



Technical Bulletin (TB-0053A-05)

VARISPEED COMMISSIONING

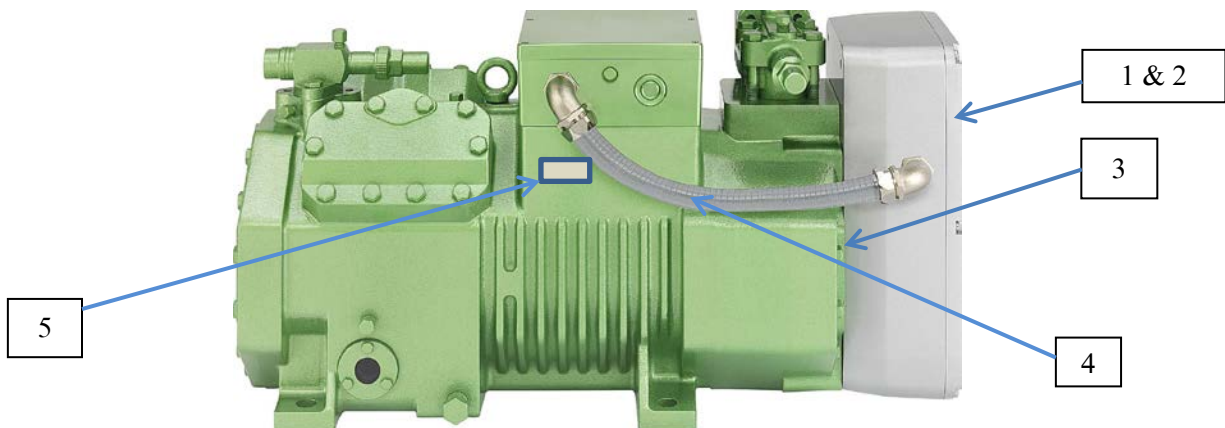
Version 5, Oct 2017

Document Contents

- General Overview
- Main Commissioning Checks
- Terminal Overview: (F3 and F4 Inverters)
- Commissioning w/ BEST Tool
- Troubleshooting
- Common Mistakes
- Typical Wiring (F3 and F4 Inverters)

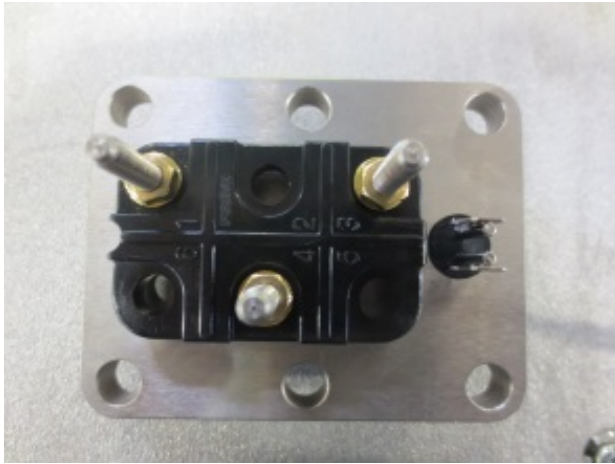
GENERAL OVERVIEW

1. The inverter is 460/3/60 input voltage/phase/hertz only (230/3/60 is not available).
2. The inverter is mounted and wired to the compressor by BITZER.
3. Heat transfer paste is applied between inverter and suction end bell of compressor to remove heat from the inverter. The inverter must be securely fastened to compressor.
4. Power from the inverter to the compressor is a sinusoidal DC voltage and may not be accurately measured with a standard multi-meter. A True-RMS meter or the BEST converter must be used
5. The motor code on the nameplate for CE3 model compressors is 2DU for 230V. The motor code for CE4 compressors is 2NU and must have jumpers bars configured for 230V direct on line start.

