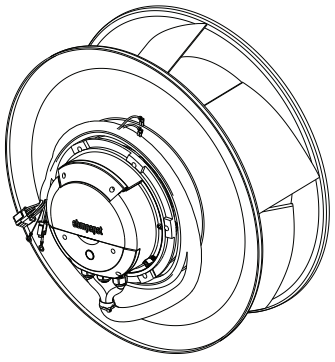
Programming and Troubleshooting Guide

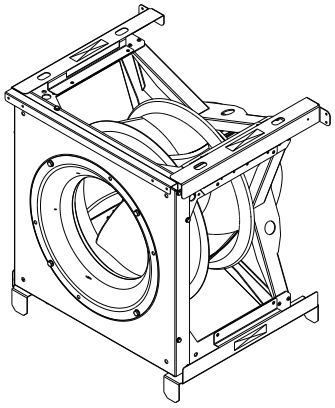
BC Plenum Indoor Fan

Precedent™ Packaged Rooftop Air Conditioners

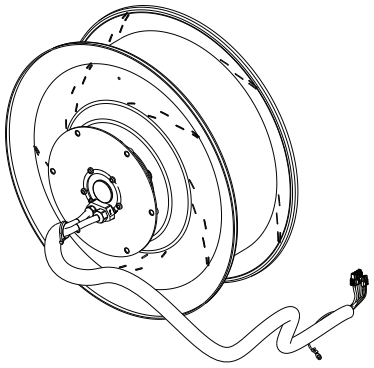
- EBM Fans: 6 to 10 Tons
- Regal Fans: 10 Ton Standard Efficiency
- EBM Fans with Separate VFD: 6 to 10 Tons Standard and High Efficiency



EBM



Regal



EBM with Separate VFD

Model Numbers:

EBM

T/YSC092-102H3,4,W
T/YHC074F3,4
T/YHC092E3,4
T/YHC092F3,4
T/YHC102E3,4
T/YHC120E3,4
T/YZC072-120F3,4,W
WSC090-120E3,4,W
D/WHC074-120

Regal

TSC120H3,4,W,K

EBM with Separate VFD

YSJ072*3,4
YSJ090*3,4
YSJ102*3,4
YSJ120*3,4
YHJ072*3,4
YHJ090*3,4
YHJ102*3,4
YHJ120*3,4

⚠SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

May 2023 **RT-SVP08G-EN**

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

Copyright

Trademarks

All trademarks referenced in this document are the trademarks of their respective owners.

Revision History

Added EBM Fans with Separate VFD Model Numbers and information.

Table of Contents

EBM

Important:

- *This chapter is not applicable for 10 ton, standard efficiency units (models TSC120H3,4,W,K). See "Regal," p. 16 for information on these models.*
- *This chapter is not applicable for units with separate VFD (see Page 1 for models). See "EBM Fans with Separate VFD," p. 25 for information on these models.*

Operation

Plenum Fan Motor

Mount Bolt Pattern

All factory installed plenum fan motors use 6 bolts to mount the motor to the fan assembly and all 6 bolts are installed. Newer, third generation plenum fans (FAN05492 and FAN05496) only have a 6-bolt pattern in the mounting flange. Older, second generation plenum fan motors (FAN04605 and FAN04606) have mounting holes for the 6 bolt pattern as well as an older 8 bolt pattern. When replacing a motor, use the 6 bolt pattern as factory installed.

Figure 1. Third generation EBM motor mounting bolt pattern

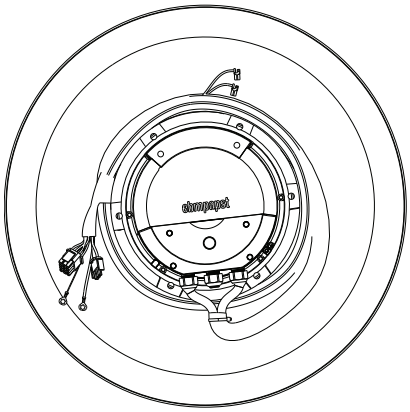
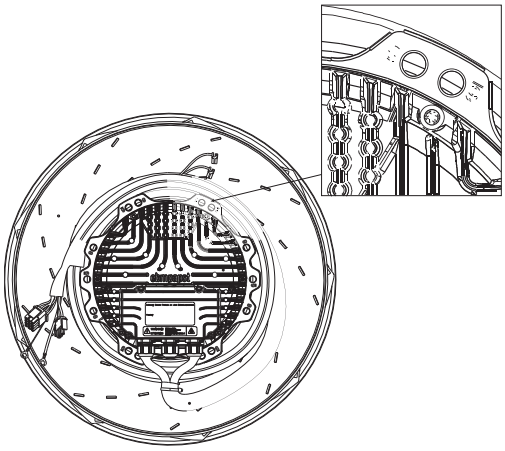


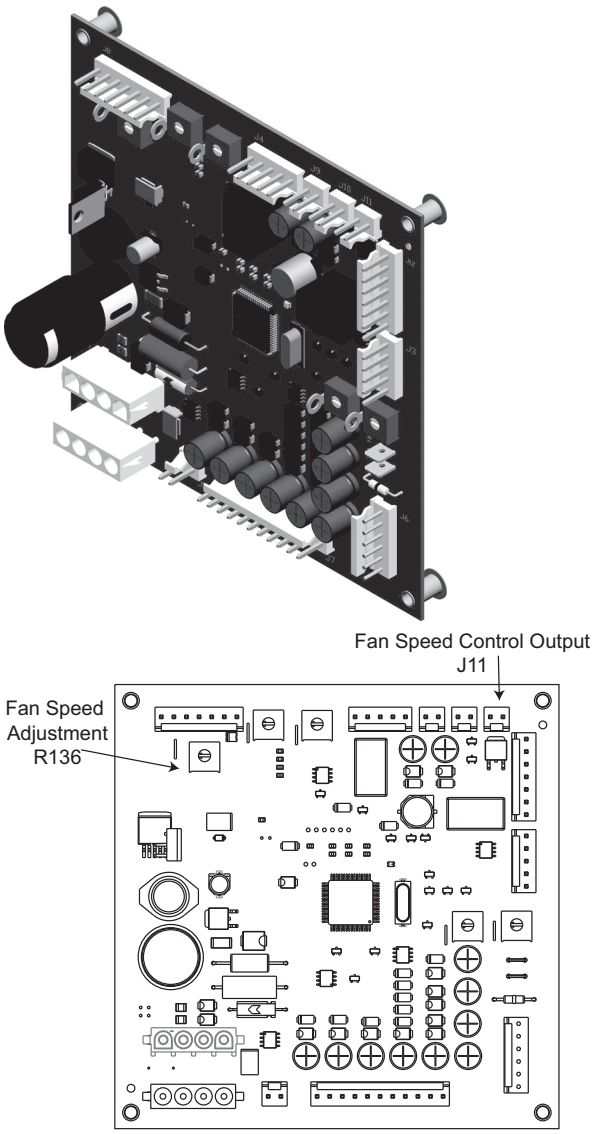
Figure 2. Second generation EBM motor mounting bolt pattern



Plenum Fan Motor Control Identification

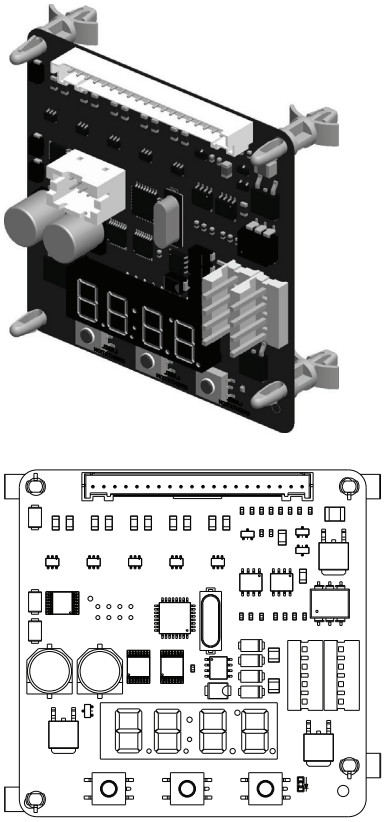
There are three ways the plenum indoor fan motor can be controlled and each are covered in this document. (See Figure 3 and Figure 4.)

Figure 3. ReliaTel™ options module control (RTOM)



Note: *T/YZC072-120F3,4,W only uses this board for plenum fan speed adjustment.*

Figure 4. Engine module control (ECM)



Troubleshooting

Initial Motor Troubleshooting

⚠WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

1. Call for fan - Is the thermostat, zone sensor, or Building Automation System (BAS) calling for the indoor fan to be on?
   a. Check system for indoor fan call.
   b. Check low-voltage connections and wiring.
2. Phase monitor - Is there a fault on the unit phase monitor (PHM)?
   a. If there is a fault on the unit phase monitor, the red LED will be on and the unit will not operate.
   b. Check LED on unit phase monitor (Red = Fault, Green = Okay).
   c. The unit phase monitor checks for a reversed phase, a lost phase, or a phase imbalance. If any of those conditions exist, correct the issue. When the issue is corrected, the green LED should be on.
3. Applicable only to third generation motors.
   a. Check the remote LED indicator.
   b. A steady LED indicates the motor is powered and there are no errors/ warnings in the motor.
   c. A blinking LED indicates the motor has an error code. The number of blinks indicates the specific error.

Table 1. LED blinking codes - EBM

	Optical status indication LED statically: Motor in operation or ready for operation; status ok	
	LED is Blinking	Error Codes
External LED; connected to I/O 1 and VOUT	1x	mains voltage phase failure
	3x	over temperature of power module
	4x	internal communication error primary - secondary
	6x	over temperature of motor winding
	7x	hall sensor error
	8x	rotor locked
	13x	dc-link-undervoltage

Figure 5. Plenum third generation motors

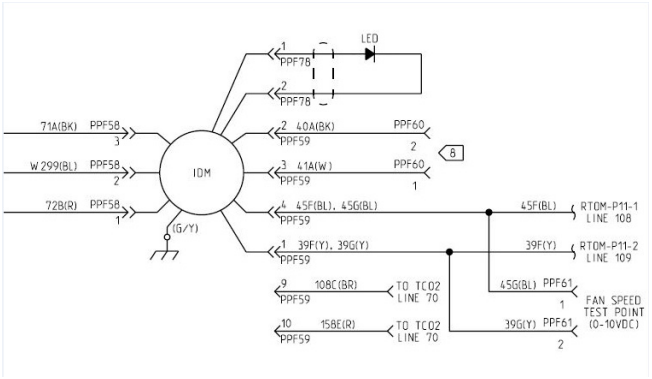
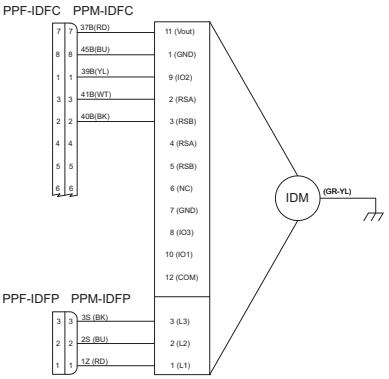


Figure 6. Plenum third generation motor harness connections throughout troubleshooting



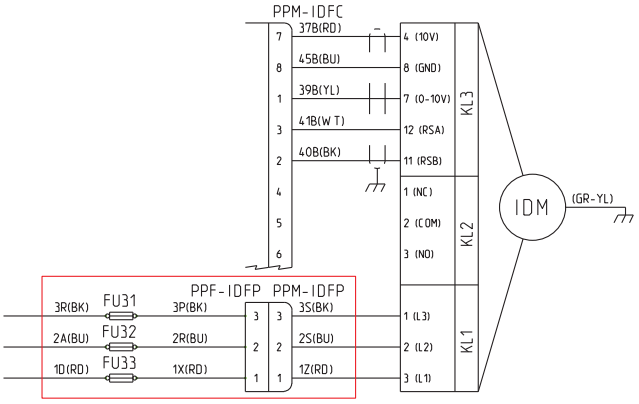
4. Motor power - Is the problem with the motor power?
   a. Supply power needs to be within 10% of rated unit nameplate voltage. (See Table 2.)

Table 2. Unit operating voltage range

Unit Nameplate Voltage	Voltage Range
208-230V	187-253
460V	414-506
575V	517-633

   b. Measure AC line voltage to unit: (Difference between each measurement should be less than 2%)
      i. L1 - L2
      ii. L2 - L3
      iii. L1 - L3
   c. Measure AC phase voltage to ground:
      i. L1 - Ground
      ii. L2 - Ground
      iii. L3 - Ground
   d. Check for blown fuses by measuring the AC phase voltage before and after fuse:
      i. L1 - Ground (entering fuse)
      ii. L2 - Ground (entering fuse)
      iii. L3 - Ground (entering fuse)
      iv. L1 - Ground (leaving fuse)
      v. L2 - Ground (leaving fuse)
      vi. L3 - Ground (leaving fuse)
   e. Check incoming motor power by checking line-to-line AC voltage at pins 1, 2, and 3 of PPF-IDFP. All measurements should be within 2% of each other. (See Figure 7.)
5. Internal motor protection - Cycling the unit power off for 3 minutes will allow the internal motor protection to reset if it is tripped.
6. Check 575 Vac plenum fan motor supply voltage. On 575 Vac units, the plenum fan motor will be a 460 Vac motor powered with a step down transformer. (See Figure 10.)

Figure 7. Plenum fan - incoming motor power(a)



(a) Not used on TZC072-120F3,4,W.

