

## P/N: 74099 = Instructions for Service Kit # 74097

Inverter Replacement for PS638, PS640, PS740, PS840, PS640VE2, PS840VE2, PS670, PS770, PS870, PS360G, PS360GWB, & PS970 models.

### PN 74097 = INVERTEK E3 2HP INVERTER KIT

#### Kit Contents:

<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>TOOLS NEEDED</u>	<u>SIZE</u>
1	74098	2HP Invertek E3 Inverter (programmed PS640)	Phillips Screw Driver	
1	74091	Inverter Mounting Plate	Wire Stripper/Cutter	
1	70885	Wireset (includes ¼" FEMALE QC)	Terminal Crimper	
2	68170	#10 X 1-1/2" Self-Drilling Screw	Nut Driver	5/16"
4	44661	8-32 X 3/8" Hex Head Machine Screw	Nut Driver	1/4"
2	33363	DIN rail end stop		
1	74099	Inverter Installation Instructions		

**WARNING:** Disconnect the oven power, before proceeding to remove or replace the inverter. There should be nothing displayed on the inverter display. Wait for the display to clear after power is removed from the oven.

## **PHYSICAL CHANGES FOR FIRST TIME INSTALLATION OF THE INVERTEK E3**

### For replacement of the Invertek E3 inverter (all models):

1. If the inverter being replaced is an E3 Invertek inverter, simply move the wires from their position on the inverter being replaced to the new inverter.
2. The new inverter should be preprogrammed for the PS640 model. Follow the instructions to reprogram the parameters indicated that require alteration per the oven model being fitted with the new E3 inverter.
3. The parameters should be checked in sequence to confirm that the programming is correct.

### For replacement of the Lenze SMD inverter (all models):

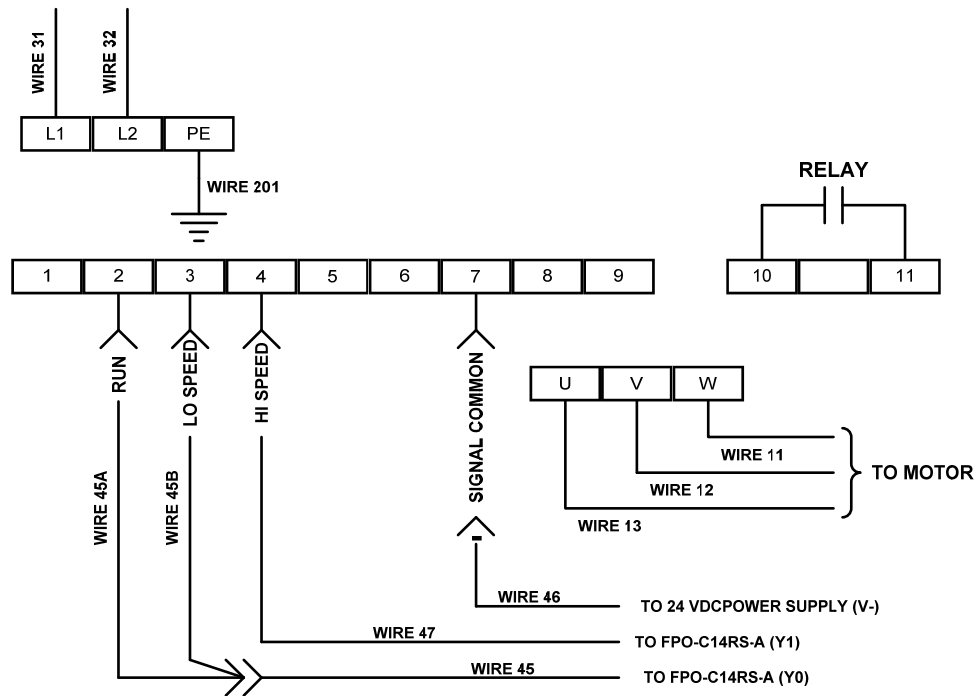
1. The Invertek E3 inverter will be mounted on a mounting plate, PN 74091. This bracket should be mounted in the oven using four 8-32 X 3/8" machine screws, PN 44661. The mounting plate will mount directly in place of the Lenze SMD inverter. The inverter will mount to the DIN rail by sliding it on from the end of the rail and is secured from moving using the two DIN rail end stops, PN 33363. Push the end stop against the inverter and snap the stop down onto the rail.
2. Wires used will be the same for the Invertek E3 as they were for the Lenze SMD. Connection diagrams on following pages show the new wiring arrangement.



