FD5 Diesel Fire Pump Controller

This manual provides general information, installation, operation, maintenance, and system setup information for Metron FD5 Diesel Fire Pump Controllers.

Publication 248C-EN – March 2021

History of Changes

Rev. No.	Date	Description of Changes
-	June 2019	Initial release
A	February 2020	Update test procedure instructions
B	May 2020	Update tech support phone number
C	March 2021	Update Overspeed test procedure.

Introduction

Metron FD5 Diesel Fire Pump Controllers are microprocessor-based controllers intended for use with diesel engine fire pumps. The controller's purpose is to automatically start the fire pump diesel engine upon a drop in pressure in the water main or from a number of other demand signals. The FD5 provides alarm and/or alarm shutdown protection for various engine and power failures. Stopping the engine after the demand period is over may be performed either manually or automaticly.

Approvals

Metron FD5 controllers are listed by Underwriter's Laboratories, Inc., in accordance with UL218, Standard for Industrial Controls; and CSA, Standard for Industrial Control Equipment (cUL); and Approved by Factory Mutual and New York City. They are built to meet or exceed the requirments of NFPA 20 (Installation of Centrifugal Fire Pumps).

NOTICE Read these instructions thoroughly before installing and operating the controller. If there are still questions, contact your Metron factory representative for assistance.

Installation

The controller has been assembled and wired at the factory with the highest workmanship standards. All wiring and functions have been thoroughly tested to ensure correct operation when properly installed. The installer should be completely familiar with the external hookup of the pump junction box to the fire pump controller. All national and local electric codes should be used for proper installation, wiring, and grounding of the controller prior to startup.

Receiving, Handling, and Storage

1. Immediately upon receipt, carefully unpack and inspect the controller for damage that may have occurred in shipment. If damage or rough handling is evident, file a damage claim with the transportation carrier immediately.
2. If the controller must be stored, cover it and then place it in a clean, dry location. Avoid unheated locations, where condensation can result in damage to the insulation or corrosion of metal parts.

Precautions

DANGER

To avoid risk of **SERIOUS INJURY or DEATH,** and to avoid damage to the controller, READ THIS SECTION CAREFULLY. If questions or concerns still exist, contact the Metron factory for further clarification.

ARC FLASH

HAZARD

Do not operate controls or open covers without appropriate personal protection equipment. Failure to comply may result in **SERIOUS INJURY or DEATH!** Refer to NFPA70E for PPE requirements.

If work must be carried out on the engine or controller, ensure the controller is ISOLATED AND LOCKED OFF from the batteries and AC mains supply before work commences. Lockout/Tag out procedures should be followed in accordance with NFPA standard and any local standards that may apply.

During installation and maintenance, to prevent automatic starting of the engine turn the selector switch to Off.

Installation Instructions

Mounting

The controller should be mounted using appropriate fixing methods:

A. If the controller is mounted directly to the pump skid, anti-vibration mounts should be used.
B. If the controller is mounted to a wall, it should use the four (4) external mounting holes of the controller cabinet. Suitable fixings to the wall should be used taking into consideration the weight of the controller. It is recommended that the controller be mounted at least 12 inches (300mm) above floor level.

Electrical Connections

DANGER

SHOCK HAZARD

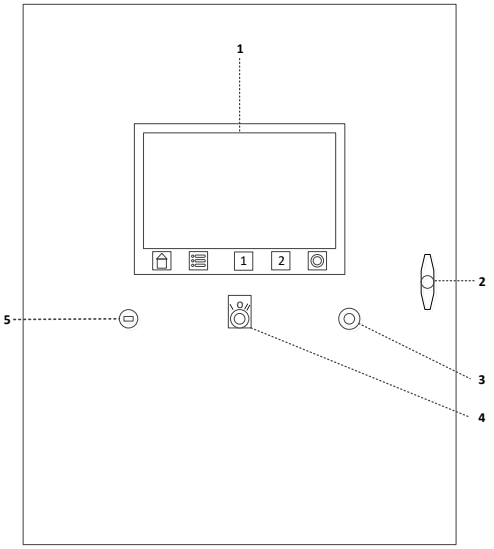
Electric shock may result in **SERIOUS INJURY OR DEATH.** Electrical connections should be made by a qualified electrical engineer only.

Refer to Field Connection drawing supplied with the controller.

