Cutler-Hammer
Installation Instructions
VPM Inverters

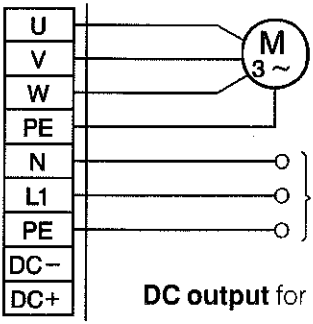
EATON

Index

Power connections

Single phase supply - VPM750 to VPM2201

You will get a lower output voltage to the motor when you have a lower supply voltage to the motor. When the inverter has a single phase supply, 220/240V (between phase and neutral), **the nominal output voltage at 50 Hz will be 3 x 220/240V. Therefore the motor must be Δ-connected.**



Motor

Δ-connected 3 x 220/240V

Supply

220/240V between phase and neutral or between two phases in a 3 x 220V system.

DC output for connection of brake chopper (option)

Fusing single phase inverters

The following units have internal 5 x 20 mm glass tube fuse :

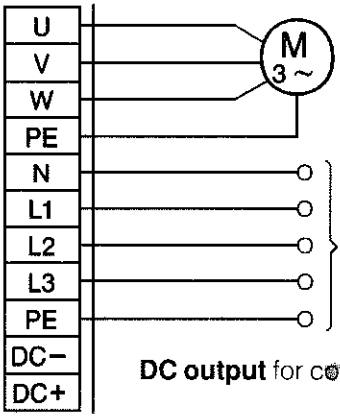
VPM750 10A **VPM1200** 10A **VPM1500** 16A

VPM2201 should be externally protected by a 20A standard Q1 fuse.

Three phase supply - VPM2200 to VPM30000

The unit is fed from the 3 x 380/415 V mains supply.

A 220/380 (240/415V) motor must be Y-connected (connected for 3 x 380/415V). **A 380/660V motor must be Δ-connected.**



Motor

Y-connected 3 x 380/415V

Supply

3 x 380/415V + neutral

DC output for connection of brake chopper (option)

Fusing of three phase inverters

All three phase units should externally have the following standard Q1 fuses:

VPM2200	6A	**VPM11000**	25A
VPM3000	10A	**VPM15000**	35A
VPM4000	16A	**VPM18500**	50A
VPM5500	20A	**VPM22000**	63A
VPM8000	20A	**VPM30000**	80A

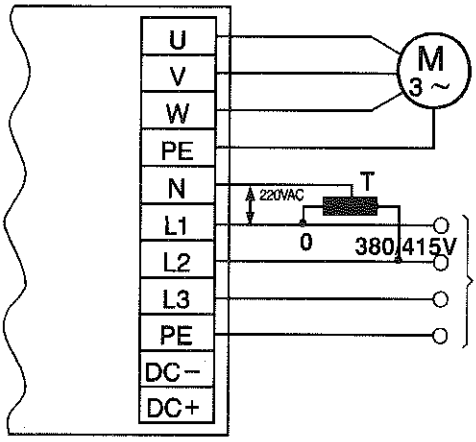
All three phase units have a 315mA fuse for protection of electronics and fans.

Internal voltage supply

Control electronics and fans must have a 220/240V supply (normally from the phase and neutral of the mains supply). In cases when the neutral is not available, the units can be supplied with an optional transformer. The transformer has to be connected according to the figure below.

Fans + control electronics – Power ratings:

VPM2200	50VA	**VPM8000**	70VA	**VPM18500**	90VA
VPM3000	50VA	**VPM11000**	70VA	**VPM22000**	90VA
VPM4000	50VA	**VPM15000**	70VA	**VPM30000**	90VA
VPM5500	50VA				