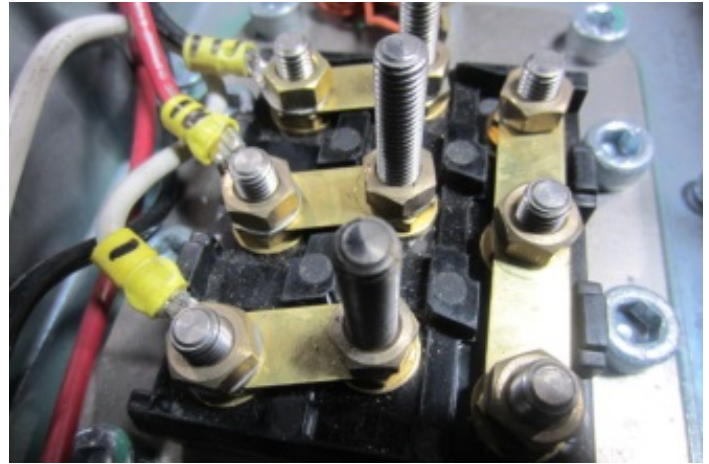


COMMISSIONING

- **CAUTION:** Make sure power is off before entering the electrical boxes for inspection.
- Ensure the inverter is securely mounted to the compressor. Inverter is mounted w/ four M8x25 bolts, torque to 22 ft-lb.
- Remove the terminal box cover and verify wiring is correct. For CE4 compressor (motor code 2NU), verify jumper bar configuration is for 230V direct on line start.
- Check and tighten all electrical connections. Check mechanical connections.



230V CE3 MODEL (2DU Motor)



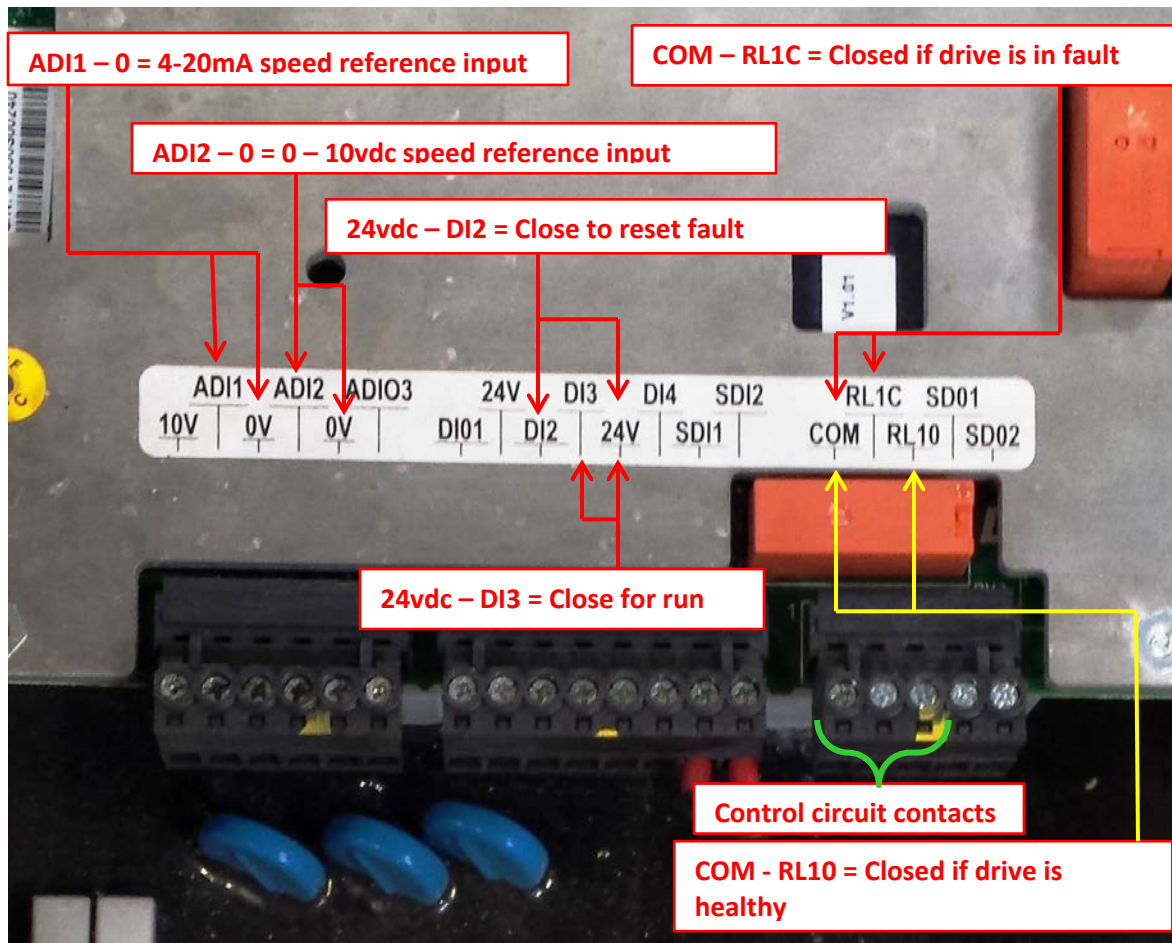
230V CE4 MODEL (2NU Motor)

