

Npaq® Series

Drive Racks

3U plug-in drives

19 inch rack-mount design

Flexible design provides the ability to drive brush, brushless, or stepper motors with the same amplifier

5 A to 30 A peak output current

Integral power supplies

IEEE-1394 FireWire® interface

Digital current, velocity and position loops for improved motion stability

Optional Ethernet for I/O expansion

UL and CE approval

PWM or linear amplifier

EN954-1 compliant

Integrated encoder multiplier for higher throughput and reduced wiring

Encoder or resolver feedback

The Npaq® is the high performance rack-mountable servo amplifier solution for the Automation 3200 motion system. The Npaq® can control up to six axes of motion using a variety of plug-in amplifiers. With both linear and PWM amplifiers capable of driving brushless and DC brush-type servomotors, as well as stepping motors, the Npaq® performs both current loop and servo-loop closure to assure the highest level of positioning accuracy and rate stability.

The Npaq® is built on a high-performance DSP that allows it to perform complex calculations in real time. It is this

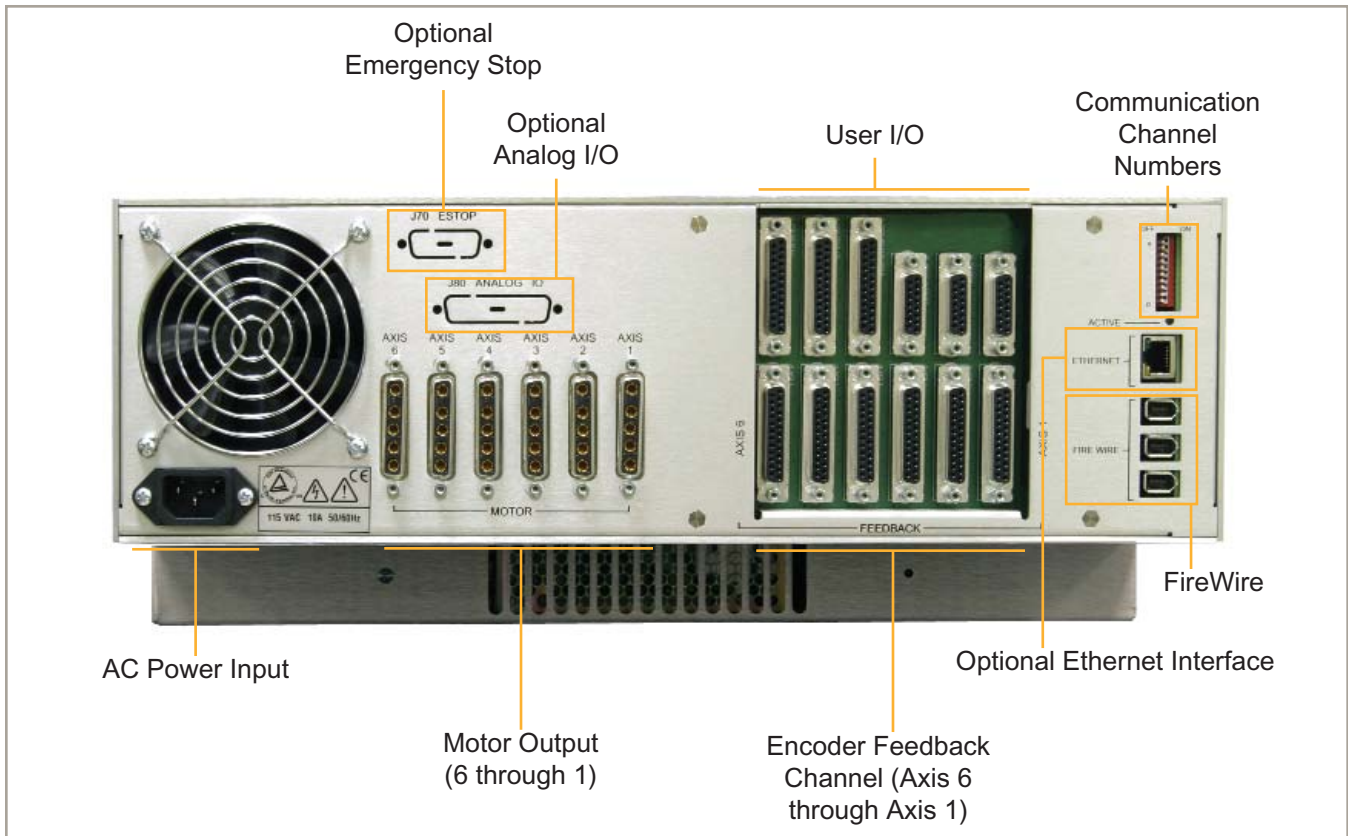


processing capability that allows the Npaq® to provide loop closure rates up to 20 kHz, and to handle both digital and analog I/O, laser firing, and encoder multiplication.

