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GE Drives wishes to thank you for choosing our adjustable frequency controller product. We are committed to being the world's leading supplier of AC adjustable speed drives by providing the highest quality products as well as the best documentation and product support available in the industry.

Compiled in this manual is a comprehensive set of documentation for your purchase. The manual is designed to provide you installation, commissioning, preventative maintenance, trouble-shooting and proper operating instructions for your GE Drives adjustable speed drive product. We suggest complete review of the manual by your personnel prior to installation and subsequent operation of the product.

Before proceeding to the instructions note that throughout this manual are several warnings, cautions and notes, which are highlighted in, shadowed boxes as shown below. Please take time to read these special instructions because they contain important information regarding protection and safety of personnel and equipment.

WARNING: Denotes operating procedures and practices that may result in personal injury or loss of life if not correctly followed

CAUTION: Denotes operating procedures and practices that, if not strictly observed, may result in damage to, or destruction of equipment.

NOTE: *Notes call attention to information that is especially significant in understanding and operating the equipment.*

INSTALLATION AND START-UP INSTRUCTIONS FOR AF-600 REDUNDANT DRIVE PANELS

The following information is provided for reference use during the installation of your AF-600 Redundant Drive Panels. Please note that all equipment shall be installed in accordance with the 2008 edition of NFPA 70 (National Electric Code) along with applicable local codes. This document provides information pertaining to: inspections, environment, installation, and wiring. The AF-600 Drive User's Guide DET - 609 and the AF-600 Redundant Drive Panel Operating Instructions contained in this notebook have additional information and will be referenced through out this document.

INSPECTION #1

After unpacking your control panel inspect it for damage that may have occurred during shipment.

If any damage is found please report it to the distributor from which the panel was purchased.

CAUTION: Care should be taken when unpacking the panel; improper use of tools could damage equipment.

PREPARING FOR INSTALLATION

Remove and discard desiccant / drying / silica packs, if included.

Before you begin to install the drive panel, make sure the proper equipment for lifting is available. Refer to the appropriate *Outline* drawing for the dimensions, estimated weight, and required clearances for installation.

WARNING: Improper lifting of enclosure could result in a fatal or serious injury.

Review the *Layout* and *Elementary* diagrams before wiring your AF-600 Redundant Drive panel.

CAUTION: On Wall-Mounted enclosures the panel doors can swing through 180+ degrees and there are no stops to inhibit the door from hitting equipment located next to the panel. This could result in damage to the door mounted switches and indicator lights on the panel door.

ENVIRONMENT

AF-600 Redundant Drive Panels are available only in NEMA type 1 Enclosures. The environment must also be totally free from flammable or combustible vapors and/or dust.

WARNING: Failure to comply to this instruction could result in a fire and/or explosion, thus resulting in a fatal or serious injury.

The environments for NEMA Type 1 enclosures shall be indoor where the following condition may exist; falling dirt.

For all enclosure types the ambient temperature must remain in the range from -10° C (14° F) to 40° C (104° F). Never store or operate panel below or above ambient range. All wall-mounted enclosures must be mounted on a non-flammable or heat resistant surface.

Some enclosure configurations of AF-600 Redundant Drive Panels require ventilation to keep the components and inverter within their thermal recommendations. The enclosure door and sides contains grilles at the bottom and top to allow for air to circulate through the enclosure. Ventilation is accomplished by the cooling fan(s) mounted at the bottom grille(s) pulling air into the enclosure and forcing it out the top grille(s).

The air used for ventilating the enclosure must be free from condensation, moisture, dirt, dust, and flammable or combustible vapors and/or dust

The recirculation of air leaving the enclosure should be avoided. Air forced out of the enclosure should not be allowed to circulate back into the enclosure. All enclosures shall be installed where the doors are able to completely open. Do not mount enclosure where the air flow into or out of it may be restricted.

CAUTION: Damage to equipment will result if panel is operated or stored below or above stated ambient temperature range.