- Verify 460V power source to input of the inverter.
- Verify in BEST software power supply voltage selection:

Parameter	Unit	Default Setting	Actual Setting	User Setting
Operating Frequency Range				
Minimum frequency	Hz	25.0		
Maximum frequency	Hz	87.0		
Resonance Avoidance				
Frequency range 1: Start	Hz	0		
Frequency range 1: End	Hz	0		
Frequency range 2: Start	Hz	0		
Frequency range 2: End	Hz	0		
General Inverter Settings				
Maximum switching frequency	kHz			
Power supply voltage	V	400 V		
Output Signals				
ADIO3: Output value		Frequency		

- Verify oil level is between $\frac{1}{4}$ and $\frac{3}{4}$ level. Check that crankcase heater is working. Verify that suction gas temperature is not above 68°F.
- Start Varipseed compressors after all non-Varipseed compressors have been started.

TERMINAL OVERVIEW (F3 & F4 Inverter)



Speed Reference

ADI2: Connection for 0-10 VDC

ADI1 : Connection for 4-20 mA

10V: Output of 10V can be used for full speed

0V: Output of 0V can be used for minimum speed

Run Signal

24V: Inverter 24VDC supply.

DI3: Connection for contacts from controller.

(This should be a powered by dry contact, the VFD has its own 24VDC power supply).

Fault Reset

24V: Inverter 24VDC supply.

DI2: Connection for external momentary contact.

(Requires 24V power for to reset)

Control Circuit Contacts

COM: Common

RL10: Closed if drive is healthy

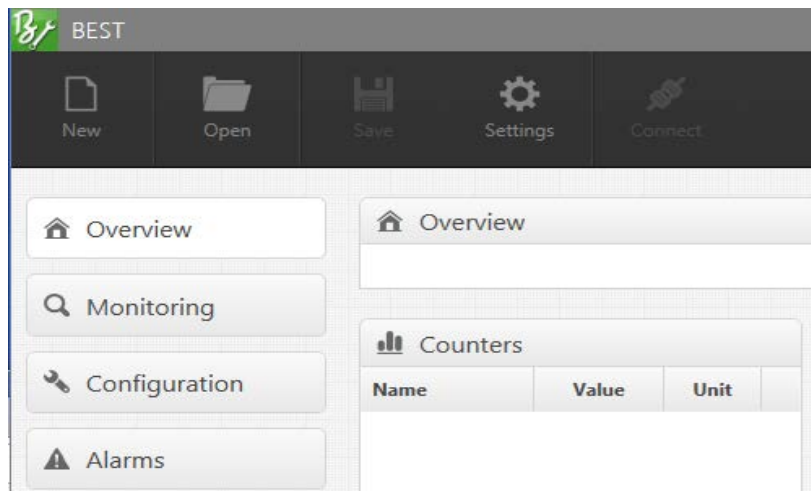
RL1C : Closed if Drive is in fault

COMMISSIONING w/ BEST Tool

- Install BEST software onto laptop or PC from the following link:
 - <https://www.bitzer.de/us/us/service/software/software/versions-best.jsp>
 - For detail instructions, see document TB-0065 VARISPEED BEST Download
- Install the BEST cable into RJ45 port on inverter and use the USB adapter to connect to a computer.



