ATC CONTROLLER MANUAL

ATC DEALERS

For all medium and low temperature systems including electric standby and heat options

Controller P.N. M910138
Manual P.N. M960327

Manual Revision D , Nov 11, 2014
Software version 1.6

SUMMARY

1) INTRODUCTION

The **M910138** electronic controller is a microprocessor controlled thermostatic device, designed to control cooling , heating and defrost for the refrigeration. It actuates in a temperature range from -40°F to +139°F.

A single setpoint is used for heat and cooling, the system will automatically switch modes to maintain the setpoint entered.

2) SYSTEM OPERATION

2.1) Control Panel

The **M910138** control panel is installed in the vehicle's panel. It has a CPU and it is consists in an keyboard for operational programming of cooling system, and of a numerical display to visualize parameters and temperature.

2.2) Power

When the system is first supplied power it will show the software version. Press the power button once quickly to turn on the device. The display will show the air return temperature inside the cargo area. To turn OFF the device, press and hold for three seconds.

On start-up of the vehicle, the controller can be configured to maintain its last on/off state (default), or it can be configured to be in off position at every start up. The change is made by altering parameter dF in the set-up function.

2.3) Numerical Display

The numerical display normally shows the air return temperature inside the cargo area. If the up or down arrows are pressed, the current setpoint is displayed for a few seconds, then returns to the return air temperature.

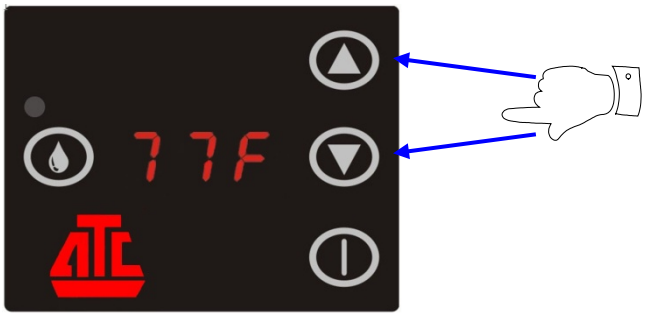
The display can be configured for °F or °C operation, this change can be made by changing parameter 'CF' in the menu. This will be explained further in the document.

2.4) Evaporator Coil Temperature

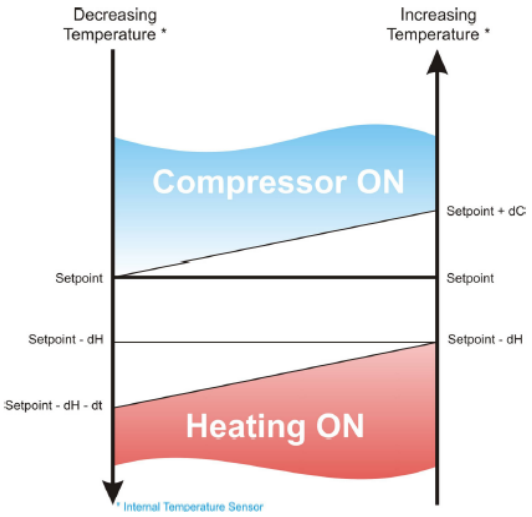
To see temperature of the exit gas at the evaporator press , and the decimal dots of the display will blink, which indicates that the display is showing gas exit temperature. If pressing results in the message **FAI** this indicates that the temperature is out of the reading range (above 59°F).

2.5) Setpoint

Setpoint is the temperature desired inside the cargo area. To regulate it, press OR . The setpoint temperature will start blinking in the display ; press the key again until the desired temperature is reached. Ability to change the set point can be blocked if the end user requests. Changing parameter 'bL' to 1 will block setpoint changes.



2.6) Single set point Control

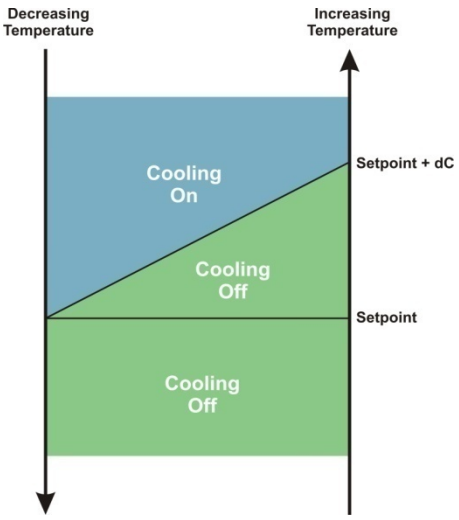


2.6.1) Cooling

The system will start cooling mode according to the setpoint and the differential value, parameter '**dC'**. This is factory set by ATC.

