XIV. Electrical / Electronics

Temperature Controllers

Mini Vehicle Controller

P/N: 35-0748   P/N: 35-8071

Specifications

Operating Voltage:	+9VDC to 32V DC
Operating Temperature:	-40°C to 85 °C (-40°F to 185°F)
Inputs:	5 Digital and 9 Analog
Outputs:	6 High side, 2 Bidirectional, 1 Analog and 2 PWM
Communication:	RS-485 and CANBus (J1939)

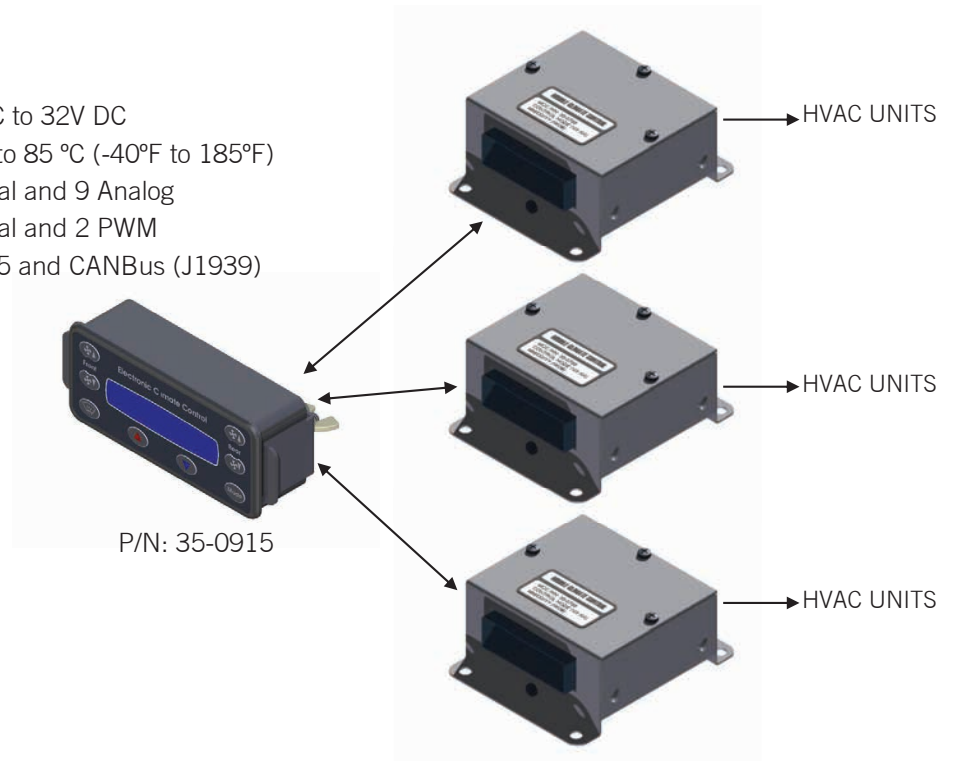## Electronic Climate Control

P/N: 35-0583   P/N: 35-0559

Temperature Controllers

Mini Vehicle Controllers

Specifications

Operating Voltage:	+9VDC to 32V DC
Operating Temperature:	-40°C to 85 °C (-40°F to 185°F)
Inputs:	5 Digital and 9 Analog
Outputs:	9 Digital and 2 PWM
Communication:	RS-485 and CANBus (J1939)

HVAC UNITS

HVAC UNITS

HVAC UNITS

P/N: 35-0915

ECC/MVC Display

ECC Diagnostic Mode

Evap Time
    12.5 Hrs. Rst->

Component running hours

Low Press.   Sw.
    0 Times   Rst->

Pressure Switch Trips

Voltage
    13.8V

Supply Voltage

Return Temp.   75°F
Open: 0Short: 0 Rst->

Temperature Sensor
Reading and errors

MVC Diagnostic Mode

==== VIEW ====
AC: On
Heater: Off
Blower: 25%
DHeat Fan: 0%
Valve: 0%

Output Parameter Status

==== Error List ====
Valve
    Short: 0
    Open: 0
    Stuck: 0
Compressor
Fail Reset: 0

Component Error List

Defroster Controller

P/N: 35-0828

Data Logger

- Cabin set-point temperature
- Air sensor temperature readings and errors
- A/C compressor clutch cycle
- Battery supply voltage
- Refrigerant pressure
- Errors
- System current draw
- Differential air pressure
- Component total running hours
- Value of all input and outputs
- Evaporator blower speed
- Condenser fan speed
- Actuator position

On-board Memory

Micro processor

Connection to controller
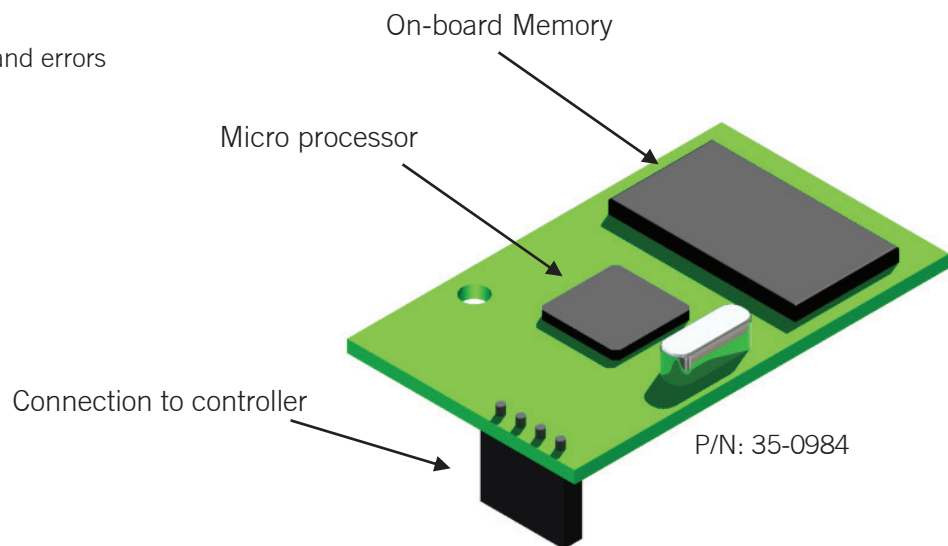
P/N: 35-0984

Control Panel with Automatic Temperature Control

The Automatic Thermostat Module (ATM) uses a temperature set-point potentiometer, motorized heater valve and temperature sensor to maintain driver cab temperature.

The operator will choose a temperature setting which will be maintained by automatically adjusting the heater valve with the Automatic Thermostat Module.

The ATM will improve cab temperature stability and provide a more comfortable operating environment.

The blower speed and evaporator coil temperature are controlled by the production proven blower switch and Deicing Module.

A/C-Defrost Switch

Blower Speed Control

Temperature Control
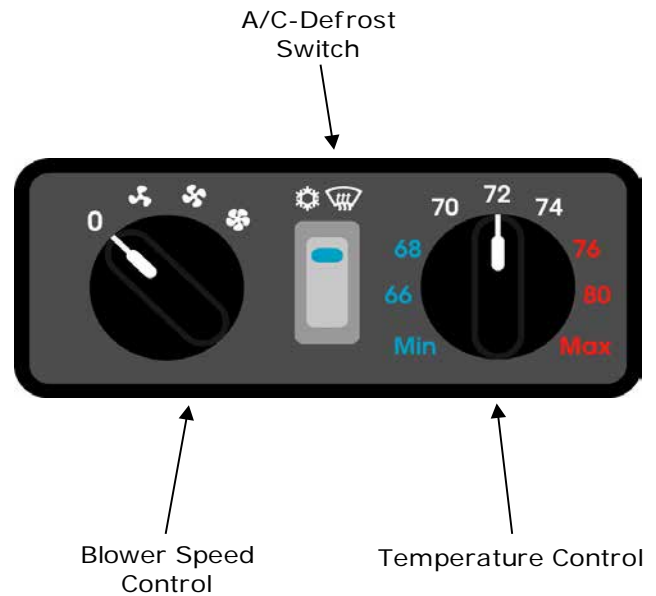
Automatic Thermostat Module

P/N: 35-0581

Specifications:

Operating Voltage: 16VDC to 32VDC
Storage Temperature: -40°C to +105°C (-40°F to 220°F)
Operating Temperature: -40°C to +85°C (-40°F to 185°F)
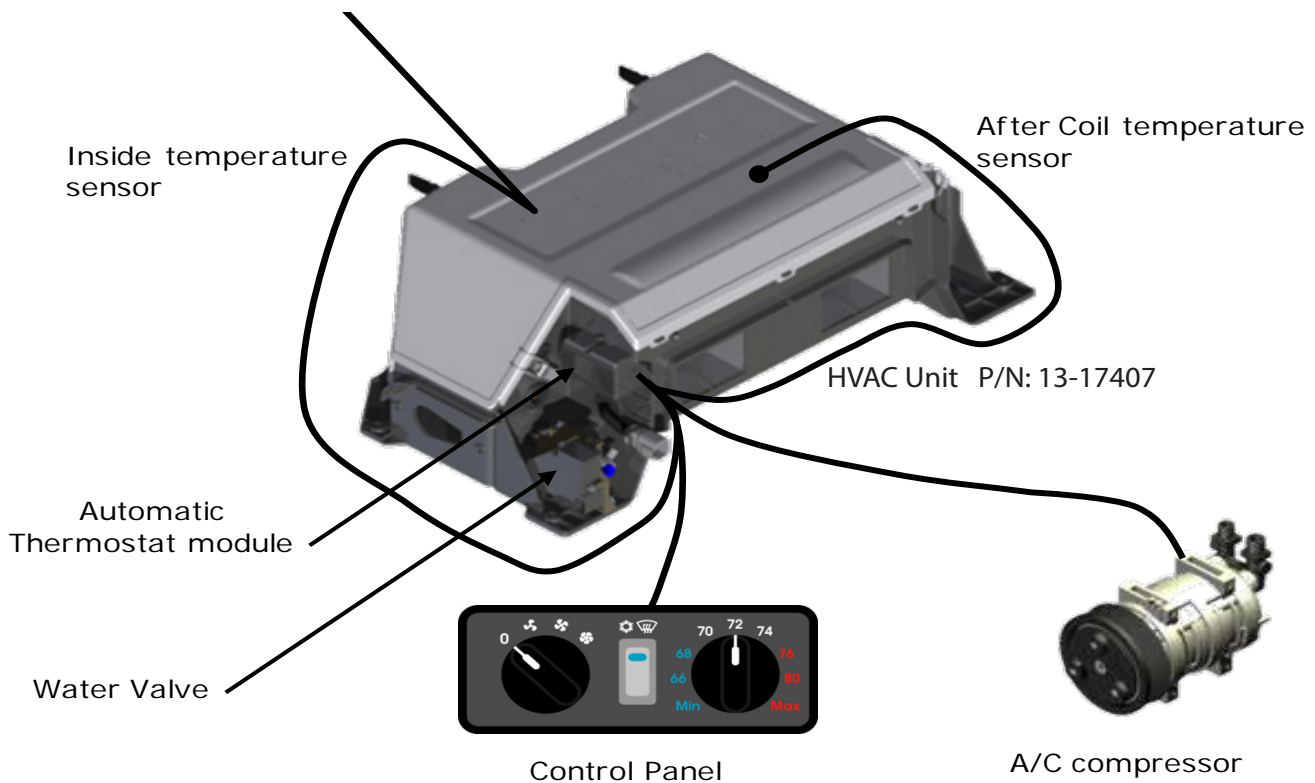Controls Cabin temperature from 16° C (60.8°F) to 28° C (82.4°F)

Automatic Thermostat System

The Automatic Thermostat Module uses a microprocessor to calculate an appropriate position of the water valve to maintain cab temperature set-point.