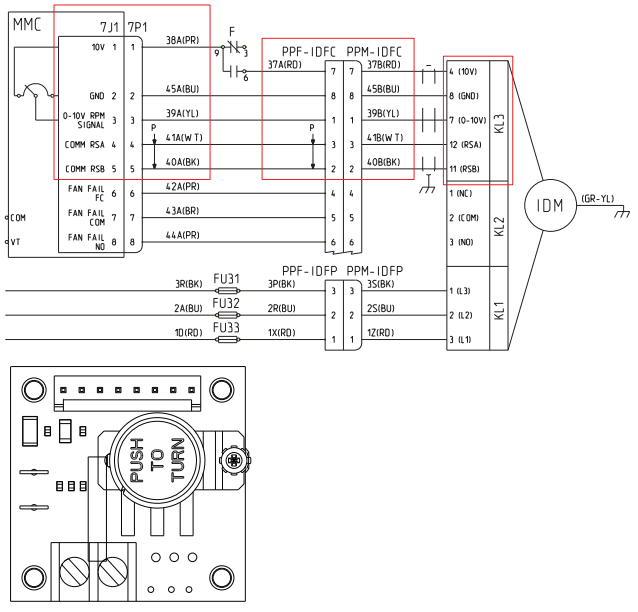
Plenum Fan Motors with MMC Motor Control Troubleshooting

WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Figure 8. MMC controlled - motor DC voltage input(a)

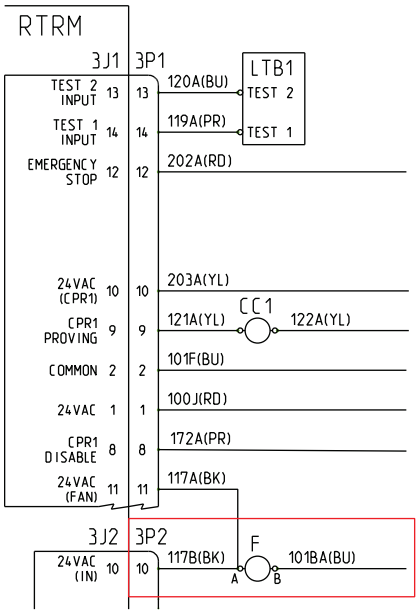


(a) Not used on TZC072-120F3,4,W.

1. Check plenum fan motor - 10 Vdc control voltage. (See Figure 8.)
   a. Check 10 Vdc output from motor - Check motor control DC voltage output by checking for 10 Vdc across pin 7 and 8 of PPM-IDFC. If voltage is not present, check wiring and connections. If wiring is correct and no 10 Vdc output is measured on pins 7 and 8 of PPM-IDFC, the motor is bad, replace motor.
   b. Check 10 Vdc input to MMC board - Check the 10 Vdc output across pins 1 and 2 on 7J1/7P1 on the MMC board. If 10 Vdc is not present, check the F fan relay. Replace F relay if needed. See Step 2 below for more detail on checking the F relay.
   c. Check MMC board Vdc output - Measure DC voltage across pins 3 and 2 of 7P1. Voltage should be greater than 3 Vdc. If voltage is less than 3 Vdc, check pins and connections of MMC 7J1 and 7P1. First try to adjust the voltage output from the MMC by adjusting the potentiometer on the MMC board. If the voltage cannot be adjusted to above 3 Vdc or there still is no output after adjustment, replace MMC module.
   d. Check motor Vdc input - Measure the DC voltage across pins 1 and 8 of PPF-IDFC. If voltage is not 3 Vdc or higher, check your wires from MMC board. Voltage should be the same across pins vt and com on the MMC Board and across pins 1 and 8 of PPF-IDFC.
   e. Check motor wiring - Check wiring at motor connection KL3. If wiring connections are correct, replace the motor.
2. Check plenum fan motor relay.

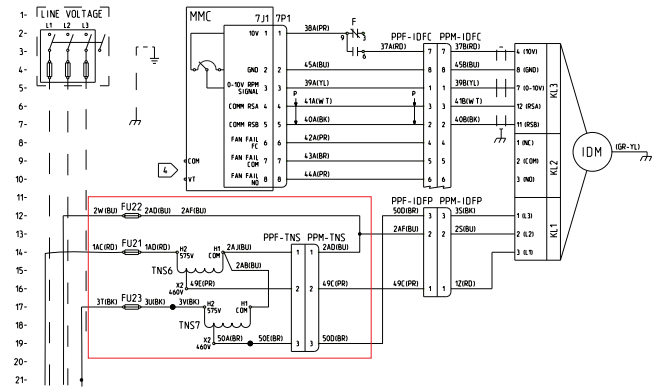
   Check for 24 Vac across pins A and B of Fan (F) relay. If voltage is not present verify control wiring. (See Figure 9.)

Figure 9. Fan (F) relay coil voltage[a]



(a) Not used on TZC072-120F3,4,W.

Figure 10. 575 Vac motor voltage power



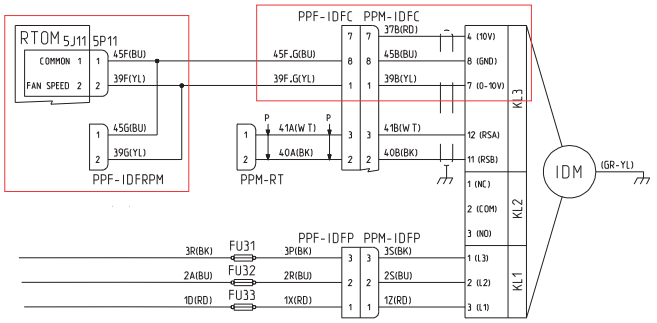
Plenum Fan Motors with ReliaTel™ Options Module (RTOM) Control Troubleshooting

WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Figure 11. ReliaTel™ RTOM controlled - motor DC voltage input



1. Check ReliaTel™ Modbus wiring.
   a. Check RTOM Modbus connection - Check to make sure the Modbus wiring is connected at J4 on the RTRM. If the J4 connection is disconnected, there will be no output from the RTOM to control the indoor plenum fan motor.
2. Check plenum fan motor speed control voltage. (See Figure 11.)
   a. Check Vdc output from RTOM - Measure the DC voltage across pins 1 and 2 of PPF-IDFRPM or J11 pins 1 and 2 on the RTOM. If no voltage output is measured, double check to make sure the fan is supposed to be on. If the fan should be on, check the wiring and

connections. If the wiring and connections are okay, the RTOM may need to be replaced.

b. Check Vdc input to motor - Measure the DC voltage across pins 1 and 8 at the PPF-IDFC connector. (Refer to Table 4 for expected voltages.) Also check wiring connections of both the PPF-IDFC and the PPM-IDFC. If voltage is present going into the motor, the motor is bad and needs to be replaced. (Refer to Table 4 for expected motor voltages.)

Table 3. PPF-IDFRPM voltage vs. motor RPM

PPF-IDFRPM Voltage Measurement	Motor RPM
1.00	N/A
1.25	N/A
1.50	N/A
1.75	N/A
2.00	N/A
2.25	325
2.50	402
2.75	465
3.00	544
3.25	630
3.50	716
3.75	775
4.00	845
4.25	912
4.50	976
4.75	1044
5.00	1115
5.25	1203
5.50	1253
5.75	1312
6.00	1368
6.25	1425
6.50	1475
6.75	1533
7.00	1581
7.25	1615
7.50	1615

Note: Third generation motor (FAN05492 and FAN05496).

Table 4. PPF-IDFRPM voltage measurement vs. motor RPM

PPF-IDFRPM Voltage Measurement	Motor RPM
1.00	217
1.25	279
1.50	312
1.75	362
2.00	427
2.25	479
2.50	543
2.75	605
3.00	668
3.25	732
3.50	797
3.75	863
4.00	929
4.25	995
4.50	1061
4.75	1126
5.00	1191
5.25	1253
5.50	1315
5.75	1374
6.00	1432
6.25	1487
6.50	1539
6.75	1588
7.00	1633
7.25	1675
7.50	1700

Note: Second generation motor (FAN04605 and FAN04606).

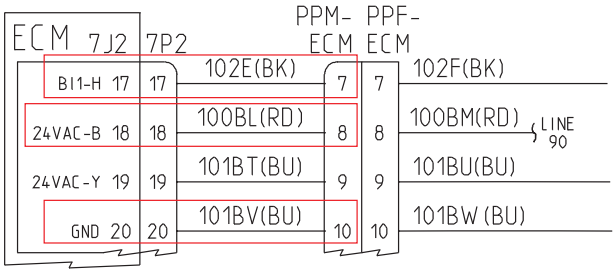
Plenum Fan Motors with ReliaTel™ ECM Engine Module Control System - Setup and Troubleshooting

WARNING

Hazardous Voltage w/Capacitors!

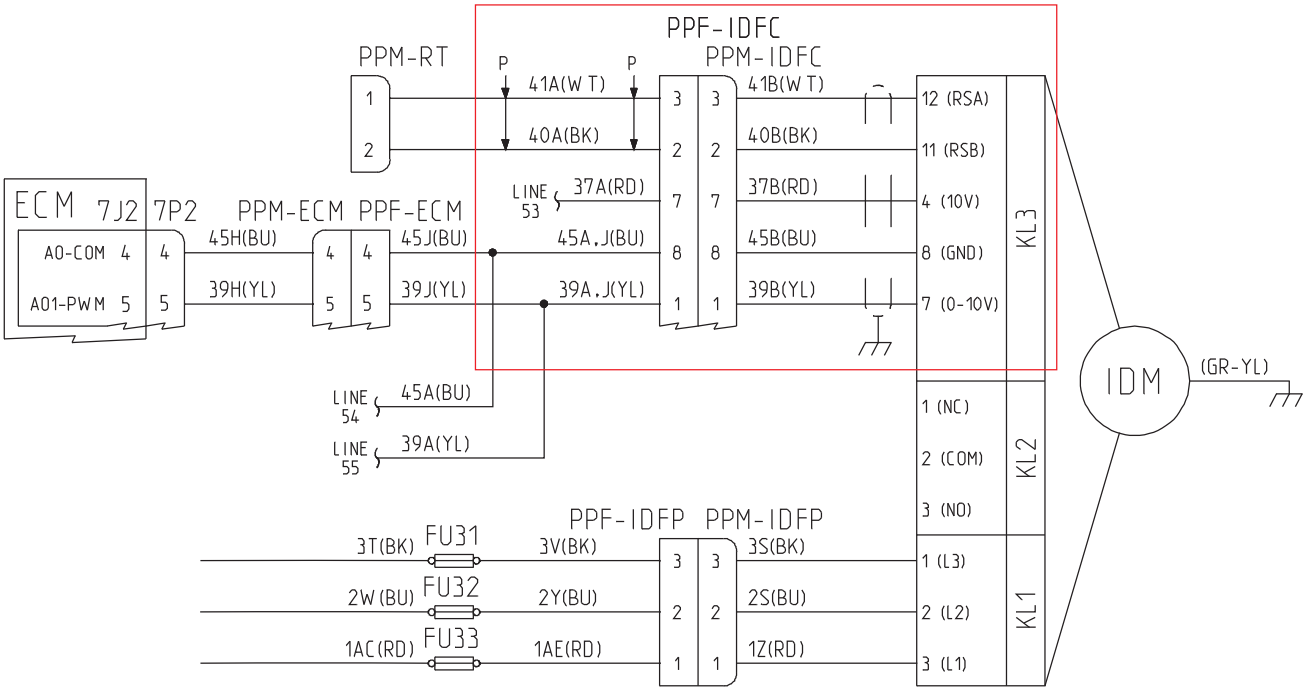
Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

Figure 12. ECM engine module controlled - ECM module AC voltage input



1. Check ECM engine module power. (See Figure 12.)
   a. Check Vac board power - Measure the AC voltage across pins 18 and 20 of on J2 of the ECM engine module. Whenever the unit is powered up, there should be 24 Vac present between pins 18 and 20 If no Vac is present check wiring and control circuit per unit diagram.
   b. Check Vac fan signal input to ECM module - Measure the AC voltage across pins 17 and 20 of on J2 of the ECM engine module. Whenever the unit is powered up AND the there is a call for the indoor fan to be on, there should be 24 Vac present between pins 17 and 20. If no Vac is present check wiring and control circuit per unit diagram.
2. Check motor speed control voltage. (See Figure 13.)
   a. Check Vdc output from ECM module - Measure the DC voltage across pins 4 and 5 of PPF-ECM or J2 pins 4 and 5 on the ECM module. If no voltage output is measured, double check to make sure the fan is supposed to be on. If the fan should be on, check the wiring and connections. If the wiring and connections are okay, the ECM module may need to be replaced.
   b. Check the Vdc input to the motor - Measure the DC voltage across pins 1 and 8 at the PPF-IDFC connector. (Refer to Table 4 for expected voltages.) Also check wiring connections of both the PPF-IDFC and the PPM-IDFC. If voltage is present going into the motor, the motor is bad and needs to be replaced.

