

Application Note 2029

PVFY Electric Heater Configuration & Electric Heat Kit Information

Table of Contents

Introduction	3
PVIFY Initial Settings	3
Fan Settings (Default):	4
Fan Settings (SW3-4 ON):	4
Backup Heat Sequence of Operations:	5
Electric Heat Lockout.....	6
PVIFY Required Changes When Using Electric Heat Kit	7
Electric Heat Kits	8
Basic Information:	8
Electrical Specs:.....	8
Safeties:.....	9

Introduction

The PVFY-NAMU-E1 multi-position air handling unit is 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-E1 installation & service manuals as well as the Electric Heat Kit installation manual. For additional details please consult these manuals.

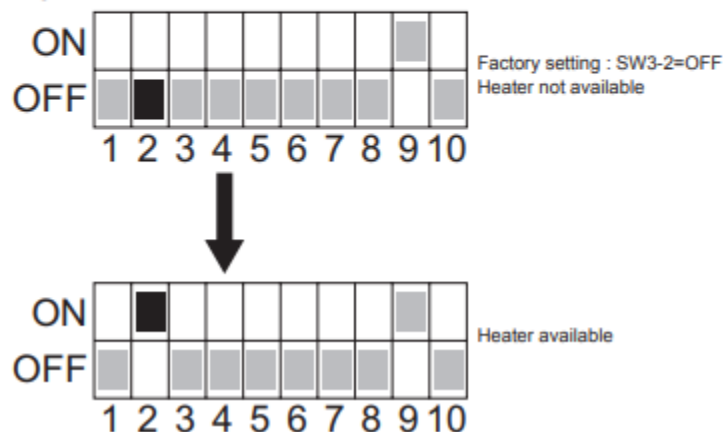
PVFY Initial Settings

If the Electric Heat Kit will be utilized then SW3-2 on the PVFY's control board needs to be switched ON. This will force the fan to run at high fan speed anytime the heater is on.

When the Heater is used, DIP switch should be set

When the heater is used, set the DIP switch 3-2 on the control board to "ON". When DIP switch 3-2 is "ON" and the heater is on, the fan will operate at high speed regardless of the fan setting in the remote controller. Refer to service manual for more information on electric heat operation.

SW3



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 stopped during defrost operation and during error. Heater does not run during defrost or error.

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	Heat pump
	ON		Stop	Stop	

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.

Fan Settings (SW3-4 ON):

If switching SW3-4 ON this will allow the heater to run during both error and defrost operation. When the heater is operating the fan will run at high fan speed. CN22 should not be modified if using the electric heat kit.

Fan control

Pattern	PVFY-NAMU-E1					
	CN22 for FAN control (CN24RELAY-KIT-CM3)	DIP S/W3-2 (Indoor unit)	DIP S/W3-4 (Indoor unit)	Fan in error *1	Fan in defrost	Fan (All modes other than defrost and error)
1	Disabled	ON	OFF	Stop (Heater OFF)		Set (Heater ON) High *2 (Heater ON)
2			ON	Stop (Heater OFF) High (Heater ON)		
3	Enabled		OFF	Low (Heater OFF)	Stop (Heater OFF)	Stop (Heater OFF) Stop (Heater ON)
4			ON	Low (Heater OFF) Low (Heater ON)	Stop (Heater OFF) Stop (Heater ON)	

*1 Heater will not operate during all error modes. Heater will only operate during a communication error between indoor unit and outdoor unit

*2 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.**

Backup Heat Sequence of Operations:

The PVFY-NAMU-E1 uses a different sequence for enabling the backup heat source, regardless of if the electric heat kit is used or not. As opposed to the standard CN24 backup heat sequence which only uses the variable of differential between space temperature and set temperature the PVFY-NAMU-E1 uses the variables of differential between space temperature and set temperature and duration of this differential.

Table. 2 [Heater Control Table]

Mode Change	Condition								
	(To -T _{RA}) > 2.7 ° F [1.5 ° C]	AND	T _{RA} has not increased by 0.9 ° F [0.5° C] in X min	EH1 ON for > 5 min	AND	(To -T _{RA}) > 2.7 ° F [1.5 ° C]	AND	T _{RA} has not increased by 0.9 ° F [0.5° C] in 5 min	(To -T _{RA}) < 0.9 ° F [0.5° C]
EH1 ON	○	AND	○						
EH2 ON				○	AND	○	AND	○	
EH1 OFF									○
EH2 OFF									○
KEY • EH1: Electric Heater 1 • EH2: Electric Heater 2 • To: Set point temperature • T _{RA} : Return Air temperature • X: Time delay (Selectable. Default is 20 min. Selectable to 10, 15, or 25 min)									