There are two temperature sensors installed in this unit. The inside temperature sensor measures temperature of the air going to the unit. The after coil sensor measures the temperature of the air that is passing the heater coil. By measuring the after coil temperature the ATM can calculate the rate of temperature change of the discharge air of the HVAC unit.

With the measurement form the sensors, The module calculates the difference between inside and set-point temperature. From this difference, the thermostat module opens or closes the water valve accordingly.

When the temperature set-point potentiometer is turned to minimum temperature position, the water valve closes completely regardless of the inside temperature. This is the coldest setting. When the temperature set-point potentiometer is turned to the maximum temperature position, the water valve will open completely regardless of inside temperature. This is the hottest setting.

Inside temperature sensor

After Coil temperature sensor

Automatic Thermostat module

Water Valve

HVAC Unit P/N: 13-17407

Control Panel

A/C compressor

The Automatic Thermostat Module is protected against vibration & contaminants by polyurethanepotting compound.

Multiplex Nodes

P/N: 35-0573

Specifications

Operating Voltage:	+9VDC to 32V DC
Operating Temperature:	-40ºC to 85 ºC (-40ºF to 185ºF)
Inputs:	6 Digital and 10 Analog
Outputs:	14 Digital and 2 PWM
Communication:	RS-485 and CANBus (J1939)

P/N: 35-0504

Specifications

Operating Voltage:	+9VDC to 32V DC
Operating Temperature:	-40ºC to 85 ºC (-40ºF to 185ºF)
Inputs:	6 Digital and 10 Analog
Outputs:	14 Digital and 2 PWM
Communication:	RS-485 and CANBus (1939)
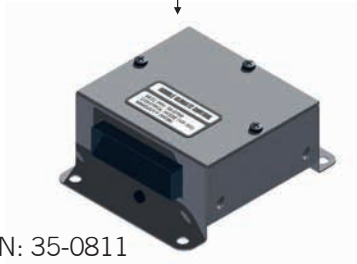
P/N: 35-0811

Specifications

Operating Voltage:	+9VDC to 32V DC
Operating Temperature:	-40ºC to 85 ºC (-40ºF to 185ºF)
Inputs:	5 Digital and 9 Analog
Outputs:	6 High side, 2 Bidirectional, 1 Analog and 2 PWM
Communication:	RS-485 and CANBus (1939)

Basic ECC

P/N: 35-0070

P/N: 35-0239

Specifications

Operating Voltage:	+9VDC to 32V DC
Operating Temperature:	-40°C to 85 °C (-40°F to 185°F)
Inputs:	3 Digital and 4 Analog
Outputs:	1 PWM and 3 Digital

Specifications

Operating Voltage:	+9VDC to 32V DC
Operating Temperature:	-40°C to 85 °C (-40°F to 185°F)
Inputs:	7 Digital and 4 Analog
Outputs:	10 Digital and 1 PWM
Communication:	RS-485

CANBus Controllers

P/N: 35-0549

P/N: 35-0557

Specifications:

Operating Voltage:	9VDC to 32VDC
Storage Temperature:	-40°C to +105°C
Operating Temperature:	-40°C to +85°C (-40°F to 185°F)
Communication:	CANBus, RS-485 (-40°F to 220°F)
Microprocessor:	10MHz 64k Flash Processor 1k EEPROM

EcoTemp NG Display

The EcoTemp NG Display is developed to meet the demanding requirements of the motor coach and transit bus HVAC systems. The EcoTemp NG Driver Display was designed as a programmable platform that can be easily customised to suit customer requirements.

The large 2.5" x 1.5" OLED display offers wide viewing angle and is able to show text, graphics and full system messages for easy diagnostics. It has six configurable "soft keys" can be customized for basic or advance functions as per customer requirements.

During vehicle maintenance, service personnel can enter diagnostic mode by pressing preset sequence of buttons or using optional MCC Coolview via CAN Bus (J1939) connection. In this mode, errors stored in memory and real-time data of inputs and outputs are displayed for easy trouble shooting.

The industry leading OLED display with wide viewing angle supports unlimited graphics and text.
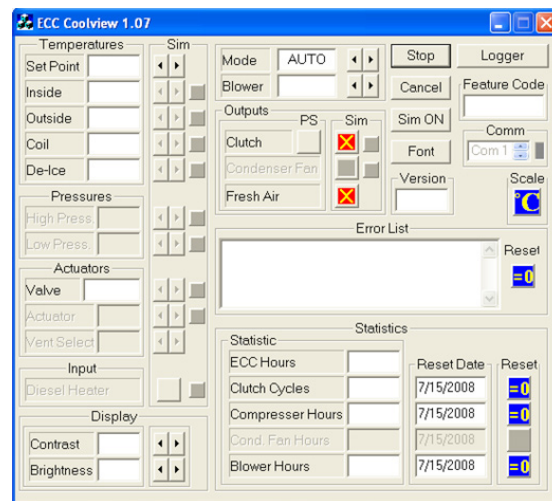
1-   Temperature Set-Point

      Adjust temperature for passenger compartment.

2-   On/Off Button

      Turns HVAC system On or Off

3-   Cursor

      Cursor and mode selection

4-   Information

      Displays system information
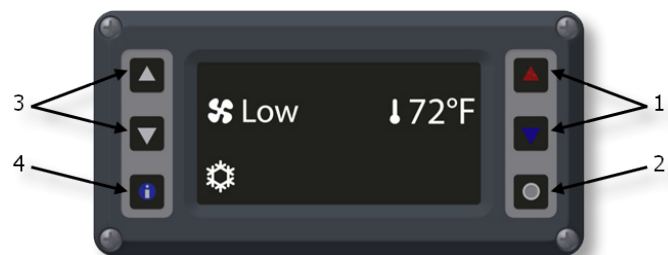
EcoTemp NG Display

The EcoTemp NG controller is developed to meet the demanding requirements of the motor coach and transit bus HVAC systems. The Bus HVAC Controller was designed as a programmable platform that can be easily customised to suit customer requirements.

FET". These MOS-FET have over current and temperature protection and have no moving parts. With built-in over current and temperature protection, it means less downtime due to controller failure.

During vehicle maintenance, service personnel can enter diagnostic mode by pressing preset sequence of buttons or using optional MCC Coolview via CAN Bus (J1939) connection. In this mode, errors stored in memory and real-time data of inputs and outputs are displayed for easy trouble shooting.

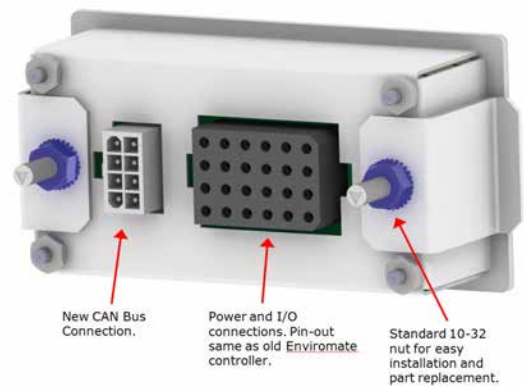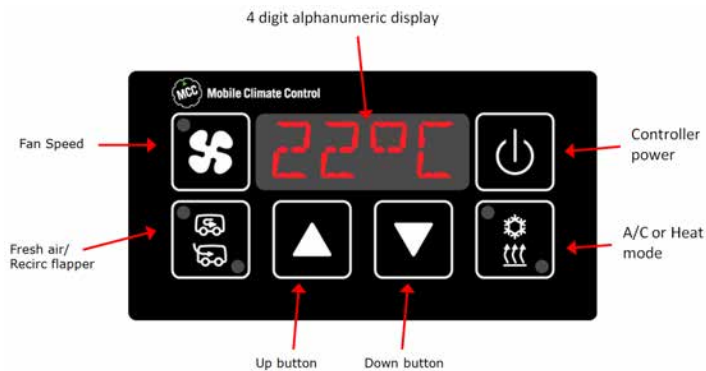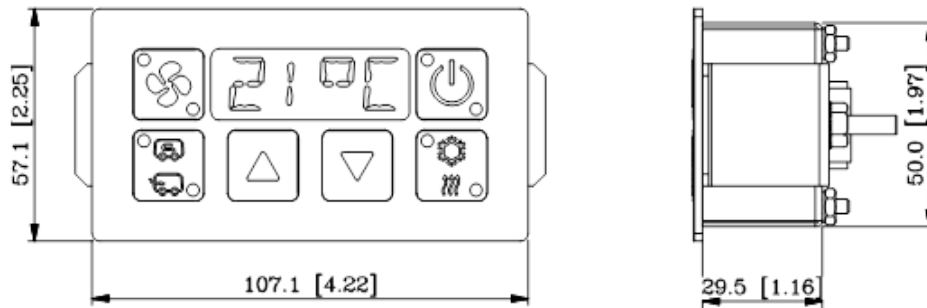| EcoTemp NG Controller			
Operating Voltage		+9V to 32V DC	
Operating Temperature		-40°C TO 85°C	
Inputs	23 Digital	12V or 24V DC	Cool, Heat, Defrost Vent, Auto and Off
		12V or 24V DC	Condensor fan high/low
		12V or 24V DC	Test Mode
	11 Analog	10kΩ @25°C	3 Temperature Sensors
		0 to 4.5V DC	High Pressure Sensor
		0 to 4.5V DC	Low Pressure Sensor
		0 to 10kΩ	Valve 1 Position Sensor
		0 to 10kΩ	Valve 2 Position Sensor
	5 Digital or Analog	0V to Supply Voltage	
Outputs	14 Digital	12V or 24V DC	
	4 H Bridge	12V or 24V DC	
	4 PWM	12V or 24V DC	25kHz
Communication	RS 485		
	2 CanBus	J1939	
Micro Processor	Clock Speed	10MHz	64k Flash Processor 1k EEPROM

EcoTemp Lite

The EcoTemp Lite is a HVAC control unit designed for on-road use. It has a simple and easy to use layout, it is ideal for motor coaches and transit buses. The easy to ready read LED display shows temperature settings, blower speed or error display. The bus controller was designed as a programmable platform that could easily be expanded and customized. Several methods of compressor protection are available.

Features	Benefits
• Simple layout	• Large display and buttons. Less driver distraction Keep drive's eyes on the road
• Small foot print	• Takes up little space in dash board. Perfect for smaller size buses
• RS 485 and CAN BUS communication	• New feature! Allows easy and fast dignostics. Able to upgrade HVAC system software while vehicle is running Less vehicle downtime
• Built-in diagnostics • Easy software upgrade • Optional coolview system monitoring software • Easy to use and install	• Reduces maintenance, troubleshooting and minimise downtime

EcoTemp Lite

4 digit alphanumeric display

Fan Speed

Fresh air/
Recirc flapper

Up button   Down button

Controller power

A/C or Heat mode

New CAN Bus Connection.

Power and I/O connections. Pin-out same as old Enviromate controller.

Standard 10-32 nut for easy installation and part replacement.