Figure 13. ECM engine module controlled - motor DC voltage input



ReliaTel™ Engine Module Programming

Upper and lower case 7-segment display characters:

Note: *Not used on TZC072-120F3,4,W.*

Upper case alphabet

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
R	b	C	d	E	F	G	H	I	J	H	L	n	n	O	P	q	r	S	t	U	u	u	H	y	2

Lower case alphabet

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
R	b	c	d	E	F	G	h	i	J	H	L	n	n	o	P	q	r	S	t	U	u	u	H	y	2

Numbers

1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	6	7	8	9	0

What the Scrolling on the Display Means:

No call for fan:

n	t	r	1	0	0	0		*Motor 1 volts*
n	t	r	2	0	0	0		*Motor 2 volts*
F	S	t	1	0	F	F		*Fan status 1 off*
F	S	t	2	0	F	F		*Fan status 2 off*
E	H	E	n	0	n			*Temp sensing circuit good*

Call for fan (ramping):

r	r	n	P	*Ramp*

Call for fan (ramping complete):

n	t	r	1	5	0	0		*Motor 1 volts (will display value programmed in parameter)*	H	1
n	t	r	2	0	0	0		*Motor 2 volts*		
F	S	t	1	0	n			*Fan status 1 off*		
F	S	t	2	0	F	F		*Fan status 2 off*		
E	H	E	n	0	n			*Temp sensing circuit good*		

To Change Motor Speed: 1.Push and hold the SET button for 3 seconds, board will display HI 1.

2. Push the SET button again to display the current value.
3. Push the + or - to set your desired voltage.
4. Push and hold the SET button for 3 seconds to save changes.

To Change a Parameter: 1.Push SET for 3 seconds to enter menu.

2. Push + or - to scroll to a specific parameter.
3. Push SET to enter the parameter sub menu.
4. Push + or - to change the parameter value.
5. Push SET for 3 seconds to save the change.

Note: *You have to push SET for 3 seconds after changing each parameter to save your change. If parameter won't save, verify that the Protect Function is Off.*

Replacing the Plenum Fan's Electronic Control Module

Note: *This section is only applicable to EBM configurations, third generation motors (FAN05492 and FAN05496).*

Care must be taken during this process to reduce chance of electrostatic discharge to the electronics control module. Before changing the control module, disconnect power for more than 30 seconds to discharge any capacitance, preventing damage to the body.

Installation

These instructions are intended solely to provide assistance with replacement of the electronics of the R3G500PW0715 (FAN05492) or R3G500PW9905 (FAN05496).

- Check the electrical equipment of the product at regular intervals.
- Replace loose connections and defective cables immediately.

⚠WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.
Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

- Wait five minutes after disconnecting the voltage at all poles before opening the device or disassembling the electronics.

⚠CAUTION

Hot Surface!

Failure to follow instructions below could result in severe burns.
Surface temperatures may exceed 300°F (150°C). To avoid possible skin burns, stay clear of these surfaces. If possible, allow surfaces to cool before servicing. If servicing is necessary while surface temperatures are still elevated, you MUST put on all Personal Protective Equipment (PPE).

- High temperature possible at electronics housing.

Storage

- Store the product, partially or fully assembled, in a dry and weatherproof manner in the original packaging in a clean environment.
- Protect the product against environmental influences and dirt until final installation.
- We recommend storing the product for no longer than two years in order to guarantee trouble-free operation and the longest possible service life.
- Even products explicitly intended for outdoor use are to be stored as described prior to commissioning.
- Observe the correct storage temperature.

Disposal

Comply with all relevant local requirements and regulations when disposing of the product.

Intended Use

The replacement electronics are intended to be used solely for replacement purposes for the applicable motors R3G500PW0715 (FAN05492) and R3G500PW9905 (FAN05496).

For the initial pairing of the electronics module to the existing motor assembly, refer to the Module Pairing section.

Any other usage above and beyond this does not conform to the intended purpose and constitutes misuse of the product.

Customer equipment must be capable of withstanding the mechanical and thermal stresses that can arise from this product. This applies for the entire service life of the equipment in which this product is installed.

Improper Use

In particular, use of the product in the following ways is prohibited and could be hazardous:

- Operation in an explosive atmosphere.
- Operation in medical products with a life-sustaining or life-support function.
- Painting the product.
- Unfastening connections (e.g. screws) during operation.
- Opening the terminal box during operation.
- Series connection of variable frequency drives, transformers or electronic voltage regulating products (e.g. phase control).
- Operating the product close to flammable substances or components.
- Use of the product as a safety component or to perform safety related functions.
- In addition, all applications not listed among the intended uses.

Technical Data

Figure 14. Product image

Transportation and Storage Conditions

The replacement electronics must not be stored for longer than 2 years.

Perm. max. ambient temp. (transportation/storage)	+95°C
Perm. min. ambient temp. (transportation/storage)	-55°C
Perm. humidity	5 – 95% relative humidity, non-condensing

Ambient Conditions

For the ambient conditions of the replacement electronics in operation, please refer to the operating instructions of the fan for which these replacement electronics are intended.

Table 5. Scope of delivery

Scope of Delivery	Quantity	Remarks
Pre-assembled control unit	1x	With cable
Bag of screws	1x	Screw M5x12 micro encapsulated/T25
Bag with O-ring seal	1x	Dia. 199
Extra adhesive label	1x	
Packaging material ESD bag	1x	
Installation instructions	1x	

Tools required

- Torx ratchet wrench T25
- Torque wrench for tightening torque 5.5 Nm +/- 0.8 Nm (48.6 in-lbf +/- 7 in-lbf)

Assignment of Replacement Electronics to End Device

The replacement electronics product is only compatible with the intended motor. Information on assignment can be found in the following table and on the motor nameplates.

Electronics no.	Voltage Range	Control unit no. ebm-papst	End device ebm-papst	End device no.
MOD02788	200V	11200-1-0171	R3G500PW0715	436692270001
MOD02789	400V	11201-1-0171	R3G500PW9905	436692280001

Mechanical Connection

NOTICE

Static Sensitive Components!

Static charge on the human body can regularly reach voltages of more than 12,000 volts. You MUST follow instructions below to reduce the risk of damage to the electronics.
Before handling the module, discharge yourself by touching the panel sheet metal or use an anti-static wrist strap.

- Check the product for transportation damage.
- Damaged products are not to be installed.
- The electronics are only to be replaced in a dry environment with a non-condensing atmosphere.
- The ingress of moisture in the form of mist or precipitation could destroy the electronics.
- Do not subject the cables to impermissible strain.

Control Unit Disassembly

Compare all nameplates for the motor and replacement electronics module to ensure that compatible electronics are installed on the end device.

⚠WARNING

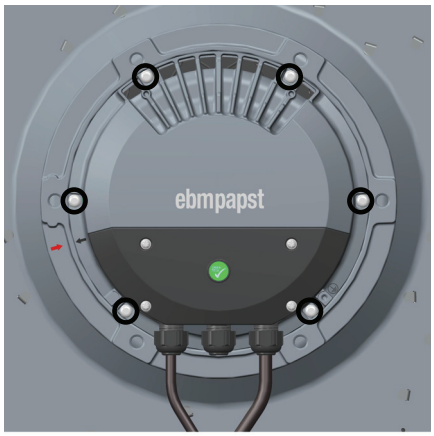
Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

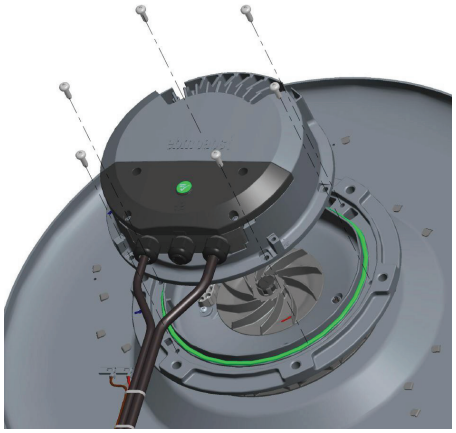
- De-energize the fan.
- Secure against renewed switch-on.
- Ensure safe isolation from supply.
- Observe the waiting time on account of capacitor voltage.
- The minimum waiting time is 5 min.
- The rotor must be stationary during the disassembly and installation process.
- It is best to fix it mechanically in position as otherwise there may be hazardous voltage at the motor connector.

1. Lay aside all the parts disassembled (control unit, screws, O-ring seal). These parts must be returned to ebm-papst following replacement.

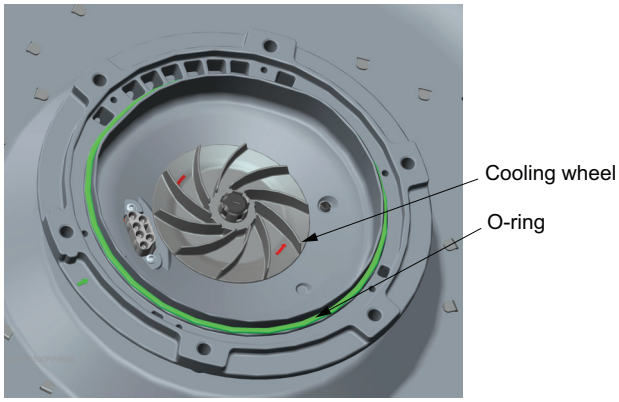
2. Slacken off the screws at the stator bushing/control unit (6x M5x16).



3. Carefully detach the electronics from the motor in axial direction.



4. Remove the O-ring from the stator bushing.



5. Visually inspect the motor/plug contact for foreign matter/ damage.

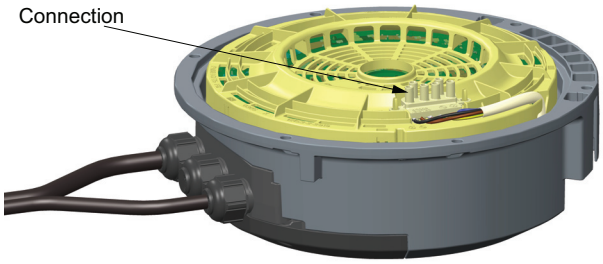
Unpacking Replacement Electronics

NOTICE

Static Sensitive Components!

Static charge on the human body can regularly reach voltages of more than 12,000 volts. You MUST follow instructions below to reduce the risk of damage to the electronics.
Before handling the module, discharge yourself by touching the panel sheet metal or use an anti-static wrist strap.

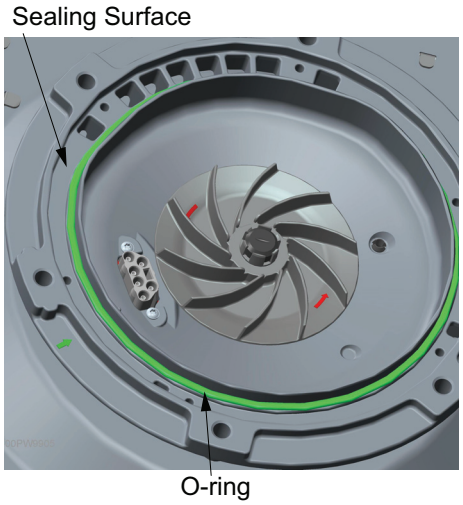
1. Remove the control unit from the ESD bag.
2. Always set down the control unit with the electronics side facing upwards as otherwise the connection could be damaged.



Fitting O-ring

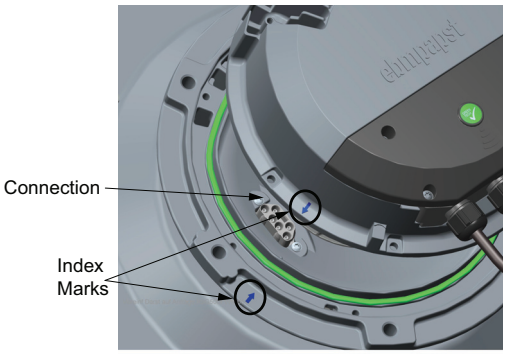
1. Remove dirt and dust from the sealing surfaces and the O-ring slot.
2. Insert the new O-ring supplied in the slot on the stator bushing.

Note: *Take care to avoid twisting the O-ring on fitting and make sure it is fully inserted in the slot on the stator bushing.*



Mounting Control Unit

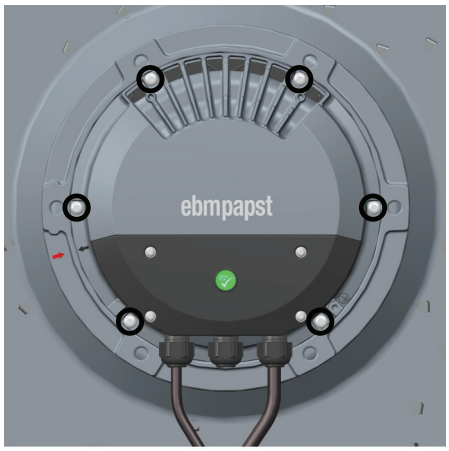
1. Mount the electronics on the stator bushing in line with the index marks (arrows). Make sure the connection is made without exerting excessive force.



2. Make sure the connection is made without exerting any force.

Connecting Control Unit to Motor

1. Press on the control unit as far as it will go.
2. Screw in the six new micro encapsulated screws M5x12 mm provided and tighten to the corresponding torque.
3. Tightening torque: 5.5 Nm +/- 0.8 Nm (48.6 in-lbf +/- 7 in-lbf).



Mechanical Checks Following Installation

Perform a visual inspection to check for proper installation.

- Is the control unit evenly screwed to the motor?
- Have the torques of all six fastening screws been checked?
- Are no cracks or damage resulting from inexpert installation to be seen on the edge of the control unit and on the motor?
- Has the replaced control unit been packed in the ESD bag?
- Have all the components removed on disassembly been packed together with the replaced control unit?

If the answer to these questions is “Yes”, **release the mechanical blocking of the impeller** and continue with the next section.

Electrical Connections

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Route motor harness as required to the Precedent unit's control harnesses, as well as to the remote LED harness.

Module Pairing

1. Apply voltage to the fan.
2. The fan initialization starts automatically, independent from control signal e.g. analog setpoint selection.
3. During initialization main voltage must not be interrupted.
4. Time for initialization is approximately 1min. During that time the fan starts automatically to rotate.
5. After successful initialization the fan operates according to its set point.