WARNING: The temperature of the inverter heat sink fins may reach 90° C (194° F). Thus if not mounted on a heat resistant or a non-flammable surface a fire may occur resulting in a fatal or serious injury, as well as damage to equipment.

INSTALLATION

Panels must be installed per NEC 110.26 and local codes and have minimum clearance to operate door safely and allow for proper maintenance as needed, (e.g., access and change filters).

Determine conduit entry and exit locations on the enclosure before mounting. See the appropriate *Outline* drawing for recommended conduit locations.
Allow for input and output power wiring to be located in separate conduit.

No conduit holes are provided in the enclosure; therefore the customer must install all conduit holes. Place a protective covering over the components of the panel while installing the conduit holes to prevent metal shavings or chips from landing on part or electronic boards.

CAUTION: Failure to cover components from metal shavings may result in damage to equipment.

All panels/enclosures must be grounded. **All exposed metal parts are connected to ground to prevent contact with a dangerous voltage if electrical insulations fail.**

Each panel contains a grounding bus with provisions for connecting a field-grounding conductor.

All field wiring shall be copper and have a minimum insulation rating of 75°C (167° F).

Size grounding conductors according to local and national codes

Grounding methods must comply to local and national codes.

POWER WIRE
(Greater than 120 VAC)

All field wiring shall be copper and have a minimum insulation rating of 75° C (167° F).

Size all wire based on panel nameplate current ratings in accordance with local and national codes. Do not use the cable sizes listed in DET - 609 & DET – 610 manuals.

All power wiring must be routed away from other wiring. Avoid running power wiring parallel to other wiring without a minimum separation distance of four (4) inches. Power wiring should only cross perpendicular to other wiring.

Input and output power shall be connected as per the wiring diagram.

Incoming power cables should be terminated at line side of the lugs provided with the Disconnect switch.

Locate terminals (T1, T2, and T3) in the panels and use these terminals to connect the motor wires. Depending on actual drive panel configuration, motor cables should be terminated on the load side of the Power Distribution Blocks.

Refer to Appendix B for Tightening torque details for motor connections.

CAUTION: Do not connect power supply voltage greater than panel rated voltage, or damage will occur to equipment.

WARNING: Never connect or disconnect input wiring with voltage applied, a serious or fatal injury may result.

WARNING: Never connect or disconnect output wiring with voltage applied, a serious or fatal injury may result.

CONTROL WIRING
(120 VAC)

All field wiring shall have a minimum insulation rating of 75° C (167° F).

Size wire according to local and national codes.

All control wiring must be routed away from power wiring. If control wiring is routed parallel to signal wiring (24 Vdc or less), isolation of the signal wiring must be maintained. A minimum of four (4) inches is needed to adequately separate signal and control wiring. If signal wire is UL recognized shielded cable, separation can be minimized to a one (1) inch separation.

AF-600 Redundant Drive Panels require no additional control wiring to operate properly. Additional control interfacing to your control panel can be accomplished through the panel mounted customer terminal board "CTB1". Please reference the appropriate wiring diagram. Torque values for connecting to "CTB1" are located in the Appendices.

SIGNAL WIRING
(24 VDC or less)

All field wiring shall have a minimum insulation rating of 75° C (167° F).

Size wire according to local and national codes.

All field signal wiring must be twisted and shielded. All shields must be grounded at one point ONLY. It is recommended to terminate the shield drains at the signal's source. Avoid routing signal wiring with power wiring. If signal wiring is routed with control wiring a minimum separation of one (1) inch is required.

AF-600 Redundant Drive Panels require no additional signal wiring to operate properly. Additional signal interfacing to your control panel can be accomplished through the panel mounted customer terminal board "CTB1". Please reference the appropriate customer interface diagram for signal interfacing to your control panel. Torque values for connecting to "CTB1" are located in the Appendices.

If your application requires wiring to the AF-600 FP inverter I/O control terminal board, use 16 to 18 AWG wire.