- Open the BEST Software and connect to the VARISPEED compressor (See TB-0065)
- Power on the compressor



- The “OVERVIEW” tab is the main informational screen.
- The “MORITORING” tab has more informational data and operational graphs
- The “CONFIGURATION” tab allow adjustments of various parameters
 - **CAUTION:** Some of the settings in the “Default” column may have been changed for US motor versions. Contact BITZER before changed any parameter
 - Resonance Avoidance frequency ranges should be set to “Jump” out any frequencies that may be causing excessive vibrations.
- Survey compressors operating data.
- Input the operating data into BITZER software and compare the output to the BEST software.

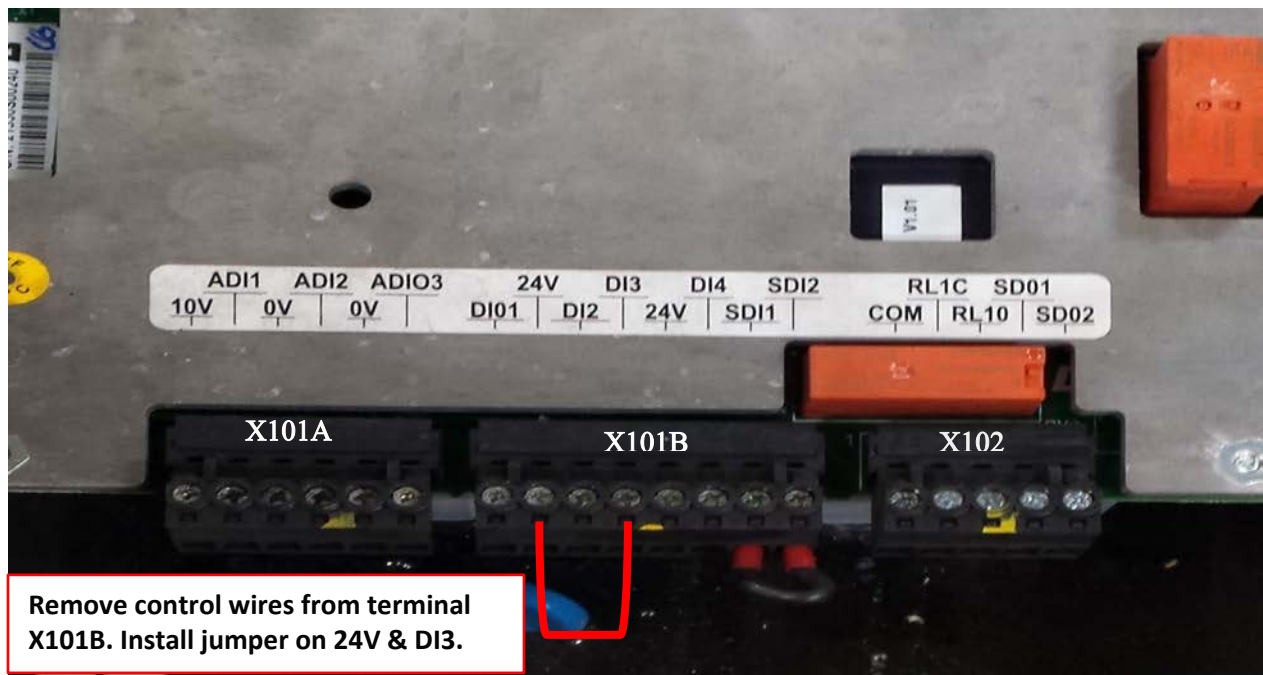
TROUBLESHOOTING

- Input the operating data into BITZER software and compare the result with the BEST output.
- Check for vibrations and resonance; the inverter has capability to “JUMP FREQUENCY”.
- BEST program has an Alarms page
 - This page as Alarm status and troubleshooting information.
- Green LED on and COM & RL10 closed indicates healthy drive
- Green LED off and RL1C closed for fault condition.

