VARIABLE SPEED DRIVE NANO

motive ®

the brothers:

NANO-COMP & NEO-COMP
https://www.youtube.com/watch?v=y8yHVdYlRKA

NEO-PUMP
https://www.youtube.com/watch?v=7y1J4rFUVy8

NEO-WIFI
tutorial
https://www.youtube.com/watch?v=hUXJ47P_Qxo&feature=youtu.be

NANO-VENT & NEO-VENT
https://www.youtube.com/watch?v=dBcVtzZGyAM&feature=youtu.be

NANO-OLEO & NEO-OLEO
https://youtu.be/-m7uT6MnDq4

motive

NANO is for single phase supply, three phase motors. This permits NANO to add to the well known power saving of variable speed drives, the possibility to replace the single phase motors (technically losing lot of power) with the higher efficenty IE2 and IE3 three phase motors.

Setting and command can also be made by a PC, thanks to the free PC interface program "Motive Motor Manager"

Thanks to BLUE, motive bluetooth trasnsmitter for NANO and NEO, and to the free App NANO, you can make the setting or command NANO via tablets or smartphones.

NANO can be commanded by analog controls or MODBUS.

Any NANO can be fixed to a wide range of motors of different power and size.
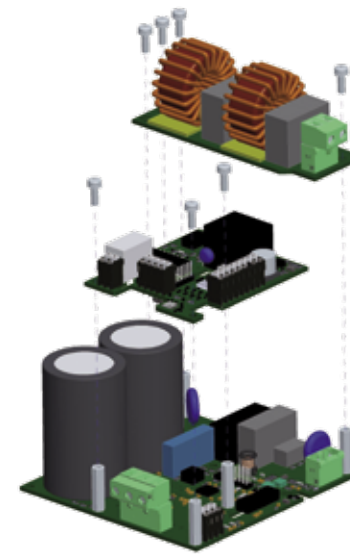
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A flashing led shows you from far the good working or the presence of an alarm event.
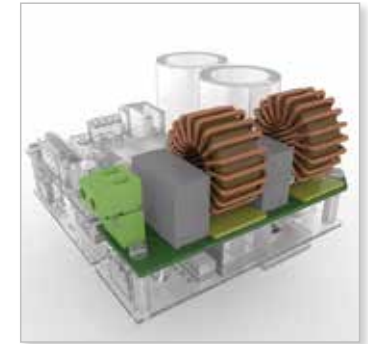
NANO is modular, for a better adaptation to the specific needs of each application.

Extractable terminals simplify the wiring.

The EMC filter makes NANO compatible not just with industrial environment, but also with light industrial, commercial end residential environments.

A voltage booster guarantees a stable torque Nm at very slow speed too.

NANO is also offered in the versions "NANO-COMP", "NANO-VENT" and "NANO-OLEO", with a SW specifically modified for the automatic speed+power adaptation to the required pressure and variable flow rate of air compressors, fans, pumps, hydraulic power packs.

Physical dimension	Symbol	U.O.M	NANO-0.75	NANO-2.2
Inverter protection degree*	IP		IP65*	
Inverter input voltage	V_{1n}	V	$1 \times 110(-10\%) \div 240(+10\%)$	
Inverter input frequency	f_{1n}	Hz	$50/60\ (\pm 5\%)$	
Maximum output voltage of NANO	V_2	V	$0{,}95 \cdot V_{1n}$	
Inverter output frequency	f_2	Hz	$200\%\ f_{1n}$ (f_2 $0 \div 100$Hz with f_{1n}50Hz)	
Rated input inverter current	I_{1n}	A	5	10
Rated output inverter current (to the motor)	I_{2n}	A	4	9
Maximum output current of NANO	I_2	A	$I_{2n} + 5\%$	
Maximum Starting torque / Rated torque ratio	Cs/Cn	Nm	150%	
Maximum Starting current (kept for 3 seconds)	I_{2max}	A	$200\%\ I_2$	
Storage temperature	T_{stock}	°C	-20 … +70	
Environment al operating temperature	T_{amb}	°C	0 … +40	
Maximum relative humidity		$\%_{(40°C)}$	5 … 85 without condensation	

