Automatic Thermostat Module Application Guide

Contents

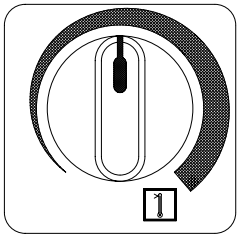
What is Automatic Thermostat Module (ATM)?

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

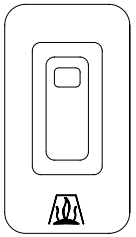
Use of the potentiometer and motorised heater valve will eliminate the rotary switch, and control cable.

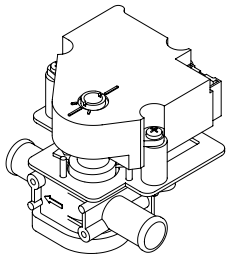
This will increase temperature accuracy and reduce installation time.

Temperature Set point Control



Diesel Heat Switch





Motorised Heater Valve

Normal Operation

Automatic Thermostat Module
When not receiving a signal on the diesel heat input and the set point is not at the maximum or minimum positions then the module will be using a temperature control routine to calculate an appropriate position for the valve to maintain the set point. From the inside sensor temperature reading the module calculates the difference between the inside temperature and the desired inside temperature (set point). From this it calculates an appropriate value to either open the valve (too cold) or close the valve (too hot). From the inside temperature sensor, the module also calculates the rate of change of inside temperature. From this value, it calculates how much to move the valve to dampen the change of inside temperature. From the After Coil Sensor the module calculates the rate of change of temperature of the air that is flowing through the unit. From this value, it calculates an appropriate amount to move the valve to dampen out fluctuations in airflow temperature. All of these values are combined and the resultant value is used to move the valve an appropriate amount so that the set point is reached and maintained.

Temperature Set Point Potentiometer
When the temperature set point potentiometer is turned all the way counter clock wise then the valve will close completely, regardless of the inside temperature. When the temperature set point potentiometer is turned all the way clockwise then the valve will open completely regardless of inside temperature.

Diesel Heat Input
When a supply is applied to the diesel heat input then the valve will open completely regardless of the Temperature Set Point and inside temperature.

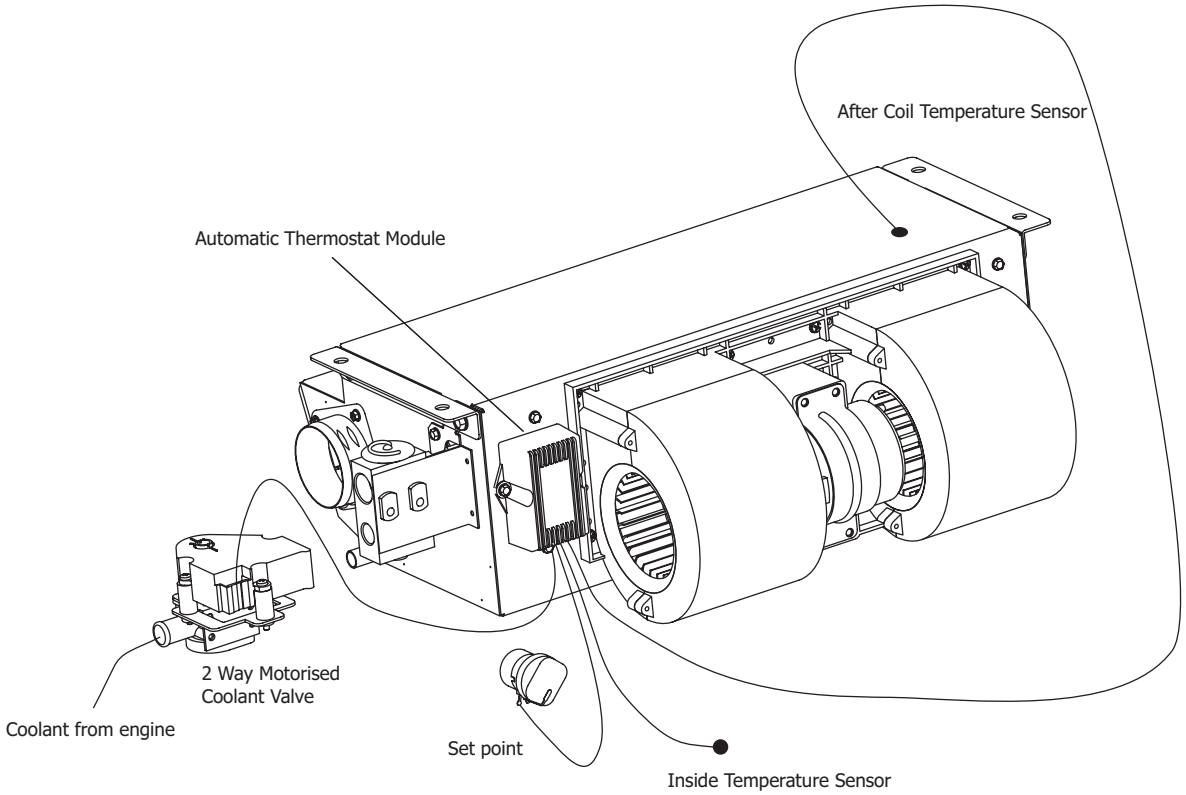
Inside Temperature Sensor
This sensor measures the temperature of the air inside the cab. This is the temperature that the Automatic Thermostat Module tries to maintain at the setting on the Temperature Set Point potentiometer.

