NEW

Control techniques NE 200/300 Drive

2020-3-3

Control Techniques Overview	Marketing Trends	Media	Who is NE
Case Studies	Successful Applications	NE vs ABB	NE vs TOSHIBA	NE vs Delta

Internal Positioning Map – NE200/300 – For OEM

Power Rating

2800kW

900kW

280kW

132kW

5.5kW

Open Loop

EV2000

C200/300

EV1000 NE200

Close Loop

NE300

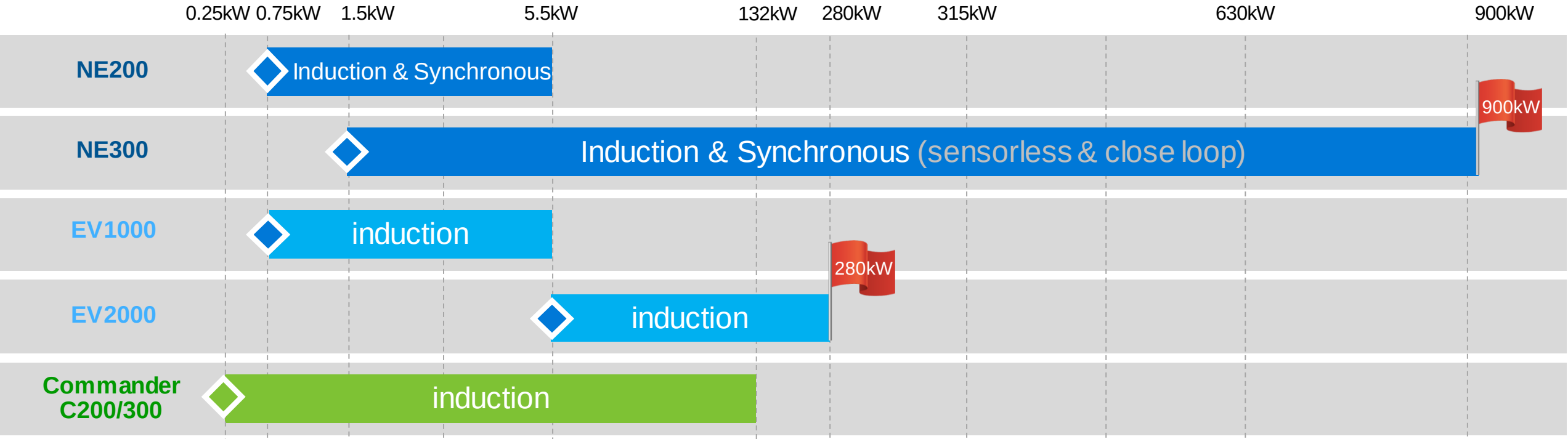
Unidrive M700

Induction motor control (OL & CL)

PMSM control (OL & CL)