Other characteristics	NANO-0.75	NANO-2.2
Motor control	V / F	
EMC for DOMESTIC, COMMERCIAL AND LIGHT INDUSTRIAL ENVIRONMENT (rif. EN50081-1, part 5)	With optional code NANFILT or with external EMC filter	
EMC for INDUSTRIAL ENVIRONMENT		
Analog/Digital I/O Module	Optional, code NANEXPS	
Power Switch IP65	Optional, code INTEM1X12A	
Potentiometer with Knob and Unit Scale IP65	Optional, code NANPOT	
Bluetooth module for smartphone and tablet control	Optional, code BLUE	
Communication Protocol	MODBUS RS485	

*IP65 degree refers to the inverter case and to the optional components on the cover (Power Switch and Potentiometer).

Table RP: Power range of motors that can be connected (at 230Vac)

KW motor	0.13	0.18	0.25	0.37	0.55	0.55	0.75	1.1	1.5	1.9	2..2
NANO-0.75	■	■	■	■	■	■	■				
NANO-2.2								■	■	■	■

Table RD: Size range of IEC motors that can be connected

IEC Motor	63	71	80	90S	90L	100L	112M	132S
NANO-0.75	■	■	■	■	■	■		
NANO-2.2			■	■	■	■	■	■

MAIN FUNCTIONS

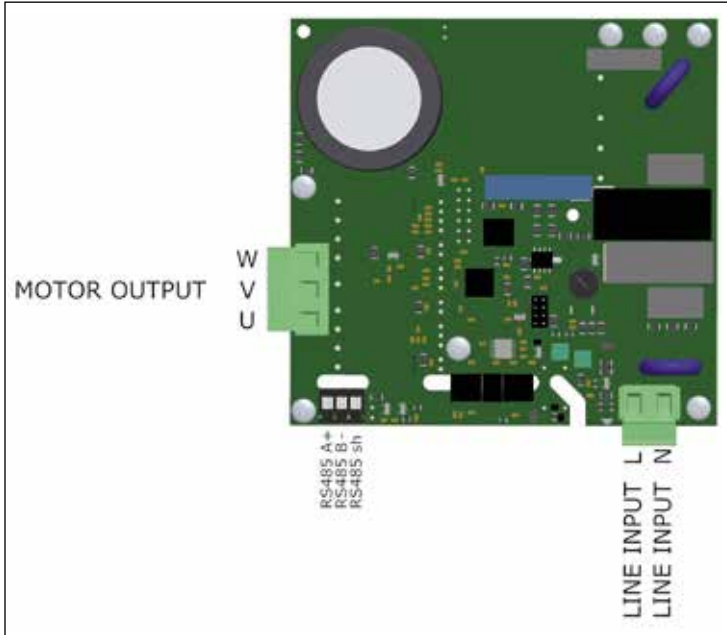| Section	Characteristic	Range
Motor	Rated Power [kW]	0.13 ÷ 0.75 (NANO-0,75); 0.13 ÷ 2.2 (NANO-2,2)
	Rated Voltage [V]	with input 110Vac single phase: 90 ÷ 110Vac three phase
		with input 230Vac single phase: 90 ÷ 230Vac three phase
	Rated Current [A]	0.1 ÷ 5 (NANO-0,75); 0.1 ÷ 10 (NANO-2,2)
	Rated frequency [Hz]	50 / 60
	Rated RPM	350 ÷ 5950
Motor limits	Maximum speed [% di rpm]	2 ÷ 200
	Minimum speed [% di rpm]	0 ÷ 120
	Acceleration [sec]	0.1 ÷ 99
	Deceleration [sec]	0.1 ÷ 99
	Maximum inrush current [% of rated current]	80 ÷ 200
	Magnetization [%]	70 ÷ 120
	Braking voltage [V]	0 ÷ 200 Electronic control that allows the motor inertia to be braked quickly by a DC voltage injection into the windings. The duration of the braking is adjustable from 1msec to 60sec.
	Boost voltage [V]	0 ÷ 50 Command that allows increasing the motor torque at low speeds through an additional voltage.
Control	Start/Stop command	· from controls wired to the I/O Module · from modbus
	Input reference	· internal (modbus parameter 19) · modbus (modbus parameter 106) · analogic signal 0-10V (I/O Module) · analogic signal 4-20mA (I/O Module)
	Mode	· Open loop speed · Ventilation · Air compressor · Oleodynamic pump
Feedback (only for Ventilation, Air Compressor, Hydraulic power pack)	Transducer range	0 ÷ 16000 (Bar,Psi,Pascal)
	Pressure reference	0 ÷ 16000 (Bar,Psi,Pascal)
	Pressure hysteresis	1 ÷ 16000 (Bar,Psi,Pascal)
P.I.D.Factors	K Proportional Factor	1 ÷ 100 Multiplies the error of the reference
	K Integral Factor	1 ÷ 100 Multiplies the integral of the error
RS485 Modbus	Communication	ON= Program and control only from modbus ON+KEY= Control from the I/O Module, reference value from modbus OFF= Control only from the I/O Module
	Baude Rate [bit/sec]	4800, 9600, 14400, 19200.
	Modbus address	1 ÷ 127