Two independent supplies provide bus voltage to the amplifiers and may be configured to allow different bus voltages for different motors operating from the same Npaq®.

In order to provide the capability for increased I/O counts for PLC-type applications, the Npaq® has an optional dedicated Ethernet port to communicate with I/O modules from third-party vendors.

Standard options for the Npaq® include on-board encoder multiplication (up to x16384), three-axis position synchronized output (PSO), brake control logic, shunt regulator, external fan tray, and emergency stop relays.



Plug-in drives
 Brush, brushless, or stepper
 PWM or linear
 Wide range of power



Amplifiers	DP32010E	DP32020E	DP32030E	DL4010
Control Type	Brushless, DC Brush, Stepper			
Output Type	PWM	PWM	PWM	Linear
Output Voltage (VDC)	10-320	10-320	10-320	10-40 (Bipolar)
Continuous Current	5	10	15	5 ⁽¹⁾
Peak Current	10	20	30	10 ⁽¹⁾
Minimum Load ⁽²⁾	0.8 mH	0.8 mH	0.8 mH	0.5 ohms
Protection	Short Circuit Protection; Overload Protection; Low Level Power Supply Detection and Fuse			
Switching Frequency	20 kHz	20 kHz	20 kHz	N/A

Notes:

1. Actual current ratings dependent on motor resistance

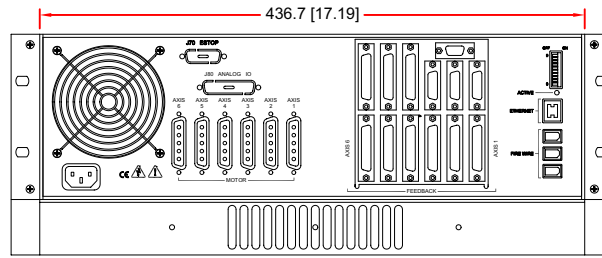
2. Minimum load is based on output voltage; 0.8 mH is minimum load at 160 VDC, 1.0 mH at 320 VDC