Notes:

- *If the initialization is not completed correctly the control unit LED flashes 11 times.*
- *To start a new initialization disconnect the power supply for at least 1min. Follow instruction starting with Step 1.*

Once successful initialized, control unit cannot be used a second time as replacement electronic. For further use the control unit must be reset through factor default program e.g. EC Clone.

Maintenance, Malfunctions, Possible Causes and Remedies

The product is sealed by OEM. Modifications or repairs above and beyond the exchange of these replacement electronics are only to be performed by OEM.

Do not perform any repairs on your product. Send the product to OEM for repair or replacement.

Regal

Important:

- *This chapter is only applicable to 10 ton, standard efficiency units (models TSC120H3,4,W,K). For all other unit configurations, see "EBM," p. 5.*
- *This chapter is not applicable for units with separate VFD (see Page 1 for models). See "EBM Fans with Separate VFD," p. 25 for information on these models.*

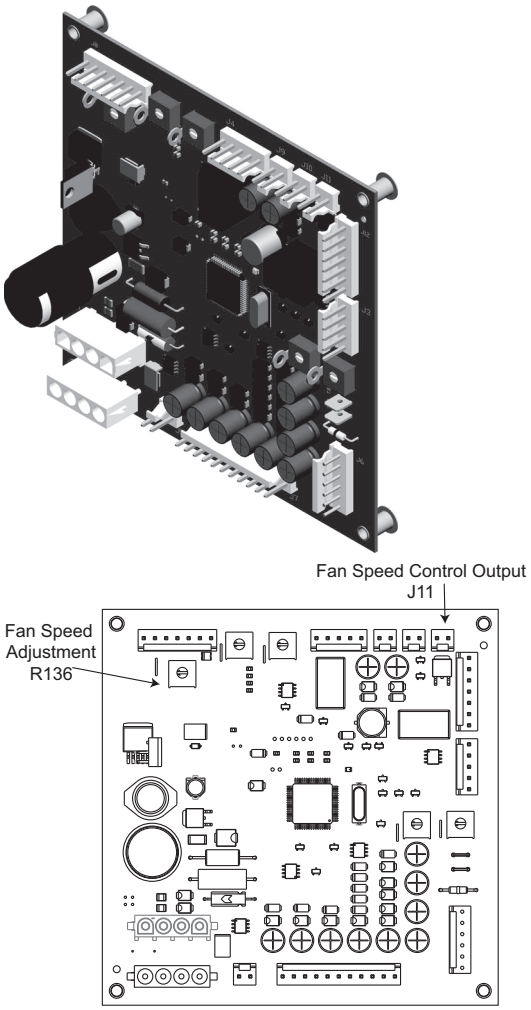
Operation

Plenum Fan Motor

Plenum Fan Motor Control Identification

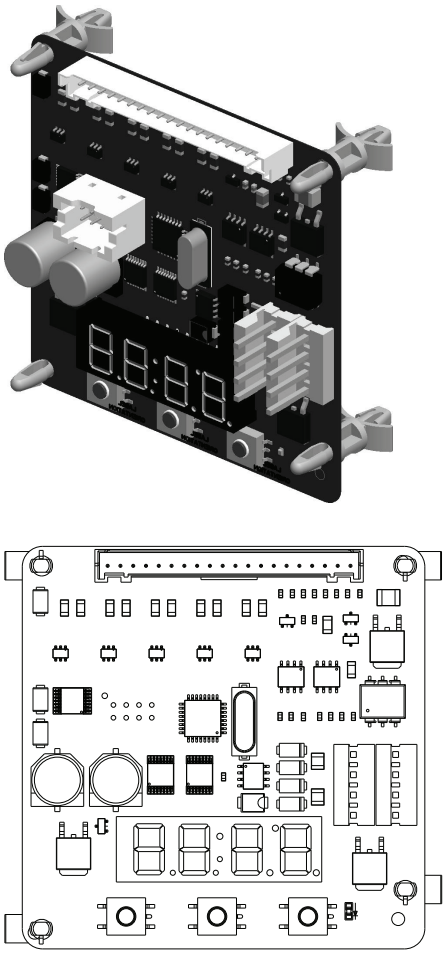
There are three ways the plenum indoor fan motor can be controlled and each are covered in this document. (See Figure 15 and Figure 16.)

Figure 15. ReliaTel™ options module control (RTOM)



Note: *T/YZC072-120F3,4,W only uses this board for plenum fan speed adjustment.*

Figure 16. Engine module control (ECM)



Troubleshooting

Initial Motor Troubleshooting

⚠WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

1. Call for fan - Is the thermostat, zone sensor, or Building Automation System (BAS) calling for the indoor fan to be on?
   a. Check system for indoor fan call.
   b. Check low-voltage connections and wiring.
2. Phase monitor - Is there a fault on the unit phase monitor (PHM)?
   a. If there is a fault on the unit phase monitor, the red LED will be on and the unit will not operate.
   b. Check LED on unit phase monitor (Red = Fault, Green = Okay).
   c. The unit phase monitor checks for a reversed phase, a lost phase, or a phase imbalance. If any of those conditions exist, correct the issue. When the issue is corrected, the green LED should be on.
3. Applicable only to third generation motors.
   a. Check the remote LED indicator.
   b. A steady LED indicates the motor is powered and there are no errors/ warnings in the motor.
   c. A blinking LED indicates the motor has an error code. The number of blinks indicates the specific error.

Table 6. LED blinking codes - Regal

Fault	Modbus Fault Code	LED Code (Number of Blinks)	Description
No Fault	0	0	No Fault
Motor Control Software Fault	1	1	Sensorless control loop in software lasted too long
Under Voltage	2	2	DC bus voltage falls below the threshold voltage
Over Voltage	4	3	DC bus voltage exceeds the threshold voltage
Over Temperature	8	4	IPM temperature is above threshold
Speed Feedback	16	5	Measured speed does not match reference speed

Table 6. LED blinking codes - Regal (continued)

Fault	Modbus Fault Code	LED Code (Number of Blinks)	Description
Start Up	32	6	Open to close loop transition failed
Loss of Input Phase	64	7	One of the input AC voltage phases is lost
(RESERVED)	128	8	Reserved
Hardware Fault	256	9	Hardware over voltage or short circuit fault
UL Safety Fault	512	10	One of the UL safety core faults
Internal Communication Loss	1024	11	Internal communication between micro controllers is lost
Software Error	2048	12	Motor control firmware error

Figure 17. Plenum third generation motors

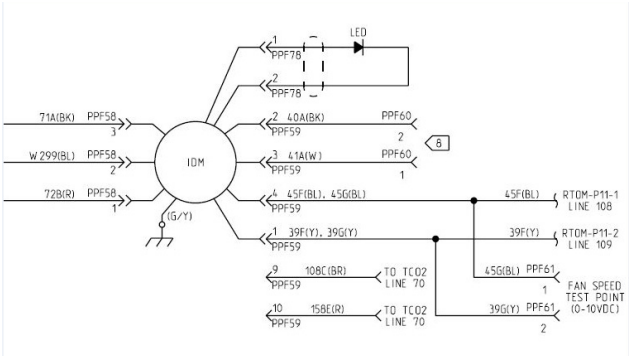
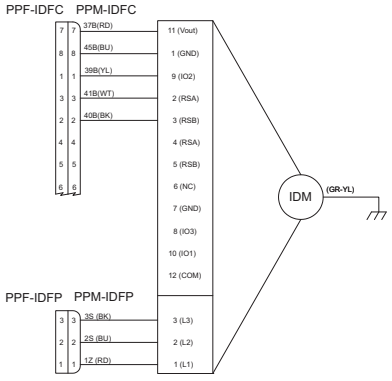


Figure 18. Plenum third generation motor harness connections throughout troubleshooting



4. Motor power - Is the problem with the motor power?
   a. Supply power needs to be within 10% of rated unit nameplate voltage. (See Table 7.)

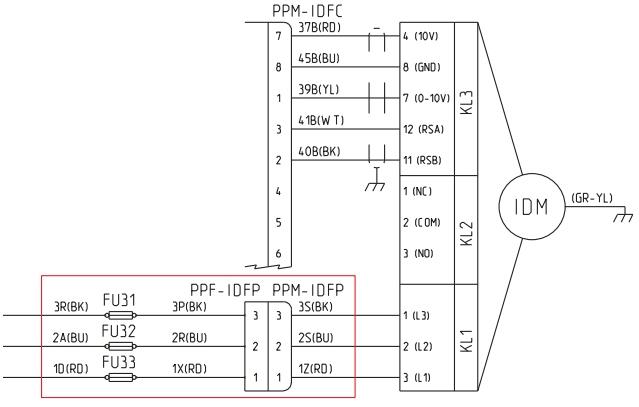
Table 7. Unit operating voltage range

Unit Nameplate Voltage	Voltage Range
208-230V	187-253
460V	414-506
575V	517-633

b. Measure AC line voltage to unit: (Difference between each measurement should be less than 2%)
   i. L1 - L2
   ii. L2 - L3
   iii. L1 - L3
c. Measure AC phase voltage to ground:
   i. L1 - Ground
   ii. L2 - Ground
   iii. L3 - Ground
d. Check for blown fuses by measuring the AC phase voltage before and after fuse:
   i. L1 - Ground (entering fuse)
   ii. L2 - Ground (entering fuse)
   iii. L3 - Ground (entering fuse)
   iv. L1 - Ground (leaving fuse)
   v. L2 - Ground (leaving fuse)
   vi. L3 - Ground (leaving fuse)
e. Check incoming motor power by checking line-to-line AC voltage at pins 1, 2, and 3 of PPF-IDFP. All measurements should be within 2% of each other. (See Figure 19.)

5. Internal motor protection - Cycling the unit power off for 3 minutes will allow the internal motor protection to reset if it is tripped.
6. Check 575 Vac plenum fan motor supply voltage. On 575 Vac units, the plenum fan motor will be a 460 Vac motor powered with a step down transformer. (See Figure 22.)

Figure 19. Plenum fan - incoming motor power[(a)]



(a) Not used on TZC072-120F3, 4, W.

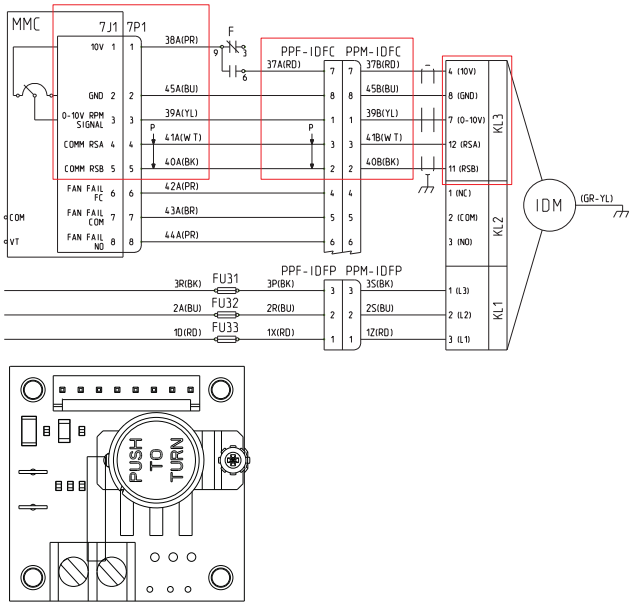
Plenum Fan Motors with MMC Motor Control Troubleshooting

WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Figure 20. MMC controlled - motor DC voltage input[(a)]



(a) Not used on TZC072-120F3,4,W/

1. Check plenum fan motor - 10 Vdc control voltage. (See Figure 20.)
   a. Check 10 Vdc output from motor - Check motor control DC voltage output by checking for 10 Vdc across pin 7 and 8 of PPM-IDFC. If voltage is not present, check wiring and connections. If wiring is correct and no 10 Vdc output is measured on pins 7 and 8 of PPM-IDFC, the motor is bad, replace motor.
   b. Check 10 Vdc input to MMC board - Check the 10 Vdc output across pins 1 and 2 on 7J1/7P1 on the MMC board. If 10 Vdc is not present, check the F fan relay. Replace F relay if needed. See Step 2 below for more detail on checking the F relay.
   c. Check MMC board Vdc output - Measure DC voltage across pins 3 and 2 of 7P1. Voltage should be greater than 3 Vdc. If voltage is less than 3 Vdc, check pins and connections of MMC 7J1 and 7P1. First try to adjust the voltage output from the MMC by adjusting the potentiometer on the MMC board. If the voltage cannot

be adjusted to above 3 Vdc or there still is no output after adjustment, replace MMC module.

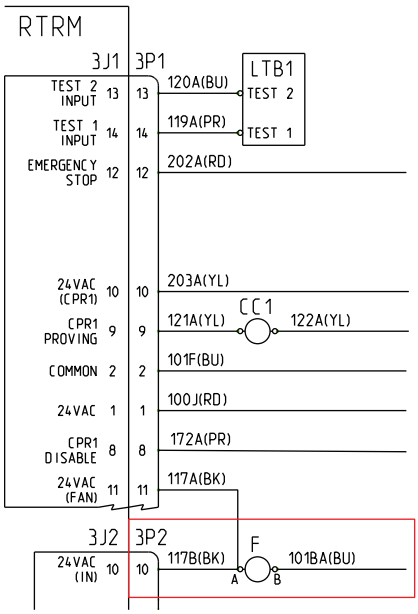
d. Check motor Vdc input - Measure the DC voltage across pins 1 and 8 of PPF-IDFC. If voltage is not 3 Vdc or higher, check your wires from MMC board. Voltage should be the same across pins vt and com on the MMC Board and across pins 1 and 8 of PPF-IDFC.

e. Check motor wiring - Check wiring at motor connection KL3. If wiring connections are correct, replace the motor.

