SERVICE MANUAL SECTION

Green Diesel Retrofit

S12016

10/03/2005

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DESCRIPTION

Fleetguard Emission Solutions' UCM

The Ultra-Compact Module (UCM) is a diagnostic and alarming device designed to monitor installed DPF systems. The UCM provides critical information to the vehicle operator and maintenance staff relative to operating performance of the installed DPF device.

Included in this User's Manual is a UCM kit parts list, a description of the UCM, general guidelines for proper installation of the UCM and operational instructions.

Please read each section carefully before installing and operating your UCM.

The information provided in this manual is general in nature, if you have questions for your specific installation, please contact your distributor/dealer or Fleetguard Emission Solutions (FES).

NOTE – Federal and CARB verifications require that every vehicle fitted with a diesel particulate filter must install and operate a backpressure monitoring device such as the UCM. Contact FES or your distributor/dealer if you have questions regarding your specific requirements.

1. WARRANTY AND RECORD OF INSTALLATION

The statement of warranty for the UCM can be found at the end of this User's Manual. The Record of Installation for the UCM is part of the Record of Installation for the entire DPF system.

The Record of Installation Form provided in the DPF or UCM kit MUST be completed for each DPF installed. This form must be filed with FES to validate the product warranty.

Be sure to record the information from the UCM (serial number) to validate the product warranty.

2. UCM PARTS

2.1. BASE UCM

The base UCM includes the following:

Table 1

Part Number	Description	Quantity
Q229482	Harness/Control Module Assembly	1
Q229511	Pressure Switch	1
Q229513	SS Flex Hose, 24"	1
Q229569	12V Warning Light Assembly	1
Q229543	Power Harness, 2A fused, 20'	1

2.2. OPTIONAL UCM COMPONENTS

FES offers optional components which may be included depending on the specified kit including the following:

Table 2

Part Number	Description	Quantity
Q229538	Temperature Sensor	1
Various	TLD (Derate option)	1
Q229562	24V Warning Light Assembly	1
Q229497	TLD Harness Extension, 36"	1
Q229498	TLD Harness Extension, 60"	1
Q229499	Light Extension, 36"	1
Q229500	Light Extension, 144"	1
Q229501	Light Extension, 600"	1
Q229520	Thermistor Harness Extension, 36"	1
Q229521	Thermistor Harness Extension, 60"	1
Q458293	¼" NPT to M12×1.25 Adapter	1

2.3. AVAILABLE UCM KITS

Three main derivations of the UCM system are available. The first is the base model (kit number Q229533). This model is used for monitoring back pressure only. The second model (kit number Q229528) is designed to collect temperature data along with monitoring back-pressure. The third model (various kit numbers) is designed with all the same functionality as the second with added engine derate/shutdown capability. There are many variants of this system depending on the engine type and chosen derate strategy.

3. SYSTEM DESCRIPTION

3.1. UCM MODULE

The UCM module is a compact monitor system integrally contained within the system wiring harness which is operable in a wide range of temperatures and environmental conditions designed for both first-fit and retrofit into buses, trucks, and other industrial vehicles.

Back-pressure is measured with a pressure switch which is mounted in the vicinity of the DPF. A stainless steel hose connects the DPF with the pressure switch. In the systems equipped for temperature monitoring, temperature is measured via an in-stream thermistor installed at the inlet of the DPF. The pressure and temperature (if installed) are measured on a continuous basis monitoring for alarm situations.

The UCM contains two low voltage alarm outputs which can be configured to activate warning lights or provide other signals to alert the driver and maintenance staff of any potential exhaust system problems.

Figure 1 illustrates the externals of the UCM unit followed by a brief description of each component.

3.2. UCM COMMUNICATIONS SOFTWARE

The UCM software is a user friendly program that operates under Windows 95, 98, XP, and NT. Once installed, the program allows for UCM communication to view any active or previous warnings, view current status, change settings and download data.