Technical Data

Operating Voltage	+9VDC to 32V DC
Operating Temperature	-40°C to 85 °C (-40°F to 185°F)
Inputs	5 Digital and 9 Analog
Outputs	10 High side, 1 Analog / PWM
Communication	RS-485 and CANBus (J1939)

Viper 2000 Multi - Zone Control

Zone 1 HVAC Unit

12V 15001
24V 15120

24V 15230

24V 14040

Viper 2000 Control Unit

EASY 2000

Viper 2000 Node 1

Viper 2000 Node 2

Zone 2 HVAC Unit

Zone 3 HVAC Unit
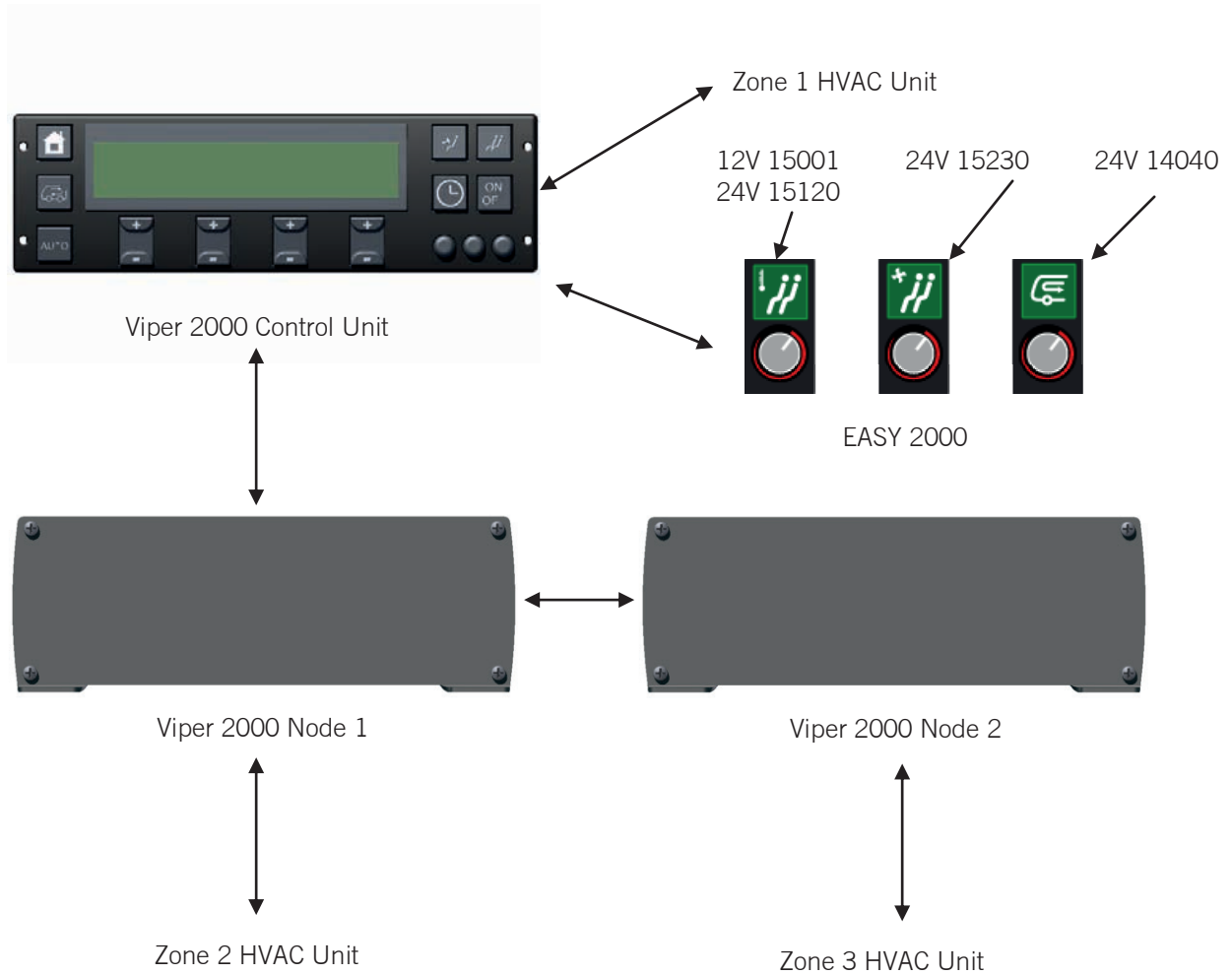
Viper 2000 System

Viper 2000 Display

Viper 2000 Node

P/N: 16649

P/N: 14389

EasyTerm Quattro System

P/N: 17463

Zone 2 HVAC Unit

Viper 2000 Node

Zone 2 HVAC Unit

MCC's EasyTerm Quattro is an economically priced automatic climate controller for large vehicles such as buses and motor coaches in an easy to use design.

Viper Mark 1

The Viper Mark 1 is a complete HVAC control system that has the ability to control two separate HVAC systems simultaneously. Designed for mass transit and motor coach applications. With dual heating system control, passenger and driver temperatures can be controlled separately.

P/N: 11459

Viper Mark 1
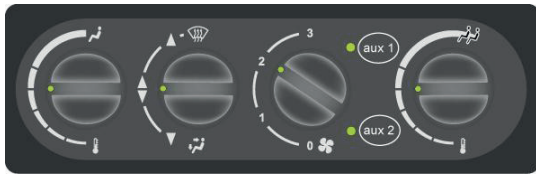
Convector Unit   HVAC Unit

Heater Unit

Control Panels

26-0413 Control Panel 12V
26-0342 Control Panel 24V

No.	Part No.	Description
1	24-2213	Control Plate
2	28-0200	Overlay
3	25-0044	Blower Switch
4	26-0350	Rotary Control
5	25-0581	Knob
6	25-1105	Rocker Switch (G) 12V
	25-1106	Rocker Switch (G) 24V
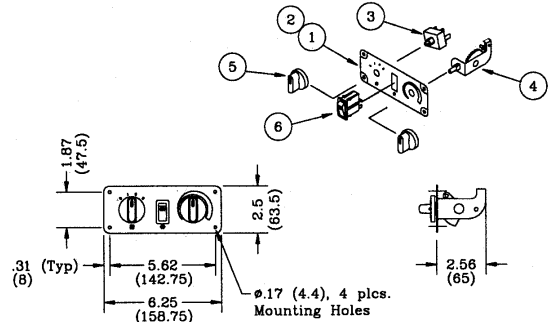
26-0445 Control Panel 12V
26-0446 Control Panel 24V

No.	Part No.	Description
1	24-2508	Control Plate
2	28-0245	Overlay
3	35-0036	Potentiometer Assy.
4	25-0581	Knob
5	25-1105	Rocker Switch (G) 12V
	25-1106	Rocker Switch (G) 24V
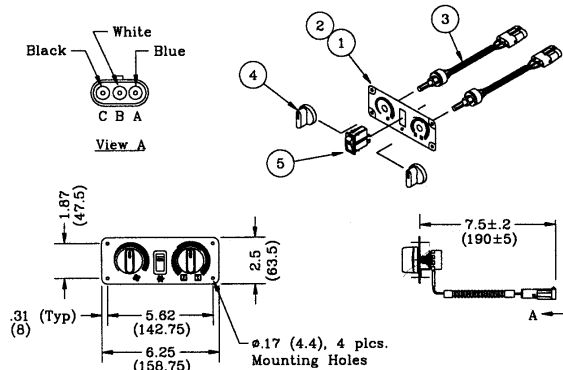
Connector Info: Connector 3-way Male Packard #12010717 with Male Terminal #12124582-L (3x) and Seal #12015323 (3x)

26-0415 Control Panel 12V
26-0416 Control Panel 24V

No.	Part No.	Description
1	24-2401	Control Plate
2	28-0224	Overlay
3	25-0044	Blower Switch
4	35-0036	Potentiometer Assy.
5	25-0581	Knob
6	25-1105	Rocker Switch (G) 12V
	25-1106	Rocker Switch (G) 24V
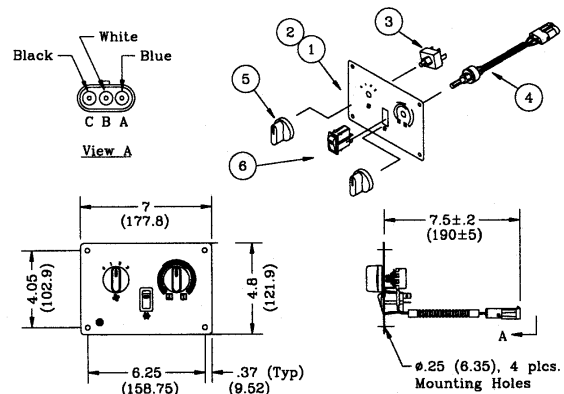
Connector Info: Connector 3-way Male Packard #12010717 with Male Terminal #12124582-L (3x) and Seal #12015323 (3x)

Control Panels

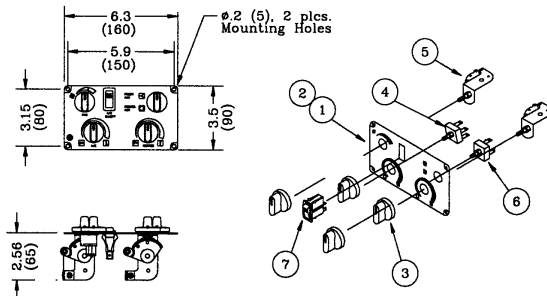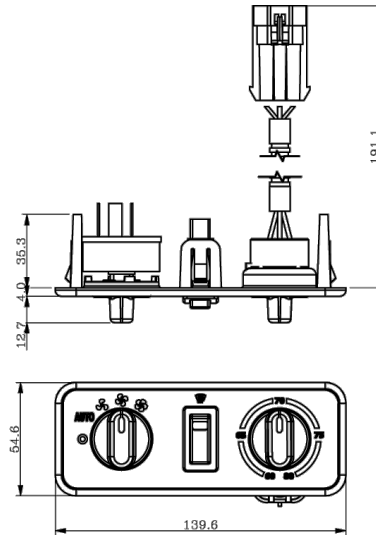## 26-0387 Control Panel 12V
26-0386 Control Panel 24V
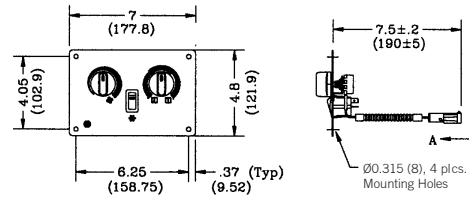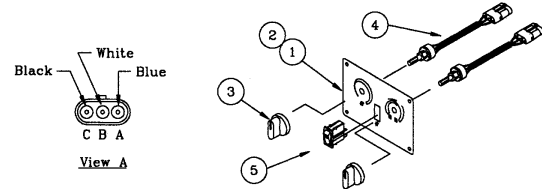
No.	Part No.	Description
1	24-3248	Control Plate
2	28-0223	Overlay
3	25-0581	Knob
4	35-0036	Potentiometer Assy.
5	25-1105	Rocker Switch (G) 12V
	25-1106	Rocker Switch (G) 24V

Connector Info: Connector 3-way Male Packard #12010717 with Male Terminal #12124582-L (3x) and Seal #12015323 (3x)

