SQUARE D

Product Data Bulletin

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Raleigh, NC, U.S.A.

Technical Overview

Omegapak® Class 8803 Type P AC Drive
1.5 to 150 hp
Variable Torque

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Chapter 1 - General Overview

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INTRODUCTION

AC squirrel cage induction motors are the most widely used in industry today because they are rugged, simple and economical.

MOTOR DRIVE

With modern techniques, it is possible to vary motor speed electrically while maintaining the torque characteristics required by the machines encountered in most applications. To obtain this result, along with optimized performance, it is essential to supply the stator windings of the motor with variable voltage and frequency. The Omegapak Type P AC drive is specifically designed for this use.

The drive is comprised of (see Figure 1-1):

- ❑ A DC supply obtained from a bridge rectifier fed by three-phase AC input lines
- ❑ A filter capacitor circuit
- ❑ An inverter consisting of six power transistors.

The inverter is composed of one or three isolated modules according to the motor rating. It uses the fixed DC voltage for creating three-phase supply with variable voltage and frequency. The AC drive is controlled by a microprocessor.

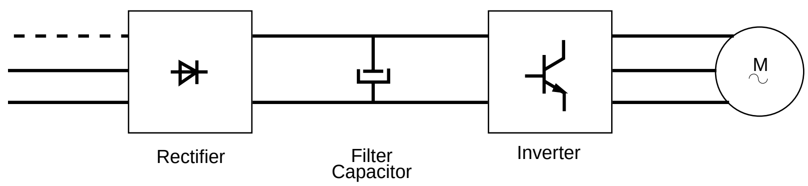

Figure 1-1 AC Drive Components

PRINCIPLE OF OPERATION

The Omegapak Type P AC drive operates on the principle of sinusoidal pulse width modulation (PWM) by chopping a fixed, smooth DC waveform (Figure 1-2). The output current is very close to a sine wave, insuring uniform and smooth rotation of motors even at a very low speed (Figure 1-3).

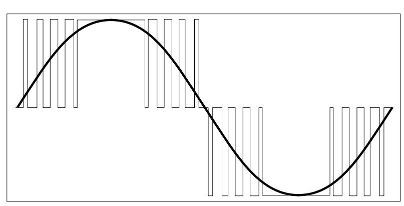

Figure 1-2 PWM Sine Wave

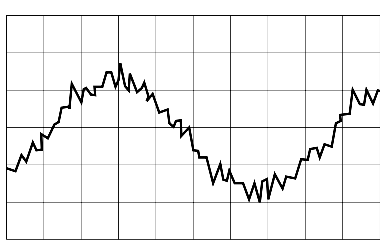

Figure 1-3 Motor Output Current

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BENEFITS

The Omegapak Type P drive is designed to provide advanced performance, protection and features which industrial users and OEMs demand.

The compact size, communications options and reliability of the Omegapak Type P drive make it ideal for a wide variety of industrial applications. The Type P drive also provides a foundation of digital accuracy, repeatability and precise speed control which are critical elements in many industrial control applications.

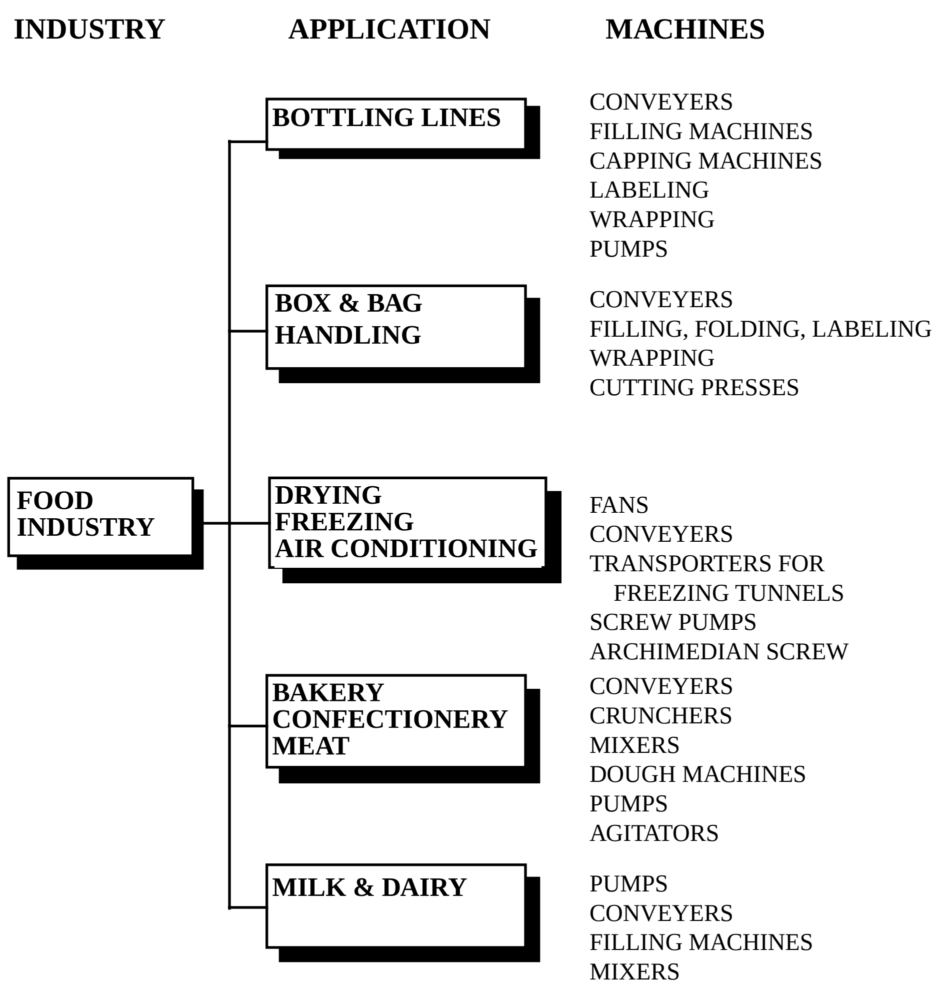
The Omegapak Type P drive provides users with maximum flexibility and advanced functions without compromising the need for ease of use and simple start up. Most applications require the adjustment of only a few parameters. Therefore, the programming of the drive is organized and structured to support easy access to common parameters and controlled access to advanced functions for more demanding applications.

The Omegapak Type P drive is accepted worldwide and adheres to rigid standards of design and construction specified by UL, CSA, VDE and IEC.

INDUSTRIES AND APPLICATIONS

The Omegapak Type P drive provides speed and torque control solutions in many industrial applications.

Food Industry



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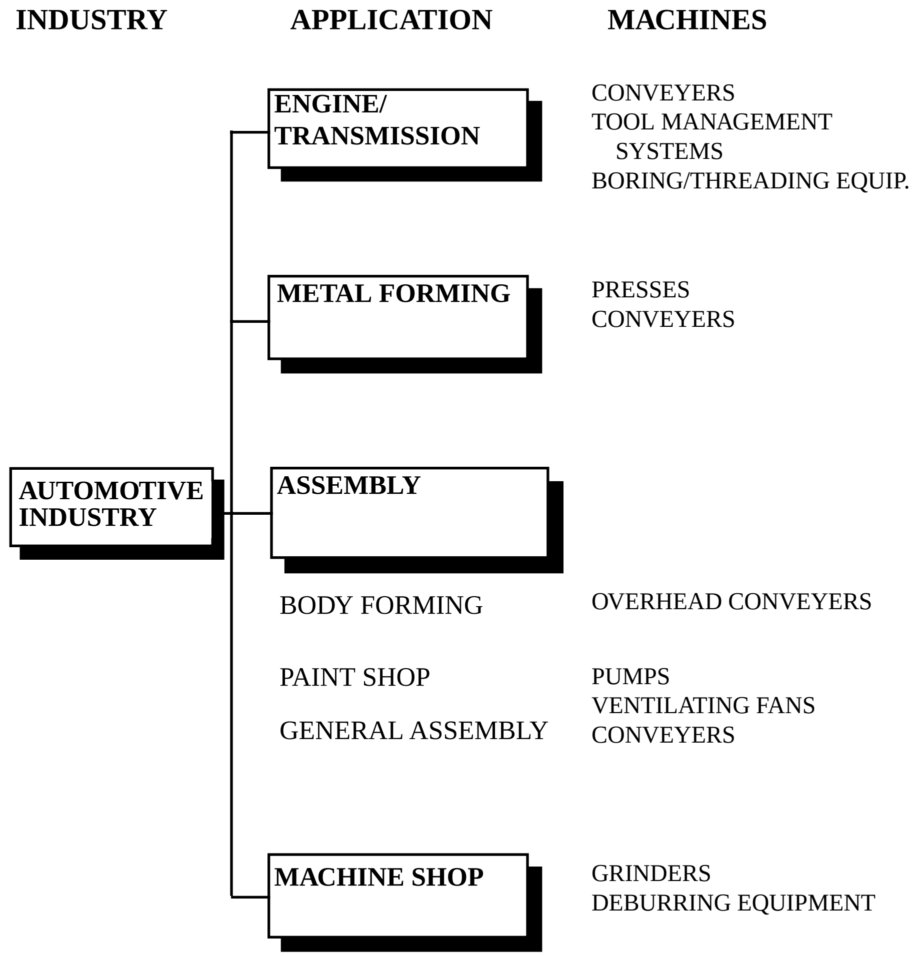
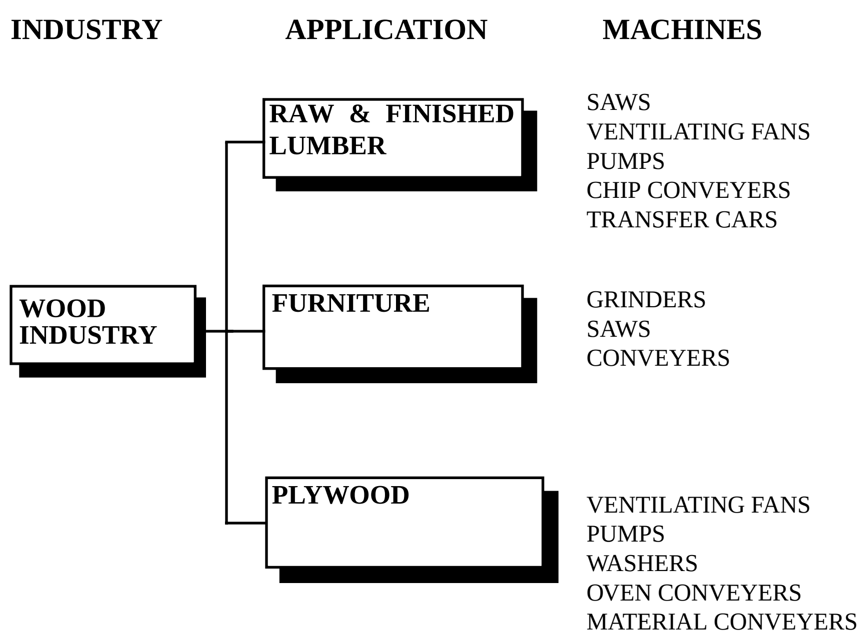
Automotive Industry



Wood Industry



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Textile Industry

INDUSTRY	APPLICATION	MACHINES
TEXTILE INDUSTRY	**FIBER FABRICATION**	
	MAN MADE FIBERS	BOBBIN WINDER TEXTURING MACHINES GEAR PUMPS MIXERS EXTRUDER TWISTER, DOUBLER DRAWING ROLLER
	NATURAL FIBERS	WASHERS CONVEYERS BEAM WRAPPERS CARDING MACHINES PRESSER FRAMES
	FIBER KNITTING	KNITTERS CIRCULAR RIB KNITTERS WEAVER’S LOOM DYERS PICKING MACHINES FLOCKING MACHINES PRINTING MACHINES SCRAPERS BAG HANDLING MACHINES SCREW PUMPS ARCHIMEDIAN SCREW
	CLOTHING	SEWING MACHINES CUTTING MACHINES CONVEYERS WASHING MACHINES DRY CLEANING IRONER
	LEATHER	SPECIAL MACHINES TRANSPORTERS HANDLING MACHINES

