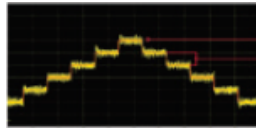# NPA*PM*

+/-0.4nm jitter
1nm steps

NanoPWM™

Single & Dual Axis *Nano*PWM™ *Drive with ±10V interface*

Powerful & Smart EtherCAT Drive Module

> Two drives per module

> Voltage: 12Vdc – 100Vdc

> Current: Up to 13.3A / 40A (cont./peak)

The Ultimate Drive for Demanding Positioning Applications

> Sub-nanometer standstill jitter

> Nanometer tracking error and optimal velocity smoothness

Replaces Linear Drives while gaining all the advantages of PWM drives

> ±10v current commutation commands controller-drive interface

> Lower heat dissipation

> Better reliability

> Significantly smaller

> Simpler supply requirements

> Digitally controlled and easy setup

> DRBoost™ Dynamic range control

> STO (Safe Torque Off) option

> Built-in motor phases shortening relays option

The NPA*PM* is a line of the most advanced PWM servo drives available today.

It 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 NPA*PM* is based on the ACS **Nano**PWM™ proprietary and unique technology that exceeds the stand still jitter and tracking error performance that until now has been achieved only with linear drives, while gaining all the benefits of a PWM type drive, such as lower heat dissipation, smaller size, and better reliability.

The unit is designed to operate with any motion controller that supports two ±10V sine wave current commutation commands.

The unique **DR**Boost™ feature enables the motion controller to dynamically modify the current/command gain of the drive for higher resolution low level current control and thus providing better velocity smoothness and lower position jitter control.

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

The drives are protected against over current, over temperature, and over voltage. The unit supports motor over temperature protection.

Optional built-in relays will shorten the motor phases when the drive is disabled.

Optional STO (Safe Torque Off) is available to comply with EN ISO 13849-1 system safety standard.

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. input current [A]	2.6	5.3	8.0	10.6
Maximum cont./peak output power @ 100Vdc [W]	260/780	520/1560	790/2340	1050/3120
Peak current time [sec]	1			
Minimum load inductance @100Vdc [mH]. Can be derated linearly for lower voltages	0.05			

Per Module				
Control voltage input [Vdc]	24 ±10%			
Drive voltage input range [Vdc]	12 – 100 (96 recommended)			
Maximum drive voltage [Vdc]	(Vin motor) x 88%			
Maximum heat dissipation [W] i = no. of drives	7 + 0.9 x i	7 + 2.1 x i	7 + 3.7 x i	7 + 5.6 x i

Drives
Type: three-phase bridge NanoPWM™ 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.
Protection: Over and under voltage, Over current, Over-temperature, Phase to phase and phase to ground short (short circuit on one of the motor phases might damage the drive).
Built-in motor phase shortening relays (optional): disconnect the motor from the drive and shorten the phases of the motor.

Supplies
The module is fed by two power sources. A motor supply and a 24Vdc control supply. During emergency conditions there is no need to remove the 24Vdc control supply.
Motor Drive Supply: 12Vdc to 100Vdc. Maximum recommended: 96Vdc. Current rating should be calculated based on actual load.
If regeneration resistor is required, it should be added in parallel to motor supply with 102V activation.
Mating connector is not supplied.
Control Supply: 24Vdc ± 10%.
Mating connector supplied.
Maximum input current / power: 1A/20W without motor brake outputs. With two motor brakes: 1.9A/42W.
Protection: reverse polarity.

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

Drive-Controller Interface
Current command input: 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, a 10V current command will generate the specified maximum current.
When 5V, a 10V current command will generate 1/8 of the specified maximum current.

Drive On/Off output: TTL, active low @ enable, active high @ disable. Output current 1mA.
Drive enable input: TTL, active low. Input current: <7mA.
Drive fault output: TTL, active high. Output current 1mA.

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

STO (Safe Torque Off) inputs
Two inputs. 24V ±20%, Input current: <50mA.
All drives are disabled within 200mS.

Motor brake control outputs
One per drive, 24V ±20%, source, 0.5A.

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 tuning purposes.
Two EtherCAT ports: In and Out, RJ45 connector.

Environment
Operating range: 0 to + 40°C.
Storage and transportation range: -25 to +60°C.
Humidity (operating range): 5% to 90% non-condensing.

Dimensions
257x154.9x50.9 mm^3

Accessories
NPXpm-ACC1: Mating connectors kit.
NPXpm-ACC2: (J1) mating 2m flying lead cable.

Certifications
CE: Yes
Safety: IEC 61800-5-1
EMC: EN61800-3
UL: UL 61800-5-1 (Pending)
Functional Safety: IEC 61800-5-1, IEC 61800-5-2

Ordering Options

Ordering Options	Field	Example User Selection	Values
Number of axes/drvies	1	2	1, 2
Current	2	A	A - 3.3/10A, B - 6.6/20A C - 10/30A, D - 13.3/40A
STO	3	Y	Y - Yes / N - No*
Motor relays	4	N	Y - Yes / N - No
Special Options	5	N	N - No
Type of motor	6	S	T - Three phase motor only / S - Single phase motor only

* Currently, only units with STO can be ordered.

Example:NPApm2AYNNS

Field		1	2	3	4	5	6
PN	NPApm	2	A	Y	N	N	S

ACS MOTION CONTROL