The time duration variable is adjustable via function settings through the MA controller:

Table. 3 [Time Delay Selection Table]

Function Setting *1	Action *3
108-1	Set Time Delay to <u>10</u> minutes
108-2	Set Time Delay to <u>15</u> minutes
108-3	Set Time Delay to <u>20</u> minutes *2
108-4	Set Time Delay to <u>25</u> minutes

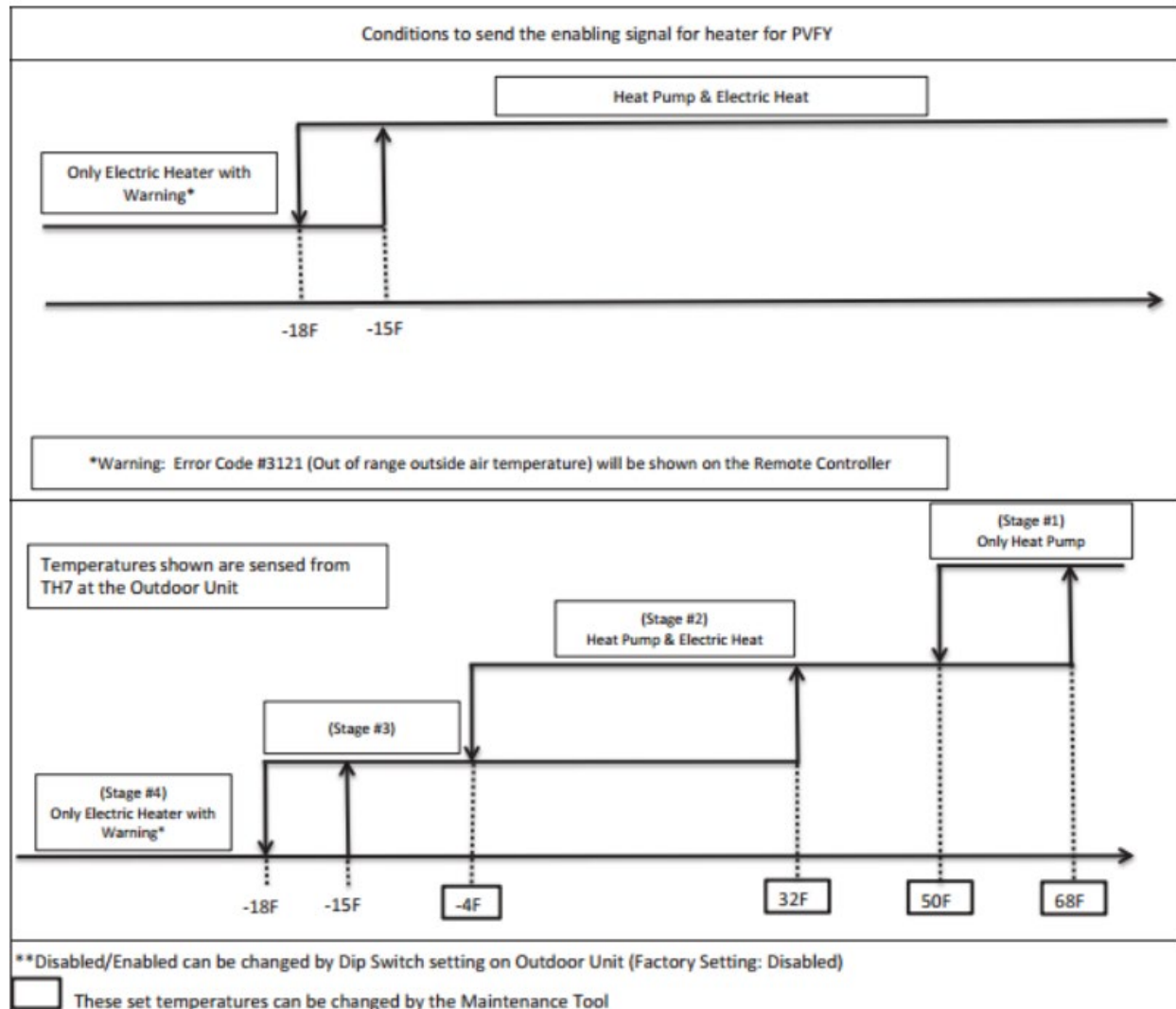
*1 Time delay can only be selected with MA controller. If use of a non-MA controller is desired, the time delay must first be selected with the MA controller. Then the non-MA controller can be attached and used.

*2 The default time delay setting is 20 minutes.

