

**Application Note 2029:
PVFY Electric Heater Configuration &
Electric Heat Kit Information**

Author **Matthew Sooy** | Sr. Mechanical Engineer - NEBU

Table of Contents

Introduction.....	3
PVFX Initial Settings	3
Fan Settings (Default):.....	3
Heater Comfort Mode (Default):.....	4
Heater Economy Mode:.....	5
Heater Basic Control Mode (Single Stage Operation):.....	6
Electric Heat Lockout.....	7
PVFX Required Changes When Using Electric Heat Kit	8
Electric Heat Kits	9
Basic Information:	9
Electrical Specs:.....	9
Safeties:.....	10

Introduction

The PVFY-NAMU-E vertical air handling unit is the first unit designed to be used with a Mitsubishi Electric Heat Kit (EH##-MPA-S/M/L) as opposed to a third party auxiliary heater. As such the unit's default settings have been modified to ensure that the Electric Heat Kit will operate effectively out of the box. These settings can be modified as desired to fit specific applications. As the default, the Electric Heat Kit is designed to operate based on drop in space temperature (default) or drop in ambient temp during normal heat pump operation. Supplemental default functions include Electric Heat Kit operation during error mode. The broad scope of error modes includes operation at ambient temperatures below the condensing unit's heating cut-out temperature (typically -18.7FWB as sensed by the thermistor (TH7) on the condensing unit's control board) i.e. the Electric Heat Kit will enable and attempt to maintain the set temperature on the controller while Error Code #3121 (out of range outside air temperature) will display on the controller.

This document is meant as a supplement to the PVFY-NAMU-E installation & service manuals as well as the Electric Heat Kit installation manual. For additional details please consult these manuals.

PVFY Initial Settings

The unit is setup from the factory assuming that an Electric Heat Kit will be installed. This is done to provide emergency heat operation (operation during system error*1) and to prevent damage to the heater.

*1: Not applicable to communication error, return air thermistor error or motor error

Fan Settings (Default):

No CN22 jumper, SW3-1 **OFF**, SW1-7 **OFF**, SW1-8 **OFF** (Default):

Fan operates in extra low fan speed during thermo-off (modifiable). Fan operates at speed indicated at controller during thermo-on. Fan operates at high fan speed when Electric Heat Kit is enabled (overrides fan speed setting at controller). The fan is always stopped during defrost operation.

Fan control

Pattern	PVFY-NAMU-E			
	CN22 for FAN control (YU25)	DIP S/W3-4 (Indoor unit)	Fan in defrost	Fan (All modes other than Defrost)
1	Disabled	OFF	Stop (Heater OFF)	Set (Heater ON)
2	(CN22 cannot be used with this unit)	ON	Stop (Heater OFF)	High*1 (Heater ON)

*1. While the heater is on, the fan will operate at high speed regardless of the fan setting on the remote controller.



*** If a heater is installed in the duct, do not use CN22. By doing so, the fan will turn off when the heater is on, which may result in fire.**

(2) Back-up heating will not be performed when the heater turns on while demand control is performed (not a request item).

APPLICATION NOTES

Fan Speed Setting During Heating Thermo-OFF:

Switch setting			Fan speed during Thermo-OFF		Cooling-only/heat pump
SW3-1	SW1-7	SW1-8	Heating	Cooling	
OFF	OFF	OFF	Very Low	Preset speed	Heat pump
	ON		Low		
	OFF	ON	Preset speed		
	ON		Stop		
ON	OFF	OFF	-	Preset speed	Cooling-only
	ON		-		
	OFF	ON	-	Stop	
	ON		Stop	Stop	Heat pump

Note: If stopping fan during heating thermo-off or cooling thermo-off it is recommended to sense at the wall controller as opposed to the unit's return air thermistor.

Heater Comfort Mode (Default):

SW 3-2 **OFF**, SW 3-4 **ON** (Default): During defrost CN24 is de-energized during error CN24 is energized.

