

# Integrated panel mount brushless DC drive

**DRIVESURE**

## FEATURES AND BENEFITS

Watson-Marlow Pumps

- Brushless DC motor with integrated speed controller
- Available in 24V and 48V DC versions
- 24V for 100 series, 300 series and 400RXMD pumpheads
- 48V for 300 series multi-channel and 500 series pumpheads
- Superior speed control range
- Guaranteed torque, low noise and long service life
- Accepts standard analogue control signals



*Watson-Marlow... Innovation in Full Flow*

## SPECIFIC FEATURES

- 51:1 control ratio from 8 to 408rpm<sup>(3)</sup>
- Closed speed control loop with brake function (recommended for accuracy)
- 24V and 48V versions, with over voltage and reverse polarity protected inputs
- Motor over current and stalled rotor protection
- Drive electronics and motor housing over temperature limiting built in
- 0-10V or 4-20mA speed control input with digital output tachometer

## FLOW RATES (ml/min)

Flow rates when 1.6mm wall thickness tubing is used						
Tube bore	Pumphead Speed Range (rpm)					
	102R (8-130rpm)	114 (8-408 rpm)	313 (8-408 rpm)	314 (8-408 rpm)	520R (8-220 rpm)	400RXMD (8-408 rpm)
0.5	0.16 - 2.76	0.16 - 8	0.24 - 12	0.24 - 12	0.33 - 9.50	
0.8	0.40 - 6.44	0.32 - 16	0.56 - 29	0.48 - 24	0.84 - 24	
1.6	1.80 - 28	1.10 - 57	2.20 - 112	2.00 - 102	3.40 - 97	2 - 102
3.2	6.40 - 104	3.80 - 194	8 - 408	6.80 - 350	13 - 390	8 - 375
4.8	13 - 212	6.80 - 347	18 - 900	15 - 780	30 - 870	
6.4			29 - 1500	24 - 1224	54 - 1500	
8.0			75 - 2040	32 - 1632	84 - 2400	

Flow rates are for guidance only at 0 bar. Always test pumphead flow capability in the relevant fluid system

Flow rates when 2.4mm wall thickness tubing is used						
Tube bore	Pumphead Speed Range (rpm)					
	102R (8-130rpm)	114 (8-408 rpm)	313 (8-408 rpm)	314 (8-408 rpm)	520R2 (8-220 rpm)	400RXMD (8-408 rpm)
0.5			0.24 - 12	0.24 - 12	0.33 - 9.50	
0.8			0.56 - 29	0.48 - 24	0.84 - 24	
1.6			2.20 - 112	2.00 - 102	3.40 - 97	
3.2			8 - 408	6.80 - 350	13 - 390	
4.8			18 - 900	15 - 780	30 - 870	
6.4			29 - 1500	24 - 1224	54 - 1500	
8.0					84 - 2400	
9.6					120 - 3500	

Flow rates are for guidance only at 0 bar. Always test pumphead flow capability in the relevant fluid system

## NUMBER OF RECOMMENDED PUMPHEADS PER DRIVE

PMD24C V / I	Heads
102R, 114	1
313, 314	1
400RXMD	1

PMD48C V / I	Heads
313, 314	2
520R, 520R2, 520REL, 520REM	1

## INTERFACE CONNECTORS AND TECHNICAL DATA

Controller Electrical Specification	Minimum	Nominal	Maximum	Unit
<b>Typical continuous drive supply current (PMD24) @20C (68F) ambient <sup>(4)</sup></b>				
200-408 rpm		2.00		Amps
8-200 rpm		1.25		Amps
<b>Typical continuous drive supply current (PMD48) @20C (68F) ambient <sup>(4)</sup></b>				
200-408 rpm		2.00		Amps
8-200 rpm		1.25		Amps
<b>PMD24C Minimum regulated speed</b>				
0 to 0.5 Nm		8 <sup>(1)</sup>		rpm
0.5 to 1.0 Nm		10 <sup>(1)</sup>		rpm
1.0 to 1.25 Nm		12 <sup>(1)</sup>		rpm
<b>PMD48C Minimum regulated speed</b>				
0 to 1.0 Nm		8 <sup>(1)</sup>		rpm
1.0 to 1.5 Nm		9 <sup>(1)</sup>		rpm
1.5 to 2.5 Nm		10 <sup>(1)</sup>		rpm
Control voltage input Pin 6(B) (V option)		0 to 10		Volts
Control input current Pin 6(B) (I option)		4 to 20		mA
Control input Low level Pin 3(B) /REV and Pin 4(B) /RUN nominally 0.0V		0.00	1.30	Volts
Control input High level Pin 3(B) FWD and Pin 4(B) BRAKE nominally 5.0V	3.50	5.00	24.00	Volts
Control Pin 2(B)/Tacho /Fault NPN output (8 to 408rpm) pulses per second	202.66		10336	PPS
Control Pin 2(B) /Tacho and Pin 1(B) /Fault Low NPN output (nominal @50µA sinking)	0.00	0.10	0.20	Volts
Control Pin 1(B) /Fault Pin 2(B) /Tacho High output <sup>(7)</sup> (50µA sourcing) To increase to 5 - 24V or increase current use a pull up resistor, 10mA DC sink current max.	4.50	4.60	4.80	Volts
Control heatsink/motor, speed vs temperature constant		+/-0.05%		rpm/DegC