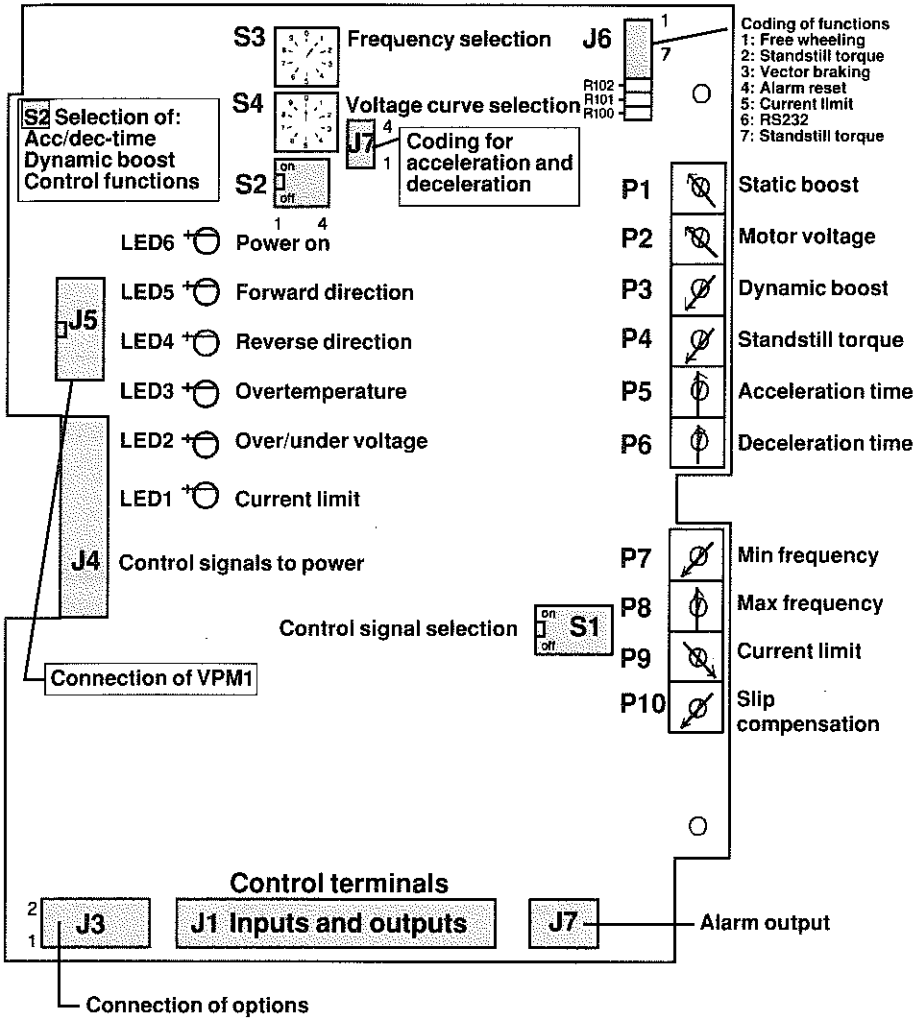


Motor

Supply
380/415V

Note: Check that the supply to the electronics (between N & L1) is 220/240V before connecting.

Control card



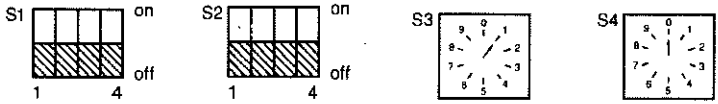
Factory settings

Potentiometers

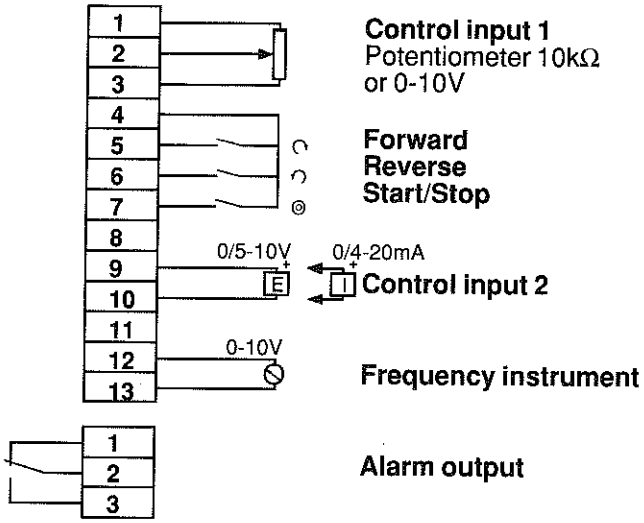
As the arrows in the figure above indicate.

Switches

According to the figures below.



