

Installation and Advanced Programming Instructions



HP8211-1RJ and HP8321-1RJ Heat Pump Thermostats



These instructions are intended for installation and first time set up of the thermostat. For day to day use please refer to the User Instruction Sheet.

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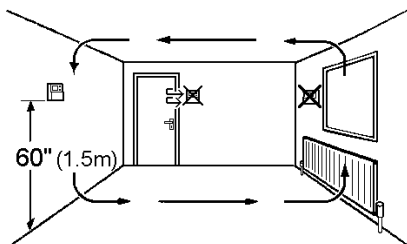
Ordering Details for Series 8000 Product Range

Number of Stages & Application	Model	Code Number
1 Heat 1 Cool for heat/cool systems (no occupancy relay)	HC8111-1	087N6807NA
1 Heat 1 Cool for heat/cool or heat pump systems	HC8111-1RJ	087N7224NA
2 Heat 2 Cool for heat/cool systems	HC8221-1J	087N6939NA
2 Heat 2 Cool for heat/cool systems (battery operated)	HC8220-1J	087N6940NA
2 Heat 1 Cool for heat pump systems	HP8211-1RJ	087N6959NA
3 Heat 2 Cool for heat pump systems	HP8321-1RJ	087N6963NA
Accessories		
Remote room sensor	TS2/2	087N728500
Duct mounting sensor	TS5	087N681200
Outdoor sensor	TS6	087N681300
Optional wall plate for 8000 Series thermostats	1810	087N8000WP

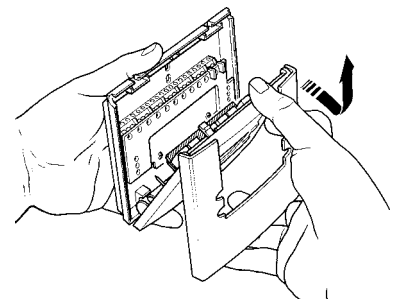
Unpacking and installing the thermostat

1. Thermostat location

Note: a wall plate (code no: 087N8000WP) is available to cover a wider area when retrofitting.

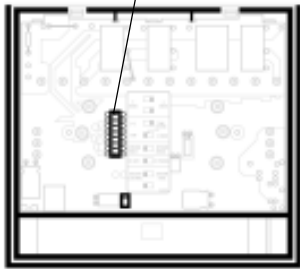


2. Unpacking the thermostat



Setting the DIP Switches

Switch Location

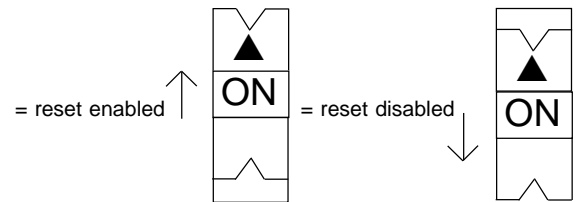
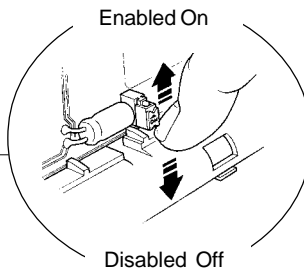
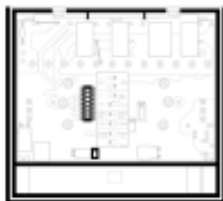


Switch	→ = On	← = Off
Non-prog	1 Off & 2 On	
2 Events	1 Off & 2 Off *	
4 Events	1 On & 2 Off	
6 Events	1 On & 2 On	
7 Day	3 On & 4 Off *	
5/2 Day	3 Off & 4 Off	
24hr	3 On & 4 On	
Keyboard	Disable = 5 On	Enable = 5 Off *
Changeover	Auto = 6 Off *	Man = 6 On
Aux Heat	Electric = 7 Off *	Fossil = 7 On
Occ Relay	N/O = 8 Off	N/C = 8 On *

- A) It is advisable to make DIP switch settings prior to installing the thermostat on the wallplate.
- B) If Keyboard Disable function is required (DIP switch 5), do not set until any advanced programming options are completed, and user programs have been set.
- C) To return the thermostat DIP switches to the factory setting set switches as indicated by *