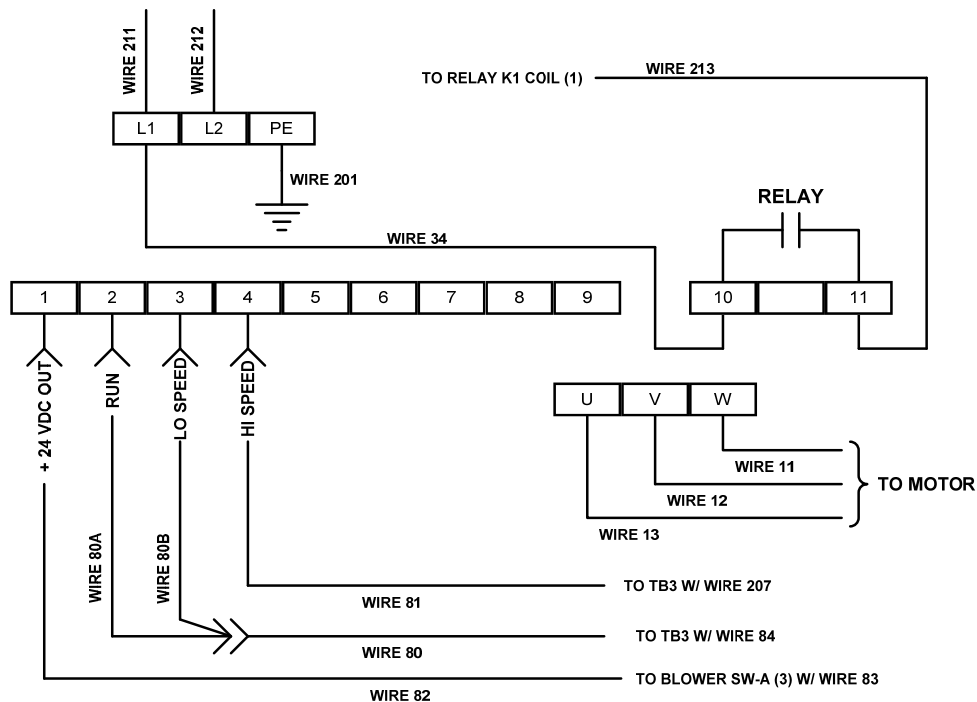
**For replacement of Vacon or Reliance inverters (PS640, PS740, PS840, PS670, PS770 & PS870):**

1. If the inverter being replaced was located on a DIN rail, this rail can be utilized to support the Invertek E3 inverter.
2. If the inverter being replaced is a Reliance MD60 or Vacon inverter, there are several wiring differences that will need to be addressed.
3. First, for PS640, if wires 44 and/or 252 are present, they will not be required and must be removed. A jumper wire associated with wire 44 at the inverter terminal block should be removed, as well.
4. Wire the power connection as shown in the appropriate diagram for the oven being serviced.
  - a. For the PS640/740/840 ovens, wires 31, 32 and 201 are used.
  - b. For the PS640/840 VE2 ovens, wires 211, 212 and 201 are used.
  - c. For the PS670/770/870 ovens, wires 32, 33 and 135 or wires 37, 38 and 136 are used.
5. Wire the signal wires per the appropriate diagram for the oven being serviced.
  - d. For the PS640/740/840 ovens, wires 45, 46 and 47 are used. A wire assembly, 45A/45B (PN 70885) is provided to make connections from wire 45 to the inverter. Wire 45 will need to be terminated with a ¼" female insulated quick connect (provided) to mate with this assembly.
  - e. For the PS640/840 VE2 ovens, wires 80, 81 and 82 are used. A wire assembly, 80A/80B (PN 70885) is provided to make connections from wire 80 to the inverter. Wire 80 will need to be terminated with a ¼" female insulated quick connect (provided) to mate with this assembly.
  - f. For the PS670/770/870 ovens, wires 49/50, 56/57 and 51/52 or 50, 51 and 57 are used. A wire assembly (PN 70885), 49A/49B or 50A/50B is provided to make connections from wire 49/50 or 50 to the inverter. Wire 49/50 or 50 will need to be terminated with a ¼" female insulated quick connect (provided) to mate with this assembly.
6. Wire the motor wires per the appropriate diagram for the oven being serviced. The wires previously on terminals T1, T2 and T3 are now connected to U V and W on the Invertek E3 inverter.
  - g. For the PS640/740/840 ovens, wires 11, 12 and 13 are used.
  - h. For the PS640/840 VE2 ovens, wires 11, 12 and 13 are used.
  - i. For the PS670/770/870 ovens, wires 34, 35 and 36 or wires 39, 40 and 41 are used.