- All national and local electric codes should be used for proper installation, wiring, and grounding of the controller prior to startup.
- **Warning:** The installer is responsible for ensuring no metallic foreign objects (such as drilling chips, etc.) fall inside the controller onto the electrical circuit. Failure to observe this could result in damage to the controller and will void the controller warranty.
- The cabinet should be properly grounded per the requirements of NFPA 70.
- NOTE: It is highly recommended, although not essential, that the following recommendations are considered:
    - All signal wiring should be separated from power feeds and supplies. Where the two must be in proximity, it is advisable that they are located at right angles to each other.
    - Signal wiring will be less prone to disturbances if contained within grounded conductive conduit or trunking. Avoid passing signal cables in proximity of known interference sources, or high-power electrical equipment where possible.
    - Refer to the Field Connection diagram for wiring sizes.

Installation

Cabinet Overview



Drawing not to scale

Item	Description
1	Operator Interface Device (OID)
2	Cabinet Door Handle
3	USB Port
4	Manual-Off-Auto (MOA) Selector Switch
5	Horn/Sounder

Opening the Cabinet Door

ARC FLASH

HAZARD

Do not open door or cover without appropriate personal protection equipment. Failure to comply may result in **SERIOUS INJURY or DEATH!** Refer to NFPA70E for PPE requirements.

DANGER

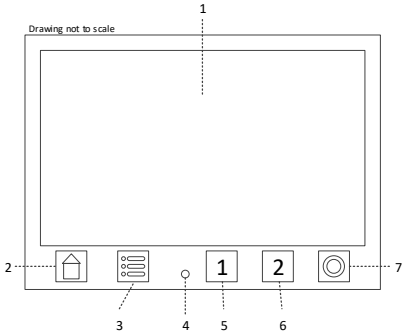
ARC FLASH

Arc Flash or electric shock may result in **SERIOUS INJURY OR DEATH**. Always wear an arc flash suit when opening the cabinet door.

The door can be opened with AC and DC power still applied. Appropriate personal protection equipment should be worn when the door is open. Follow NFPA70E requirements.

Operator Interface Device (OID) Use and Navigation

The Operator Interface Device (OID) provides visual indication of the alarms, status of system parameters, and an interface for adjusting set points to configure the FD5.

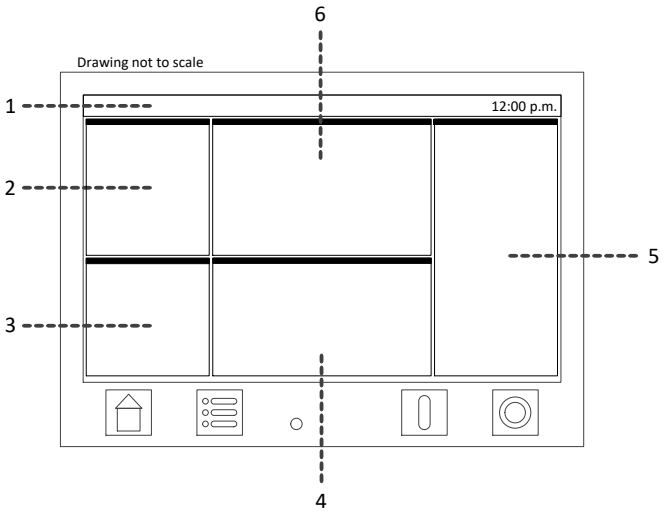


Item	Description
1	LCD Touchscreen
2	Home key This key will always return the on-screen window to the Home window.
3	Main Menu key This key will always return the on-screen window to the Main Menu window.
4	Alarm LED The LED will illumunate when an alarm occurs.
5/6	Battery #1 / Battery #2 When the selector switch is in Manual, pressing and holding either key will crank the corresponding battery. Both keys may be pressed simultaneously to crank using both batteries.
7	Manual Stop key This key will stop the pump only after all starting causes have returned to normal.

