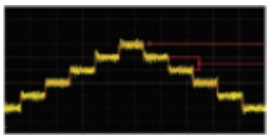
NPARM



+/-0.4nm jitter
1nm steps

2 to 8 NanoPWM™ Motor Drives System with ±10V Current Commutation Commands

The Ultimate Modular Drive for Demanding Positioning Applications

- Sub-nanometer standstill jitter
- Nanometer tracking error and optimal velocity smoothness

Fully Integrated 19" Rack Mounted Drive Module

- 2, 4, 6, 8 drives
- Motor phase current: 3.3A/10A, 6.6A/20A, 10A/30A, 13.3A/40A (sine-amplitude cont./peak)
- 3.2kW Drive Power Supply. Input: 100- 240Vac.
- Single and Dual Drive Supply Voltage:
  - 96Vdc, 32A
  - 48Vdc, 64A
  - 96Vdc and 48Vdc, 32A

Replacing Linear Drives While Gaining All the Advantages of PWM Drives

- ±10v current commutation commands
- **DR**Boost™ Current command Dynamic range control
- Current control dynamic range > 100db (100,000:1)
- Lower heat dissipation
- Better reliability
- Significantly smaller
- Simpler supply requirements
- Digitally controlled and easy setup
- STO (Safe Torque Off)
- Built-in motor phases shortening relays

The NPARM is an integrated servo motor drive system that is designed to operate with any motion controller with ±10V current commutation commands interface. It includes 2 to 8 **Nano**PWM™ drives that enable achieving motion performance that exceeds the performance achievable with linear drives, in a much smaller package, with significantly lower heat dissipation and higher reliability.

The NPARM 19", 6U enclosure includes a 3.2kW power supply, with a single or two outputs, providing 48V or 96V or both, and power regeneration circuitry.

The NPARM has 4 slots for two-axis drive plug-in modules. Each slot can accommodate a drive module operating with different current and voltage ratings.

The NPARM is specifically designed to address the most demanding applications with regards to move and settle times, standstill jitter, and velocity smoothness, such as wafer metrology and inspection, FPD inspection, and ultra-precision machining for processing of optical components.

The unique **DR**Boost™ feature enables the motion controller to dynamically modify the range of the current command and together with the **Nano**PWM™ technology achieving an unprecedented current control with dynamic range of >100dB (100,000:1), resulting in better velocity smoothness and lower position jitter.

The current loop filter is programmable. Its gains can be selected by setting a DIP-Switch to one of 16 pre-set values, as well as by using the SPiiPlusMMI software suite for the ultimate fine tuning.

The drives are protected against over current, over temperature, and over voltage, and protect against motor over temperature.

The drives include relays that shorten the motor phases when a drive is disabled.

The NPARM supports E-Stop input that complies with CE and UL safety standard as well as STO (Safe Torque Off) to comply with EN ISO 13849-1, SIL3 and PLe.

ACS MOTION CONTROL

Specifications

Per Axis	A	B	C	D
Continuous/peak current Sine amplitude [A]	3.3/10	6.6/20	10/30	13.3/40
Continuous/peak current [Arms]	2.3/7	4.6/14.1	7/21.2	9.4/28.2
Maximum cont./peak output power @ 96Vdc [W]	229/675	459/1350	695/2025	924/2700
Peak current time [sec]	1			
Minimum load inductance @96Vdc [mH]	0.5			
Per Module				
Control Supply input [Vac]	100-240			
Drive Supply input [Vac]	100-240			
Drive Supply output(s) [Vdc]	48Vdc, 64A 96Vdc, 32A Both 96Vdc and 48Vdc, 32A			
Maximum cont. input current [A] per plug-in drive module (i = 1 or 2 ; number of drives)*	i x2.5	i x 4.9	i x 7.5	i x 10.0
Maximum heat dissipation per plug-in drive module [W] (i = 1 or 2 ; number of drives)**	7 + i x0.9	7 + i x 2.1	7 + i x 3.7	7 + i x 5.6
Maximum heat dissipation on drive supply for plug-in drive module [W] (i = 1 or 2 ; number of drives)**	i x 12	i x 24	i x 37	i x 49

* The total current that is extracted from the Drive supply is the sum of the input currents of each plug-in drive module.

** The total heat dissipation is the sum of the heat dissipation of each plug-in drive module and heat dissipation of the power supply for each plug-in drive module.