Connecting control functions

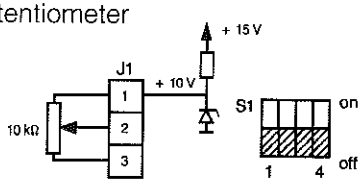


Speed control

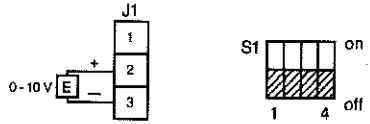
The speed can be controlled from two separate inputs:

Input 1 (Terminals 1-3 on J1)

Potentiometer

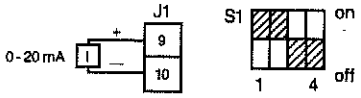


Control voltage 0-10V

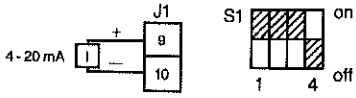


Input 2 (Terminals 9-10 on J1)

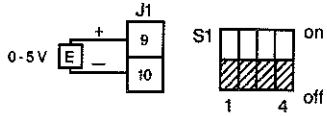
Control current 0-20mA



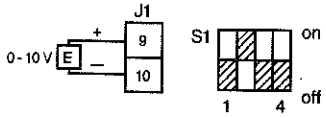
Control current 4-20mA



Control voltage 0-5V

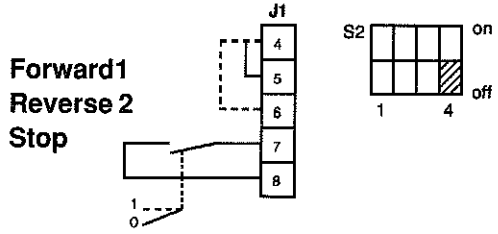


Control voltage 0-10V



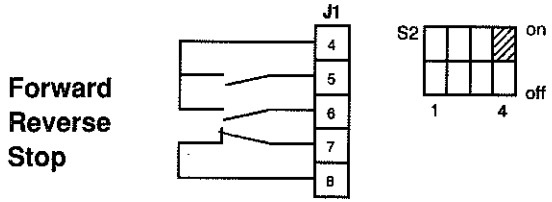
Forward - Stop - Reverse

Single direction



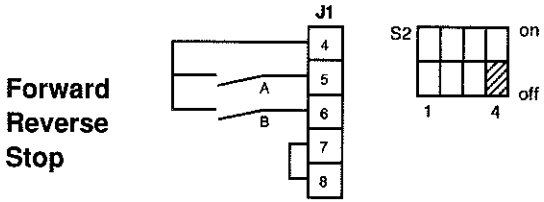
Two directions

Pushbutton



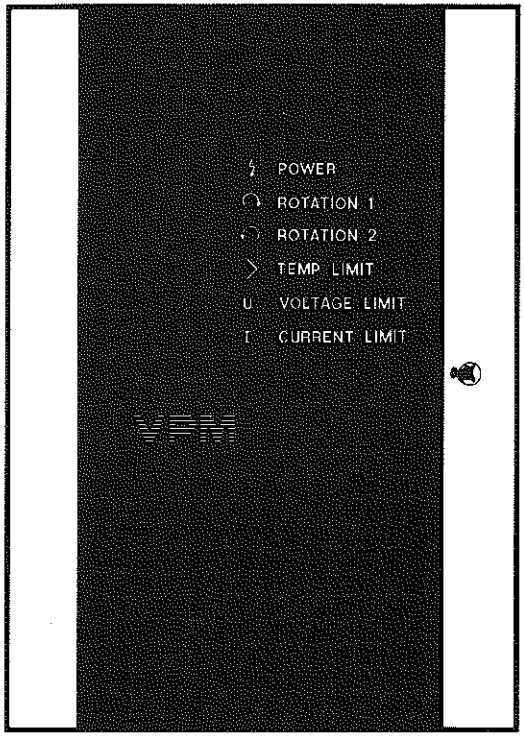
Two directions

Changeover switch



Stop function: If A **and** B are both closed **or** open.
Forward: If A is closed **and** B is open.
Reverse: If A is open **and** B is closed.

Indications



Power: Indicates when the supply voltage is present (on the 1-phase units: after the fuse)

Rotation 1: Indicates when the motor is running forward.

Rotation 2: Indicates when the motor is running in the reverse direction.