How to disable the reset button

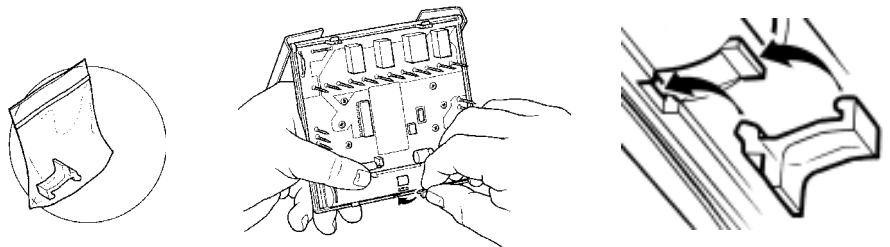
To prevent unauthorised resetting of programs and advanced programming options the reset button can be disabled.



How to Lock the Front Cover

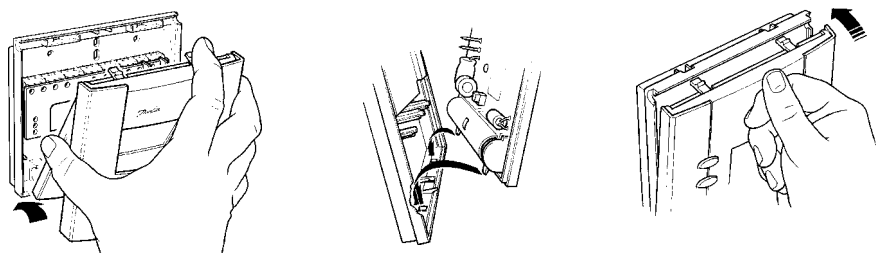
If locking is required fit locking piece before fitting the thermostat to wallplate. Do not close the front cover until the thermostat has been fitted to the wallplate.

To open a locked cover, slide a flat-blade screwdriver in from the side between the bottom of the thermostat and center locking tab. Gently twist the blade to pry open the cover.



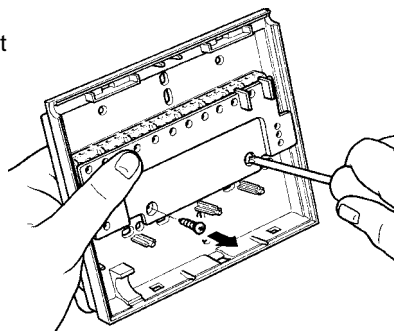
Attaching the Thermostat onto the Wallplate (see illustrations to right)

To remove the thermostat from the wallplate, open the front cover, place a flat blade screw driver into the slots on top of the thermostat and gently twist. Once both slots are done, gently pull top of thermostat towards you. Note: do not press down on the white tabs as this could damage the thermostat.