Functions / Performance

Control Techniques General Purpose Product Lineup



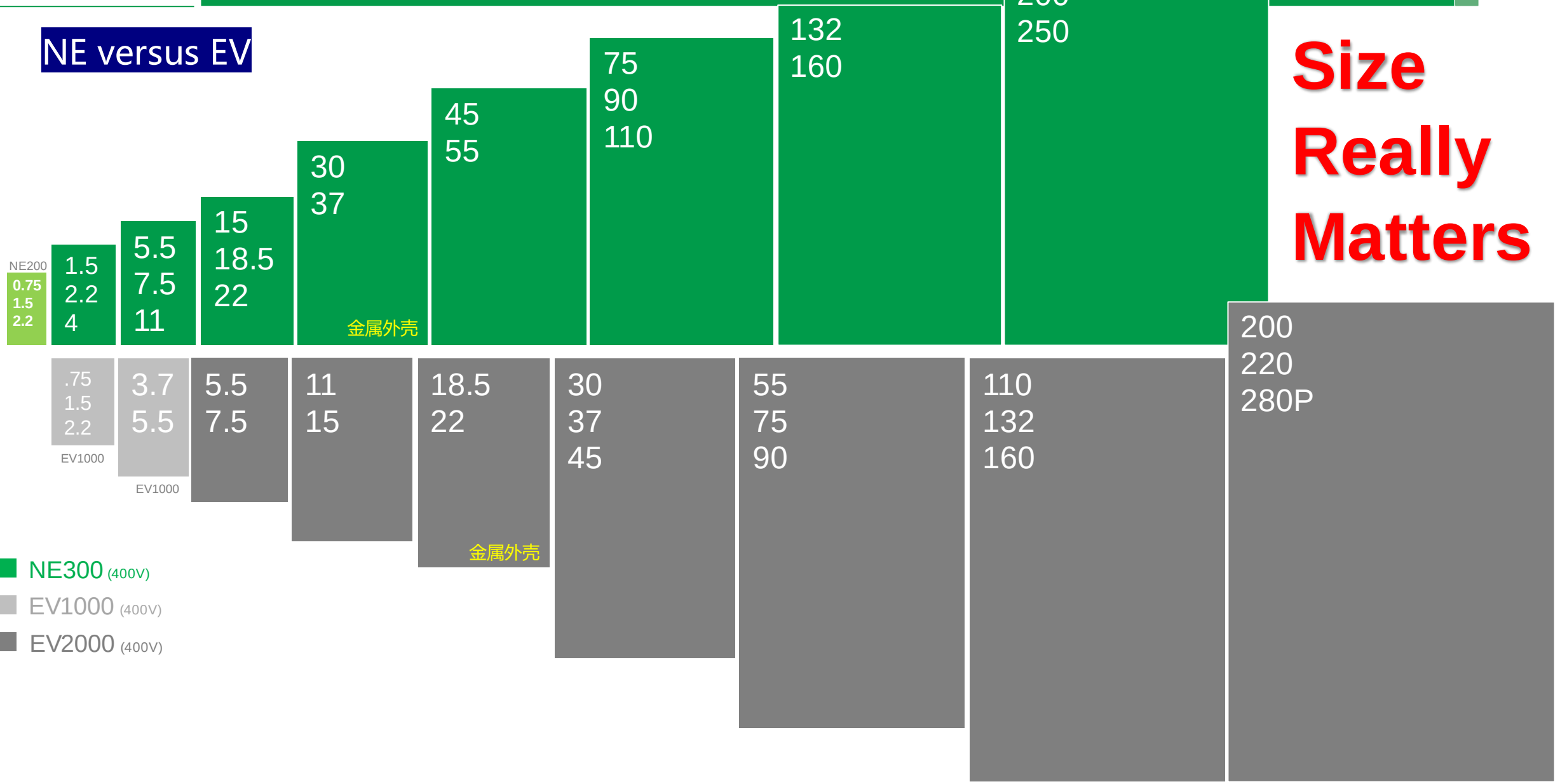
Power rating up to 900kW

- *400V products*
- *1ph 220v 0.4~2.2kW*
- *3ph 220v customisation*

Nidec
All for dreams

Relative Size Comparison

NE versus EV



Size Really Matters

Nidec
All for dreams

All around NE vs EV performance

Scenario	NE200/300 (Constant Torque Apps)	NE200/300 (Variable Torque Apps)	EV1000/2000 (Constant Torque Apps)	EV1000/2000 (Constant Torque Apps)
Power Rating	900 kW	900 kW	200 kW	280 kW
Starting Torque (V/F OL vector)	150%@1.5Hz 150%@0.5Hz	150%@1.5Hz 150%@0.5Hz	180%@0.5Hz	N/A
Overload Capacity (Normal/ Instantaneous)	150% 60s 180% 20s	120% 60s 150% 1s	150% 60s 200% 0.5s	110% 60s 150% 1s
Switching Frequency	16 kHz	16 kHz	16 kHz	16 kHz
Output Frequency	3200 kHz	3200 kHz	500 kHz	500 kHz
		For Fan/Pump		For Fan/Pump

