

**DIESEL ENGINE  
FIRE PUMP CONTROLLER**

**Metron  
Eledyne**

**Battery Electric Start To N.F.P.A. No 20  
Factory Mutual Systems Approved**

**Autostart Type EFP/NFPAW/93**

*SPEC. 1/9805 release 2.0*

## SPECIFICATION

- ! The Metron Eledyne **AUTOSTART Type EFP/NFPAW/93** Diesel Engine Fire Pump Controller is designed on a **value for money** based philosophy. It is designed for **operation in adverse weather conditions** and suitable for use on installations such as Offshore Oil Platforms, Chemical and Petrochemical Plants.
- ! The Controller is designed to **NFPA No 20 Standards and is Factory Mutual Systems Approved** for auto and manual starting of diesel engine driven fire pumps.
- ! Components are housed in a **NEMA 4X weatherproof enclosure with a Lexan glass windowed front door** and lockable internal access door on which is mounted in a lockable break-glass panel.
- ! The controller is suitable for **direct mounting on the engine skid using anti-vibration mounts or for wall-mounting**. As an optional extra, a free-standing plinth is also available.
- ! Standard paint finish is in epoxy resin, colour red to Metron Eledyne paint specification No PS 0396 and **suitable for use in corrosive environments**. Internal components are mounted on a white stove enamelled gear tray.
- ! The controller is designed for installation in **exposed, non hazardous environment** at ambient temperatures up to 50°C and is fitted with an anti-condensation heater/thermostat as standard.
- ! Hermetically sealed relay logic type controller integrated with well tried and tested solid state timers.
- ! Adjustable 0 - 30 seconds delay start timer (option D) and 20 - 80 minutes auto-stop timer (option B).
- ! **Weekly start timer** with manual override and **AC supply monitoring** with power failure alarm.



- ! **Battery chargers are of the latest solid state design** with current limited charging at 10 amps, constant voltage output at float with ambient temperature compensation to prevent unnecessary gassing of the battery. **Intelligent battery monitoring and charging** is provided to ensure fully charged batteries at all times providing detection of faulty or disconnected batteries.
- ! **Volt free remote alarm changeover contacts** for "Pump on Demand", "Controller off or in Manual", "Engine Running" (2 sets), "Engine Failed to Start", and "Fault on Engine or Controller".
- ! **Crank cycle of 15 seconds** with alternate crank from each battery with 15 seconds rest and failed to start after 6 cranks. In the event of a battery failure all engine cranking is switched to good battery.
- ! Air flaps can be operated in an overspeed shutdown condition (option C).
- ! Circuit breakers fitted for engine oil and water jacket heaters (option E1 and E2).
- ! Mounted on the sides of the controller are the alarm bell, stainless steel pressure switch/drain valve fitted in a lockable housing and a pressure recorder with a 7 day operation in the event of power failure.
- ! RS232 computer output port for transmission of controller monitoring data (options Q and T).

**Indicator lamps:-**

AC mains on	Engine Running	Battery Charger A Failed
Battery A Healthy	Engine Failed to Start	Battery Charger B Failed
Battery B Healthy	Low Oil Pressure	Auxiliary oil channel (option H3)
Auto Mode On	High Water Temperature	Aux channel 1 (option H1)
Pump on Demand	Engine Over speed	Aux channel 2 (Option H2)
Crank Timer Operating	Test Mode On	Air flaps closed (Option C)

**Switches & Push buttons:-**

Battery Voltmeter Selector	Mode selector (Automatic, Manual & Test)	Oil Test
Engine Shutdown	A.C Isolator Switch	Crank A
Alarm Silence	Lamp test	Crank B.
Cancel Alarm/Reset		



## **AUTOSTART FIRE PUMP CONTROLLER OPERATING INSTRUCTIONS**

### **1 PREFACE**

This operating manual explains the operation of the complete control system and options. Refer to the options table on the circuit diagram which indicates specific options fitted.

### **2 CAUTION**

In order to avoid risk of personal INJURY or damage to the control equipment, READ THIS MANUAL VERY CAREFULLY. If after reading these instructions doubt exists, do not hesitate to contact Metron-Eledyne for further clarification.

In the interests of safety pay special attention to the CAUTION notes listed below:

If work has to be carried out on the engine or control equipment, isolate the control equipment from the AC and DC supplies, and remove the start solenoid supplies from control circuit terminals 9 and 10 before work commences. If possible use a temporary label which draws attention to this fact.

Before attempting to start the engine during commissioning, ensure that the 'Fuel Stop Solenoid' is operational. Due to the nature of the equipment, the control system may start the engine at any time when operating in automatic mode. Ensure all concerned are aware of this condition by means of an appropriate label, prominently displayed on the engine skid.

When the equipment is energised and on line, ensure all doors are closed and where applicable locked.

If during commissioning the equipment is energised with the access door to the panel interior open, make sure the terminal cover is fitted to avoid the risk of electric shock.

### **3 GENERAL**

Refer To Title Page And Panel Rating Label To Confirm Panel Type

These operating instructions are applicable to the following types of Metron-Eledyne 'Diesel Engine Firepump Controller':-

EFP/24/NFPA/IND/93/XXX/XX NEMA2 enclosure with unsealed relays.  
EFP/12/NFPA/IND/93/XXX/XX NEMA2 enclosure with unsealed relays.  
EFP/24/NFPAW/IND/93/XXX/XX NEMA4X enclosure with unsealed relays.  
EFP/12/NFPAW/IND/93/XXX/XX NEMA4X enclosure with unsealed relays.

EFP/24/NFPAW/93/XXX/XX NEMA4X enclosure with sealed relays.

EFP/12/NFPAW/93/XXX/XX NEMA4X enclosure with sealed relays.

Note: NEMA2 Approximates to IP54.

NEMA4X Approximates to IP65.

X = Job specific variables.

The controller is designed as a fully-automatic engine start system based on the requirements of National Fire Codes NFPA No. 20 for Engine Driven Fire Pump Controllers.

In these instructions, the following terms used are defined as:-

Visual - Lamp or meter.

Audible - Alarm bell.

Volt free - Remote indicating volt free changeover contacts.

Generally, for simplicity, only changes in status will be mentioned the above.

