

Applies to: PREEVA Models PDH, SDH, and RDH with Control Option DG1, DG2, DG5, or DG6

Application and Instructions for Field Adjustment of the Control (Model FX05) in Digital Control Option DG1, DG2, DG5, and DG6

Control Options Apply to PREEVA Models SDH, PDH, and RDH (without optional dehumidification) (Includes worksheet on page 12 to record adjustable parameters.)

Contents

Introduction.....	1
Installation Warnings and Notes	1
General Sequence of Operation	2
Controller Display.....	6
Main Display.....	6
ERROR CODES	7
Reviewable Parameters on Main FX05 Display.....	7
<u>Time Clock</u> (Option BHB1 required.)	9
Discharge/Duct Sensor	10
WORKSHEET for Adjustable Parameters.....	12

Introduction

The microprocessor unit (Model FX05) in control Options DG1/2/5/6 is custom programmed for pre-engineered ventilation air handlers (PREEVA) split system HVAC systems. Control features include:

- Custom 3-step control sequence of heating and cooling
- Gas heating modulation control option
- Fully integrated outdoor ambient lockouts based on outdoor dry bulb
- Alarm and equipment shutdown features
- Service/Commissioning Test Mode
- Integrated timer functions for cooling and heating (optional)



FX05

There are four buttons that can be used for adjusting setpoints, viewing unit status; and enabling unit test or shut down modes. The controller display will indicate unit status (on, off, or alarm), discharge air

Installation Warnings and Notes

DANGER: Risk of Electrical Shock - To avoid possible electrical shock or equipment damage, disconnect power supply before making electrical connections.

IMPORTANT: The Model FX05 controller is designed for use only as an operating control. Where an operating control failure would result in personal injury or loss of property, it is the responsibility of the installer to add devices (safety and/or limit controls) or systems (alarm and/or supervisory systems) that provide protection from or warning of control failure.

IMPORTANT INSTALLATION NOTES

- 1) All Installations** - The FX05 control is DC voltage. DC voltage wires must not be run in the same conduit as the 24V or line voltage wiring. Use of shielded cable wire is recommended for DC voltage.
- 2)** The discharge air sensor is factory wired in the low voltage control box. The installer must relocate the discharge air sensor to the heater discharge or ductwork for proper heating discharge air control.
- 3) Installation with an optional communication or time clock card insert (Option BHB1, BHB2, or BHB3)**
- Always remove controller power when installing or removing a communication or time clock card insert.

General Sequence of Operation

The four DG control sequences include a wall-mounted Fan/Heat/Cool/Auto Switch.

Option DG1 - Room control with 2-stage gas heating and 3-stage cooling control. The wall mount interface allows the user to adjust the space setpoint from 45°F to 95°F and select the unit mode. Unit modes are Cool Only, Heat Only, Fan Only, Auto Mode, and Off

Option DG2 - Room control with 4:1 modulated gas heat and 3-stage cooling control. The wall mount interface allows the user to adjust the space setpoint from 45°F to 95°F and select the unit mode. Unit modes are Cool Only, Heat Only, Fan Only, Auto Mode, and Off.

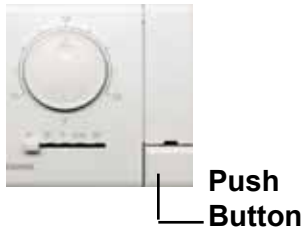
Option DG5 - Room control with 2-stage gas heating and 3-stage cooling control. The wall mount interface allows the user to adjust the discharge air temperature $\pm 6^\circ\text{F}$ from the factory-mounted controller setpoint and select unit mode. Unit modes are Cool Only, Heat Only, Fan Only, Auto Mode, and Off

Option DG6 - Room control with 4:1 modulated gas heat and 3-stage cooling control. The wall mount interface allows the user to adjust the discharge air temperature $\pm 6^\circ\text{F}$ from the factory-mounted controller setpoint and select unit mode. Unit modes are Cool Only, Heat Only, Fan Only, Auto Mode, and Off

The heating and cooling equipment will cycle to maintain the active heating discharge or space temperature setpoint, based upon the unit mode and time of day schedule.

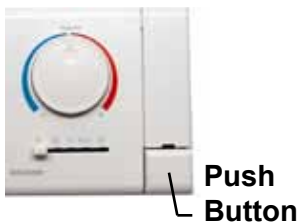
Unit Control Points - DG1, DG2, DG5, DG6	
Analog Inputs	Digital Inputs
1) Space Temperature/Discharge Air Temperature	1) Dirty Filter
2) Space Temperature Setpoint (45 - 90°F) or ($\pm 6^\circ\text{F}$ Warmer/Cooler)	2) Temporarily Unoccupied Override
3) Outdoor Air Temperature	3) Occupied/Unoccupied
4) Mode Slider - Heat, Cool, Auto, Fan, Off	4) Air Proving/Phase Loss
	5) Boost Mode
Digital Outputs	Analog Outputs
1) Fan	1) Modulating Gas Valve
2) Heat Stage 1	
3) Heat Stage 2	
4) Cool Stage 1	
5) Cool Stage 2	
6) Cool Stage 3	

FIGURE 1A - Room Command Module, P/N 211423, in Option DG1 and Option DG2



Provides on-off and heat/vent/cool mode selection; room temperature selection; and has a push button for unoccupied override.