To turn OFF the cooling mode, press for three seconds.

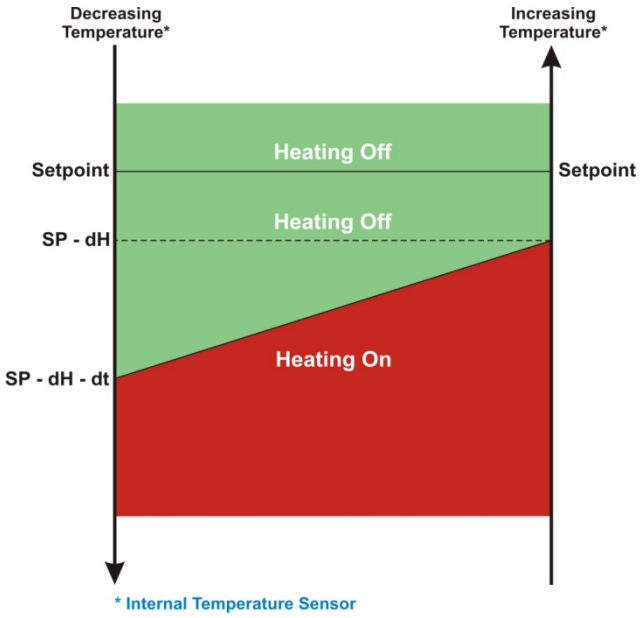
The compressor will maintain it's current position for a minimum time of 30 seconds, in order to protect the clutch against inadvertent operation.



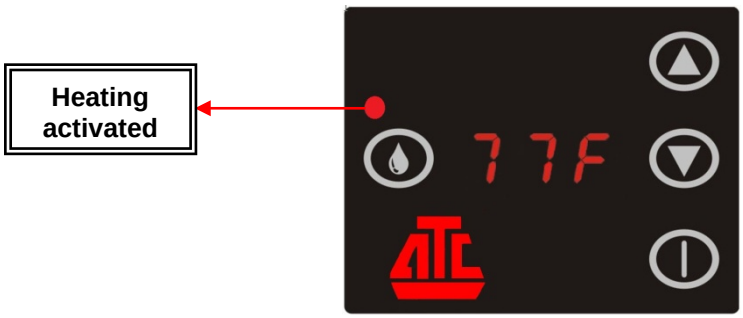
2.6.2) Heating

The system will initiate the heating mode according to the setpoint entered, and the programmed values **dH and dt** .

To turn OFF heating mode, press for three seconds.



When the heating mode is active the led will turn red.



2.7) Defrost

When the defrost mode is activated, the control panel will show the message **"dEF"** in the display.

2.7.1) Automatic Defrost

There are two basic available options which can be programmed for defrost, by time , or by temperature. The default set at ATC will terminate the defrost cycle based on temperature. Details on both methods are below.

2.7.1.1) Defrost based on Time

With parameter **Pd** equal to 1, defrost is controlled according to the time. Defrost mode will run for the time entered into parameter **P4**. The defrost is enabled after time **P9** has passed. The time count in **P9** begins only after the coil is at or below freezing.

2.7.1.2) Defrost By Temperature –

With parameter **Pd** equal to 0 (which is the default setting for both low and medium units), the defrost will be terminated based on the temperature set in **P3**. The defrost cycle will not be allowed to start unless the coil sensor is equal or lower than the temperature programmed in **P2.** Defrost will end when the coil sensor reaches the temperature set in **P3**, or the when the time in **P4** has been reached. Which ever occurs first will end Defrost**.** The cooling cycle will then run for a minimum time set in parameter **HS. HS** is basically the time between defrost cycles when **Pd**=0

2.7.2) Manual Defrost

With parameter **Pd** equal to 1, defrost can be activated any time when you press for three seconds. Defrost will stay ON for the programmed time in **P4**.

With parameter **Pd** equal to 0, defrost will be activated if the evaporator coil temperature is lower than the temperature of ending defrost programmed in **P3**. Defrost will terminate as explained above in 2.7.1.2) .

2.8) Drip Mode

At the end of the defrost cycle Drip Mode is initiated. The fans will be off during Drip Mode, and the message **"Go"** will blink on the display. Drip time is set using parameter **P8.**

3) SYSTEM PARAMETERS

- To access parameters press simultaneously and for 3 seconds. 3 lines will show in the display which the password **041** must be typed;
- To enter the password, press to increase and to decrease, to change the digit, press , after typed **041**, press again to enter the parameter menu.
- The first parameter is **P0**, to navigate through the parameters, press or ;
- To see the value of each parameter, press and to change the value, press or ;
- To return to the parameter menu press .
- To exit parameters mode, press when in the parameter menu.