ATTENTION

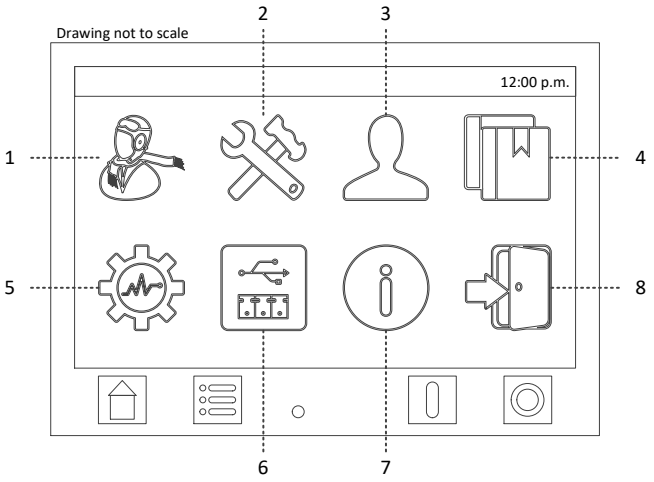
Touch one button at a time. Touching the touchscreen with multiple fingers may result in unintended operation.

Home Window



Item	Description
1	Window Status Bar Displays the date, time, and background activity such as downloading to a USB memory stick.
2	Engine Status Panel Displays the status of the engine: Idle, Starting, Running, Stopping. Also displays the engine run time and the remaining minimum run time.
3	System Pressure Panel Displays the system pressure, start pressure set point, stop pressure set point, and the automatic stop option set point.
4	Power Panel Displays the voltage and current for DC power.
5	Alarm Panel Displays the list of active and recent alarms. Touching a "cleared" alarm will remove it from the list.
6	Controller Status Panel Displays status information about the controller.

Main Menu Window



Item	Description
1	Quick Start Begins the Quick Start set point configuration process for start up of controller.
2	System Set Points Displays a list of all controller, engine, power, and alarm set points.
3	User Preferences Displays a list of all user preference set points.
4	Data Log Lists options for viewing the data log and engine run stats.
5	Diagnostics & Tests Lists options for calibrations, test starts, and PCB info.
6	Devices Lists options for connected devices, such as Modbus and USB Memory Sticks.
7	About Displays information about the controller, such as serial number, build date, software version, etc.
8	Log In/Log Out

User Log In

Navigating and viewing set point configurations is allowed at all times; however, changing any set point configuration requires the user password. The user password is shown below. This password is also on a label affixed to the cabinet door on the inside.

When prompted for the user password, enter the following pin number:

1 2 3 3 3 3

Logging Out

If there is no user activity on the OID after five minutes, the login state is automatically logged out.

To manually log out:

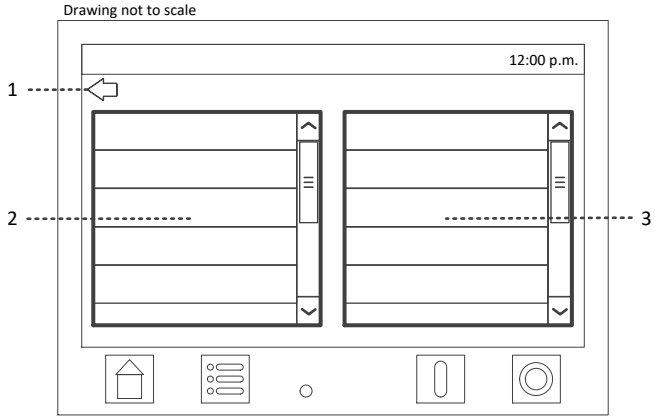
- From the Main Menu window, touch the *Log Out* icon.

Configuring System Set Points

WARNING

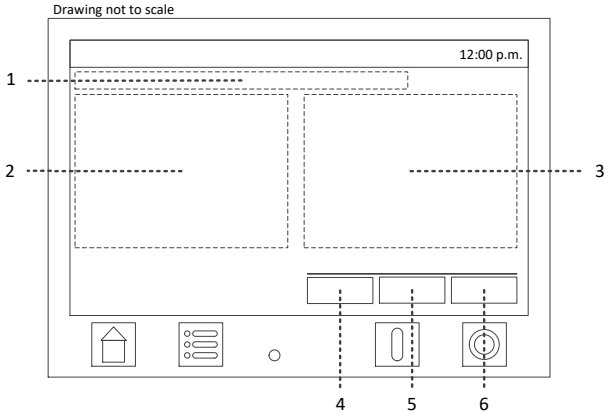
Modifying set points may cause the engine to start unexpectedly. Adjustments should be performed by qualified personnel only.

Touching the *System Set Points* icon or the *User Preference* icon on the Main Menu Window will load a new window with the following layout:



Item	Description
1	Back Button This button will return to the previous window.
2	Category List Contains a list of high-level set point categories. Touching an item will populate the Settings List with category specific set points.
3	Settings List Contains a list of set points specific to the selected category. Touching an item will load the set point configuration window.