2. Check plenum fan motor relay.

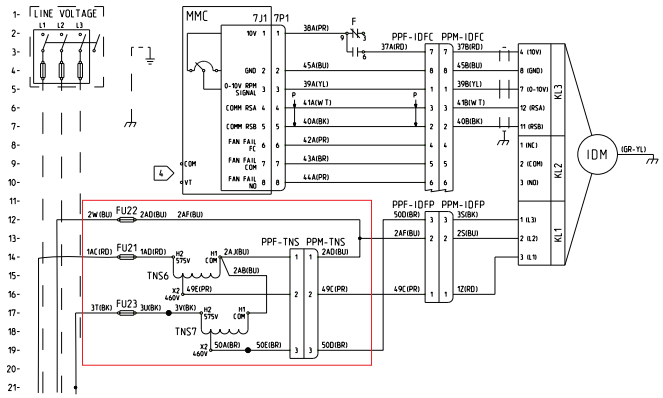
Check for 24 Vac across pins A and B of Fan (F) relay. If voltage is not present verify control wiring. (See Figure 21.)

Figure 21. Fan (F) relay coil voltage[a]



(a) Not used on TZC072-120F3, 4, 2.

Figure 22. 575 Vac motor voltage power



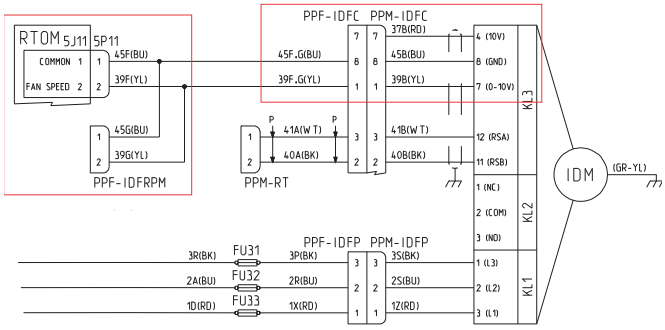
Plenum Fan Motors with ReliaTel™ Options Module (RTOM) Control Troubleshooting

WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Figure 23. ReliaTel™ RTOM controlled - motor DC voltage input



1. Check ReliaTel™ Modbus wiring.

a. Check RTOM Modbus connection - Check to make sure the Modbus wiring is connected at J4 on the RTRM. If the J4 connection is disconnected, there will be no output from the RTOM to control the indoor plenum fan motor.

2. Check plenum fan motor speed control voltage. (See Figure 23.)

a. Check Vdc output from RTOM - Measure the DC voltage across pins 1 and 2 of PPF-IDFRPM or J11 pins 1 and 2 on the RTOM. If no voltage output is measured, double check to make sure the fan is supposed to be on. If the fan should be on, check the wiring and connections. If the wiring and connections are okay, the RTOM may need to be replaced.

b. Check Vdc input to motor - Measure the DC voltage across pins 1 and 8 at the PPF-IDFC connector. Also check wiring connections of both the PPF-IDFC and the PPM-IDFC. If voltage is present going into the motor, the motor is bad and needs to be replaced. (See the following table for expected motor voltages.)

Table 8. Direct drive plenum fan settings (RPM vs. voltage) - Regal

Potentiometer Voltage	Motor RPM
0.5	N/A
1	N/A
1.5	N/A
1.8	N/A
2	N/A
2.1	255.6
2.3	357.2
2.5	428.2
2.7	520
2.9	602
3.1	693
3.3	795
3.5	868
3.7	964
3.9	1060
4.1	1126
4.3	1229
4.5	1310
4.7	1395
4.9	1490
5.1	1564
5.3	1652
5.5	1720
5.7	1795
5.9	1860
6.1	2000
6.3	2062
6.5	2100
6.7	2118
6.9	2119
7.1	2120
7.3	2120
7.5	2120
7.6	2120

Notes:
1. See catalog fan tables for unit rpm and cfm units.
2. Factory setting is 5V.

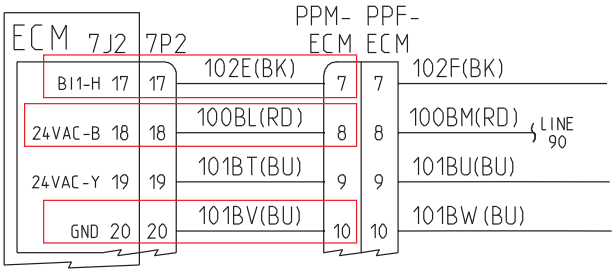
Plenum Fan Motors with ReliaTel™ ECM Engine Module Control System - Setup and Troubleshooting

WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

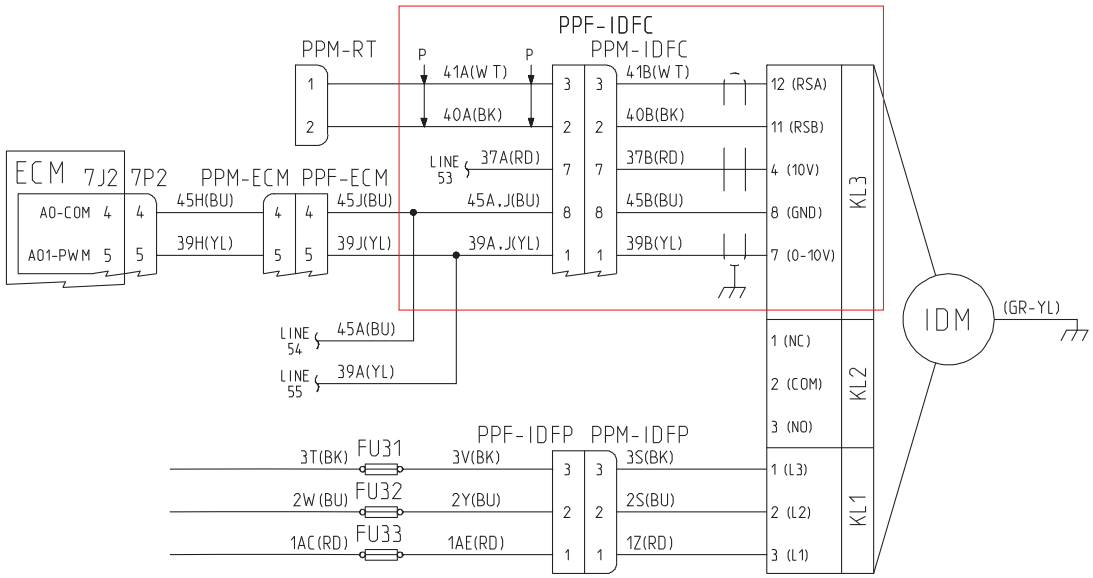
Figure 24. ECM engine module controlled - ECM module AC voltage input



1. Check ECM engine module power. (See Figure 24.)
   a. Check Vac board power - Measure the AC voltage across pins 18 and 20 of on J2 of the ECM engine module. Whenever the unit is powered up, there should be 24 Vac present between pins 18 and 20 If no Vac is present check wiring and control circuit per unit diagram.
   b. Check Vac fan signal input to ECM module - Measure the AC voltage across pins 17 and 20 of on J2 of the ECM engine module. Whenever the unit is powered up AND the there is a call for the indoor fan to be on, there should be 24 Vac present between pins 17 and 20. If no Vac is present check wiring and control circuit per unit diagram.

2. Check motor speed control voltage. (See Figure 25.)
   a. Check Vdc output from ECM module - Measure the DC voltage across pins 4 and 5 of PPF-ECM or J2 pins 4 and 5 on the ECM module. If no voltage output is measured, double check to make sure the fan is supposed to be on. If the fan should be on, check the wiring and connections. If the wiring and connections are okay, the ECM module may need to be replaced.
   b. Check the Vdc input to the motor - Measure the DC voltage across pins 1 and 8 at the PPF-IDFC connector. (See Table 8, p. 20 for expected voltages.) Also check wiring connections of both the PPF-IDFC and the PPM-IDFC. If voltage is present going into the motor, the motor is bad and needs to be replaced.

Figure 25. ECM engine module controlled - motor DC voltage input



ReliaTel™ Engine Module Programming

Upper and lower case 7-segment display characters:

Note: *Not used on TZC072-120F3,4,W.*

Upper case alphabet

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	b	C	d	E	F	g	H	I	J	H	L	n	n	O	P	q	r	S	t	U	u	u	H	y	2

Lower case alphabet

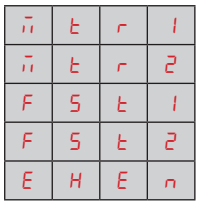
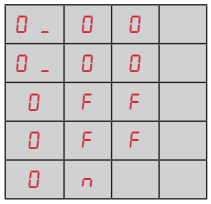
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
a	b	c	d	E	F	g	h	i	J	H	L	n	n	o	P	q	r	S	t	U	u	u	H	y	2

Numbers

1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	6	7	8	9	0

What the Scrolling on the Display Means:

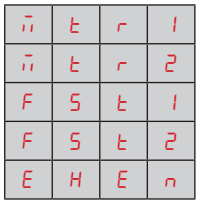
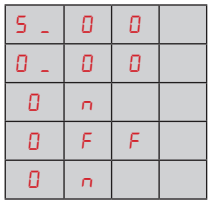
No call for fan:

		*Motor 1 volts*
		Motor 2 volts
		Fan status 1 off
		Fan status 2 off
		Temp sensing circuit good

Call for fan (ramping):

 *Ramp*

Call for fan (ramping complete):

		*Motor 1 volts (will display value programmed in parameter)* 
		Motor 2 volts
		Fan status 1 off
		Fan status 2 off
		Temp sensing circuit good

To Change Motor Speed: 1.Push and hold the SET button for 3 seconds, board will display HI 1.

2. Push the SET button again to display the current value.
3. Push the + or - to set your desired voltage.
4. Push and hold the SET button for 3 seconds to save changes.

To Change a Parameter: 1.Push SET for 3 seconds to enter menu.

2. Push + or - to scroll to a specific parameter.
3. Push SET to enter the parameter sub menu.
4. Push + or - to change the parameter value.
5. Push SET for 3 seconds to save the change.

Note: *You have to push SET for 3 seconds after changing each parameter to save your change. If parameter won't save, verify that the Protect Function is Off.*

Motor Protections

Motor Protections - Non UL Safety

Application level protections:

- Over Voltage
- Under Voltage
- Over Temperature
- Loss of Input Phase

Over Voltage

1. Drive shuts down on over voltage when DC bus voltage exceeds the threshold voltage. (see the following table.)

Model	Over Voltage Threshold (DC)	Approximate AC Input Voltage
230V	450V DC	318V AC
460V	850V DC	600V AC

2. Drive will try to restart after a delay of 30 seconds. If the over voltage condition persists, drive will shut down and indicates an over voltage fault and keeps retrying after the fault wait delay expires.

Under Voltage

1. Drive shuts down on under voltage when DC bus voltage falls below the threshold voltage. (see the following table.)

Model	Under Voltage Threshold (DC)	Approximate AC Input Voltage
230V	200V DC	140V AC
460V	400V DC	282V AC

2. Drive will try to restart after a delay of 30 seconds. If the under voltage condition persists, drive will shut down and indicates an under voltage fault. Drive will keep retrying after the fault wait delay expires.

Over Temperature

1. Drive shuts down on over temperature when IPM temperature exceed the threshold temperature. (see the following table.)

Model	Over Temperature Threshold (DC)	Hysteresis Temperature
230V	125°C	5°C
460V	125°C	5°C

2. Drive will try to restart after a delay of 30 seconds. If the over temperature condition persists, drive will shut down and indicates an over temperature fault. Drive will keep retrying after the fault wait delay expires.
3. For the motor to start successfully after an over temperature fault, the temperature needs to be below the Threshold temperature minus the Hysteresis temperature, or 120°C.

Loss of Input Phase

1. Drive shuts down on loss of phase when an loss of phase is detected, and significant power is used.
2. Drive will try to restart after a delay of 30 seconds. If the loss of phase persists, drive will shut down and indicates a loss of phase fault and keeps retrying after the fault wait delay expires.

Motor Protections - UL Safety

UL Safety-core level protections are:

- Locked Rotor
- Loss of Output Phase
- Over Load
- Hardware Faults

These faults are a backup protection if the non UL safety faults fails to shuts down or activate limits/derating. If UL safety faults exceeds four counts, safety core will perform a microcontroller reset.

Locked Rotor

1. Drive shuts down on locked rotor on start-up if the locked rotor condition is detected.
2. Drive will try to restart after a delay of 30 seconds. If the locked rotor condition persists, drive will shut down and indicates an UL Locked Rotor Fault and keeps retrying after the fault wait delay expires.

Loss of Output Phase

1. Drive shuts down on loss of output phase if a sudden loss of output phase is detected while the motor is running.
2. This fault is not detected when the drive is output current is zero (when motor is in idle state).
3. Drive will try to restart after a delay of 30 seconds. If the loss of output phase condition persists, drive will shut down and indicates an UL Loss of Output Phase Fault and keeps retrying after the fault wait delay expires.

Over Load

1. Drive shuts down on over load if the measured output drive current is above the threshold limit.
2. Drive will try to restart after a delay of 30 seconds. If the over load condition persists, drive will shut down and indicates an UL Over Load Fault and keeps retrying after the fault wait delay expires.

Hardware Faults

1. Drive shuts down on hardware faults if a hardware fault is detected by safety core.
2. Drive will try to restart after a delay of 30 seconds. If the condition persists, drive will shut down and indicates an UL Hardware Fault and keeps retrying after the fault wait delay expires.