Example: NPArmD2BAT2BAT00000000

Field		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PN	NPArm	D	2	B	A	T	2	B	A	T	0	0	0	0	0	0	0	0

Ordering Options

Ordering Options	Field	Example User Selection	Values
Power Supply	1	D	A – 48V,32A, B – 48V, 64A, C – 96V, 32A, D – 96V&48V
Drive Slot 1			
Number of Drives	2	2	1,2
Current	3	B	A – 3.3/10A, B – 6.6/20A, C – 10/30A, D – 13.3/40A
Voltage Connected to	4	A	A – 48V, B – 96V
Type of motor	5	T	T – Three phase motor only S – Single phase motor only
Drive Slot 2			
Number of Drives*	6	2	0, 1, 2
Current	7	B	A – 3.3/10A, B – 6.6/20A, C – 10/30A, D – 13.3/40A
Voltage Connected to	8	A	A – 48V, B – 96V
Type of motor	9	T	T – Three phase motor only S – Single phase motor only
Drive Slot 3			
Number of Drives*	10	0	0, 1, 2
Current	11	0	A – 3.3/10A, B – 6.6/20A, C – 10/30A, D – 13.3/40A
Voltage Connected to	12	0	A – 48V, B – 96V
Type of motor	13	0	T – Three phase motor only S – Single phase motor only
Drive Slot 4			
Number of Drives*	14	0	0, 1, 2
Current	15	0	A – 3.3/10A, B – 6.6/20A, C – 10/30A, D – 13.3/40A
Voltage Connected to	16	0	A – 48V, B – 96V
Type of motor	17	0	T – Three phase motor only S – Single phase motor only

* If 'Number of Drives' 0 is selected, all other three options of the same drive slot should also be set as 0.

Drives
Type: three-phase bridge technology.
PWM frequency: 20kHz.
Switching method: Advanced unipolar PWM.
Control: PI digital filter. PI gains are selected by a four position DIP-switch or programmed when connected to a PC.
Current loop sampling rate and update rate: 20 kHz.
Programmable current loop bandwidth: up to 4kHz, will vary with tuning & load parameters. Built-in motor phases shortening relays.
Protection: Over voltage, Over current, Overtemperature, Drive saturation, Phase to phase and phase to ground short (short circuit on one of the motor phases might damage the drive).
Motor over temperature protection.
Type: Single ended, opto-isolated.
Built-in motor phases shortening relays (optional): disconnects the motor from the drive and disconnects the phases of the motor.

Supplies
The module is fed by two AC power sources. PWRIN drive supply and a AC-IN control supply.
Drive Supply (PWR-IN): 100-240Vac feeds the internal drive supply that generates the 48/96Vdc to the plug-in drive modules.
Input Current rating should be calculated based on actual load, up to 16A.
Mating connector is not supplied
Control Supply (AC-IN): 100-240Vac feeds the internal control supply that generates the 24Vdc ± 10%.
Maximum input current 1.7A @100Vac (0.7A@ 240Vac).
Mating connector supplied.

Motor Types
Two- and three-phase permanent magnet synchronous (DC brushless/AC servo), DC brush, Voice coil, Two- and three-phase stepper (microstepping open or closed loop)..

Drive-Controller Interface
Current command Input
Type: Sine wave current commutation commands, ±10V differential, 16 bit resolution.
Offset: <20mV, Bandwidth <5KHz.
Dynamic range control input
5V, opto-isolated, source. Input current <7mA.
When 0V (DGND), a 10V command will generate the specified maximum current.
When 5V, a 10V command will generate 1/8 of the specified maximum current.
Drive On/Off output: TTL, active low, upon enable this signal is low (DGND), upon drive disable this signal is high.
Output current 1mA.
Drive enable input: TTL, active low (DGND).
Input current: <7mA.
Drive fault output: TTL, active high.
Output current 1mA.

Drive status display
One per drive, 7 segment display.
Fault Indications: Over voltage, STO, short current, drive over temperature, motor over temperature, drive over current, drive saturation.

STO (Safe Torque Off) inputs
Two inputs. 24V ±20%, Input current: <200mA.
All drives are disabled within 200mS.

Current monitoring analog outputs
Two per drive, for motor phases S and T. Type: ±10V, differential, 16 bit resolution. Offset: ±50mV, Max. output load: 10kΩ.

EtherCAT Communication
Used to connect to an ACS motion controller for current loop setup and fine tuning purposes. One EtherCAT port per module. Type RJ45 connector.

Environment
Operating range: 0 to +45°C. Storage and transportation range: -25 to +60°C. Humidity (operating range): 5% to 90% non-condensing.

Dimensions
LxDxH (mm^3): 440 (483 w/ears) x 266 (306 w/ handles) x 260 (6U).

Weight
4-axis: 11.8 (Kg). 8-axis: 13.3(Kg).

Accessories
NPArm-ACC1: 4-axis mating connectors kit.
NPArm-ACC2: 8-axis mating connectors kit.