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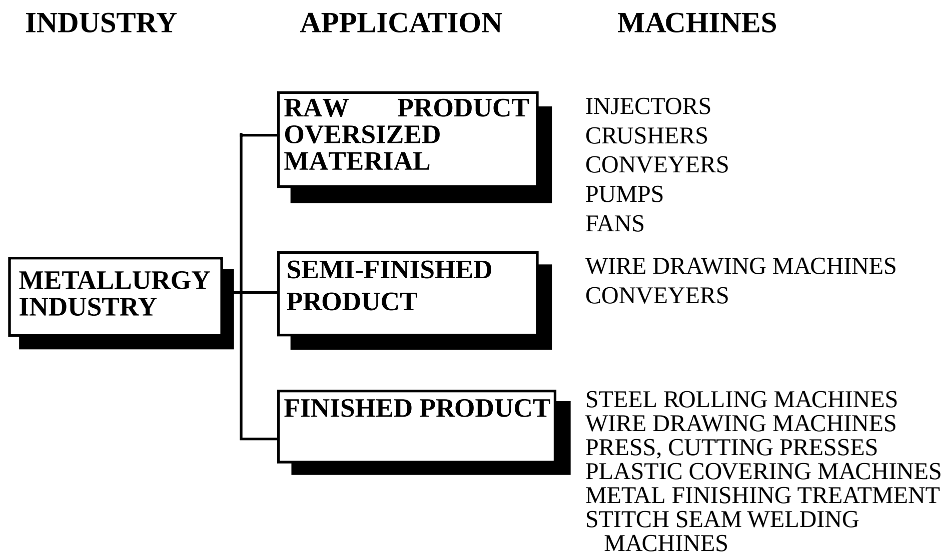
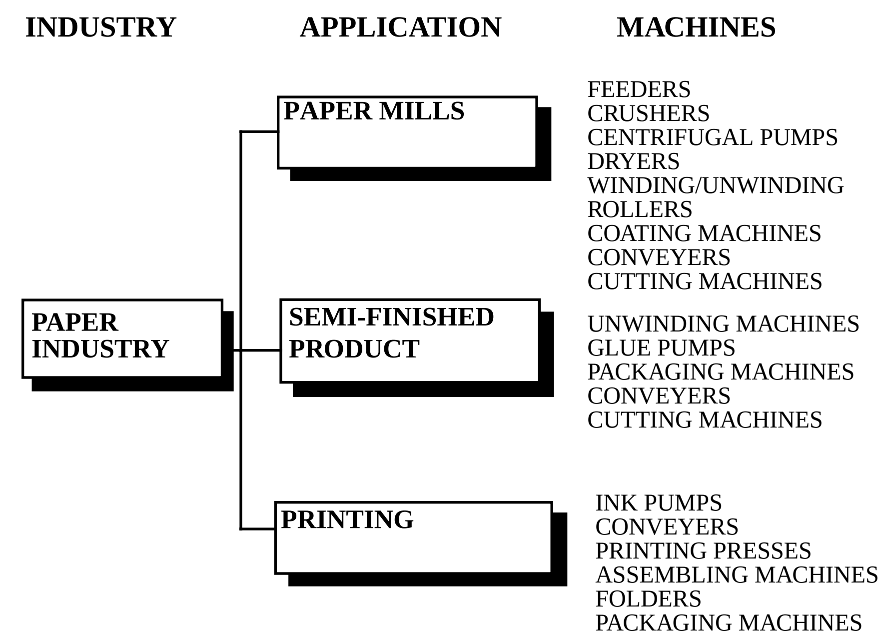
Metallurgy Industry



Paper Industry



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Chemical Industry

INDUSTRY	APPLICATION	MACHINES
CHEMICAL INDUSTRY	PETROLEUM	CENTRIFUGAL PUMPS FANS DOSING, METERING PUMPS GRANULATOR MIXERS CONTAINER HANDLING
	PHARMACY	MIXERS AGITATORS PACKAGING MACHINES FANS
	FERTILIZERS	DOSING CONVEYORS, PUMPS CRUNCHERS MIXERS PACKAGING MACHINES CENTRIFUGAL PUMPS AGITATORS
	PAINT	DOSING PUMPS CRUNCHERS MIXERS PACKAGING MACHINES CENTRIFUGAL PUMPS AGITATORS

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Notes:

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Chapter 2 - Specifications

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CATALOG NUMBER IDENTIFICATION

Consult Figure 2-1 for the interpretation of the catalog numbers that appear throughout this manual.

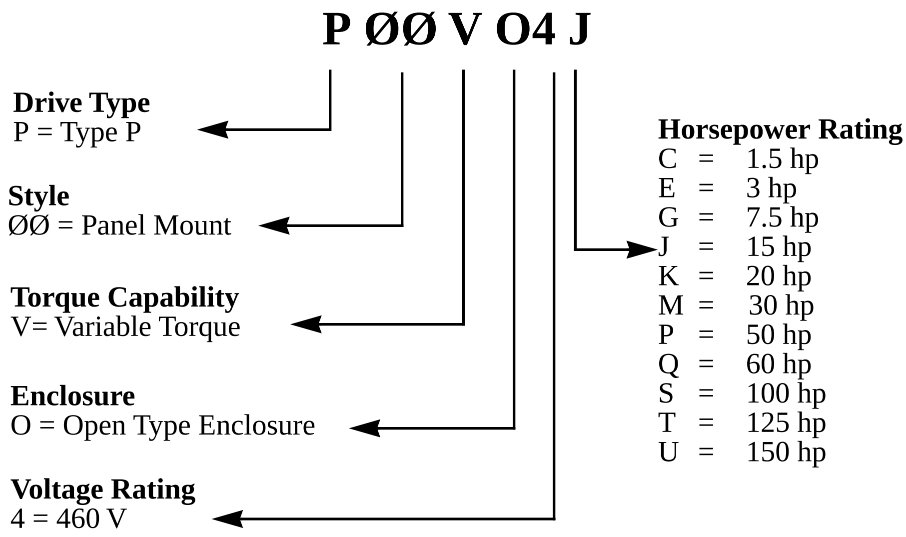

Figure 2-1 Catalog Number Identification

PRODUCT SELECTION

Table 2-1 Product Selection

Supply Voltage	Maximum Ratings			Open Type Enclosure for Panel Mount Type Number
	kW	hp	Output Current (Amperes)	
460 V	1.1	1.5	2.6	PØØVO4C
+10%/-15%	2.2	3	4.8	PØØVO4E
50/60 Hz	5.5	7.5	11	PØØVO4G
	11	15	21	PØØVO4J
	15	20	27	PØØVO4K
	22	30	40	PØØVO4M
	37	50	65	PØØVO4P
	45	60	77	PØØVO4Q
	75	100	124	PØØVO4S
	90	125	156	PØØVO4T
	110	150	180	PØØVO4U

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OPTION SELECTION

Table 2-2 Options

Option	Type Number	Drive Rating: 460 V
Δ Adaptation for ± 10 V Control	VW3-A45108	All types
Dynamic Braking and Speed Regulation	8803 PB01	1.5-30 hp (1.1-22 kW)
	8803 PB02	50 hp (37 kW)
	8803 PB03	60-150 hp (46-110 kW)
Dynamic Braking Resistors	8803 PR01	1.5-7.5 hp (1.1-5.5 kW)
	8803 PR02	15-20 hp (11-15 kW)
	8803 PR02 (2 ea.)	30-50 hp (22-37 kW)
	8803 PR04	60-100 hp (46-75 kW)
	8803 PR04 (2 ea.)	125-150 hp (90-110 kW)
Δ Gasket Kits (1.5-50 hp drives)	VY1-A451U1501	1.5 hp (1.1 kW)
	VY1-A451U4001	3-7.5 hp (2.2-5.5 kW)
	VY1-A451U7501	15 hp (11 kW)
	VY1-A451D1101	20 hp (15 kW)
	VY1-A451D1501	30 hp (22 kW)
	VY1-A451D3001	50 hp (37 kW)
Δ Ventilation Kit (1.5 to 50 hp drives)	VY1-A05107	1.5-50 hp (1.1-37 kW)
Serial Communication Kit	8803 PS01	All types
Δ Cable Kit 9-pin to 9-pin Δ Cable Kit 9-pin to 25-pin	VY1-A45509 VY1-A45525	All Types

Δ NOTE: Order by part number, not Class and Type.

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SPECIFICATIONS

Table 2-3 Specifications

Output voltage	Maximum voltage equal to input line voltage
Frequency range	1 to 67/80 Hz
Torque/overtorque	See page 39
Speed reference	0-10 V, 0-20 mA, 4-20 mA, 20-4 mA
Frequency resolution	Analog reference: 0.015 Hz Digital reference (by serial link): 0.1 Hz
Reference response time	10 ms < t < 20 ms
Low speed/high speed limits	Adjustable
Ramps	Acceleration: 1 to 990 seconds Deceleration: 1 to 990 seconds
Reversing	Control inputs Optional: adaptation for ± 10 V control (page 32)
Braking to standstill	By DC injection: Automatic for 0.5 s if the frequency drops below 1 Hz Manual by external signal
Dynamic braking	By optional resistor
Drive controller protection	Against short circuits: Between output phases[1] Between output phases and ground Against input line supply under/overvoltage Against overheating (thermal sensor)
Motor protection	Incorporated electronic thermal protection
Automated system dialog	Optional multidrop serial link
Temperature	Operation: + 32° to + 100° F (0° to + 40° C) Storage: - 15° to + 160° F (- 25° to + 70° C)
Humidity	90% maximum without condensation or dripping water[2]
Altitude	≤ 3300 ft (1000 m); above this derate by 3% for every 3300 ft
Degree of protection	Open: Open/IP20 (1.5 to 50 hp) Open/IP10 (60 to 150 hp)
Pollution	Protect the drive controller against dust, corrosive gases and splashing liquid[2]

[1] PØØVO4T and -4U: protection assured if length of motor-drive controller cables is greater than 75 ft (25 m). Otherwise, install line inductors

[2] The controller electrical creepages are designed for use in a Pollution Degree 2 environment per NEMA ICS-111A and IEC 664A.

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TECHNICAL CHARACTERISTICS

Table 2-4 Drive Controller Power and Current

Supply Voltage	Part No.	Motor Power		Line Current[1]	Rated Output Current	Transient Output Current	Total Dissipated Power @ Rated Load[2]	Fault Withstand Current
		kW	hp	A	A	A	W	A rms sym.
460 V	PØØVO4C	1.1	1.5	3.9	2.6	2.9	80	5000
+10%/-15%	PØØVO4E	2.2	3	7	4.8	5.3	110	5000
50/60 Hz	PØØVO4G	5.5	7.5	16	11	12	190	5000
	PØØVO4J	11	15	31	21	23	350	5000
	PØØVO4K	15	20	40	27	30	450	5000
	PØØVO4M	22	30	60	40	44	600	5000
	PØØVO4P	37	50	98	65	72	800	10000
	PØØVO4Q	45	60	115	77	85	1000	10000
	PØØVO4S	75	100	186	124	136	1600	10000
	PØØVO4T	90	125	234	156	170	1800	10000
	PØØVO4U	110	150	270	180	200	2200	10000

[1] The values given correspond to the current absorbed by the drive controller on a low impedance input line supply, with the rated load and speed conditions, for the associated motor. These values can be reduced by adding line inductors, or when power is supplied via a suitable transformer or autotransformer.

[2] Multiply by 3.41 to obtain BTU per hour.

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DESIGN AND OPERATION
Omegapak 1.5 to 3 hp Controllers

This section applies to 1.5 to 3 hp drive controllers at 460 V (PØØVO4C to PØØVO4E).

The measurement board components, rectifier, filter capacitors, thermal sensor and the six transistor modules of these drive controllers are all mounted on the power board. The dialog unit and control jumpers are located on the control board.