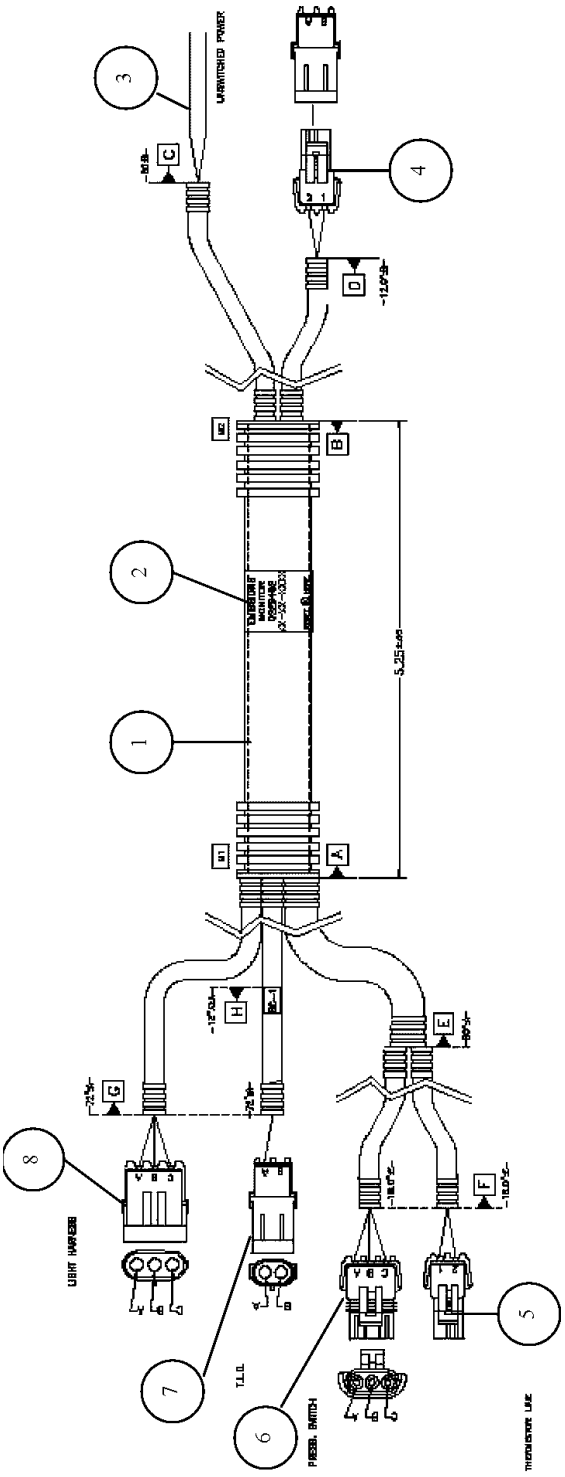

Figure 1 UCM Module

1. UCM module. UCM processor is encapsulated within this section.
2. Magnetic Reset Switch. Running a magnet around this location will reset any of the alarm lights (as long as the alarm no longer exists).
3. Power Leads. The UCM is connected to a 12 or 24 Volt (depending on the specified kit) fused, unswitched power source through these leads.
4. Communications Port. Communication with a PC is achieved through this port.
5. Thermistor Connector. If the temperature option is specified, a thermistor is connected through this port.
6. Pressure Switch Connector. The pressure switch is connected through this port.
7. TLD Connector. If the derate option is specified, the derate device is connected to this port.
8. Warning Light Connector. The warning light assembly is connected to this port.

4. INSTALLATION PROCEDURE

The UCM installation should be first physically mounted and second electrically connected. Care must be taken during installation. Flex on the main UCM over molded section will create faults and can damage the unit.

NOTE – The following UCM installation conditions must be met or the warranty may be voided.

- The UCM must be mounted in a space where the ambient temperature is below 85°C under normal vehicle operation. The UCM must be located away from direct sources of heat such as the engine, exhaust manifolds, or the radiator.
- The UCM should be mounted in a location where it is not directly exposed to the elements or electrical discharge.
- The UCM must be connected to a 12 or 24 volt DC power supply.
- The UCM must be connected to an unswitched and fused power supply.
- The UCM must not be subjected to voltage supply or power surges greater than 30 volts DC.

The pressure switch must be mounted in a position higher than the DPF inlet. This will reduce clogging of the pressure switch from water that collects in the tubing between the DPF and the pressure switch.

NOTE – The power must be turned off in the vehicle or the batteries disconnected before installing the UCM.