<b>THROUGHOUT THE TEXT IN TWO COLUMNS FORMAT SECTIONS</b>	
The left hand column describes initiative events.	The right hand column describes resultants.

**4 ENERGISING THE CONTROL SYSTEM**

Engine, controller and field interconnections. As detailed on the engine wiring/interconnection drawing.

Set the following in order:

Mode Switch (S6).	Man.
All internal CBs.	On.
DC Isolator/CBs (CB2 & CB3).	On.
AC Isolator (S10).	On.
Visual.	AC Mains On.
	Ammeters show current.
	Voltmeter shows selected battery
volts.	
Audible.	Non-mutable

Volt free. Fault on engine or controller.  
Controller off or in manual.

Press the Cancel Alarm/Reset Controller button (S2).

Visual. AC Mains On.  
Battery A Healthy.  
Battery B Healthy.  
Ammeters show current.  
Voltmeter shows selected battery

volts.

Audible. Silent.

Volt free. Controller off or in manual.

5 **BATTERY DISCONNECTION/OVERVOLTAGE OPERATION**

If a battery system connection is loose, a battery is disconnected or the AC supply is off.

Visual. Battery Chargers Failed.

Audible. Mutable.

When the charging system is ready, reset the controller. Battery charger alarms clear.  
Battery chargers operate normally.

6 **BATTERY CHARGING**

(12 & 24 volt systems)

TEMPERATURE COMPENSATION (option V)

Rising temperature reduces the battery gassing point voltage.

The voltage performance of the battery charger is temperature compensated. Battery Voltage is reduced by approximately 0.05 volts/degree Celsius above 20 degrees. (0.004 v/cell/deg C).

NOTE
THE VOLTAGE LEVELS QUOTED FOR ALL TYPES OF BATTERY ARE FOR AN AMBIENT TEMPERATURE OF 20 DEGREES CELCIUS

WARNING NOTICE
The performance of the battery chargers is entirely automatic. No operator variables are provided, the chargers are factory preset and <b><u>NO ADJUSTMENTS MUST BE ATTEMPTED ON SITE</u></b> or damage to the batteries may result. Maintenance of batteries should be carried out in accordance with the instructions issued by the battery manufacturer.

If the temperature compensation unit becomes disconnected or malfunctions.

Battery voltages default to the value at 20 degrees Celcius.

Visual.

Battery Charger A Failed.  
Battery Charger B Failed.

Audible.

Mutable.

Volt free.

Fault on engine or controller.

LEAD ACID BATTERIES

NOTE
Figures in brackets refer to 12 volt systems.

Set the voltmeter switch to the desired battery position.

The battery voltage remains stable at the float level of 27.5 (13.7) volts until reduced by loading.

If the battery voltage goes more than 100mV below the nominal float voltage level.

The ammeter reads Current Limit level of 10 Amps.

If loading reduces the battery voltage to below 26 (13) volts.

A period of boost/equalisation is initiated.

Battery voltage rises and may reach the maximum of 31.5 (15.1) volts.

Regular voltage sampling takes place.

The voltage plateau of the battery is

determined.

A period of cell voltage equalisation occurs.

The battery voltage floats at 27.5 (13.7) volts, each cell ideally being at 2.29 volts.

The battery voltage remains stable at the float level of 27.5 (13.7) volts until again reduced by loading.

The battery charger achieves the stable battery float voltage in less than 24 Hrs.

NOTE
For recombination batteries the float voltage is 2.3 V/Cell. To achieve full charge in 24 hours they are voltage boosted to 2.33 V/Cell, which is below the safe maximum of 2.346 V/Cell.

18 (9) CELL NI/CAD BATTERIES

NOTE
Figures in bracket refer to 12 volt systems.

Set the voltmeter switch to the desired battery position.

The battery voltage remains stable at the float level of 26.1 (13) volts until reduced by loading.

If the battery voltage goes more than 100mV below the nominal float voltage level.

The ammeter reads Current Limit level of 10 Amps.

If loading reduces the battery voltage to below 24.6 (12.4) volts.

A period of boost/equalisation is initiated.

The ammeter reads the Current Limit level of 10 Amps.

Battery voltage rises and may reach the maximum of 29.7 (14.8) volts.

Regular voltage sampling takes place.

The voltage plateau of the battery is

determined.

A period of cell voltage equalisation occurs.

The battery voltage floats at 26.1 (13) volts, each cell ideally being at 1.45 volts.

The battery voltage remains stable at the float level of 26.1 (13) volts until again reduced by loading.

The battery is recharged in less than 24 Hrs.

20 (10) CELL NI/CAD BATTERIES

NOTE
Figures in brackets refer to 12 volt systems.

Set the voltmeter switch to the desired battery position.

The battery voltage remains stable at the float level of 29 (14.5) volts until reduced by loading.

If the battery voltage goes more than 100mV below the nominal float voltage level.

The ammeter reads Current Limit level of 10 Amps.

If loading reduces the battery voltage to below 27.5 (13.8) volts.

A period of boost/equalisation is initiated.

The ammeter reads the Current Limit level of 10 Amps.

Battery voltage starts to rise.

On passing 30.3 (15.1) volts the current limit value is reduced to 5 Amps.

Battery voltage rises and may reach the maximum of 33.0 (16.5) volts.

Regular voltage sampling takes place.

Battery voltage approaches 31.5 (17) volts.

Regular voltage sampling takes place.

The voltage plateau of the battery is



determined.

A period of cell voltage equalisation occurs.

The battery voltage floats at 29 volts, each cell ideally being at 1.45 volts.

The battery voltage remains stable at the float level of 29 volts until again reduced by loading.

The battery is recharged in less than 24 Hrs.

## 7 CONTROL SYSTEM MANUAL OPERATION

Unlock and lift the hinged switch cover.  
Select Manual Mode.

Set the Alarm Silence switch to Normal.

Visual.

AC Mains On.  
Battery 'A' Healthy.  
Battery 'B' Healthy.  
Others - Out.

Volt free.

Controller off or in manual.

### STARTING

Press either crank A or Crank B button.

Engine cranks from respective battery.

Visual.

Ammeters show zero current during cranking.  
Used battery ammeter shows current at the limit level after cranking.  
Unused battery ammeter shows float current after cranking.

If the engine does not start.

Press the other crank button.

battery.

Engine cranks from alternative

If the engine does not start.