After Coil Temperature Sensor
This sensor, as the name implies, measures the temperature of the air flowing past the heater coil. By measuring this temperature, the Thermostat Module can know the amount of heat being added to the air flowing through the unit.

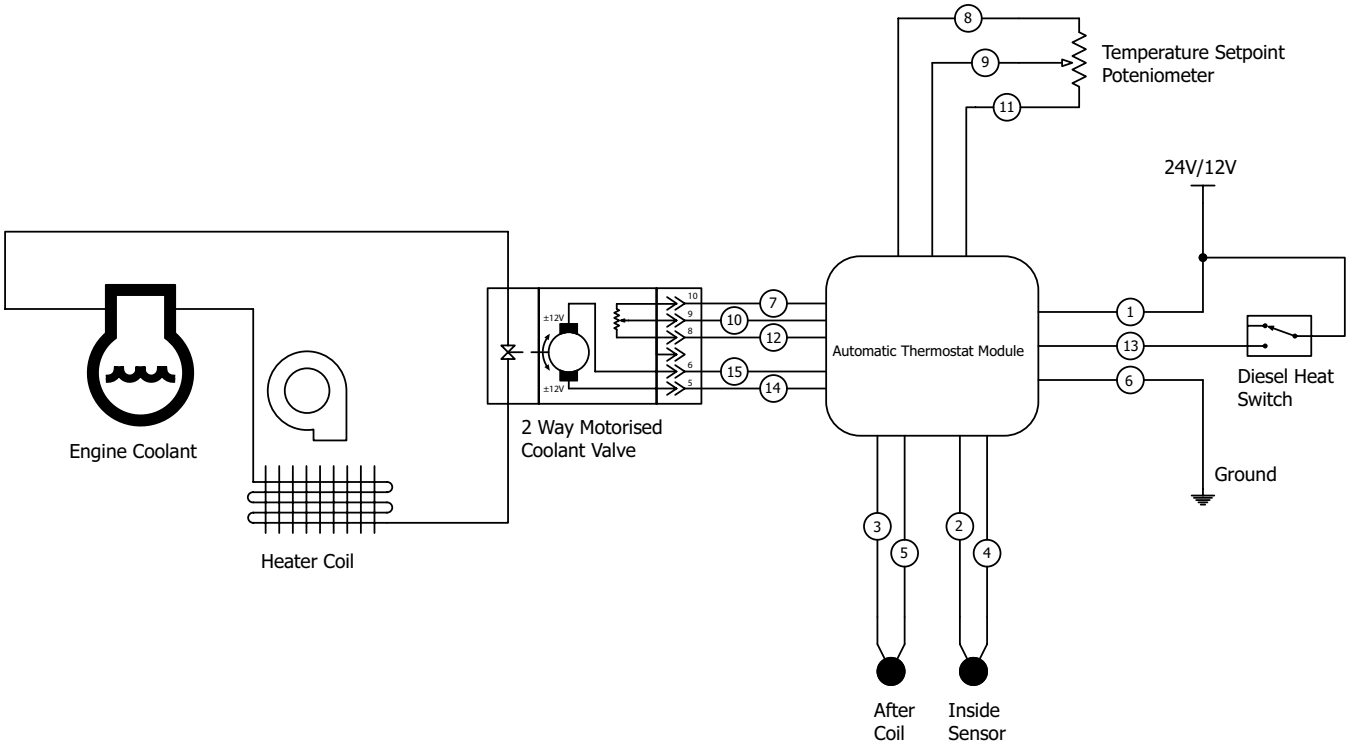
Setpoint Potentiometer Assembly

Inside/After Coil Sensor

Optional Air Temperature Sensor



Schematic Diagram



Symbol	Description
1	BAT POS-IP1
2	T2 POS-IP2
3	TI POS-1P3
4	T2 NEG-1P4
5	T1 NEG-IP5
6	GROUND-IP6
7	POT1 POS-IP7
8	POT2 POS-IP8
9	POT2 SIG-IP9
10	POT1 SIG-IP10
11	POT2 NEG-IP11
12	POT1 NEG-IP12
13	DIESEL HT-IP13
14	MTR1-IP14
15	MTR2-IP15

Connections

GROUND IP6 – This wire should be connected to ground.

BATPOS IP1 – This wire should be connected to the positive supply. If connected directly to the ignition then no function, including diesel heat, will be realized unless the ignition is turned on.

DIESEL HT IP13 – When the module is powered up and there is a positive voltage on this wire, the module will be forced to move the motorised valve to the fully open position. This wire is typically connected to an output from a diesel heater and/or an output from a defrost switch so that the valve will be placed in the fully open position when the diesel heater or defroster is on. This assures maximum heat is available to initially warm up the cabin or defrost the windows.

T1 POS IP3 / T1 NEG IP5 – These wires are connected to the After Coil Sensor. The NEG IP5 wire should be at ground potential. The potential at the POS IP3 wire should change with temperature. At 25°C, the voltage should be around 2.5V. The warmer the temperature the lower the voltage on this wire will be and visa versa.

T2 POS IP2 / T2 NEG IP4 – These wires are connected to the Inside Temperature Sensor. The NEG IP4 wire should be at ground potential. The potential at the POS IP2 wire should change with temperature. At 25°C, the voltage should be around 2.5V. The warmer the temperature the lower the voltage on this wire will be and visa versa.