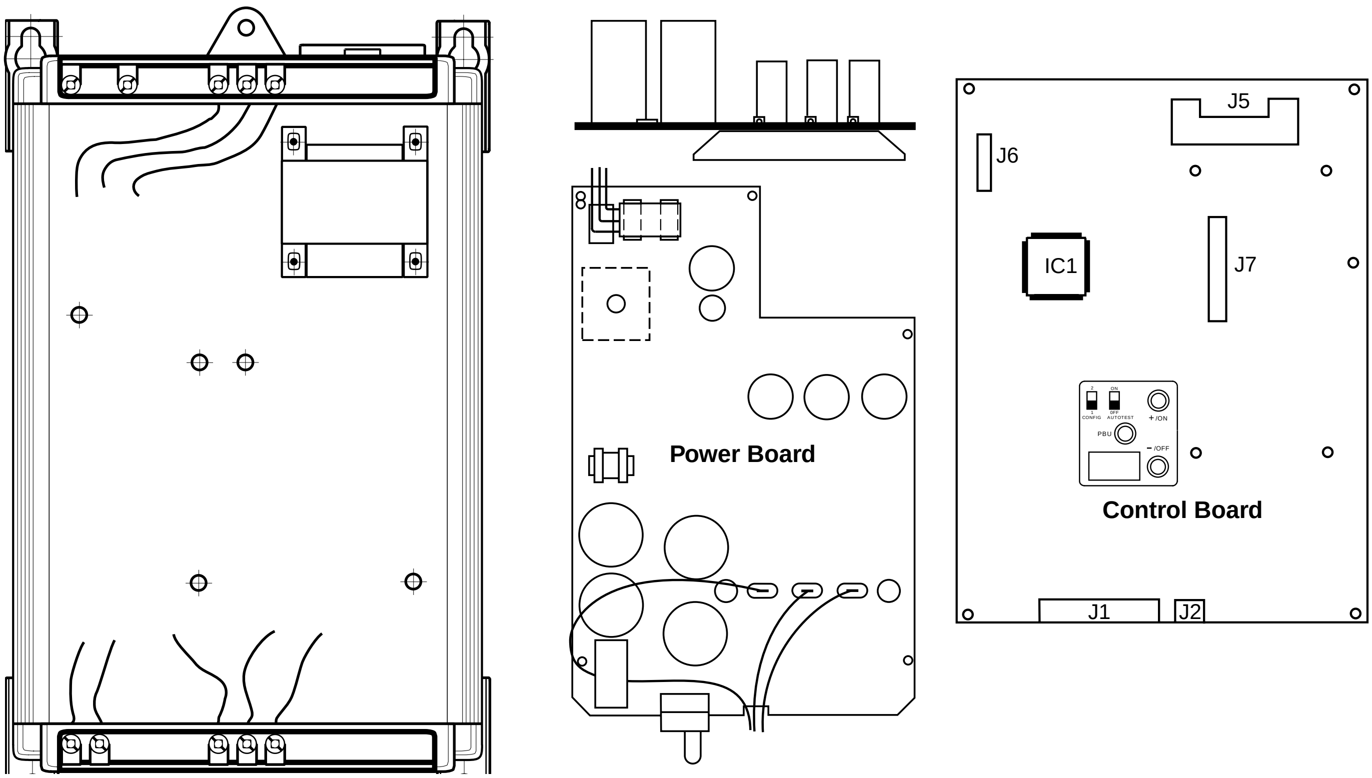

Figure 2-2 Design of 1.5 to 3 hp Controllers

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Functional Block Diagram

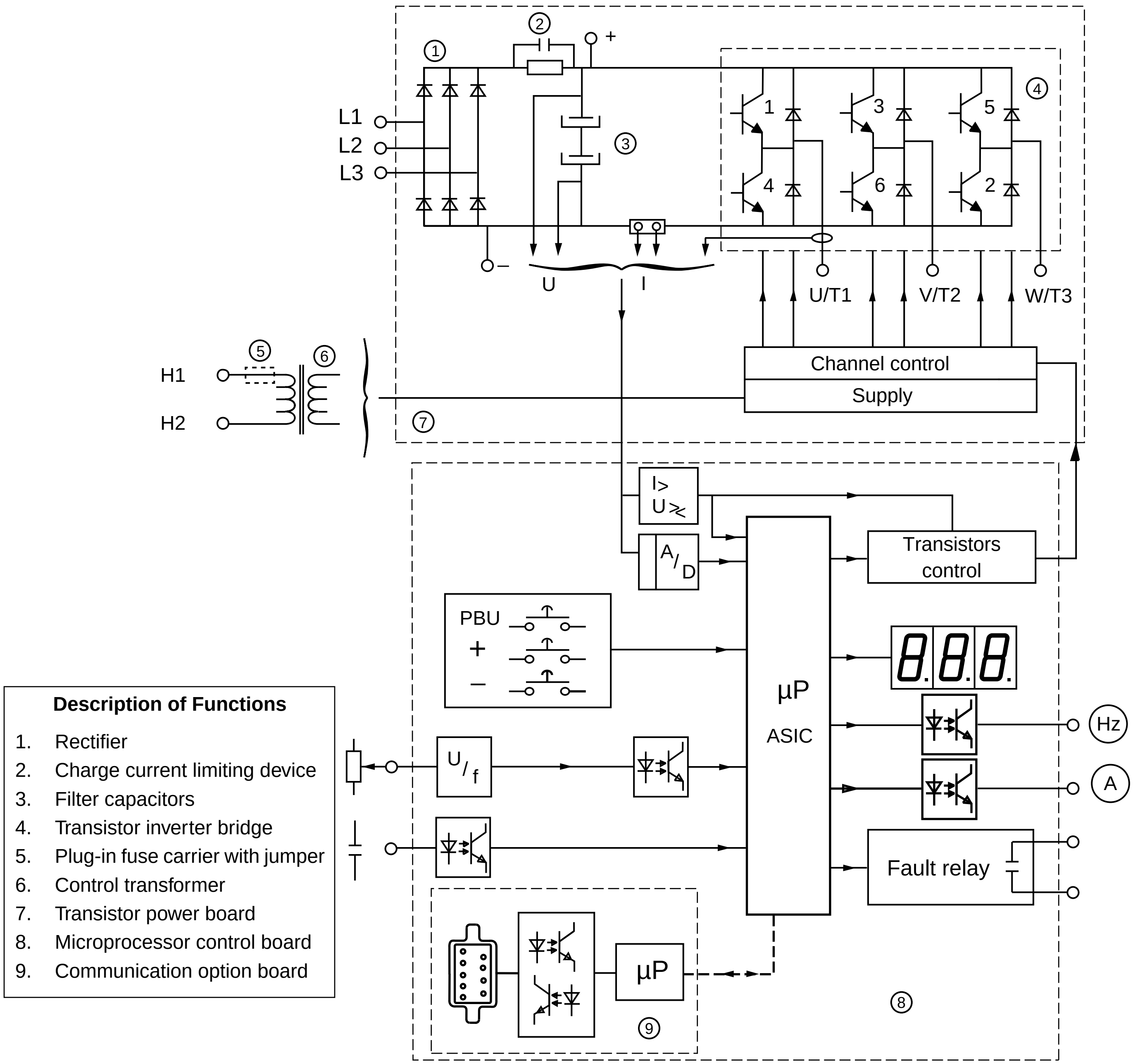

Figure 2-3 Functional Block Diagram for 1.5 to 3 hp Controllers

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Omegapak 7.5 to 50 hp Controllers

This section applies to 7.5 to 50 hp drive controllers at 460 V (PØØVO4G to 4P).

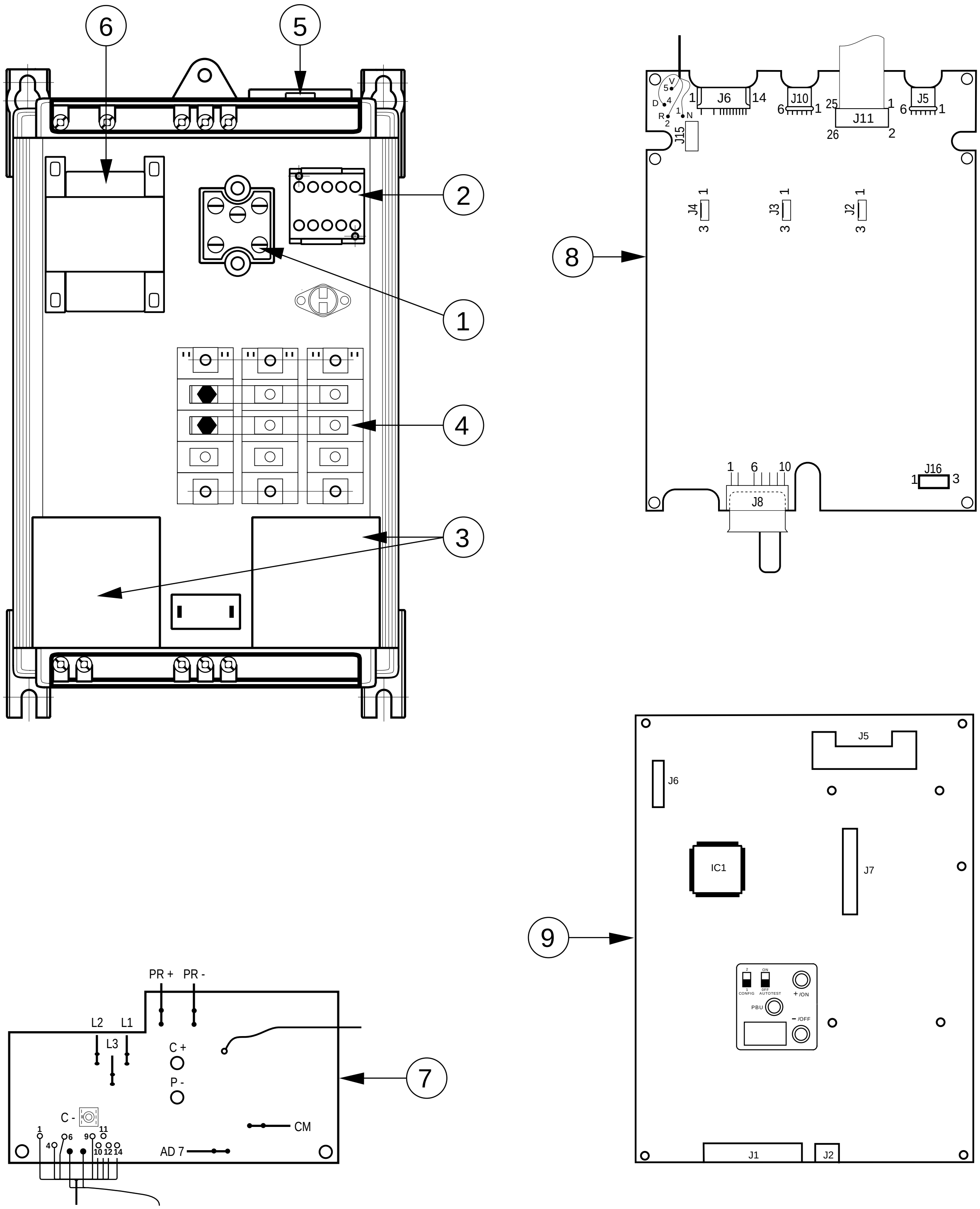

Figure 2-4 Design of 7.5 to 50 hp Controllers

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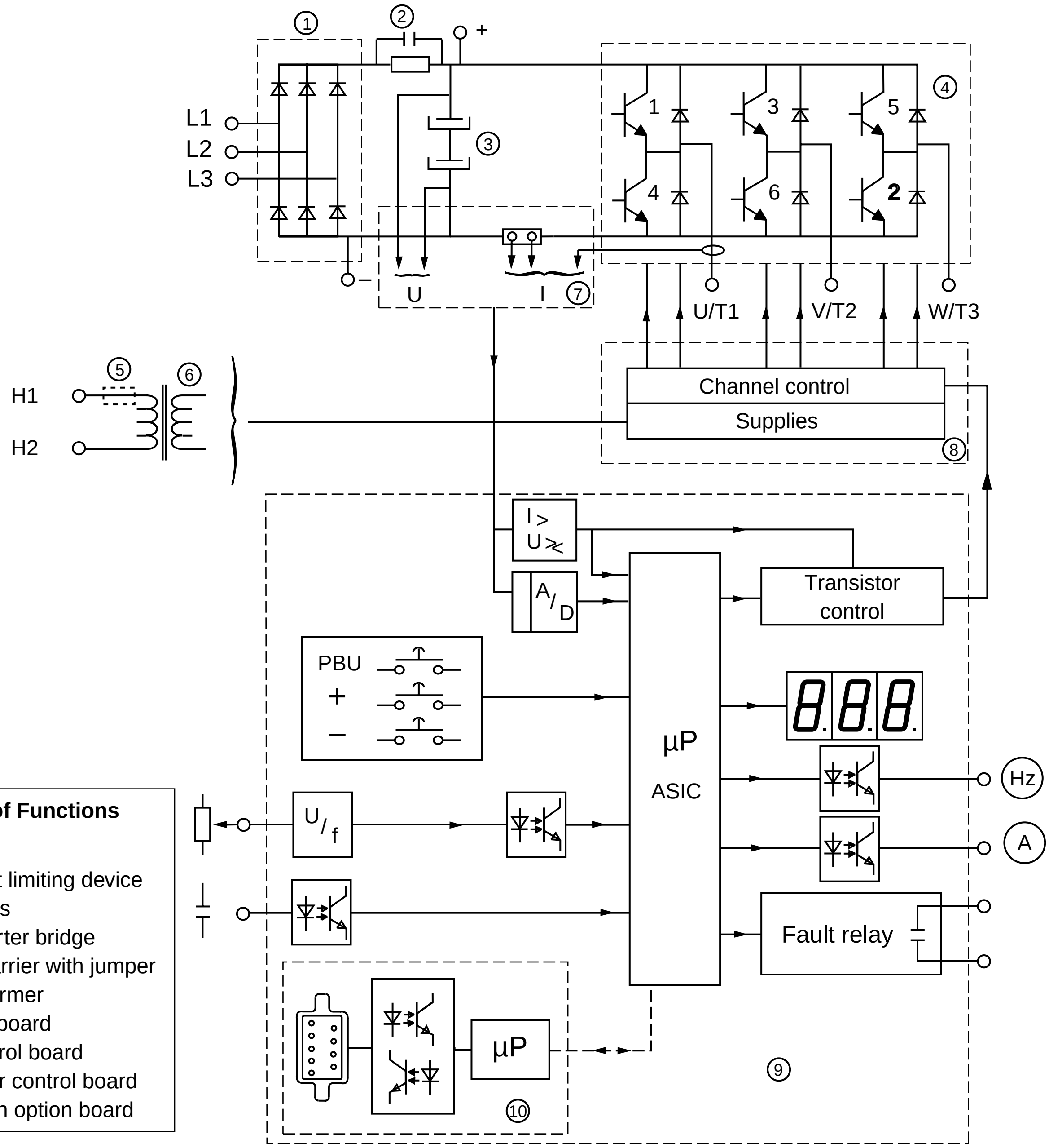
Functional Block Diagram



Description of Functions

1. Rectifier
2. Charge current limiting device
3. Filter capacitors
4. Transistor inverter bridge
5. Plug-in fuse carrier with jumper
6. Control transformer
7. Measurement board
8. Transistor control board
9. Microprocessor control board
10. Communication option board

Figure 2-5 Functional Block Diagram for 7.5 to 50 hp Controllers

Omegapak 60 to 150 hp Controllers

This section applies to the 60 to 150 hp drive controllers at 460 V (PØØVO4Q to PØØVO4U).