When unit is connected to a **PUHY/PURY/PQHY/PUMY** condensing unit (**PUMY** operation differs, see PVFY service manual):

- 1st stage enabled at -0.9F
- 2nd stage enabled at -1.8F
- 1st & 2nd stage disabled at +0.9F

Heater control			DIP switch setting		Initial setting
Pattern	Output	Details	SW3-2	SW3-4	
#2 (Enable heater comfort mode)	1 st	<p>Heater OFF Inlet air temp. \geq set temp. +0.9°F(+0.5°C)</p> <p>Heater ON Inlet air temp. $<$ set temp. -0.9°F(-0.5°C)</p> <p>- The fan will stop and the heater will turn off when [DEFROST] is displayed.</p> <p>Set temp. +0.9°F(+0.5°C) Set temp. (Room temperature setting) Set temp. -0.9°F(-0.5°C)</p>	OFF	ON	O
	2 nd	<p>Heater OFF Inlet air temp. \geq set temp. +0.9°F(+0.5°C)</p> <p>Heater ON Inlet air temp. $<$ set temp. -1.8°F(-1°C)</p> <p>- The fan will stop and the heater will turn off when [DEFROST] is displayed.</p> <p>Set temp. +0.9°F(+0.5°C) Set temp. (Room temperature setting) Set temp. -0.9°F(-0.5°C) Set temp. -1.8°F(-1°C)</p>			

APPLICATION NOTES

Heater Economy Mode:

SW 3-2 **ON**, SW 3-4 **ON**: During defrost CN24 is de-energized during error CN24 is energized.

When unit is connected to a **PUHY/PURY/PQHY/PUMY** condensing unit (**PUMY** operation differs, see PVFY service manual):

- 1st stage enabled at -2.7F
- 2nd stage enabled at -3.6F
- 1st & 2nd stage disabled at -0.9F

Heater control			DIP switch setting		Initial setting
Pattern	Output	Details	SW3-2	SW3-4	
#3 (Enable heater economy mode)	1 st	<p>Heater OFF Inlet air temp. \geq set temp. -0.9°F (-0.5°C) Heater ON Inlet air temp. < set temp. -2.7°F (-1.5°C) - The fan will stop and the heater will turn off when [DEFROST] is displayed.</p> <p style="text-align: right;"> Set temp. +0.9°F (+0.5°C) -Set temp. (Room temperature setting) Set temp. -0.9°F (-0.5°C) Set temp. -2.7°F (-1.5°C) </p>	ON	ON	-
	2 nd	<p>Inlet air temp. \geq set temp. -0.9°F (-0.5°C) Heater ON Inlet air temp. < set temp. -3.6°F (-2°C) - The fan will stop and the heater will turn off when [DEFROST] is displayed.</p> <p style="text-align: right;"> Set temp. +0.9°F (+0.5°C) -Set temp. (Room temperature setting) Set temp. -0.9°F (-0.5°C) Set temp. -3.6°F (-2°C) ON OFF </p>			

APPLICATION NOTES

Heater Basic Control Mode (Single Stage Operation):

SW 3-4 **OFF**: During defrost CN24 is de-energized during error CN24 is de-energized.

When unit is connected to a **PUHY/PURY/PQHY/PUMY** condensing unit (**PUMY** operation differs, see PVFY service manual):