MTR 1 OP14 – This output should be connected to Pin 5 of the motorised valve. When the valve is opening the voltage on this wire should be 9V. When the valve is stopped, the voltage should be around 0.5V. When the valve is closing, the voltage should be around 0.9V.

MTR 2 OP15 – This output should be connected to Pin 6 of the motorised valve. When the valve is closing the voltage on this wire should be 9V. When the valve is stopped, the voltage should be around 0.5V. When the valve is opening, the voltage should be around 0.9V.

POT1 NEG IP12 – This wire is connected to pin 8 of the motorised valve. This wire should be at ground potential.

POT1 SIG IP10 – This wire is connected to pin 9 of the motorised valve. When the motorised valve is connected to the Automatic Thermostat Module then this wire returns a voltage that is dependant on the position of the valve. When the valve is fully closed then the voltage on this wire should be around 0.9V. When the valve is fully open, the voltage on this wire should be around 2.7V.

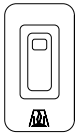
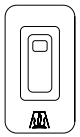
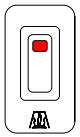
POT1 POS IP7 – This wire is connected to pin 10 of the motorised valve. There should be a voltage of around 5V on this wire at all times.

POT2 NEG IP11 – This wire is connected to the CW pin of the Temperature Set Point Potentiometer. This wire should be at ground potential.

POT2 SIG IP9 – This wire is connected to the centre pin of the Temperature Set Point Potentiometer. When the potentiometer is connected to the Automatic Thermostat Module then this wire returns a voltage dependant on the position of the potentiometer. When in the minimum heat position the voltage on this wire will be 0V. When in the maximum heat position the voltage on this wire will be 5V. In between the maximum and the minimum the voltage will vary proportional to the position of the potentiometer.

POT2 POS IP8 – This wire is connected to the CCW pin of the Temperature Set Point Potentiometer. This wire will always show a potential of 5V.