Npaq® Series SPECIFICATIONS

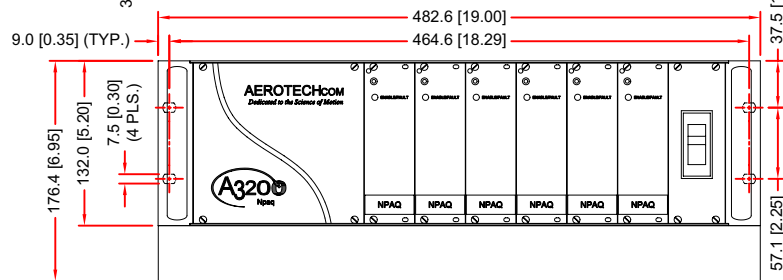
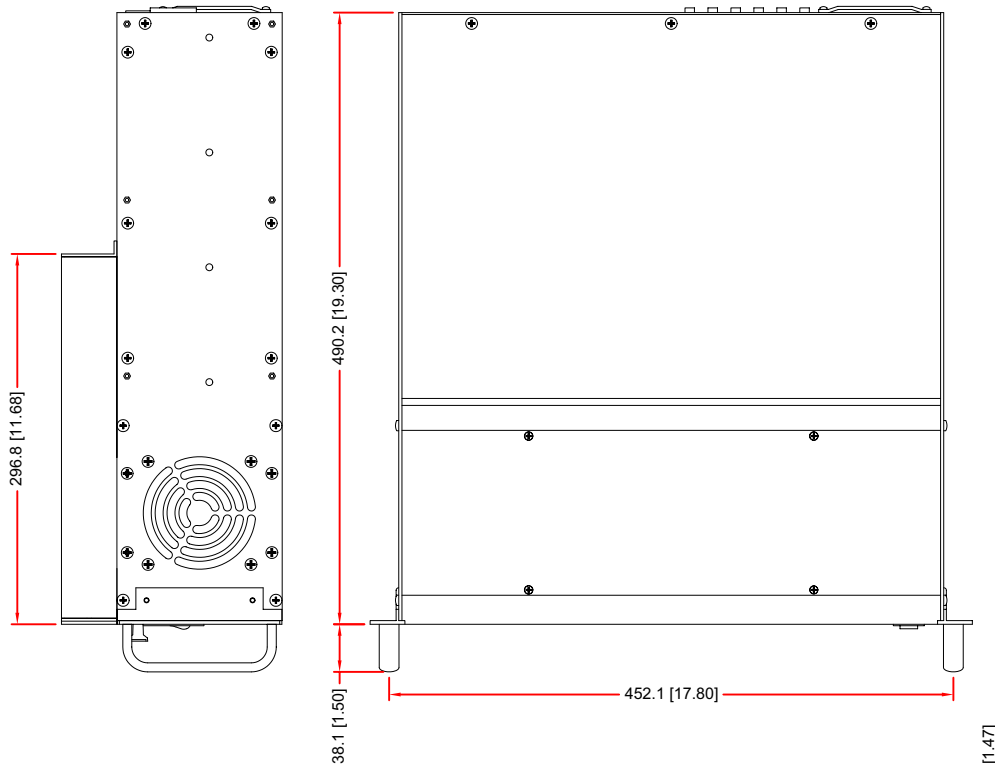
Npaq Drive Rack	Units	
Operating Temperature	°C	0 to 50
Storage Temperature	°C	-30 to 85
Weight ⁽¹⁾	kg (lb)	9 to 21 (20 to 46)
Power Input	VAC	100-240 VAC
Number of Axes	—	1 to 6
Encoder Inputs	—	6 (Additional Through High Speed IO)
Encoder Input Frequency	kHz	450 kHz to 2 MHz ⁽²⁾ Amplified Sine, 40 MHz TTL
Laser Feedback Support	—	Yes
Current Loop Update Rate	kHz	20 kHz
Servo Loop Update Rate	kHz	1 to 20 kHz
Keep Alive/ Auxiliary Power Supply	—	With ESTOP Option
Brake Output	—	Optional
Position Synchronized Output	—	Single Axis Standard, Two/Three Axis Optional
High Speed Digital Inputs	—	4 Differential Inputs (1 µs Response Time)
High Speed Digital Outputs	—	6 Differential Outputs
Bi-Directional Lines	—	3
Joystick Input	—	Yes
Digital Inputs	—	8 Optically-Isolated
Digital Outputs	—	8 Optically-Isolated, Current Source or Sink
Analog Inputs	—	4 Differential, ±1 to ±10 V input, 16 bit
Analog Outputs	—	2 Single Ended, ±10 V, 16 bit
Additional I/O ⁽³⁾	—	4 Analog Input, 6 Analog Output
MXR	—	Optional, x16384
Ethernet	—	Optional
Emergency Stop Sense Input (ESTOP)	—	Yes
Resolver Interface	—	Optional

Notes:

1. Option dependent.
2. Amp sine signals > 450 kHz require MXR2M option (max of 2 MHz).
3. Requires IO option.



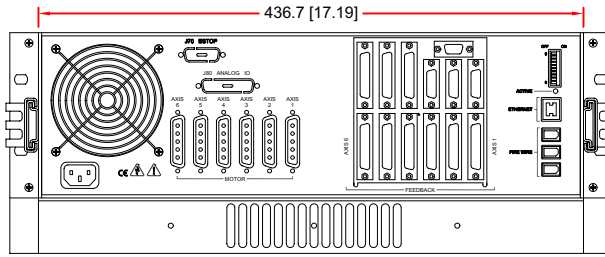
REAR VIEW ROTATED 180°



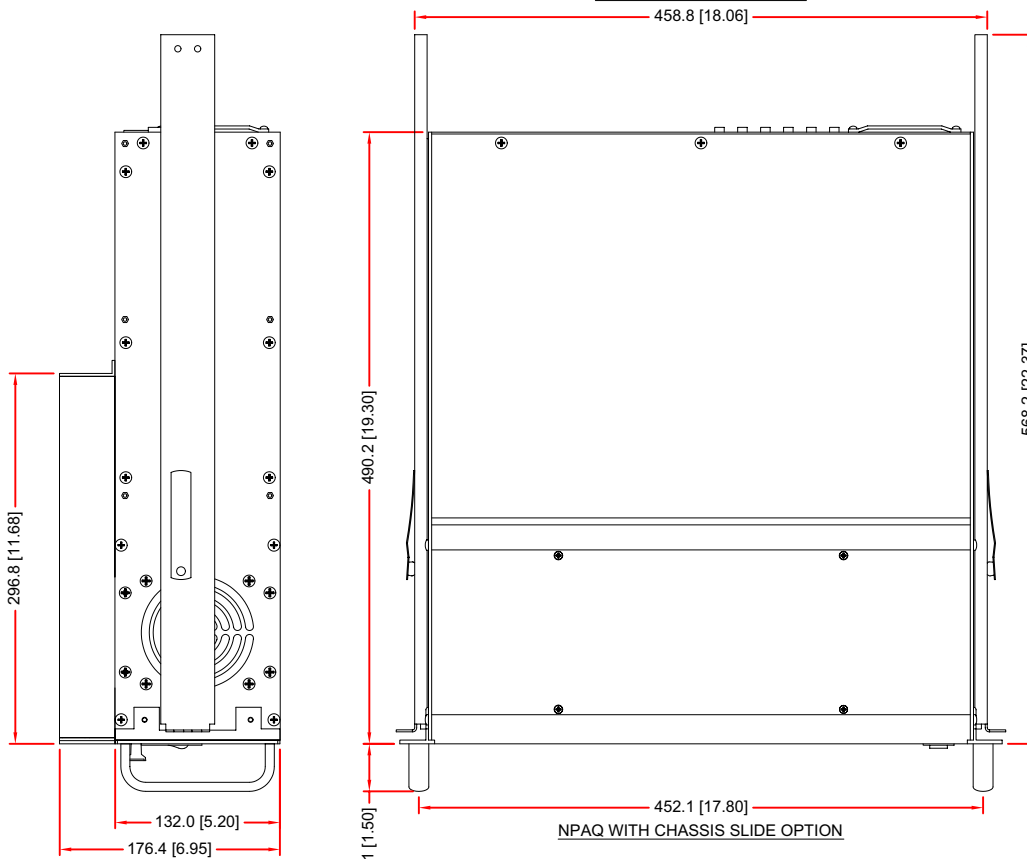
NPAQ WITH FAN TRAY OPTION

Npaq® Series DIMENSIONS

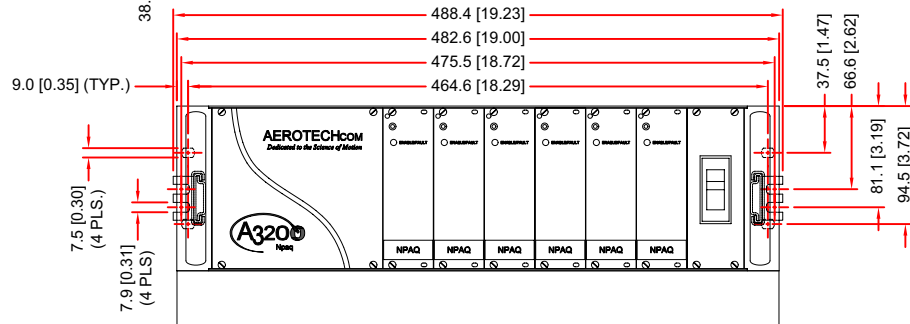
AN NPAQ WITH CHASSIS SLIDES REQUIRES 18" [45.72mm] MINIMUM CLEARANCE BETWEEN RACK MOUNTING RAILS. ADJUSTMENT OF THE RAILS MAY BE REQUIRED FOR PROPER INSTALLATION



REAR VIEW ROTATED 180°



NPAQ WITH CHASSIS SLIDE OPTION



NPAQ WITH FAN TRAY OPTION

Npaq® Series ORDERING INFORMATION

Ordering Example: Required

Npaq	-A	-10B	-0	-ULTRA	/1-DL4010	/NO SPLIT	/STAND
Base	Power Input	Vbus1	Vbus2	Controller Options	Amp1-6	Split Bus	Cooling
	A	0	0	ULTRA	DL4010	Split Bus 1/2-6	STAND
	B	10B	10B		DP32010	Split Bus 1-2/3-6	EXT
	C	20B	20B		DP32020	Split Bus 1-3/4-6	FAN
	D	30B	30B		DP32030	Split Bus 1-4/5-6	
		40B	40B		BLANK	Split Bus 1-5/6	
		80B	80B			Split Bus 1-6	
		160LT	160LT				
		320LT	320LT				