## 26-0398 Control Panel 12V
## 26-0444 Control Panel 24V
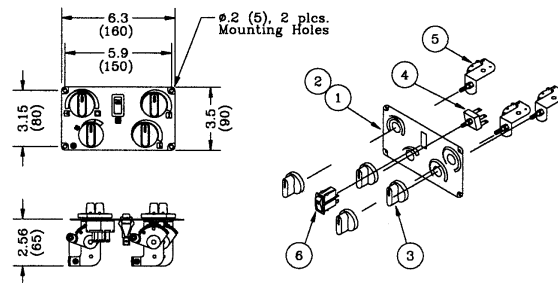
No.	Part No.	Description
1	24-2355	Control Plate
2	28-0215	Overlay
3	25-0581	Knob
4	25-0044	Blower Switch
5	26-0350	Rotary Control
6	25-1105	Rocker Switch (G) 12V
	25-1106	Rocker Switch (G) 24V

No.	Part No.	Description
1	24-2355	Control Plate
2	28-0163	Overlay
3	25-0581	Knob
4	25-0044	Blower Switch
5	26-0350	Rotary Control
6	25-0307	Switch On-Off
7	25-1105	Rocker Switch (G) 12V
	25-1106	Rocker Switch (G) 24V

Control Panels

26-0361 Control Panel 12V
26-0362 Control Panel 24V

No.	Part No.	Description
1	24-2248	Control Plate
2	28-0214	Overlay
3	25-0044	Blower Switch
4	35-0036	Potentiometer Assy.
5	25-0435	Knob
6	25-1105	Rocker Switch (G) 12V
	25-1106	Rocker Switch (G) 24V
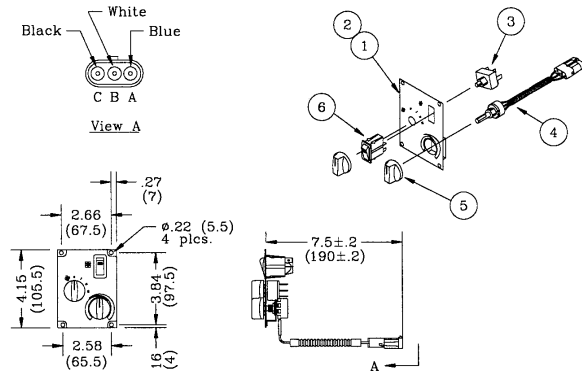
Connector Info: Connector 3-way Male Packard #12010717with Male Terminal #12124582-L (3x) and Seal #12015323 (3x)

Control Panels

56-0093 Control panel 12V
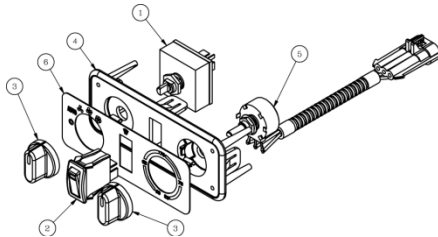
No.	Part No.	Description
1	25-0857	Switch W/Nut
2	25-1105	Rocker Switch (G) 12V
3	25-2884	Knob Assembly
4	28-2005	Control Plate
5	35-1016	Potententiometar ASSY.
6	56-0095	Overlay

56-0079 Control panel 12V
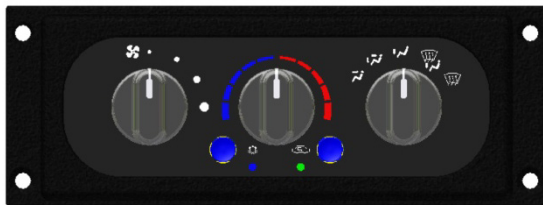
No.	Part No.	Description
1	25-0857	Switch W/Nut
2	25-2884	Knob Assembly
3	26-2018	Overlay
4	28-1988	Switch Holder
5	28-1989	Front Cover
6	28-1990	Rear Cover
7	31-1444	Connector
8	35-0989	Board Assembly
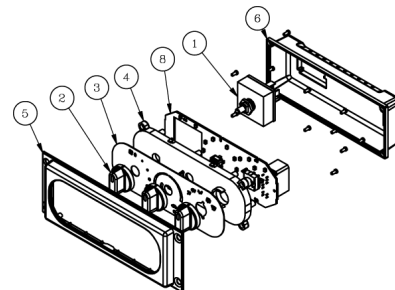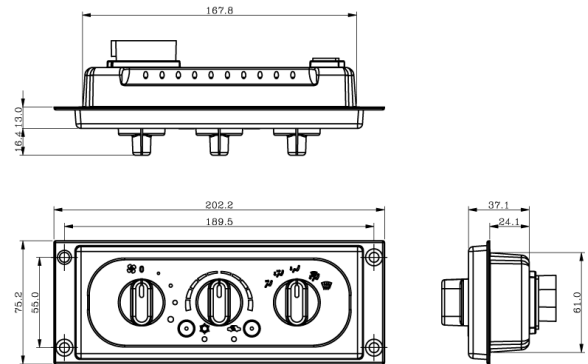
Temperature Sensors

Temperature sensors are an essential part of a automatic climate control system. These sensors send temperature information to the climate controller so set-point temperature can be maintained.

There are four types of sensors used in MCC HVAC systems.

• Device sensor is located near the evaporator coil to prevent the coil from freezing.

• Outside sensor is used to measure air temperature that is coming in to the HVAC unit's air inlet.

• Return air sensor is used to measure re-circulated air temperature.

• Inside sensor is used to measure cabin air temperature.

P/N: 35-0008

Deice Sensor

P/N: 35-0176

Inside Air Sensor

P/N: 35-0011

Outside Air Sensor

P/N: 35-0584

P/N: 35-0012

Return Air Sensor
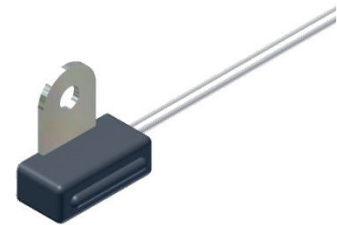
PWM Stepless Motor Drive

A Stepless Motor Drive Module controls motor speed by interrupting the current flow. The motor's speed is controlled by the duty cycle of output signal. At top speed (100% duty cycle) , there is no current interruption. Without any moving parts, the power is delivered to the motor in "infinite" steps. A Stepless motor Drive allows more precise control, requires no maintenance and operates efficiently.
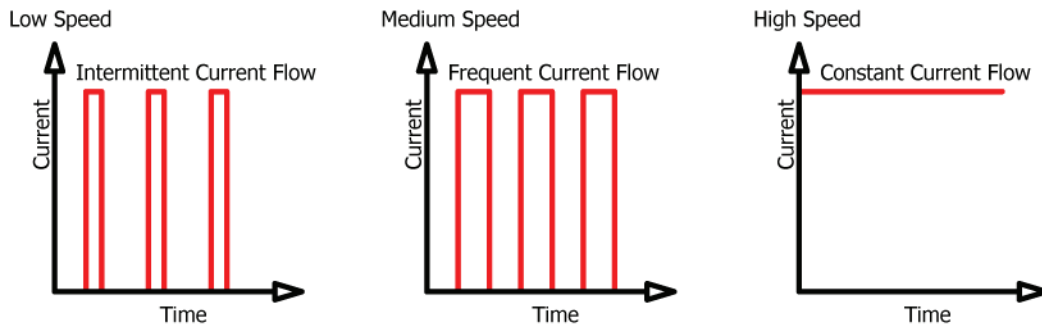
At low speed, current flow is switched on for a short time.

At high speed, current flow is not interrupted.

Standard Stepless Motor Drive
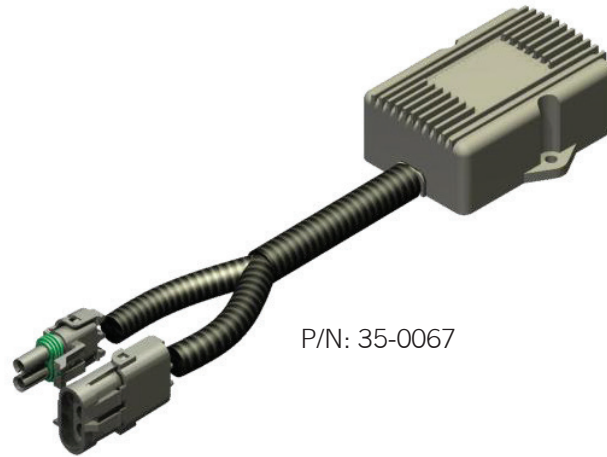
P/N: 35-0067

Specifications

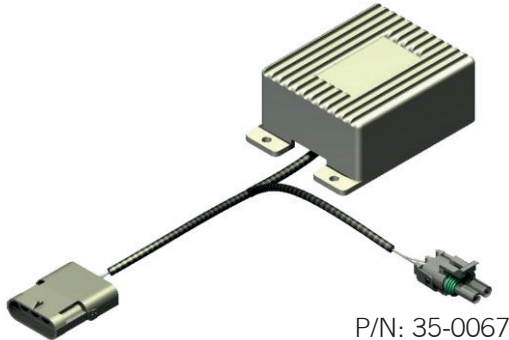|	
Operating Voltage	: 9VDC to 32VDC
Storage Temperature:	-40°C to +105°C
	(-40°F to 220°F)
Operating Temperature:	-40°C to +85°C
	(-40°F to 185°F)
PWM Signal Input:	9V to 32V
Output:	300W

The Stepless Motor Drive Module is stand alone motor drive that uses an external PWM source to control blower's speed.
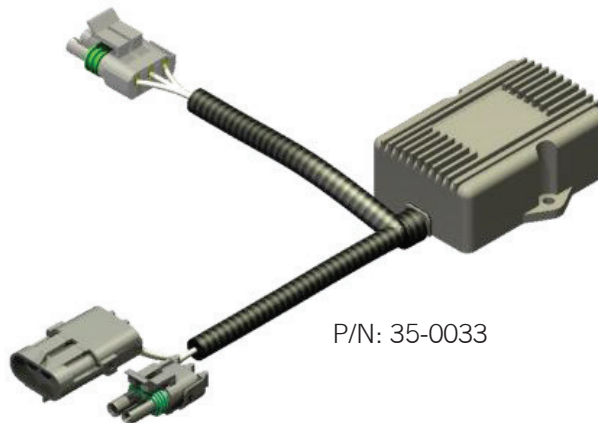
P/N: 35-0033

The Stepless Motor Drive Module uses a 10kΩ potentiometer to control the blower's speed.