The set point configuration window has the following layout:



Item	Description
1	Set Point Name
2	Description of Set Point
3	Configuration Area This area is specific to the set point being configured. It consists of standard user interface controls, such as list boxes, radio buttons, and spin lists, which are used to modify the set point value.
4	Default button Loads the default value for the set point but does not close the window.
5	Cancel button Cancels any changes and returns to the previous window.
6	Set button Saves all changes and returns to the previous window.

Quick Start

The quick start feature is used to sequentially configure the primary system set points without having the navigate through the onscreen menu. The following set points are configured: *Language*, *Pressure Unit*, *Date & Time*, *Start Pressure*, *Stop Pressure*, *Start Delay*, *Automatic Stop*, *Min Run Time*, and *Auto Weekly Test Option*. Refer to Main Menu Window, Item 1, on page 10 above.

To perform a quick start:

1. From the Main Menu window, touch *Quick Start*.
2. Configure each set point one at a time, pressing the *Next* button to move to the next set point.
3. The window will return to the Main Menu after the last Quick Start set point has been configured.

NOTE Canceling the Quick Start process will discard all changes.

Aux Contact Programs

Aux contacts can be programmed at the factory or in the field. The Aux Program set point category is located under System Set Points screen.

Select a pre-set aux program or the walk-thru option. The contact is activated by an input, event, or alarm condition. One to three relays can be selected per aux program, depending on availability.

NOTE Canceling will discard all changes.

Set Points List

System Set Point Window

Pressure Settings
- Start Pressure
- Stop Pressure
- High Pressure Option
- High Pressure Level
- High Pressure Alarm Delay
- Low Pressure Option
- Low Pressure Level
- Low Pressure Alarm Delay
- Pressure Change Data Log Event
- Max Time Between Pressure Event

Test Start Settings
- Dump Valve Timeout
- Shutdown on Alarm
- Auto Weekly Test Option
- Auto Weekly Test Day of Week
- Auto Weekly Test Start Time
- Auto Weekly Test Duration

Start Settings
- Pump Start Time Delay
- Pressure Sensor Failure Start
- Deluge Valve Start
- Low Zon Option
- Restart Time Delay
- Remote Start Option
- Remote Start Normal Contact
- Supervisory Power Fail Start
- Supervisory Power Fail Start Delay

Stop Settings
- Pump Auto Stop Option
- Minimum Run Time
- Low Intake Shutdown
- Low Intake Trip Time
- Low Intake Auto Reset
- Low Intake Contact

Engine Settings
- Low Oil Pressure Alarm Delay
- ECM Engine

Battery & Charger Settings
- AC Power Failure Alarm Delay
- Charger Failure Delay
- Battery Low Voltage Level
- Battery Low Voltage Alarm Delay

High Zone Settings
- High Zone Option
- Low Zone Start Delay
- Always Start

Aux Programs
- Aux Program 1–48

User Preference Window

User Preferences

- Language
- GUI Theme
- Pressure Unit
- Temperature Unit
- Date Format
- Time Format
- Idle Timeout
- Change User Password

Date & Time

- Set Date
- Set Time
- Set Timezone
- Daylight Saving Time Option
- DST Start Date
- DST End Date

Screen Settings

- Brightness
- LCD Auto Dim
- Calibrate Touch Screen

Test Procedures

All the following tests should be performed on each unit after installation. If each test is satisfactory, the operator may depend upon the controller operating properly when required. Any one of these tests may be carried out at any time after installation, if so desired.

Before beginning each test, verify pressure is above the Start Pressure set point. Toggle the MOA selector switch to Off and then back to Auto to clear all alarms.

Manual Start

1. Switch the MOA selector switch to Manual.
2. Press and hold either the CRANK 1 key or the CRANK 2 key. Release as soon as the engine starts.
3. Press and hold the STOP key until the engine stops.
4. Switch the MOA selector switch to Auto.

Automatic Pressure Start

1. With the MOA selector switch in Auto, lower the system pressure below the *Start Pressure*.
2. The automatic start process will begin. Once the engine begins running, it will run until:
    a. The MOA selector switch is switched to Off, or
    b. The system pressure rises above the *Stop Pressure*, and:
        i. The STOP key is pressed, or
        ii. The *Automatic Shutdown* option is enabled, and the *Minimum Run Timer* expires.

