



SERVICE BULLETIN

SUBJECT: Reliance VFD Service Change Summary - 2002	NUMBER: C0224A DATE: 1-21-03 SUPERSEDES: C0224 DATE: PAGE: 1 OF: 4
MODELS AFFECTED: 19XRV centrifugal chillers with Reliance unit-mounted VFD's (Variable Frequency Drives)	
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SITUATION:

Over the course of 2002 a variety of changes have been recommended for VFD setup parameters, wiring, and PIC controls configuration, often on a case-by-case basis. This bulletin summarizes those changes so that they can be more consistently understood and applied where necessary. *A (*) marks the revised paragraph in this bulletin.*

In addition, the most common diagnostic issues encountered at 19XRV jobsites can be summarized in a table which is provided with this bulletin.

INFORMATION:

The following changes affect drive operation:

- **Change (swap) wiring of 1M auxiliary relay and VFD Regulator Card (RC) terminals 30-31.** Part of this wiring "swap" connects power panel interface terminals 50-51 to RC board terminals 30-31. Since an internal relay closes to connect RC 30-31 whenever the VFD is running, this will assure that the chiller's oil pump will operate in the case of the VFD started by local control rather than by PIC control. *(Local control should never occur except as a result of an error in VFD configuration.)* The original wiring would not provide this important protection. This change *should be done* during the next scheduled service visit.

The other part of this wiring "swap" connects ISM terminals J2 9-10 (start contact feedback) to 1M relay terminals 4-6. The original wiring would not provide the feedback (contact closure) until the drive was actually running. With the change, the ISM correctly detects the start signal (from the ISM's 1CR) regardless of whether or not the drive starts. This restores the usefulness of the PIC diagnostic messages in diagnosing startup faults.

- **Increase drive parameter H.002 by a factor of 1.08.** This changes the threshold at which the drive starts integrating motor overload from 100% to 108% of load side full load amps (FLA). This should make the VFD's load side (motor) overload start counting at approximately the same time that the ISM would start integrating overload based on line side current. The change should eliminate frequent unnecessary VFD motor overload trips when the chiller is operating at or slightly above full load. This change should be done during the next scheduled service visit.

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- **Revise PIC-II controls software (I)CVC and replace ISM.** Changes in the (I)CVC and ISM software (a) provide a separate Starter Type configuration for VFDs, (b) permit line side current imbalances greater than 40%, and (c) change the ISM's line side overload calculation so that it won't start to integrate overload until line side current exceeds 120% RLA for VFDs (still 108% RLA for other starter types). These changes allow the VFD to take responsibility for providing load side (motor) overload protection, and they prevent the ISM from shutting down the chiller unnecessarily due to moderate line side current imbalances when operating at full design load. Refer to Service Bulletins C0209 (CVC), C0211A (ICVC), and C0215 (ISM) for details. Immediate field upgrades of (I)CVC and ISM together are recommended only for sites which presently have a line side current imbalance problem. There is currently a program to upgrade software in all ICVCs in the field which includes (but is not limited to) 19XRVs.

The following changes affect the ability to diagnose faults:

- **Change drive parameter r.044 from 0 to -1.** This parameter defines an off-delay in opening Relay #1, which is used for run contact (2M) feedback to the ISM. The change delays opening this equivalent to 2M when the drive shuts down. It is intended to prevent Fault 201 (2M contact fault) from being declared instead of Fault 206 (Starter Fault) or Fault 207 (High Condenser Pressure Trip) when one of the latter conditions is responsible for the drive shutdown. This change is recommended for generally improving fault diagnosis.
- **Revise drive EPROM software.** VFD EPROM software has been revised by Reliance. The revision assures that, when the drive declares and shuts down on a motor overload fault, the drive's display will show and retain the "OL" code. Prior to this revision the overload fault code would be overwritten by the VFD's autorestart counter, so no fault code was displayed (at the VFD), and troubleshooting was more difficult. This upgrade is recommended for sites plagued by drive-initiated shutdowns with no fault code explanation. The currently recommended method for upgrade is to change the VFD's Regulator Board (P/N 179116). The new regulator boards have the latest software loaded into the EPROM.