Standard Stepless Motor Drive
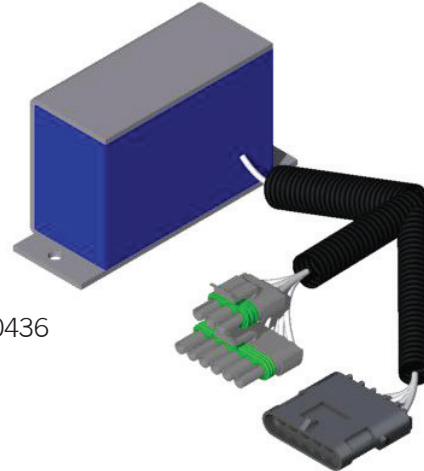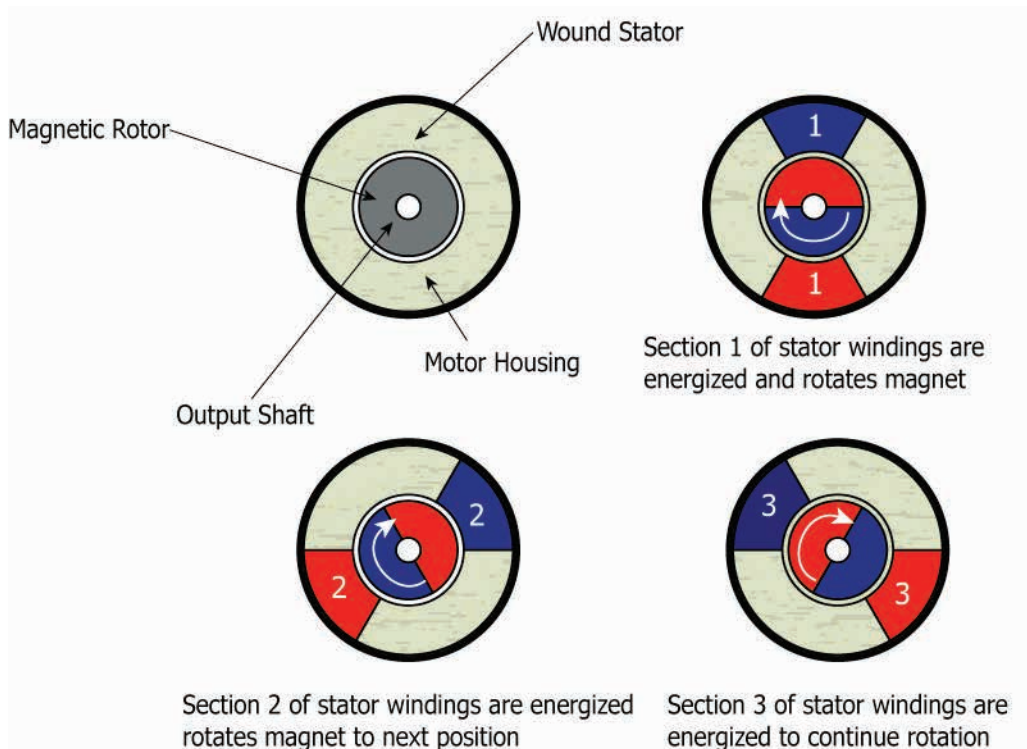
Specifications

Operating Voltage:	9VDC to 32VDC Storage
Temperature:	-40°C to +105°C (-40°F to 220°F)
Operating Temperature:	-40°C to +85°C (-40°F to 185°F)
PWM Signal Input:	9V to 32V
Output:	2700W

P/N: 35-0067

PWM Module with 400Hz input
Converts 400Hz PWM input signal to 25kHz output.
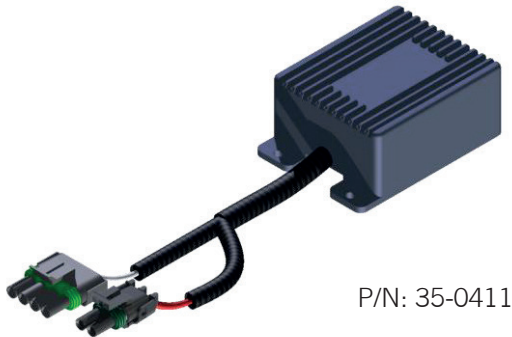
Specifications

Operating Voltage:	9VDC to 32VDC
Storage Temperature:	-40°C to +105°C (-40°F to 220°F)
Operating Temperature:	-40°C to +85°C (-40°F to 185°F)
PWM Signal Input:	9V to 32V (400Hz)
Output:	2700W

P/N: 35-0411

Brushless Motor Drives

Specifications

Operating Voltage:	16VDC to 27VDC
Storage Temperature:	-40°C to +105°C (-40°F to 220°F)
Operating Temperature:	-40°C to +85°C (-40°F to 185°F)
Signal Input:	0V DC to 5V DC
Output:	800W

P/N: 35-0436

Brushless Motor Drive

Wound Stator

Magnetic Rotor

Motor Housing

Output Shaft

Section 1 of stator windings are energized and rotates magnet

Section 2 of stator windings are energized rotates magnet to next position

Section 3 of stator windings are energized to continue rotation

PWM Interface Module

P/N: 35-0569

P/N: 35-0425

Specifications:
Supply Voltage: 9V DC to 32V DC
Input Signal: PWM
Output Voltage: 0V DC to 10V DC

Specifications:
Supply Voltage: 9V DC to 32V DC
Input Signal: PWM
Output Voltage: 0V DC to 5V DC

Relays

P/N: 35-0625

Relay:	12V 30A (Fuse protected)
Inputs:	10 Channel 500mA
Outputs:	10 Channel Supply Switching 10A
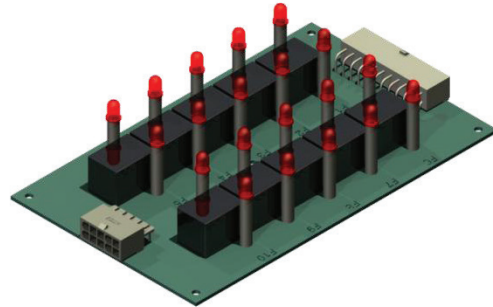
P/N: 35-0660

| Relay:	24V 30A (Fused protected)
Inputs:	8 Channel 24V 5A
Outputs:	3 Channel 24V 20A
	2 Channel 12V 1A
	5 Channel Ground Switching 10A
	1 Channel Supply Switching 10A
	4 Channel for Actuator Flapper Door Control
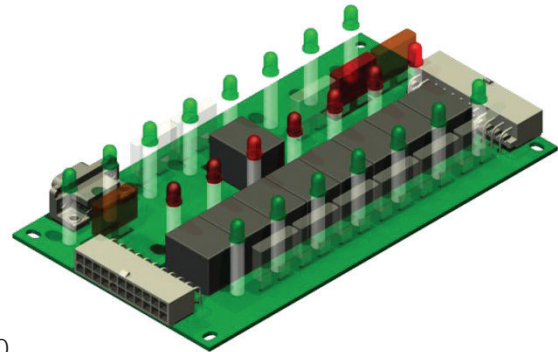
Relays

Relay:	12V/24V DC Fuse protected
Inputs	16 Channels Supply Switching 500mA
Output:	10 Channel single output 20A
	2 Bus outputs 20A
	12V Output for Actuator

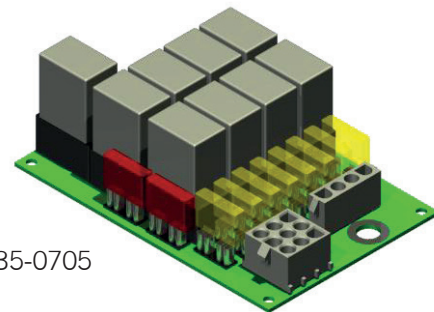Flapper door angle can be adjusted by resistor network.
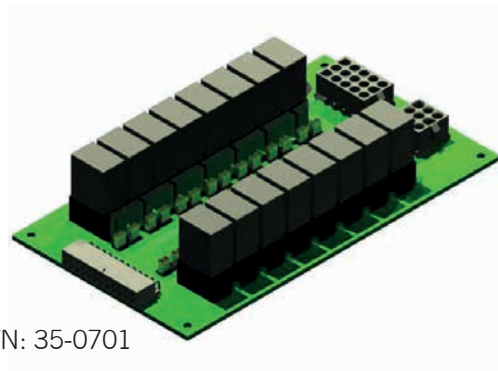
P/N: 35-0701

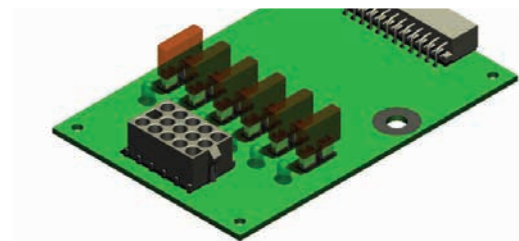|	
Relay:	12V DC/24V DC Fuse protected
Inputs:	10 Channel Supply Switching 500mA
Outputs	6 Chanel Supply Switching 20A
	1 Ground Switching 20A
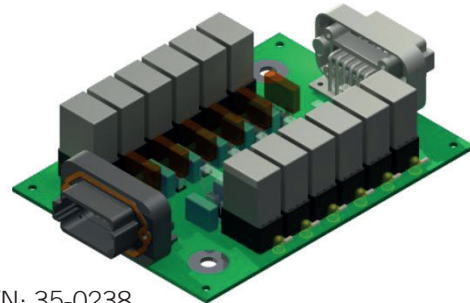
P/N: 35-0238

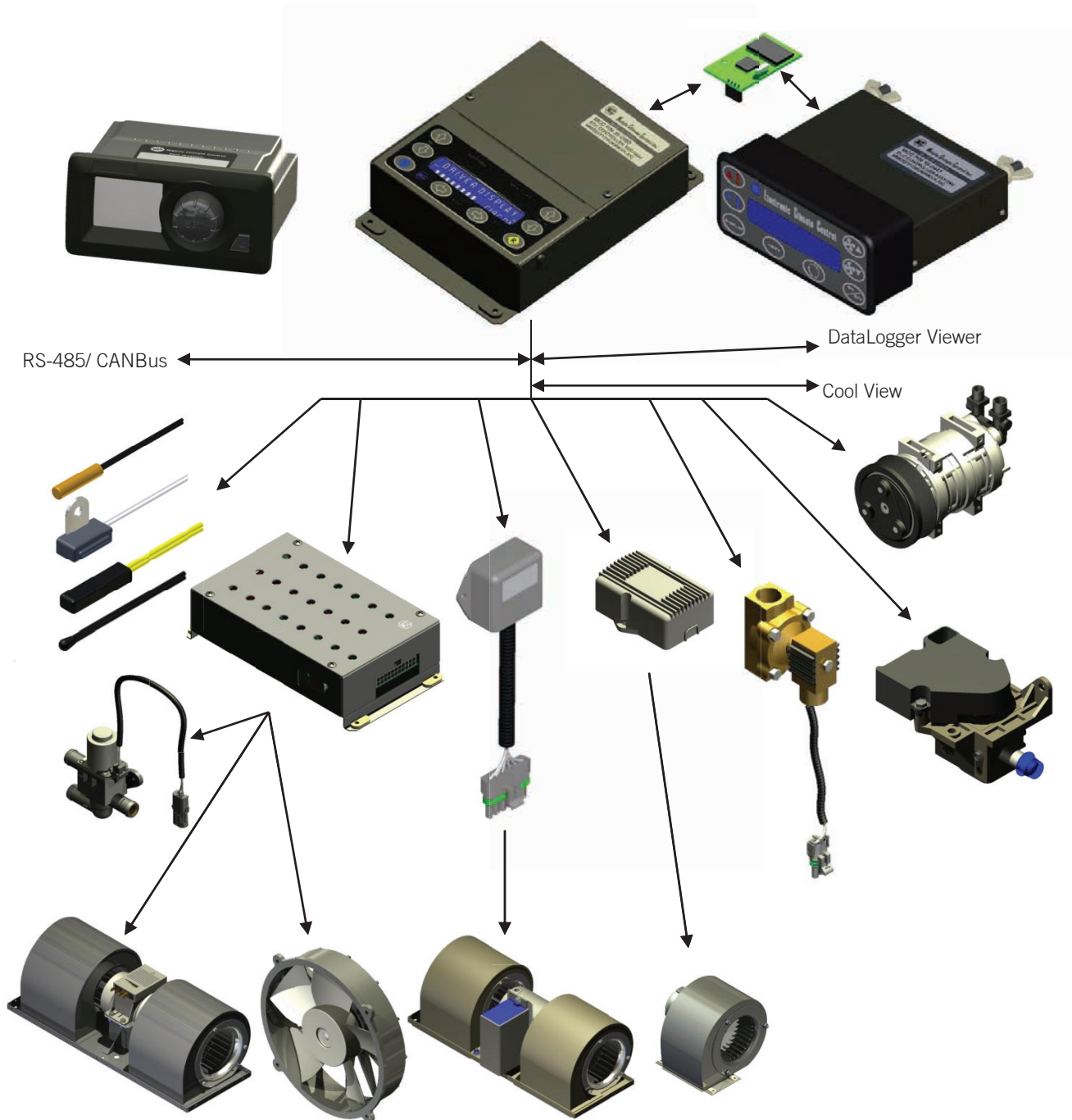|	
Relay:	12V DC/24V DC
Inputs:	5 Channels 500mA
Outputs:	3 Channel dual outputs 20A each
	1 Actuator output
	2 Channel bus