Connections on the inverter I/O terminal board should be tight enough such that a slight tug on the wire will not result in the wire coming partially or completely out of the terminal board.

CAUTION: Do not over-tighten terminal board connectors, damage to the equipment may occur.

MISCELLANEOUS INFORMATION

Refer Appendix B (Table A) for estimated watts loss of the panel.

If your enclosure is equipped with forced ventilation for keeping the inverter and other components within their thermal recommendations, the cooling fan(s) used to ventilate your enclosure also need to be cleaned periodically. Cleaning the cooling fan(s) is recommended to keep the proper amount of air circulating through the enclosure.

GE Drives recommends that all power connections be checked for proper tightness every 6 months due to thermal cycling that may occur during normal operation.

INSPECTION #2

Prior to start-up of your drive panel inspect the following:

- The mechanical installation for any safety and local or national code violation.
- The electrical installation for proper connections and any violation of local or national code.
- Proper grounding of equipment.
- All field wiring for tight and proper connections (no split wire ends that may come in contact with adjacent connection points).
- No loose hardware, metal shavings, or wiring chips.
- All factory wiring for proper tightness that may have became loose due to shipping vibration.

OPERATING AND TROUBLESHOOTING INSTRUCTIONS FOR AF 600 REDUNDANT DRIVE PANELS

Your AF 600 Redundant Drive Panel comes with an AF 600 FP Adjustable Frequency Drive from GE Drives mounted on or in an enclosure, which contains the following equipment.

Ferraz Shawmut® Non-Fused Disconnect w/through-the-door lockable handle (or equivalent)
Ferraz Shawmut ® Fused Disconnect w/through-the-door lockable handle (or equivalent) for 15 HP Only
GE *C-2000™* 3-Pole Non-Reversing Contactors
GE *C-2000™* Selector Switches
P9 Series Pilot lights
GE Type IP Encapsulated or Vacuum Impregnated 115 VAC Control Power Transformer w/fuses
Bussman / Ferraz Shawmut *Amp-trap®* Time-Delay Class J Fuses (or equivalent)
GE Line Reactors (optional)
GE DC Link Reactors (Drive inbuilt)

These instructions are intended as a supplement to the User's Guide for the AF 600 FP drive. For programming, operating and troubleshooting instructions for the adjustable frequency drive please refer to the User's Guide, which is included with your Redundant Drive panel documentation package.

DET -609 *AF 600 FP User's Guide for up to 60HP @ 208V @ & up to 125HP @460/575*

Also included with your Redundant Drive panel documentation package are installation instructions, electrical and mechanical drawings of your Redundant Drive panel.

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NOTE: *The terms drive and inverter are used interchangeably in this document.*

1. Operator Devices

Your Redundant Drive panel is equipped with several panel door mounted operator devices, which may include the following: one (1) through-the-door, lockable, input device disconnect handle; two (2) operator selector switches; and five (5) indicator lights. The operation of these devices is explained in this section. Refer to the Drive Terminal Board I/O section of this manual and wiring diagrams for specifics on wiring connections.

Input Disconnect

The purpose of the panel-mounted input disconnect with through-the-door handle is to provide a local, lockable method of removing all AC input power from the Redundant Drive panel and AF 600 FP drive.

> **WARNING: Although input power is removed from the drive in the "Off" position this does not guarantee that dangerous voltage levels are absent. The AF 600 FP drives contain capacitors, which can maintain dangerous voltage levels for an extended period following removal of AC input power.**
> **Before touching any potentially live parts of the frequency inverter or drive, it is always advisable to wait at least 20 mins if not specified.**
> **380-480V, 150-300 HP, wait at least 20 minutes**
> **Shorter time is allowed only if indicated on the nameplate for the specific unit.**
> **Do not manually drain capacitors.**

If your panel includes a Non-fusible Disconnector/Fusible Disconnector, in addition to providing a manual method of applying and removing AC input power from the Redundant Drive panel, the Disconnector also provides short circuit protection for the panel components and the motor.