FIGURE 1B - Room Command Module, P/N 211424, in Option DG5 and Option DG6



Provides on-off and heat/vent/cool mode selection; adjusts discharge air temperature $\pm 6^\circ$; and has a push button for unoccupied override.

Sequence of Operation

Options DG1 and DG2 are space temperature control. Options DG5 and DG6 are discharge air temperature control. With all four options, a wall-mounted sensor and setpoint dial controls the functionality. With discharge air temperature control (DG5 and DG6), the wall sensor is disabled and a discharge sensor is used to control the temperature. The wall unit shown in **FIGURE 1A** is used with Options DG1 and DG2; it has a 45°F to 95°F adjustment dial to set the desired space temperature. The wall unit shown in **FIGURE 1B** is used with Options DG5 and DG6; it has a $\pm 6^\circ\text{F}$ warmer/cooler adjustment dial for the discharge air temperature setpoint. Both wall units have a mode slider and an unoccupied mode override button. The slider selects the functionality of the unit: Cool Only, Heat Only, Fan Only, Auto Mode, Off.

The dial value will be the working heating or cooling setpoint depending on the mode. In the **auto mode**, the dial is the midpoint value between the cooling and heating setpoint. Example: (variable DB = 2°F default) If the dial is set to 72°F, the cooling and heating setpoints for unit operation are 70°F and 74°F respectively.

Mode Slider Function

Cool Only - The unit will allow only the cooling to function. There is an adjustable parameter “OC” outdoor ambient temperature lockout setting below which mechanical cooling will not be allowed to operate.

Heat Only - The unit will allow only the heating to function. There is an adjustable parameter “OH” outdoor ambient temperature setting above which heating will not be allowed to operate.

Fan Only - The unit will allow only the fan to run. The fan will run only in occupied mode if the external contact is closed (Binary input #3). If the contact is open, the fan will not run.

Auto Only - The unit will be allowed to provide heating and cooling, providing the outdoor ambient conditions are met. The heating setpoint and cooling setpoint are controlled by “HSP” and “CSP” settings and the setpoint dial (warmer/cooler adjust or the Setpoint dial setting), and the value of DB. **NOTE: The slider must be in “Auto” for automatic occupied/unoccupied change to work.**

Off - The unit will shut down all functionality – neither heating, cooling nor fan will be allowed to operate.

Note: Hold the Enter key on the controller for 15 seconds to access the variable screens. (SUO should appear.) Use the down arrow to go to SSI. Press the enter button. If the value is ON, the sensor with the setpoint overlay is active. If the value is OFF, the sensor with the warmer/cooler adjust should be used. Use the up/down arrows to toggle between ON/OFF and press the enter button to save. This setting can also be changed in CommPro (nciWallStatSelect). See the control instruction manual for more information.

Fan Operation

When the slide is not in the OFF position and the unit is in the Occupied Mode based upon the input, the fan will run continuously. In the Unoccupied Mode, the fan will only run on a call for heating or cooling. The fan will be off if the slide is in the OFF mode. Upon a call for the fan to run, if the air proving switch does not make after 180 seconds, the unit shuts down. Turn the unit FX-05 controller OFF then ON, or press the UP and Down arrows simultaneously for 5 seconds, to reset the alarm condition. When the unit is locked out, heating and cooling functions will be disabled. Control will display a flashing “AP”

If cooling or heating operations are energized and fan proof is lost for three seconds, the cooling or heating functions will be shut down, fan will be de-energized, and “AP” will flash on the display.

In the unoccupied mode, when the slider switch is moved to the OFF position, or the call for heating or cooling ends, the fan will run for an additional 30 seconds before shutting off. This fan delay time is adjustable using variable “Fod”.

General Sequence of Operation (cont'd)

Occupied Mode

Unit will control to the Occupied Setpoints.

Cooling or Heating Slider Mode & Dial Setpoint (Options DG1 and DG2): The dial setting is the working heating or cooling setpoint.

Auto Slider Mode & Dial Setpoint (Options DG1 and DG2): The dial setting is the midpoint for the working heating and cooling setpoint. The actual setpoint is adjusted by a value of "db" (deadband) which has a default value of 2°F.