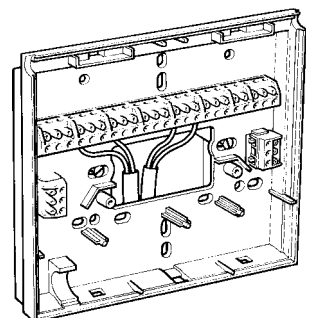
Wiring Access

1. Removing the thermostat terminal cover



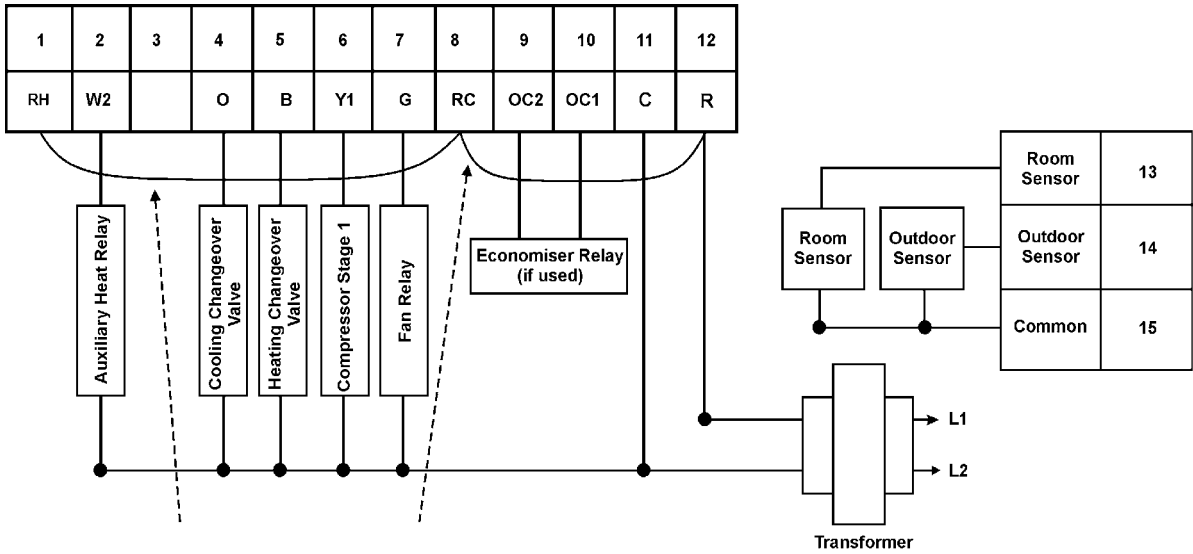
2. Correct wiring access

- Feed the wires through the access in the rear of the wallplate.
- Wires must enter from below the terminal block screws