## INVERTER WIRING CONNECTIONS BY MODEL



## INVERTEK E3 INVERTER CONNECTIONS PS640/740/840



## INVERTEK E3 INVERTER CONNECTIONS PS640-VE2/840-VE2



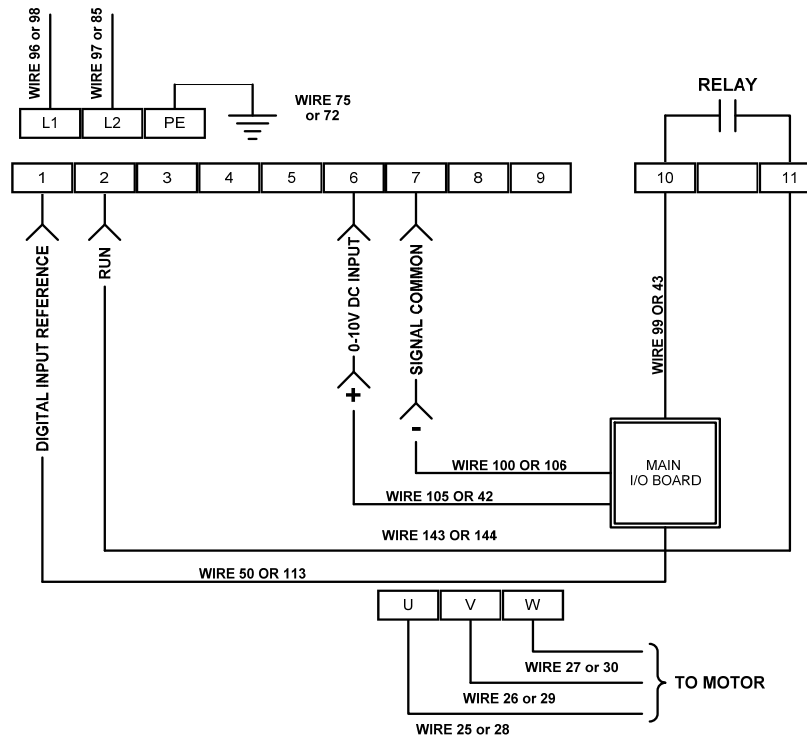
The diagram illustrates the wiring for the FPO-C14RS-A (Y0) terminal block. It features a 11-terminal block with the following connections:

- Terminal 1:** Connected to WIRE 50A or 49A (RUN).
- Terminal 2:** Connected to WIRE 50B or 49B (LO SPEED).
- Terminal 3:** Connected to WIRE 50C or 49C (HI SPEED).
- Terminal 4:** Connected to WIRE 51/52 or 52 (TO 24 VDC POWER SUPPLY (V-)).
- Terminal 5:** Connected to WIRE 56/57 or 57 (TO FPO-C14RS-A (Y1)).
- Terminal 6:** Connected to WIRE 49/50 or 50 (TO FPO-C14RS-A (Y0)).
- Terminal 7:** Connected to WIRE 51/52 or 52 (TO 24 VDC POWER SUPPLY (V-)).
- Terminal 8:** Connected to WIRE 56/57 or 57 (TO FPO-C14RS-A (Y1)).
- Terminal 9:** Connected to WIRE 51/52 or 52 (TO 24 VDC POWER SUPPLY (V-)).
- Terminal 10:** Connected to WIRE 56/57 or 57 (TO FPO-C14RS-A (Y1)).
- Terminal 11:** Connected to WIRE 56/57 or 57 (TO FPO-C14RS-A (Y1)).