The cooling setpoint = dial setting + db = 72°F + 2°F = 74°F

The heating setpoint = dial setting + db = 72°F - 2°F = 70°F

Auto, Cooling, or Heating Slider Mode, & Warmer/Cooler Dial (Options DG5 and DG6): The value HSP or CSP in the controller becomes the active heating and cooling setpoint basis. The warmer/cooler adjusts the setpoint by ±6°F.

"HSP," default 68°F

"CSP," default 72°F

The cooling setpoint = dial setting + CSP = +6°F + 72°F = 78°F

The cooling setpoint = dial setting + CSP = -6°F + 72°F = 66°F

The heating setpoint = dial setting + HSP = +6°F + 68°F = 74°F

The heating setpoint = dial setting + HSP = -6°F + 68°F = 62°F

Note: When variable SSI = ON, Room Command Module with setpoint scale should be used (DG1 or DG2). When SSI = OFF, Room Command Module with warmer/cooler scale should be used (DG5 or DG6).

Unoccupied Mode

(NOTES: Option BHB1 time clock card is required. Unoccupied Mode is not available with Option DG6.)

Unit will control to the unoccupied temperature setpoints.

The unoccupied setpoints are the working Heating Setpoint minus the value of "UoU" which has a default of 10°F and the working Cooling Setpoint plus the value of "UoU".

Auto Slider Mode & Dial Setpoint (Options DG1 and DG2):

The cooling setpoint = dial setting + db + UoU = 72°F + 2°F + 10°F = 84°F

NOTE: The automatic change to unoccupied mode will only occur with the slider in "Auto" position. Unoccupied mode will not work with slider in Heat or Cool position.

Boost Mode: Unit will add an adjustable amount BOU (nciBoostModeOffset) (default 5°F) to the working heating setpoint and subtract from the working cooling setpoint. **NOTE: Boost Mode will only operate with the slider in Heat or Cool position. Boost is not available when slider is in Auto position.**

Example: Cooling Slider Mode & Dial Setpoint:

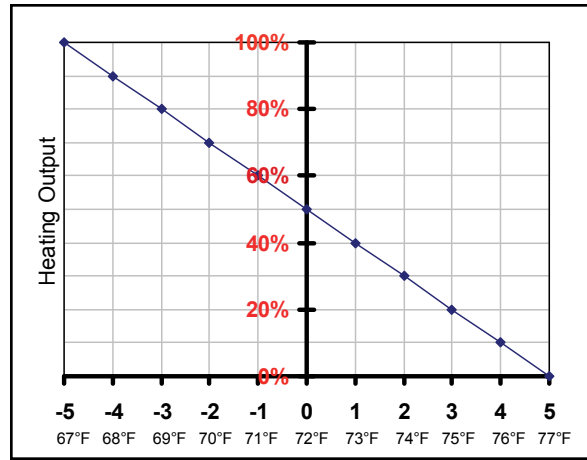
The cooling setpoint = dial setting + BOU = 72°F - 5°F = 67°F

Heating Operation

The unit will initiate heating if the temperature sensed at the space sensor or discharge falls below the "HSP" setpoint by the value of the heating proportional band, "HPB" (Default value 5°F). When it does, full heating turns on (high fire).

The analog output will modulate to 100% full fire for 180 seconds to ensure proper burner ignition. After the burner ignition, the gas valve will modulate to maintain the space or discharge air temperature setpoint.

Temperature Difference From Setpoint and Heating Output



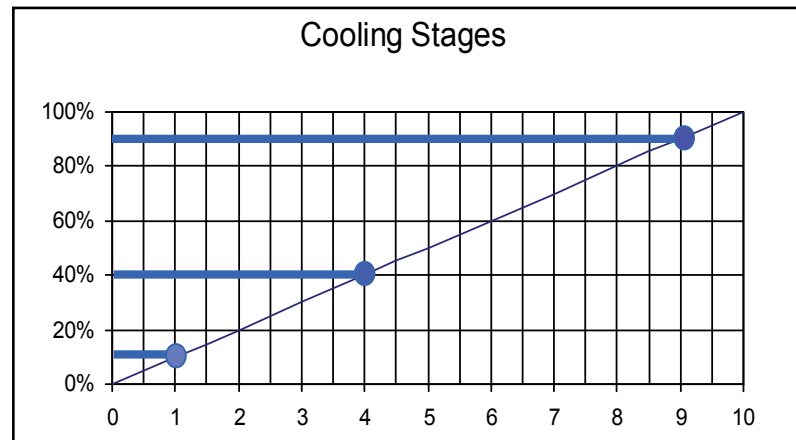
Example: Heating will enable when

$$\text{Temperature} < \text{WHSP} - \text{HSP} - \text{HDB} < 72^\circ\text{F} - 5^\circ\text{F} - 0^\circ\text{F} < 67^\circ\text{F}$$

So, when the space temperature drops below 67°F, the signal to the gas valve is 100% and the burner ignites. After the 180 seconds, if the temperature is 72°F, the signal to the gas valve will be 50%.