1st stage enabled at -2.7F

1st stage disabled at +0.9F

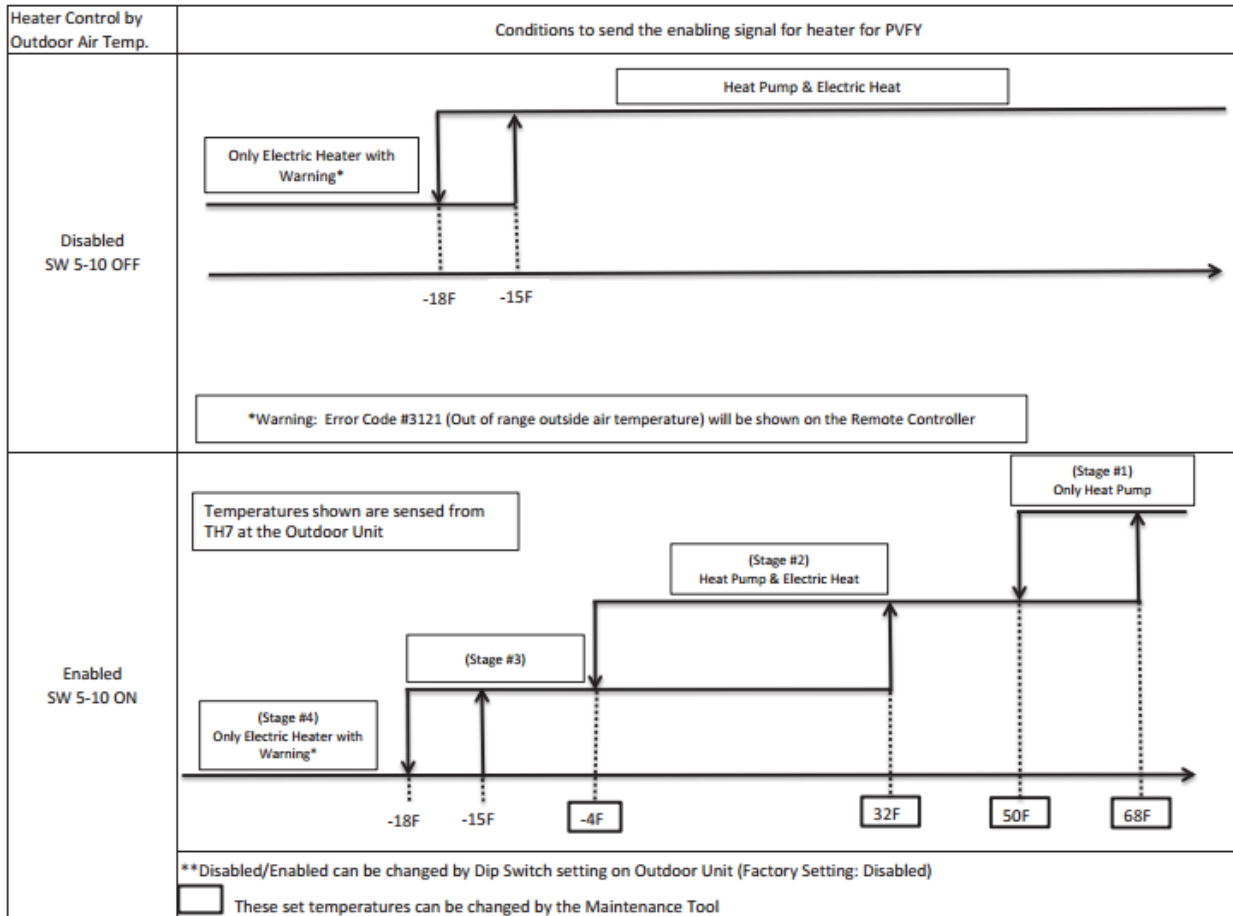
Heater control			DIP switch setting		Initial setting
Pattern	Output	Details	SW3-2	SW3-4	
#1 (Enable heater basic control)	1 st	<p>Heater OFF Inlet air temp. \geq set temp. +0.9°F(+0.5°C)</p> <p>Heater ON Inlet air temp. < set temp. -2.7°F(-1.5°C)</p> <p>- The fan will stop and the heater will turn off when [DEFROST] or [ERROR] is displayed.</p> <p>Set temp. +0.9°F(+0.5°C) Set temp. (Room temperature setting) Set temp. -0.9°F(-0.5°C) Set temp. -2.7°F(-1.5°C)</p> <p>ON OFF</p>	-	OFF	-

If an Electric Heat Kit is not used the PVFY installation manual recommends that SW3-4 be set to **OFF** such that CN24 is de-energized during error.

APPLICATION NOTES

Electric Heat Lockout

The Electric Heater Kit's operation is not locked out by default i.e. the heater will energize anytime the space temperature drops -0.9F below the set temp (default value, value is adjustable based on heater control mode). If an ambient temperature lockout is desired SW5-10 should be set to **ON**. Once SW5-10 is set to **ON** the Electric Heat Kit will be locked out until 32FWB as sensed by the thermistor (TH7) on the condensing unit's control board. The temperature bins can be modified using Maintenance Tool:



PVFY Required Changes When Using Electric Heat Kit

The approximate pressure drop attributed to the Electric Heat Kit is 0.20inWG. When calculating the duct pressure drop 0.20inWG should be added to the cumulative system pressure drop. The PVFY-NAMU-E unit has a default static pressure setting of 0.50inWG (SWA in position 2). The maximum static pressure setting is 0.80inWG; therefore, the maximum ESP due to the ductwork cannot exceed 0.60inWG. Again, the unit will operate at high fan speed any time the Electric Heat Kit is operating. Consult the PVFY-NAMU-E engineering manual for the unit's fan curves at different static pressure settings.

The air handler is equipped with an adjustable static pressure setting. The available settings are shown in the table below.