P/N: 35-0705

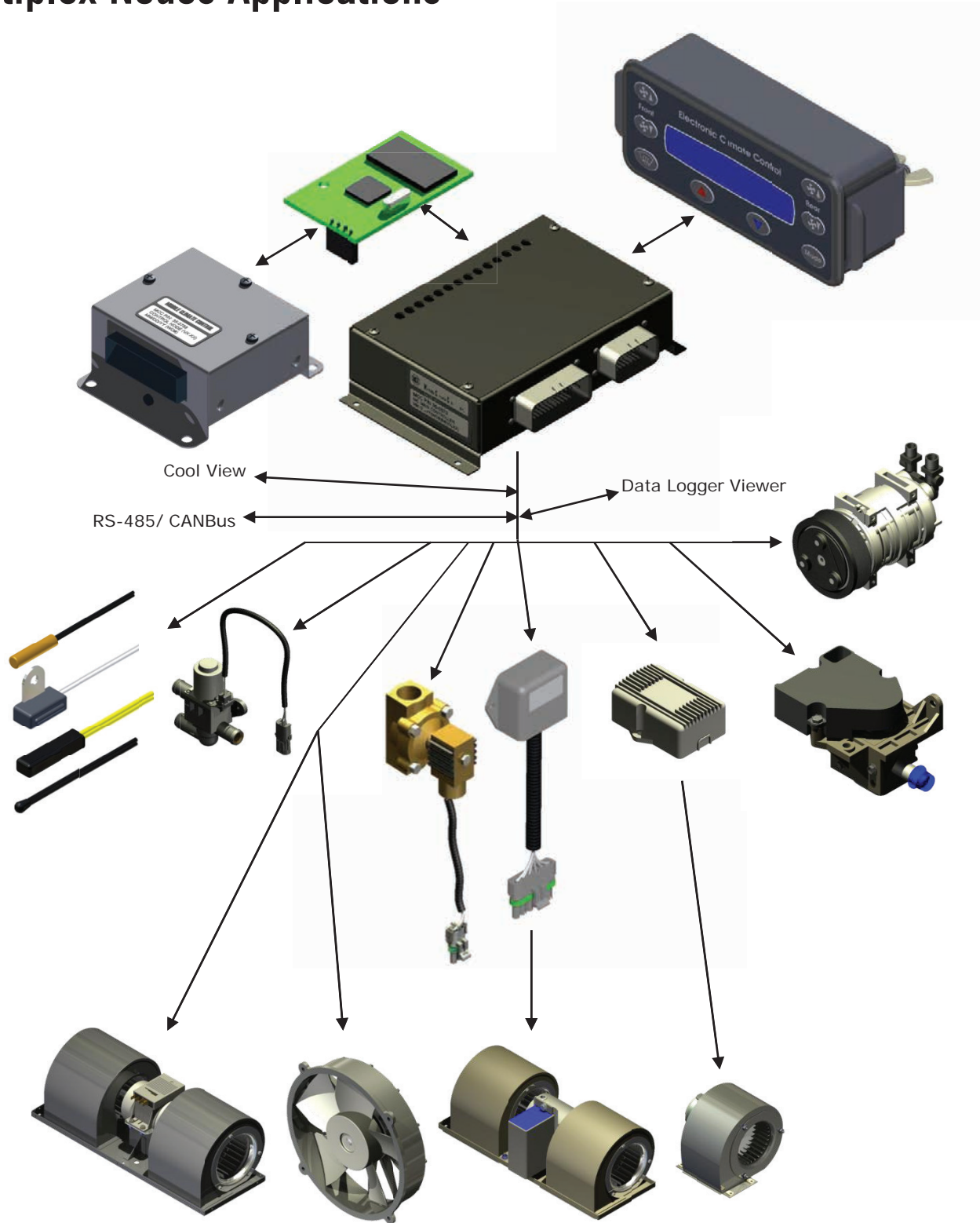|	
Relay:	Solid state 12V/24V DC
Inputs:	5 Ground Switching high impedance inputs 500mA
	2 PWM input
Outputs:	6 Supply Switching Output (Fuse protected) 20A
	5 Low side output 20A
	Bused 10V PWM for 3 Blowers 20A
	Bused 5V PWM for 3 Condenser Fans 20A

P/N: 35-0765

ECC Applications

DataLogger Viewer

RS-485/ CANBus

Cool View

Multiplex Nodes Applications

Cool View

Data Logger Viewer

RS-485/ CANBus

EasyTurn Family

P/N:35-0816	P/N: 35-0818	P/N: 35-0817	P/N 35-0815
EasyTurn Defroster	**EasyTurn Convector**	**EasyTurn Compartment**	**EasyTurn ATM**
The EasyTurn Defroster module is design to control driver defroster temperature from mini buses to highway coaches.	This module is design to control floor temperature in a passenger compartment in transit bus and highway coaches.	The EasyTurn Compartment module is design to control temperature in passenger compartment in transit bus and highway coaches.	The EasyTurn Automatic Temperature Module (ATM) ideal for controlling cabin temperature in mini-buses and off-road equipments.

P/N: 35-0821

EasyTurn Fan control

P/N: 35-0822   P/N: 35-0825

EasyTurn A/C

The EasyTurn A/C Module controls A/C compressor and fan speed for fresh and recycled air. It is ideal for off-road and high-way applications.
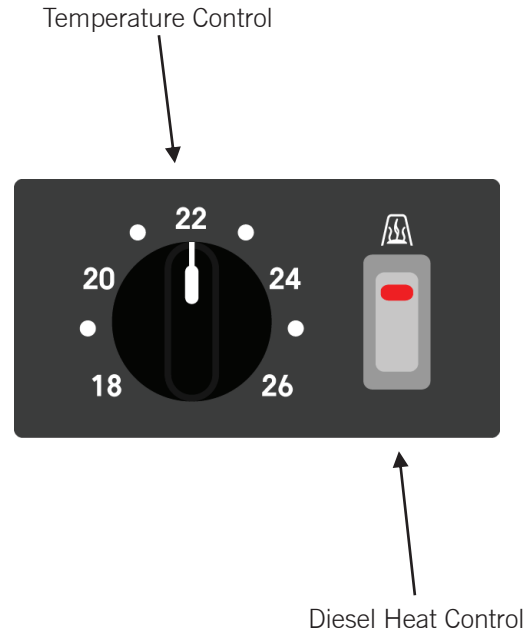
Features:

- CANBus ready
- Flash memory – easily reprogrammable
- Designed to control interior climate in mini bus to full size bus
- Integrated backlighting
- Easy to install

Automatic Thermostat Module

P/N: 35-0591

Temperature Control

Diesel Heat Control

Specifications:

Operating Voltage: 16VDC to 32VDC
Storage Temperature: -40°C to +105°C (-40°F to 220°F)
Operating Temperature: -40°C to +85°C (-40°F to 185°F)
Controls Cabin temperature from 16° C (60.8°F) to 28° C (82.4°F)

Electronic De-icing Thermostat

P/N: 35-0709

Specifications: 9VDC to 32VDC
Operating Voltage: Cut in: +2°C ±0.4°C
Cut in/Cut out Temperature: Cut out: -2°C ±0.4°C

Temperature
Storage Temperature: -40°C to +105°C (-40°F to 220°F)
Operating Temperature: -40°C to +85°C (-40°F to 185°F)
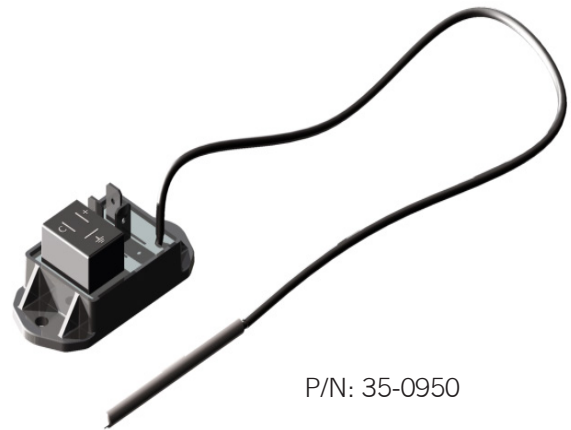Clutch: 7A

Electronic De-icing Thermostat (EDT)

1. Description

The MCC Electronic De-icing Thermostat (EDT) is a microcontroller based module that measures evaporator coil temperature and cycles the compressor clutch to maintain a constant evaporator coil temperature. Onboard temperature sensor diagnostics are also built into the module. The EDT is very compact and with the same foot print as the older mechanically operated thermostats.

2. Basic Operation

If the EDT does not detect any temperature sensor failure, it will turn the compressor clutch and status light on when the evaporator coil temperature is above +2°C. When the evaporator coil temperature is below -2°C, the EDT will turn off the compressor clutch output and status light.

The EDT has built-in algorithm to protect the A/C system in case of temperature sensor failure.

P/N: 35-0950

3. Application and Pin Out
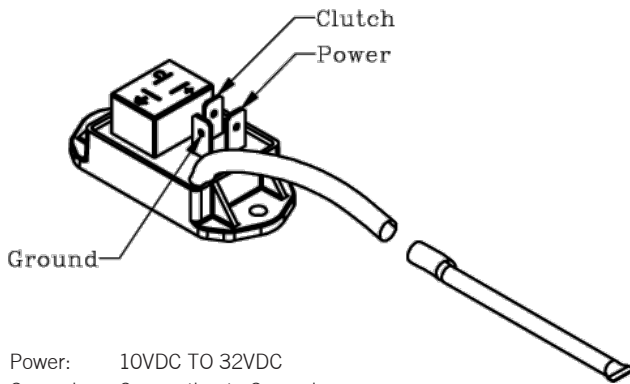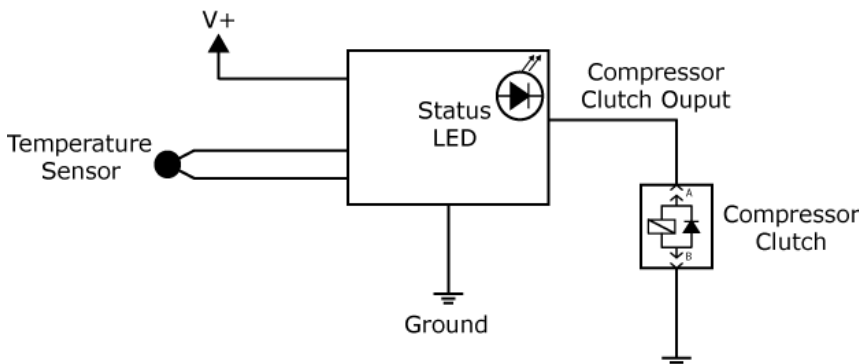
Power:	10VDC TO 32VDC
Ground:	Connection to Ground
Clutch:	Output connection Compressor Clutch (10 Amps Max)

Electronic De-icing Thermostat (EDT)

4. Diagnostics

In an event of temperature sensor error, the compressor clutch output is turned off and the status light will indicate the type of error detected.