4.1. MECHANICAL INSTALLATION

Pre-Installation

- The UCM should first be laid in place to verify that there is adequate length to connect all associated components. If the UCM will not fit, contact the distributor/dealer for extension harnesses which can be ordered through FES.
- The UCM should be installed to allow accessibility to the main harness section (this is needed to download data, troubleshoot, and reset faults).
- Each DPF is fitted with at minimum one ¼” NPT boss that will accept the pressure hose. Before any fittings are installed on the DPF system, the location of the boss must be accessible and correctly positioned to ensure that the pressure hose can be attached and connected to the pressure switch with a constant upward slope in the hose (Figure 2). If the boss is not in the correct position, the DPF inlet head should be rotated.

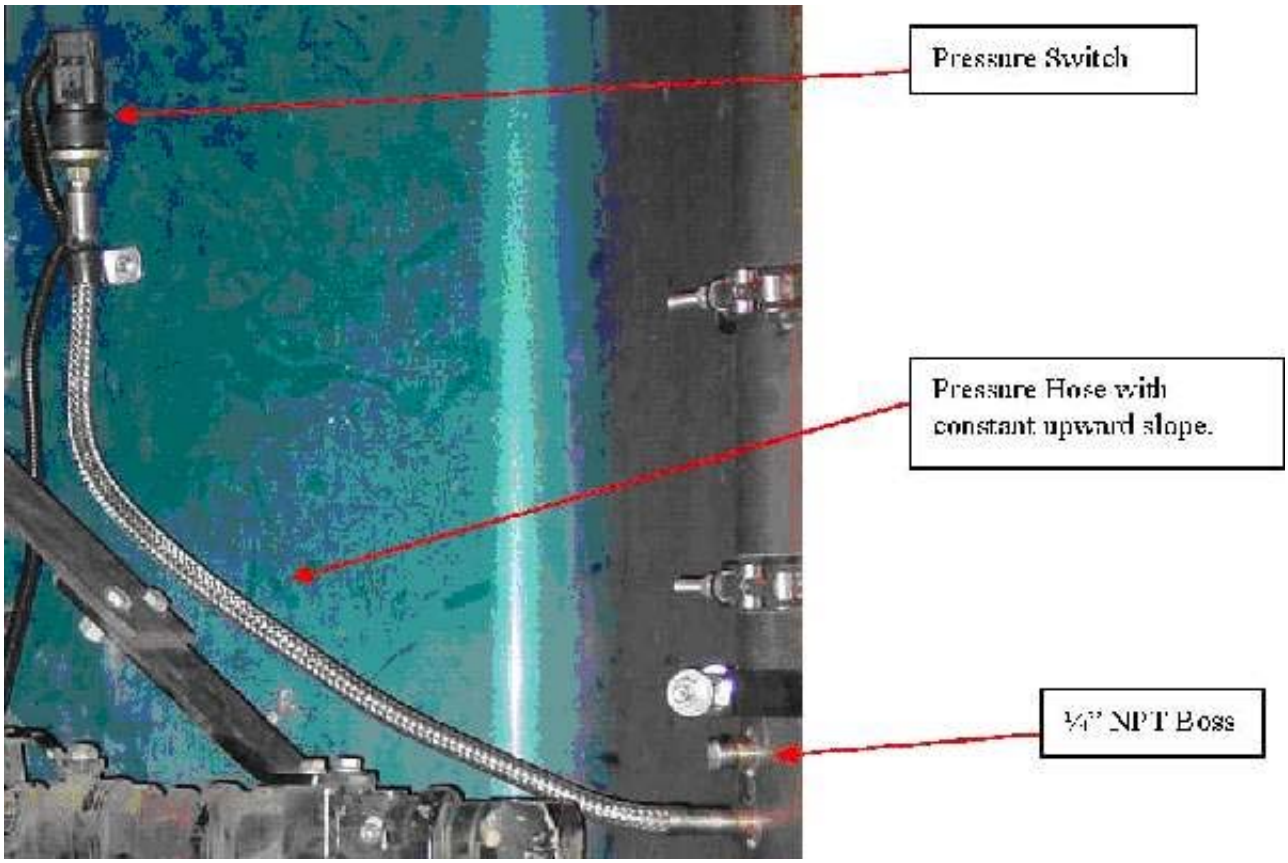

Figure 2 Pressure Connections at DPF Inlet

Installation of Fittings, Hoses, and Thermistors (optional)