Fault Indication - LED Blink Codes

When a fault is indicated, the LED will blink the number of times specified in the Table 6, p. 17 followed by a 2 second pause before it blinks again.

If the motor is shut down on a fault and it did not restart, the LED will continue blinking until a start command is issued (even though the fault condition is no longer present).

See Table 6 for a list of blink codes.

Troubleshooting Faults

When the troubleshooting below calls for “power cycle”, follow these steps:

1. Turn off power to the motor.
2. Wait 30 seconds.
3. Turn power back on to the motor to restart.

Note: *The drive automatically retries after the 30 second wait time. Number of retries is not limited; drive will retry until the fault condition is cleared and a successful restart is achieved.*

Table 9. Faults

Fault	Description	Possible Remedy
Motor control software fault	Sensorless control loop in software lasted too long	Power cycle to reset drive
Under Voltage	DC bus voltage falls below the threshold voltage	Check line voltage to verify it is within 10% of nameplate voltage.
Over Voltage	DC bus voltage exceeds the threshold voltage	Check line voltage to verify it is within 10% of nameplate voltage.
Over Temperature	IPM temperature is above threshold	Turn off motor and remove power to allow drive to cool. Restart and retry.
Speed Feedback	Measured speed does not match reference speed	Check if fan is loose and retighten. Check if shaft is physically locked and try to free. Restart and retry.
Start Up	Open to close loop transition failed	Check if fan is loose and retighten. Check if shaft is physically locked and try to free. Restart and retry.
Loss of input phase	One of the input AC voltage phases is lost	Check incoming power to verify all three phases are present.
Hardware Fault	Hardware over voltage or short circuit fault	Power cycle and try again. If problem persists, replace motor.
UL Safety fault	One of the UL safety core faults	UL safety core faults occur for various reasons such as a locked rotor or an overloaded situation. Turn off motor and verify the shaft is not locked and retry. Power cycling can reset the fault.
Internal Communication Loss	Internal communication between micro controllers is lost	Power cycle and try again. If problem persists, replace motor,
Software Error	Motor control firmware error	Power cycle and try again. If problem persists, replace motor.

EBM Fans with Separate VFD

On models using EBM fans with separate VFD, the following table contains the factory-programmed parameters.

Table 10. Drive programming specification

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
0	Torque boost	4	4
1	Maximum frequency	1850	1850
2	Minimum frequency	93	93
3	Base frequency	720	720
4	Multi-speed setting (high speed)	60	60
5	Multi-speed setting (middle speed)	360	360
6	Multi-speed setting (low speed)	120	120
7	Acceleration time	20	20
8	Deceleration time	60	60
9	Electronic thermal O/L relay/Rated motor current	10.8	5.6
10	DC injection brake operation frequency	36	36
11	DC injection brake operation time	0.5	0.5
12	DC injection brake operation voltage	4	4
13	Starting frequency	0	0
14	Load pattern selection	1	1
15	Jog frequency	5	5
16	Jog acceleration/deceleration time	0.5	0.5
17	MRS input selection	0	0
18	High speed maximum frequency	1850	1850
19	Base frequency voltage	9999	9999
20	Acceleration/deceleration reference frequency	1850	1850
21	Acceleration/deceleration time increments	0	0
22	Stall prevention operation level	150	150
23	Stall prevention operation level compensation factor at double speed	9999	9999
24	Multi-speed setting (speed 4)	9999	9999
25	Multi-speed setting (speed 5)	9999	9999
26	Multi-speed setting (speed 6)	9999	9999
27	Multi-speed setting (speed 7)	9999	9999
28	Multi-speed input compensation selection	0	0
29	Acceleration/deceleration pattern selection	0	0
30	Regenerative function selection	0	0
31	Frequency jump 1A	9999	9999
32	Frequency jump 1B	9999	9999
33	Frequency jump 2A	9999	9999
34	Frequency jump 2B	9999	9999
35	Frequency jump 3A	9999	9999
36	Frequency jump 3B	9999	9999
37	Speed display	0	0

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
41	Up-to-frequency sensitivity	10	10
42	Output frequency detection	72	72
43	Output frequency detection for reverse rotation	9999	9999
44	Second acceleration/deceleration time	5	5
45	Second deceleration time	9999	9999
46	Second torque boost	9999	9999
47	Second V/F (base frequency)	9999	9999
48	Second stall prevention operation level	120	120
49	Second stall prevention operation frequency	0	0
50	Second output frequency detection	360	360
51	Second electronic thermal O/L relay/ Rated second motor current	9999	9999
52	Operation panel main monitor selection	0	0
54	CA terminal function selection	1	1
55	Frequency monitoring reference	1850	1850
56	Current monitoring reference	10.8	5.6
57	Restart coasting time	9999	9999
58	Restart cushion time	1	1
59	Remote function selection	0	0
60	Energy saving control selection	0	0
65	Retry selection	0	0
66	Stall prevention operation reduction starting frequency	720	720
67	Number of retries at fault occurrence	110	110
68	Retry waiting time	60	60
69	Retry count display erase	0	0
70	Parameter for manufacturer setting		
71	Applied motor	9090	9090
72	PWM frequency selection	15	15
73	Analog input selection	1	1
74	Input filter time constant	1	1
75	Reset selection/Disconnected PU detection/PU stop selection/Reset limit	14	14
76	Fault code output selection	0	0
77	Parameter write selection	0	0
78	Reverse rotation prevention selection	0	0
79	Operation mode selection	0	0
80	Motor capacity	2.2	2.2
81	Number of motor poles	10	10
82	Motor excitation current	9999	9999
83	Rated motor voltage	230	460
84	Rated motor frequency	1850	1850
85	Excitation current break point	9999	9999

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
86	Excitation current low-speed scaling factor	9999	9999
89	Speed control gain (Advanced magnetic flux vector)	9999	9999
90	Motor constant (R1)	0.614	1.762
91	Motor constant (R2)	9999	9999
92	Motor constant (L1)/d-axis inductance (Ld)	6	23.27
93	Motor constant (L2)/q-axis inductance (Lq)	7.31	25.8
94	Motor constant (X)	9999	9999
95	Online auto tuning selection	0	0
96	Auto tuning setting/status	0	0
100	V/F1 (first frequency)	9999	9999
101	V/F1 (first frequency voltage)	0	0
102	V/F2 (second frequency)	9999	9999
103	V/F2 (second frequency voltage)	0	0
104	V/F3 (third frequency)	9999	9999
105	V/F3 (third frequency voltage)	0	0
106	V/F4 (fourth frequency)	9999	9999
107	V/F4 (fourth frequency voltage)	0	0
108	V/F5 (fifth frequency)	9999	9999
109	V/F5 (fifth frequency voltage)	0	0
111	Check valve deceleration time	9999	9999
117	PU communication station number	0	0
118	PU communication speed	192	192
119	PU communication stop bit length / data length	1	1
120	PU communication parity check	2	2
121	Number of PU communication retries	1	1
122	PU communication check time interval	9999	9999
123	PU communication waiting time setting	10	10
124	PU communication CR/LF selection	1	1
125	Terminal 2 frequency setting gain frequency	1850	1850
126	Terminal 4 frequency setting gain frequency	1850	1850
127	PID control automatic switchover frequency	9999	9999
128	PID action selection	0	0
129	PID proportional band	100	100
130	PID integral time	1	1
131	PID upper limit	9999	9999
132	PID lower limit	9999	9999
133	PID action set point	9999	9999
134	PID differential time	9999	9999
135	Electronic bypass sequence selection	0	0
136	MC switchover interlock time	1	1

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
137	Start waiting time	0.5	0.5
138	Bypass selection at a fault	0	0
139	Automatic switchover frequency from inverter to bypass operation	9999	9999
140	Backlash acceleration stopping frequency	12	12
141	Backlash acceleration stopping time	0.5	0.5
142	Backlash deceleration stopping frequency	12	12
143	Backlash deceleration stopping time	0.5	0.5
144	Speed setting switchover	110	110
145	PU display language selection	1	1
147	Acceleration/deceleration time switching frequency	9999	9999
148	Stall prevention level at 0 V input	120	120
149	Stall prevention level at 10 V input	150	150
150	Output current detection level	120	120
151	Output current detection signal delay time	0	0
152	Zero current detection level	5	5
153	Zero current detection time	0.5	0.5
154	Voltage reduction selection during stall prevention operation	1	1
155	RT signal function validity condition selection	0	0
156	Stall prevention operation selection	0	0
157	OL signal output timer	0	0
158	AM terminal function selection	1	1
159	Automatic switchover frequency range from bypass to inverter operation	9999	9999
160	User group read selection	0	0
161	Frequency setting/key lock operation selection	0	0
162	Automatic restart after instantaneous power failure selection	0	0
163	First cushion time for restart	0	0
164	First cushion voltage for restart	0	0
165	Stall prevention operation level for restart	120	120
166	Output current detection signal retention time	0.1	0.1
167	Output current detection operation selection	0	0
168	Parameter for manufacturer setting	8700	8700
169	Parameter for manufacturer setting	variable	variable
170	Watt-hour meter clear	9999	9999
171	Operation hour meter clear	9999	9999
172	User group registered display/batch clear	0	0
173	User group registration	9999	9999
174	User group clear	9999	9999
178	STF terminal function selection	60	60

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
179	STR terminal function selection	61	61
180	RL terminal function selection	0	0
181	RM terminal function selection	1	1
182	RH terminal function selection	2	2
183	RT terminal function selection	3	3
184	AU terminal function selection	4	4
185	JOG terminal function selection	5	5
186	CS terminal function selection	9999	9999
187	MRS terminal function selection	24	24
188	STOP terminal function selection	25	25
189	RES terminal function selection	62	62
190	RUN terminal function selection	26	26
191	SU terminal function selection	41	41
192	IPF terminal function selection	2	2
193	OL terminal function selection	3	3
194	FU terminal function selection	80	80
195	ABC1 terminal function selection	99	99
196	ABC2 terminal function selection	98	98
232	Multi-speed setting (speed 8)	9999	9999
233	Multi-speed setting (speed 9)	9999	9999
234	Multi-speed setting (speed 10)	9999	9999
235	Multi-speed setting (speed 11)	9999	9999
236	Multi-speed setting (speed 12)	9999	9999
237	Multi-speed setting (speed 13)	9999	9999
238	Multi-speed setting (speed 14)	9999	9999
239	Multi-speed setting (speed 15)	9999	9999
240	Soft-PWM operation selection	0	0
241	Analog input display unit switchover	0	0
242	Terminal 1 added compensation amount (terminal 2)	100	100
243	Terminal 1 added compensation amount (terminal 4)	75	75
244	Cooling fan operation selection	1	1
245	Rated slip	9999	9999
246	Slip compensation time constant	0.5	0.5
247	Constant output range slip compensation selection	9999	9999
248	Self power management selection	0	0
249	Earth (ground) fault detection at start	0	0
250	Stop selection	9999	9999
251	Output phase loss protection selection	1	1
252	Override bias	50	50
253	Override gain	150	150
254	Main circuit power OFF waiting time	600	600
255	Life alarm status display	0	0
256	Inrush current limit circuit life display	100	100

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
257	Control circuit capacitor life display	100	100
258	Main circuit capacitor life display	100	100
259	Main circuit capacitor life measuring	0	0
260	PWM frequency automatic switchover	1	1
261	Power failure stop selection	0	0
262	Subtracted frequency at deceleration start	36	36
263	Subtraction starting frequency	1850	1850
264	Power-failure deceleration time 1	5	5
265	Power-failure deceleration time 2	9999	9999
266	Power failure deceleration time switchover frequency	1850	1850
267	Terminal 4 input selection	0	0
268	Monitor decimal digits selection	9999	9999
269	Parameter for manufacturer setting		
289	Inverter output terminal filter	9999	9999
290	Monitor negative output selection	0	0
291	Pulse train I/O selection	0	0
294	UV avoidance voltage gain	100	100
295	Frequency change increment amount setting	0	0
298	Frequency search gain	9999	9999
299	Rotation direction detection selection at restarting	9999	9999
331	RS-485 communication station number	5	5
332	RS-485 communication speed	1152	1152
333	RS-485 communication stop bit length / data length	0	0
334	RS-485 communication parity check selection	2	2
335	RS-485 communication retry count	1	1
336	RS-485 communication check time interval	15	15
337	RS-485 communication waiting time setting	10	10
338	Communication operation command source	0	0
339	Communication speed command source	0	0
340	Communication startup mode selection	10	10
341	RS-485 communication CR/LF selection	1	1
342	Communication EEPROM write selection	0	0
343	Communication error count	0	0
374	Overspeed detection level	1970	1970
384	Input pulse division scaling factor	0	0
385	Frequency for zero input pulse	0	0
386	Frequency for maximum input pulse	720	720
390	% setting reference frequency	1850	1850
414	PLC function operation selection	0	0