Temp limit: At over-temperature the LED lights up, the inverter shuts off and the alarm relay opens.

Voltage limit: Whenever the voltage in the intermediate circuit is outside the limits:

185 - 265V for single phase supply and
325 - 460V for three phase supply

the LED lights up and after 1 second the alarm relay opens.

Overvoltage occurs at two levels.

At the first level the ramp will be extended. A flashing LED shows this is happening.

If the voltage continues to increase, the inverter will trip and the alarm relay will be de-activated.

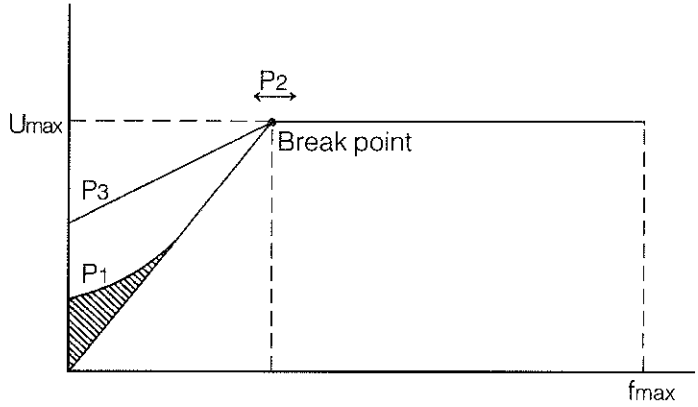
Current limit: Indicates when the value set by the potentiometer P9 is reached. The indication depends on the selected function for measuring the current.

Functions and adjustments

The VPM drives are set at delivery to suit most applications.

The optional parameter terminal VPM1 is a useful tool for checking set values and for the read out of motor voltage and current.

The voltage settings are given as % of maximum output voltage.



The graph shows the influence of the potentiometers P1 - P3.

Static boost (P1)

For adjustment of the output voltage to the motor, within the frequency range 0 - 20 Hz.

Size	VPM750 - 4000	VPM5500 - 15000	VPM18500 - 30000
Range:	0 - 25%	0 - 16%	0 - 8%
Factory setting:	~ 12%	~8%	~4%

Motor voltage (P2)

The output voltage should normally be adjusted according to the nominal motor voltage.

Range: ±12.5% of nominal voltage at set frequency.

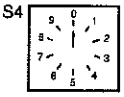
Factory setting: Mains nominal voltage at 50 Hz.

Example: If the 50 Hz range is selected and you adjust to +12.5%, then you are getting nominal motor voltage at 42.5 Hz. You will get nominal motor voltage at 57.5 Hz if you adjust to -12.5%.

Voltage curve selection (S4)

The rotary switch S4 is used for adaption of the output voltage/frequency for different applications and motor types.

Range selections with rotary switch S4



0 = Maximum voltage at 57% of max frequency.*

1 = Maximum voltage at 100% of max frequency.

2 = Maximum voltage at 75% of max frequency.

3 = Maximum voltage at 50% of max frequency.

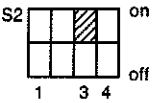
4 = Maximum voltage at 25% of max frequency.

*** = Factory setting. (57% = 57 Hz).**

Maximum frequency = The frequency set on S3.

Dynamic boost (P3, S2)

By using the dynamic boost you will get an extra torque for overcoming standstill friction or for getting faster acceleration. After end of acceleration the continuous motor voltage will be the voltage set on P1 and P2.

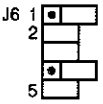


Range: 0-25%
Factory setting: 0%

Standstill braking (P4)(J6:2, J6:7)

The torque at standstill is required when it is necessary to stop the motor at a certain position.

Range: 0-40%, time function.
Factory setting: 0%



Selectable functions

DIP-shunt J6:2

Open:	No torque at standstill. Factory setting.
Closed:	Torque at standstill.

DIP-shunt J6:7

Closed:	(From factory) Torque when the frequency reached 0.
Open:	Standstill torque only after a stop signal.

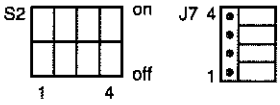
For acceleration and deceleration times, select ranges by switch settings as table below.

Acceleration time (P5)

Range: See table below.
Factory setting: See table below.