- Apply a thin coat of anti-seize to the threads of the male end of the pressure hose and thread it into the boss on the DPF inlet.
- Locate a position for mounting the pressure switch.
- Apply a thin coat of anti-seize to the threads of the pressure switch and thread it into the female end of the pressure hose.
- Securely attach the pressure switch to the vehicle (on cab, frame rail, etc.) (Figure 3). A clamp should be used around the pressure switch to ensure that it is securely fastened to the vehicle.
- If using the temperature capable option, apply a thin coat of anti-seize to the male adapter end of the ¼" NPT to M12x1.25 adapter. Thread it into the ¼" NPT boss. Then, thread the thermistor fitting into the adapter(Figure 4). **NOTE: The thermistor is delivered with an anti-seize compound already applied. DO NOT apply anti-seize to the thermistor.**

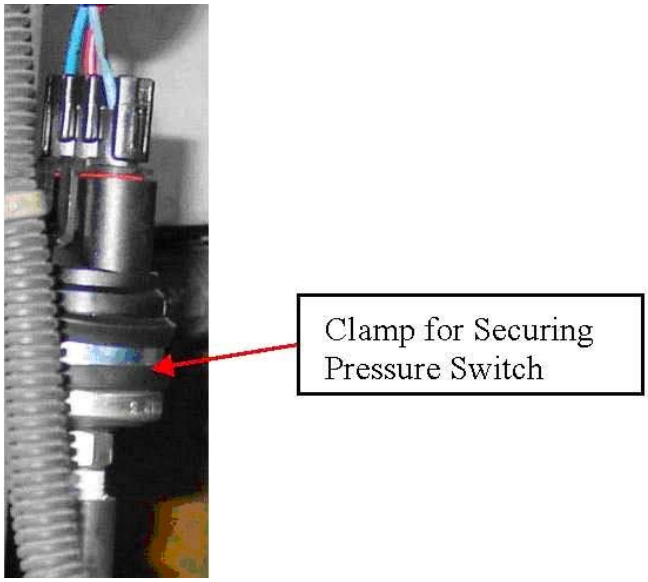

Figure 3 Clamp for Pressure Switch

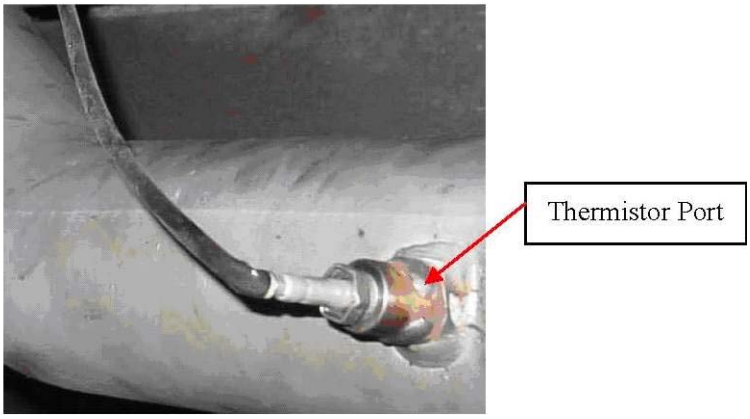

Figure 4 Thermistor Attachment

- Install warning lights in a visible location to allow for system monitoring. The lights supplied with most models are rated for a 12 volt system. If only 24 volts are available to power the UCM, the optional 24 volt light assembly must be specified. Light position and mounting method is subject to customer preference. Two examples of possible mounting methods are shown in Figure 5.