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
415	Inverter operation lock mode setting	0	0
416	Pre-scale function selection	0	0
417	Pre-scale setting value	1	1
450	Second applied motor	9999	9999
453	Second motor capacity	9999	9999
454	Number of second motor poles	9999	9999
455	Second motor excitation current	9999	9999
456	Rated second motor voltage	200	400
457	Rated second motor frequency	9999	9999
458	Second motor constant (R1)	9999	9999
459	Second motor constant (R2)	9999	9999
460	Second motor constant (L1) / d-axis inductance (Ld)	9999	9999
461	Second motor constant (L2) / q-axis inductance (Lq)	9999	9999
462	Second motor constant (X)	9999	9999
463	Second motor auto tuning setting/status	0	0
495	Remote output selection	0	0
496	Remote output data 1	0	0
497	Remote output data 2	0	0
498	PLC function flash memory clear	0	0
502	Stop mode selection at communication error	2	2
503	Maintenance timer 1	0	0
504	Maintenance timer 1 warning output set time	9999	9999
505	Speed setting reference	154.2	154.2
506	Display estimated main circuit capacitor residual life	100	100
507	Display/reset ABC1 relay contact life	100	100
508	Display/reset ABC2 relay contact life	100	100
514	Emergency drive dedicated retry waiting time	9999	9999
515	Emergency drive dedicated retry count	1	1
522	Output stop frequency	9999	9999
523	Emergency drive mode selection	9999	9999
524	Emergency drive running speed	9999	9999
539	MODBUS RTU communication check time interval	15	15
547	USB communication station number	0	0
548	USB communication check time interval	9999	9999
549	Protocol selection	1	1
550	NET mode operation command source selection	1	1
551	PU mode operation command source selection	9999	9999
552	Frequency jump range	9999	9999
553	PID deviation limit	9999	9999

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
554	PID signal operation selection	0	0
555	Current average time	1	1
556	Data output mask time	0	0
557	Current average value monitor signal output reference current	10.8	5.6
560	Second frequency search gain	9999	9999
561	PTC thermistor protection level	9999	9999
563	Energization time carrying-over times	0	0
564	Operating time carrying-over times	0	0
565	Second motor excitation current break point	9999	9999
566	Second motor excitation current low-speed scaling factor	9999	9999
569	Second motor speed control gain	9999	9999
570	Multiple rating setting	1	1
571	Holding time at a start	9999	9999
573	4 mA input check selection	9999	9999
574	Second motor online auto tuning	0	0
575	Output interruption detection time	1	1
576	Output interruption detection level	0	0
577	Output interruption cancel level	1000	1000
578	Auxiliary motor operation selection	0	0
579	Motor connection function selection	0	0
580	MC switchover interlock time	1	1
581	Start waiting time	1	1
582	Auxiliary motor connection-time deceleration time	1	1
583	Auxiliary motor disconnection-time acceleration time	1	1
584	Auxiliary motor 1 starting frequency	720	720
585	Auxiliary motor 2 starting frequency	720	720
586	Auxiliary motor 3 starting frequency	720	720
587	Auxiliary motor 1 stopping frequency	0	0
588	Auxiliary motor 2 stopping frequency	0	0
589	Auxiliary motor 3 stopping frequency	0	0
590	Auxiliary motor start detection time	5	5
591	Auxiliary motor stop detection time	5	5
592	Traverse function selection	0	0
593	Maximum amplitude amount	10	10
594	Amplitude compensation amount during deceleration	10	10
595	Amplitude compensation amount during acceleration	10	10
596	Amplitude acceleration time	5	5
597	Amplitude deceleration time	5	5
598	Undervoltage level	9999	9999
599	X10 terminal input selection	0	0
600	First free thermal reduction frequency 1	9999	9999

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
601	First free thermal reduction ratio 1	100	100
602	First free thermal reduction frequency 2	9999	9999
603	First free thermal reduction ratio 2	100	100
604	First free thermal reduction frequency 3	9999	9999
606	Power failure stop external signal input selection	1	1
607	Motor permissible load level	150	150
608	Second motor permissible load level	9999	9999
609	PID set point/deviation input selection	2	2
610	PID measured value input selection	3	3
611	Acceleration time at a restart	9999	9999
617	Reverse rotation excitation current low-speed scaling factor	9999	9999
653	Speed smoothing control	0	0
654	Speed smoothing cutoff frequency	20	20
655	Analog remote output selection	0	0
656	Analog remote output 1	1000	1000
657	Analog remote output 2	1000	1000
658	Analog remote output 3	1000	1000
659	Analog remote output 4	1000	1000
660	Increased magnetic excitation deceleration operation selection	0	0
661	Magnetic excitation increase rate	9999	9999
662	Increased magnetic excitation current level	100	100
663	Control circuit temperature signal output level	0	0
665	Regeneration avoidance frequency gain	100	100
668	Power failure stop frequency gain	100	100
673	SF-PR slip amount adjustment operation selection	9999	9999
674	SF-PR slip amount adjustment gain	100	100
675	User parameter auto storage function selection	9999	9999
684	Tuning data unit switchover	0	0
686	Maintenance timer 2	0	0
687	Maintenance timer 2 warning output set time	9999	9999
688	Maintenance timer 3	0	0
689	Maintenance timer 3 warning output set time	9999	9999
692	Second free thermal reduction frequency 1	9999	9999
693	Second free thermal reduction ratio 1	100	100
694	Second free thermal reduction frequency 2	9999	9999
695	Second free thermal reduction ratio 2	100	100
696	Second free thermal reduction frequency 3	9999	9999
699	Input terminal filter	9999	9999

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
702	Maximum motor frequency	1850	1850
706	Induced voltage constant (phi f)	635	1270.1
707	Motor inertia (integer)	30	30
711	Motor Ld decay ratio	100	100
712	Motor Lq decay ratio	96.2	93.3
717	Starting resistance tuning compensation	98.4	99.9
721	Starting magnetic pole position detection pulse width	9999	9999
724	Motor inertia (exponent)	3	3
725	Motor protection current level	200	200
726	Auto Baudrate/Max Master	255	255
727	Max Info Frames	1	1
728	Device instance number (Upper 3digits)	0	0
729	Device instance number (Lower 4digits)	0	0
738	Second motor induced voltage constant (phi f)	9999	9999
739	Second motor Ld decay ratio	9999	9999
740	Second motor Lq decay ratio	9999	9999
741	Second starting resistance tuning compensation	9999	9999
742	Second motor magnetic pole detection pulse width	9999	9999
743	Second motor maximum frequency	9999	9999
744	Second motor inertia (integer)	9999	9999
745	Second motor inertia (exponent)	9999	9999
746	Second motor protection current level	9999	9999
753	Second PID action selection	0	0
754	Second PID control automatic switchover frequency	9999	9999
755	Second PID action set point	9999	9999
756	Second PID proportional band	100	100
757	Second PID integral time	1	1
758	Second PID differential time	9999	9999
759	PID unit selection	9999	9999
760	Pre-charge fault selection	0	0
761	Pre-charge ending level	9999	9999
762	Pre-charge ending time	9999	9999
763	Pre-charge upper detection level	9999	9999
764	Pre-charge time limit	9999	9999
765	Second pre-charge fault selection	0	0
766	Second pre-charge ending level	9999	9999
767	Second pre-charge ending time	9999	9999
768	Second pre-charge upper detection level	9999	9999
769	Second pre-charge time limit	9999	9999
774	Operation panel monitor selection 1	9999	9999
775	Operation panel monitor selection 2	9999	9999
776	Operation panel monitor selection 3	9999	9999

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
777	4 mA input check operation frequency	9999	9999
778	4 mA input check filter	0	0
779	Operation frequency during communication error	9999	9999
791	Acceleration time in low-speed range	9999	9999
792	Deceleration time in low-speed range	9999	9999
799	Pulse increment setting for output power	1	1
800	Control method selection	110	110
820	Speed control P gain 1	25	25
821	Speed control integral time 1	0.333	0.333
822	Speed setting filter 1	9999	9999
824	Torque control P gain 1 (current loop proportional gain)	50	50
825	Torque control integral time 1 (current loop integral time)	40	40
827	Torque detection filter 1	0	0
828	Parameter for manufacturer setting		
830	Speed control P gain 2	9999	9999
831	Speed control integral time 2	9999	9999
832	Speed setting filter 2	9999	9999
834	Torque control P gain 2	9999	9999
835	Torque control integral time 2	9999	9999
837	Torque detection filter 2	9999	9999
849	Analog input offset adjustment	100	100
858	Terminal 4 function assignment	0	0
859	Torque current/Rated PM motor current	10.8	5.6
860	Second motor torque current/Rated PM motor current	9999	9999
864	Torque detection	150	150
866	Torque monitoring reference	150	150
867	AM output filter	0.01	0.01
868	Terminal 1 function assignment	0	0
869	Current output filter	0.02	0.02
870	Speed detection hysteresis	6	6
872	Input phase loss protection selection	0	0
874	OLT level setting	120	120
882	Regeneration avoidance operation selection	0	0
883	Regeneration avoidance operation level	380	760
884	Regeneration avoidance at deceleration detection sensitivity	0	0
885	Regeneration avoidance compensation frequency limit value	185	185
886	Regeneration avoidance voltage gain	100	100
888	Free parameter 1	9999	9999
889	Free parameter 2	9999	9999
891	Cumulative power monitor digit shifted times	9999	9999

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
892	Load factor	100	100
893	Energy saving monitor reference (motor capacity)	2.2	2.2
894	Control selection during commercial power-supply operation	0	0
895	Power saving rate reference value	9999	9999
896	Power unit cost	9999	9999
897	Power saving monitor average time	9999	9999
898	Power saving cumulative monitor clear	9999	9999
899	Operation time rate (estimated value)	9999	9999
900	CA terminal calibration		
901	AM terminal calibration		
902	Terminal 2 frequency setting bias frequency	0	0
-902	Terminal 2 frequency setting bias	0	0
903	Terminal 2 frequency setting gain frequency	N/A	N/A
-903	Terminal 2 frequency setting gain	100	100
904	Terminal 4 frequency setting bias frequency	0	0
-904	Terminal 4 frequency setting bias	20	20
905	Terminal 4 frequency setting gain frequency	N/A	N/A
-905	Terminal 4 frequency setting gain	100	100
917	Terminal 1 bias frequency (speed)	0	0
-917	Terminal 1 bias (speed)	0	0
918	Terminal 1 gain frequency (speed)	N/A	N/A
-918	Terminal 1 gain (speed)	100	100
919	Terminal 1 bias command (torque)	0	0
-919	Terminal 1 bias (torque)	0	0
920	Terminal 1 gain command (torque)	150	150
-920	Terminal 1 gain (torque)	100	100
930	Current output bias signal	0	0
-930	Current output bias current	0	0
931	Current output gain signal	100	100
-931	Current output gain current	100	100
932	Terminal 4 bias command (torque)	0	0
-932	Terminal 4 bias (torque)	20	20
933	Terminal 4 gain command (torque)	150	150
-933	Terminal 4 gain (torque)	100	100
934	PID display bias coefficient	9999	9999
-934	PID display bias analog value	20	20
935	PID display gain coefficient	9999	9999
-935	PID display gain analog value	100	100
977	Input voltage mode selection	0	0
989	Parameter copy alarm release	10	10
990	PU buzzer control	1	1

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
991	PU contrast adjustment	58	58
992	Operation panel setting dial push monitor selection	0	0
997	Fault initiation	9999	9999
998	PM parameter initialization	9009	9009
999	Automatic parameter setting	9999	9999
1000	Direct setting selection	0	0
1002	Lq tuning target current adjustment coefficient	9999	9999
1006	Clock (year)	2000	2000
1007	Clock (month, day)	101	101
1008	Clock (hour, minute)	0	0
1013	Running speed after emergency drive retry reset	N/A	N/A
1015	Integral stop selection at limited frequency	0	0
1016	PTC thermistor protection detection time	0	0
1018	Monitor with sign selection	9999	9999
1020	Trace operation selection	0	0
1021	Trace mode selection	0	0
1022	Sampling cycle	2	2
1023	Number of analog channels	4	4
1024	Sampling auto start	0	0
1025	Trigger mode selection	0	0
1026	Number of sampling before trigger	90	90
1027	Analog source selection (1ch)	201	201
1028	Analog source selection (2ch)	202	202
1029	Analog source selection (3ch)	203	203
1030	Analog source selection (4ch)	204	204
1031	Analog source selection (5ch)	205	205
1032	Analog source selection (6ch)	206	206
1033	Analog source selection (7ch)	207	207
1034	Analog source selection (8ch)	208	208
1035	Analog trigger channel	1	1
1036	Analog trigger operation selection	0	0
1037	Analog trigger level	1000	1000
1038	Digital source selection (1ch)	1	1
1039	Digital source selection (2ch)	2	2
1040	Digital source selection (3ch)	3	3
1041	Digital source selection (4ch)	4	4
1042	Digital source selection (5ch)	5	5
1043	Digital source selection (6ch)	6	6
1044	Digital source selection (7ch)	7	7
1045	Digital source selection (8ch)	8	8
1046	Digital trigger channel	1	1
1047	Digital trigger operation selection	0	0
1048	Display-off waiting time	0	0

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
1049	USB host reset	0	0
1106	Torque monitor filter	9999	9999
1107	Running speed monitor filter	9999	9999
1108	Excitation current monitor filter	9999	9999
1132	Pre-charge change increment amount	9999	9999
1133	Second pre-charge change increment amount	9999	9999
1136	Second PID display bias coefficient	9999	9999
1137	Second PID display bias analog value	20	20
1138	Second PID display gain coefficient	9999	9999
1139	Second PID display gain analog value	100	100
1140	Second PID set point/deviation input selection	2	2
1141	Second PID measured value input selection	3	3
1142	Second PID unit selection	9999	9999
1143	Second PID upper limit	9999	9999
1144	Second PID lower limit	9999	9999
1145	Second PID deviation limit	9999	9999
1146	Second PID signal operation selection	0	0
1147	Second output interruption detection time	1	1
1148	Second output interruption detection level	0	0
1149	Second output interruption cancel level	1000	1000
1150	PLC function user parameter 1	0	0
1151	PLC function user parameter 2	0	0
1152	PLC function user parameter 3	0	0
1153	PLC function user parameter 4	0	0
1154	PLC function user parameter 5	0	0
1155	PLC function user parameter 6	0	0
1156	PLC function user parameter 7	0	0
1157	PLC function user parameter 8	0	0
1158	PLC function user parameter 9	0	0
1159	PLC function user parameter 10	0	0
1160	PLC function user parameter 11	0	0
1161	PLC function user parameter 12	0	0
1162	PLC function user parameter 13	0	0
1163	PLC function user parameter 14	0	0
1164	PLC function user parameter 15	0	0
1165	PLC function user parameter 16	0	0
1166	PLC function user parameter 17	0	0
1167	PLC function user parameter 18	0	0
1168	PLC function user parameter 19	0	0
1169	PLC function user parameter 20	0	0
1170	PLC function user parameter 21	0	0
1171	PLC function user parameter 22	0	0
1172	PLC function user parameter 23	0	0