NE performance is better than EV

Model number

NE3 00 - 4 T 0007G/0015P B U

Product Range

DIN rail,
Wall-mount,
Freestanding

00	Standard

Voltage	Code
380V	4
220V	2

Input	Code
3 Phase	T
1 Phase	S

G	Heavy Duty
P	Normal Duty

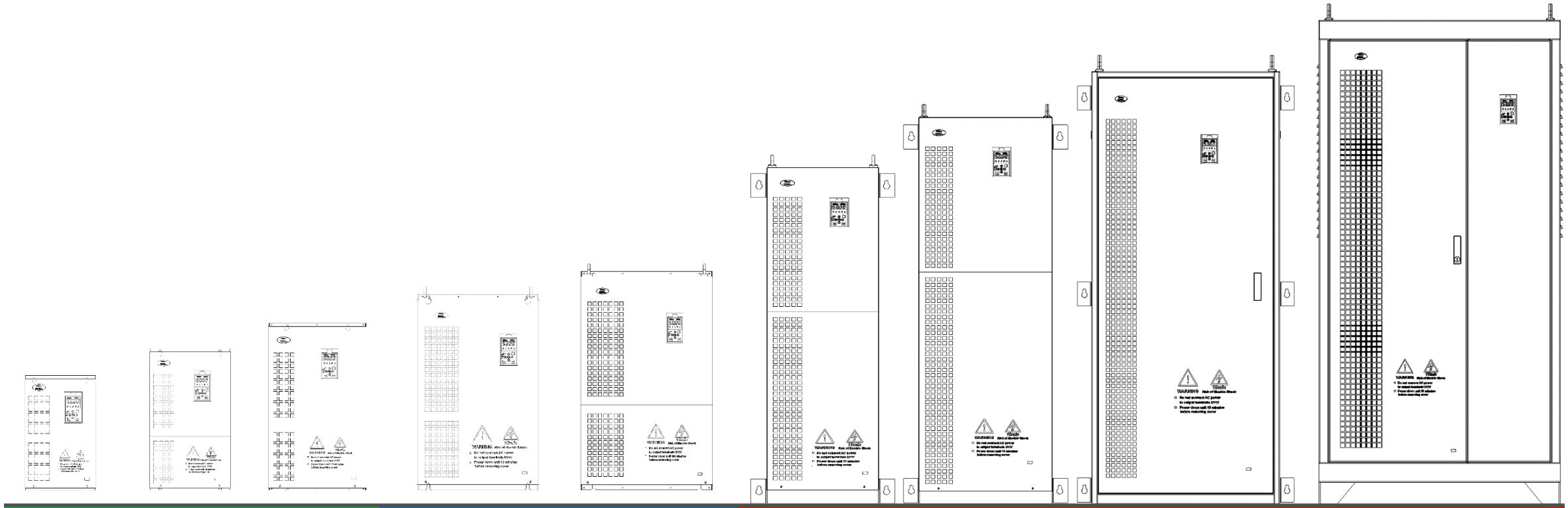
Code	Motor (kW)
0007	0.75
0015	1.5
:	:
0110	11
0150	15
:	:
1320	132
1600	160
:	:
7100	710
8000	800
9000	900

M	Compact
U	Up in Down Out
D	Down in Down Out
F	Freestanding

–	No Brake Unit
B	With Brake Unit

Triple Single

NE300 Frame Sizes



305	306	307	308 wall 1	308 wall 2	308 F	309 F	310 F	311 F
30G/37P 37G/45P	45G/55P 55G/75P	75G/90P 90G/110P 110G/132P	132G/160P 160G/185P	185G/200P 200G/220P 220G/250P 250G/280P	160G/185P 185G/120P 200G/220P 220G/250P	250G/280P 280G/315P 315G/355P	355G/400P 400G/450P 450G/500P 500G/560P	560G/630P 630G/710P 710G/800P 800G/900P