Modes of Operation

Mode	Maxium Heat	Minium Heat	Diesel Heat
	Temperautre setpoint knob is set at Maximum. 	Temperautre setpoint knob is set at Mininum. 	Temperautre setpoint knob is ignored when "Diesel Heat" mode is ON. 
	Diesel Switch is OFF 	Diesel Switch is OFF 	Diesel Switch is ON 
BAT POS-IP1	**Supply 12V-24V DC**	**Supply 12V-24V DC**	**Supply 12V-24V DC**
T2 POS-IP2	2.5V @ 25°C	2.5V @ 25°C	2.5V @ 25°C
TI POS-1P3	2.5V @ 25°C	2.5V @ 25°C	2.5V @ 25°C
T2 NEG-1P4	Ground Potential	Ground Potential	Ground Potential
T1 NEG-IP5	Ground Potential	Ground Potential	Ground Potential
GROUND-IP6	Ground 0V	Ground 0V	Ground 0V
POT1 POS-IP7	5V DC	5V DC	5V DC
POT2 POS-IP8	5V DC	5V DC	5V DC
POT2 SIG-IP9	5V DC	0V DC	Override by Diesel Heat Switch
POT1 SIG-IP10	2.7V DC	0.9V DC	2.7V DC
POT2 NEG-IP11	Ground Potential	Ground Potential	Ground Potential
POT1 NEG-IP12	Ground Potential	Ground Potential	Ground Potential
DIESEL HT-IP13	Ground Potential	Ground Potential	= Supply Voltage
MTR1-IP14	9V During opening 0.5V stopped	0.9V During closing 0.5V stopped	9V During opening 0.5V stopped
MTR2-IP15	0.9V During opening 0.5V stopped	9V During closing 0.5V stopped	0.9V During opening 0.5V stopped
Motorised Valve	Open	Closed	Open

Installation Procedures

Automatic Thermostat Module

Locate a secure mounting location for the Automatic Thermostat Module. The location should be close enough to the heater coil and the coolant lines so that the temperature sensors and the connector to the motorised valve can reach their desired locations.

Motorised Valve (Fig. C)

Locate a suitable location for the motorised valve on the inlet hose of the heater coil. Remove a 1.75 inch section of hose and insert each exposed end onto the motorised valve with hose clamps. Ensure that the valve is placed with the proper orientation as indicated by the arrow, which shows direction of coolant flow. Tighten the hose clamps. Attach the 6 way connector from the Automatic Thermostat Module to the Motorised Valve. Route and securely attach the wires leading up to the Motorised Valve.

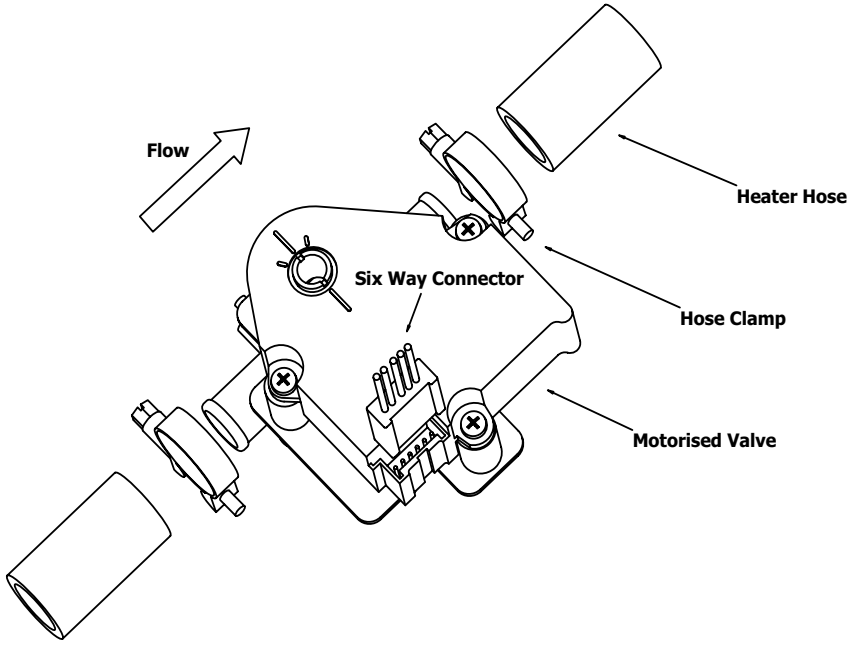


Fig: C

Temperature Sensors (Fig. D)

Remove or disassemble the necessary hardware to gain access to the heater coil and adjoining duct work. On the downwind side of the heater coil, locate a suitable location for the After Coil Sensor. It should be placed near the coil but not in physical contact with it. The end of the temperature sensor should not be in contact with anything and should be insulated from contact with metal surfaces. Use a P-Clamp or similar fastening device. On the up wind (return air) side of the ducting locate a suitable location for the Inside Sensor. The Inside sensor should be as far away from the heater coil as possible but still far enough inside the duct work to have adequately mixed airflow across it. The end of the temperature sensor should not be in contact with anything and should be insulated from contact with all metal surfaces. Route and securely attach the wires leading to the temperature sensors.