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
1173	PLC function user parameter 24	0	0
1174	PLC function user parameter 25	0	0
1175	PLC function user parameter 26	0	0
1176	PLC function user parameter 27	0	0
1177	PLC function user parameter 28	0	0
1178	PLC function user parameter 29	0	0
1179	PLC function user parameter 30	0	0
1180	PLC function user parameter 31	0	0
1181	PLC function user parameter 32	0	0
1182	PLC function user parameter 33	0	0
1183	PLC function user parameter 34	0	0
1184	PLC function user parameter 35	0	0
1185	PLC function user parameter 36	0	0
1186	PLC function user parameter 37	0	0
1187	PLC function user parameter 38	0	0
1188	PLC function user parameter 39	0	0
1189	PLC function user parameter 40	0	0
1190	PLC function user parameter 41	0	0
1191	PLC function user parameter 42	0	0
1192	PLC function user parameter 43	0	0
1193	PLC function user parameter 44	0	0
1194	PLC function user parameter 45	0	0
1195	PLC function user parameter 46	0	0
1196	PLC function user parameter 47	0	0
1197	PLC function user parameter 48	0	0
1198	PLC function user parameter 49	0	0
1199	PLC function user parameter 50	0	0
1211	PID gain tuning timeout time	100	100
1212	Step manipulated amount	1000	1000
1213	Step response sampling cycle	1	1
1214	Timeout time after the maximum slope	10	10
1215	Limit cycle output upper limit	1100	1100
1216	Limit cycle output lower limit	1000	1000
1217	Limit cycle hysteresis	1	1
1218	PID gain tuning setting	0	0
1219	PID gain tuning start/status	0	0
1300	Communication option parameter	0	0
1301	Communication option parameter	0	0
1302	Communication option parameter	0	0
1303	Communication option parameter	0	0
1304	Communication option parameter	0	0
1305	Communication option parameter	0	0
1306	Communication option parameter	0	0
1307	Communication option parameter	0	0
1308	Communication option parameter	0	0

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
1309	Communication option parameter	0	0
1310	Communication option parameter	0	0
1311	Communication option parameter	0	0
1312	Communication option parameter	0	0
1313	Communication option parameter	0	0
1314	Communication option parameter	0	0
1315	Communication option parameter	0	0
1316	Communication option parameter	0	0
1317	Communication option parameter	0	0
1318	Communication option parameter	0	0
1319	Communication option parameter	0	0
1320	Communication option parameter	0	0
1321	Communication option parameter	0	0
1322	Communication option parameter	0	0
1323	Communication option parameter	0	0
1324	Communication option parameter	0	0
1325	Communication option parameter	0	0
1326	Communication option parameter	0	0
1327	Communication option parameter	0	0
1328	Communication option parameter	0	0
1329	Communication option parameter	0	0
1330	Communication option parameter	0	0
1331	Communication option parameter	0	0
1332	Communication option parameter	0	0
1333	Communication option parameter	0	0
1334	Communication option parameter	0	0
1335	Communication option parameter	0	0
1336	Communication option parameter	0	0
1337	Communication option parameter	0	0
1338	Communication option parameter	0	0
1339	Communication option parameter	0	0
1340	Communication option parameter	0	0
1341	Communication option parameter	0	0
1342	Communication option parameter	0	0
1343	Communication option parameter	0	0
1350	Communication option parameter	0	0
1351	Communication option parameter	0	0
1352	Communication option parameter	0	0
1353	Communication option parameter	0	0
1354	Communication option parameter	0	0
1355	Communication option parameter	0	0
1356	Communication option parameter	0	0
1357	Communication option parameter	0	0
1358	Communication option parameter	0	0
1359	Communication option parameter	0	0

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
1361	Detection time for PID output hold	5	5
1362	PID output hold range	9999	9999
1363	PID Priming time	9999	9999
1364	Stirring time during sleep	15	15
1365	Stirring interval time	0	0
1366	Sleep boost level	9999	9999
1367	Sleep boost waiting time	0	0
1368	Output interruption cancel time	0	0
1369	Check valve closing completion frequency	9999	9999
1370	Detection time for PID limiting operation	0	0
1371	PID upper/lower limit pre-warning level range	9999	9999
1372	PID measured value control set point change amount	5	5
1373	PID measured value control set point change rate	0	0
1374	Auxiliary pressure pump operation starting level	1000	1000
1375	Auxiliary pressure pump operation stopping level	1000	1000
1376	Auxiliary motor stopping level	9999	9999
1377	PID input pressure selection	9999	9999
1378	PID input pressure warning level	20	20
1379	PID input pressure fault level	9999	9999
1380	PID input pressure warning set point change amount	5	5
1381	PID input pressure fault operation selection	0	0
1410	Starting times lower 4 digits	0	0
1411	Starting times upper 4 digits	0	0
1412	Motor induced voltage constant (phi f) exponent	9999	9999
1413	Second motor induced voltage constant (phi f) exponent	9999	9999
1460	PID multistage set point 1	9999	9999
1461	PID multistage set point 2	9999	9999
1462	PID multistage set point 3	9999	9999
1463	PID multistage set point 4	9999	9999
1464	PID multistage set point 5	9999	9999
1465	PID multistage set point 6	9999	9999
1466	PID multistage set point 7	9999	9999
1469	Number of cleaning times monitor	0	0
1470	Number of cleaning times setting	0	0
1471	Cleaning trigger selection	0	0
1472	Cleaning reverse rotation frequency	N/A	N/A
1473	Cleaning reverse rotation operation time	5	5
1474	Cleaning forward rotation frequency	9999	9999
1475	Cleaning forward rotation operation time	9999	9999

Table 10. Drive programming specification (continued)

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
1476	Cleaning stop time	5	5
1477	Cleaning acceleration time	9999	9999
1478	Cleaning deceleration time	9999	9999
1479	Cleaning time trigger	0	0
1480	Load characteristics measurement mode	0	0
1481	Load characteristics load reference 1	9999	9999
1482	Load characteristics load reference 2	9999	9999
1483	Load characteristics load reference 3	9999	9999
1484	Load characteristics load reference 4	9999	9999
1485	Load characteristics load reference 5	9999	9999
1486	Load characteristics maximum frequency	N/A	N/A
1487	Load characteristics minimum frequency	N/A	N/A
1488	Upper limit warning detection width	20	20
1489	Lower limit warning detection width	20	20
1490	Upper limit fault detection width	9999	9999
1491	Lower limit fault detection width	9999	9999
1492	Load status detection signal delay time / load reference measurement waiting time	1	1

Field Programming of Trane Parameters After Factory Reset

Factory reset of the Mitsubishi drive in the field is not recommended.

Factory reset will erase all custom parameters programmed by Trane prior to shipment. The factory reset returns parameters to Mitsubishi default values, not Trane default values. The unit will not operate properly without Trane default values.

If a factory reset is performed on the Mitsubishi drive, the following procedure must be used to manually enter all custom values shown in Table 11 below.

Reset Parameters to Trane Defaults

Follow the procedure below to change the parameters shown in Table 11 to Trane default values. The procedure is the same for all parameters.

The unit must be powered but not operating.

1. Press PU/EXT to choose the PU operation mode.
2. Press MODE to choose the parameter setting mode.
3. Turn the dial until P.1 (Parameter 1) appears.
4. Press SET to read the present set value. 120 should appear.
5. Turn the dial to change the set value to 1850.
6. Press SET to enter the setting.
7. 1850 and P.1 will flicker alternately.
8. Turn the dial to read another parameter.
9. Press SET to show the setting again.

10. Press SET twice to show the next parameter.
11. Press MODE three times to return to the monitor display of the frequency.
12. Repeat this process for all parameters in the table.

Important: *Parameters must be input in the order shown in* Table 11. Do NOT input parameters in their numerical sequence.

Table 11. Trane programming after factory reset

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
1	Maximum frequency	1850	1850
2	Minimum frequency	93	93
3	Base frequency	720	720
5	Multi-speed setting (middle speed)	360	360
6	Multi-speed setting (low speed)	120	120
7	Acceleration time	20	20
8	Deceleration time	60	60
9	Electronic thermal O/L relay/Rated motor current	10.8	5.6
10	DC injection brake operation frequency	36	36
18	High speed maximum frequency	1850	1850
20	Acceleration/deceleration reference frequency	1850	1850
42	Output frequency detection	72	72
50	Second output frequency detection	360	360
55	Frequency monitoring reference	1850	1850
56	Current monitoring reference	10.8	5.6
66	Stall prevention operation reduction starting frequency	720	720
67	Number of retries at fault occurrence	110	110
68	Retry waiting time	60	60
71	Applied motor	9090	9090
72	PWM frequency selection	15	15
80	Motor capacity	2.2	2.2
81	Number of motor poles	10	10
83	Rated motor voltage	230	460
84	Rated motor frequency	1850	1850
90	Motor constant (R1)	0.614	1.762
92	Motor constant (L1)/d-axis inductance (Ld)	6	23.27
93	Motor constant (L2)/q-axis inductance (Lq)	7.31	25.8
123	PU communication waiting time setting	10	10
125	Terminal 2 frequency setting gain frequency	1850	1850
126	Terminal 4 frequency setting gain frequency	1850	1850
140	Backlash acceleration stopping frequency	12	12
142	Backlash deceleration stopping frequency	12	12
144	Speed setting switchover	110	110

Table 11. Trane programming after factory reset

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
145	PU display language selection	1	1
168	Parameter for manufacturer setting	8700	8700
190	RUN terminal function selection	26	26
191	SU terminal function selection	41	41
192	IPF terminal function selection	2	2
193	OL terminal function selection	3	3
194	FU terminal function selection	80	80
195	ABC1 terminal function selection	99	99
196	ABC2 terminal function selection	98	98
240	Soft-PWM operation selection	0	0
244	Cooling fan operation selection	1	1
262	Subtracted frequency at deceleration start	36	36
263	Subtraction starting frequency	1850	1850
266	Power failure deceleration time switchover frequency	1850	1850
331	RS-485 communication station number	5	5
332	RS-485 communication speed	1152	1152
333	RS-485 communication stop bit length / data length	0	0
334	RS-485 communication parity check selection	2	2
335	RS-485 communication retry count	1	1
336	RS-485 communication check time interval	15	15
337	RS-485 communication waiting time setting	10	10
340	Communication startup mode selection	10	10
374	Overspeed detection level	1970	1970
386	Frequency for maximum input pulse	720	720
390	% setting reference frequency	1850	1850
505	Speed setting reference	154.2	154.2
539	MODBUS RTU communication check time interval	15	15
549	Protocol selection	1	1
550	NET mode operation command source selection	1	1
557	Current average value monitor signal output reference current	10.8	5.6
570	Multiple rating setting	1	1
584	Auxiliary motor 1 starting frequency	720	720
585	Auxiliary motor 2 starting frequency	720	720
586	Auxiliary motor 3 starting frequency	720	720
702	Maximum motor frequency	1850	1850
706	Induced voltage constant (phi f)	635	1270.1
707	Motor inertia (integer)	30	30
711	Motor Ld decay ratio	100	100
712	Motor Lq decay ratio	96.2	93.3
717	Starting resistance tuning compensation	98.4	99.9

Table 11. Trane programming after factory reset

Parameter	Name	Value after Programming	
		230V Drive	460V Drive
724	Motor inertia (exponent)	3	3
725	Motor protection current level	200	200
800	Control method selection	110	110
859	Torque current/Rated PM motor current	10.8	5.6
870	Speed detection hysteresis	6	6
885	Regeneration avoidance compensation frequency limit value	185	185
893	Energy saving monitor reference (motor capacity)	2.2	2.2
998	PM parameter initialization	9009	9009
13	Starting frequency	0	0
22	Stall prevention operation level	150(a)	150(a)

(a) Parameter 22 will read as “1500” in EZ-Socket.

Table 12. Motor diagnosing data

Part Number	Vendor	Model Number	Maximum RPM	Voltage	Maximum Frequency	Motor Poles	Motor Inertia	Motor Inductance	Maximum Winding Resistance	Back EMF @1000 rpm
X38011446001	EBM-PAPST	8300100649	1850	200-240	154.2	10	0.3 kg*m^2	10.4 mH	0.87Ω	66.5 Vpk (47 Vrms)
X38011446002	EBM-PAPST	8300100650	1850	380-480	154.2	10	0.3 kg*m^2	40.2 mH	3.49Ω	133 Vpk (94 Vrms)

Maximum Temperature Limits with Refrigerant System Inactive

On units with separate variable frequency drive operating the supply fan motor, the supply fan motor should not be operated without the refrigeration system active if the indoor or outdoor temperature is above 120°F, as this could lead the ambient temperature around the drive to exceed its ratings.

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