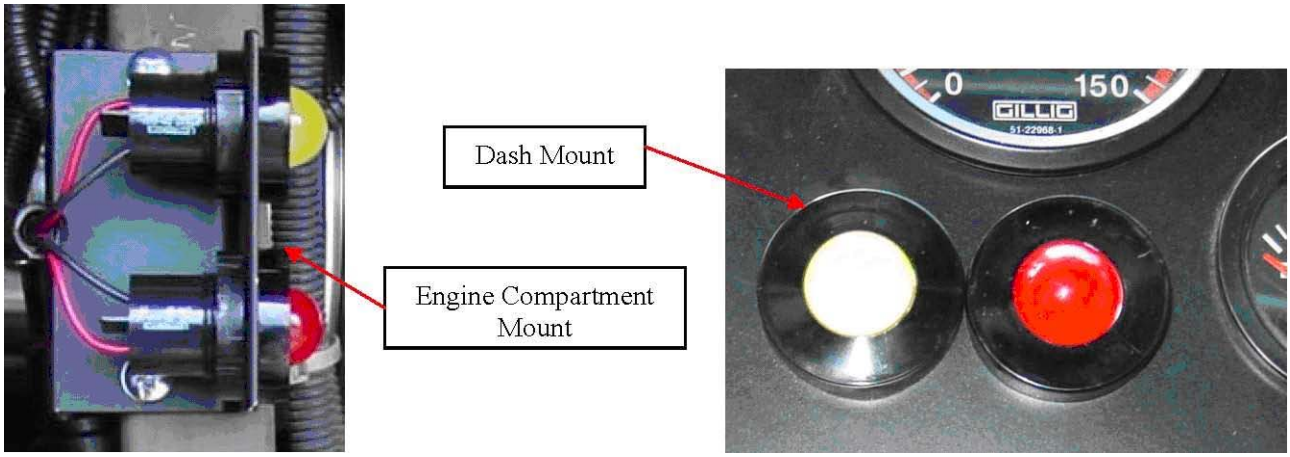

Figure 5 Examples Of Engine Mount And Dash Mount For Warning Lights

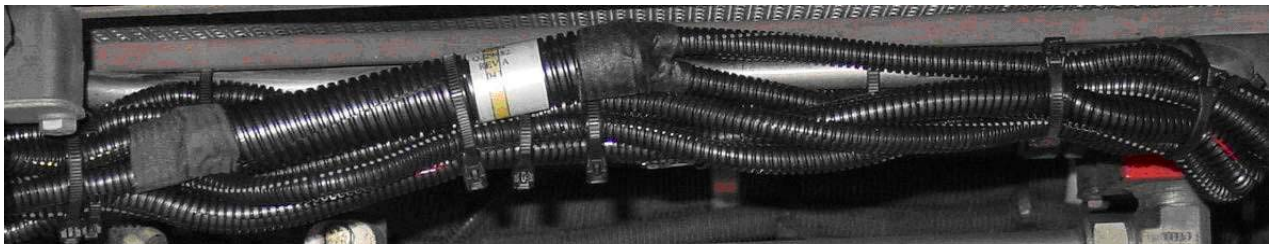

Figure 6 Tie-down of Main UCM Harness and Excess Wiring

- Once a final location for the UCM is determined, it should be secured to the vehicle. Each end of the main harness section should be secured. The labeled area must remain accessible. This area is used for magnetically resetting any faults (Figure 6).
- When all wiring is complete, the excess wire should be tied out of the way (Figure 6).

4.2. ELECTRICAL INSTALLATION

The UCM is a fully encapsulated module integrated into a wiring harness. Each connector is labeled for its intended use. The warning light connector, derate (TLD) connector, and J1708 datalink connector are Packard Weather Pack connectors. The pressure switch connector is a Packard Metri-Pack connector. The thermistor connector is a Framatome connector.

NOTE – All wiring should be run in such a way that it is not in contact with heat sources such as the engine, exhaust manifold, or radiator.

Component Connection

- Connect all components with supplied connectors.
- Excess wire should be secured to the vehicle with tie wrap or other fastening devices.

NOTE – If components are not connected before the system is powered, faults will occur.

Power Connection

- Locate an unswitched 12 or 24 volt power supply. (All systems should be connected to 12 volts unless otherwise specified in the UCM kit.)

- Connect the supplied fused power harness to the previously located power supply (the red wire is run to the positive side of the power supply and black is run to ground).
- Trim any excess wire from the power harness.
- Splice the UCM power wire and the power harness together.
- The joint must then be heat sealed to ensure environmental protection. The warranty may be void if this is not completed.

TLD (Derate) Connection

Various methods are used to connect the derate option to the engine. Contact your distributor/dealer or FES for complete instructions.

NOTE – Once all connections are made, reconnect the power to the vehicle. The warning lights should flash one time if the base model is connected or two times if the temperature enabled model is connected. If any lights flash after the original one or two, reset the unit by running a magnet around the main harness label area. The lights should flash once or twice again and then all lights should remain off. If the alarm persists, ensure that all connections are properly made and reset the unit again. Contact the distributor/dealer if the problem persists.

5. OPERATION

The UCM comes pre-programmed from the factory with default settings. These defaults should be appropriate for most fleets. Once the UCM is powered and the lights flash once or twice, no other operation is required.

NOTE – In order to change the settings in the unit, the operator must follow the instructions in the UCM Interface Software Operations Manual.

