

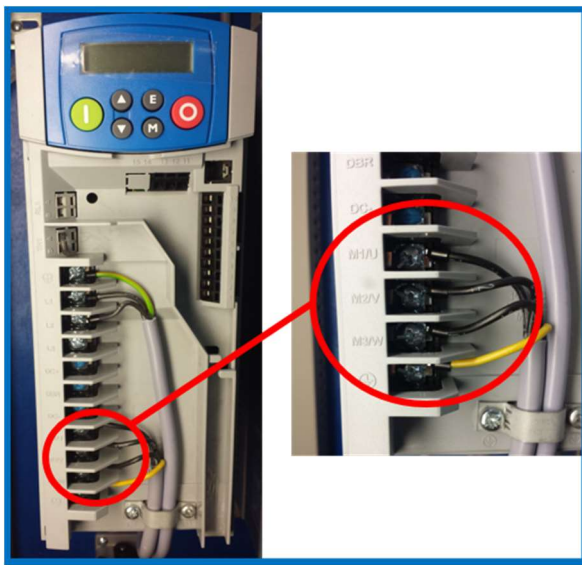
## CONNECTION OF COMPRESSOR MOTORS TO **FrigoPack** REFRIGERATION INVERTERS

### 0. General Information

- Operation in the delta connection:
  - Advantages:
    - Smaller compressors can be used for the same cooling capacity
    - Smaller relative minimum capacity
  - Disadvantages:
    - Larger **FrigoPack** refrigeration inverter required
    - Higher cost
    - Lower COP at higher speed
    - Higher acoustic noise
    - Bypass emergency operation complicated and expensive (4 contactors, 2x motor cables)
  
- Operation in the star connection:
  - Advantages:
    - Minimum overall installed cost
    - Optimum COP
    - Lower compressor stress (longer working life)
    - Bypass emergency operation simple and low cost (2 contactors, 1x motor cable)
  - Disadvantages:
    - Higher relative minimum refrigeration capacity

### 0.1 Motor connection terminals of the **FrigoPack** Refrigeration Inverters

The motor connection terminals are accessible after the removal of the terminal cover (see Application Information Bulletin 1-001.2). The motor cable can now be connected to the Inverter terminals with the U/M1, V/M2, W/M3 and PE labelling as shown on the picture below.



**FrigoPackE FMV**

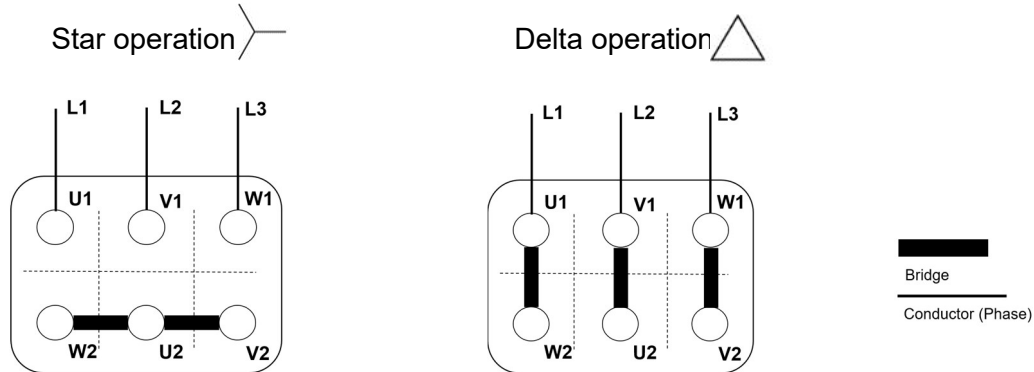


**FrigoPack FU+**



## 1. Operation of various types of compressors with *FrigoPack* Refrigeration Inverters

### 1.1 Smaller-size semi-hermetic reciprocating/piston compressors (up to about 30 m<sup>3</sup>/h at 50 Hz)

- Typical motor winding (six terminals):