NE200 vs NE300

NE200

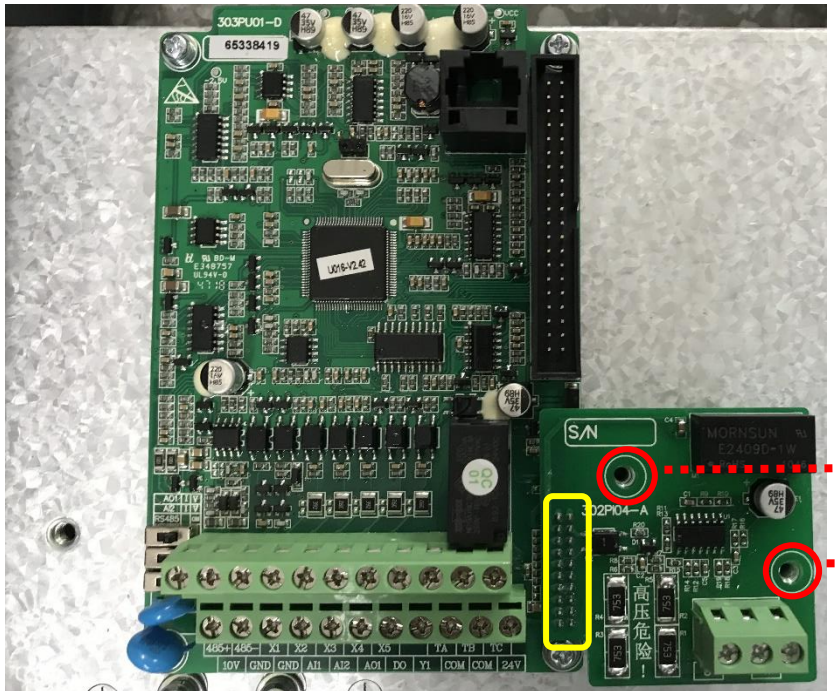
- 200V,400V 0.4kW ~ 5.5kW
- V/F, OL Vector, Permanent Magnet
- In built break unit
- High Starting Torque 150% @ 0.5Hz
- DIN rail installation
- Modbus (in-built)

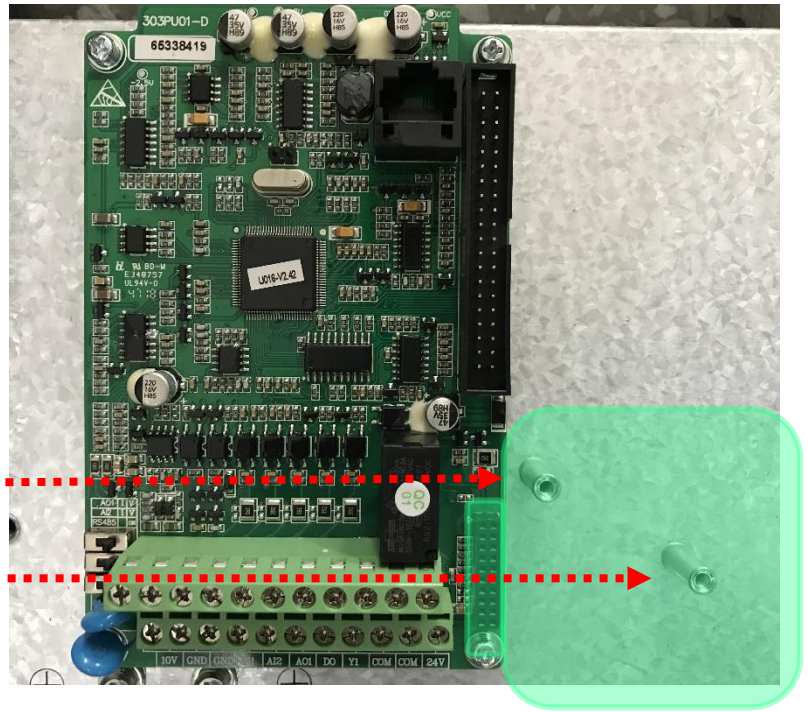
NE300

- 200V,400V 1.5kW ~ 900kW
- V/F, OL Vector, Permanent Magnet, CL Vector
- High Starting Torque 180% @ 0Hz
- Modbus (in-built), Profibus, Profinet, CC-link
- Option Cards
- LCD Keypad (optional)