Status LED	Sensor Status
Single blink	Open
Double blink	Short to ground

5. Specifications

Operating Voltage: 10VDC to 32VDC

Voltage Cut in/Cut out Temperature
Cut in: +2°C ±0.4°C
Cut out: -2°C ±0.4°C

Temperature
Storage Temperature: -40°C to +105°C
Operating Temperature: -40°C to +85°C
Clutch Output: 10A Maximum

Electrical Connections:

Connector
Delphi: 02984378 MCC: 31-1029

18GA
Delphi P/N: 02965510 MCC: 31-1369

14GA
Delphi: 02965867
MCC: 31-1018

10GA-12GA
TE: 4-520448-2MCC:31-1247

14GA-16GA
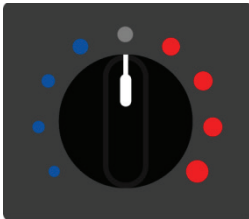TE: 3-350820-2/MCC: 31-1100

18GA
TE: 2-520184/MCC: 31-1106
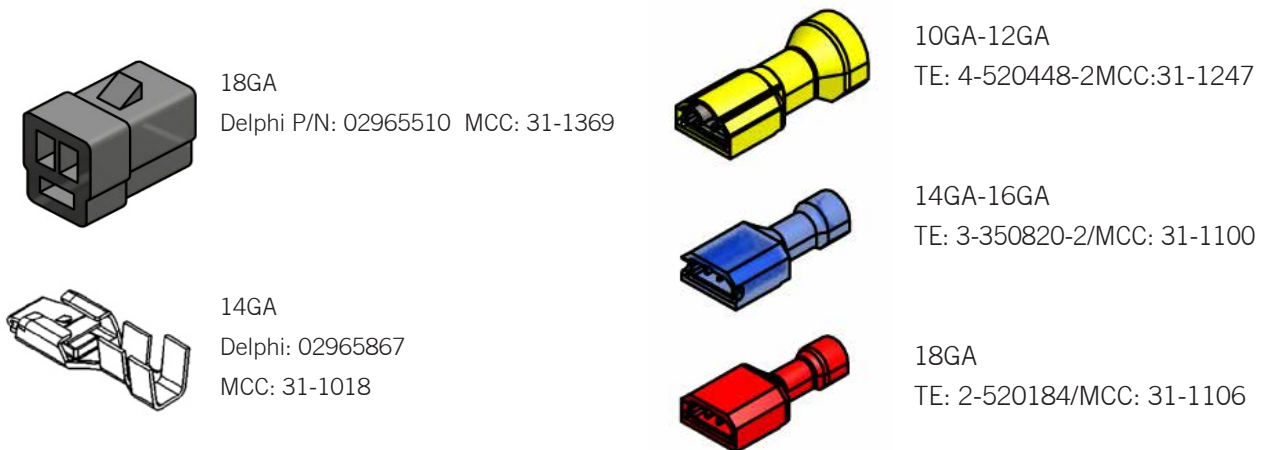
Electronic De-icing Thermostat (EDT)

6. Physical Characteristics and Dimensions

The EDT measures approximately 68 mm long, 32 mm wide and 23 mm high. The printed circuit board is mounted in a plastic case and is encased in a polyurethane potting compound.
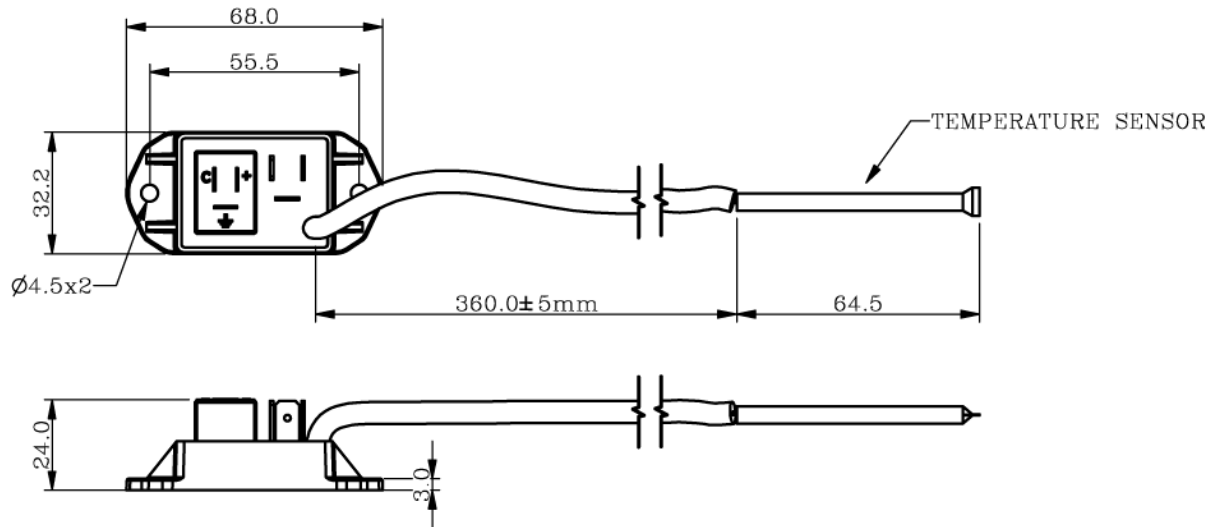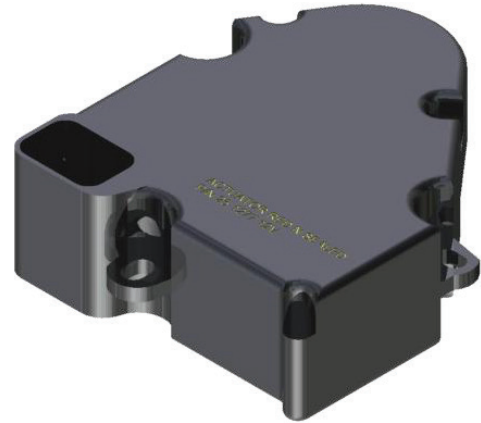
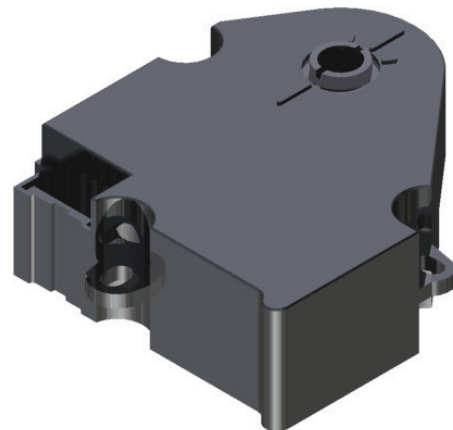# Electronic Actuators

Temperature Control

Flapper Door Control

Sealed Type 12V or 24V
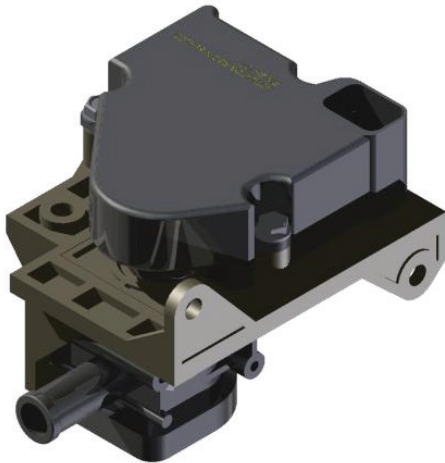P/N: 25-1277 12V
P/N: 25-2660 24V

P/N: 26-1021
Water Valve Assembly

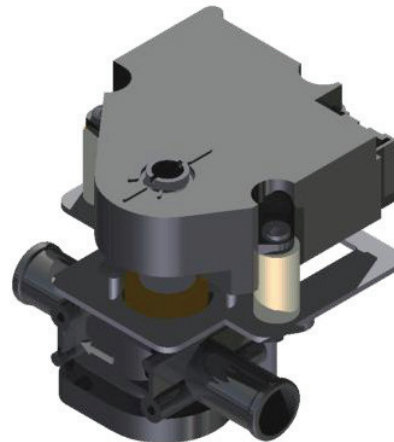Unsealed type 12V
P/N: 12-1128 12V
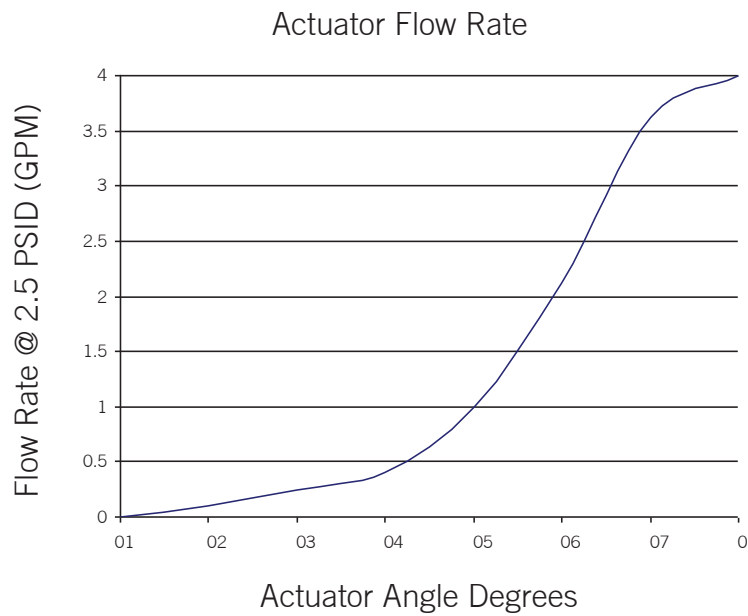
Electronic Power Supplies

P/N: 26-1429

P/N: 26-0652

Water valve with sealed actuator

Water valve with unsealed actuator

Actuator Flow Rate

Flow Rate @ 2.5 PSID (GPM)

Actuator Angle Degrees
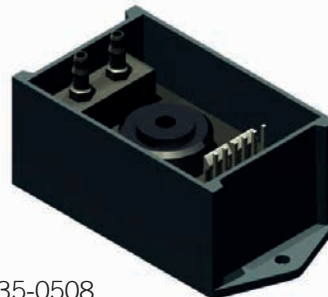
Status Module

P/N: 35-0536

Specifications:

Operating Voltage: 9V DC to 32V DC
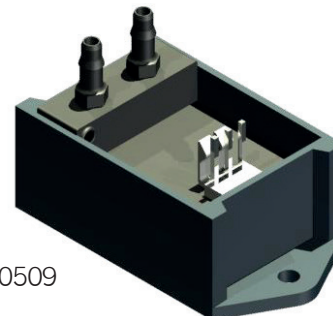Operating Temperature: -40°C to +85°C (-40ºF to 185ºF)

Differential Pressure Transducer
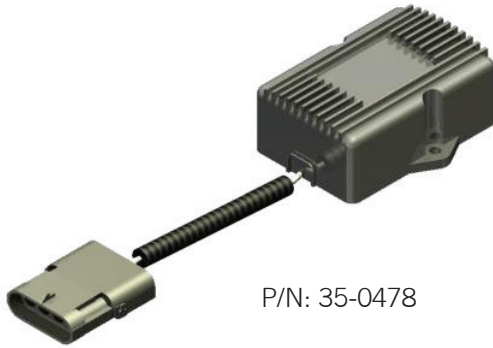

Specifications:

Input Voltage: 4.8V to 15V DC
Pressure Range: 0.1 mbar(0.5V) to 10mbar(4.5V)
Storage Temperature: -40°C to +85°C (-40ºF to 185ºF)
Operation Temperature: -20°C to 70°C (-5ºF to 160ºF)
Humidity: 0% to 95% RH

P/N: 35-0508

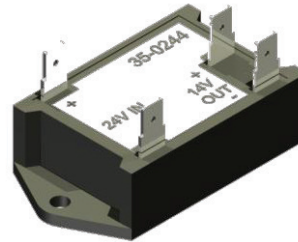P/N: 35-0509

Electronic Power Supplies

35-0244 and 35-0478 are voltage converters designed to convert 24V DC to 12V DC.