Manual Test Start

1. Press the MENU key on the OID.
2. Touch the "*Diagnostics & Tests*" icon on the LCD.
3. Touch the "*Test Start*" icon.
4. When prompted, select "*Yes*" to initiate the test start using the dump valve or select "*No*" to bypass the dump valve.
5. Once the engine begins running, it will run until:
    a. The MOA selector switch is switched to Off, or
    b. The system pressure rises above the *Stop Pressure*, and:

i. The STOP key is pressed, or
ii. The *Automatic Shutdown* option is enabled, and the *Minimum Run Timer* expires.

Automatic Weekly Test Start

1. System pressure must be up and all other demand switches deactivated.
2. When the current day and time of day matches the settings upder “Test Start Settings”, the solendoid drain valve will energize and the pump will start. The pump will continue to run for the configured run time, and then stop automatically.
3. Should a real demand-to-start occur, the test timer will be canceled, and the pump will continue to run until:
    a. The MOA selector switch is switched to Off, or
    b. The demand to start s cleared, and
        i. The STOP key is pressed, or
        ii. If enabled, the *Minimum Run Timer* expires.

Remote Start Switch

1. When the *Remote Start Option* set point is enabled, closing TB5-DS on the Engine Board will initiate a remote start and the engine should start. Refer to field connection diagram.
2. Remove the jumper.
3. The engine will continue to run until the STOP key is pressed.

NOTE *Remote Start Option*, *Deluge Valve Option*, and *Low Zone Option* all use the same input; therefore, only one may be enabled at a time.

Deluge Valve Start Switch

1. When the Deluge Vavle Option set point is enabled, opening TB5-DS on the Engine Board will initiate a deluge valve start demand. Refer to the field connection diagram.
2. When the configured *Start Delay* timer expires, the engine should start.
    a. If Input DS closes before the *Start Delay* timer expires, the demand will be cleared, and the engine will not start.
3. Once the engine begins running, it will continue to run until:
    a. The MOA selector switch is switched to Off, or
    b. The demand to start s cleared, and
        i. The STOP key is pressed, or
        ii. If enabled, the *Minimum Run Timer* expires.

NOTE *Remote Start Option*, *Deluge Valve Option*, and *Low Zone Option* all use the same input; therefore, only one may be enabled at a time.

Lockout

1. Connect a jumper across TB5-ELO and TB1-11 on the Engine Board.
2. The engine status panel on the OID home screen will say "*Remote Lockout*".
3. Attempt to start the engine by dropping system pressure.
4. The engine will not start.

CAUTION Lockout will not prevent a user from performing a manual start.

Alarm Condition Tests

Loss of Crank Connectivity

1. Disconnect lead connected to TB1-9 on the Engine Board.
2. The alarm annunciator will illuminate, the horn will sound, and the "*No Crank 1 Connectivity*" message will appear on the display within two (2) seconds.
3. Reconnect the lead to TB1-9.
4. Switch the MOA selector switch to Off and then back to Auto to clear the alarm.
5. Repeat steps 1 through 4 for TB1-10 to test Crank 2 Connectivity.

Overspeed

1. Start the controller by dropping the system pressure.
2. Place a jumper between TB1-3 on the engine board and TB6 on the FD5 battery connection. The alarm annunciator will illuminate, the horn will sound, and the "*Engine Overspeed*" message will appear on the display.
3. Remove the jumper. Note that the alarm will not clear while Terminal #3 is closed.
4. Switch the MOA selector switch to Off and then back to Auto to clear the alarm.

Low Oil Pressure / High Coolant Temperature

1. Start the controller by dropping the system pressure.
2. Place a jumper between TB1-4 and TB1-11 on the Engine Board. The alarm annunciator will illuminate, the horn will sound, and the "*Low Oil Pressure*" message will appear on the display.

3. Place a jumper between TB1-5 and TB1-11 on the Engine Board. The alarm annunciator will illuminate, the horn will sound, and the "*High Coolant Temperature*" message will appear on the display.
4. Switch the MOA selector switch to Off and then back to Auto to clear the alarms.

Battery #1 Failure / Battery #2 Failure / Loss of DC

WARNING The battery charger input power must be disconnected. A surge may be generated and could damage the engine and controller boards.