> **WARNING: Potential arc flash and shock hazard**
> Do not perform any maintenance/work when panel is Energized. Follow local work rules and proper Personal Protective Equipment (PPE).

Drive1-Off- Drive2

The setting of this selector switch determines whether power to the motor will be from the adjustable frequency drive1 ("Drive1" position) or from drive2 ("Drive2" position). This selector can be changed "on-the-fly" without first completely stopping the motor. However, when changing from "Drive1" to "Drive2" mode a short delay is required to be inserted by the operator (approximately 10 seconds) to allow time for the motor's rotor flux to decay.

> **NOTE:** *In the event of a drive1 fault need to move switch to "drive2" from "drive1" Vice-versa.*

CAUTION: Failure to insert enough time delay between operation of the motor from the drive1 and operation from drive2 can result in a protective trip of the drive. The time delay is to ensure a safe transition.

Hand/Off/Auto Selector

This selector is also referred to as the H-O-A switch. In the "Off" position power will be removed from the motor in both drive "drive 1" and "drive 2" modes of operation. It should be noted that this will not cause AC input power to be removed from the drive. To remove drive input power the Disconnector switch should be placed in the "OFF" position (or) need to take out fuse link from FSBLK2 & FSBLK3 after Disconnector is moved to "OFF" position.

In "Hand" mode, power will be applied to the motor from either the drive1 or drive2 according to the Drive1-Off- Drive2 selector. In this mode the inverter's frequency reference is determined by the setting of speed pot on the panel if ordered.

In "Auto" mode, power will be applied to the motor only when a connection is made between the two remote run contacts on the customer terminal board inside the panel enclosure. In this mode the inverter's frequency reference is determined by a customer supplied 0-10 VDC or 4-20 mA signal

Hand-Off-Auto on the Drive key pad

All AF 600 redundant drive panels include a keypad for programming and operation of the drive and includes Hand, Off and Auto operation keys / buttons. When shipped from the factory, the Hand, Off and Auto buttons are enabled. Pressing the Off button while the drive is running will cause the drive to decelerate and shut off regardless of the position of the panel's selector switches. To resume normal operations when selector switch is in "Auto" (that is control the unit from its selector switches and analog signal) press the Auto Button one time
Keypad "Hand" button should only be use to control Drive Operation when the selector switch is in "Hand".

For more details on the Hand, Off, and Auto operation keys, refer to manuals DET-609

WARNING: Using the Hand operation in the keypad when selector switch in "Auto" mode may cause control inputs on drive to be ignored and may result in unintended operations / starting of the drive unit.

Emergency Stop — This operator is used to shut off the panel output in case of Emergency. To restart the panel, Reset the E-stop by turn to release.

Power On Indicator — This white light on the panel door indicates that the circuit breaker/disconnect switch is closed and that AC power is present at the panel input terminals. Absence of light from this indicator when it should be "ON" may indicate the presence of a blown fuse(s) on the primary or secondary of the control power transformer or a blown bulb.

Drive1 Run Indicator — This green light on the panel door indicates that the drive1 output contactor is energized and the drive1 may output power to the motor. The conditions that will cause this light to become energized are – Drive1-Off-Drive2 is in the "Drive1". Note that this light only means that the drive1 output contactor is energized and the panel is operating in "Drive1" mode. If the motor's shaft is not rotating then it may be due to 1) no run command provided to the drive1 (i.e. H-O-A switch in the "Off" position) 2) No Speed ref. 3) an open load side disconnect (external to drive panel).

Drive2 Run Indicator — This blue light on the panel door indicates that the Drive2 contactor is energized. In order for this to happen the Drive1-Off- Drive2 selector must be in the "Drive2" position and the H-O-A switch must be in either the "Hand" or "Auto" positions (if "Auto" then remote run contacts must also be closed).