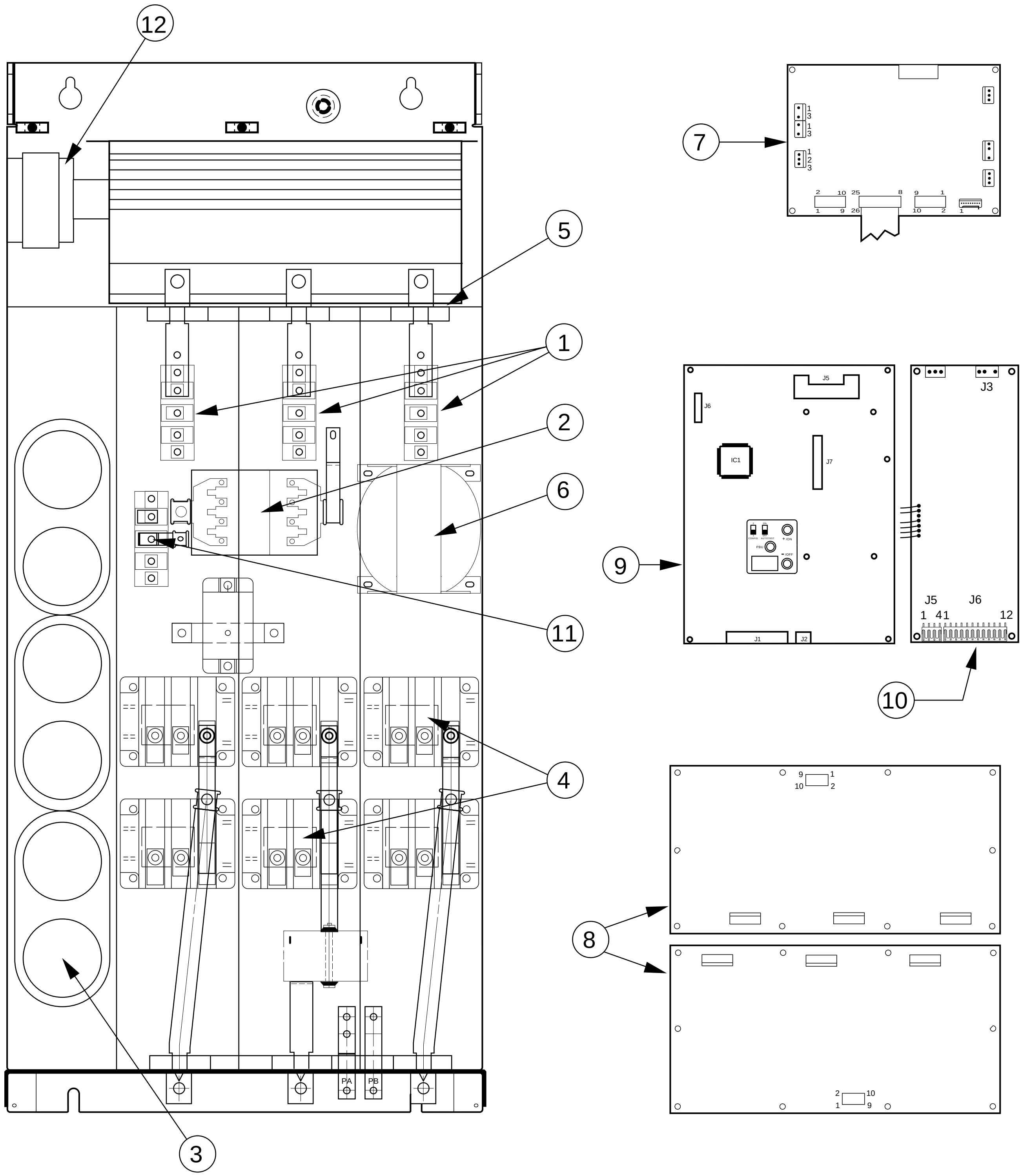


Figure 2-6 Design of 60 to 150 hp Controllers

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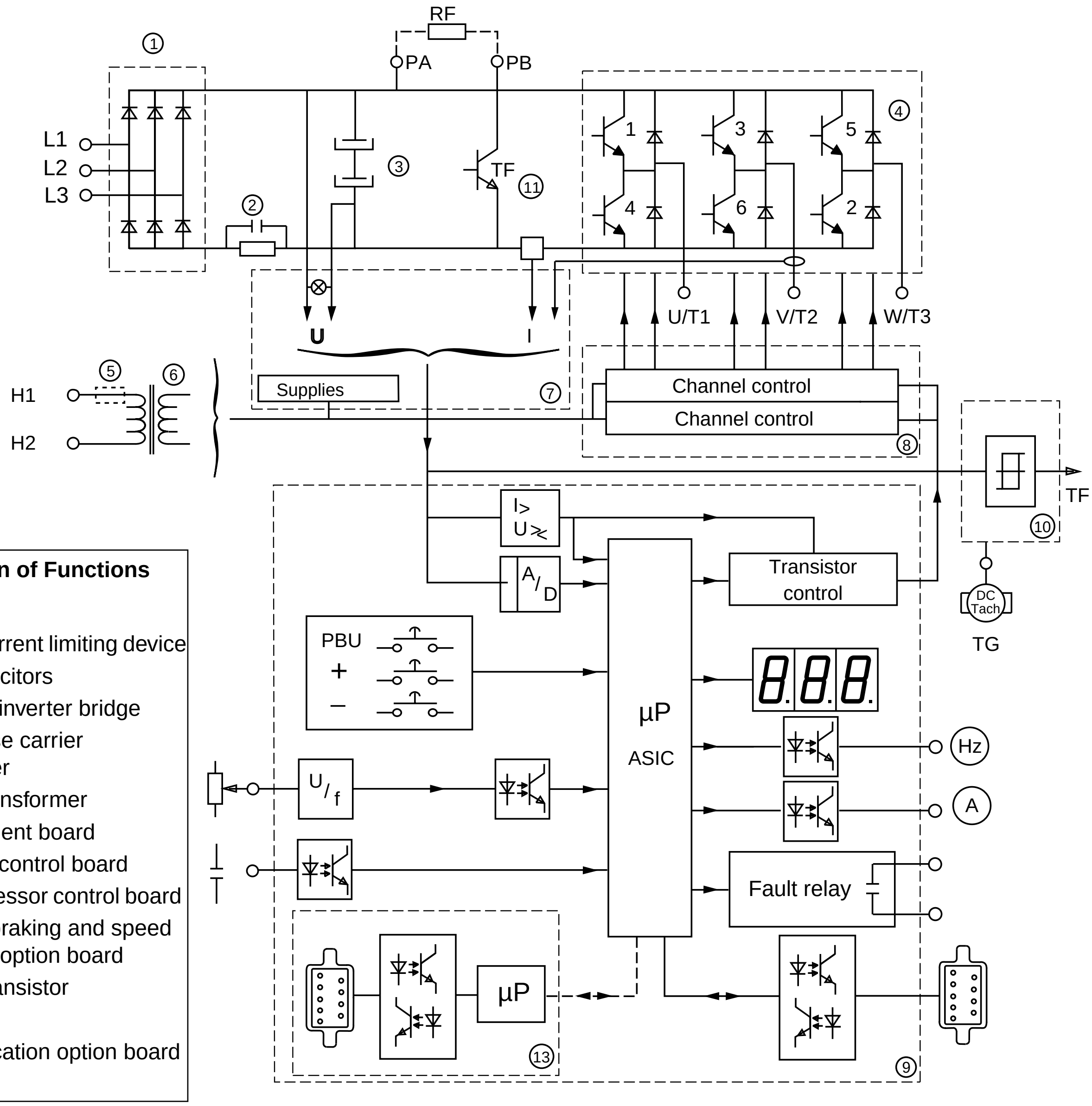
Functional Block Diagram



Description of Functions

1. Rectifiers
2. Charge current limiting device
3. Filter capacitors
4. Transistor inverter bridge
5. Plug-in fuse carrier with jumper
6. Control transformer
7. Measurement board
8. Transistor control board
9. Microprocessor control board
10. Dynamic braking and speed regulation option board
11. Braking transistor
12. Fan
13. Communication option board

Figure 2-7 Functional Block Diagram for 60 to 150 hp Controllers

TERMINAL STRIP CONNECTIONS

1.5 to 50 hp

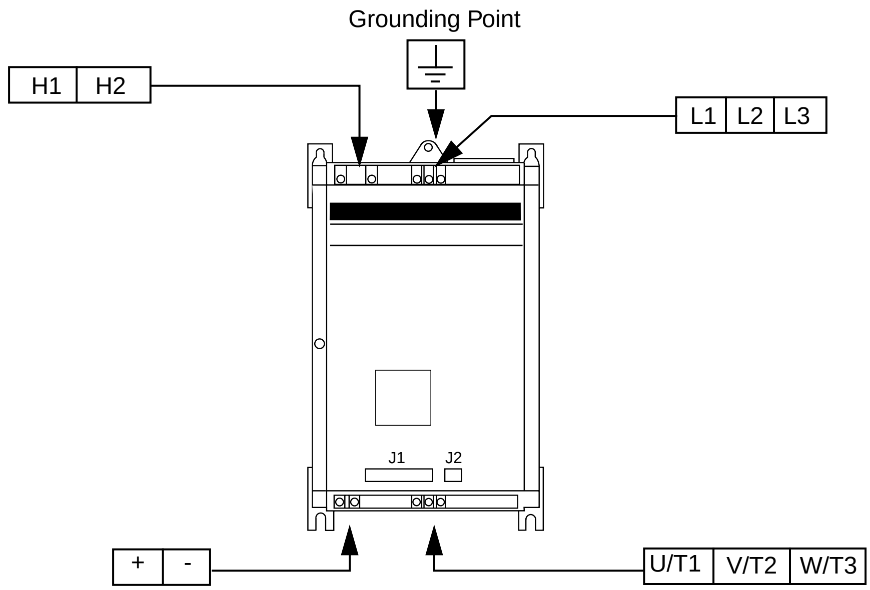


Figure 2-8 Terminal Strip Connections for 1.5 to 50 hp Controllers

60 to 150 hp

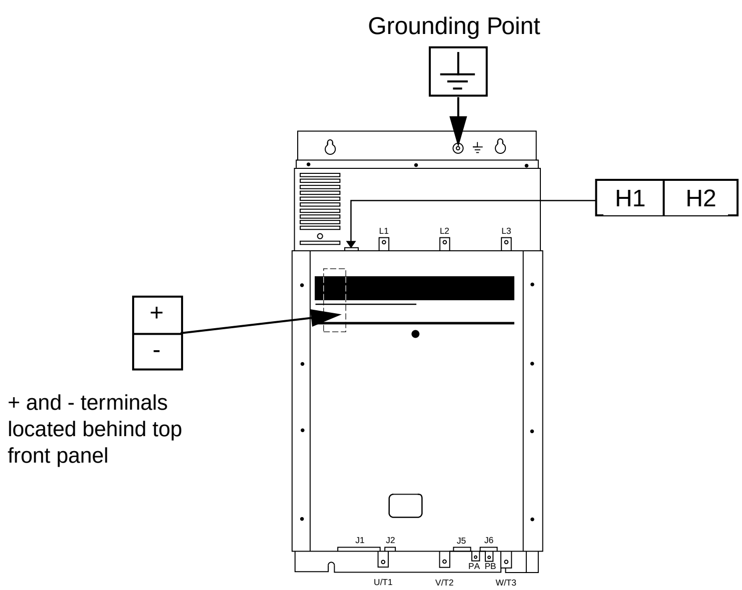


Figure 2-9 Terminal Strip Connections for 60 to 150 hp Controllers

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Table 2-5 Terminal Strip Characteristics for 1.5 to 150 hp Controllers

<table>
<tr><th>Jumper</th><th>Item</th><th colspan="2">Function</th><th>Characteristics
PØØVO4_</th></tr>
<tr><td rowspan="3"></td><td>L1
L2
L3</td><td colspan="2">3-phase power supply</td><td>460 V
+10%/-15%
@ 50/60 Hz</td></tr>
<tr><td>H1
H2</td><td colspan="2">Single phase control supply</td><td>460 V
@ 50/60 Hz</td></tr>
<tr><td>U/T1
V/T2
W/T3</td><td colspan="2">Output connections to the motor</td><td>460 V
@ 50/60 Hz</td></tr>
<tr><td>1.5 to 50 hp</td><td>+
-</td><td colspan="2">Filtered DC voltage</td><td>550 to 800 V</td></tr>
<tr><td>60 to 150 hp</td><td>PA
PB</td><td colspan="2">Braking Resistance</td><td></td></tr>
<tr><td rowspan="3">J1</td><td>OE1
E1
P10
E2
EC</td><td colspan="2">Speed reference
Input 1 - Speed reference voltage
Output voltage
Input 2 - Speed reference voltage
Input 3 - Speed reference current</td><td>0V
0 - 10 V, Impedance = 28 kΩ
10 V, Is = 10 mA
0 - 10 V, Impedance = 28 kΩ
0 - 20 mA, 4 - 20 mA, 20-4 mA, Impedance = 100 Ω</td></tr>
<tr><td>A01
A02</td><td colspan="2">Analog output 1
Analog output 2</td><td>0 - 20 mA, 10 V maximum
0 - 20 mA, 10 V maximum</td></tr>
<tr><td>PL
NL
FW
RV
DCB</td><td colspan="2">Control inputs supply
Negative supply
Forward control input
Reverse control input
DC injection braking control input</td><td>24 V, Is = 60 mA maximum
-15 V, Is = -10 mA maximum
24 V (minimum 19 V, maximum 30 V), Impedance = 1.5 kΩ
24 V (minimum 19 V, maximum 30 V), Impedance = 1.5 kΩ
24 V (minimum 19 V, maximum 30 V), Impedance = 1.5 kΩ</td></tr>
<tr><td>J2</td><td>SA
SB</td><td colspan="2">Fault relay output</td><td>Closes when power is applied, opens on fault
Voltage free contact (220/240 V, 50/60 Hz, 2 A maximum)
V min 10 V, I min 16 mA</td></tr>
<tr><td>60 to 150 hp

J5</td><td>SN+
SGN
PN</td><td>Do Not Connect</td><td rowspan="4">Braking Option</td><td rowspan="3">Note: These connections are at input line potential with respect to ground.</td></tr>
<tr><td rowspan="3">60 to 150 hp

J6</td><td>300 V
145 V
70 V
10 V
0 V</td><td>Do Not Connect</td></tr>
<tr><td>PZ
PY</td><td>Braking Resistance Thermocontact</td></tr>
<tr><td>LA
LB</td><td>Mechanical Brake Control Relay</td><td>Voltage free contact (220/240 V, 50/60 Hz, 2 A max)
V min 10 V,I min 16 mA</td></tr>
</table>

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CIRCUIT DIAGRAMS

Figure 2-10 and Figure 2-11 give the typical and alternate circuit diagrams for the Omegapak Type P AC drive. The alternate circuit diagram may be used when the drive is connected to the load-side of an existing combination starter.