Applicable standards: CE, conforms to BS EN 61010-1, IEC 61010-1, UL 61010-1, cert to CAN/CSA std C22.2 No 61010-1. RoHS compliant. <sup>(9)</sup>

Controller Electrical Specification	Minimum	Nominal	Maximum	Unit
Power supply fixed DC voltage PMD24		24.00		Volts
Power supply fixed DC voltage PMD48		48.00		Volts
Power Supply current peak rating PMD24 <sup>(4)(5)(6)</sup>		3.10		Amps
Power Supply current peak rating PMD48 <sup>(4)(5)(6)</sup>		2.90		Amps
No load speed range (24C, 48C) <sup>(3)</sup>	8		408	rpm
Speed torque constant PMD24C		-8		rpm/Nm
Speed torque constant PMD48C		-2		rpm/Nm
IP Rating PMD24C, PMD48C / NEMA Rating		IP30		
<b>Absolute maximum electrical ratings</b>				
Power supply input short term DC Voltage withstand	-55		+55	Volts
Analogue input voltage (V option 0-10V control unit)	-50		+50	Volts
Analogue input current (I option 4-20mA control unit)	-40		+40	mA
FWD/REV, BRAKE/RUN input	-50		+50	Volts
<b>Absolute maximum thermal ratings</b>				
Motor housing temperature <sup>(2)(7)</sup>	+5 (41)		+105 (221)	Deg C (F)
Controller temperature <sup>(2)(7)</sup>	+5 (41)		+85 (185)	Deg C (F)
Gearbox running temperature <sup>(2)</sup>	+5 (41)		+70 (158)	Deg C (F)
Ambient operating temperature range	+5 (41)		+40 (104)	Deg C (F)
Storage temperature range	-25 (-13)		+65 (149)	Deg C (F)
Humidity operating 5C (41F) to 31C (88F) (none condensing)			80	% RH
Humidity decreases linearly to 40C (104F)			30	% RH
Maximum altitude			2000	Metres
<b>Absolute maximum noise</b>				
Maximum audible noise @ 1m (motor & gearbox)		<50	Nominal: <50 (without head) Maximum: <70 (with head)	dB

(1) For low rpm, minimum speed starting is up to 7 rpm higher than regulated speed. For low rpm start raise set point for 200-500mS. Drive speed overshoot can occur on brake release, this effect decreases with added load. Ramping up speed demand after removing brake can reduce this effect.

(2) Provide sufficient space around the product for heat dissipation. Absolute maximum temperatures: controller 85C (185F); motor enclosure 105C (221F). Do not run the gearbox over 70C (158F); the gearbox front mounting surface should be used to conduct heat away from the motor/gearbox to improve temperature performance. Motor insulation Class A. The motor body heat sink and gearbox can get very hot 105C (221F) max. during operation. After running leave time for cooling before handling the motor.

(3) No load set speed range @20C (68F) ambient and nominal power supply. (+/- 4rpm @408rpm, +/- 1rpm @ 8rpm)

(4) PMD24C single pumphead maximum load PMD48C 520 single pumphead maximum load and PMD48C 313 twin pumpheads

(5) Roller cyclic, peak current indicated.

