TORNATECH

LISTEN DEVELOP LEAD

INSTALLATION AND MAINTENANCE MANUAL FOR DIESEL FIRE PUMP CONTROLLERS MODEL GFD

V2026.10 r0

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IMPORTANT SAFETY INFORMATION

Warning:

This product can expose you to chemicals including DINP, which is known to the State of California to cause cancer, and DIDP which is known to the State of California to cause birth defects or other reproductive harm.

Warning:

This product can expose you to chemicals including lead and lead compounds, which are know to the State of California to cause cancer and birth defects or other reproductive harm.

For more information go to: www.P65Warnings.ca.gov

DANGER

RISK OF ELECTROCUTION

PERSONAL INJURY OR DEATH COULD OCCUR.
ENSURE ALL POWER IS DISCONNECTED BEFORE INSTALLING OR SERVICING THIS EQUIPMENT.

DANGER

Do not attempt to install or perform maintenance on equipment while it is energized. Contact with energized equipment may result in death, serious personal injury, or substantial property damage.

Before proceeding, always verify that no voltage is present and follow all applicable safety procedures. De-energize the power supply to the controller.

The controller must be completely disconnected from all power sources, and the disconnect switch must be in the “OFF” position before opening the enclosure door.

If any person chooses to install, inspect, service, or perform maintenance on the equipment while it is energized, they do so entirely at their own risk and assume full responsibility and liability for any resulting death, injury, loss, or property damage, to the fullest extent permitted by law.

Tornatech shall not be liable for any misapplication, improper installation, unauthorized energized work, or failure to follow these instructions and applicable safety procedures.

INTRODUCTION

Diesel Fire Pump controllers are designed to automatically manage the pressure of a fire protection system by controlling the operation of a diesel engine driven fire pump. System pressure is continuously monitored through a pressure transducer, and the controller automatically starts the fire pump when the pressure drops below the configured threshold. The fire pump can also be started manually through the local start pushbutton. The fire pump will stop automatically after the expiration of a field-programmable timer (when approved by the authority having jurisdiction) or it can be stopped manually with the local stop push-button once the desired pressure condition is re-established.

The Diesel Fire Pump controller's main electrical supply is two sets of engine batteries. Additionally, two battery chargers connected to the AC supply voltage keep the batteries charged at all times.

This controller can be used with non-approved engine, using the optional control by analog senders for magnetic pickup, oil pressure and engine temperature, all shown using on-screen gauges on the display.

TECHNICAL DATA

Rating	Value
Rated Operational Voltage Ue	According to the controller rating label
Rated Operational Frequency	50/60Hz
Standard environmental temperature	4°C - 40°C
Altitude	≤ 2000m
Relative humidity	5% to 80%
Pollution degree	3
Standard degree of protection	IP 55
Standby power consumption	N/A

ENERGY CONSUMPTION

Model	State	120 VAC	220/240 VAC	Output voltage
12 VDC	No charge	< 0.5 A	< 0.5 A	13.8 VDC
	Full charge	6 A	4 A	
24 VDC	No charge	< 0.5 A	< 0.5 A	27.6 VDC
	Full charge	9 A	6 A	

INSTALLATION

STORAGE

If the controller is not installed and energized immediately, Tornatech recommends following the instructions in chapter 3 of NEMA ICS 15.

ENVIRONMENT

Diesel Fire Pump controllers are intended to be installed in locations where ambient temperatures are within 4°C - 40°C and the relative humidity is controlled between 5% and 80%. Optionally, the controller can have an extended temperature of up to 55 °C and as low as -5°C, provided that the controller and the pressure water pipes are heated to prevent water freezing and damaging the electronics and the piping system.

They are intended for pollution degree 3 and shall be installed at an altitude of no more than 2000 meters. For abnormal installation environment, consult factory.

ELECTROMAGNETIC COMPATIBILITY (EMC)

Diesel Fire Pump controllers have been tested for the most stringent conditions for emissions (Environment B) and immunity (Environment A), hence controllers can be installed in either environment. All controllers variants share the same electronics and comply to those criteria without requiring additional measures.