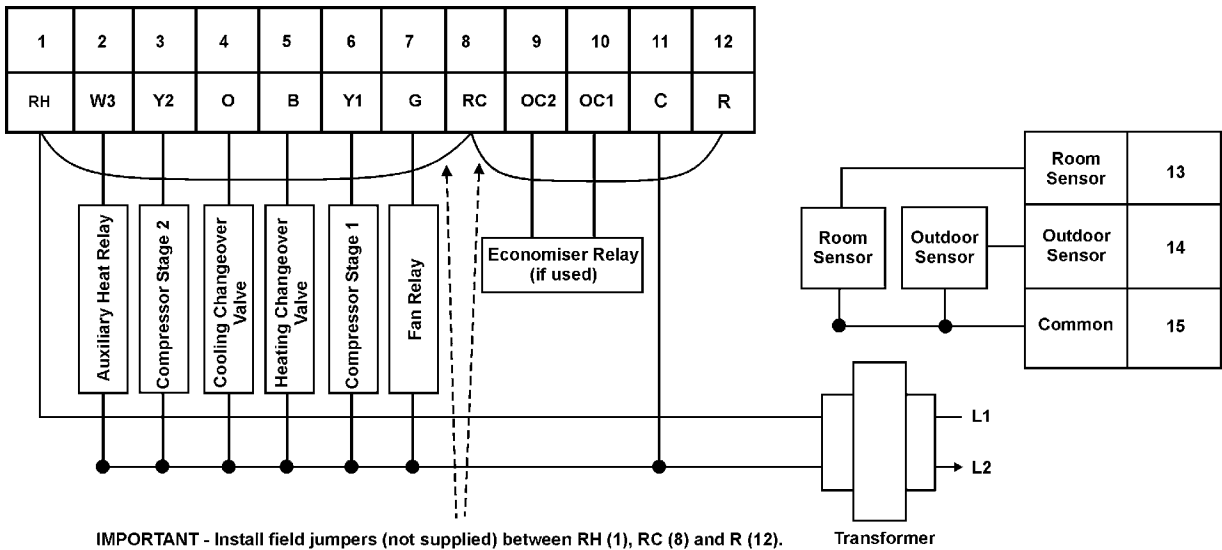
Wiring Instructions for the thermostat

HP8211-1RJ Model



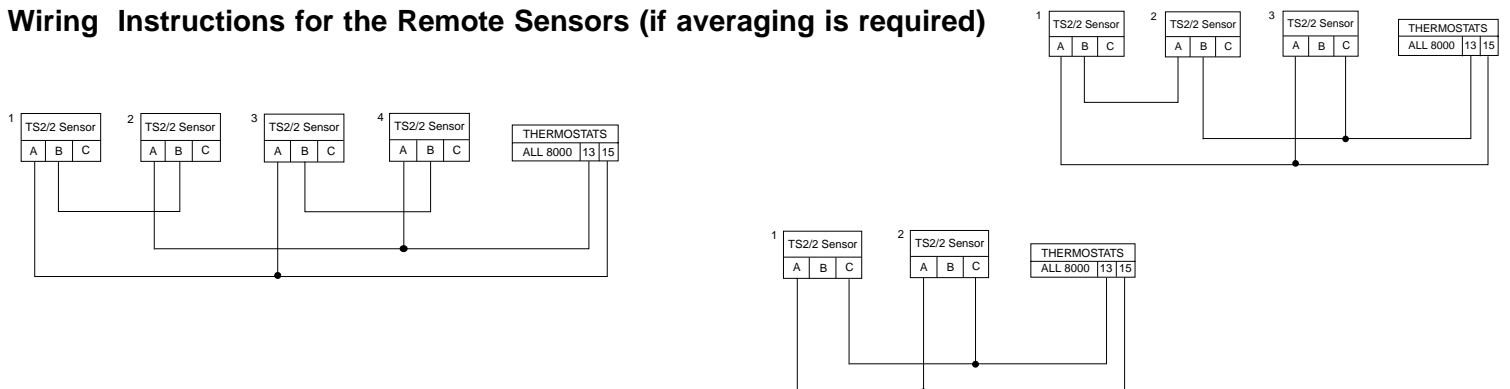
IMPORTANT - Install field jumpers (not supplied) between RH (1), RC (8) and R (12).

HP8321-1RJ Model



IMPORTANT - Install field jumpers (not supplied) between RH (1), RC (8) and R (12).

Wiring Instructions for the Remote Sensors (if averaging is required)



PROGRAMMING THE EVENT TIMES (SETBACKS) AND TEMPERATURES

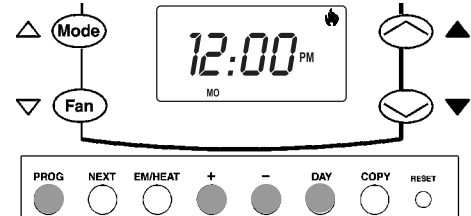
Note : This thermostat is delivered with DIP switches and advanced programming options factory preset to cover most common applications. Should you require to change from any of the factory presets it is advisable to do so prior to setting the event times and temperatures as they may affect the following sequence.

Keyboard lockout (DIP switch 5) should not be in the enable position (Off) until after programming is complete.

Step 1: - Setting the current time and day

- 1.1 Press the PROG button to enter programming mode. If necessary, adjust the day using the DAY button and the time using the + or – buttons.

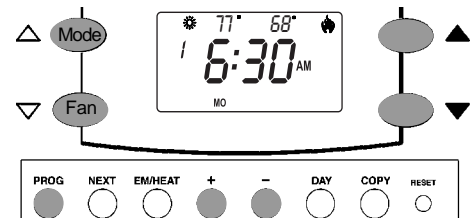
Note : It is advisable to fill out the appropriate THERMOSTAT SETTING TEMPLATE in the users instructions before proceeding to the next step.



Step 2: - Programming the first event

- 2.1 Press the PROG button a second time to enter the event-programming mode.
- 2.2 Adjust the start time for the first event of the day using the + or – buttons.
- 2.3 Adjust the temperatures for the first event of the day using the buttons to the left of the display for cooling and the buttons to the right for heating.

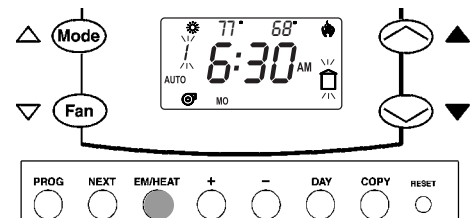
Note : If Option 4 of the advanced programming section has been enabled (factory default is disabled) the fan operation and occupancy relay can also be set at this time, following Step 3 below.



Step 3: - Selecting fan operation (skip to Step 4 if Option 4 of the APM is in the DISable setting)

- 3.1 Using the EM HEAT button simply cycle through the following combinations to find the right selection.
- 3.2 Fan AUTO and building symbol flashing = Fan AUTO, Unoccupied Event Occupation relay open *.
- 3.3 Fan ON and building symbol flashing = Fan ON, Occupancy Relay open.
- 3.4 Fan AUTO and building symbol steady = Fan AUTO, Unoccupied Event Occupation relay closed *.
- 3.5 Fan ON and building symbol steady = Fan ON, Unoccupied Event Occupation relay closed *.