Drive1 Fault Indicator — This amber light on the panel door indicates that the Drive-1 is reporting a fault condition.

Drive 2 Fault Indicator — This amber light on the panel door indicates that the Drive-2 is reporting a fault condition.

2. Customer Terminal Board – "CTB"

Inside the panel enclosure there is terminal board for convenient customer connections. The customer interface drawing provides a visual reference of the terminal board positions with the detailed descriptions as follows:

WARNING: When the disconnect handle is turned to the "On" position, terminal board points can be at 115 VAC with respect to ground. Therefore, prior to making any connections to these points lock the disconnect handle in the "Off" position. In fact, good safety practice dictates that prior to servicing any electrical equipment that all sources of electrical energy be disconnected and "locked out" to avoid reconnection by a third party unaware of the maintenance efforts underway.

NOTE: *Terminal CTB1-1 through CTB1-3 will be at 115V.*

CTB1-1 through **CTB1-3** — **Customer Safety Interlocks.** Put normally closed contacts between CTB-1 and CTB-3. CTB-2 and CTB-3 provide an additional connection point if required. An open circuit between these positions will cause the bypass and drive output contactors to drop out resulting in power being removed from the motor. These positions come jumpered together from the factory and require removal of the factory jumpers prior to connecting customer normally closed contacts.

CTB1-6 through **CTB1-7** — **Auto Run Input.** Put normally open remote run contacts between CTB-6 and CTB-7. Closure between these positions is required for the motor to run in either Drive-1 or Drive-2 modes when the H-O-A switch is in the "Auto" position. The positions come jumpered together from the factory.

CTB1-19 through **CTB1-21** — **Analog Speed Reference Input for Drive 1.** Connect customer supplied 0-10 VDC or 4-20 mA "Auto" speed reference signal. This signal functions as the drive's speed reference when the H-O-A switch is in the "Auto" position. If utilizing a 0-10 VDC signal, CTB1-19 and CTB1-21 are to be used. If utilizing a 4-20 mA signal, CTB1-19 and CTB1-20 are to be used. CTB1-19 is the common terminal for either input signal. See the customer interface diagram for details. Ground bar provided for cable shield grounding.

CTB1-16 through **CTB1-18** — **Analog Speed Reference Input for Drive 2.** Connect customer supplied 0-10 VDC or 4-20 mA "Auto" speed reference signal. This signal functions as the drive's speed reference when the H-O-A switch is in the "Auto" position. If utilizing a 0-10 VDC signal, CTB1-16 and CTB1-18 are to be used. If utilizing a 4-20 mA signal, CTB1-16 and CTB1-17 are to be used. CTB1-16 is the common terminal for either input signal. See the customer interface diagram for details. Ground bar provided for cable shield grounding.

3. AF 600 FP Drive Terminal Board I/O

Any of the AF 600 FP terminal board I/O points which are not already in use for proper operation of the bypass panel are available for customer use. The meanings and connection diagrams for these I/O points are well described and illustrated in the AF 600 FP User's Guide (DET609 – For up to 60HP@208V and up to 125HP@460/575V) which is supplied with your panel documentation package. However there are several I/O points, which will find frequent use in bypass panel applications that they are described below for convenience. Refer to user's guide DET – 609 for terminal locations. Refer to section 2 and wiring diagram for details on correct connection points

18 & 33 — Need to add wire jumper in between these terminal to prevent users from starting a drive using keypad Hand when the selector switch is in the off position

39 & 42 — *4-20 mA output signal will be available from the drive at terminal 39 and 42*