- If Compressor won't run
 - Check 460/3/60 to inverter
 - Check that 24V and DI3 is closed (Compressor run proof command)
 - Check that there is output voltage at the compressor terminals.
 - If there is no output voltage to compressor terminals and 24VDC run proof is present, COM-RL10 is closed and 0-10VDC run signal is present, contact Bitzer Tech Support.
 - If 24V and DI3 terminals run proof contact is closed:
 - Check if COM to RL1C is closed → the drive is in fault. BEST alarm log will show fault.
 - Reset the inverter – temporarily place a jumper between 24V & DI2 to reset.
 - If 24VDC power does not exist → onboard 24VDC power supply has failed (replace inverter)

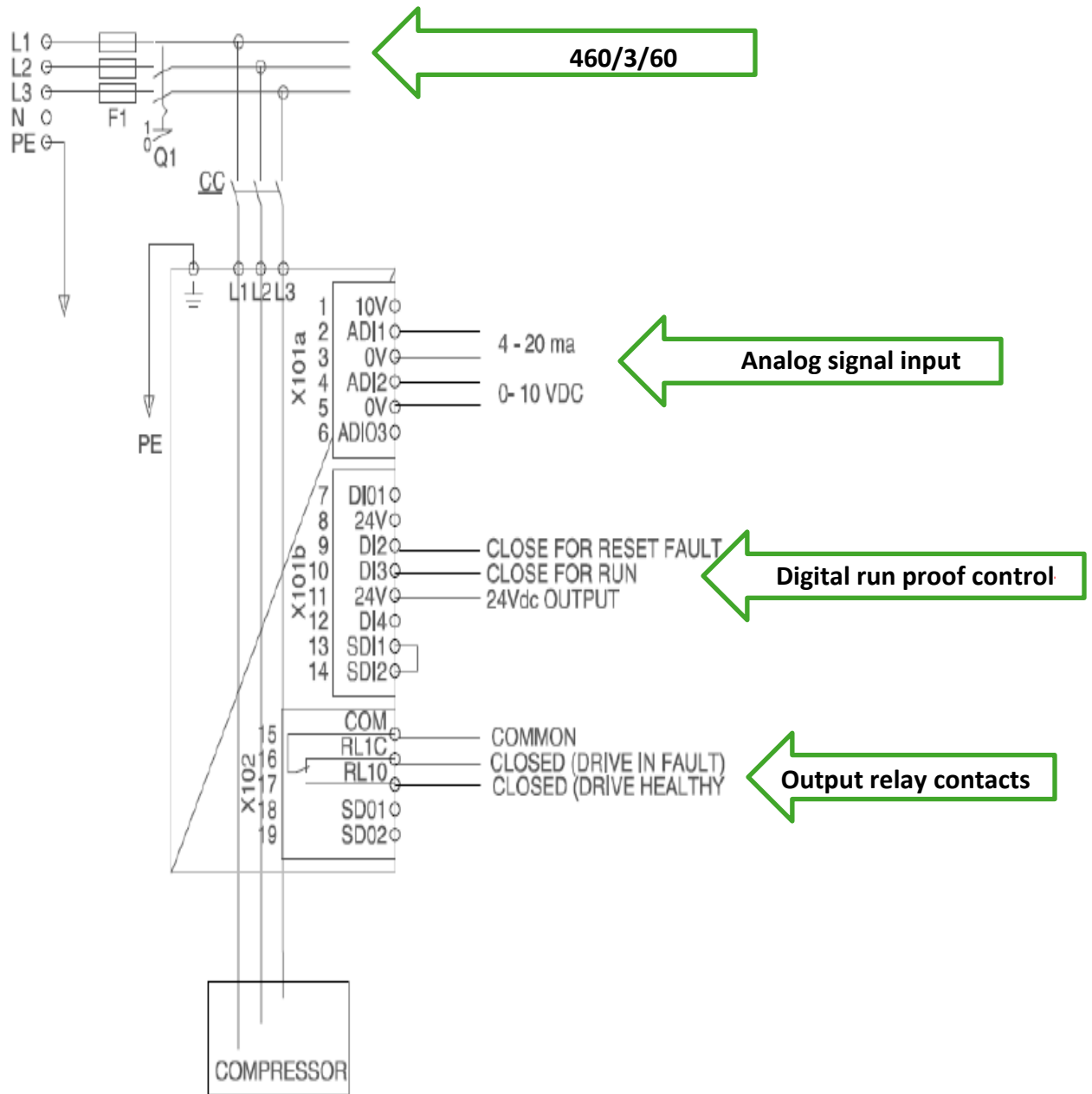
Alternate “Jump Start” Method

Directions on how to force inverter on without controller (for testing)