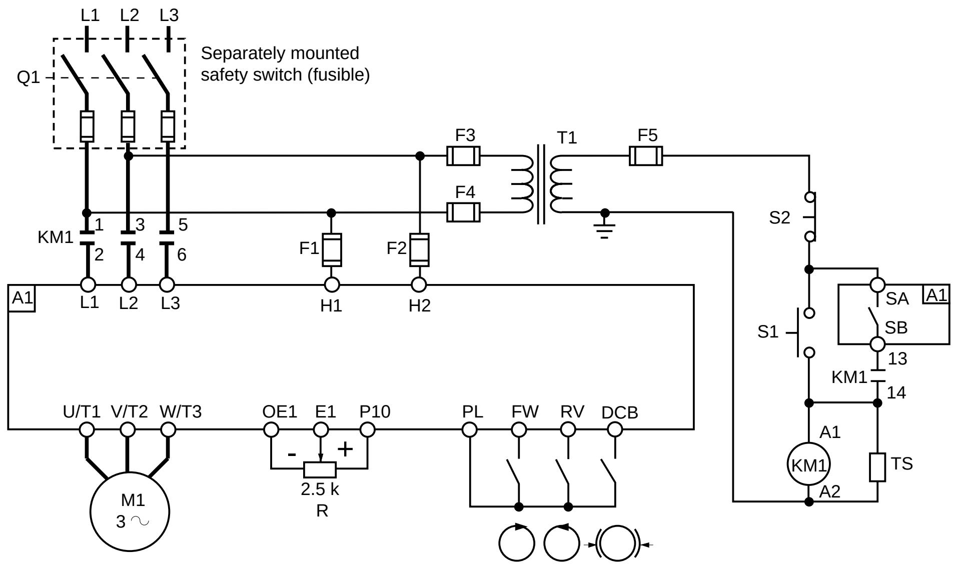

Figure 2-10 Typical Circuit Diagram

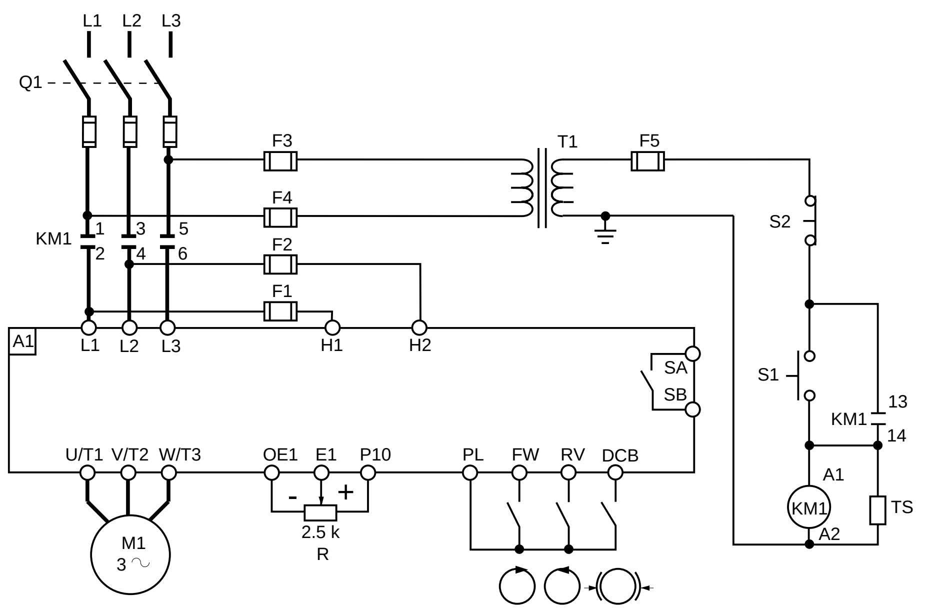

Figure 2-11 Alternate Circuit Diagram

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EQUIPMENT REQUIREMENTS

The equipment lists in the following tables are valid for both versions of the circuit diagram (see Figure 2-10 and Figure 2-11 on page 22).

Table 2-6 Equipment Required for all Controllers, Ratings and Models

F1- F5	Fuse carriers	Class 9080 FB1611CC
R1	Potentiometer	Class 9001 K2106
S1-S2	Push buttons	Class 9001 KR1UH13
	Control station enclosure[1]	Class 9001 KYAF3

[1] Accepts R1, S1 and S2.

Table 2-7 Equipment Required for 1.5 to 15 hp 460 V Controllers

M1	Motor hp	1.5	3	7.5	15
A1	Drive	PØØVO4C	PØØVO4E	PØØVO4G	PØØVO4J
Q1	Safety Switch (Fusible)	Class 3110 H361	Class 3110 H361	Class 3110 H361	Class 3110 H362
	+ 3 Fuses [1]	KTS-R-6	KTS-R-10	KTS-R-20	KTS-R-40
KM1	Contactor	Class 8502 PC3.10EV02	Class 8502 PC3.10EV02	Class 8502 PD3.10EV02	Class 8502 PF1.11V02
TS	Suppressor	Class 9999 PZV250	Class 9999 PZV250	Class 9999 PRV250	Class 9999 PSF220
T1	Transformer	Class 9070 K50D1	Class 9070 K50D1	Class 9070 K50D1	Class 9070 K75D1
F1, F2	Control Fuses [1]	FNQ-R-1.0	FNQ-R-1.0	FNQ-R-1.0	FNQ-R-1.0
F3, F4	Control Fuses [1]	FNQ-R-1/4	FNQ-R-1/4	FNQ-R-1/4	FNQ-R-1/4
F5	Control Fuse [1]	FNQ-R-1/2	FNQ-R-1/2	FNQ-R-1/2	FNQ-R-3/4

[1] Bussman or equivalent

Table 2-8 Equipment Required for 20 to 60 hp 460 V Controllers

M1	Motor hp	20	30	50	60
A1	Drive	PØØVO4K	PØØVO4M	PØØVO4P	PØØVO4Q
Q1	Safety Switch (Fusible)	Class 3110 H362	Class 3110 H363	Class 3110 H364	Class 3110 H364
	+ 3 Fuses [1]	KTS-R-50	KTS-R-80	KTS-R-125	KTS-R-150
KM1	Contactor	Class 8502 PF3.11V02	Class 8502 PG1.11V02	Class 8502 PJ1.11V02	Class 8502 PJ1.11V02
TS	Suppressor	Class 9999 PSF220	Class 9999 PSF220	Class 9999 PSJ220	Class 9999 PSJ220
T1	Transformer	Class 9070 K75D1	Class 9070 K150D1	Class 9070 K200D1	Class 9070 K200D1

[1] Bussman or equivalent

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Table 2-8 Equipment Required for 20 to 60 hp 460 V Controllers (Continued)

M1	Motor hp	20	30	50	60
F1, F2	Control Fuses [1]	FNQ-R-1.0	FNQ-R-1.0	FNQ-R-3.0	FNQ-R-3.0
F3, F4	Control Fuses [1]	FNQ-R-1/4	FNQ-R-1/2	FNQ-R-1/2	FNQ-R-1/2
F5	Control Fuse [1]	FNQ-R-3/4	FNQ-R-1.5	FNQ-R-2.0	FNQ-R-2.0

[1] Bussman or equivalent

Table 2-9 Equipment Required for 100 to150 hp 460 V Controllers

M1	Motor hp	100	125	150
A1	Drive	PØØVO4S	PØØVO4T	PØØVO4U
Q1	Safety Switch (Fusible)	Class 3110 H365	Class 3110 H365	Class 3110 H365
	+ 3 Fuses [1]	KTS-R-225	KTS-R-250	KTS-R-300
KM1	Contactor	Class 8502 PK1.11V02	Class 8502 PK1.11V02	Class 8502 PK5.11V02
TS	Suppressor	Class 9999 PSJ220	Class 9999 PSJ220	Class 9999 PSJ220
T1	Transformer	Class 9070 K250D1	Class 9070 K250D1	Class 9070 K250D1
F1, F2	Control Fuses [1]	FNQ-R-3.0	FNQ-R-3.0	FNQ-R-3.0
F3, F4	Control Fuses [1]	FNQ-R-3/4	FNQ-R-3/4	FNQ-R-3/4
F5	Control Fuse [1]	FNQ-R-2.5	FNQ-R-2.5	FNQ-R-2.5

[1] Bussman or equivalent

Table 2-10 Terminal Wire Range for 1.5 to 15 hp Controllers

Terminals	Drive Part No.	Max. Wire Size [1]		Mounting Screw	Required Terminal Torque
		AWG	mm^2	mm	lb-in
H1, H2	All ratings	14	2.5		
PL, FW, RV, DCB, SA, SB, NL, OE1, E1, P10, E2, EC	All ratings	18	1	N/A	
L1,L2,L3,U/T1,V/T2,W/T3, +, -	PØØVO4C PØØVO4E PØØVO4G PØØVO4J[2]	8 8 8 8	10 10 10 10	N/A N/A N/A N/A	15 15 15 15

[1] 60/75° C copper only.
[2] Controller shipped with terminal adapter that accepts AWG 4 wire max (part no. LA9Z960).

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Table 2-11 Terminal Wire Range for 20 to 150 hp Controllers

Terminals	Drive Part No.	Max. Wire Size [1]		Mounting Screw [3]	Required Terminal Torque
		AWG	mm^2	mm	lb-in
H1, H2	All ratings	14	2.5		
PL, FW, RV, DCB, SA, SB, NL, OE1, E1, P10, E2, EC	All ratings	18	1	N/A	
L1,L2,L3,U/T1,V/T2,W/T3, +, -	PØØVO4K [2]	8	10	N/A	15
	PØØVO4M [2]	8	10	N/A	15
	PØØVO4PFS	2	30	N/A	30
	PØØVO4Q	N/A	N/A	20x3 M6 screw	
	PØØVO4S	N/A	N/A	25x3 M8 screw	
	PØØVO4T	N/A	N/A	25x3 M10 screw	
	PØØVO4U	N/A	N/A	25x3 M10 screw	
PA-PB	PØØVO4Q	N/A	N/A	15x3 M6 screw	
	PØØVO4S	N/A	N/A	15x3 M6 screw	
	PØØVO4T	N/A	N/A	15x3 M6 screw	
	PØØVO4U	N/A	N/A	15x3 M6 screw	

[1] 60/75° C copper only.
[2] Controller shipped with terminal adapter that accepts AWG 4 wire max (part no. LA9Z960).
[3] Requires user supplied lug.

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DIMENSIONS AND WEIGHTS
1.5 to 50 hp

Table 2-12 Dimensions and Weights for 1.5 to 50 hp Controllers

Drive Part No.	**A** in (mm)	**B** in (mm)	**C** in (mm)	**G** in (mm)	**H** in (mm)	**Weight** lb (kg)
PØØVO4C	9.41 (239)	15.04 (382)	6.69 (170)	8.35 (212)	14.17 (360)	17.6 (8)
PØØVO4E PØØVO4G	9.41 (239)	15.83 (402)	7.56 (192)	8.35 (212)	14.96 (380)	24.2 (11) 25.3 (11.5)
PØØVO4J	9.21 (234)	15.94 (405)	10.55 (268)	8.19 (208)	14.17 (360)	33 (15)
PØØVO4K	9.21 (234)	21.85 (555)	10.55 (268)	8.19 (208)	20.08 (510)	46.2 (21)
PØØVO4M	9.21 (234)	23.43 (595)	10.55 (268)	8.19 (208)	21.65 (550)	51.7 (23.5)
PØØVO4P	9.21 (234)	32.28 (820)	10.55 (268)	8.19 (208)	29.53 (750)	66 (30)

PØØVO4C
PØØVO4D

PØØVO4E
PØØVO4G

PØØVO4J
PØØVO4K
PØØVO4M
PØØVO4P

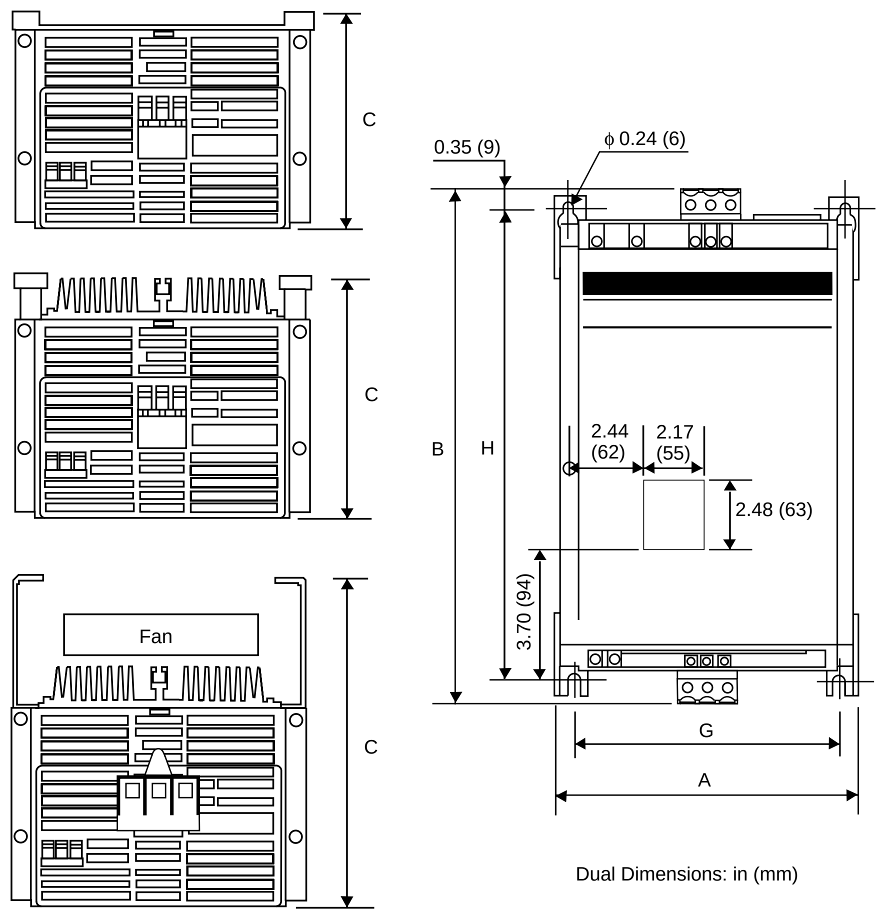

Figure 2-12 Dimension Drawing for 1.5 to 50 hp Controllers

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DIMENSIONS AND WEIGHTS
60 to 150 hp