Both batteries may individually have insufficient charge to crank the

engine.

Press both crank A and crank B buttons together. Engine attempts to crank from both batteries in parallel.

The following Emergency Start instructions are mounted on the switch cover.

<b><u>EMERGENCY INSTRUCTIONS</u></b>
1. UNLOCK COVER OR BREAK GLASS 2. TURN MODE SWITCH TO 'MAN' POSITION 3. PRESS CRANK 'A' OR CRANK 'B' BUTTON UNTIL ENGINE RUNS 4. IF THIS DOES NOT START PRESS OTHER BUTTON 5. SHOULD EITHER BATTERY NOT HAVE SUFFICIENT CHARGE TO START ENGINE, PRESS BOTH BUTTONS TOGETHER.

**ENGINE RUNNING**

The engine normally starts after only a few seconds cranking.

Engine runs up to speed.

Visual.

Engine running.

Volt free.

Engine running.

**ENGINE SHUTDOWN**

Push the Engine Shutdown button.

Engine fuel solenoid shuts off the fuel.  
Engine stops.

Visual.

Engine running - goes out.

Volt free.

Engine running clears.

**8 CONTROL SYSTEM AUTOMATIC OPERATION**

<b><u>CAUTION</u></b>
The engine may start without warning when in Auto Mode.

Set the mode switch to Auto.

Visual.

Auto Mode On.

Volt free. Controller off or in manual clears.

AUTOSTART (Without option D)

Pressure falls below the set point of the start pressure switch.

Visual.

Without delay the engine cranks from battery A.  
Pump On Demand - for duration of pressure drop.  
Crank Timer Operating.  
Ammeters show zero current during cranking.  
Used battery ammeter shows current at the limit level after cranking.  
Unused battery ammeter shows float current after cranking.

Volt free.

Pump on demand - until engine stops.

Engine runs up to speed.  
Cranking is automatically cut off.

Visual.

Pump On Demand.  
Engine Running.  
Crank Timer Operating - goes out.

NOTE
Whilst the engine alternator recharges the batteries, the controller battery charger current may be zero.

Volt free.

Pump on demand.  
Engine running.

Pressure rises above the start pressure switch set point.

Visual.

Pump On Demand - goes out.

Volt free.

Pump on demand - persists.

Engine runs on until manually stopped by the operator or the Autostop Module.

AUTOSTART (With delay start, option D).

The start delay allows the programmed starting of two or more pumps.

The start delay also enables the autostart to ignore pressure transients in the system which could cause nuisance starts.

Pressure falls below the set point of the start pressure switch.

Delay Start Timer starts to time.

If pressure rises above the start pressure switch set point within the timing period.

Delay Start Timer is reset and no Pump On Demand occurs.

If pressure remains low beyond the timing period.

The Delay start timer times out. Engine cranks from battery A.

Visual.

Pump On Demand - for duration of pressure drop.  
Crank Timer Operating.  
Ammeters show zero current during cranking.  
Used battery ammeter shows current at the limit level after cranking.  
Unused battery ammeter shows float current after cranking.

Volt free.

Pump on demand - until engine stops.  
Engine runs up to speed.

Cranking is automatically cut off.

Visual.

Pump On Demand.  
Engine Running.  
Crank Timer Operating - goes out.

NOTE
Whilst the engine alternator recharges the batteries the controller battery charger current may be zero.

Volt free.

Pump on demand.

Engine running.

When pressure rises above the start pressure switch set point.

Visual.

Pump On Demand - goes out.

Volt free.

Pump on demand - persists.

Engine runs on until manually stopped by the operator or the Autostop Module.

### AUXILIARY AUTOSTART

An Auxiliary autostart can be initiated by a set of remotely sited, closing contacts.

Delayed start is not available on this facility.

When the auxiliary start contacts close.

Engine cranks from battery A.

Visual.

Pump On Demand - for duration of contact closure.  
 Crank Timer Operating.  
 Ammeters show zero current during cranking.  
 Used battery ammeter shows current at the limit level after cranking.  
 Unused battery ammeter shows float current after cranking.  
 Pump on demand.

Volt free.

Engine runs up to speed.  
 Cranking is automatically cut off.

Visual.

Engine Running.  
 Crank Timer Operating - goes out.

NOTE
Whilst the engine alternator recharges the batteries the controller battery charger current may be zero.

Volt free.

Pump on demand.  
 Engine running.

Engine continues to run until shut down by the operator or the Autostop Module.

CRANK SEQUENCE

Once initiated, crank attempts occur alternately from each battery.

If the engine fuel system is held off and cranking allowed to proceed.

Crank solenoid A energises for 15secs.

Cranking ceases for 15 secs.

Crank solenoid B energises for 15 secs.

Cranking ceases for 15 secs.

The cycle repeats until a total of six alternate crank attempts have occurred.

ENGINE FAILED TO START

Crank sequence ends.

Visual.

Engine Failed To Start.

Audible.

Non-mutable.

Volt free.

Engine failed to start.

Fault on engine or controller.

Restore the engine to operational condition.

Press the Cancel Alarm/Reset Controller pushbutton.

Alarms clear.

ENGINE SHUTDOWN

<b>NOTE</b>
Before operating the shutdown switch, ensure that the Pump On Demand lamp is not lit. If the engine must be shutdown for overriding safety reasons in the presence of a Pump On Demand, select Man mode first.

Press the Engine Shutdown pushbutton.

Engine fuel solenoid shuts off the fuel.

Engine stops.

Visual.

Auto Mode On - goes out during the stop timing period.

Engine Running - goes out.

Volt free.

Engine running - clears.

Pump on demand - clears.

### AUTOSTOP (Option B)

With the engine running and Pump On Demand lamp on, the Autostop module is inactive.

When the Pump On Demand clears.

Visual.

Pump On Demand - goes out.

Autostop timer starts to time.

Adjustable 20 to 80 mins.

Autostop timer times out.

Engine fuel solenoid shuts off the fuel.

Engine stops.

Visual.

Auto Mode On - goes out during the stop timing period.

Engine Running - goes out.

Volt free.

Engine running - clears.

Pump on demand - clears.

If the Autostop timer is timing and the Pump On Demand lamp lights.

Autostop timer operation is inhibited.

### TEST START

Turn the mode switch to Test and hold until the Pump On Demand lamp lights.