NOTE – The warning lights must be monitored for routine maintenance. The following section on Troubleshooting explains how to troubleshoot the unit.

NOTE – Any red warning lights should be investigated to prevent damage to the engine or DPF system. Failure to correct the cause of a red warning light may cause severe damage to the CRT and void the system warranty.

5.1. DIAGNOSTIC TROUBLE CODE INDEX

Troubleshooting can generally be completed without connecting to a computer. If any faults are active, the lights will illuminate and may flash out a fault code, i.e. Fault 1 both lights will flash one time, Fault 2 both lights will flash two times, Yellow (over pressure) event will illuminate the yellow light, Red (over pressure or over temperature) event will illuminate the red light, etc. The following is a simplified troubleshooting guide. For more in depth troubleshooting, contact FES or your distributor.

Table 3

Fault	Action
Fault 1 (Switch 1 Failed)	Disconnect pressure switch. View the Status page of UCM interface software. Jumper between light blue line (Terminal A) and red line (Terminal B). If Switch 1 (N.O.) is closed, replace the pressure switch. If Switch 1 (N.O.) is open, replace the UCM harness.

Fault	Action
Fault 2 (Switch 1 Shorted)	Check Status page of UCM Interface Software. If Switch 1 (N.O.) is closed, disconnect the pressure switch. If after disconnecting the sensor Switch 1 on the Status page shows open, replace the pressure switch. If it is still closed, replace the UCM harness.
Fault 4 (Switch 2 Failed Open)	Disconnect the pressure switch. Jumper between dark blue line (Terminal C) and red line (Terminal B). Check Status page of UCM Interface Software. If Switch 2 (N.C.) is closed, replace the pressure sensor. If it is open, replace the harness.
Fault 5 (Thermistor Failed)	Verify that the exhaust temperature was not below 100C for more than an hour continuously (by downloading the drive cycle table) and that the thermistor is connected. If both of these are true, replace the thermistor.
Fault 6 (Thermistor Shorted)	Replace thermistor.
Solid Yellow Light	Clean filter.
Solid Red Light	Verify that the temperature did not exceed 700 C. If the temperature did not exceed the set point, clean the filter.
No lights upon engine start-up.	Verify that the lights are functioning by using the Yellow On and Red On buttons on the Status page of the Communications Software to activate the lights and replace if they do not illuminate. If the lights are functioning, verify that the Battery Counts increase by 4% after the engine is started. If the battery counts do not increase, contact the distributor.

6. CONTACT INFORMATION

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7. SPECIFICATIONS

Table 4 UCM Electro-Mechanical

Housing	PVC overmolding completely weatherproofing module
Dimensions	5.5” x .75” diameter
Wiring Connections	All wires are integral to the overmolded module
Pressure Connections	Via ¼’ – 18 Male NPT to remotely mounted pressure switch
Ambient Operating Temperature	-40° to 105°C (-40° to 221°F)

Table 5 UCM Electrical

Supply Voltage	Input range 12 to 30 Vdc
Supply Current	35mA average current, 100mA max current loading including all sensor excitation.
Sample Capacity	The UCM is capable of storing the last 100 hours of actual driving time and 7 – 10 years of alarm history and temperature overview.
Alarm Outputs	Two outputs
Serial Data Port	Two-wire serial interface for connection to a PC.
Software Restart	Upon interruption and re-application of power, the UCM will commence normal operation including data logging and alarm functions.

Table 6 Pressure Switch

Housing	Glass reinforced polyester
Diaphragm	Polyimide film
Operating Temp Range	-40°F to 250°F
Accuracy	± 0.5 psi
Vibration	10G at 20-2000 Hz.
Lifetime	1 million cycles
Operating Range	500 PSI proof pressure, 750 PSI burst pressure
Pressure Connection	Via ¼” – 18 Male NPT directly into pressure hose
Supply Power	Power will be supplied through UCM. The power supply will be pre-regulated and surge protected.

Table 7 Temperature Sensor

Type	LS type Thermistor
Package	3 mm x 38 mm insertion probe with integral fitting. 350 mm total length and approx. 280 mm leads with 2 pin Framatome connector.
Temp. Range (Withstand)	-40° to 1000°C
Temp. Range (Operational	-40° to 1000°C
Sensor Accuracy	50° to 550°C: +/- 10°C, 500° to 1000°C: +/-20°C