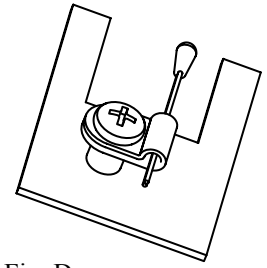


Fig: D

Temperature Selection Potentiometer

Locate a position within the drivers reach and drill a 7/16 inch diameter hole in which to mount the Temperature Selection Potentiometer. Place the Temperature Selection Potentiometer through the hole and tighten the mounting nut securely. Route the wires for the Temperature Selection Potentiometer and securely attach them. Plug in the 3 way connector for the Temperature Selection Potentiometer.

Attach Main Connector (Fig. E)

Route the wires from the main 3-way connector. Pin A of the Main Connector is the positive power. Positive Power can be anywhere from 12V to 28V. A fuse or breaker should be employed with a rating of 2 Amps. Pin B of the Main Connector is the ground pin. Pin B should be connected to a suitable ground source. Pin C of the Main connector is the Diesel Heat pin. When a positive voltage is applied to this pin then the heater valve is moved to the fully open position. Pin C can be hooked to the output of an auxiliary diesel heater or to the output of a Maximum defrost switch. If this input is not used then it should be grounded.

*All wires should be securely mounted with considerations made for chaffing or environmental conditions and any other possible causes of short or long term damage to the wire or connections.

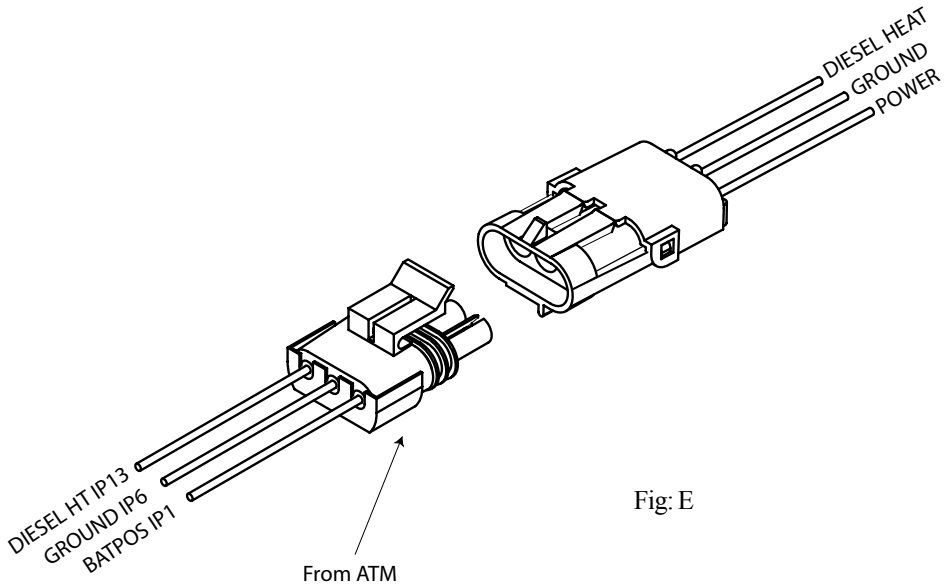


Fig: E

Specifications

ATM

Controls Cabin temperature from 16° C (60.8°F) to 28° C (82.4°F)
Cabin temperature is controlled to within +/- 0.5 C of set point
Two temperature sensors operation Inside and After Coil sensor or with optional air temperature sensor.
Protected against vibration & contaminants by polyurethane potting compound.

Thermistor

Voltage (V)	Resistance (Ω)	Temperature
0	1.5k	75.0°C (167°F)
2.5	10k	25.0°C (77°F)
5.0	336k	-40.0°C (-40.0°F)

2 Way Motorised Coolant Valve

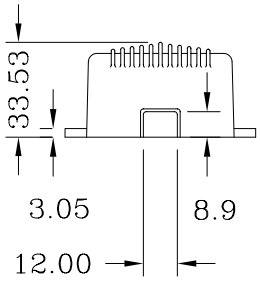
Motor:
12 Volts
0.5 A Max

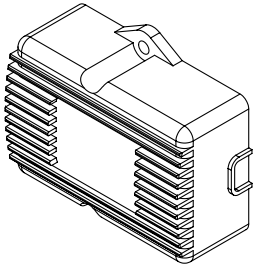
Note: Swaping Polarity across motor changes rotation direction of Valve