** 900kW=2 * 500kW parallel*

NE300 Option cards interface





Installation position

NE300 options

NE30-I/0 Plus

GND	AO2	Y2	COM	BRB	BRC
X6	X7	X8	X9	X10	BRA

NE30-I/0 Lite

GND	AO2	Y2		BRB	BRC
X6	X7	X8	PLC		BRA

NE30-I/0 Relay

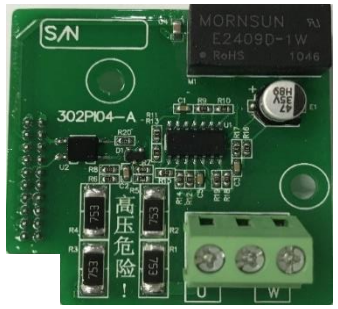
NE30-ZS01

Injection Machine

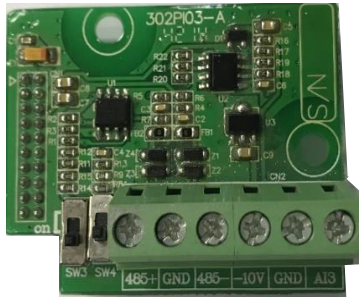
+A1 –A1 Pressure
+A2 –A2 Flow rate
X6 digital input

NE30-SP01

catch spinning motor*



NE30-AN01 +-10V



NEF-LCD01

NEF-LED01

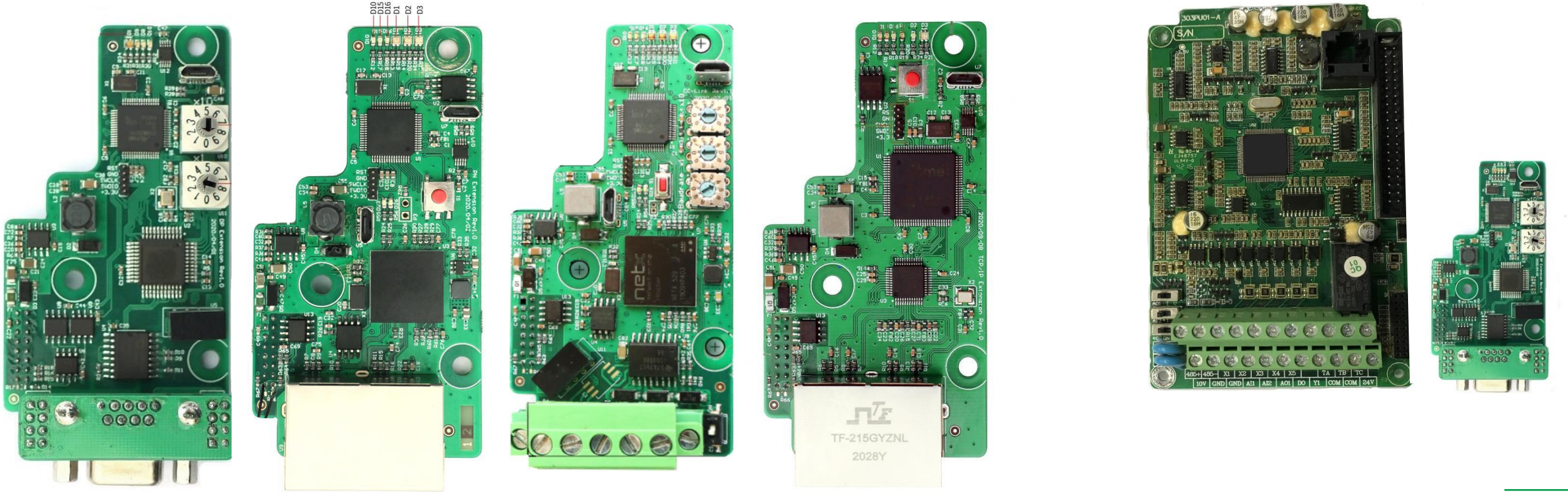
NE30-KB01

U W connect to power terminals

* <18.5 kw

NE300 communication option cards

NE200 don't support any option cards

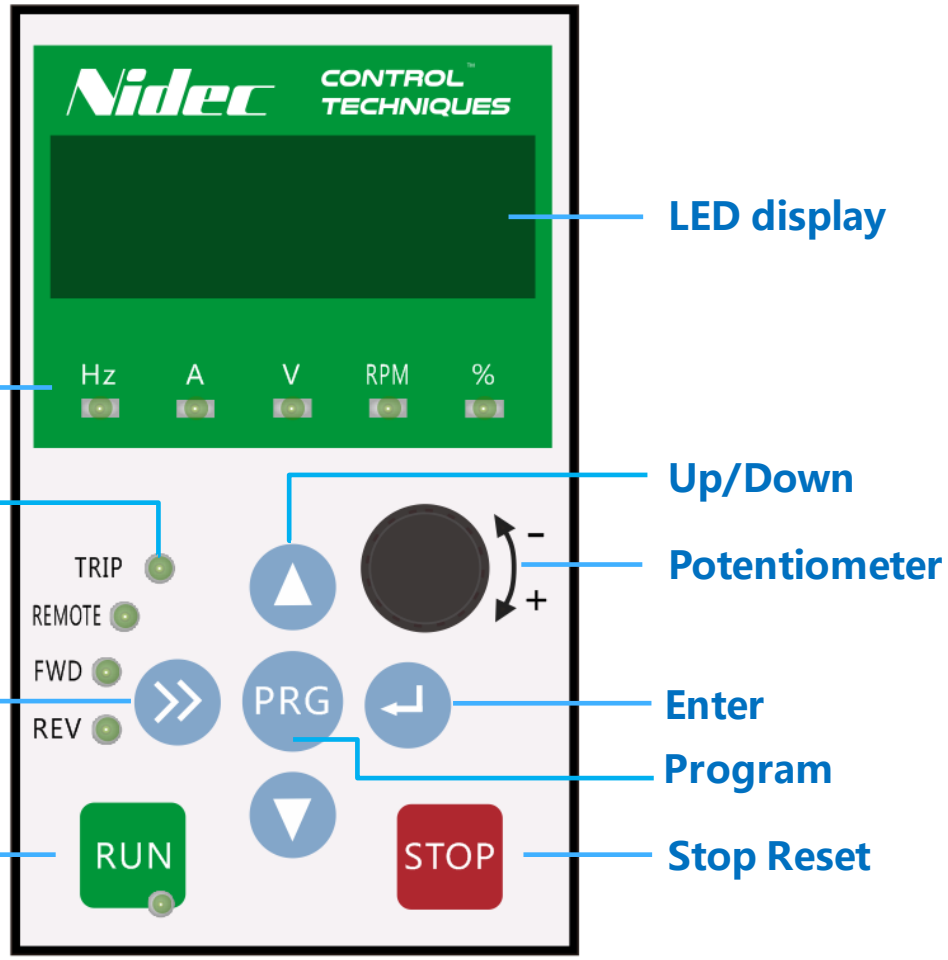


Terminal blocks

NE30-I/O Plus	X6	Multifunctional Input Terminal 6