Drain valve energises to lower pressure in the start pressure switch pipework.

	The crank sequence is initiated.
Visual.	Drain Valve On. Pump On Demand. Crank Timer operating.
Volt free.	Pump on demand.
If a drain valve is not fitted, when the mode switch is turned to Test.	Autostart is initiated directly by the mode switch.
Visual.	Test Start On. Pump On Demand. Crank Timer operating.
Volt free.	Pump on demand.
In either case above.	The engine starts and runs until shut down by the operator or the Autostop module.

**BATTERY FAILURE DURING CRANKING**

As the starter motor engages, the battery voltage dips briefly to a low value and then recovers to a higher steady value during cranking.

	With a poor battery, the steady cranking voltage eventually falls below the fault level of half the float voltage.
Engine cranking.	Battery voltage goes below fault level.  Cranking from the faulty battery ceases.  Cranking resumes with the healthy battery in circuit. Battery A (or B) Healthy - goes out.
Visual.	
Audible.	Non-mutable.
Volt free.	Fault on engine or controller.



Cranking continues. All remaining crank attempts occur from the healthy battery.

Press the Cancel Alarm/  
Reset Controller pushbutton. Alarms clear.

**9 WEEKLY START TIMER**

Set the timer. To activate at a convenient day and time.

The timer activates.

With a drain valve fitted. The drain valve energises to lower the pressure in the start pressure switch pipework.

Visual. Drain Valve On.  
Pump On Demand.  
Crank Timer operating.

Volt free. Pump on demand.

If a drain valve is not fitted. Autostart is initiated directly by the timer contacts.

Visual. (Weekly) Test Start On/Due.  
Pump On Demand.  
Crank Timer operating.

Volt free. Pump on demand.

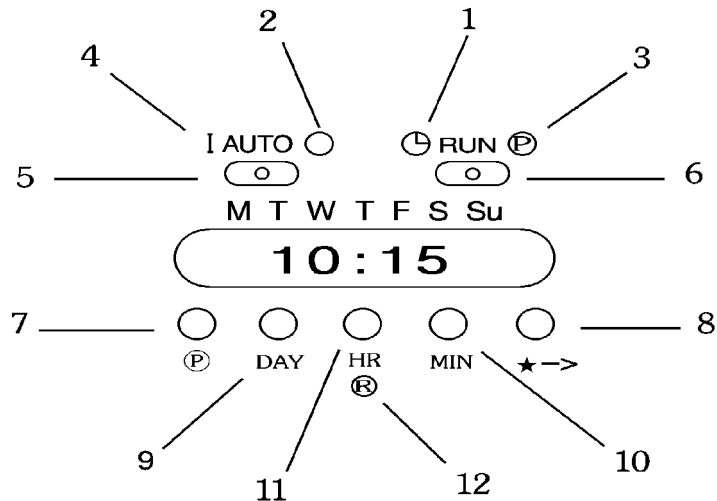
In either case above. The engine starts and runs until shut down by the operator or the Autostop module.

The Weekly start timer must be allowed approximately 30 minutes to reset before the engine is stopped. This is automatic when using the autostop module.

10 **TIMER**

TIMER SETTINGS - DIEHL TYPE 884

CONTROLS



- 1 Allows actual time of day to be set using HR & MIN buttons. Allows actual day to be set using DAY button.
  - 2 Timer Off.
  - 3 Enables pushbuttons to be used to set programme ON & OFF times.
  - 4 Timer ON Constant.
  - 5 Timer operating to selected programme.
  - 6 Displays time of day & allows set programme to run.
  - 7 Selects programme memories. 8 ON 8 OFF.
  - 8 Soft override.
  - 9 Individual or group of Days.
  - 10 Minute Units. Hold for Fast Scroll.
  - 11 Units of Hours. Hold for Fast scroll.
  - 12 Clears all settings.
- REAL TIME SETTING

- 1 Press the 'R' button to reset all functions.
- 2 Set the 'RUN' slider switch to its left hand position.
- 3 Set time of day using the 'HR' and 'MIN' buttons
- 4 Set current day by repeatedly pressing the 'DAY' button until the Day arrow at the top of the digital display lines up with the current day symbol.
- 5 Set the 'RUN' slider switch to its centre position. The digital display now shows real time and current day.

#### WEEKLY START TIME SETTING

- 6 Set the 'RUN' slider switch to its right hand position.
- 7 Select the required start day by pressing the 'DAY' button repeatedly until the indicator arrow at the digital display top lines up with the required day symbol.
- 8 'ON' status is indicated by a 'LAMP BULB' graphic symbol on the digital display right hand side.  
'OFF' status is indicated by the absence of the 'LAMP BULB' graphic symbol.
- 9 Press the circled P button (bottom row left hand button) until the digital display shows 1 and the lamp bulb symbol together at the right hand side of the digital display.
- 10 Set the 'ON TIME' by pressing the 'HR' & 'MIN' buttons until the digital display shows the desired 'ON' time.
- 11 Press the circled P button once (bottom row left hand button) and see that the digital display lamp bulb symbol is absent and the right hand symbol is now 2. Set the 'OFF' time at least 30 minutes later than the 'ON' time. This is required by the N.F.P.A. rules to give 30 minutes pump test run.
- 12 Ensure that all other on and off times are set at 00.00.
- 13 Set the 'RUN' slider switch to its centre position.
- 14 The timer will start the engine at the set day/time.
- 15 The 'AUTO' slider switch should remain in the centre position for normal operations. If the 'AUTO' slider switch is set to the left hand position, the timer is permanently ON. If the 'AUTO' slider switch is set to the right hand position, the timer is permanently OFF.

11 **ENGINE SYSTEM MONITORING****ENGINE OVERSPEED (Without air flaps fitted)**

If the engine overspeeds.

Engine fuel solenoid shuts off the fuel.  
Engine stops.  
Autostart is inhibited.

Visual.

Engine Overspeed.  
Engine Running - goes out.  
Auto Mode On - goes out during stop timing period.

Audible.

Non-mutable

Volt free.

Fault on engine or controller.  
Engine running - clears.

The controller remains latched in this condition until reset.

**RESETTING AFTER OVERSPEED**

Select Man mode.

If necessary reset the engine speed switch.