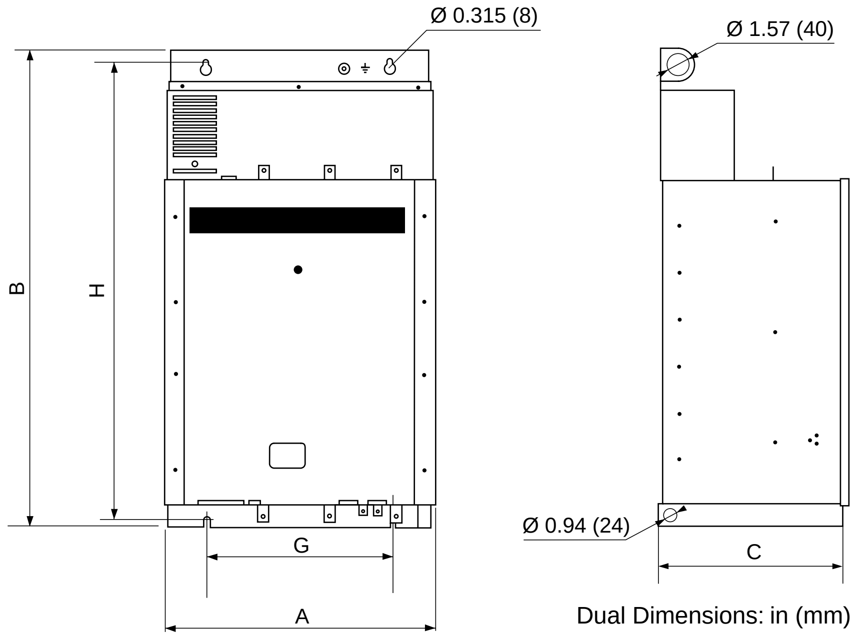

Figure 2-13 Dimension Drawing for 60 to 150 hp Controllers

Table 2-13 Dimensions and Weights for 60 to 150 hp Controllers

Drive Part No.	**A** in (mm)	**B** in (mm)	**C** in (mm)	**G** in (mm)	**H** in (mm)	**Weight** lb (kg)
PØØVO4Q	19.06 (484)	33.86 (860)	13.78 (350)	13.19 (335)	32.28 (820)	189 (86)
PØØVO4S	19.06 (484)	40.94 (1040)	13.78 (350)	13.19 (335)	39.37 (1000)	231 (105)
PØØVO4T	23.42 (595)	46.77 (1188)	14.37 (365)	17.52 (445)	45.67 (1160)	308 (140)
PØØVO4U	23.42 (595)	46.77 (1188)	14.37 (365)	17.52 (445)	45.67 (1160)	308 (140)

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MOUNTING IN DUST AND DAMP PROOF METAL ENCLOSURE (1.5 to 50 hp Drives)

Degree of protection: NEMA Type 12 (IP54).

Provide a stirring fan to circulate the air inside the enclosure and prevent hot spots in the drive controller. This allows operation of the controller in an enclosure with a maximum internal temperature of 140° F (60° C). Ventilation kit VY1-A05107 may be used for this purpose.

Locate the fan to ensure:

- ❑ Air movement over the control and power boards.
- ❑ Air flow inside enclosure = 200 CFM (100 dm^3/s), fan mounted beneath the controller at a maximum distance of 2 in (50 mm); see Figure 2-14.

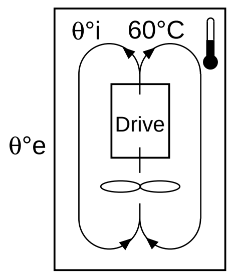

Figure 2-14 Ventilation for Dust and Damp Proof Enclosure

Calculating Enclosure Size for Non-Ventilated Enclosures

Below is the equation for calculating Rth (°C/W), the maximum allowable thermal resistance of the enclosure:

$$Rth = \frac{60 - \theta°e}{P}$$

θ°e = Maximum external temperature (°C)

P = Total power dissipated in enclosure (W)

For the power dissipated by the controllers at rated load, see Table 2-1 on page 10.

Useful heat exchange surface area of a wall mounted enclosure S (in^2) consists of the sides, top and front. The minimum surface area required for a controller enclosure is calculated as follows:

$$S = \frac{K}{Rth}$$

Rth = Thermal resistance of the enclosure (calculated previously)

K = 300 for a painted metal enclosure

Do not use polymetric enclosures, since they have poor thermal conduction. Do not install enclosures where external heat sources can add to enclosure heat load.

Below is an example of how to calculate the enclosure size for a PØØVO4E (3 hp) mounted in a NEMA 12 enclosure with internal stirring fan.

- ❑ Maximum external temperature: 30°C
- ❑ Power dissipated inside the enclosure: 110 W
- ❑ Maximum allowable thermal resistance:

$$Rth = \frac{60 - 30}{110} = 0.27\ °C/W$$

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- ❑ Minimum useful heat exchange surface area:

$$S = \frac{300}{0.27} = 1099 \text{ in}^2$$

Useful heat exchange surface area of the proposed wall mounted enclosure:

- ❑ Height: 24 in (600 mm)
- ❑ Width: 20 in (500 mm)
- ❑ Depth: 10 in (250 mm)

$$S = \underbrace{(24 \times 20)}_{\text{front area}} + \underbrace{(10 \times 20)}_{\text{top area}} + 2\underbrace{(24 \times 10)}_{\text{side area}} = 1160 \text{ in}^2$$

Recess Mounting

To reduce power dissipated in the enclosure, the drive controller can be recess mounted in the back of the enclosure, with the heat sink on the outside. This arrangement necessitates a cut-out and a gasket kit. To obtain a temperature that does not exceed 140° F (60° C), the air inside the enclosure must be stirred by the addition of a fan with a flow rate of 100 CFM (44 dm^3/s).

The minimum metal enclosure dimensions enabling the mounting of one drive controller with an internal fan in an external ambient air temperature less than 86° F (30° C) are given in Table 2-14:

Table 2-14 Minimum Metal Enclosure Dimensions

Gasket Kit Part No.	**Drive Part No.**	**H** in (mm)	**W** in (mm)	**D** in (mm)	**Pi**[1] W
VY1-A451U1501	PØØVO4C	19.69 (500)	15.75 (400)	9.84 (250)	70
VY1-A451U4001	PØØVO4E	19.69 (500)	15.75 (400)	9.84 (250)	85
	PØØVO4G	27.56 (700)	15.75 (400)	9.84 (250)	105
VY1-A451U7501	PØØVO4J	23.62 (600)	15.75 (400)	9.84 (250)	80
VY1-A451D1101	PØØVO4K	27.56 (700)	19.69 (500)	9.84 (250)	95
VY1-A451D1501	PØØVO4M[2]	27.56 (700)	19.69 (500)	9.84 (250)	110
VY1-A451D3001	PØØVO4P[2]	35.43 (900)	27.56 (700)	11.81 (300)	150

[1]Pi = power dissipated in the enclosure by a recess mounted drive controller.

[2]Gasket kit does not maintain dust- and damp-proof integrity of interior of 30 and 50 hp drive controller enclosures (bus capacitors protrude through heat sink).

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MOUNTING IN DUST AND DAMP PROOF METAL ENCLOSURE **(60 to 150 hp Drives)**

Degree of protection: NEMA Type 12 (IP54).

Provide a stirring fan to circulate the air inside the enclosure and prevent hot spots on the drive controller.

- ❏ See power dissipated by drive controllers, listed in Table 2-1 on page 10.

Refer to Calculating Enclosure Size for Non-Ventilated Enclosures on page 28

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Chapter 3 - Options

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INTRODUCTION

The Omegapak Type P drive has the following option kits available for user installation:

- ❏ Adaptation for ± 10 V Control
- ❏ Dynamic braking and speed regulation options
- ❏ Dynamic braking resistors
- ❏ Gasket kits for mounting in dust- and dampproof metal enclosures (1.5 to 50 hp drives only)
- ❏ Ventilation kit (1.5 to 50 hp drives only)
- ❏ Serial communication kit

Each option is described in the following sections.

ADAPTATION FOR ±10 V CONTROL

The ±10 V control module, part no. VW3-A45108, is an interface that changes the ±10 V input into a 0 to 10 V speed reference and a rotation direction (forward or reverse) control. It has the following characteristics:

- ❏ Dimensions (H x W x D):
  3.78 in (96 mm) x 1.89 in (48 mm) x 1.65 in (42 mm)
- ❏ Clip-on fastener onto ⊓⊔ 1.38 in (35 mm) omega rail
- ❏ Two summing analog input terminals, 22 and 23 (Ze = 28 kΩ). The resulting speed reference is equal to the absolute value of the sum of references AE1 and AE2.
- ❏ The sign (+ or -) of the sum of the references determines the rotation direction.

The module may be enabled by a balanced 30 VDC external supply between terminals 25 (+) and 26 (-).

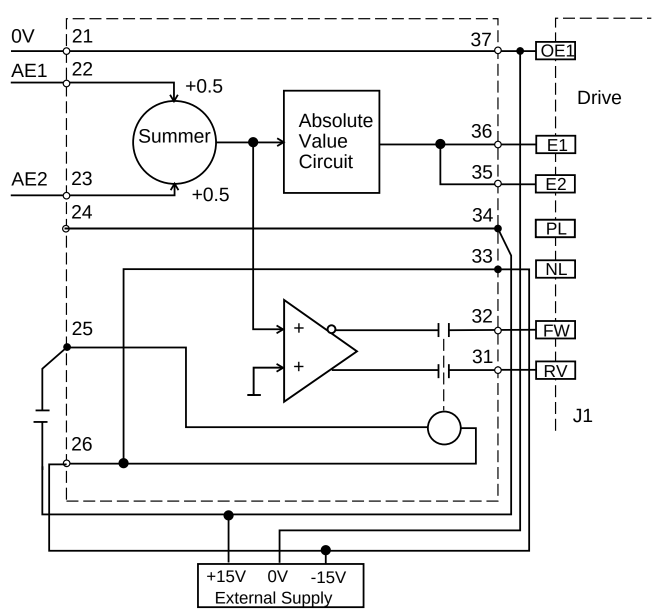

Figure 3-1 Block Diagram of ±10 V Control Module

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DYNAMIC BRAKING AND SPEED REGULATION

The dynamic braking and speed regulation options are grouped together and are available in three versions according to the drive power:

- ❏ Dynamic braking and speed regulation module (8803 PB01) for 460 V, 1.5 to 30 hp drives
- ❏ Dynamic braking and speed regulation module (8803 PB02) for 460 V, 50 hp drives
- ❏ Dynamic braking and speed regulation board (8803 PB03) for 460 V, 60 to 150 hp drives.

In all cases, the braking resistor is not supplied with the option and must be ordered separately. Four resistor kits are available for use with the three dynamic braking options. The resistor kits are open types intended to be mounted separately from the drive controller.

Dynamic Braking Principles

When the frequency produced by the controller decreases rapidly, the motor behaves like an asynchronous generator and produces a braking torque. The motor feeds energy back to the drive controller. The amount of energy depends on the rate of deceleration, the inertia of the moving mass and the resistive torque.

Since the controller cannot feed the energy back into the supply, this causes an increase in the voltage of the filter capacitors, which limits the braking effect, potentially causing the controller to fault on overvoltage. Part of the braking energy is dissipated as losses in the motor and the corresponding braking torque varying from 10 to 35% of the rated motor torque.

Dynamic braking allows a higher braking torque to be obtained and ensures dissipation of part of the braking energy in an external resistor. Dynamic braking consists of the following major components:

- ❏ Power transistor that switches the braking resistor across the filter capacitor terminals
- ❏ Control electronics
- ❏ Separately mounted braking resistor and fuse
- ❏ Low speed relay, which will control a brake if necessary: pick up at $f > 0$ Hz and motor $I \geq 0.7$ rated drive controller current, drop out at $f \leq 0$ Hz.

For Omegapak 1.5 to 50 hp drives, the dynamic braking modules contain all the control electronics, power transistor and low speed relay.

For Omegapak 60 to 150 hp drives, the power transistor is incorporated directly into the drive controller. The control electronics and low speed relay are located on the dynamic braking board.