NANO-0.75 and NANO-2.2

Terminal	Function
L	Supply inverter phase.
N	Supply inverter neutral phase.
U	U phase motor connection.
V	V phase motor connection.
W	W phase motor connection.
A+	High signal ModBus RS485.
B-	Low signal ModBus RS485.
sh	Ground for Modbus RS485 cable shield.

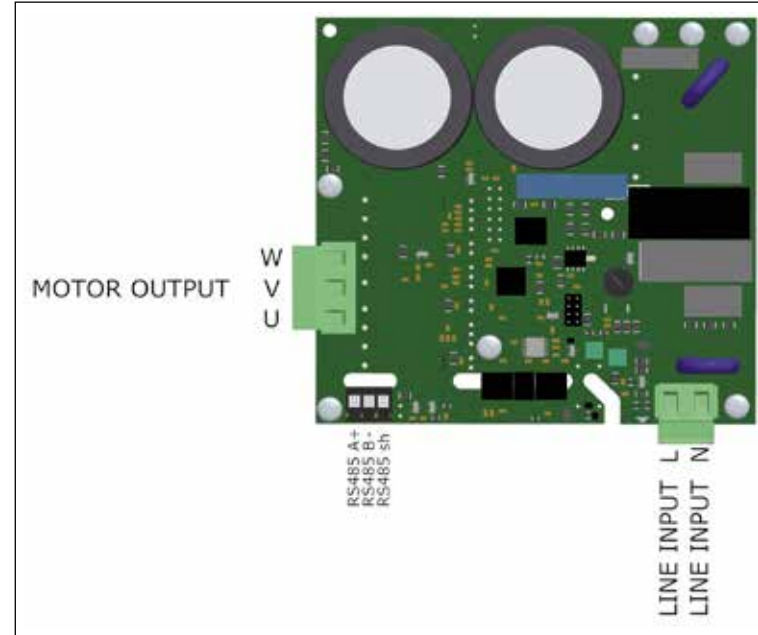## Analog/Digital I/O Module (optional code NANEXPS)