Press the Cancel Alarm/Reset Controller pushbutton.

Fault indications clear.

When the engine is ready, reselect Auto mode for operations.

**ENGINE AIR FLAPS (Option C)**

If the engine overspeed activates.

Air Flap Solenoid is energised.  
Air flaps close.  
Engine fuel solenoid shuts off the fuel.  
Engine stops.  
Autostart is inhibited.

Visual.

Engine Overspeed.  
Air Flaps Closed.  
Engine Running - goes out.

Audible.	Auto Mode On - goes out during stop timing period. Non-mutable
Volt free.	Fault on engine or controller. Engine running - clears.  Air flap solenoid de-energises when the airflaps close. The controller remains latched in this condition until reset.

**RESETTING THE AIR FLAPS**

Select Man mode.

If necessary reset the engine speed switch.

Press the Cancel Alarm/Reset Controller pushbutton. Overspeed indications clear.

Audible.	Air flap alarms persist. Non-mutable.
Reset the air flaps.	Air flap alarms persist.
Press the Cancel Alarm/Reset Controller pushbutton.	Air flap alarms clear.
When the engine is ready, reselect operational mode.	

**OIL PRESSURE MONITOR (Press To Test)**

To test the oil pressure sensor when the engine is stationary, select Test Oil on the Lamp Test/Oil Test switch.

Visual.	Low Oil Pressure.
Audible.	None.
Volt free.	None.
Release the Test Oil switch.	

Visual. Low Oil Pressure clears.

**OIL PRESSURE MONITOR (Engine Running)**

With engine running, if oil pressure goes low. Oil timer starts (10 secs).

Oil timer times out.

Visual. Low Oil Pressure.

Audible. Non-mutable.

Volt free. Fault on engine or controller.

Alarm remains active whilst pressure is low only until the engine is shutdown.

Engine stops. Alarms clear.

**AUXILIARY LOW PRESSURE MONITOR (Option H3)**

The Aux' Low Pressure channel option H3 operates exactly the same as the low oil pressure channel above.

**HIGH WATER TEMPERATURE**

With engine running, if water temperature goes high. Oil timer starts (10 secs).

Oil timer times out.

Visual. High Water Temperature.

Audible. Non-mutable.

Volt free. Fault on engine or controller.

Alarm remains active whilst temperature is high only until the engine is shutdown.

Engine stops. Alarms clear.

**SPARE CHANNELS (Options H1 & H2)**

These channels can monitor a variety of parameters whose sensors provide closing

contacts on fault.

When a spare channel sensor activates:

Visual.

Channel lamp.

Audible.

Mutable.

Volt free.

Fault on engine or controller.

Channel sensor clears.

Alarm indications clear.

## 12 MAINS FAILURE

If the AC supply fails:

Visual.

AC Mains On - goes out.

Audible.

Non-mutable.

Volt free.

Fault on engine or controller.

### MAINS FAILURE START (Option F)

With the controller in Auto Mode, if the AC supply fails.

A 0-30 sec timer starts.

The timer times out.

Engine cranks from battery A.

Visual.

AC Mains On - goes out.  
Pump On Demand - for duration of AC mains failure.  
Crank Timer Operating.

Volt free.

Fault on engine or controller.  
Pump on demand - until engine stops.

Engine runs up to speed.

Cranking is automatically cut off.

Visual.

Pump On Demand.  
Engine Running.  
Crank Timer Operating - goes out.  
Battery ammeters show zero current until the AC supply is restored.

Volt free.	Pump on demand. Engine running.
When the AC supply is restored.	Battery chargers resume normal operation.
Visual.	AC Mains On. Pump On Demand - goes out.
Volt free.	Pump on demand - persists. Fault on engine or controller - clears.  Engine runs on until manually stopped by the operator or the autostop module.
Volt free.	Pump on demand - clears.

13 **MUTABLE ALARM**

When a mutable alarm exists, the Alarm Silence switch can be turned to the Mute position for silence.

If the Alarm Silence switch is left in the Mute position when there is no alarm, the audible alarm sounds until the switch is returned to Normal.

14 **LAMP TEST**

Select Lamp Test on the Lamp Test/Oil Test switch.

Visual.	All lamps light.
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15 **ANTI-CONDENSATION HEATER (Option G)**

Thermostat setting.	30°C.
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With the cabinet interior temperature below 30°C.	Anticondensation heater warms.
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With the cabinet interior temperature above 30°C.	Anticondensation heater cools.
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**16 ENGINE HEATERS (Options E1 AND E2)**

There can be up to two engine heater supplies covering a range of power up to 3 KW with the standard optional circuit breakers CB6 & CB7.

**17 AUXILIARY DC SUPPLY**

(For Non-Inductive Loads)

The control system provides a protected auxiliary D.C. supply at control voltage, for non-inductive loads which is available at fused terminal 49 (F7).

**18 PRESSURE RECORDER (H.P.I.)**

The recorder is fitted with a 7 day chart. To change a chart, undo and remove the centre clamping hand nut. Release the old chart. Place the new chart in position and make sure that it lies under the four tags which are equally spaced round the edge. Rotate the chart until the current day/time position is under the pen tip. Refit and finger tighten the hand nut. Ensure that the pen tip rubber cover is removed. A pen is changed by simply sliding the old pen from the housing and sliding in a new one until it stops.

The rotational speed of the chart is regulated by means of a quartz clock which is powered by a rechargeable battery. The battery is kept in a charged state from the AC supply and will power the recorder for more than seven days in the event of a mains failure.

**19 PRESSURE RECORDER (Dickson)**

The recorder is fitted with a 7 day chart. To change a chart slip the old chart off the centre slotted boss, Place the new chart in position and make sure that it lies under the two tags which are at the top and right hand edges. Rotate the chart using a coin or similar tool in the centre boss slot until the current day/time position is under the pen tip. Ensure that the pen tip rubber cover is removed. Take care not to over strain the pen arm. A pen is changed by simply sliding the old pen from the housing and sliding in a new one until it stops. The pen position can be zeroed using the PEN ADJUST at the top left of the chart plate.