Heating is disabled when the ambient temperature is above the lockout value “oH” (default 62°F).

Cooling Operation



The unit will initiate cooling if the temperature sensed at the space sensor (discharge air sensor) climbs above the WCSP into the Cooling proportional band, CPB. The cooling stages are based on C1, C2 and C3 value.

Example: WCSP = 72°; CPB = 10°

Cooling Stage 1 will enable when:

$$\text{Temperature} > \text{WCSP} + 10\% \text{ of CPB or } 72^\circ + 1^\circ = 73^\circ$$

Stage 2 will enable when:

$$\text{Temperature} > \text{WCSP} + 40\% \text{ of CPB or } 72^\circ + 4^\circ = 76^\circ$$

Stage 3 will enable when:

$$\text{Temperature} > \text{WCSP} + 90\% \text{ of CPB or } 72^\circ + 9^\circ = 81^\circ$$

Cooling is disabled by the following percentages of CPB:

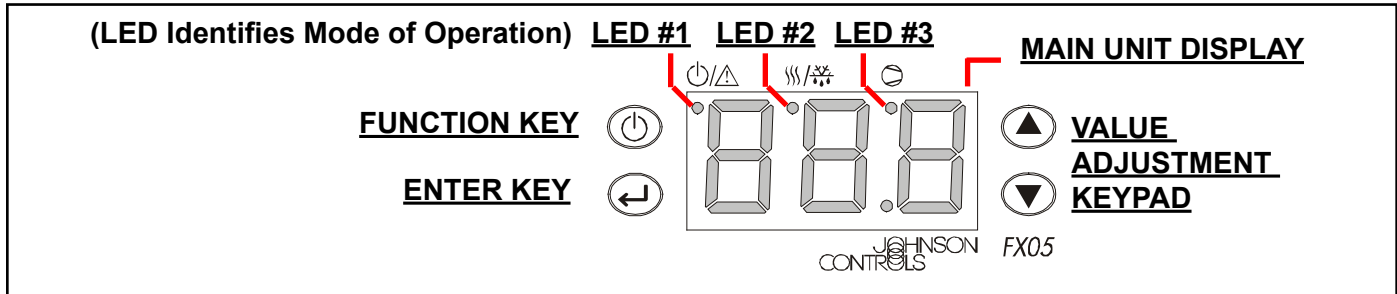
Stage 3 will disable when temperature drops to WCSP + 40% of CPB
or $72^\circ + 4^\circ = 76^\circ$

Stage 2 will disable when temperature drops to WCSP + 10% of CPB
or $72^\circ + 1^\circ = 73^\circ$

Stage 1 will disable when temperature drops to WCSP + 5% of CPB
or $72^\circ + .5^\circ = 72.5^\circ$

Controller Display

The display of the FX05 controller is designed to allow the user to identify the current operating mode of the system, change key functional settings, and to aid in troubleshooting. The key controller parameters are shown in the illustration below.



LED #1, #2, and #3 Identify Operation Mode

If **LED#1** is **ON**, the unit is on at the FX05 control. If the LED#1 is OFF, the unit is off at the FX05 control. The FX05 must be ON, before any heating/cooling/fan functions can occur. To turn FX05 control ON/OFF, push and hold the Function Key (power symbol) (upper left) for 5 seconds. If the unit is on at the FX05 control, the slider switch on the room stat will then take over control.

LED#2 is ON if the unit is in Occupied Mode. **LED#2** is OFF if the unit is in Unoccupied Mode. If **LED#2 FLASHES**, the unit is in Temporary Occupied Mode (i.e. unit is in unoccupied, and the button on the space sensor is pushed, forcing the control to produce heat or cool to meet occupied setpoints for the temporary occupied time period default of 60 minutes.)

LED#3 is ON if the blower is on. **LED#3** is OFF if the blower is off.

Main Display

The unit-mounted controller main display is shown below. Use the up or down arrow to move through the menu. Press the enter key to view the current value.

FX-05 Display	Lon Variable	Description	Default / Range
oFF, FA _n , CL _g , Ht _g , AU _t	-	The Unit status or current mode is controlled by the user interface *oFF: The unit is “off” providing no control *FA _n : Blower operation only *CL _g : Blower and cooling control *Ht _g : Blower and heating control *AU _t : Blower, heating, and cooling control with deadband between heating and cooling modes	N/A
SA _t	nvoSpaceTemp	SA_t - Current space (or discharge) temperature value.	N/A
OA _t	nvoOutdoorTemp	OA_t - Outdoor Air Temperature	N/A
CSP	nvoWHSP	CSP - Working Heating Setpoint	N/A
HSP	nvoWCSP	HSP - Working Cooling Setpoint	N/A
oS	Occupancy PLC / Output 1	oS - Occupied Status Occupied Mode - OCC (DI-3 closed) or Unoccupied Mode – UNO (DI-3 Open).	N/A

ERROR CODES

Error Codes on FX05 Display and LED on the Room Command Module

On Option DG1 and DG2 systems, the software is configured so the analog output will turn on the LED of the space sensor when any of the following errors occur. On all DG options, the main display on the FX05 control will flash the error codes listed below.