1. Switch off AC power (CB20) to both battery chargers. Equipment may be damaged while disconnecting the battery if AC power is available.
2. Disconnect the lead going to Battery #1. The alarm annunciator will illuminate, the horn will sound, and the "*Battery #1 Trouble*" message will appear on the display after approximately five (5) minutes.
3. Reconnect Battery #1.
4. Switch the MOA selector switch to Off and then back to Auto to clear the alarms.
5. Disconnect the lead going to Battery #2. The alarm annunciator will illuminate, the horn will sound, and the "*Battery #2 Trouble*" message will appear on the display after approximately five (5) minutes.
6. Reconnect Battery #2.
7. Switch the MOA switch to Off and back to Auto to clear the alarms.
8. Disconnect the lead going to both Battery #1 and Battery #2. The alarm annunciator will illuminate, the horn will sound, and the "*Battery #1 Trouble*" and "*Battery #2 Trouble*" messages will appear on the display
9. The "*Loss of DC*" message will appear on the screen.
10. Reconnect both batteries.
11. Switch the MOA selector switch to Off and then back to Auto to clear the alarms.

Charger #1 Failure / Charger #2 Failure

1. Turn off the Charger 1 breaker located on the backpanel.
2. The alarm annunciator will illuminate, the horn will sound, and the "*Charger #1 Trouble*" message will appear on the display within five (5) minutes.
3. Reset the Charger 1 breaker.
4. Toggle the selector switch to Off and then back to Auto to clear the alarms.
5. Repeate steps 1 – 4 using the Charger 2 breaker to test Charger #2 Failure.

AC Power Failure

1. Disconnect AC Power going to the controller
2. The alarm annunciator will illuminate, the horn will sound, and the "*AC Power Failure*" message will appear on the display.
3. The "*Charger 1 Trouble*" and "*Charger 2 Trouble*" messages will appear on the display within 30 seconds.
4. Reconnect AC Power.
5. Toggle the selector switch to Off and then back to Auto to clear the alarms.

Fail to Start

Method 1

1. Disconnect the leads going to TB1-9 and TB1-10 on the Engine Board.
2. The "*No Crank 1 Connectivity*" and "*No Crank 2 Connectivity*" alarms will occur.
3. Start the controller by dropping system pressure.
4. The controller will immediately trip the "*Fail to Start*" alarm.
5. Reconnect TB1-9 and TB1-10.
6. Toggle the selector switch to Off and then back to Auto to clear the alarms.

Method 2

1. Disconnect the leads going to Battery #1 and Battery #2.
2. The "*Battery 1 Trouble*" and "*Battery 2 Trouble*" alarms will occur.
3. Start the controller by dropping system pressure.
4. The controller will immediately trip the "*Fail to Start*" alarm.
5. Reconnect leads to both batteries.
6. Toggle the selector switch to Off and then back to Auto to clear the alarms.

Method 3

1. Disconnect the lead going to TB1-1 (Fuel Solenoid).
2. Start the controller by dropping system pressure.
3. After the controller has run through six (6) crank attempts, the "*Fail to Start*" alarm will occur.
4. Toggle the selector switch to Off and then back to Auto to clear the alarms.

Low Fuel Level

1. Connect a jumper across TB5-LF and TB1-11 on the Engine Board.

2. The alarm annunciator will illuminate, the horn will sound, and the "*Low Fuel Level*" message will appear on the display.
3. Remove the jumper.
4. Toggle the selector switch to Off and then back to Auto to clear the alarms.

Disposal

Metron Eledyne is a member of a compliance scheme under the Waste Electrical and Electronic Equipment regulations which is applicable in all EC countries. At the end of the service life of the equipment the company offers to collect and dispose of this equipment in accordance with regulations in force under the Registration Number WEE/CF0105WV. (Equipment must be suitably packed for collection by courier if outside the UK).

Contact:

Tel: +44 (0) 1283 500500

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Replacement Parts

For replacement parts, contact your local Metron sales office or the Metron factory at:

United States	Telephone: +1 (336) 434-2800 ext. 2802 FAX: +1 (336) 434-2809 Email: saleshitarcnc@metroninc.com
Europe	Telephone: +44 (0) 7730 050 100 Email: jmcivor@hubbel-icd.com

Technical Support

United States	**For 24-hour technical support:** Telephone: +1 (336) 434-2800 ext. 2803 Email: fpctechsupport@hubbell.com
Europe	**Service & Commissioning** Telephone: +44 (0) 1283 493 215 Email: djones@gai-tronics.co.uk **Emergency Contact:** Telephone: +44 (0) 7730 050100

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