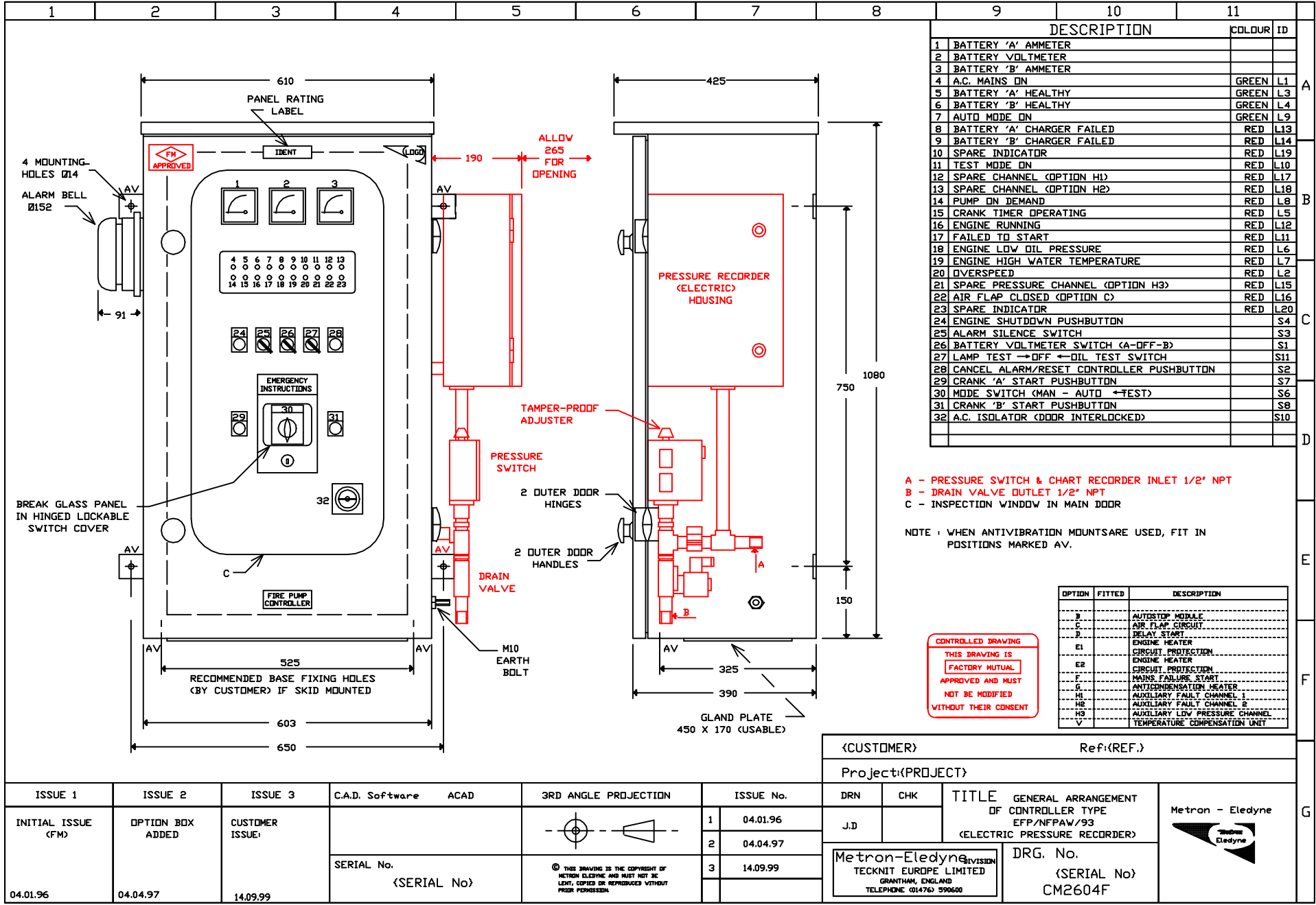
The rotational speed of the chart is regulated by means of a clock which is powered by a battery, size AA. The recorder is shipped switched off. The ON/OFF switch is at the bottom right of the chart plate. It is recommended that the battery is renewed every six months. See the battery record under the chart. Access to the battery is via the turn-to-release cap at the bottom left of the chart plate. The battery should be installed + at the top.

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	DESCRIPTION	COLOUR	ID
1	BATTERY 'A' AMMETER		
2	BATTERY VOLTMETER		
3	BATTERY 'B' AMMETER		
4	A.C. MAINS ON	GREEN	L1
5	BATTERY 'A' HEALTHY	GREEN	L3
6	BATTERY 'B' HEALTHY	GREEN	L4
7	AUTO MODE ON	GREEN	L9
8	BATTERY 'A' CHARGER FAILED	RED	L13
9	BATTERY 'B' CHARGER FAILED	RED	L14
10	SPARE INDICATOR	RED	L19
11	TEST MODE ON	RED	L10
12	SPARE CHANNEL (OPTION H1)	RED	L17
13	SPARE CHANNEL (OPTION H2)	RED	L18
14	PUMP ON DEMAND	RED	L8
15	CRANK TIMER OPERATING	RED	L5
16	ENGINE RUNNING	RED	L12
17	FAILED TO START	RED	L11
18	ENGINE LOW OIL PRESSURE	RED	L6
19	ENGINE HIGH WATER TEMPERATURE	RED	L7
20	OVERSPEED	RED	L2
21	SPARE PRESSURE CHANNEL (OPTION H3)	RED	L15
22	AIR FLAP CLOSED (OPTION C)	RED	L16
23	SPARE INDICATOR	RED	L20
24	ENGINE SHUTDOWN PUSHBUTTON		S4
25	ALARM SILENCE SWITCH		S3
26	BATTERY VOLTMETER SWITCH (A-OFF-B)		S1
27	LAMP TEST → DFF ← OIL TEST SWITCH		S11
28	CANCEL ALARM/RESET CONTROLLER PUSHBUTTON		S2
29	CRANK 'A' START PUSHBUTTON		S7
30	MODE SWITCH (MAN - AUTO ←TEST)		S6
31	CRANK 'B' START PUSHBUTTON		S8
32	A.C. ISOLATOR (DOOR INTERLOCKED)		S10

A - PRESSURE SWITCH & CHART RECORDER INLET 1/2" NPT  
 B - DRAIN VALVE OUTLET 1/2" NPT  
 C - INSPECTION WINDOW IN MAIN DOOR