Resistor kits containing resistor(s) and fuses are available for all drive controllers. See Table 3-1 on page 34.

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BRAKING RESISTOR KITS

Kits containing standard values of braking resistors and associated fuses are available. Table 3-1 lists the electrical and thermal characteristics of the resistor kits as well as the recommended kits for various drive controllers.

Table 3-1 Standard Braking Resistors

Resistor Kit No.		**8803 PR01**	**8803 PR02**	**8803 PR02 (2 ea)**	**8803 PR04**	**8803 PR04 (2 ea)**
Drive	**PØØVO-4** 460 V	**C** (1.5 hp) **E** (3 hp) **G** (7.5 hp)	**J** (15 hp) **K** (20 hp)	**M** (30 hp) **P** (50 hp)	**Q** (60 hp) **S** (100 hp)	**T** (125 hp) **U** (150 hp)
Standard Resistor Configuration [1]	**PØØVO-4** 460 V	50 Ω (2 ea.) in series	6.4 Ω (5 ea.) in series	2 PR02 kits in parallel [2]	10 Ω	2 PR04 kits in parallel [2]
Power Rating per Resistor [3]		50 W	57.6 W	57.6 W	1440 W	1440 W
Std. Resistor Value [4]		100 Ω	32 Ω	16 Ω	10 Ω	5 Ω
Fuse Value		1 A	3 A	3 A	12 A	12 A
Gould Shawmut Part No. [5]		TRS1R	TRS3R	TRS3R	TRS12R	TRS12R

[1] Resistors supplied with kits are type PX1 for kits PR01 and PR02, and type TW27D for kit PR04.
[2] When more than one kit is required to obtain the correct power and resistance values, connect the fuse and resistor supplied with each kit in series to form a group, then connect the groups in parallel.
[3] Power ratings per resistor are calculated based on fuse current. Actual resistor power rating is 135 W for kits PR01 and PR02 and 7290 W for kit PR04.
[4] Standard resistor value represents the total series resistance of the recommended resistor string.
[5] Do not substitute for these fuses, since they can operate correctly at the DC voltages in this application.

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Ventilation Kit
(1.5 to 50 hp drives)

The ventilation kit, part no. VY1-A05107, is comprised of a single phase stirring fan and mounting accessories. It is attached to the upper part of the drive controller. This arrangement reduces hot spots, allowing the controller to be used in an enclosure with a maximum internal temperature of 140° F (60° C).

The ventilation kit, shown in Figure 3-2, has the following characteristics:

- ❏ Attached to upper part of drive controller with 0.79 in (20 mm) standoffs, leaving an area free for wiring
- ❏ Overall height: 2.95 in (75 mm) + 0.79 in (20 mm) = 3.74 in (95 mm)

At least 2 in (50 mm) clearance must be provided above the fan for air flow.

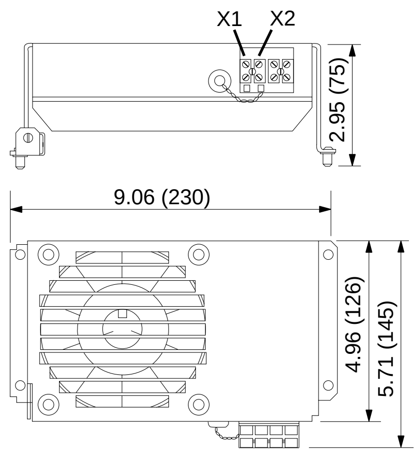

Figure 3-2 Ventilation Kit

The fan has the following characteristics:

- ❏ Flow: 100 CFM (44 dm^3/s)
- ❏ Power supply (terminals X1-X2): 208 to 240 V, 50/60 Hz
- ❏ Current consumption: 125/105 mA

To access the top of the drive controller once the fan is installed, remove the two screws on the right hand side of the kit and pivot the kit away from the controller

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SERIAL COMMUNICATION KIT

Designed for incorporation in modern automated system architectures, Omegapak Type P AC drives can be connected to an RS-485 standard multidrop bus. This option board (part no. 8803 PS01) is required for each drive on the bus.

The serial communication kit is supplied complete with accessories for mounting it onto the control board of the drive controller and an instruction bulletin.

This option enables data exchange via the following protocols:

- ❑ UNI-TELWAY®
- ❑ MODBUS®
- ❑ SY/MAX® PNIM

Via a single asynchronous serial link, a programmable controller or computer can control and monitor up to 28 Omegapak Type P drive controllers equipped with the communication option board.

The following data may be transmitted over the serial link:

- ❑ Operating mode (read and write): LOCAL or LINE
- ❑ Drive controller configurations and settings (read and write): ramp times, speed limits, voltage/frequency ratio, thermal (overload) protection, etc.
- ❑ Commands (read and write): run, frequency reference, braking, et.
- ❑ Signalling (read only): state and fault recording, motor current, thermal state, etc.

For further information, refer to the Serial Communication Kit Instruction Bulletin No. 50006-378-05.

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Chapter 4 - Application Data

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DRIVE SELECTION

The motor/drive combination must be adequately rated to:

- ❑ Overcome the load torque of the motor load over the entire speed range used
- ❑ Supply the transient overtorque needed for the required acceleration
- ❑ Provide required braking torque for rapid deceleration either by DC injection braking or dynamic braking.

Depending on the type of machine load, certain considerations must be kept in mind:

- ❑ Constant torque load (conveyors): insure that the required starting torque is compatible with the AC drive controller available overtorque.
- ❑ Quadratic torque load (fans and centrifugal pumps): torque increases rapidly with speed and it may be necessary to limit the maximum speed to avoid exceeding the capabilities of the motor-drive combination.
- ❑ Constant power load (winders): check the speed range. If torque is highest at low speed, check the torque capability at the lowest speed and provide forced ventilation if necessary.

Overhauling load/high inertia: closely examine the required braking methods and oversize if necessary.

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AVAILABLE MOTORING TORQUE

Continuous Duty

For continuous duty reduced speed applications, motor torque derating may be necessary. This derating is linked to two causes:

- Although the current waveform is very close to a sine wave, motor heating is slightly greater than that obtained by direct supply from the input line. The resulting torque derating is approximately 5%.
- For self-ventilating motors, the ventilation produced by the internal shaft fan decreases as the speed is reduced. This necessitates derating of the maximum continuous torque capability of the motor. Generally, the required derating occurs at approximately 50% of nameplate motor speed. Since motor designs vary, the motor manufacturer should be consulted for the required derating for a specific motor.

Overtorque Capability

The driving overtorque capabilities of a given motor are determined by: the motor NEMA design category (Design B, Design D, etc.), no-load (magnetizing) current of the motor at nameplate speed, maximum transient output current of the controller and the applied V/f at reduced speed.

- For NEMA design B motors whose no-load currents are less than 58% of the motor nameplate current, the maximum overtorque capability is approximately 110% of motor rated torque with 110% of motor rated current.
- With constant V/f excitation, the motor overtorque capability begins to decrease below 50% of motor nameplate speed. Improved low speed overtorque performance is possible by choosing the proper V/f selection.

Overspeed Operation ($f \geq 50/60$ Hz)

With an adjustable frequency controller, operation at speeds greater than motor nameplate speed may be possible. However, above some output frequency, the controller is incapable of producing additional output voltage. Generally, this frequency is 50/60 Hz. When operated in this region, the available continuous motor torque will begin to decrease along with the motor maximum overtorque capability. The motor manufacturer should be consulted concerning the continuous torque and overtorque capabilities of the particular motor.

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Reduced V/f Operation

Many centrifugal fans and pumps require driving torque which increases in proportion to the square of the speed. Such load types are sometimes called quadratic loads. Since the torque production ability of an induction motor decreases in proportion to the square of the applied motor V/f, it is possible, when driving quadratic loads, to linearly reduce the motor V/f as motor speed decreases and still have sufficient torque for satisfactory operation. When operated in this manner, constant motor slip is maintained throughout the operating speed range of the load.

Reduced V/f motor operation with quadratic loads can be advantageous.

- ❏ Audible motor noise resulting from the controller PWM output voltage waveform at reduced speeds is significantly reduced.
- ❏ Motor excitation losses should decrease resulting in more efficient motor operation at reduced speed.

Driving Torque Production Envelope

Figure 4-1 and Figure 4-2 illustrate typical continuous torque and overtorque driving capability for a typical self-ventilated NEMA Design B, 1.0 service factor motor whose no-load current is less than 58% of the motor rated current. In Figure 4-1, the motor is operated with reduced V/f excitation while in Figure 4-2 the motor is operated with constant V/f excitation. In addition, the controller rated output current is greater than or equal to the motor nameplate current and the controller transient output current capability is no less than 110% of controller rated output current.

For 1.15 service factor motors, the continuous torque rating is 1.0 times the motor rated torque from 50 to 100% of motor nameplate rated speed.

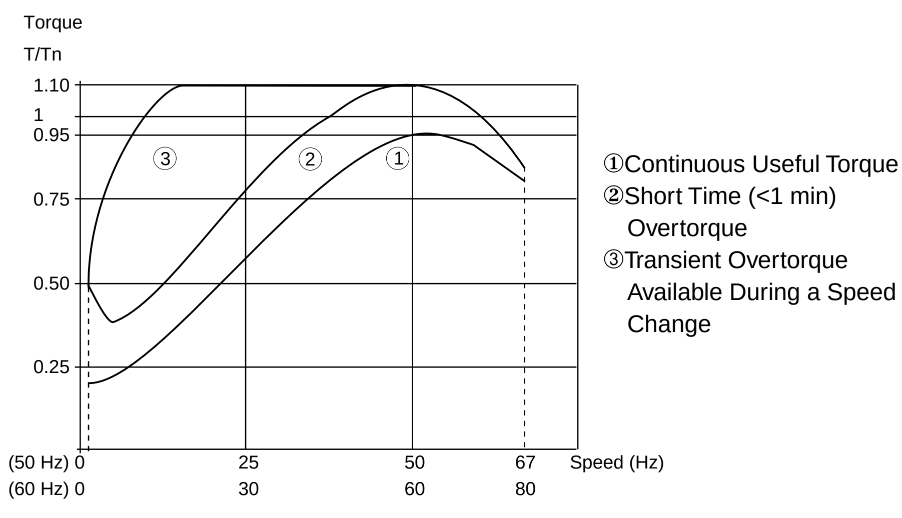

Figure 4-1 Operation with Quadratic Torque Load

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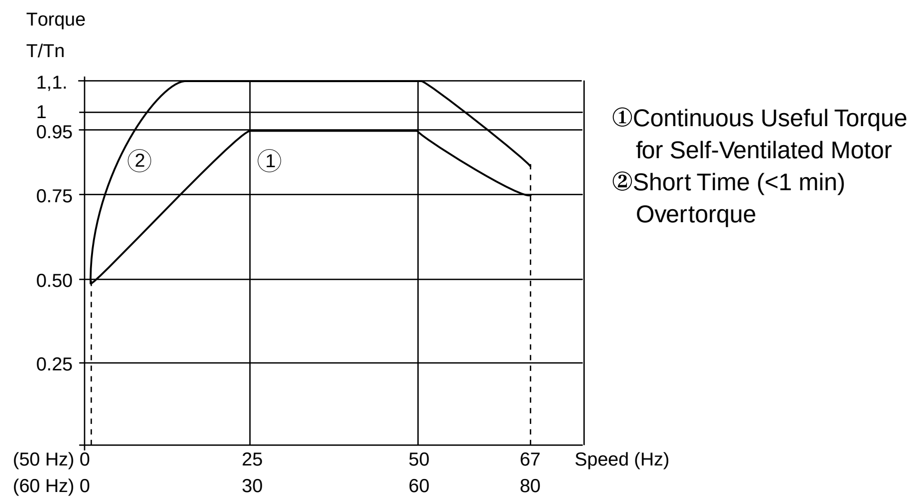

Figure 4-2 Operation with Constant Torque Load

THERMAL (OVERLOAD) PROTECTION OF THE MOTOR

Indirect thermal (overload) protection of the motor is incorporated in the drive controller, taking into account:

- ❏ Current absorbed by the motor
- ❏ Motor speed (ventilation)
- ❏ Ambient air temperature of 104° F (40° C)

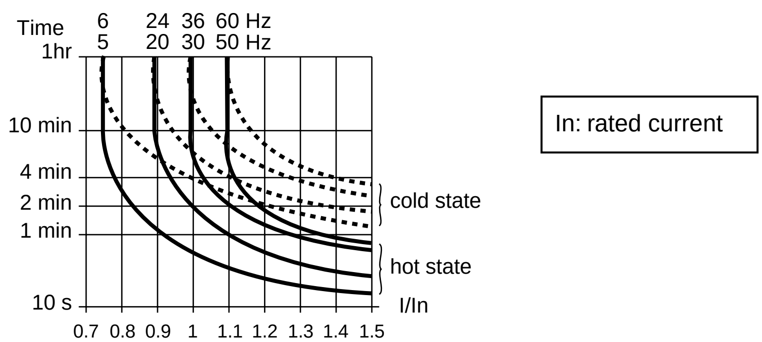

Figure 4-3 Thermal Trip Curves

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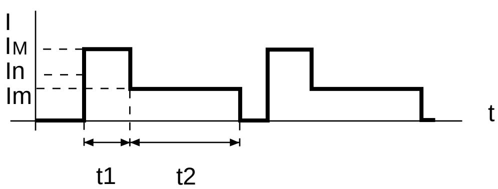
INTERMITTENT DUTY

The controller can supply output current in excess of its rating for a finite duration of time. The allowable magnitude and duration of a non-periodic overload for a controller is defined by the transient output current and the thermal trip curves shown in Figure 4-3 on page 41. For this case, In equals the controller rated output current.