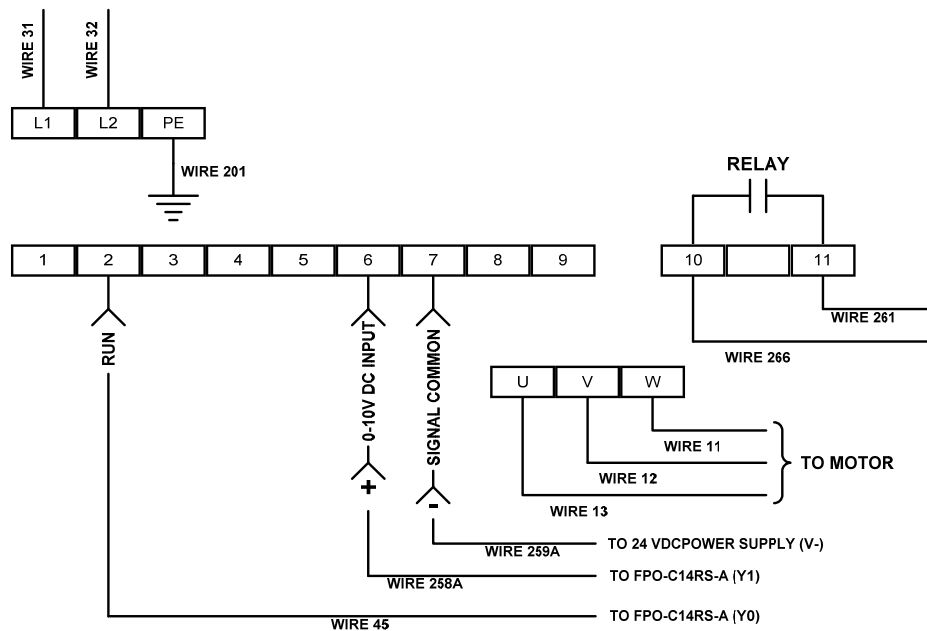
Additional components shown include a 24 VDC POWER SUPPLY (V-) connected to terminals 4, 7, 8, and 9; a RELAY connected to terminals 10 and 11; and a MOTOR connected to terminals 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11.

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## INVERTER WIRING CONNECTIONS BY MODEL (cont.)



## INVERTEK E3 INVERTER CONNECTIONS PS360G OR PS970 2-INVERTER



## INVERTEK E3 INVERTER CONNECTIONS PS638



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## **MODIFYING THE INVERTER PROGRAM**

The programs for the Invertek inverters are very similar for the PS640 series ovens and the PS670 series ovens. Only a few parameters need to be reset in order to customize the inverter for the required model. **Inverters sent out for service are sent with a program customized for the PS640 Standard ovens.**

Power must be applied to the inverter in order to modify the parameter settings.

To change the parameters to accommodate the model being serviced:

1. Follow the instructions for changing parameters following the table below.
2. Change only the parameters shown in the table below to those values utilized for the oven being serviced. Only four parameters (P-01, P-02, P-21 & P-23) require changing or confirmation. These are noted in the table below by an asterisk before the parameter label.
3. **For models not listed, you will need to order a specifically programmed inverter or contact Middleby for correct program information.**



Parameter	PS640-24VE2RL	PS640 Standard (Default)	PS640 Domino's	PS740	PS840 YRI (PHD & Par Bake)	PS840 YRI & Pizza Hut	PS640/740/840 VE2	PS670 Standard	PS670 Domino's	PS770	PS870	PS360G/GWB	PS970	PS638
P-01 *	30	53	53	55	53	53	53	74	76	67	74	90	90	80
P-02 *	25	30	30	30	30	30	30	40	40	40	40	45	40	30
P-03	10	10	10	10	10	10	10	10	10	10	10	20	10	10
P-04	10	10	10	10	10	10	10	10	10	10	10	20	10	10
P-06	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P-08	7	7	7	7	7	7	7	7	7	7	7	3.2	7	7
P-09	60	60	60	60	60	60	60	60	60	60	60	60	60	60
P-11	6	6	6	6	6	6	6	6	6	6	6	5.3	6	6
P-13	2	2	2	2	2	2	2	2	2	2	2	2	2	2
P-14	101	101	101	101	101	101	101	101	101	101	101	101	101	101
P-15 **	2	2	2	2	2	2	2	2	2	2	2	0 **	0 **	0 **
P-16	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10	U 0-10
P-17	16	16	16	16	16	16	16	16	16	16	16	16	16	16
P-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P-21 *	25	30	30	30	30	30	30	40	40	40	40	(30)	(30)	(30)
P-23 *	30	53	53	55	53	53	50	74	76	67	74	(53)	(53)	(53)
P-30	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>	<b>Auto-5</b>