HANDLING

The weight of each Diesel Fire Pump controller is indicated on the packing label. Lightweight controllers do not require special handling instructions, while heavy controllers are equipped with lifting means and should be handled following the guidelines specified in Tornatech's document "Large Enclosure Safe Handling Requirements_PN12162021".

FCC REGULATIONS AND RADIO STANDARDS SPECIFICATION (RSS) RULES

To comply with FCC and Industry Canada RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all nearby persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Compliance: CAN ICES-003(B) / NMB-003(B)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

“Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.”

LOCATION

Consult the appropriate job plans to determine the controller mounting location.

The controller shall be located as close as practical to the engine or motor it controls and shall be within sight of the engine or motor. The controller shall be located or protected such that it will not be damaged by water escaping from pump or pump connections. Current carrying parts of the controller shall be not less than 12 in. (305 mm) above the floor level.

Working clearances around controller shall comply with NFPA 70, National Electrical Code, Article 110 or C22.1, Canadian Electrical Code, Article 26.302 or any applicable local codes.

The standard controller enclosure is rated IP 55. It is the installer’s responsibility to insure that either the standard enclosure meets the ambient conditions or that an enclosure with an appropriate rating has been provided. Controllers must be installed inside a building and they are not designed for outside environment. The paint color may change if the controller is exposed to ultraviolet rays for a long period of time.

MOUNTING

The Diesel Fire Pump controller shall be mounted in a substantial manner on a single incombustible supporting structure.

FLOOR MOUNTING

Floor mounted controllers shall be attached to the floor using all holes provided on the mounting feet with hardware designed to support the weight of the controller. The mounting feet provide the necessary 12 in. (305 mm) clearance for current carrying parts.

WALL MOUNTING

Refer to the controller dimension drawing for necessary mounting dimensions.

The controller is wall mounted by using at least four (4) wall anchors, 2 anchors for the top mounting brackets and 2 anchors for the bottom mounting brackets. The brackets are dimensionally on the same centerline for ease in mounting. There should be a clearance of at least 6 inches (152mm) around the controller to allow proper air circulation around the equipment.

1. Using either the dimension print or by measuring the distance between the center lines of the lower bracket slots, transcribe this dimension on to the wall. Note: The bottom edge of the enclosure should be a minimum of 12” (305mm.) from the floor in case flooding of the pump room occurs.
2. Drill and put anchors into the wall for the lower mounting brackets.
3. Mark on the wall, the location of the holes in the upper mounting brackets.
4. Drill and put anchors into wall for the upper mounting brackets.
5. Install bolts and washers in lower anchors.
6. Align holes in upper mounting brackets and install bolts and washers in anchors.
7. Shim anchors as necessary to ensure rear of enclosure is vertical level and enclosure is not stressed.
8. Tighten all anchor bolts.
9. Check to be sure enclosure door open and closes freely and that enclosure is level.

MAKING SYSTEM PRESSURE CONNECTIONS

The controller requires one (1) “System Pressure” connection from the system piping to the enclosure. The connection fitting, 1/2” NPT male port, is provided on the left external side of the enclosure for this purpose. Refer to NFPA 20 for correct field piping procedure of the sensing line between the pumping system and the controller. If a drain is present, the connection to the drain is a tapered connection for plastic tubing.

MAKING ELECTRICAL CONNECTIONS

Diesel engine driven fire pump controllers shall be powered by a dedicated source protected by a fuse or circuit breaker. Verify the label on the cabinet to select the correct protection. Always follow this procedure when connecting or disconnecting the controller: Connect both batteries before connecting the AC power. Disconnect the AC power before disconnecting the batteries. Disconnecting the batteries while the AC is connected may result in severe damage to the controller electronic boards.

IMPORTANT PRECAUTIONS

A licensed electrician must supervise the electrical connections. The dimension drawings show the area suitable for incoming power and motor connections. No other location shall be used. Only watertight hub fittings shall be used when entering the cabinet to preserve the NEMA or IP rating of the cabinet.