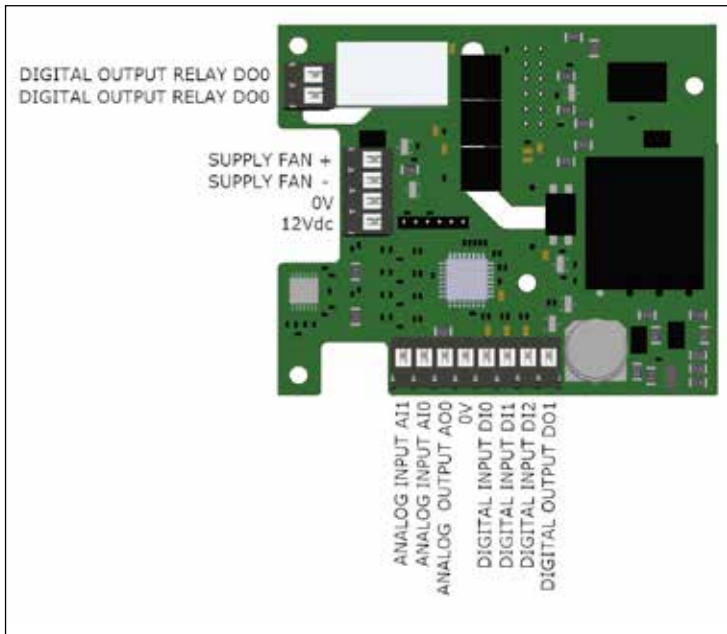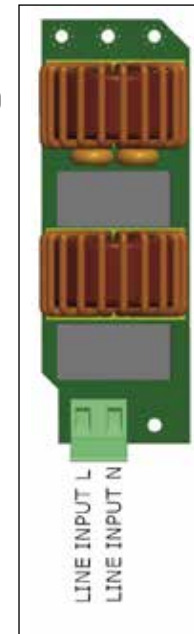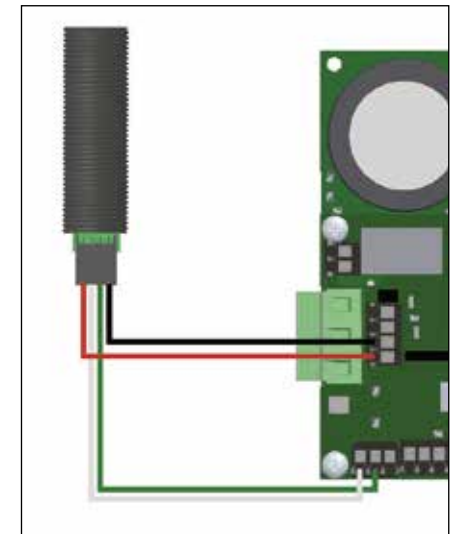| Terminal	Function
0V	0Vdc supply.
12Vdc	12Vdc supply for all the electronic Inputs (analogic e digital) and DO1 Digital Output.
FAN+ FAN -	12Vdc supply (max 1A) for inverter ventilation. It's automatically enabled when the IGBT module starts to overheat.
AI0	Analog Input 0, programmable in the following functions: • speed reference with potentiometer; • speed reference with external signal; • current limit reference; • PID feedback (for example: connection of a transducer). The type of input signal can be in voltage (0-10V) or in current (4-20mA).
AI1	Analog Input 1, programmable in the following functions: • speed reference with potentiometer; • speed reference with external signal; • current limit reference; • PID feedback (for example: connection of a transducer). The type of input signal can be in voltage (0-10V) or in current (4-20mA).
AO0	Analog Output 0, programmable in the following functions: • 0-12V motor speed reference (from 0% to the maximum speed value set); • 0-12V motor current absorbed reference (from 0% to the maximum absorption set).
0V	0Vdc supply for AO0 Analogic Output.
DI0	Digital Input 0, programmable in the following functions: • Start/Stop motor command clockwise direction (1=Start, 0=Stop); • Start/Brake motor command (1=Start, 0=Brake); • reverse motor command (it works only when Start/Stop motor command is set to a Digital Input with value=1) • brake motor command (can also be used as an inverter enable or as an emergency stop); • Start/Stop motor command counter-clockwise direction (1=Start, 0=Stop).
DI1	Digital Input 1, programmable in the following functions: • Start/Stop motor command clockwise direction (1=Start, 0=Stop); • Start/Brake motor command (1=Start, 0=Brake); • reverse motor command (it works only when Start/Stop motor command is set to a Digital Input with value=1) • brake motor command (can also be used as an inverter enable or as an emergency stop); • Start/Stop motor command counter-clockwise direction (1=Start, 0=Stop).
DI2	Digital Input 2, programmable in the following functions: • Start/Stop motor command clockwise direction (1=Start, 0=Stop); • Start/Brake motor command (1=Start, 0=Brake); • reverse motor command (it works only when Start/Stop motor command is set to a Digital Input with value=1) • brake motor command (can also be used as an inverter enable or as an emergency stop); • Start/Stop motor command counter-clockwise direction (1=Start, 0=Stop).
DO0	Digital Output 0 N.O. contact, programmable in the following functions: • signaling when the motor is running; • signaling of the motor rotation sense (0=clockwise, 1=counter-clockwise); • signaling maximum speed reached; • motoinverter fault; • signaling when the motor is stopped; • load/unload electric valve control (air compressor mode).
DO1	Digital Output 1, programmable in the following functions: • signaling when the motor is running; • signaling of the motor rotation sense (0=clockwise, 1=counter-clockwise); • signaling maximum speed reached; • motoinverter fault; • signaling when the motor is stopped; • load/unload electric valve control (air compressor mode). When is enabled, DO1 Digital Output supplies 0Vdc signal: this signal can be used to drive a relay (use the 12Vdc supplied by the inverter).