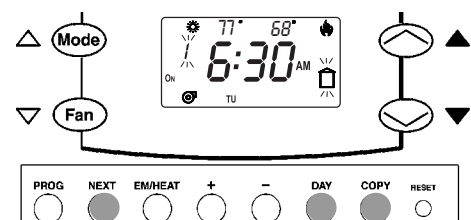
* With DIL switch 8 set to ON (Occ N/C). If set to Occ N/O the reverse state will apply to the Occupation relay.



Step 4: - Programming other events

- 4.1 Press NEXT to move to next event, repeat steps 2-3 until all events for current day are programmed. Number of Events will be defined by DIP switches 1 & 2 (factory default is 2 per day).
- 4.2 Press the DAY button to advance to the next day, or next group of days, and repeat steps 1-5 until all programs are set.

Note : To copy a program from one day to the next press DAY then COPY.



ADVANCED PROGRAMMING MODE (APM) OPTIONS SUMMARY

For further details of the APM options refer to pages 6, 7 & 8.

NOTE: If centigrade display has been selected then all temperatures will be the °C equivalent of the °F temperatures shown below.

Option	Description	Default Setting	Optional Setting	Comments
1	Temperature override timer	NE (next timed event will reset the override)	1, 2, 3, 4Hr, or DIS	1, 2, 3 or 4 hours override, or override disabled
2	Fan run-on timer after each cooling cycle	OFF	30, 60 or 90 seconds	Fan runs on for additional 30, 60 or 90 seconds after each cooling cycle
3	Fan run-on timer after each heating cycle	OFF	30, 60 or 90 seconds	Fan runs on for additional 30, 60 or 90 seconds after each heating cycle
4	Enable or Disable occupancy relay and Smart Fan programming	DIS (able)	En (able)	When enabled this feature sets 3 functions: 1. Occupancy relay can be set to open or close at each event time 2. The fan can be set for AUTO or ON at each event time. 3. Optimum Start Control will be effective at each Occupied Event time. When this feature is disabled the Occupancy Relay and smart fan energizes at first programmed event time and de-energizes at the last programmed event time, and OSC will only operate at the first event time of the day.
5	Fan Lock	ALL	LOC	ALL allows AUTO, ON or SMART fan to be selected. LOC disables the fan button and locks the thermostat in SMART fan mode.
6	Use of keyboard disable (DIP switch 5)	NOR	FUL	NOR = PROG key disabled and temperature override limited to 3°F up or down from setpoint. This feature may be used in conjunction with options 1 & 5. FUL = full keyboard lockout.
7	Minimum deadband	5°F	2°F, 7°F or 10°F	Minimum temperature difference between heating and cooling setpoints
8	Max Heating Temp	86°F	85°F to 43°F	Used in conjunction with Option A
9	Min Cooling Temp	61°F	62°F to 104°F	Used in conjunction with Option b
A	Min Heating Temp	43°F	44°F to 86°F	Used in conjunction with Option 8
b	Max Cooling Temp	104°F	103°F to 61°F	Used in conjunction with Option 9
c	Optimum start control for heating	0 (off)	1-8	Sets the maximum amount of start up time for heating. 1 = 15 mins, 2 = 30 mins up to 8 = 120mins. Refer to table on page 7
d	Optimum start control for cooling	0 (off)	1-8	See Option c above
E	Calibration	0°F	+ 3°F to -3°F	Raises or lowers display temp in 1°F steps
F	Compressor minimum off time	4 mins	3 mins or 2 mins	Sets the compressor min Off time for each cycle
H	Compressor minimum on time	2 mins	0-4 mins	Sets the compressor min On time for each cycle
L	Low balance point (low temp cut off)	16°F	-22°F to +60°F or Off	Below this temp the thermostat switches off the heat pump and runs with auxiliary heat alone. Only available when outdoor sensor is installed
N	High balance point	50°F	32°F to 70°F or Off	Above this temp the thermostat switches off the auxiliary heat and runs with the heat pump alone. Only available when outdoor sensor is installed
r	Remote room sensor disable	En (able)	DIS (able)	Disables or enables the remote room sensor. Only available when remote sensor is installed

DETAILED DESCRIPTION OF ADVANCED PROGRAMMING MODE (APM) OPTIONS

To enter Advanced Programming Mode (APM) press and hold FAN and COPY buttons for 3 seconds. Note: the thermostat must be in normal running mode (not programming mode).