The installer is responsible for adequate protection of the Diesel Fire Pump controller components against metallic debris or drilling chips. Failure to do so may cause Death, serious personal injury, damage the controller and subsequently void warranty.

Prior to making any field connections

1. Open door of enclosure and inspect internal components and wiring for any signs of frayed or loose wires or other visible damage.

2. Verify that the controller information is what is required on the project:
    1. Tornatech catalog number
    2. Battery voltage, capacity and chemistry matches controller rating
3. Project's electrical contractor must supply all necessary wiring for field connections in accordance with the National Electrical Code, local electrical code and any other authority having jurisdiction.
4. Refer to the appropriate field connection drawing for wiring information.

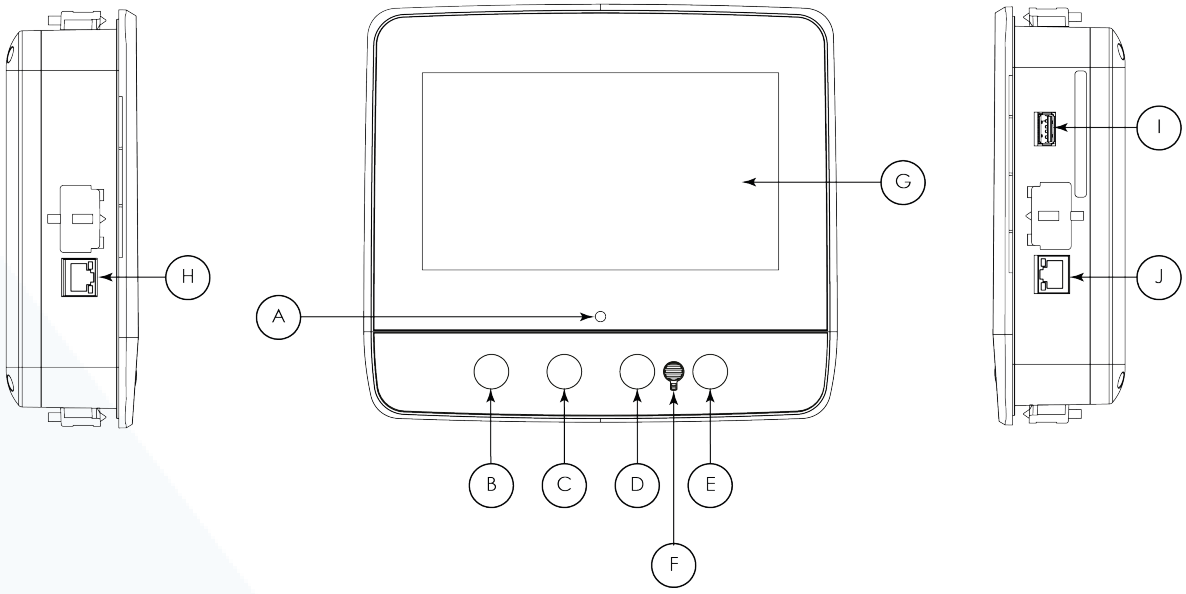
PROCEDURE

All field connections, remote alarm functions and AC wiring are brought into the enclosure through conduit entrances as indicated on the dimensional drawing. For feet or wall-mounted enclosures, properly grounded metallic conduits shall be used.

Do not place conduit entrances on the sides of the enclosure unless a gland plate is provided.