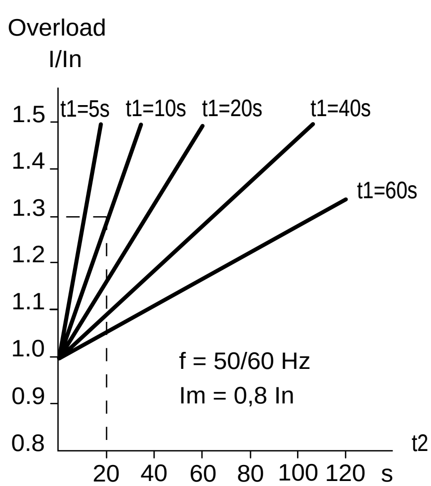
For intermittent (periodic) overloads, the controller overload period must be followed by a cool-down period as illustrated in Figure 4-4. The relationship between the magnitude and period of overload versus cool-down is given by the formula in Figure 4-5. The formula assumes operation at output frequencies of 50/60 Hz. For frequencies below 50/60 Hz, the rated current, In, must be decreased by the amount shown in Figure 4-3 to prevent tripping the thermal (overload) protection. If the thermal (overload) protection is set for a force-cooled motor, no reduction is required.



IM: overload current
In: rated current
Im: normal running current
t1: duration of overload
t2: recovery time

Figure 4-4 Intermittent Duty

The curves in Figure 4-5 can be used to determine the ratio between the overload duration and the operating time at 80% of the rated current at 50/60 Hz. For example, following an overload of 1.1 In for 40 seconds, it would require 20 seconds at 0.8 In to return to the previous thermal state.



IM: overload current
In: rated current
Im: normal running current

Formula for controller:

$$t2 = 1.25[(IM - In)/(In - Im)]t1$$

Figure 4-5 Overload Curves for Controller

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ASSOCIATION WITH DIFFERENT MOTORS

Omegapak Type P drive controllers are designed to drive motors with a corresponding power rating. However, they can be used with motors having different power ratings as long as certain precautions are observed. Depending on the motor characteristics and performance necessary for the application, special configuration may be necessary.

Omegapak Type P drive controllers are selected on the basis of required output current and power over the expected frequency range. Under no circumstances should the motor continuous power or current requirements for a given load situation exceed the drive controller's continuous output current and power rating.

When Motor Power is Less Than or Equal to Controller Rated Power

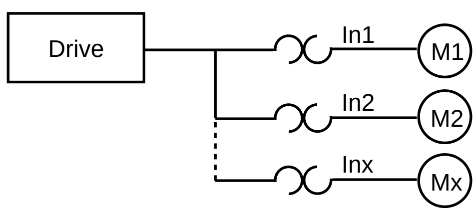
It is permissible for motor power to be less than or equal to the drive rated power. However, since compensation is not at the optimum level, this can lead to a reduction in continuous torque at low speed. Adjustments during set up may be necessary.

If the motor rated current is less than 50% of drive rated output current, correct adjustment of motor thermal protection is impossible and nuisance tripping of the controller may result. In this case, use standard external protection (overload relay or thermal sensor).

When Motor Power is Greater Than Controller Rated Power

Magnetizing current peaks generally limit this combination to the motor power immediately above the drive rating. Compensation is not at the optimum level, and adjustments during set up may be necessary. The motor current must remain less than or equal to the drive controller's rated current. In addition, the power required by the load should not exceed the power rating of the controller. If necessary, install a three-phase inductor between the drive controller and the motor (page 46).

Motors in Parallel



Drive controller selection:
- Drive controller In ≥ In1 + In2 + ... Inx
- Drive controller Pn ≥ Pn1 + Pn2 + ... Pnx
- Protect each motor with a thermal overload relay

In: rated current   Pn: rated power

Figure 4-6 Motors in Parallel

When motors are in parallel, compensation is not at the optimum level and adjustments during set up may be necessary. If the motors have different power ratings, the ratio adjustment can only be a compromise. If the load is to be shared between the motors, adjustments during set up may be necessary.

If there are three or more motors in parallel, installation of a three phase inductor between the drive controller and the motor is recommended (page 46).

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Using a Brake Motor

Electric Brake Solenoid

Make sure that the brake winding is brought out to terminals, without a common point to the stator. The brake should be supplied separately at its rated voltage and switched on simultaneously with the motor.

Tapered Rotor Motor

The brake on a tapered rotor motor is released by the magnetic field of the motor. This kind of motor can be used with a frequency inverter, but requires special adjustments.

Using a Synchronous Permanent Magnet or Wound-Field Motor

It is possible to operate a synchronous motor as long as the following conditions are met:

- ❏ Slip compensation is not used.
- ❏ External overload protection (overload relay or thermal sensor) is used.
- ❏ Operation only at constant V/f.
- ❏ Appropriate field excitation and protection is provided for externally-excited motors.

Using a Synchronous Reluctance Motor

It is possible to operate a synchronous reluctance motor as long as adjustments are made during set up.

Additional Motor Connected Downstream of the Drive Controller

When connecting an additional motor, comply with the timing sequence shown in Figure 4-7:

- ❏ t1 = 20 ms
- ❏ t2 = time required for motor residual voltage to reach 10% of motor nameplate voltage.

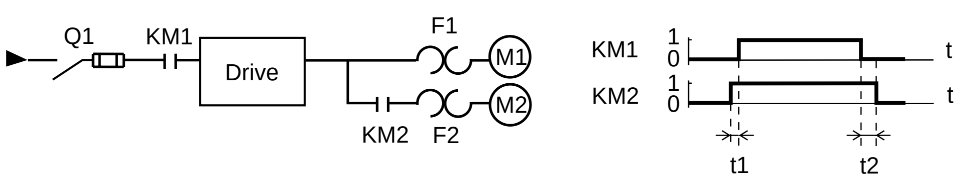

Figure 4-7 Connecting an Additional Motor

If the motor is to be connected to the controller while the controller is running, the sum of the running motor current(s) plus the expected starting current of the switched motor must not exceed 90% of the controller's transient output current rating.

Bypassing the Drive Controller

When bypassing the drive controller or inserting an isolation contactor between the controller and motor, comply with the timing sequence shown in Figure 4-8:

- ❏ t1 = 20 ms
- ❏ t2 = time required for motor residual voltage to reach 10% of motor nameplate voltage.

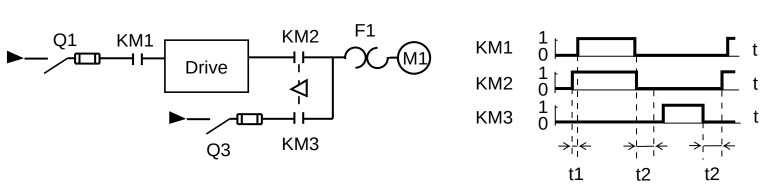

Figure 4-8 Bypassing the Drive (Direct Coupling)

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ADAPTATION TO THE INPUT LINE

If a suitable input line is not available, the drive controller can be supplied via a three-phase transformer or autotransformer, rated as shown in Table 4-1.

Table 4-1 Suitable Transformers

Drive	Transformer Rating
PØØVO4C	2 kVA
PØØVO4E	4 kVA
PØØVO4G	9 kVA
PØØVO4J	16 kVA
PØØVO4K	22 kVA
PØØVO4M	32 kVA
PØØVO4P	52 kVA
PØØVO4Q	75 kVA
PØØVO4S	100 kVA
PØØVO4T	125 kVA
PØØVO4U	155 kVA

LINE INDUCTORS

Use line inductors in the following circumstances:

- ❏ Input lines subject to interference from other loads (interference, overvoltage).
- ❏ Drive controller supplied by a line with very low impedance (fed from power transformers with more than 10 times the drive power).
- ❏ Large number of adjustable frequency drives installed on the same line.

In the cases above, using line inductors provides the following advantages:

- ❏ Increased protection of input rectifier bridge against overvoltage and spikes.
- ❏ Reduction of the current absorbed by the drive controller at full load.
- ❏ Reduction of the harmonic current load on the power factor correction capacitors, when used.

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Inductors Between the Drive Controller and the Motor

The addition of inductors between the drive controller and the motor is recommended in the following circumstances:

- ❏ Wire connecting drive controller and motor is longer than 320 ft (100 m).
- ❏ For PØØVO4T and PØØVO4U, if the drive-motor connection wires are less than 82 ft (25 m) (to ensure protection against short circuits between output phases).
- ❏ More than three motors being controlled in parallel.
- ❏ Motor has more than six poles, with a high power factor and low stator inductance.
- ❏ Motor with a higher power rating than the controller power rating.

In the cases above, using line inductors enables reduction of:

- ❏ Values of the current peaks absorbed by the motor.
- ❏ Ground leakage interference currents.
- ❏ Radio interference created by the motor connection wiring.
- ❏ Vibrations and motor noise.

Recommended Three-Phase Inductors

The inductors listed in Table 4-2 can be used between the input line and drive controller and/or between the drive controller and the motor.

Table 4-2 Suitable Inductors

Inductor Characteristics		Drive	Drive Ratings	
Inductance	Amperes (continuous)[1]		Horsepower	Voltage
5 mH	5 A	PØØVO4C PØØVO4E	1.5 hp 3 hp	460 V 460 V
1.7 mH	15 A	PØØVO4G	7.5 hp	460 V
0.80 mH	30 A	PØØVO4J PØØVO4K	15 hp 20 hp	460 V 460 V
0.6 mH	40 A	PØØVO4M	30 hp	460 V
0.35 mH	70 A	PØØVO4P	50 hp	460 V
0.17 mH	150 A	PØØVO4Q PØØVO4S	60 hp 100 hp	460 V 460 V
0.150 mH	250 A	PØØVO4T PØØVO4U	125 hp 150 hp	460 V 460 V

[1] Continuous rms current rating. To prevent inductor saturation, inductor peak current rating must be 3 to 4 times the continuous current rating.

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DRIVE CONTROLLER SETTINGS

The parameters of the Omegapak Type P drive controller are factory preset to meet the most common application requirements.

Make sure the preset values are compatible with your requirements. If they are:

1. Check the drive controller connections (see Figure 2-10 on page 24).
2. Close and secure all enclosures.
3. Be sure the dialog unit CONFIG switch is set to 1 and AUTOEST switch is off.
4. Apply power to the controller.

If the parameter preset values are not compatible with your requirements, readjust the settings as described in this chapter.

DIALOG UNIT

The parameter settings are controlled by the dialog unit which is on front of the control board and is accessible without removing the front cover by lifting the protective flap.

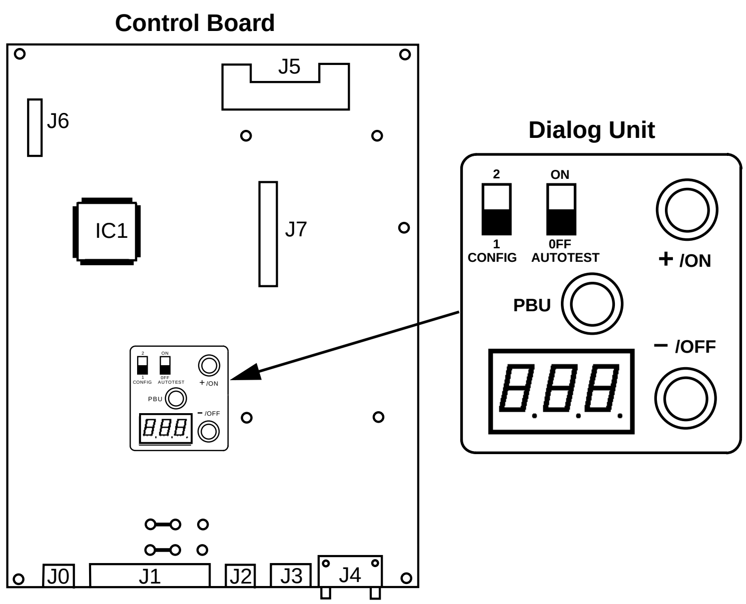

Figure 5-1 Dialog Unit

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DRIVE PARAMETERS

The following sections describe the parameters available on the Omegapak variable torque drives.

Operation Parameters

FrH	Frequency reference (Hz)
Lcr	Motor current (A)
tHr	Motor thermal state (percentage of nominal state)

Adjustment Parameters

Acc dEc	Acceleration and deceleration ramps (seconds)
LSP HSP	Frequency thresholds: low and high speeds (Hz)
Fr1 Fr2	Skip frequencies
UFr	Voltage/frequency ratio correction (code “n” or “P”)
ItH	Adjustment of motor thermal (overload) protection (A)
ULn	Line voltage

Configuration Parameters

FrS	Nominal input line frequency: 50/60 Hz
rE	Current reference: 0-20 mA / 4-20 mA / 20-4 mA
dFr	Skip frequency bandwidth
SLP	Slip compensation on or off
dcS	DC stop

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rbL	Ramp blocking
FSt	Fast stop
FLS	Freewheel stop
Obr	Overbraking detection
Aut	Automatic restart

Display of Faults

OSF	Supply overvoltage
USF	Supply undervoltage
PhF	Phase failure
OcF	Overcurrent
ObF	Overbraking
OhF	Drive overtemperature
OLF	Motor overload
InF	Internal connection fault

An autodiagnostic sequence is incorporated in the drive. This enables monitoring of the drive's main functions and the display of faults at

- ❏ Internal connections
- ❏ Control logic inputs
- ❏ Power boards and modules
- ❏ Control board

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