Display	Error
AP	AP – Air Proving Switch Lockout – When switching into Occupied Mode or on a call for heating or cooling in the Unoccupied Mode, the blower will be initiated. If after 180 seconds the air proving switch does not close, the unit will be locked out on manual reset (i.e. reset by cycling power (24VAC), turning the unit off then on, or pressing the Up and Down Arrows simultaneously for 5 seconds). When the unit is locked out because air proving switch does not close, heating and cooling functions will be disabled. Control will display a flashing “AP”.
FS	FS – Low Limit Freeze Lockout – If the space temperature (Options DG1 & DG2) or discharge air temperature (Options DG5 & DG6) is below the “LSP” (low limit freeze protection setpoint) for 600 seconds, the unit is shutdown (blower off and no heating/cooling functions). Pressing and holding the up and down arrows simultaneously for 5 seconds will reset the controller, allowing it to continue from its final position. Cycling of power to the FX05 control will reset the alarm as well. If the space temperature (Options DG1 & DG2) or discharge air temperature (Options DG5 & DG6) increases 30°F above the low limit setpoint (LSP), the unit will resume operation without being physically reset.
St	St – Failed Space/Discharge Temperature Sensor – The display will flash ST, and the unit will not be allowed to operate.
ot	ot – Failed Outside Air Temperature Sensor – Heating /cooling functions will be disabled; blower will still run if unit is in Occupied Mode.
df	df – If the dirty filter pressure switch option is ordered, display will flash when the pressure switch closes.

Reviewable Parameters on Main FX05 Display

Control Parameters - Hold ENTER Key on FX05 Control for 5 seconds to show:	
Display	Use UP and DOWN arrow keys to view the following codes
St 1	ST1
db	db = Unit is within Heating & Cooling dead band
C 1	C1 = Unit is in 1st Stage Cooling
C 2	C2 = Unit is in 2nd Stage Cooling
C 3	C3 = Unit is in 3rd Stage Cooling
H 1	H1 = Unit is in Active Heating
St 2	ST2
oCC	oCC = Unit is in Occupied Mode via Time Clock Card
UnO	UnO = Unit is in Unoccupied Mode via Time Clock Card
ntC	ntC = No Time Clock Attached

Reviewable Parameters on Main FX05 Display (cont'd)

Commissioning Parameters - Hold ENTER Key on FX05 Control for 10 seconds to show:			
The initial screen text will appear. Use the "up" and "down" arrow key to scroll through the parameters. To view a parameter setpoint, select it and push "enter". To change the parameter setpoint, use the "up" or "down" keys and press "enter" to accept new setting and "enter" again to exit.			
Display	Description	Range	Default
CSP	CSP - This is the (discharge or space) Cooling setpoint. The Working Cooling setpoint is this value, +/- the warmer-cooler adjust, and if the unit is Occupied, Unoccupied, Boost.	100 to 49°F	72°F
CPb	CPb - This is the cooling proportional band. As the zone temperature increases above the working cooling setpoint, the proportion of cooling activated depends upon this value. For instance if the working cooling setpoint is 72°F, and the cooling proportional band is 10°F, as the zone temperature increases from 72°F to 82°F, the proportion of cooling will increase from 0% to 100%.	41 to 0°F	10°F
HSP	HSP - This is the (discharge or space) Heating setpoint. The Working Heating setpoint is this value, +/- the warmer-cooler adjust, and if the unit is Occupied, Unoccupied, Boost.	120 to 45°F	68°F
HPb	HPb - This is the heating proportional band. As the zone temperature decreases below the working heating setpoint, the proportion of heating activated depends upon this value. For instance if the working heating setpoint is 68°F, and the heating proportional band is 5°F, as the zone temperature decreases from 68°F to 63°F, the proportion of heating will increase from 0% to 100%.	41 to 0°F	5°F
Hdb	Hdb - This value adjusts the point at which the proportional band begins working. For instance if this value is 2°F, and the above scenario describing the proportional band is used, the heating output would not begin increasing until 66°F (i.e. 68°F-2°F).	2.7to0°F	0°F (DG1&5) 2°F (DG2&6)
iCt	iCt - This value will force the heating call to increase in a quicker fashion than standard proportional control. The lower the value the quicker the integration, the higher the value the slower. This value should remain at the default setting, and if it is changed, the action should be observed very closely.	999 to 0 seconds	0(DG1&5) 300 (DG2&6)
SSH	SSH - When the call for heating is 90%, DO-3 will close (Option DG2 or DG6). A default value of 50% is used as second stage of heat when the unit has a 2-stage heating system (Option DG1 or DG5).	100% to 10%	50% (DG1&5) 90% (DG2&6)
SSo	SSo - When DO-3 is closed and the call for heating drops to 5%, DO-3 will open.	10%to0%	5%
LSP	LSP - If the space sensor (discharge air sensor) reads a value below this value for 10 minutes, the unit will stop all heating or cooling or blower functions.	40to-40°F	36°F
UoU	UoU - This is the value added to the working cooling setpoint and subtracted from the working heating setpoint when the unit is in unoccupied mode – BI-3 Open. NOTE: Slider must be in "Auto" position for unoccupied to work.	45 to 0°F	10°F
boU	boU - This is the amount subtracted from the working cooling setpoint and added to the working heating setpoint when the unit is in Boost Mode – BI-5 Closed. NOTE: Slider must be in either heat or cool position for Boost to operate.	45 to 0°F	5° F
oC	oC - This is the outdoor air setpoint below which mechanical cooling is not allowed to function.	131 to 57°F	68°F
oC2	oC2 - The outside air setpoint that must be met to energize stage 2 of cooling.		75°F
oC3	oC3 - The outside air setpoint that must be met to energize stage 3 of cooling.		80°F
oH	oH - This is the outdoor air setpoint above which heating is not allowed to function.	105 to 22°F	62°F
C1	C1 - Percentage of Cpb above working cooling setpoint required to energize cooling Stage 1.		10%
C2	C2 - Percentage of Cpb above working cooling setpoint required to energize cooling Stage 2.		40%
C3	C3 - Percentage of Cpb above working cooling setpoint required to energize cooling Stage 3.		100%