The following items clarify previously published information:

- **Toggle behavior of drive parameter passwords.** Reliance VFD configuration tables previously published refer to password 107 for parameter P.006 (Read/Write Access to H and r parameters) and password 26 for parameter P.051 (Programming Enable). Rather than being simply passwords to *enable* the features described, these passwords toggle access to the features. That is, the password can be used to change the feature *from disabled to enabled*, or *from enabled to disabled*.
- * ▪ **Negative value display.** Generally a minus sign (-) appears on the VFD display for negative values. However, if the value to be displayed includes four other characters, the minus sign is NOT displayed. In this cases negative is indicated by the SPEED LED blinking. For example, this applies to Parameter r.046 which has a value of -999.0 (previously incorrectly shown as 999 on Carrier drawing).

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Table I summarizes lessons learned relating to troubleshooting the most commonly encountered Reliance VFD issues:

Condition	Problem Description	Potential Cause
Setup	Drive will not show 'H' and 'r' parameters	P.006 = 107 not entered (password toggles access to these parameters on and off)
Setup	All parameters reset to Rockwell default values	P.050 set to ON instead of OFF
Setup	Cannot change parameters, 'Password' light is on in VFD display	P.051 = 1, should be 0. Enter P.051 password = 26 to toggle access to change P.051 back to 0
Calibration	RMI 65,68 0-5V speed feedback signal will not change with VFD speed	r.001 set to 1 instead of 4
Calibration	ISM 4-20 mA VFD output signal will not change to 20 mA @ 100% VFD speed	Version 04 or higher ISM is not installed
Calibration	Motor will not accelerate past .5 Hz(fault 202)	ISM J8-1 & 2 reversed (RC card 14,15 terminals are polarity sensitive.)
Calibration	VFD display changes from -99.9 to 100 while scrolling parameter r.046 to -999	Normal behavior. The VFD does not display minus sign when r.046 is set less than -99.9
Fault State 201	2M Contact Fault	H.002 is less than 1.08 x VFD Current Limit (SETUP2 Screen). (VFD Current Limit = "Motor RLA") Wiring change/swap connecting 1M 4-6 and ISM J2 9-10 has not been done, resulting in a misleading diagnostic. Perform wiring change, then evaluate. Auxiliary Relays loose
Fault State 202	Motor Amps Not Sensed	Test/Run switch is in Test position. See Service Bulletin C0205. P.000 is LOCL mode, should be rE
Fault State 205 and/or VFD Codes bYC & Aln	Drive shunt trips when power is applied, Current Sensed When Stopped	P.025 set to 1 instead of 0 ISM senses current precharging DC bus when power is first applied to VFD Starter Type selected in ISM CONFIG is not matched to ISM Version. (Use Type 2 for ISM Ver.4, Type 3 for ISM Ver.6.)

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<u>Condition</u>	<u>Problem Description</u>	<u>Potential Cause</u>
Fault State 207	High Condenser Pressure Trip (but condenser pressure is NOT excessive)	24vdc start signal is not getting to RC-24. Check operation of HPR, ISM, and 1M when start command is active.
		Check that VFD 'Remote' and 'Forward' lights are all on.
		P.000 should be set to rE to illuminate the remote light.
		P.027 should be set to 1 to illuminate the forward light.
		P.052 should be set to ON to disable the AUTO/MAN key.
Fault State 208	Excessive Motor Amps	H.002 set too high. (All phase currents exceeded 110% RLA for 30 sec.) Set H.002 to 1.08 x VFD Current Limit.
Fault State 215	Line Current Imbalance	Current Imbalance limit set too low. Increase Current % Imbalance limit in ISM CONFIG. If limit needs to be greater than 40%, replace ISM with Version 06 and load new (I)CVC software per Service Bulletin C0215.
Fault State 245	VFD Speed Out of Range	r.001 set to 0 instead of 4
VFD Code Aln	Loss of analog signal	Normal code when power is disconnected from chiller. When power is restored, press VFD STOP/RESET key
VFD Code CHS	Checksum Error	P.999 not configured following Regulator Board or VFD firmware chip replacement. (See p. 9 of C0130A.)
VFD Code EC	Earth Current	Ground fault or floating ground at job site. MOV modification may be required.
VFD Code FL	Function Loss(FL) code will not reset from VFD keypad	Chiller has shunt tripped. Cycle VFD power off for 3 minutes to clear.
Operation	Surge	Incorrect or variable cooler water flow
		Delta P and Delta T surge parameters incorrect - check surge parameter nameplate
		Adjust Delta P per p. 61 of O&M Manual