Relay 1 – 01,02,03	Normally open inverter fault contacts. These contacts are utilized to energize an interposing relay for bypass panel control logic and to provide customers with a drive fault status via higher rated normally open contacts than those inherent to the drive.
Relay 2 – 04,05,06	Normally open programmable contacts. These contacts have been configured to provide a drive running status for customer use. This status is then used to energize an interposing relay to provide customers with drive running status via higher rated normally open contacts than those inherent to the drive. .
54, 55	Used for drive speed reference inputs
29	Jog (Digital input) Drive will be programmed (Parameter C20) to run at preset speed (50Hz jog frequency)
1,2,3,4,5	DEVICE NET Communications (with option card)
62,63,66,67,CS	PROFIBUS/BACNET Communications (with option card)
79,80	LONWORKS Communications (with option card)
68,69,61	RS485 Port / Modbus / Metasys / Apogee Communications

4. Adjustments

The AF 600 FP & Redundant Drive panel has several user settable adjustments, which allow it to be tailored specifically for your 3-phase induction motor. Setting these adjustments appropriately is an important factor in ensuring that applicable safety codes are met and that your bypass panel, wiring, and motor are adequately protected. The following list comprises all of the user adjustable devices/components inside the AF 600 FP & Bypass panel. The user may wish to have a copy of NFPA 70-2008 (commonly known as the National Electric Code or simply NEC) available for reference when setting these adjustments.

Input Fuses	Main input fuses are provided standard with your AF 600 FP & Redundant Drive panel. In general there are two configurations that utilize input fuses; 1) input disconnect with load side separately mounted fuses and 2) input Fused Disconnect where the fuses are an integral part of the disconnect. If your panel was ordered with 8% line reactor then it will have main input fuse connected prior to reactor, This fuses will provide shirt circuit protection for 15HP with 8% reactor or without 8% reactor fusible Disconnector itself will have integral fuses. The main input fuses provided with your bypass panel has been closely coordinated to provide short circuit protection for the inverter along with short circuit and over current protection for the motor. In "Drive1" or "Drive2" mode of operation, the fuses only provide short circuit protection due to the fact that the inverter has inherent over current

protection.

UL listed Class J time-delay fuses are provided with your panel. These fuses have been sized in accordance to NEC section 450-52 and Table 450-152. NEC states fuses of this type are to be sized at 175% of motor full-load amps (FLA). Due to the fact that actual motor FLA along with starting current requirements vary between manufacturer and motor types the fuses provided are based on standard NEC motor data. Verify that the input fuse amp rating is less than or equal to the actual motor FLA * 1.75. In the case where the actual motor FLA * 1.75 is less than the provided fuses amp rating then smaller fuses may need to be installed to be in compliance with NEC section 430-52 and Table 430-152. Please note exception 1 to NEC 430-52, which states that where the calculated fuse amp rating does not correspond to a standard fuse size the next higher standard fuse size may be used. In cases where the fuses provided is not sufficient for the starting current requirements of the motor, please note exception 2-b to NEC 430-52. Exception 2-b states the rating of a time-delay fuse may be increased but shall not exceed 225% of the motor FLA in any case. In the case where a larger or smaller fuse is required, a limiting factor in the bypass panel may be the fuse holder. The appendices provide a table for the maximum fuse size permitted in the existing fuse holder.

5. AF 600 FP Drive Function Code Changes

The AF 600 FP Adjustable Frequency Drive has programmable function. A complete description of these function codes can be found in DET – 609 manuals. The purpose of this section is to identify those function codes, which changed from the factory drive defaults for panel installation.

Live Zero Time Out Time	(AN00)	Set to "10" seconds
Live Zero Time Out Function	(AN01)	Set to "3" Jogging
Terminal 53 Live Zero	(AN17)	Set to "0" Disabled
Terminal 54 Live Zero	(AN27)	Set to "1" Enabled
Jog Speed	(C20)	Set to "50" Hz
Frequency Command 2	(C30)	Set to "2" Analog Input 54
Terminal 27 Digital Input	(E03)	Set to "2" Coast inverse
Terminal 32 Digital Input	(E05)	Set to "14" Jog
Terminal 33 Digital Input	(E06)	Set to "6" Stop Inverse

Relay 1	(E24)	Set to "9" Alarm
Relay 2	(E24)	Set to "5"Running
Electronic Overload	(F10)	Set to "4" Elec OL Trip 1
Motor Thermistor Input	(F12)	Set to "0" None
Auto-Reset (Times)	(H04)	Set to "13" Infinite Auto Reset

Drive Programming

Auto-Tune
In the event that it is desired to "auto-tune" the drive to the connected motor, reference the following instructions along with the AF 600 FP User's Guide (DET – 609):

With power applied to the panel –

1) Place the Hand/Off/Auto, and Drive1/Off/Drive2 selector switches in the "Off", and "Drive1" positions respectively.