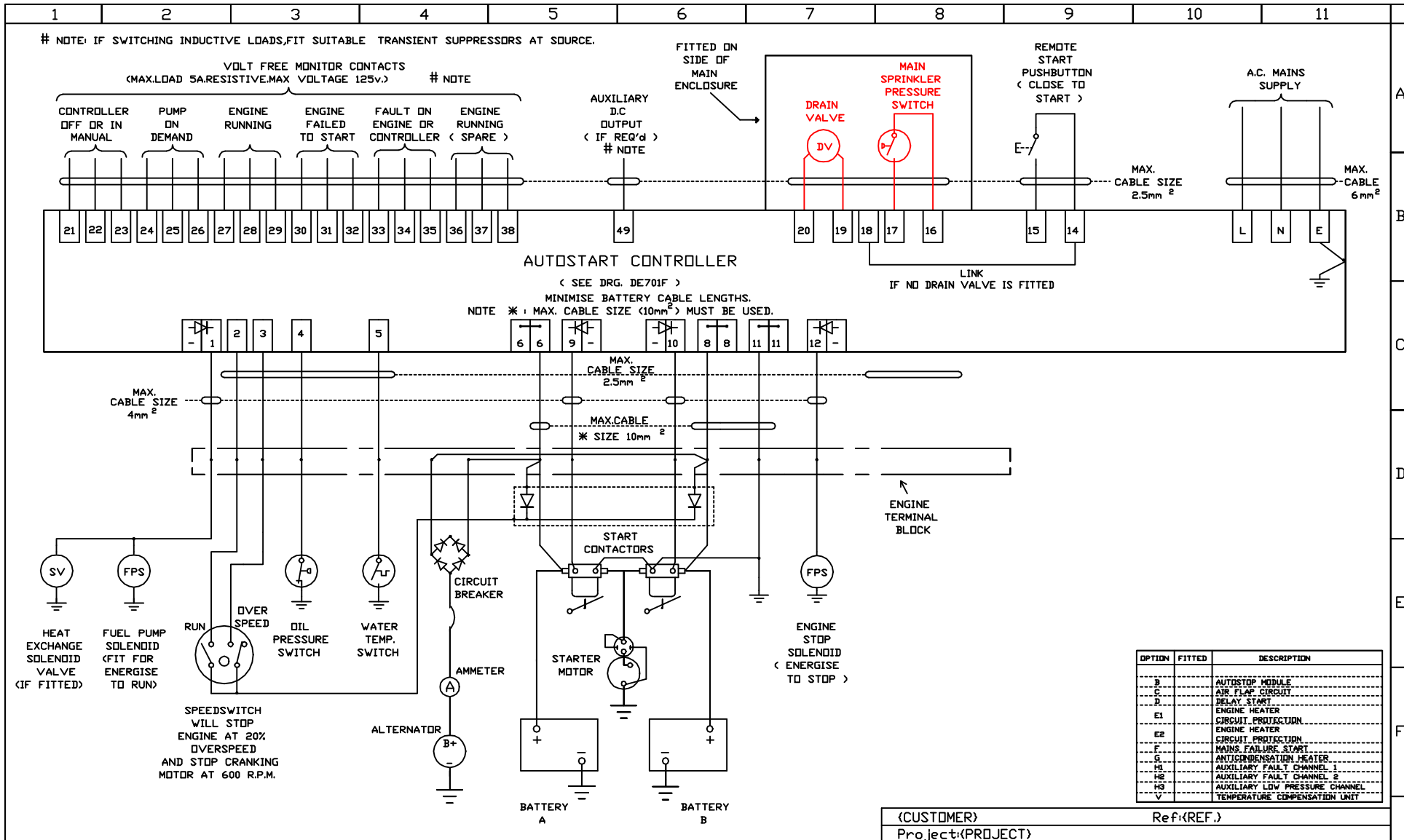
NOTE: WHEN ANTIVIBRATION MOUNTS ARE USED, FIT IN POSITIONS MARKED AV.

OPTION	FITTED	DESCRIPTION
B		AUTOSTOP MODULE
C		AIR FLAP CIRCUIT
D		DELAY START
E1		ENGINE HEATER
		CIRCUIT PROTECTION
		ENGINE HEATER
E2		CIRCUIT PROTECTION
F		MAINS FAILURE START
G		ANTICONDENSATION HEATER
H1		AUXILIARY FAULT CHANNEL 1
H2		AUXILIARY FAULT CHANNEL 2
H3		AUXILIARY LOW PRESSURE CHANNEL
V		TEMPERATURE COMPENSATION UNIT

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(CUSTOMER) Ref:(REF.)  
 Project:(PROJECT)

ISSUE 1	ISSUE 2	ISSUE 3	C.A.D. Software	ACAD	3RD ANGLE PROJECTION	ISSUE No.	DRN	CHK	TITLE	GENERAL ARRANGEMENT OF CONTROLLER TYPE	Metron - Eledyne
INITIAL ISSUE (FM)	OPTION BOX ADDED	CUSTOMER ISSUE				1 04.01.96	J.D		EFF/NPFAW/93 (ELECTRIC PRESSURE RECORDER)		
04.01.96	04.04.97	14.09.99				2 04.04.97					
						3 14.09.99			DRG. No. (SERIAL No) CM2604F		
			SERIAL No. (SERIAL No)		© THIS DRAWING IS THE COPYRIGHT OF METRON ELEDYNE AND MUST NOT BE LOANED, COPIED OR REPRODUCED WITHOUT PRIOR PERMISSION		Metron-Eledyne DIVISION TECKNIT EUROPE LIMITED GRANTHAM, ENGLAND TELEPHONE (01476) 590600				



ISSUE 2	ISSUE 3	ISSUE 4	C.A.D. Software	AUTOCAD	ISSUE No.
MAX. CABLE SIZES REVISED	OPTION BOX ADDED	CUSTOMER ISSUE:			1 17.03.95
27.02.96	J.D	14.09.99			2 27.02.96
					3 04.04.97
					4 14.09.99

(CUSTOMER) Ref:(REF.)  
Project:(PROJECT)

DRN	CHK	TITLE	TYPICAL
D.V.T.		ENGINE WIRING DIAGRAM FOR AUTOSTART CONTROLLER	

Metron - Eledyne

DRG. No. (SERIAL No) CE702F

Metron-Eledyne DIVISION  
TECKNIT EUROPE LIMITED  
GRANTHAM, ENGLAND  
TELEPHONE (01476) 590600

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## Recommended Consumable Spares Package for Controller Type EFP/12/NFPAW/93