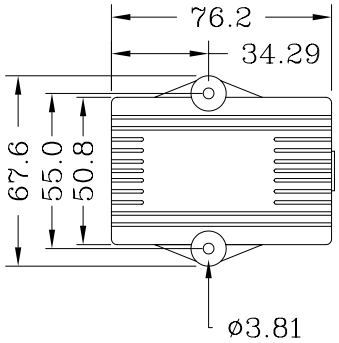
Valve angle: 113.4°

Pin Out:
5-Motor±12V
6-Motor±12V
7-Not Used
8-Feedback Pot (-)
9-Feedback Pot (Signal)
10-Feedback Pot (+)
Feedback Pot: 10kΩ±25%

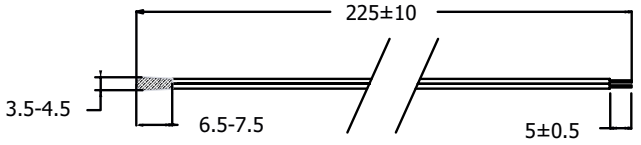
Drawings





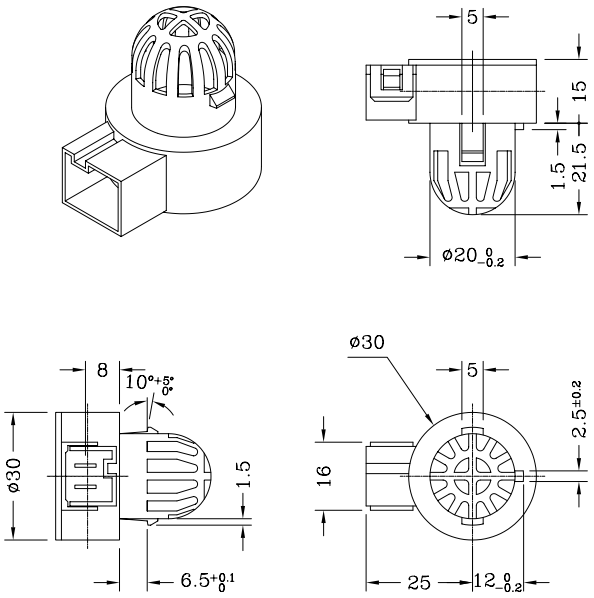


Automatic Thermostat Module
MCC P/N: 35-0293

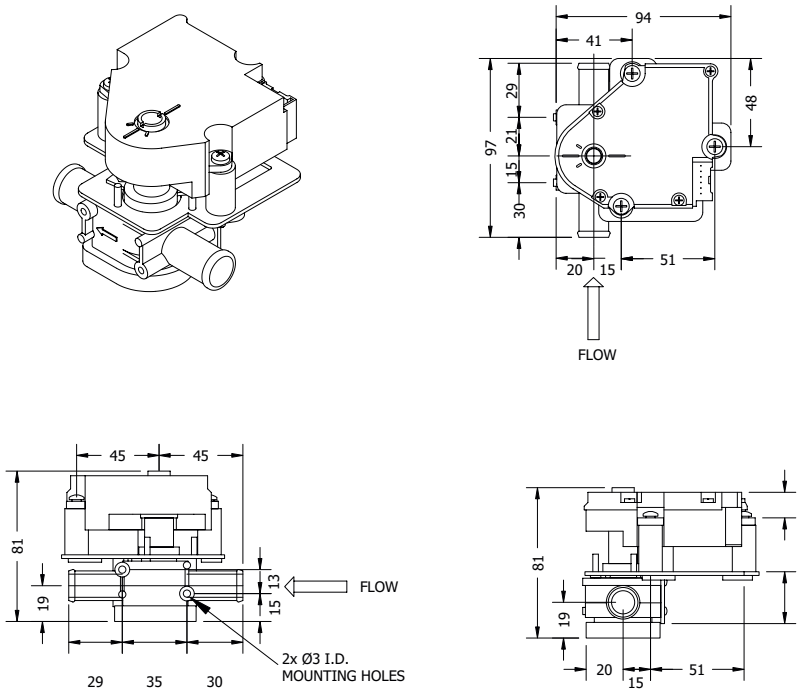


Inside Temperature Sensor
MCC P/N: 35-0176

*All Drawings are in millimeters



Air Temperature Sensor
MCC P/N: 35-0438



Motorised Valve Assembly
MCC P/N: 26-0652

*All Drawings are in millimeters