Deceleration time (P6)

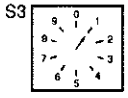
Range: See table below.
Factory setting: See table below.



Range selection

Acceleration	Deceleration	Coding				Factory setting
S2:2	S2:1	Off	Off	On	On	
J7:3	J7:1	Closed	Open	Open	Open	
J7:4	J7:2	Open	Open	Open	Closed	
Type		**Sec**	**Sec**	**Sec**	**Sec**	**Sec**
VPM750		0.1 - 1	0.3 - 3	3 - 30	30 - 300	1.5
VPM1200		0.1 - 1	0.3 - 3	3 - 30	30 - 300	1.5
VPM1500		0.1 - 1	0.3 - 3	3 - 30	30 - 300	1.5
VPM2201		0.1 - 1	0.3 - 3	3 - 30	30 - 300	1.5
VPM2200		0.1 - 1	0.3 - 3	3 - 30	30 - 300	1.5
VPM3000		0.5 - 3		3 - 30	30 - 300	1.5
VPM4000		0.5 - 3		3 - 30	30 - 300	1.5
VPM5500		1.0 - 3		3 - 30	30 - 300	2.0
VPM8000		1.0 - 3		3 - 30	30 - 300	2.0
VPM11000		3.0 - 30			30 - 300	15
VPM15000		3.0 - 30			30 - 300	15
VPM18500		6.0 - 60			30 - 300	30
VPM22000		6.0 - 60			30 - 300	30
VPM30000		6.0 - 60			30 - 300	30

Frequency range selection (S3)



10 different frequency ranges can be selected by the rotary switch S3. These ranges are:

Position 0: 0 - 50Hz
1: 0 - 100Hz*
2: 0 - 200Hz
3: 0 - 300Hz
4: 0 - 500Hz
Position 5: 0 - 60Hz
6: 0 - 120Hz
7: 0 - 240Hz
8: 0 - 360Hz
9: 0 - 600Hz

*** Factory setting**

Minimum frequency (P7)

Range: 0-40% of selected range.
Factory setting: 0Hz

The setting is % of the set range.

Maximum frequency (P8)

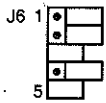
Range: 0-100% of selected range.
Factory setting: 50Hz

The setting is % of set range.

Current (P9, J6:5)

Range: 0-100% of maximum output current according to the specification.

Factory setting: 110% of max continuous inverter current.



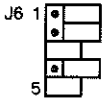
Function can be selected on the DIP-shunt J6:5 as follows:

OPEN: Current limit by decreased frequency. Factory setting.
CLOSED: Automatic reset when the current reaches set value.

Slip compensation (P10)

Range: 0-10%
Factory setting: 0%

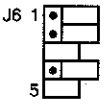
Alarm reset (J6:4)



Usually the alarm reset is made by initiating a stop command. In some applications (eg fans) it is desirable to have an automatic alarm reset.

OPEN: Alarm reset by a stop signal. Factory setting.
CLOSED: Automatic reset after the fault has disappeared.

Freewheeling (J6:1)



OPEN: The motor stops with active braking over the set deceleration period. Factory setting.

CLOSED: The inverter shuts off and the motor freewheels.

Starting procedure

The start up should be done in the following order:

1. Potentiometers and switches to be left on factory settings.
2. Connect the power supply. The LED's should indicate:

   LED 6 (Power - Green) lights up.

   LED 2 (Voltage limit - Red) lights up. After 2-3 seconds (when the intermediate circuit capacitor is charged) it turns off.

If LED 2 does not turn off or none of the LED's lights up - Check the power supply.

3. LED 5 (Rotation 1 - Red) should light up if 7-8 (stop function) and 4-5 (start forward) are connected.
4. LED 4 (Rotation 2 - Red) should light up if 7-8 and 4-6 are connected.

If LED 4 or LED 5 does not turn on - Check the cables. Check especially that there is a connection between 7 and 8.

5. Using the connected potentiometer, it should now be possible to control the speed of the motor.

If the direction is wrong - change connections 5 and 6.

6. Set the desired maximum and minimum speed (pages 6 & 7).

Trouble shooting

Case 1.

The inverter reaches current limit: (The motor does not come up to the set speed).

This can be caused by high standstill friction or inertia in the system.