DESCRIPTION	STOCK NO.	QTY	UNIT PRICE	TOTAL PRICE
Relay, 2 pole 12V	19290	2	£10.52	£21.04
Relay, 3 pole 12V	19291	1	£11.65	£11.65
Relay, 4 pole 12V	19026	1	£ 7.49	£ 7.49
Relay, 2 pole 240V	19297	1	£10.48	£10.48
Pressure Chart Disk (60Box)	14531	1	£38.80	£38.80*
Chart pen	14532	1	£12.12	£12.12*
Fuse 3A ceramic	09027	10	£ 0.35	£ 3.50

\* If fitted

**Metron-Eledyne reserve the right, at the time of order placement, to offer an alternative item; on the understanding that it fulfils the conditions of FIT, FORM and FUNCTION.**

## Recommended 5-Year Spares Package for Controller Type EFP/12/NFPAW/93

DESCRIPTION	STOCK_NO.	QTY	UNIT_PRICE	TOTAL_PRICE
Audible Alarm	02009	1	£ 78.48	£ 78.48
Circuit Breaker 32A	06227	1	£ 21.67	£ 21.67
Circuit Breaker 10A	06501	1	£ 23.27	£ 23.27
Circuit Breaker 2A	06504	1	£ 24.88	£ 24.88
Circuit Breaker 6A	06507	1	£ 23.68	£ 23.68
Pushbutton ABW110	12115	1	£ 13.21	£ 13.21
Break Glass Plastic	13333	1	£ 1.95	£ 1.95
Voltmeter 0-40V	14161	1	£ 49.84	£ 49.84
Ammeter 0-15A	14662	1	£ 49.84	£ 49.84
Pressure Switch	18009	1	£739.34	£739.34
Drain Valve Coil 12V	18019	1	£ 32.63	£ 32.63
Thermostat	18022	1	£ 24.38	£ 24.38*
Anti-condensation Heater	21151	1	£ 55.94	£ 55.94*
Twin Diode Block	23260	1	£ 36.09	£ 36.09
Contact Set ( 1 n/c)	24334	1	£ 4.55	£ 4.55
Contact Set ( 1n/o)	24337	1	£ 4.55	£ 4.55
Contact Set (1 n/o latched)	24338	1	£ 6.15	£ 6.15
Pushbutton (Green)	24339	1	£ 7.38	£ 7.38
Pushbutton (Red)	24340	1	£ 8.18	£ 8.18
Switch, 3 posn s/r	24347	1	£ 13.56	£ 13.56
Switch, 2 posn	24348	1	£ 12.63	£ 12.63
Switch, 3 posn	24349	1	£ 13.56	£ 13.56
Switch, Mode	24745	1	£ 59.54	£ 59.54
Isolator, 40A 3 pole	24946	1	£ 37.48	£ 37.48
Terminal (Fused) SAKS3	25047	1	£ 9.90	£ 9.90
Timer, Weekly Start	26370	1	£ 77.68	£ 77.68
Timer, TD30S 12V	30060	1	£131.94	£131.94
Timer, DSTE30S 12V	30133	1	£142.06	£142.06
LED Lamp Board 12V	30691	1	£ 98.51	£ 98.51
Temp. Compensation Unit	30941	1	£ 41.26	£ 41.26*

\* If fitted

\*\* Repairable

Metron-Eledyne reserve the right, at the time of order placement, to offer an alternative item; on the understanding that it fulfils the conditions of FIT, FORM and FUNCTION.

## Recommended Consumable Spares Package for Controller Type EFP/24/NFPAW/93

DESCRIPTION	STOCK_NO.	QTY	UNIT PRICE	TOTAL PRICE
Relay, 2 pole 24V	19295	2	£10.52	£21.04
Relay, 3 pole 24V	19296	1	£11.65	£11.65
Relay, 4 pole 24V	19024	1	£ 7.49	£ 7.49
Relay, 2 pole 240V	19297	1	£10.48	£10.48
Pressure Chart Disk (60Box)	14531	1	£38.80	£38.80*
Chart Pen	14532	1	£12.12	£12.12*
Fuse 3A ceramic	09027	5	£ 0.35	£ 3.50

\* If fitted

**Metron-Eledyne reserve the right, at the time of order placement, to offer an alternative item; on the understanding that it fulfils the conditions of FIT, FORM and FUNCTION.**



## Recommended 5-Year Spares Package for Controller Type EFP/24/NFPAW/93

DESCRIPTION	STOCK NO.	QTY	UNIT PRICE	TOTAL PRICE
Audible Alarm	02013	1	£ 78.48	£ 78.48
Circuit Breaker 32A	06227	1	£ 21.67	£ 21.67
Circuit Breaker 10A	06501	1	£23.27	£ 23.27
Circuit Breaker 2A	06504	1	£ 24.88	£ 24.88
Circuit Breaker 6A	06507	1	£` 23.68	£ 23.68
Pushbutton ABW110	12115	1	£ 13.21	£ 13.21
Break Glass Plastic	13333	1	£ 1.95	£ 1.95
Voltmeter 0-40V	14161	1	£ 49.84	£ 49.84
Ammeter 0-15A	14662	1	£ 49.84	£ 49.84
Pressure Switch	18009	1	£739.34	£739.34
Drain Valve Coil 24V	18012	1	£ 32.63	£ 32.63
Thermostat	18022	1	£ 24.38	£ 24.38*
Anti-condensation Heater	21151	1	£ 55.94	£ 55.94*
Twin Diode Block	23260	1	£ 36.09	£ 36.09
Contact Set ( 1 n/c)	24334	1	£ 4.55	£ 4.55
Contact Set ( 1n/o)	24337	1	£ 4.55	£ 4.55
Contact Set (1 n/o latched)	24338	1	£ 6.15	£ 6.15
Pushbutton (Green)	24339	1	£ 7.38	£ 7.38
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Timer, DSTE30S 24V	30032	1	£142.06	£142.06
LED Lamp Board 24V	30690	1	£ 98.51	£ 98.51
Temp. Compensation Unit	30941	1	£ 41.26	£ 41.26*

\* If fitted

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