Power Module layout
NANO-0.75

MOTOR OUTPUT
W
V
U

RS485 A+
RS485 B-
RS485 sh

LINE INPUT L
LINE INPUT N

Power Module layout
NANO-2.2

MOTOR OUTPUT
W
V
U

RS485 A+
RS485 B-
RS485 sh

LINE INPUT L
LINE INPUT N

Analog/Digital I/O
Module layout
(optional, code NANEXPS)

DIGITAL OUTPUT RELAY DO0
DIGITAL OUTPUT RELAY DO0

SUPPLY FAN +
SUPPLY FAN -
0V
12Vdc

ANALOG INPUT AI1
ANALOG INPUT AI0
ANALOG OUTPUT AO0
0V
DIGITAL INPUT DI0
DIGITAL INPUT DI1
DIGITAL INPUT DI2
DIGITAL OUTPUT DO1

EMC filter layout
(optional, code NANFILT)

LINE INPUT L
LINE INPUT N

Bluetooth module for
smartphone and tablet control
(optional, code BLUE)

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Declaration of conformity

Motive srl with seat in Castenedolo (BS) - Italy

declares, under its exclusive responsibility,

that its range of "NANO" inverters and motor-inverters

is constructed in accordance with the following international regulations (latest edition)

- **EN 60034-1**. Rotating electrical machines: rating and performance
- **EN 60034-5**. **Rotating machines: definition of degrees of protection**
- **EN 60034-30**. Rotating electrical machines: efficiency classes of single-speed, three-phase, cage-induction motors
- **EN 60335-1**. Safety of household and similar electrical appliances
- **EN 55014-2**, Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus. Part 2: Immunity
- **EN 61000-3-2**, Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
- **EN 61000-3-3**. Limitation of voltage fluctuations and flicker in low-voltage supply systems, for equipment with rated current ≤ 16 A
- **EN 61000-6-4**. Electromagnetic compatibility (EMC): Part 6-4: Generic standards - Emission standard for industrial environments
- **EN 50178**. Electronic equipment for use in power installations.

as required by the Directives

- Low Voltage Directive (LVD) **2014/35/EEC**
- Electromagnetic Compatibility Directive (EMC) **2014/30/EEC**
  EMC for DOMESTIC, COMMERCIAL AND LIGHT INDUSTRIAL ENVIRONMENT
  EMC for INDUSTRIAL ENVIRONMENT
- Ecodesign Directive for energy related products **2009/125/EEC**

With NANFILT or external EMC filter

NB: the Machinery Directive (MD) 2006/42/EC expressly excludes from its scope electric motors (Art. 1, paragraph 2)