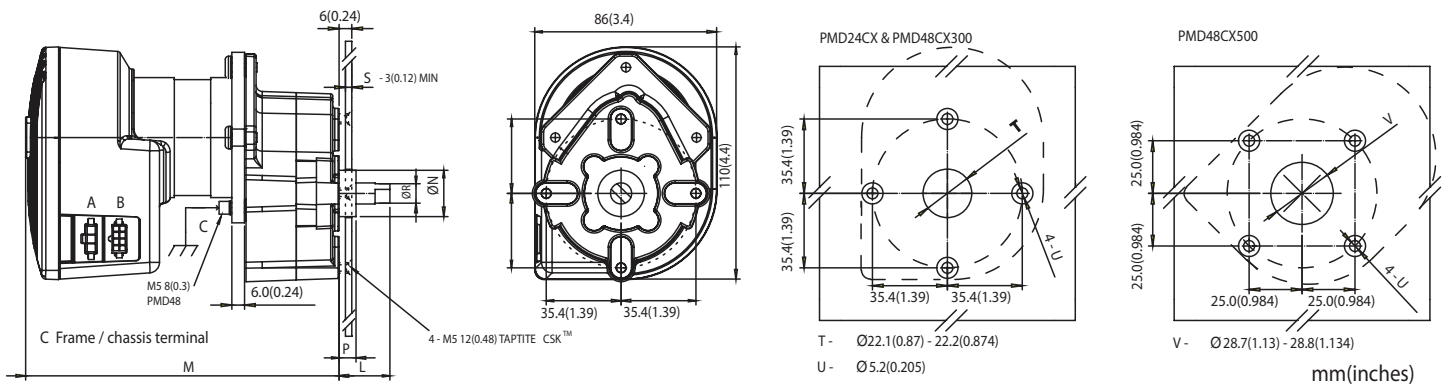
(6) PMD Power input circuit of 660µF in series with 3µH and 48 mOhms. Supply switching circuits should withstand or limit the initial current drawn.

(7) NOTE: Fault Pin 1(B) latches above this temperature disabling motor. Cool drive and cycle power to reset motor and pin 1 (B).

(8) Two year warranty for the PMD48CX500 series includes operation to 220rpm, a one year warranty is given up to 408 rpm for intermittent use (excluding REH).

(9) Radiated emissions: This drive is a class A product (EN55011:2009 A1) when external connection leads <3m/9ft, are fitted with suppression ferrites L1=L2=25MHz@150 Ohm, 100MHz@250 Ohm, close to connectors <0.05m/2in.

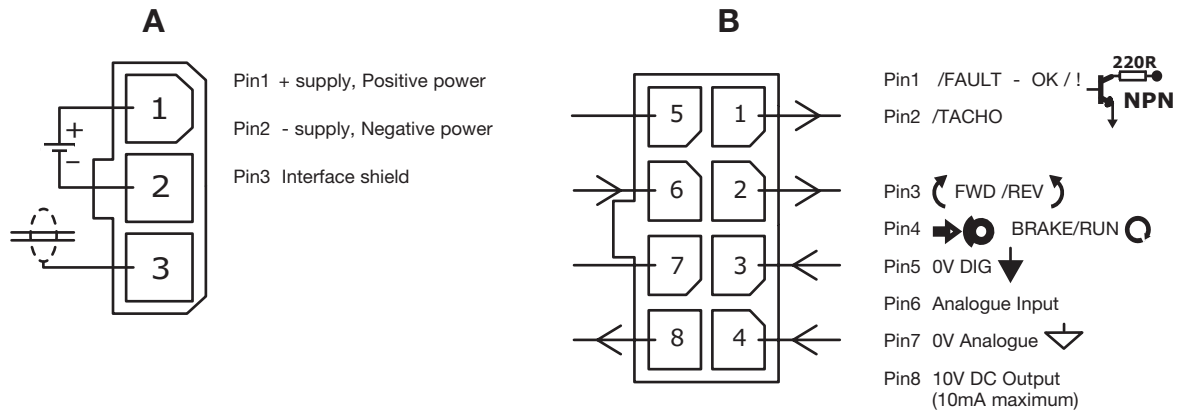
## DIMENSIONS



The table below contains the DriveSure unit dimensions depending on the pumphead to be fitted.

Pump	M mm (inch)	L mm (inch)	N mm (inch)	P mm (inch)	R mm (inch)	Weight Kg (lb)
24V drive	144.0 (5.7)					1.16 (2.557)
48V drive	184.0 (7.25)					1.68 (3.704)
102R		27.5 (1.08)	22.0 (0.866)	8 (0.315)	8 (0.315)	
114DV		16.2 (0.64)	22.0 (0.866)	8 (0.315)	10 (0.394)	
300 Series		20.9mm (0.82)	22.0 (0.866)	8 (0.315)	10 (0.394)	
520R		38.5 (1.52)	28.5 (1.122)	14 (0.55)	10 (0.394)	
400RXMD		41.9 (1.650)	22 (0.866)	8 (0.315)	8 (0.315)	