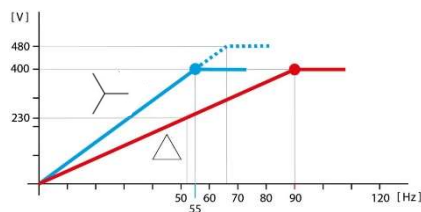


- Possible connections with *FrigoPack* Refrigeration Inverters:

Connection	Rated voltage/Frequency	Inverter current	Power
Star 	3AC 400 V / 50 Hz	100 %/	100 % *
	3AC 480 V / 60 Hz (USA)	100 %	120 %
Delta 	3AC 230 V / 50 Hz/	170 %/	100% *
	3AC 400 V / 87 Hz	170 %	170%

\* related connection

- Voltage to frequency characteristic:



Possible operating range of frequency with 3AC 400 V voltage supplies (typical limiting values):

- When using strong MT/HT motors:
 

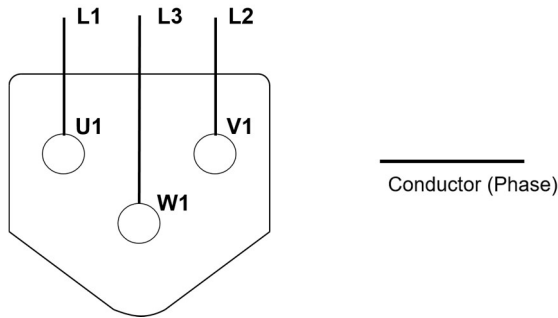
LT (-35 °C):	20-30 ... 65-75 Hz	Low evaporating temperature
MT (-10 °C):	20-30 ... 60-70 Hz	Medium evaporating temperature
HT (+ 5 °C):	20-30 ... 50-60 Hz	High evaporating temperature
- When using LT compressors with small motors:
 

LT (-35 °C):	25-35 ... 50-65 Hz	Low evaporating temperature
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**1.2. Small to medium-size fully hermetic reciprocating/piston or scroll compressors**  
**(up to about 100 m<sup>3</sup>/h at 50 Hz)**

- Typical motor winding (three terminals):

Using the example of a 3AC 230 V / 50 Hz motor winding

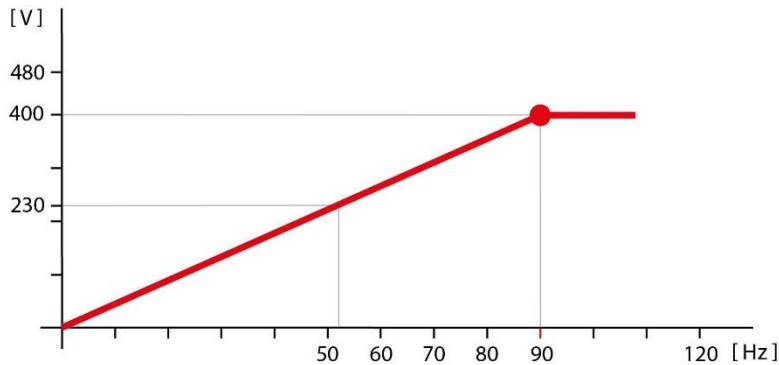


- Possible connections with **FrigoPack** Refrigeration Inverters:

<b>Rated voltage/Frequency</b>	<b>Inverter current</b>	<b>Power</b>
3AC 230 V / 50 Hz	100 %	100 %*
<b>3AC 400 V / 87 Hz</b>	100 %	170 %