Suggestion:

a. Activate the dynamic boost (increase of voltage during acceleration) by setting the rotary switch S2:3. Increase torque by turning P3 clockwise.

b. Increase acceleration time on P5.

c. Increase the static (increasing voltage at low frequency) by P1.

Case 2.

The motor is not able to brake within the set time:

The set deceleration time is too short.

Suggestion:

Increase the deceleration time on P6.

Case 3.

The motor does not stop fast enough at a set position:

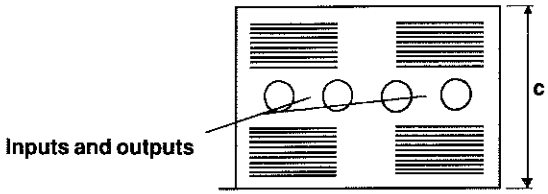
Suggestion

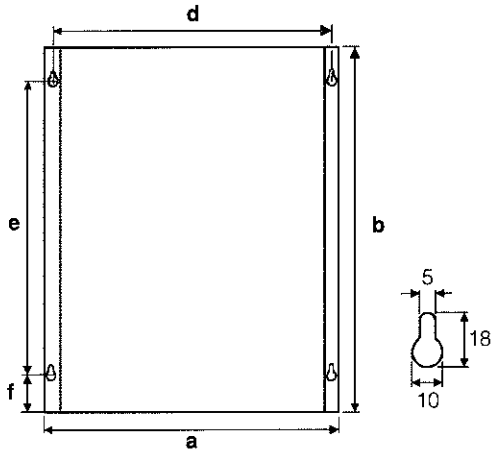
Activate the stillstand torque (J6:2) and turn P4 clockwise.

Note: The inverter will react on changes in potentiometer adjustment when the motor is running.

The microproccessor reads the position of switches and shunts only during start up. Therefore the power supply must be disconnected before changes can be made.

Technical specifications





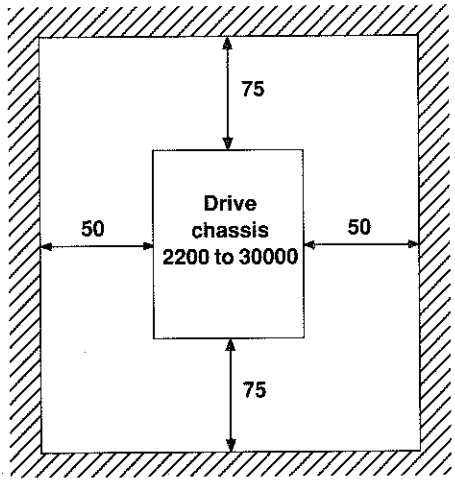
Type	Supply (V)	Motor (kW)	Motor current (A)		Dimensions (mm)						Weight (kg)
			Cont.	Max.	a	b	c	d	e	f	
VPM750	1-phase	0.75	4	7	210	230	115	195	170	29	4
VPM1200	220/240	1.2	6	10	210	300	115	195	170	29	4.5
VPM1500		1.5	8.5	14	210	300	115	195	170	29	4.5
VPM2201		2.2	12	20	210	300	115	195	170	29	5
VPM2200	3-phase	2.2	6	10	185	360	240	170	299	19	9
VPM3000	and	3	8	13	185	360	240	170	299	19	9
VPM4000	neutral	4	11	17	185	360	240	170	299	19	9
VPM5500	380/415	5.5	14	23	185	360	240	170	299	19	9
VPM8000		8	18	30	338	360	240	324	302	19	18
VPM11000		11	24	40	338	360	240	324	302	19	18
VPM15000		15	30	50	338	360	240	324	302	19	18
VPM18500		18.5	37	60	430	570	240	-	-	-	29
VPM22000		22	45	70	430	570	240	-	-	-	29
VPM30000		30	60	90	430	570	240	-	-	-	29

Heat dissipation

Type	Heat dissipation Watts
VPM750	41
VPM1200	49
VPM1500	78
VPM2201	-
VPM2200	69
VPM3000	94
VPM4000	119
VPM5500	182
VPM8000	187
VPM11000	243
VPM15000	316
VPM18500	356
VPM22000	426
VPM30000	585

Mounting details

Minimum space requirements (mm)



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