\* Denotes parameters that should be checked for specific value based upon oven model.









\*\* IMPORTANT – If this setting is incorrect, the blowers will not function properly. 360G, 360GWB, 970 & 638 require the zero ("0") setting.

( ) Denotes parameter not used for this oven – does not matter what value is here.











### **Changing the Parameters for PS640 series and PS670 series (for specific model)**

As indicated by the asterisks in the chart above, there are only a few parameters that need to be modified to set up the inverter for a specific model. All parameters should be checked however, to confirm that the default program (PS640 Standard) was present.

1. Press and hold the "Navigate" button  on the inverter for 3 seconds. It will now display a parameter code, such as "P-01".
2. Press the up or down arrow until P-01 is displayed.
3. P-01 is the Maximum Frequency setting for the inverter for the oven series being programmed. Press  to see what value (in Hz) is in P-01. If a change is required, press the up or down arrow until the desired value is displayed. Press  to return to parameter selection.
4. Arrow up to P-02. P-02 is the Minimum Frequency allowable for the oven model. Press  to see what value (in Hz) is in P-02. If a change is required, press the up or down arrow until the desired value is displayed. Press  to return to parameter selection.
5. Arrow up to P-21. P-21 is the Low Speed preset setting for the inverter. Press  to see what value (in Hz) is in P-21. If a change is required, press the up or down arrow until the desired value is displayed. Press  to return to parameter selection.
6. Repeat the process used above to change the value for P-23 (High Speed preset) per the table values to match the oven model being serviced.
7. Press and hold  to exit parameter editing mode, or wait for a minute and the display will change from displaying the parameter code to "Stop".
8. The inverter should be ready to go.

### **Changing the Parameters for PS360G/GWB, PS970 or PS638 (for specific model)**

As indicated by the asterisks in the chart above, there are only a few parameters that need to be modified to set up the inverter for a specific model. All parameters should be checked however, to confirm that the default program (PS640 Standard) was present.

1. Press and hold the "Navigate" button  on the inverter for 3 seconds. It will now display a parameter code, such as "P-01".
2. Press the up or down arrow until P-01 is displayed.
3. P-01 is the Maximum Frequency setting for the inverter for the oven series being programmed. Press  to see what value (in Hz) is in P-01. If a change is required, press the up or down arrow until the desired value is displayed. Press  to return to parameter selection.
4. Arrow up to P-02. P-02 is the Minimum Frequency allowable for the oven model. Press  to see what value (in Hz) is in P-02. If a change is required, press the up or down arrow until the desired value is displayed. Press  to return to parameter selection.
5. Arrow up to P-15. P15 configures the control terminals (1 through 9). Press  to see what value is in P-15. It must be set to "0" (zero) in order for the inverter to function properly and for blower speeds (Hz) to be set through the user interface. If a change is required, press the up or down arrow until the desired value is displayed. Press  to return to parameter selection.
6. Press and hold  to exit parameter editing mode, or wait for a minute and the display will change from displaying the parameter code to "Stop".





### CHANGING PARAMETERS

Only the parameters below need to be changed for the models listed. See the parameters for the specific models on page seven. All other parameters should remain unchanged.