## PIN SELECTION



External connector MOLEX 39-01-4030

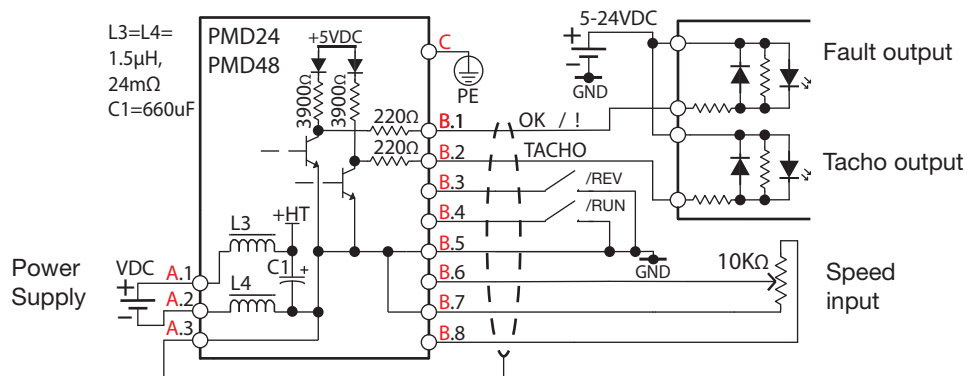
Crimp sockets MOLEX 39-00-0039 18-24 AWG

External connector MOLEX 43025-0800

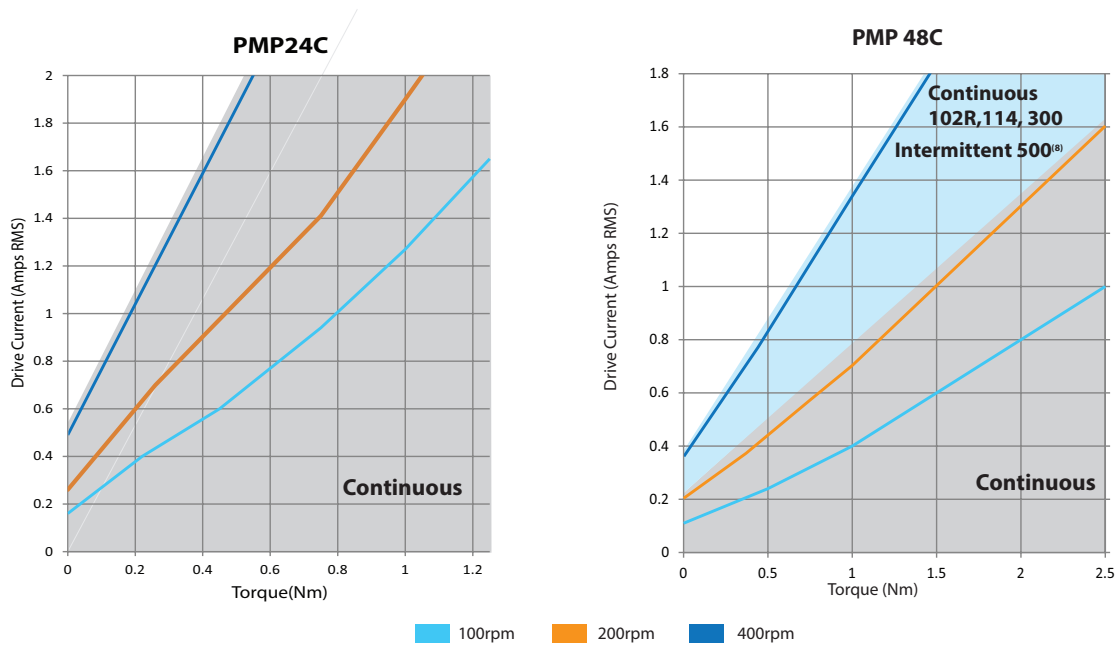
Crimp sockets MOLEX 43030-0007 20-24 AWG

MOLEX 43030-0010 26-30 AWG

## TYPICAL CONNECTION



## PERFORMANCE



Continuous / Intermittent Drive Current versus torque characteristics for 100, 200, 400 rpm, @ 20C (68F) ambient

## PRODUCT CODES

Description	Motor Control	Product code	Description	Motor Control	Product code
PMD24CV102R	0-10V	Contact your local Watson-Marlow representative	PMD24CI300	4-20 mA	Contact your local Watson-Marlow representative
PMD24CV114	0-10V		PMD48CV300	0-10V	
PMD24CV300	0-10V		PMD48CV500	0-10V	
PMD24CI102R	4-20mA		PMD48CI300	4-20 mA	
PMD24CI114	4-20 mA		PMD48CI500	4-20 mA	

For mounting plate options, test leads and further pumphead configurations, contact your local Watson-Marlow sales representative

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