P/N: 35-0478

P/N: 35-0244

Specifications:

Input Voltage:	24V DC
Output Voltage:	14V DC
Operation Temperature:	-40°C to +85°C
	(-40°F to 185°F)

Specifications:

Input Voltage:	24V DC
Output Voltage:	14V DC
Operation Temperature:	-40°C to +85°C
	(-40°F to 185°F)

DC to AC converter for EL backlights in control panels.
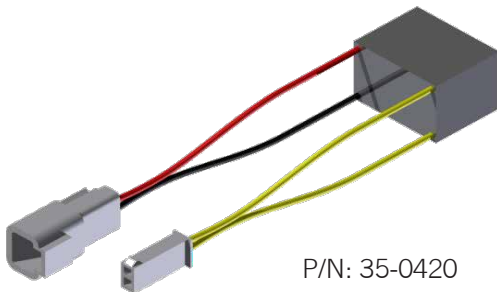
P/N: 35-0420

P/N: 35-0489

Specifications:

Input Voltage:	12 DC
Output Voltage:	120V AC @ 600HZ
Operation Temperature:	-40°C to +85°C
	(-40°F to 185°F)

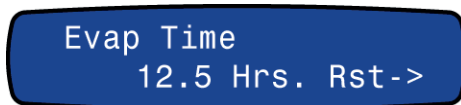**Specifications:**

Input Voltage:	24V DC
Output Voltage:	120V AC @ 600Hz
Operation Temperature:	-40°C to +85°C
	(-40°F to 185°F)

Coolview

Since the ECC, MVC, Multiplex nodes and Electronic Thermostat are micro controller based, the control algorithm can be customized to each customer's individual requirements.

Each software contains customized climate control algorithm to control different HVAC components

ECC

```
Evap Time
     12.5 Hrs. Rst->
```
Component running hours

```
Low Press.      Sw.
     0 Times      Rst->
```
Pressure Switch Trips

```
Voltage
     13.8V
```
Supply Voltage

```
Return Temp.    75°F
Open: 0Short: 0 Rst->
```
Temperature Sensor

MVC


```
==== VIEW ====
AC:        On
Heater:    Off
Blower:    25%
DHeat Fan: 0%
Valve:     0%
```
Output Parameter Status
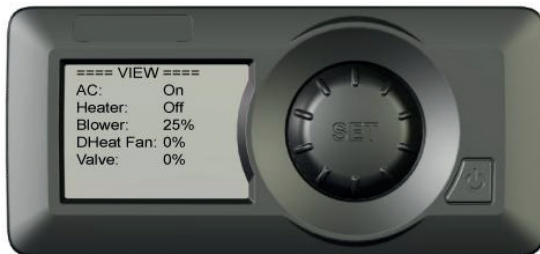
```
==== Error List ====
Valve
  Short:        0
  Open:         0
  Stuck:        0
Compressor
Fail Reset:     0
```
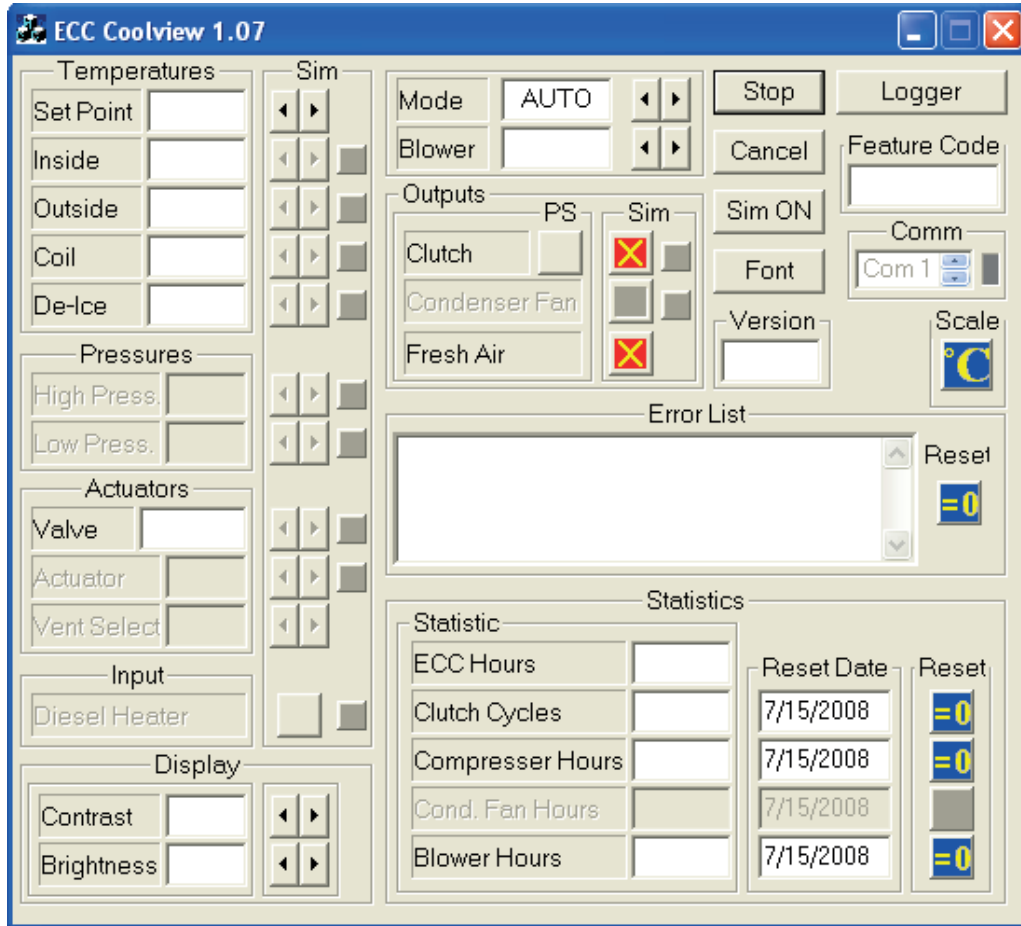Component Error List

Coolview

MCC's Coolview is designed to assist in diagnosing, monitoring and troubleshooting a vehicle's HVAC system.

Coolview Displays: Sensor Temperatures
                                    Status of Inputs and Outputs
                                    HVAC Mode (Cool, Heat, Defrost, Auto and Diesel Heat)
                                    Blower Speed, Actuators Position, Display Contrast and Brightness

System History :   ECC, Compressor and Blower Hours
                                    Errors
                                    Clutch Cycles

ECC Downloader

Using any PC running Windows™ 2000/XP/VISTA/7 platform via RS-232 or USB port, software upgrades can be make. ECC Downloader that can reprogram the ECC while the vehicle is running.

RS-485 to RS-232 converter
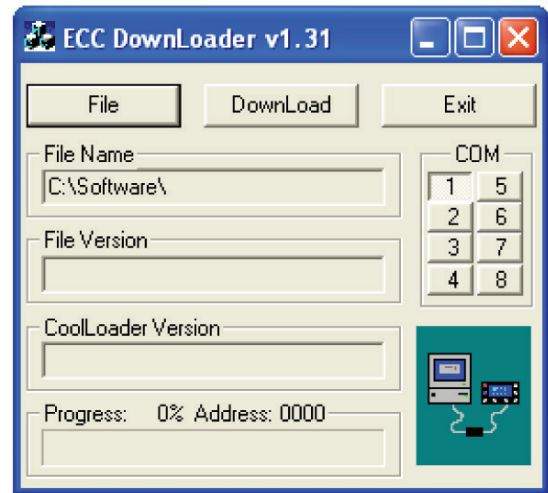
RS-485 Communication

The RS-485 to USB converter is design for communication between a computer and ECC controller via USB port. It is compatible with MCC Coolview and ECC Downloader.
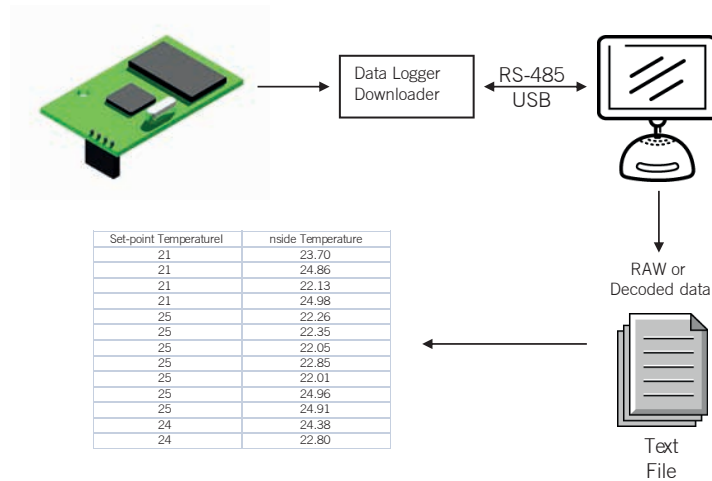
The RS-485 to RS-232 converter is design for communication between a computer and ECC controller via RS-232 port. It is compatible with MCC Coolview and ECC Downloader. Simple Plug and Play setup requires no special drivers to install.

P/N: 35-0735

P/N: 35-0202

Data Logger Downloader

The MCC Data Logger Downloader retrieves data that is saved in the Data Logger's on board memory via RS-485 or USB connection. The saved data can be in Raw or Decoded data format which can be used for troubleshooting and diagnostics.

Set-point Temperaturel	nside Temperature
21	23.70
21	24.86
21	22.13
21	24.98
25	22.26
25	22.35
25	22.05
25	22.85
25	22.01
25	24.96
25	24.91
24	24.38
24	22.80

Coolview Fleet Tracking

MCC Coolview Fleet Tracking is a standard ECC with an optional WiFi or 3G GSM transceiver. Coolview Fleet Tracking allows real-time monitoring and diagnostic. Data stored ECC's memory can be downloaded anytime to be analyzed by MCC and local service personnel.