#### MODELS PS640, PS740, PS840, PS670, PS770, PS870







Parameters to be changed for different models:

- P-01 Maximum Speed (Hz)
- P-02 Minimum Speed (Hz)
- P-21 Low Speed (Hz)
- P-23 High (Baking) Speed (Hz)

#### MODELS PS360G, 360GWB, PS638, PS970








Parameters to be changed for different models:

- P-01 Maximum Speed (Hz)
- P-02 Minimum Speed (Hz)
- P-15 Terminal Configuration

Changing Parameters	
	Press and hold the Navigate key > 2 seconds
	Use the up and down keys to select the required parameter
	Press the Navigate key for < 1 second
	Adjust the value using the Up and Down keys
	Press for < 1 second to return to the parameter menu
	Press for > 2 seconds to return to the operating display



## Viewing the Fault Log

1. Press and hold the "Navigate" button  on the inverter for 3 seconds. It will now display a parameter code, such as "P-01".
2. Press  or  until P-00 is displayed.
3. Press  and P00-01 will appear. Press  until P00-13 appears.
4. Press  to view the last fault code. Press  three times to view the previous three codes.

## 10. Trouble Shooting

### 10.1. Fault Code Messages

Fault Code	No.	Description	Suggested Remedy
no-Fault	00	No Fault	Not required
DI-b	01	Brake channel over current	Check external brake resistor condition and connection wiring
DL-br	02	Brake resistor overload	The drive has tripped to prevent damage to the brake resistor
O-I	03	Output Over Current	Instantaneous Over current on the drive output. Excess load or shock load on the motor.
I-terP	04	Motor Thermal Overload (I2t)	The drive has tripped after delivering >100% of value in P-08 for a period of time to prevent damage to the motor.
P5-trP	05	Power stage trip	Check for short circuits on the motor and connection cable
O-volt	06	Over voltage on DC bus	Check the supply voltage is within the allowed tolerance for the drive. If the fault occurs on deceleration or stopping, increase the deceleration time in P-04 or install a suitable brake resistor and activate the dynamic braking function with P-34
U-volt	07	Under voltage on DC bus	The incoming supply voltage is too low. This trip occurs routinely when power is removed from the drive. If it occurs during running, check the incoming power supply voltage and all components in the power feed line to the drive.
O-t	08	Heatsink over temperature	The drive is too hot. Check the ambient temperature around the drive is within the drive specification. Ensure sufficient cooling air is free to circulate around the drive. Increase the panel ventilation if required. Ensure sufficient cooling air can enter the drive, and that the bottom entry and top exit vents are not blocked or obstructed.
U-t	09	Under temperature	Trip occurs when ambient temperature is less than -10°C. Temperature must be raised over -10°C in order to start the drive.
P-def	10	Factory Default parameters loaded	
E-trIP	11	External trip	E-trip requested on digital input 3. Normally closed contact has opened for some reason. If motor thermistor is connected check if the motor is too hot.
SC-ObS	12	Optibus comms loss	Check communication link between drive and external devices. Make sure each drive in the network has its unique address.
FLt-dc	13	DC bus ripple too high	Check incoming supply phases are all present and balanced
P-LOSS	14	Input phase loss trip	Check incoming power supply phases are present and balanced.
h O-I	15	Output Over Current	Check for short circuits on the motor and connection cable
th-Fault	16	Faulty thermistor on heatsink	
dRtR-F	17	Internal memory fault. (IO)	Press the stop key. If the fault persists, consult your supplier.
4-20 F	18	4-20mA Signal Lost	Check the analog input connection(s).
dRtR-E	19	Internal memory fault. (DSP)	Press the stop key. If the fault persists, consult your supplier.
F-Ptc	21	Motor PTC thermistor trip	Connected motor thermistor over temperature, check wiring connections and motor
FRn-F	22	Cooling Fan Fault (IP66 only)	Check / replace the cooling fan
O-HEAt	23	Drive internal temperature too high	Drive ambient temperature too high, check adequate cooling air is provided
AtF-D1	40	Autotune Fault	The motor parameters measured through the autotune are not correct. Check the motor cable and connections for continuity. Check all three phases of the motor are present and balanced
AtF-D2	41		
AtF-D3	42		
AtF-D4	43		
AtF-D5	44		
SC-FQ1	50	Modbus comms loss fault	Check the incoming Modbus RTU connection cable. Check that at least one register is being polled cyclically within the timeout limit set in P-36 Index 3
SC-FQ2	51	CANopen comms loss trip	Check the incoming CAN connection cable. Check that cyclic communications take place within the timeout limit set in P-36 Index 3