2) For Full Auto tuning follow the instruction below

   Quick Menu

   Ok

   Quick start

   Ok

   Once Up arrow

   Ok

   P-04 Auto Tuning

   Ok

   [1] Full Auto tune

   Ok

   Follow the Keypad direction Auto tune".

   Note: If the panel has a load reactor, select "Reduced

6. Troubleshooting

Drive1 and Drive2 Motor Rotation

If careful attention to phase rotation is not made during connection of the panel to the three-phase power supply and motor, then there is only a one chance in four that the motor will rotate correctly in both drive1 and drive2 modes.

The other three possibilities and the corresponding corrective actions are as follows:

- **Problem:** Motor turns correctly in Drive2 mode and incorrectly in Drive1 mode.

  Solution: Swap the leads at the drive's output terminals.

- **Problem:** Motor turns correctly in Drive1 mode and incorrectly in Drive2 mode.
- **Solution:** Swap the leads at the drive's output terminals.
- **Problem:** Motor turns incorrectly in both modes.

  Solution: Swap the leads at the motor leads on the contactor's output terminals.

Drive Fault Codes
Refer to FP troubleshooting guide.

AF-600 FP User's Guide

DET -609 AF 600 FP User's Guide for up to 60HP @ 208V @ & up to 125HP @460/575

To be inserted here along with any other GEI for any Options, which may be included

Appendices – Table of Contents

Table A

AF 600 Redundant Drive Panels – 460 VAC
Current Ratings and Maximum Fuse Sizes

VAC Panel Hp Rating	VAC Panel Current Rating	Max Allowable Fuse Size
15	21	33.25
20	27	43.75
25	34	54.25
30	40	63.00
40	52	82.25
50	65	103.25
60	80	127.75
75	96	166.25
100	130	206.50
125	156	253.75

In-Warranty Information Form

The purpose of this form is to provide specific information to GE Drives to aid in expediting part replacement and/or troubleshooting assistance for AF-600 FP Redundant Drive panels. The following information is required prior to any assistance being provided.

Panel Model Number : _____

Panel Serial Number : _____

Start-Up Date: _____

Failure Date: _____

I. Application Information:

Input Transformer: _____ kVA Wiring distance between motor & drive _____ ft.

Power Factor Correction Capacitors: _____ Yes (_____ Microfarad) _____ No

Other Equipment on Same Power: _____ Yes _____ No

If Yes, what? _____

II. Function Code Different From Factory Settings:

FC	Setting	FC	Setting

III. Failure Message:

Latest Fault ☐ Previous Fault ☐

IV. Status When Failure Occurred (check one):

_____ Power Up _____ Running _____ Inverter Mode _____ Bypass Mode

V. Description Of Failure:

_____

_____

Once all the required information above is acquired, contact the following number for assistance:

GE Industrial Systems

Phone: **1-800-533-5885** *(24hrs.)*

VI. ***To aid in part replacement please fill complete the following:***

To: _____ From: _____

Fax: _____ Fax: _____

Phone: _____ Phone: _____

The following is the ship to address for all warranty replacement items:

Company Name

_____

_____

Street Address

_____

_____

City ***State*** ***Zip Code***

_____

Attention

_____

Rm, Dept., Suite, Division, etc.