ADJUSTABLE PARAMETERS:

MEDIUM TEMPERATURE
ATC ADJUSTABLE PARAMETERS – FACTORY DEFAULTS

PARAMETER	FUNCTION	ATC SETTTING ^{O}F	ATC SETTING ^{O}C
P0	Air sensor temperature off-set	0.0^{O}F	0.0^{O}C
P1	Coil sensor temperature off-set	0.0^{O}F	0.0^{O}C
P2*	Start defrost temperature	26.1^{O}F	-3.3^{O}C
P3*	End defrost temperature	39.0^{O}F	3.9^{O}C
P4*	Defrost max. activated time	30 (min.)	30 (min.)
P5**	Defrost type: off cycle defrost (fans) / hot-gas	0 (Fans)	0 (Fans)
P6**	Evaporator fans ON/OFF while in defrost	1 (ON)	1 (ON)
P7*	Compressor ON/OFF in dripping mode	0 (OFF)	0 (OFF)
P8	Dripping time after defrost	5 (sec.)	5 (sec.)
P9	Max. cooling time between defrost cycles (for Pd=1)	40 (min.)	40 (min.)
dC*	Cooling differential temperature	2.1^{O}F	1.2^{O}C
SL**	Display: Air temp. / Set point temp.	0 (air temp.)	0 (air Temp.)
Pr**	Power: ON/OFF initial state	1 (ON)	1 (ON)
Pd**	Defrost mode: Temperature /Time	0 (temperature)	0 (temperature)
Eu**	Fan evap. Cooling off: ON/OFF	1 (ON)	1 (ON)
Pb**	Temperature display blocked in defrost	0 (temp. not shown)	0 (Temp. not shown)
bL*	Disable (block) set point changes by driver	0 (changes allowed)	0 (changes allowed)
HS**	Minimum time between defrost cycles (for Pd=0)	30 (min.)	35 (min.)
Lt**	Temperature Set point minimum limit	33^{O}F	1.0^{O}C
Ht**	Temperature Set point maximum limit	86.0^{O}F	30.0^{O}C
CF	Temperature scale: Celsius/Fahrenheit	1 (Fahrenheit)	0 (Celsius)
dH**	Heating differential temperature	2.1^{O}F	1.2^{O}C
dt**	Heating hysteresis	2.1^{O}F	1.2^{O}C
tu*	Fan off time (after defrost)	1 (min.)	1 (min.)
dF*	Display or disable ‘PS’ fault code flashing	0 (PS off)	0 (PS off)

* Change if correction needed by dealers only.
** Do not change Factory setting (contact ATC)

LOW TEMPERATURE
ATC ADJUSTABLE PARAMETERS – FACTORY DEFAULTS

PARAMETER	FUNCTION	ATC SETTING ^{O}F	ATC SETTING ^{O}C
P0	Air sensor temperature off-set	0.0^{O} F	0.0^{O} C
P1	Coil sensor temperature off-set	0.0^{O} F	0.0^{O} C
P2*	Start defrost temperature	26.0^{O} F	-3.0^{O}C
P3*	End defrost temperature	36.0^{O} F	3.0^{O} C
P4*	Defrost max. activated time	8 (min.)	8 (min.)
P5**	Defrost type: off cycle defrost (fans) / hot-gas	1 (hot-gas)	1 (hot-gas)
P6**	Evaporator fans ON/OFF while in defrost	0 (OFF)	0 (OFF)
P7*	Compressor ON/OFF in dripping mode	0 (OFF)	0 (OFF)
P8	Dripping time after defrost	12 (sec.)	12 (sec.)
P9	Max. cooling time between defrost cycles (for Pd=1)	60 (min.)	60 (min.)
dC*	Cooling differential temperature	2.0^{O} F	1.0^{O} C
SL**	Display: Air temp. / Set point temp.	0 (air temp.)	0 (air Temp.)
Pr**	Power: ON/OFF initial state	1 (ON)	1(ON)
Pd**	Defrost mode: Temperature /Time	0 (temperature)	0 (temperature)
Eu**	Fan evap. Cooling off: ON/OFF	1 (ON)	1 (ON)
Pb**	Temperature display blocked in defrost	0 (temp. not shown)	0 (temp. not shown)
bL*	Disable (block) set point changes by driver	0 (changes allowed)	0 (changes allowed)
HS**	Minimum time between defrost cycles (for Pd=0)	60 (min.)	60 (min.)
Lt**	Temperature Set point minimum limit	-20.0^{O} F	-28.0^{O} C
Ht**	Temperature Set point maximum limit	86.0^{O} F	30.0^{O} C
CF	Temperature scale: Celsius/Fahrenheit	1 (Fahrenheit)	0 (Celsius)
dH**	Heating differential temperature	2^{O} F	1^{O} C
Dt**	Heating hysteresis	2.5^{O} F	1.2^{O} C
Tu*	Fan off time (after defrost)	1 (min.)	1 (min.)
dF*	Display or disable ‘PS’ fault code flashing	0 (not displayed)	0 (not displayed)