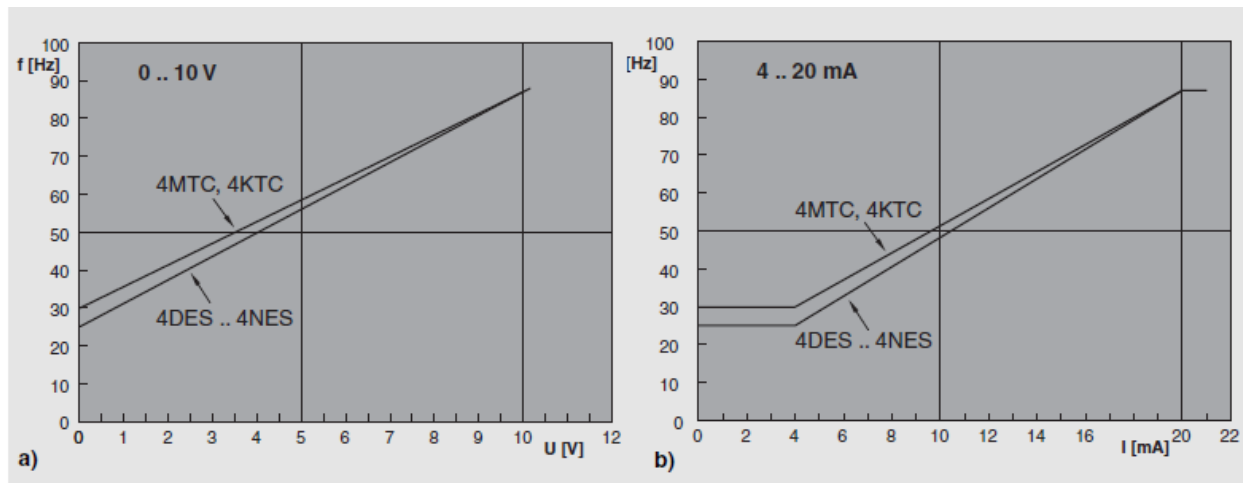
- Ensure power to VARISPEED inverter is off.
- Remove control wires from the terminal strip X101b.
- Install jumper wire from 24V to DI3
- Turn power to inverter on and check that 460/3/60 power is present to inverter.
- Check to see if COM to RL10 is closed. Measure 0 VAC. Or remove the pin connector and measure resistance of pins.
- With the jumper installed & RL10 closed, the inverter should run the compressor. It will run at minimum speed if the 0-10VDC is 0V and at maximum speed if the 0-10VDC is at 10 VDC.

Typical Wiring (F3 & F4 Inverters)



COMMON MISTAKES AND NEED TO KNOW ITEMS

- Line voltage to the X101B (24V – DI2 –DI3) terminals will damage the drive. It has its own 24VDC supply.
- 0 VDC/4mA run reference signals will drive the compressor at minimum speed (25 Hz or 30 Hz- 2 Cyl.) it will not turn the compressor off. See chart below.
- 10 VDC/20mA run reference signal will run compressor at full speed (87 Hz).



- Closure of DI2 (terminal 9) and 24VDC (terminal 11) will reset the inverter if it is in a “Fault” condition. The external switch (momentary contact) must be supplied by others.
- Alarm circuit contact available (RL1C).
- Run circuit contacts available (RL10).
- High suction gas temperature can cause the inverter to trip on high temperature. Maintain suction gas temperature below +68°F (IGBT max temp = +176°F)
- High discharge temperatures can cause the inverter to trip on overload (high amps).
- Mechanical damage to the compressor will cause high amperage and overload the inverter.
- If commissioning problem persists, check the hidden parameter buy clicking on “Details” at the bottom right corner of “Configuration” screen and contact BITZER.



Hidden parameter values differ

[Details...](#)

CAUTION!!!

The inverter may hold an electrical charge for up to 4 minutes in the capacitors after power is disconnected. Wait at least 4 minutes before opening the inverter cover after power has been removed from the inverter.