Hold ENTER Key on FX05 Control for 20 seconds to show:			
Display	Description	Range	Default
SoU	SoU - This is the amount added or subtracted from the HSP and CSP when the warmer/cooler adjust dial is turned. 6°F means that if HSP = 68°F when the notch on the dial is in the center, moving the dial fully counterclockwise subtracts 6°F, moving the dial fully clockwise adds 6°F.	16to-16°F	6°F
So1	So1 - This value is used to correct any error due to wiring lead lengths for the space or discharge air sensor.	16to-16°F	0°F
So2	So2 - This value is used to correct any error due to wiring lead lengths for the outdoor air sensor.	16to-16°F	0°F
SS	SSi - If this value is Log Off, the room sensor with warmer/cooler adjust should be used. If it is Log On, the room sensor with the setpoint dial should be used.	Off or On	Log Off
db	db - If the unit is in the Auto Mode, and the room sensor with the setpoint dial is used, this is the offset from the dial setting at which heating and cooling occurs. For instance, if the dial is set at 71°F, the heating setpoint will be 69°F and cooling setpoint will be 73°F (i.e. 2°F offset from the dial).	45 to 0°F	2°F
tot	tot - When the unit is in Unoccupied Mode and the button on the Space sensor is pressed, the unit will control to the occupied setpoints for this period of time.	999 to 0 minutes	60Minutes
APt	APt - When the unit goes into Occupied Mode, or there is a call for heat or cool in Unoccupied Mode, the blower starts. The air-proving switch must be made before this time limit to avoid lockout.	999 to 0 seconds	180 Seconds
LEd	LEd - If the unit does not have modulating gas (Options DG1 and DG5), this parameter can be set to Log On. When this occurs, and the space sensor is wired to the analog output, the room sensor LED will light if there is an error at the FX05 control.	Off or On	Log Off
FOd	FOd - When the blower is commanded off, it will remain on for this delay time after the command is given.	999 to 0 seconds	30Seconds

Time Clock

(Option BHB1 required.)

NOTE: Time clock is not available with Option DG6.

Current Status

To view the current time clock status on the FX05, hold the "Enter" and "Function" key for 5 seconds. The initial display text will appear as "Uni" or Units of measure. The time clock variables are only valid if a time clock card (Option BHB1) is installed in the controller.

Display	Description	Value
Uni	Uni - Unit of Measure	°C or °F
tS	tS - Time Clock Status - Press Enter to view	OFF= not active, ON = Active, URL = card not installed.
Add	Add - Lon or N2 Network Address (Option BHB2 or BHB3 required)	
Hr	Hr - Current Time Clock - Hour	0-23 Hours (Military Time)
in	in - Current Time Clock - Minutes	0-59 Minutes
dAy	dAy - Current Time Clock - Day	Sunday thru Saturday -- = 0 thru 7 value

Time Clock (cont'd)

Time Clock Variables

To access the time clock variables, hold the "Enter" key for the 10 seconds. (The initial screen text will appear as "SSP".) Use the "Up" or "Down" arrow key to scroll through the parameters. If you would like to view a parameter setpoint, select the desired parameter and push the "Enter" key once. Use the "Up" or "Down" arrow key to change the parameter. To exit, press "enter" (to accept the value displayed) and "enter" again to exit. A description for each of the field adjustable time clock parameters is shown below.