* Change if correction needed by dealers only.
** Do not change Factory setting (contact ATC)

4) FAILURES AND ALARMS

Indication	Failure / Alarm	Description
F1 **	Temperature sensor for air return open or has a short circuit	The panel will indicate its failure blinking indefinitely the failure code until correct it.
F2 *	Coil temperature sensor open or in short-circuit	
tA	High serpentine temperature	As soon as you activate the manual defrost with the coil temperature higher than parameter **P3**.
Go	Dripping warning	Displays when the system is in drip mode after defrost is complete.
FAI	Coil sensor is above +59°F	The panel will indicate the message when reading the serpentine temperature will be higher than +59°F.
PS	Pressure switch	The low or high pressure switch has been triggered. The compressor will be disabled until the fault is corrected. Display of alarm can be disabled with parameter dF.
bL	Blocked setpoint	Indicate blocked setpoint. It should be changed by the parameter **bL**.

***** If the coil sensor fails, the controller reverts to the time defrost cycle. Cool for **P9** minutes, the defrost for **P4** minutes.

****** If the air return sensor fails, the controller defaults to the cooling / defrost cycle as shown in the table below, starting with cycle “ON”.

Operational Range	Setpoint	Cooling ON	Cooling OFF
Range 4	>50ºF	9 min.	21 min.
Range 3	50ºF	15 min.	15 min.
	48ºF		
	46ºF		
	45ºF		
	43ºF		
Range 2	41ºF	21 min.	9 min.
	39ºF		
	37ºF		
	36ºF		
	34ºF		
Range 1	<34ºF	Always ON	-

Defrost control keeps unaltered.

5) HOURMETER

The panel has an hourmeter which counts the number of hours that control panel is ON (system running). It can be viewed by pressing and holding and simultaneously for 1 second. "Hon" will be displayed. Then press the power button .

Example: 129,798 hours – will be shown in two screens.
1st screen – 129
2nd screen – 798
The controller will then revert back to Hon, and then to the return air temperature

6) TEST MODE

Use this mode to test the outputs for troubleshooting etc.

- To enter the test mode, press simultaneously, and for 3 seconds;
- 3 lines will show in the display which the password **023** must be typed;
- To enter password, use to increase and to decrease, and to change digit, press , after the password is entered, press again to enter test mode;
- The first test is **CE**, to go for the next test, press or ;
- To turn ON an output, press and to turn OFF, press again ;
- To exit, press ;
- If current control mode will be by time, the controller returns to initial cycle.

Indication	Meaning
CE	Electric Circuit Output
Eu	Ventilation Output and Electric Circuit
dG	Defrost Output and Electric Circuit
CG	Cooling Output, Ventilation and Electric Circuit
Aq	Heating Output
dY	Segment tests of display and defrost led

7) PARAMETER RESET

This feature will reset the controller to the settings shown in the Medium parameter table above. There is no reset for Low temperature units, they will need to be entered individually.

- To enter in reset mode, press simultaneously and for 3 seconds;
- 3 lines will show in the display which password **076** must be typed;
- To enter password, press to increase and to decrease, to change digit, press , after complete **076**, press again to reset parameters;
- After parameters will be reseted, **rP** will show in the display.

8) PROTECTION

- The control panel has protected outputs against short-circuit which actuates a thermal circuit;
- The maximum output current per pin is 400mA.

9) OPERATION LIMITS

- This controller will operate in a temperature range from -40ºF to +184°F.
- The nominal voltage range is 12 to 24VDC; but the controller will function normally in a range 10 to 29VDC.
- A peak voltage of 32VDC for 5 minutes can be input without causing any permanent damage.
- The controller can sustain support -12VDC / -24VDC (polarity reversion) indefinitely without any damage.