of the diffuser width had to be made based on selected compressor tons. This was necessary because the older software did not allow a compressor selection factor input.

Compressor Selection Factor - When selected compressor tons are less than maximum compressor tons, this setting "resets" the diffuser width to a smaller opening which is based on selected tons instead of maximum tons. A selection factor of "1" has no reset. The amount of reset increases as the factor increases from settings 2 through 8.

In general, increase the factor if the compressor(s) surge when operating at $\geq$ 80% RLA with $\leq$ selected lift. Decrease the factor if the compressor(s) will not draw selected RLA or produce tons and is not surging at $\leq$ selected lift.

Impeller Diameter Multiplier - This multiplier is used to modify the lift (condensing temperature - suction temperature) when used to calculate diffuser wall position. As the multiplier increases (smaller diameter), this product (modified lift) increases. As the modified lift increases, the calculated diffuser wall position decreases.

In general, decrease impeller diameter (increases multiplier) if the compressor(s) surge with < selected lift when operating with ≤ 75% RLA.

Motor Amps Correction Factor - As motor load reduces, motor power factor also reduces and does not permit amperage to decrease linearly with load. Since the 32MP uses amperage as an indication of load, this factor compensates for reduced power factor in the various motors at part motor load to "modify" the actual % RLA measured or displayed to a value representative of motor IKW or machine load. A factor of 3 is the nominal setting. Factors > 3 reduce "corrected" % RLA (corrected < actual) and factors < 3 increase "corrected" % RLA (corrected > actual). Increasing the motor amps correction factor will help eliminate surge at extreme low load conditions provided the diffuser wall is not already fully closed.

The corrected (modified) % RLA can be displayed by the ESP using unpublished parameter codes and is used in the following control applications:

1. Calculating 19DM diffuser wall position.
2. Before starting lag, closing lead guide vanes until RLA ≤ 60%*.
3. Criteria for stopping the lag chiller/compressor.*
4. Amps must not exceed 60% at time of recycle.**
5. Matching lead and lag compressor % RLA.

* The motor amperage correction factor serves a dual purpose on 19DM compressor machines and is used in the same manner on non-19DM compressor machines to determine machine or compressor load in lead-lag applications.

** The O & M books still reference a value of 65% RLA based on the anticipated displayed value.

Uncorrected % RLA is still used in the following control applications.

1. Current limiting.
2. During motor start (acceleration); checking that RLA drops below 100% in the specified time.
3. Displaying % RLA in controls test, during operation or with data-logging.
4. Inhibit diffuser wall opening if RLA exceeds 105%.

19DM COMPRESSOR SET-UP AND CALIBRATION

The dip switch functions that control diffuser wall position depends on accurate inputs from the cooler and condenser refrigerant sensors, motor current circuit and the diffuser wall feedback potentiometer. The motor current percentage and the feedback pot inputs must be calibrated for proper positioning of the wall. For 19DR dual compressor units, these calibrations are even more sensitive because the two compressors must match lifts based on individual % RLA and wall positions. If the lifts are not matched, the compressor with the lesser lift will stall (surge) even though it may be capable of operating fine by itself. Check the following:

A. Zero motor currents (comp. A and comp. B).

1. With machine off, put capacity control in hold to display % current. Turn "zero" potentiometer CW until reading above "0" appears on LCD. Then turn CCW until reading just reduces to "0".

B. Check diffuser feedback potentiometers (for new style processor boards and potentiometers, also see service bulletin C8716).

1. Disconnect plugs 1J2 and 4J1 which contain the wiring from the feedback pots.

2. Check for 10K-OHMS across terminals 1 and 3 on the pots. Adjust using trim pot if necessary.

3. Drive walls fully closed then check resistance across terminals 1 and 2. Resistance should be 9 to 10K-OHMS and should reduce smoothly as the pot is pushed in (simulate wall opening).

4. Reconnect plugs with potentiometer wiring to boards. Calibrate potentiometer so that voltage between 2 and 3 with wall in the fully closed position is 0.3 to 0.4 V DC. Caution: Make sure wall is being driven closed during this entire calibration process; if not, wall may creep open causing actual calibration to be lower.

5. With meter still attached to terminals 2 and 3, drive walls open while observing voltage change. Voltage should increase smoothly by 0.01V increments over the entire span with an occasional 0.02V jump.