Model	Available ESP [in. WG]		
PVFY-P12	0.30	0.50	0.80
PVFY-P18	0.30	0.50	0.80
PVFY-P24	0.30	0.50	0.80
PVFY-P30	0.30	0.50	0.80
PVFY-P36	0.30	0.50	0.80*
PVFY-P42	0.30	0.50	0.80
PVFY-P48	0.30	0.50	0.80
PVFY-P54	0.30	0.50	0.80**



*PVFY-P36 in Downflow External Static pressure: 0.60

**PVFY-P54 in Downflow External Static pressure: 0.70

The air handler will be set to 0.50 ESP from the factory.

The blower static pressure setting can be changed by changing the dip switches SWA & SWC. Vertical, Horizontal Right, and Horizontal Left Switch C will always be in the "1" position. When the air handler is installed in the Downflow position, Switch C needs to be in the "2" position.

External Static Pressure	Switch A		
0.3 in. WG (75 Pa)	SWA		3 2 1
0.5 in. WG (125 Pa) (Factory Setting)	SWA		3 2 1
0.8 in. WG (200 Pa)	SWA		3 2 1

	Switch C	
Vertical, Horizontal Right, Horizontal Left (Factory Setting)		1 2
Downflow		1 2

APPLICATION NOTES

Electric Heat Kits

Basic Information:

Depending on the size of the unit and additional heat needed there will be either a single stage or two stages of backup heat. The electric heater model numbers denote the kW rating e.g. a EH03-MPA-S is a 3kW small chassis electric heater.

		Electric Heat Kit							
		EH03-MPA-S	EH05-MPA-S	EH08-MPA-S	EH08-MPA-M	EH10-MPA-M	EH10-MPA-L	EH15-MPAS-L	EH17-MPAS-L
Stages (1st, 2nd)		3	5	4+4	4+4	5+5	5+5	7.5+7.5	8.75+8.75
Air Handler Model	PVfy-P12NAMU	o	o						
	PVfy-P18NAMU	o	o	o					
	PVfy-P24NAMU	o	o	o					
	PVfy-P30NAMU				o	o			
	PVfy-P36NAMU				o	o			
	PVfy-P48NAMU						o	o	o
	PVfy-P54NAMU						o	o	o

Electrical Specs:

The heaters are powered separately from the PVFY unit and require 208/240V single phase electrical service. Electrical specifications can be seen below. The units include the necessary relays and wiring harnesses to integrate the unit with CN24-1 and CN24-2 (if 2 stages are present).

Electric Heat Part Number	Heater kW 208V/240V		Heater Amps ¹		MCA ¹		MOP ¹		Htr & Mtr Amps ²		MCA ²		MOP ²		Factory Installed Circuit Breaker
			208V/240V	208V/240V	208V/240V	208V/240V	208V/240V	208V/240V	208V/240V	208V/240V	208V/240V	208V/240V			
EH03-MPA-S	2.3/3.0		10.8/12.5	13.5/15.6	15/20	13.2/14.9	16.5/18.6	20/20						20	
EH05-MPA-S	3.8/5.0		18.1/20.8	22.6/26	25/30	20.5/23.2	25.6/29	30/30						30	
EH08-MPA-S	6.0/8.0		28.9/33.3	36.1/41.7	40/45	31.3/35.7	39.1/44.7	40/45						45	
EH08-MPA-M	6.0/8.0		28.9/33.3	36.1/41.7	40/45	32.2/36.6	40.2/45.8	45/50						50	
EH10-MPA-M	7.5/10.0		36.1/41.7	45.1/52.1	50/60	39.4/45	49.3/56.2	50/60						60	
EH10-MPA-L	7.5/10.0		36.1/41.7	45.1/52.1	50/60	40.6/46.2	50.8/57.7	60/60						60	
EH15-MPAS-L	11.3/15.0	Circuit 1	27.1/31.2	33.9/39.1	35/40	31.6/35.8	39.5/44.7	40/45						45	
		Circuit 2	27.1/31.2	33.9/39.1	35/40	27.1/31.2	33.9/39.1	35/40						40	
EH17-MPAS-L	13.2/17.5	Circuit 1	31.6/36.5	39.5/45.6	40/50	36.1/41	45.1/51.2	45/60						60	
		Circuit 2	31.6/36.5	39.5/45.6	40/50	31.6/36.5	39.5/45.6	40/50						50	

1. Heater amps; no motor
2. Heater and motor amps (connect air handler power supply to largest circuit breaker)

3. 60Hz
4. Unit tested at 0.60 in WG external static pressure
5. Minimum installation clearance to combustible material – 0"
6. Maximum outlet air temperature 200°F

