TORNATECH

LISTEN DEVELOP LEAD

INSTALLATION AND MAINTENANCE MANUAL FOR DIESEL FIRE PUMP CONTROLLERS MODEL HFD

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IMPORTANT SAFETY INFORMATION

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 start a diesel engine driven fire pump. It can either start the fire pump manually through the local start pushbutton or automatically through the sensing of a pressure drop in the sprinkler system. The fire pump can only be stopped manually.

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.

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	10 W

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%.

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.

Shielded cables must be used to connect sensors and pressure switches. The cable shielding must be grounded on the side opposite the cabinet, in accordance with CE directives for 0–10 V and 4–20 mA signal cables.

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 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.

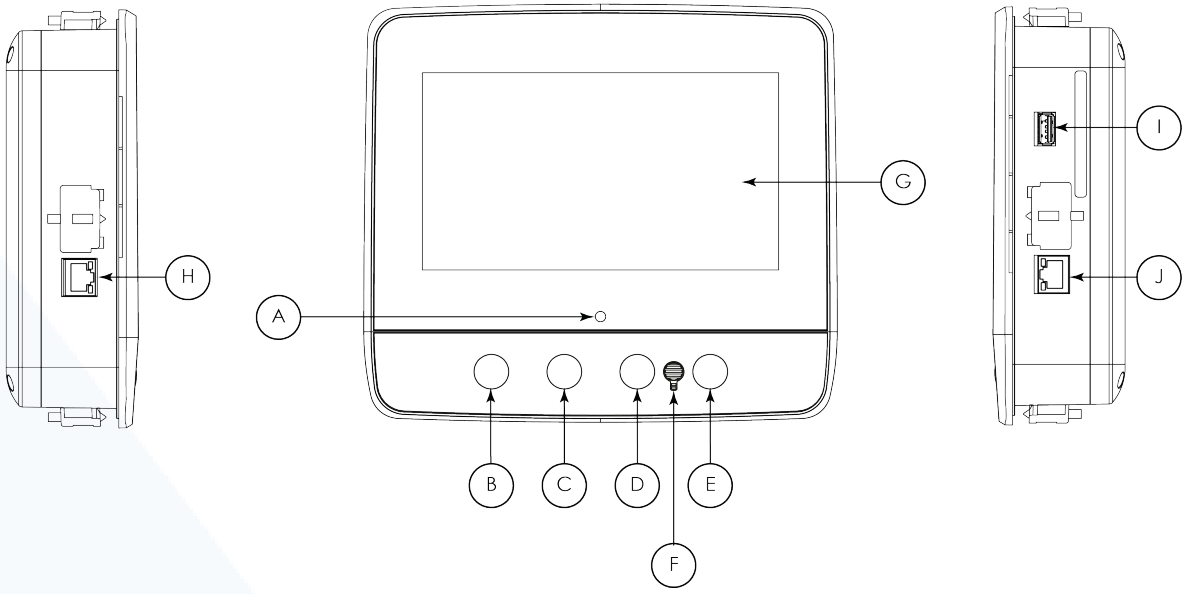
PROCEDURE

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 #1, 9, 10 ,12 are stranded #10 AWG (6 mm^2) as minimum.
    2. Wiring between controller and engine terminals #6, 8, 11 are stranded #8 AWG (10 mm^2) as minimum.
    3. 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. Manual start
C. Stop
D. Silence / Lamp test
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

INDICATORS

The dedicated status LED (A) represents the general state of the controller and can either be

- Green: healthy condition;
- Amber: fault condition, controller may not be able to operate normally. Action required;
- Red: Alarm, immediate action required.

The home page permanently displays the essential status indicators while the other statuses are displayed in a scrolling ribbon on the bottom section of the screen, when active.

In case of a display failure, the dedicated status LED will still be operational. Troubleshooting is possible by evaluating the status of the output signals either remotely, or by examining the LED indicator of each output relay physically located on the I/O board. Refer to the production drawing for the location of each output relay.

METHODS OF STARTING AND STOPPING

METHODS OF STARTING

AUTOMATIC START

The controller will start automatically on low pressure detection by the pressure switch.

MANUAL START

The engine can be started by holding the manual start pushbutton, regardless of the system pressure. The engine will be cranking while the start button is held or a run signal is detected. The cranking battery is alternated each time the manual start pushbutton is pressed.

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.

EMERGENCY START

Then engine can be started in emergency by breaking the emergency start cover and holding the button until the engine starts. The engine will crank on both batteries while the button is pressed.

Important: the controller will not interrupt cranking in any way under this mode, even upon detection of an engine run signal. To avoid damaging the engine, release the button as soon as the engine is started.

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

To start the engine in test mode, press and hold the TEST pushbutton until the engine starts. The cranking battery is alternated each time the TEST pushbutton is pressed.

The TEST pushbutton only works when the "operate test start" warning is active.

METHODS OF STOPPING

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 .

EMERGENCY STOP

The emergency stop is always possible in any running condition and is done by disabling the automatic mode and pressing the stop pushbutton.

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 with your password and complete the first start up menu on the screen.
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.

MAINTENANCE

Tornatech controllers are covered by a limited warranty and backed by a 10-years service life or until supply last, provided that proper installation, commissioning, use and maintenance of the controller is made as per this document, EN-12845, and any maintenance standard applicable.

Proper controller performance must be asserted at least once a week by executing the following:

1. Perform a test start sequence and verify that
    1. The engine starts normally, notably with respect to crank cycles and time
    2. There are no alarms
    3. The pump is able to rise the pressure above the cut-out
    4. The engine stops when the pressure is above cut-out after the configured test duration time

In addition to the above, the following preventative maintenance must be performed at least once year:

1. Turn off the controller
2. Do a visual inspection of the exterior of the controller
3. Open the enclosure and do a visual inspection of the interior of the controller
4. Make sure that there is no dust accumulation inside the controller
5. Inspect the tightness of each dead cable
6. Put the controller back in service

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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