Variable Displayed	Description	Default Value	Range
H1	H1 - Defines the hour in which to start the occupied cycle from Monday to Friday	6	0 - 23
t1	t1 - Defines the minute in which to start the occupied cycle from Monday to Friday	0	0 - 59
H2	H2 - Defines the hour in which to stop the occupied cycle from Monday to Friday	18	0 - 23
t2	t2 - Defines the minute in which to stop the occupied cycle from Monday to Friday	0	0 - 59
H3	H3 - Defines the hour in which to start the occupied cycle on Weekends	6	0 - 23
t3	t3 - Defines the minute in which to start the occupied cycle on Weekends	0	0 - 59
H4	H4 - Defines the hour in which to stop the occupied cycle on Weekends	18	0 - 23
t4	t4 - Defines the minute in which to stop the occupied cycle on Weekends	0	0 - 59

Discharge/Duct Sensor

Discharge Air Sensor, P/N 206112, and Holder, P/N 115850, for Ductwork Installation



Maximum Sensor Wire Length for less than 1°F Error

Wire Gauge	Maximum Sensor Wire Length	
	Feet	Meters
14	800	244
16	500	152
18	310	94
20	200	61
22	124	38

All makeup air digital controls have a discharge air sensor and require field installation of the discharge air sensor holder. The discharge air sensor holder and a holder bracket are shipped with all units.

Digital control inputs are low-current, resistance-based signals. The manufacturer recommends for optimum temperature control performance that the analog and digital inputs (zone sensors, discharge air sensors, etc.) that are connected to the main controller be routed to the unit in one of the following manners:

- In separate conduits, isolated from 24 VAC controls and line voltage power to the unit, **OR**
- If the main control sensor wires are to be run in the same conduit as the 24 VAC control wiring, the control wiring must be completed using shielded cable and bundled separately from the 24 VAC control wiring. The shield must be drained at the unit and taped on the opposite end.

See the table on the left for wire gauge and length requirements of digital control signal wiring.

If the installation has supply ductwork, the sensor holder must be installed in the ductwork. If the installation does not have supply ductwork, the sensor holder must be installed at the unit discharge. A bracket is supplied to use when there is no ductwork.

Instructions for Installing Discharge Air Sensor Holder in Ductwork

1. Installation requires the discharge air sensor holder including the box cover. (The bracket will not be used.)
2. Determine a location in the ductwork to install the sensor. Select a location a sufficient distance from the outlet to provide a good mixture of discharge air temperature. The holder will extend 9-3/16" (233mm) into the ductwork.
3. The position of the sensor holder is important. Turn the holder so that the element will be shielded from direct airflow and will sense the air temperature as it flows through the holes in the holder. At the selected location in the ductwork, mark the diamond-shaped hole required for the sensor holder. Cut the hole no larger than required, approximately 1" x 1" (25mm x 25mm).
4. Push the element into the clip in the holder. Determine where the sensor wire should enter the box and remove the knockout. Slide the holder into the ductwork. Using four field-supplied No. 6 sheetmetal screws, attach the box portion of the holder to the ductwork. Attach a field-supplied cable connector to the box, connect the sensor wire, and attach the box cover.

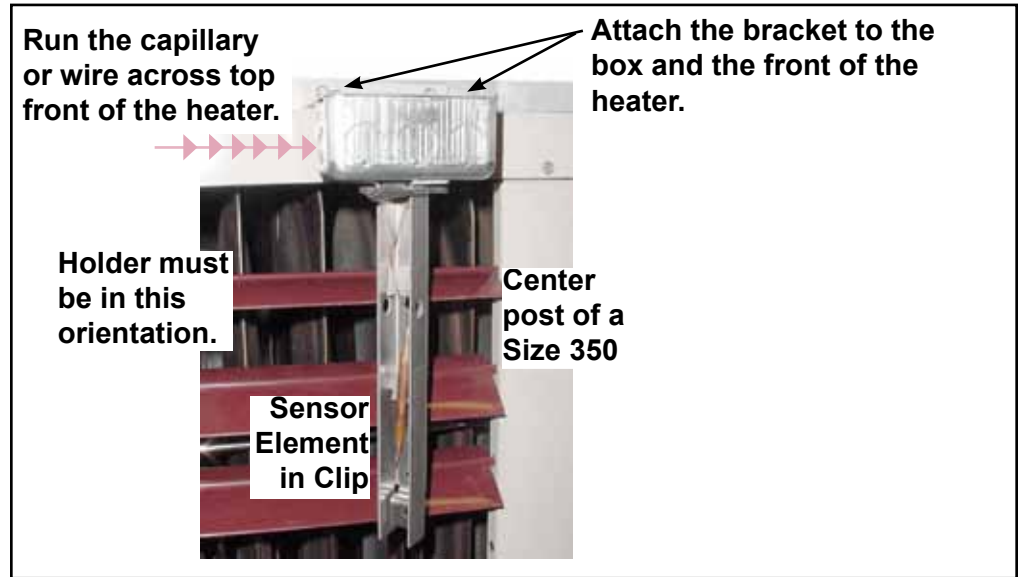
Discharge Air Sensor Holder, P/N 115850, and Bracket, P/N 213612