_____

Appendix B – Wire Sizes, Torque and Estimated Watt loss Details

Table 1 Wire Sizes and Torque Requirements for 460 VAC Panels
Table 2 UL508 Requirement- Tightening torque
Table A Redundant drive panel

In-Warranty Information Form

Table 1

Device	AF - 600 Hp Rating(s)	Minimum Wire Size	Maximum Wire Size	Required Torque
NON FUSED DISCONNECTOR AND FUSE BLOCK	15 through 30Hp	# 14 AWG	# 4 AWG	Note 1
	40 through 50Hp	# 8 AWG	1/0	Note 1
	60 through 75Hp	# 8 AWG	1/0	Note 1
	100 through 125Hp	# 4 AWG	300 MCM	Note 1
FUSED DISCONNECTOR	15 through 30	# 10 AWG	# 3 AWG	Note 1
	40 through 50	# 14 AWG	# 2/0 AWG	Note 1
	60 through 100	# 6 AWG	# 3/0 AWG	Note 1
	125 through 250	# 2 AWG	# 600MCM	Note 1
Drive output power Terminal Board	15 through 25	# 10 AWG	# 7 AWG	16 lb.in
	30 through 40	# 35 AWG	# 2 AWG	40 lb.in
	50 through 75	# 50 AWG	1/0	89 lb.in
	100	# 95 AWG	4/0	212 lb.in
	125	# 120 MCM	250MCM	212 lb.in
Power Distribution Blocks	15 through 100	# 2/0 AWG	# 14 AWG	Note 1
	125	# 350 (1) MCM	# 6 (1) AWG	Note 1
	125	# 2 (3) AWG	# 14 (3) AWG	Note 1
Control Terminal Board	2 through 125	# 26 AWG	# 10 AWG	Note 1
Note (1): For unmentioned torques, Refer UL508A tables in tab "UL508A" in the same excel file				

Table 2

UL508 Requirement				
Table 54.1 , Tightening torque for screws				
Test wire size installed in connector (AWG)	Tightening torque (lb in.)			
	Slotted head no 10 and large		Hexagonal head - external drive socket wrench	
	Slot width - 0.047 inch or less and slot length 1/4 inch or less	Slot width - 0.047 inch or slot length - over 1/4 inch	Split bolt connectors	other connectors
18-10	20	35	80	75
8	25	40	80	75
6-4	35	45	165	110
3	35	50	275	150
2	40	50	275	150
1	-	50	275	150
1/0 - 2/0	-	50	385	180
3/0-4/0	-	50	500	250
250-350	-	50	650	325
400	-	50	825	375
500	-	50	825	375
600-750	-	50	1000	375
800-1000	-	50	1100	500
1250-2000	-	-	1100	600
Note : For values of slot width or length not corresponding to those specified, the largest torque value associated with the conductor size shall be marked. Slot width is the normal design value. Slot length shall be measured at the bottom of the slot				

Table 54.2 , Tightening torque for slotted head screws smaller than No. 10 intended for use with 8 AWG or smaller conductors		
Slot length of screw[a]	Tightening torque, lb.in	
	Slot width of screw[b] smaller than 0.047 in	Slot width of screw[b] 0.047 in and larger
<5/32	7	9
5/32	7	12
3/16	7	12
7/32	7	12
1/4	9	12
9/32	-	15
Above 9/32	-	20
[a] For slot length of intermediate values, torques pertaining to next shorter length shall be utilized. For screws with multiple tightening means, the largest torques value associated with the conductor size shall be marked. Slot length shall be measured [b] Slot width is the nominal design value		

Table 54.3 , Tightening torque for socket head screws	
Socket size across flat in inches	Tightening torque in lb.in
1/8	45
5/32	100
3/16	120
7/32	150
1/4	200
5/16	275
3/8	375
1/2	500
9/16	600

Table A

Redundant drive panel	
HP Ratings	**Estimated Watt Loss (Watts) at**
	460V
15	432
20	572
25	673
30	731
40	934
50	1009
60	1258
75	1527
100	1912
125	2039