When in APM mode use the ▲ and ▼ buttons to scroll through the options available. Use the Next button to move onto the subsequent option.

<p>Option 1</p>	<p>Setting temperature override duration timer (not available if “Non-Prog” is selected on DIP switches 1 & 2) This feature allows the building owner to determine the duration of any temporary temperature override selected by the user.</p>																																										
<p>Option 2</p>	<p>Setting fan run-on after cooling demand This feature allows the installer to select a timed fan run-on following each cooling demand.</p>																																										
<p>Option 3</p>	<p>Setting fan run-on after heating demand This feature allows the installer to select a timed fan overrun following each heating demand.</p>																																										
<p>Option 4</p>	<p>Enabling or disabling programmable occupancy programming (not available if “Non-Prog” is selected on DIP switches 1 & 2) This feature allows the operation of the fan to be programmed to Auto or On, and the occupancy relay contacts to be opened or closed, during each event. Setting these options is affected during the event programming process. See step 3 para 3.1 through to 3.5 on page 4.</p>																																										
<p>Option 5</p>	<p>Setting fan operation mode (not available if “Non-Prog” is selected on DIP switches 1 & 2) This feature allows the building owner to determine what mode the fan will operate in and what overrides will be available to the user.</p>																																										
<p>Option 6</p>	<p>Selecting extent of keyboard disable function. active only when dip switch 5 is set to “keyboard disable” This feature allows installer to determine the extent of the disablement of keyboard functions if DIP switch 5 is set to “Keyboard disable”. See table below:</p> <table border="1" data-bbox="290 1119 1430 1581"> <thead> <tr> <th>Feature</th> <th>Part (nor)</th> <th>Full</th> </tr> </thead> <tbody> <tr> <td>Access to programming mode</td> <td>✗</td> <td>✗</td> </tr> <tr> <td>Access to advanced programming mode</td> <td>✗</td> <td>✗</td> </tr> <tr> <td>Access to service mode</td> <td>✗</td> <td>✗</td> </tr> <tr> <td>Access to Hold & Vacation mode</td> <td>✗</td> <td>✗</td> </tr> <tr> <td>Access to Daylight Savings Time Change</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Selection of AM/PM or 24 hour clock</td> <td>✓</td> <td>✗</td> </tr> <tr> <td>Selection of Fahrenheit or Centigrade scaling</td> <td>✓</td> <td>✗</td> </tr> <tr> <td>Mode select (auto/heat/cool/off)</td> <td>✓</td> <td>✗</td> </tr> <tr> <td>Mode select (EM heat, Heat-pump models)</td> <td>✓</td> <td>✗</td> </tr> <tr> <td>Fan Mode (Auto/On/Smart-fan)</td> <td>✓</td> <td>✗</td> </tr> <tr> <td>Temperature override (including duration)</td> <td>✓</td> <td>✗</td> </tr> <tr> <td>View temperature information</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Change display time to temperature</td> <td>✓</td> <td>✓</td> </tr> </tbody> </table>	Feature	Part (nor)	Full	Access to programming mode	✗	✗	Access to advanced programming mode	✗	✗	Access to service mode	✗	✗	Access to Hold & Vacation mode	✗	✗	Access to Daylight Savings Time Change	✓	✓	Selection of AM/PM or 24 hour clock	✓	✗	Selection of Fahrenheit or Centigrade scaling	✓	✗	Mode select (auto/heat/cool/off)	✓	✗	Mode select (EM heat, Heat-pump models)	✓	✗	Fan Mode (Auto/On/Smart-fan)	✓	✗	Temperature override (including duration)	✓	✗	View temperature information	✓	✓	Change display time to temperature	✓	✓
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<p>Note :</p>	<p>Settings of options 7 through b are dependent on each other. Not all settings will be accepted and an ERR message may be experienced. If this occurs press (▲) or (▼) to make the setting valid. Alternatively press NEXT button to return to option 7 and review the settings.</p>																																										
<p>Option 7</p>	<p>Setting heating / cooling dead-band adjustment (not available if “Changeover Manual” is selected on DIP switch 6) This feature allows the installer or the building owner to determine minimum dead-band between heating and cooling.</p>																																										
<p>Option 8</p>	<p>Setting maximum heating temperature set point This feature allows the building owner to determine the maximum heating temperature available to the user.</p>																																										
<p>Option 9</p>	<p>Setting minimum cooling temperature set point This feature allows the building owner to determine the minimum cooling temperature available to the user.</p>																																										