/US-115-VAC	/SLIDES	/BRAKE-z	/AC LINE FILTER	/ENET	/SINGLEPSO	/MXR-1	/M1
Line Cord	Line Filter	Brake	Line Filter	Options	PSO Options	Encoder Multiplier Options	Motor Output
ENGLAND	AC LINE FILTER	BRAKE-z	AC LINE FILTER	ENET	SINGLEPSO	MXR-1	M1
GERMANY		BRAKEIO		J1	DUALPSO	MXR-2	M2
ISRAEL				ESTOP1	TRIPLEPSO	MXR-3	M3
INDIA				ESTOP2	PSOOPTO2	MXR-4	M4
AUSTRALIA				LINESEL	PSOOPTO3	MXR-4	M5
US-115VAC				LINESEL-MX	PSOOPTO4	MXR-5	M6
US-230VAC				SHUNT1	PSO-AH	MXR-6	
NO-LINECORD				SHUNT2		MXR2M-1	
				AIO		MXR2M-2	
						MXR2M-3	
						MXR2M-4	
						MXR2M-5	
						MXR2M-6	

NPaq

NPAQ	Rack mount digital amplifier chassis with integral DC power supply and FireWire interface. Supports up to 6 axes of brush, brushless or stepper motor amplifiers. Includes: -8 opto-isolated digital inputs -8 opto-isolated digital outputs -4 16 bit differential analog inputs -2 16 bit analog outputs -Estop sense input -6 channels of 40Mhz quadrature encoder input (analog input optional)
------	---

Power Input

-A	115 VAC
-B	230 VAC
-C	100 VAC
-D	208 VAC

Bus Voltage

-0	Do not wire
-10B	±10 VDC (100 W Power Supply), bipolar
-20B	±20 VDC (175 W Power Supply), bipolar
-30B	±30 VDC (175 W Power Supply), bipolar
-40B	±40 VDC (175 W Power Supply), bipolar
-80B	±80 VDC (325 W Power Supply), bipolar
-160LT	160 VDC (does not include transformer), unipolar, used with DP320XX
-320LT	320 VDC (does not include transformer), unipolar, used with DP320XX

Npaq® Series ORDERING INFORMATION

Bus Voltage

-0	Do not wire
-10B	±10 VDC (100 W Power Supply), bipolar
-20B	±20 VDC (175 W Power Supply), bipolar
-30B	±30 VDC (175 W Power Supply), bipolar
-40B	±40 VDC (175 W Power Supply), bipolar
-80B	±80 VDC (325 W Power Supply), bipolar
-160LT	160 VDC (does not include transformer), unipolar, used with DP320XX
-320LT	320 VDC (does not include transformer), unipolar, used with DP320XX

Controller Options

-ULTRA	6 axis control board
--------	----------------------

NPaq Amplifiers

-DP32010E	Brushless motor driver, 320V, 5A cont., 10A peak, 20kHz PWM, 3U height, improved current feedback, requires A3200 version 2.13 or greater.
-DP32020E	Brushless motor driver, 320V, 10A cont., 20A peak, 20kHz PWM, 3U height, improved current feedback, requires A3200 version 2.13 or greater.
-DP32030E	Brushless motor driver, 320V, 15A cont., 30A peak, 20kHz PWM, 3U height, improved current feedback, requires A3200 version 2.13 or greater.
-DL4010	Brushless motor driver, ±40V, 5A cont., 10A peak, linear DC, 3U height. Actual continuous/peak current a function of motor resistance

Split Bus

-SPLIT BUS 1/2-6	Axis 1 Vbus1, Axis 2-6 Vbus2
-SPLIT BUS 1-2/3-6	Axis 1-2 Vbus1, Axis 3-6 Vbus2
-SPLIT BUS 1-3/4-6	Axis 1-3 Vbus1, Axis 4-6 Vbus2
-SPLIT BUS 1-4/5-6	Axis 1-4 Vbus1, Axis 5-6 Vbus2
-SPLIT BUS 1-5/6	Axis 1-5 Vbus1, Axis 6 Vbus2
-SPLIT BUS 1-6	Axis 1-6 Vbus1

Cooling Options

-STAND	Built in fan pulls cooling air from left side through the amplifier compartment
-EXT	Perforated covers above and below the amplifiers. Requires external fan tray for cooling (customer supplied).
-FAN	Perforated covers above and below the amplifiers. Includes 1U high fan tray for cooling. Fans wired to the NPAQ power switch.