*3 Time delays are approximate.

Electric Heat Lockout

The Electric Heater Kit's operation is not locked out by default i.e. the heater will energize if the backup heat sequence is met. If an ambient temperature lockout is desired a dipswitch change is required on the outdoor unit's board (switch dependent on model). The Electric Heat Kit will be locked out until 32F 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-E1 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 duct losses (e.g. ducts/fittings/filter/diffusers) cannot exceed 0.60inWG. As stated previously, the unit will operate at high fan speed any time the Electric Heat Kit is operating. Consult the PVFY-NAMU-E1 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

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(B) is a 3kW small chassis electric heater.

		Electric Heat Kit															
		EH03-MPA-S(B)	EH05-MPA-S(B)	EH08-MPA-S(B)	EH03-SVZ-S	EH05-SVZ-S	EH08-SVZ-S	EH03-MPA-M(B)	EH05-MPA-M(B)	EH08-MPA-M(B)	EH05-SVZ-M	EH08-SVZ-M	EH10-SVZ-M	EH10-MPA-M(B)	EH10-MPA-L(B)	EH15-MPAS-L(B)	EH17-MPAS-L(B)
Stages (1st + 2nd)		3	5	4+4	3	5	4+4	3	5	4+4	5	4+4	5+5	5+5	5+5	7.5+7.5	8.75+8.75
	PVFY-P12NAMU-E	○	○														
	PVFY-P12NAMU-E1																
	PVFY-P18NAMU-E	○	○	○													
	PVFY-P18NAMU-E1																
	PVFY-P24NAMU-E	○	○	○													
	PVFY-P24NAMU-E1																
	PVFY-P30NAMU-E							○	○	○				○			
	PVFY-P30NAMU-E1																
	PVFY-P36NAMU-E									○				○			
	PVFY-P36NAMU-E1																
	PVFY-P48NAMU-E														○	○	○
	PVFY-P48NAMU-E1																
	PVFY-P54NAMU-E														○	○	○
	PVFY-P54NAMU-E1																

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		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	
EH03-MPA-S(B)	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(B)	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(B)	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
EH03-MPA-M(B)	2.3/3.0		10.8/12.5	13.5/15.6	15/20	14.1/15.8	17.7/19.8	20/20	20
EH05-MPA-M(B)	3.8/5.0		18.1/20.8	22.6/26	25/30	21.4/24.1	26.7/30.2	30/30	30
EH08-MPA-M(B)	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(B)	7.5/10		36.1/41.7	45.1/52.1	50/60	39.4/45	49.3/56.2	50/60	60
EH10-MPA-L(B)	7.5/10		36.1/41.7	45.1/52.1	50/60	40.6/46.2	50.8/57.7	60/60	60
EH15-MPAS-L(B)	11.3/15	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(B)	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

Safeties:

The Electric Heat Kits have built in circuit breakers for overload scenarios and to function as a local disconnect. The units also have multiple built in fusible links rated at a maximum temperature. These are one time use and replaceable as individual components. If the coil/element fails the entire heater assembly must be replaced.

No.	Part No.	Part Name	Spec.	EH03-SVZ-S	EH05-SVZ-S	EH08-SVZ-S	EH03-MPA-S(B)	EH05-MPA-S(B)	EH08-MPA-S(B)	EH05-SVZ-M	EH08-SVZ-M	EH10-SVZ-M	EH03-MPA-M(B)	EH05-MPA-M(B)	EH08-MPA-M(B)	EH10-MPA-M(B)	EH10-MPA-L(B)	EH15-MPAS-L(B)	EH17-MPAS-L(B)	Notes for models	Revision Info.
107	0200-218-001P	FUSIBLE LINK 117C																	4	thermal fuse	
107	0200-200-001P	FUSIBLE LINK 110C							4											thermal fuse	
107	0200-196-001P	FUSIBLE LINK 104C										2				2		4		thermal fuse	
107	0200-150-001P	FUSIBLE LINK 98C				4									4		2			thermal fuse	
107	0200-086-001P	FUSIBLE LINK 93C					1													thermal fuse	
107	0200-195-001P	FUSIBLE LINK 84C			2						4									thermal fuse	
107	0200-228-001P	FUSIBLE LINK 77C		2						2				2						thermal fuse	
107	0200-221-001P	FUSIBLE LINK 72C					2						2							thermal fuse	

Notes:

* In the event of a heater coil/element failure, the entire heater assembly will have to be replaced. Item 108.

** All components individually packaged and labeled with Mitsubishi service part number

*** Actual configuration and number of components may differ from image shown on previous pages