1. Protect all components against any metallic debris or drilling chips.
2. Using a hole (conduit) punch, create a hole in the enclosure for the size conduit being used.
3. Install necessary watertight conduit.
4. Pull all wires necessary for field connections, remote alarm functions, AC power and all other optional features. Bring enough wire inside the enclosure to make up connections to the appropriate line, load and control terminal block points. Be sure to consult the appropriate field connection diagram for connection points and acceptable wire size. For proper wire sizing, refer to the National Electrical Code, NFPA 70. Ensure that
    1. Wiring between controller and engine terminals #301, 302, 303, 304, 305, 310, 311, 312, 2, 3, 4, 5 are stranded #14 AWG (2.5 mm^2) as minimum.
    2. Wiring between controller and engine terminals #1, 9, 10 ,12 are stranded #10 AWG (6 mm^2) as minimum.
    3. Wiring between controller and engine terminals #6, 8, 11 are stranded #8 AWG (10 mm^2) as minimum.
    4. Power supply wiring is stranded #14 AWG (2.5 mm^2) as minimum.
5. Make all field connections to the remote alarm functions and any other optional features.
6. Connect AC power.
7. Check to see that all connections are both correctly wired (in accordance with the field connection diagram) and tight.
8. Close the enclosure door.

OPERATOR INTERFACE



A. Status LED
B. Crank 1
C. Crank 2
D. Stop
E. Run test
F. Alarm buzzer
G. Touch screen display
H. Factory reserved
I. USB key connector for logs download and software updates
J. Ethernet connector for standard TCP/IP communication

METHODS OF STARTING AND STOPPING

METHODS OF STARTING

AUTOMATIC START

The controller will start automatically on low pressure detection by the pressure sensor when the pressure drops below the cut-in threshold.

MANUAL START

The engine can be started by pressing the crank 1 or crank 2 or both pushbuttons, regardless of the system pressure, when the main selector switch is in the HAND position. The fuel solenoid valve will open as soon as a crank button is pressed and will remain in this state.

REMOTE MANUAL START

The engine can be started from a remote location by momentarily closing a contact of a manual pushbutton.

REMOTE AUTOMATIC START, DELUGE VALVE START

The engine can be started from a remote location by momentarily opening a contact connected to an automatic device.

SEQUENTIAL START

In case of a multiple pump application, it may be necessary to delay the automatic starting of each motor to prevent simultaneous starting of all motors.

TEST START

The engine can be started in test mode manually by pressing the run test pushbutton, or automatically by using the periodic test feature.

METHODS OF STOPPING

AUTOMATIC STOP

This function is never activated by default and must be authorized by the authority having jurisdiction prior to activating.

Automatic stop is possible only after an automatic start. When this function is enabled, the motor is automatically stopped 30 minutes after the restoration of the pressure above the cut-out setting given that no other run cause is present. The 30 minutes delay is adjustable.

MANUAL STOP

Manual stop is done by pressing the stop pushbutton. Note that pressing the stop pushbutton will stop the engine only if all starting causes have disappeared (example: if pressure has fallen below cut-in and hasn't risen above the cut-out), even in hand mode.

EMERGENCY STOP

The emergency stop is always possible in any running condition and is done by positioning the main selector switch to the OFF position.

COMMISSIONING

Only an authorized field acceptance provider shall proceed with Diesel Fire Pump controller commissioning. If you do not have the required training and authorization, contact factory.

Until commissioning is completed, the controller main screen is replaced by the commissioning menu and the automatic mode is disabled.

PROCEDURE

To commission the controller:

1. Ensure the internal battery is connected by removing the insulation plastic tab, if installed.
2. Secure the door in closed position then put the circuit breaker disconnecting means in ON position.
3. Log in using your password and complete the initial setup wizard. Steps requiring validation display a green check mark once completed.
    a. **Verify the power supply, batteries, and chargers.** Confirm that the incoming power supply, both engine batteries, and both battery chargers are operating normally.
    b. **Verify engine operation.** Follow the on-screen engine startup test instructions to confirm that the engine operates correctly.
    c. **Configure the pressure settings**.
        - Verify that the pressure displayed on the controller matches the reading on the calibrated pressure gauge installed on the sensing line.
        - Select the pressure units.
        - Adjust the maximum pressure display value, if required.
        - Enter the fire pump cut-in and cut-out pressure values.
        - If desired, enter the jockey pump cut-in and cut-out pressure values for pressure recording purposes.