Linecord

-ENGLAND	U.K. compatible line cord
-GERMANY	German compatible line cord
-ISRAEL	Israel compatible line cord
-INDIA	India compatible line cord
-AUSTRALIA	Australia compatible line cord
-US-115VAC	U.S. 115\VAC line cord
-US-230VAC	US 230\VAC line cord
-NO-LINECORD	No line cord

Mounting Options

-STANDARD	Rack Mount
-SLIDES	Rack mounted drawer slides

Brake Options

-BRAKE-z	Brake control logic and power supply; specify which axis "z" as 1, 2, 3, 4, 5 or 6
-BRAKEIO	Brake control logic and power supply; brake signal wired to miscellaneous I/O connector

Npaq® Series ORDERING INFORMATION

Line Filter

-AC LINE FILTER AC line filter for reducing conducted emissions. Required for CE

Options

-ENET 10/100BASE-T Ethernet port
-JI Industrial joystick with cable, 1.5 m (5 ft)
-ESTOP1 Internal ESTOP; controller decels motors to stop while bus power is removed via relays. For EN954-1 category 2 applications. Actual risk assessment is responsibility of user.
-ESTOP2 Internal ESTOP; controller decels motors to stop while bus power is removed via relays. For EN954-1 category 4 applications. Actual risk assessment is responsibility of user.
-LINESEL User selectable input voltages
-LINESEL-MX User selectable input voltages, for MXR option
-SHUNT1 Shunt for Vbus1, 160VDC operation
-SHUNT2 Shunt for Vbus2, 160VDC operation
-AIO Analog IO option. Adds an additional 4 16 bit analog inputs and 6 16bit analog outputs. Note: High speed digital I/O not available when selecting this option.

PSO Options

-SINGLEPSO Single axis PSO, includes HCPL2601 opto-isolator
-DUALPSO Dual axis PSO, includes HCPL2601 opto-isolator
-TRIPLEPSO Triple axis PSO, includes HCPL2601 opto-isolator
-PSOOPTO2 opto-coupler 6N136 5-25V 2ma, 75-kHz
-PSOOPTO3 opto-coupler 4N33 5-25V 50ma, 10kHz
-PSOOPTO4 opto-coupler TIL117-M, 40 KHz, 5-25VDC, 50 ma
-PSO-AH Active high output

Encoder Multiplier Options

-MXR-1 4096x (16384 with quadrature) multiplier for 1 axis, 450 kHz input, 4096x real time output for PSO operation - 1 axis
-MXR-2 4096x (16384 with quadrature) multiplier for 2 axes, 450 kHz input, 4096x real time output for PSO operation, 2-axes
-MXR-3 4096x (16384 with quadrature) multiplier for 3 axes, 450 kHz input, 4096x real time output for PSO operation, 3-axes
-MXR-4 4096x (16384 with quadrature) multiplier for 4 axes, 450 kHz input, 4096x real time output for PSO operation, 3-axes max
-MXR-5 4096x (16384 with quadrature) multiplier for 5 axes, 450 kHz input, 4096x real time output for PSO operation, 3-axes max
-MXR-6 4096x (16384 with quadrature) multiplier for 6 axes, 450 kHz input, 4096x real time output for PSO operation, 3-axes max
-MXR2M-1 4096x (16384 with quadrature) multiplier for 1 axis, 2MHz input, 4096x real time output for PSO operation - 1 axis
-MXR2M-2 4096x (16384 with quadrature) multiplier for 2 axes, 2MHz input, 4096x real time output for PSO operation, 2-axes
-MXR2M-3 4096x (16384 with quadrature) multiplier for 3 axes, 2MHz input, 4096x real time output for PSO operation, 3-axes
-MXR2M-4 4096x (16384 with quadrature) multiplier for 4 axes, 2MHz input, 4096x real time output for PSO operation, 3-axes max
-MXR2M-5 4096x (16384 with quadrature) multiplier for 5 axes, 2MHz input, 4096x real time output for PSO operation, 3-axes max
-MXR2M-6 4096x (16384 with quadrature) multiplier for 6 axes, 2MHz input, 4096x real time output for PSO operation, 3-axes max

Motor Output

-M1 NPAQ 1 AXIS MOTOR OUTPUT
-M2 NPAQ 2 AXIS MOTOR OUTPUT
-M3 NPAQ 3 AXIS MOTOR OUTPUT
-M4 NPAQ 4 AXIS MOTOR OUTPUT
-M5 NPAQ 5 AXIS MOTOR OUTPUT
-M6 NPAQ 6 AXIS MOTOR OUTPUT