Sensor Data for Johnson A99 Series Temperature Sensors - Resistance vs Temperature
(applies to both discharge and outside air sensor)

°F	°C	Ohms
-40	-40	613
-31	-35	640
-22	-30	668
-13	-25	697
-4	-20	727
5	-15	758
14	-10	789
23	-5	822
32	-0	855
41	5	889
50	10	924
59	15	960
68	20	997
77	25	1035
86	30	1074
95	35	1113
104	40	1153
113	45	1195
122	50	1237
131	50	1279
140	60	1323
149	65	1368
158	70	1413
167	75	1459
176	80	1506
185	85	1554
194	90	1602
203	95	1652
212	100	1702
221	105	1753
230	110	1804
239	115	1856
248	120	1908

Instructions for Installing Discharge Air Sensor Holder on the Heater - applies only to Models PDH and SDH without ductwork

1. Installation requires the discharge air sensor holder and the bracket. (If attached, remove the box cover; it will not be used.)



2. Select a location for the box on the front near the center of the heater as shown on the Model Size 350 in the illustration. Orientation of the sensor holder is important. Position the box so that the element will be sensing the air temperature as it flows through the holes in the holder.
3. Push the element into the clip in the holder. Determine where the sensor wire should go through the box and remove the knockout at that location. Attach a field-supplied cable connector to the box. Connect the sensor wire. Attach the bracket to the box. Attach the bracket to the front of the heater.

Outside Air Dry Bulb Sensor The outside air sensor (P/N 206112) for the FX05 is the same as the discharge sensor. The Johnson A99 Series Temperature Sensor Chart below applies to both the discharge and outside air sensors. If the application uses mixed air (return and outside air), the outside air temperature sensor and optional humidity transmitter must be mounted together to sense outdoor air conditions. Verify that factory mounted positions provide acceptable performance.

Outside Air Dry Bulb Sensor, P/N 206112



WORKSHEET for Adjustable Parameters
(See pages 6-9 for explanations.)

Display	PARAMETER	Adjustable Range	DEFAULT Setting	Field Value
Hold ENTER Key for 10 seconds to show. To change, use UP or DOWN key, press ENTER to accept, press ENTER again to exit				
CSP	CSP - <u>Occupied COOLING SETPOINT</u> (discharge air or space)	100 to 49°F	72°F	
CPb	CPb - Cooling Proportional Band	41 to 0°F	10°F	
HSP	HSP - <u>Occupied HEATING SETPOINT</u> (discharge air or space)	100 to 45°F	68°F	
HPb	HPb - Heating Proportional Band	41 to 0°F	5°F	
Hdb	Hdb - Heating Deadband	2.7 to 0°F	0°F (DG1&5)	
			2°F (DG2&6)	
iCt	iCt - Value to force heating call to increase in a quicker fashion than standard proportional control	999 to 0 seconds	0 (DG1&5)	
			300 (DG2&6)	
SSH	SSH - Second Stage Heat Energizing	100% to 10%	50% (DG1&5)	
			90% (DG2&6)	
SSo	SSo - Second Stage Heating Disable	10% to 0%	5%	
LSP	LSP - Low Limit Freeze Protection	40 to -40°F	36°F	
UoU	UoU - Unoccupied Mode Value	45 to 0°F	10°F	
boU	boU - Boost Mode Value	45 to 0°F	5°F	
oC	oC - Outdoor air setpoint below which cooling is not allowed	131 to 57°F	68°F	
oC2	oC2 - Outside air setpoint that must be met to energize stage 2 of cooling.		75°F	
oC3	oC3 - Outside air setpoint that must be met to energize stage 3 of cooling.		80°F	
oH	oH - Outdoor air setpoint above which heating is not allowed	105 to 22°F	62°F	
C1	C1 - Percentage of CPb above CSP required to energize cooling Stage 1.		10%	
C2	C2 - Percentage of CPb above CSP required to energize cooling Stage 2.		40%	
C3	C3 - Percentage of CPb above CSP required to energize cooling Stage 3.		100%	

**Keep this and all other manuals
for future reference.**

Specifications & illustrations subject to change without notice and without incurring obligations.

©Nortek Global HVAC, LLC 2015. All rights reserved.

All marks are the property of their respective organizations.

O'Fallon, MO | Printed in U.S.A. (12/15)

Form CP-PREEVA DG with FX05 (12-15), PN 254027R3