    Note: The jockey pump cut-in and cut-out pressure values must be set on the jockey pump controller. Entering these values on the fire pump controller does not change the jockey pump settings.

    d. **Verify the date, time, and battery status.** Confirm that the date and time are correct and that the controller's internal battery status is normal.
    e. **Configure the remaining operating settings.**
        - If automatic shutdown is required, enable it and set the duration for which the pump continues to run after the automatic stop condition is met.

- Set the periodic test frequency, day of the week, start time, and duration.
- Set the manual run test duration.

4. Once all the necessary steps are completed and that you are logged in with your password, the "Service Done" button will become online.
5. Press the "Service Done" button once you are satisfied with the readings and parameters.
6. Download the logs to save in your report.

PREVENTIVE MAINTENANCE PROGRAM

Pursuant to NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-based Fire Protection Systems, 2023 edition, a preventive maintenance program must be established according to the manufacturer's recommendations for all components of the pump assembly. The program must begin after the pump assembly has passed all acceptance tests (See NFPA 25 Section 8.5.1 – 8.5.3 and Table 8.1.1.2 – *Maintenance*). Failure to comply could result in loss of life and/or property. The warranty may also be deemed null and void.

The following information outlines the parts and intervals for preventive maintenance recommended by Tornatech to ensure the fire pump controller and associated components are in optimum condition. The program should be used in conjunction with the general requirements for inspecting and testing outlined in NFPA 25.

FACTORY RECOMMENDATIONS

The factory also recommends the following tasks be performed on an annual basis for all controller types:

INTERNAL VERIFICATIONS

- Check for corrosion on components or circuit boards.
- Check for breakdown/fraying of conductor insulation.
- Check for any signs of water leakage into controller.
- Remove all objects placed inside the panel not associated with the fire pump.

EXTERNAL VERIFICATIONS

- Check for signs of water leakage on the system pressure sensing lines.
- Clean the outside of the controller to remove any dust or other substances that may have accumulated.
- Remove all objects placed on top of the panel not associated with the fire pump.

END-OF-LIFE, DISMANTLING AND RECYCLING INFORMATION

This product contains electrical and electronic components, including but not limited to printed circuit boards, cables, relays, user interface modules, I/O boards, surge protection devices, pressure transducers, and other control components. Some of these components may contain materials that are recoverable through specialized recycling processes.

At the end of its service life, this product and its replaced components should not be disposed of with unsorted municipal waste. They should be collected, handled and treated through an appropriate waste electrical and electronic equipment (WEEE) or authorized recycling channel, in accordance with applicable local regulations.

Before any dismantling, disposal or recycling activity, the product must be disconnected from all power sources and placed in a safe condition by qualified personnel. Dismantling should be performed only by qualified personnel using appropriate safety procedures.

For products integrated into a larger pump assembly or fire protection system, the system owner, installer, integrator or end user is responsible for coordinating proper end-of-life handling of the complete system and its components.

Tornatech can provide additional information on product components upon request to support maintenance, replacement, recycling or end-of-life treatment activities.

REPLACEMENT INTERVALS

2 years

- Pressure Transducer

3 years

- Battery Chargers

4 years

- Solenoid Valve

5 years

- Circuit Breakers
- Fuel Level Switch
- User Interface
- I/O Board(s)

10 years

- Complete Controller

PATENTS

Country	Title	Grant NO
CA	Mechanical activator for contactor	2741881
US	Mechanical activator for contactor	US8399788B2
CA	Mechanical activator for electrical contactor	165512
CA	Mechanical activator for electrical contactor	165514
US	Mechanical activator for electrical contactor	D803794
US	Mechanical activator for electrical contactor	Patent pending
EP	Mechanical activator for electrical contactor	002955393-0001/2
AE	Mechanical activator for electrical contactor	Patent pending
AE	Mechanical activator for electrical contactor	Patent pending
CA	Fire pump digital operator	163254
US	Fire pump digital operator interface	D770313
AE	Fire pump digital operator interface	Patent pending
EP	Fire pump digital operator interface	002937250-0001
CA	System and method for detecting failure in a pressure sensor of a fire pump system	Patent pending
US	System and method for detecting failure in a pressure sensor of a fire pump system	Patent pending

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