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Option C	<p>Optimum start control, heating (OSC) (not available if "Non-Prog" is selected on DIP switches 1 & 2) This feature allows the installer to enable the optimum start control for the heating event. If enabled it allows the heating to be turned on earlier than the programmed time in order to ensure that recovery of room temperature is achieved by the programmed time. The setting is dependent upon the capacity of the system and the building heat gain/loss characteristics and can be determined from the following table. If Option 4 (occupancy and smart-fan programming) has been enabled, the optimum start control will operate at each occupied event change that requires an increase in temperature. If Option 4 has been left in the disabled mode the optimum start controller will only function prior to the first event (Event 1) of the day</p> <table border="1" data-bbox="375 537 1370 926"> <thead> <tr> <th>Estimate of system temperature rise capability in 30 minutes</th> <th>Optimum start control settings</th> <th>Maximum duration of early on period</th> </tr> </thead> <tbody> <tr> <td>N/A</td> <td>0</td> <td>Optimizer disabled</td> </tr> <tr> <td>16°F</td> <td>1</td> <td>15 mins</td> </tr> <tr> <td>8°F</td> <td>2</td> <td>30 mins</td> </tr> <tr> <td>5-6°F</td> <td>3</td> <td>45 mins</td> </tr> <tr> <td>4-5°F</td> <td>4</td> <td>60 mins</td> </tr> <tr> <td>3-4°F</td> <td>5</td> <td>75 mins</td> </tr> <tr> <td>2-3°F</td> <td>6</td> <td>90 mins</td> </tr> <tr> <td>2°F</td> <td>7</td> <td>105 mins</td> </tr> <tr> <td>1-2°F</td> <td>8</td> <td>120 mins</td> </tr> </tbody> </table>	Estimate of system temperature rise capability in 30 minutes	Optimum start control settings	Maximum duration of early on period	N/A	0	Optimizer disabled	16°F	1	15 mins	8°F	2	30 mins	5-6°F	3	45 mins	4-5°F	4	60 mins	3-4°F	5	75 mins	2-3°F	6	90 mins	2°F	7	105 mins	1-2°F	8	120 mins
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Option d	<p>Optimum start control, cooling (OSC) (not available if "Non-Prog" is selected on DIP switches 1 & 2) This feature allows the installer to enable the optimum start control for the cooling event. If enabled it allows the cooling to be turned on earlier than the programmed time in order to ensure that recovery of room temperature is achieved by the programmed time. The setting is dependent upon the capacity of the system and the building heat gain/loss characteristics and can be determined from the following table. If Option 4 (occupancy and smart-fan programming) has been enabled, the optimum start control will operate at each occupied event change that requires a decrease in temperature. If Option 4 has been left in the disabled mode the optimum start controller will only function prior to the first event (Event 1) of the day.</p> <table border="1" data-bbox="363 1209 1360 1598"> <thead> <tr> <th>Estimate of system temperature reduction capability in 30 minutes</th> <th>Optimum start control settings</th> <th>Maximum duration of early on period</th> </tr> </thead> <tbody> <tr> <td>N/A</td> <td>0</td> <td>Optimizer disabled</td> </tr> <tr> <td>16°F</td> <td>1</td> <td>15 mins</td> </tr> <tr> <td>8°F</td> <td>2</td> <td>30 mins</td> </tr> <tr> <td>5-6°F</td> <td>3</td> <td>45 mins</td> </tr> <tr> <td>4-5°F</td> <td>4</td> <td>60 mins</td> </tr> <tr> <td>3-4°F</td> <td>5</td> <td>75 mins</td> </tr> <tr> <td>2-3°F</td> <td>6</td> <td>90 mins</td> </tr> <tr> <td>2°F</td> <td>7</td> <td>105 mins</td> </tr> <tr> <td>1-2°F</td> <td>8</td> <td>120 mins</td> </tr> </tbody> </table>	Estimate of system temperature reduction capability in 30 minutes	Optimum start control settings	Maximum duration of early on period	N/A	0	Optimizer disabled	16°F	1	15 mins	8°F	2	30 mins	5-6°F	3	45 mins	4-5°F	4	60 mins	3-4°F	5	75 mins	2-3°F	6	90 mins	2°F	7	105 mins	1-2°F	8	120 mins
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Option E	<p>Setting thermostat calibration This feature allows the installer to calibrate the temperature shown in the LCD display by $\pm 3^\circ\text{F}$.</p>																														