Castenedolo, 1 January 2018

The Legal Representative

Reg. Impresa BS.n° 73020/2000- N. REA 422301
Cod. Fisc. e P. IVA 03590280174

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ATEX certified V.F.Drives for zones 21 and 22, Cat. 2 and 3, Dust
ATEX is the conventional name of the Directive 94/9/EC for the equipment intended for use in potentially explosive atmospheres.
Motive Variable Frequency Drives NANO Ex and NEO-Ex differ from standard NANO and NEO because they are designed to be used, like motive "Ex" gearboxes, in the ATEX zones 21 and 22, Categories 2 and 3, Groups A, B and C, Dust

Cat	Zone	Description
2	21	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.
3	22	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

NANO Ex and NEO-Ex are in fact certified for such zones according to the norms IEC 60079-0:2011 - EN 60079-31:2014 by a notified body

TERMS OF SALE AND GUARANTEE

ARTICLE 1
GUARANTEE

1.1 Barring written agreements, entered into between the parties hereto each time, Motive hereby guarantees compliance with specific agreements.

The guarantee for defects shall be restricted to product defects following design, materials or manufacturing defects leading back to Motive.

The guarantee shall not include:

* Faults or damages ensuing from transport. Faults or damages ensuing from installation defects; incompetent use of the product, or any other unsuitable use.

* Tampering or damages ensuing from use by non-authorised staff and/or use of non-original parts and/or spare parts;

* Defects and/or damages ensuing from chemical agents and/or atmospheric phenomena (e.g. burnt out material, etc.); routine maintenance and required action or checks;

* Products lacking a plate or having a tempered plate.

1.2 Returns to credit or replace will be accepted only in exceptional cases; however returns of goods already used to credit or replace won't be accepted in any case.

The guarantee shall be effective for all Motive products, with a term of validity of 12 months, starting from the date of shipment.

The guarantee shall be subject to specific written request for Motive to take action, according to statements, as described at the paragraphs herein below. By virtue of aforesaid approval, and as regards the claim, Motive shall be bound at its discretion, and within a reasonable time-limit, to alternatively take the following actions:

a) To supply the Buyer with products of the same type and quality as those having proven defective and not complying with agreements, free ex-works; in aforesaid case, Motive shall have the right to request, at Buyer's charge, early return of defective goods, which shall become Motive's property;

b) To repair, at its charge , the defective product or to modify the product which does not comply with agreements, by performing aforesaid action at its facilities; in aforesaid cases, all costs regarding product transport shall be sustained by the Buyer.

c) To send spare parts free of charge: all costs regarding product transport shall be sustained by the Buyer.

1.3. The guarantee herein shall assimilate and replace legal guarantees for defects and discrepancies, and shall exclude any other eventual Motive liability, however caused by supplied products; in particular, the Buyer shall have no right to submit any further claims. Motive shall not be liable for the enforcement of any further claims, as of the date the guarantee's term of validity expires.

ARTICLE 2
CLAIMS

2.1. Claims, regarding quantity, weight, gross weight and colour, or claims regarding faults and defects in quality or compliance, and which the Buyer may discover on goods delivery, shall be submitted by a max. 7 days of aforesaid discovery, under penalty of nullity.

ARTICLE 3
DELIVERY

3.1. Any liability for damages ensuing from total or partial delayed or failed delivery, shall be excluded.

3.2. Unless differently communicated by written to the Client, the transport terms have to be intended ex-works.

ARTICLE 4
PAYMENT

4.1. Any delayed or irregular payments shall entitle Motive to cancel ongoing agreement, including agreements which do not regard the payments at issue, as well as entitling Motive to claim damages, if any. Motive shall, however, have the right, as of payment's due date and without placing in arrears, to claim interest for arrears, to the extent of the discount rate in force in Italy, increased by 12 points. Motive shall also have the right to withhold material under repair for replacement. In the case of failed payment, Motive shall have the right to cancel all guarantees of materials, as regards the insolvent Client.

4.2. The Buyer shall be bound to complete payment, including cases whereby claims or disputes are underway.

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TÜV SÜD
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