\* related connection

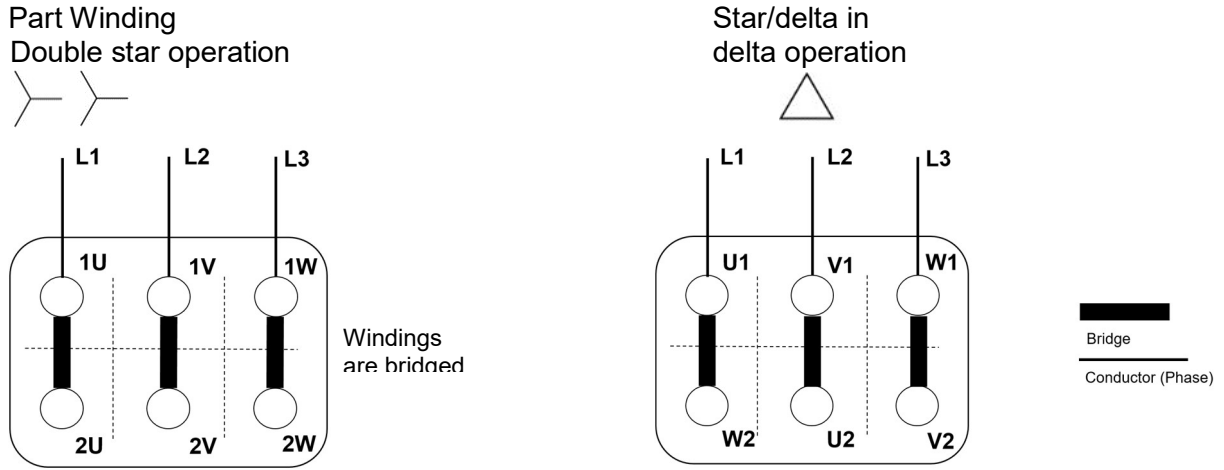
Voltage to frequency characteristic



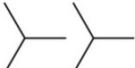

- Possible operating range of frequency with 3AC 400 V voltage supplies:
  - Refer to compressor manufacturer's technical data:
  - Typical: 20-45 ... 90-120 Hz

**1.3. Medium to large open or semi-hermetic reciprocating/piston or screw compressors**  
**(from about 100 m<sup>3</sup>/h at 50 Hz)**

- Typical motor winding (six terminals):

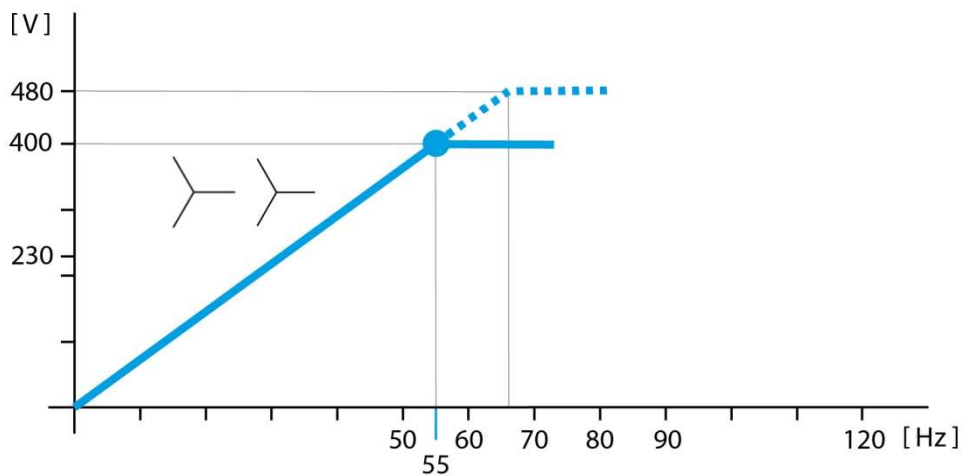


- Possible connections with **FrigoPack** Refrigeration Inverters:

Connection	Rated voltage/Frequency	Inverter current	Power
Double star 	3AC 400 V / 50 Hz	100 %	100 % *
	3AC 480 V / 60 Hz (USA)	100 %	120 %
Delta 	3AC 480 V / 50 Hz	100 %	100 % *
	3AC 480 V / 60 Hz (USA)	100 %	120 %

\* related connection

- Voltage to frequency characteristic:



- Possible operating range of frequency with 3AC 400 V voltage supplies:  
- See compressor manufacturer's technical data