Option F	<p>Setting minimum off times and thermostat cycle rate This feature allows the installer to set the minimum Off time of the heat-pump, plus the thermostat cycle rate. The thermostat cycle rate depends on both the minimum off and minimum on times set.</p> <table border="1" data-bbox="565 220 1032 411"> <thead> <tr> <th rowspan="2">Minimum Off Times</th> <th colspan="5">Minimum On Times</th> </tr> <tr> <th>0</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td></td> <td colspan="5" style="text-align: center;"><i>Cycle Rate / Hour</i></td> </tr> <tr> <td>2</td> <td>6</td> <td>6</td> <td>6</td> <td>3</td> <td>3</td> </tr> <tr> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> <tr> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </tbody> </table>	Minimum Off Times	Minimum On Times					0	1	2	3	4		<i>Cycle Rate / Hour</i>					2	6	6	6	3	3	3	3	3	3	3	3	4	3	3	3	3	3
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3	3	3	3	3	3																															
4	3	3	3	3	3																															
Option H	<p>Setting minimum on times and thermostat cycle rate This feature allows the installer to set the minimum On time of the heat-pump, plus the thermostat cycle rate. The thermostat cycle rate depends on both the minimum on and minimum off times set (see table above).</p>																																			
Option L	<p>Setting low balance point This feature, which is only available if an outdoor sensor is installed, allows the installer to determine the outdoor temperature below which the heat pump is stopped and where the thermostat reverts to auxiliary heat. The setting depends upon the COP of the heat pump.</p>																																			
Option n	<p>Setting high balance point This feature, which is only available if an outdoor sensor is installed, allows the installer to determine the outdoor temperature above which the auxiliary heat is disabled. The setting is to a large extent determined by the heat-pump capacity and the building insulation standard. <i>Note: Emergency heat can still be selected at any time via the front panel button</i></p>																																			
Option r	<p>Setting remote sensor disable function This feature is only active if a remote temperature sensor is installed. The feature is used to disable the remote sensor and returns control to the thermostat's built-in sensor.</p>																																			

TROUBLE SHOOTING GUIDE

Problem	Possible Cause	Solution
The display does not come on when the thermostat is powered up	No common wire connected to terminal 11	Connect terminal 11 to the transformer common
The display is on and the relays in the thermostat are clicking	No 24 volt on terminals RH and/or RC	Install jumpers between terminals 1 (RH), 8 (RC) and 12
Nothing happens when the PROG button is pressed	DIP switches 1 & 2 are set to NON-programmable	Select a programmable option (DIP switch 1 & 2)
	Keyboard locked	Unlock keyboard (DIP switch 5)
When the thermostat is taken off the wall to change one of the DIP switches the time is lost and needs to be reset	The on-board rechargeable backup battery is not sufficiently charged to hold the memory	Leave the thermostat running for a few hours to charge the battery

SPECIFICATION

Power supply

Battery models	: 2 x AA Alkaline
24 Volt models	: 20-30 VAC 50/60 Hz
Switch rating	: 10-30 VAC, 2(1)A per output
Max. ambient temp.	: 113°F (45°C)
Dimensions (inches)	: 5.3 wide x 4.5 high x 1 deep
Dimensions (mm)	: 135 wide x 116 high x 27 deep

**For more information on the 8000 Series thermostat visit our website:
www.na.heating.danfoss.com**



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