	X7	Multifunctional Input Terminal 7
	X8	Multifunctional Input Terminal 8
	X9	Multifunctional Input Terminal 9
	X10	Multifunctional Input Terminal 10
	AO2	Analogue Output2 (0～10V,0/4～20mA Optional)
	Y2	Multifunctional Output Terminal Y2 (With COM)
	COM	Multifunctional Input COM Terminal
	BRA/BRB/BRC	Relay Output 2
	GND	Analogue Output COM Terminal
NE30-I/O Lite	X6	Multifunctional Input Terminal 6 (With “PLC” Terminal)
	X7	Multifunctional Input Terminal 7 (With “PLC” Terminal)
	X8	Multifunctional Input Terminal 8 (With “PLC” Terminal)
	Y2	Multifunctional Output Terminal Y2
	PLC	PLC COM Terminal
	BRA/BRB/BRC	Relay Output 2
	AO2	Analogue Output2 (0～10V,0/4～20mA Optional)
	GND	Analogue Output COM Terminal
NE30-I/O Relay	BRA/BRB/BRC	Relay Output 2
	AO2	Analogue Output2 (0～10V,0/4～20mA Optional)
	GND	Analogue Output COM Terminal
NE30-ZS01	+A1	0-1A Current Input
	-A1	0-1A Current Output
	+A2	0-1A/2A Current Input
	-A2	0-1A/2ACurrent Output
	X6	Multifunctional Input Terminal 6 (With COM)
	COM	Multifunctional Input COM Terminal
NE30-AN01	485+	485 Differential Signal +
	485−	485Differential Signal -
	-10V	Power Supply -10V (With GND)
	AI3	±10V Analogue Input (With GND)
	GND	Analogue input & Output COM Terminal
NE30-SP01	U	Connecting Inverter’s “U” Output Terminal
	W	Connecting Inverter’s “W” Output Terminal

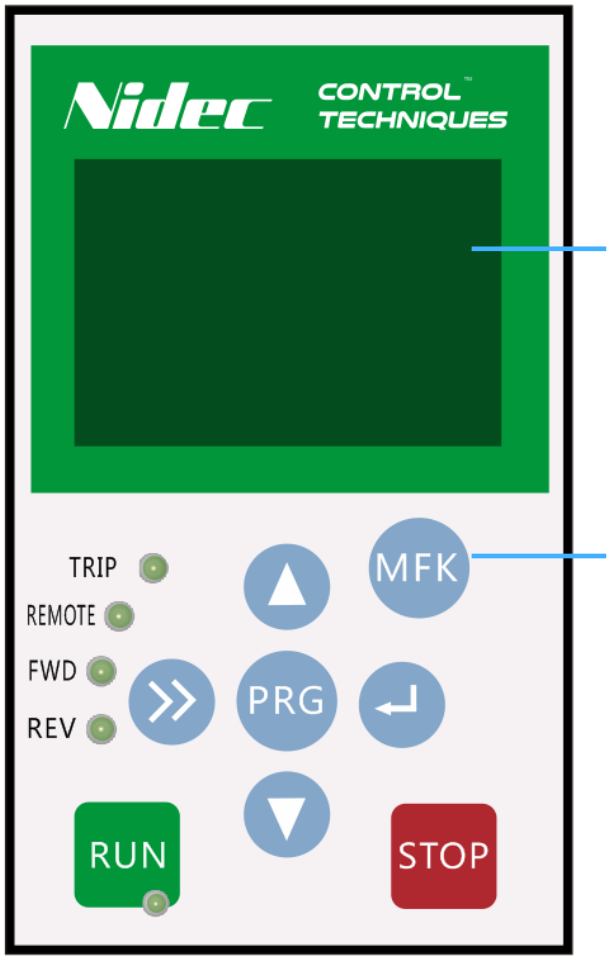
Keypad

NEF-LED01



- Indicator
- Status Light
- Shift
- Run
- LED display
- Up/Down
- Potentiometer
- Enter
- Program
- Stop Reset

NEF-LCD01 (options - only chinese)



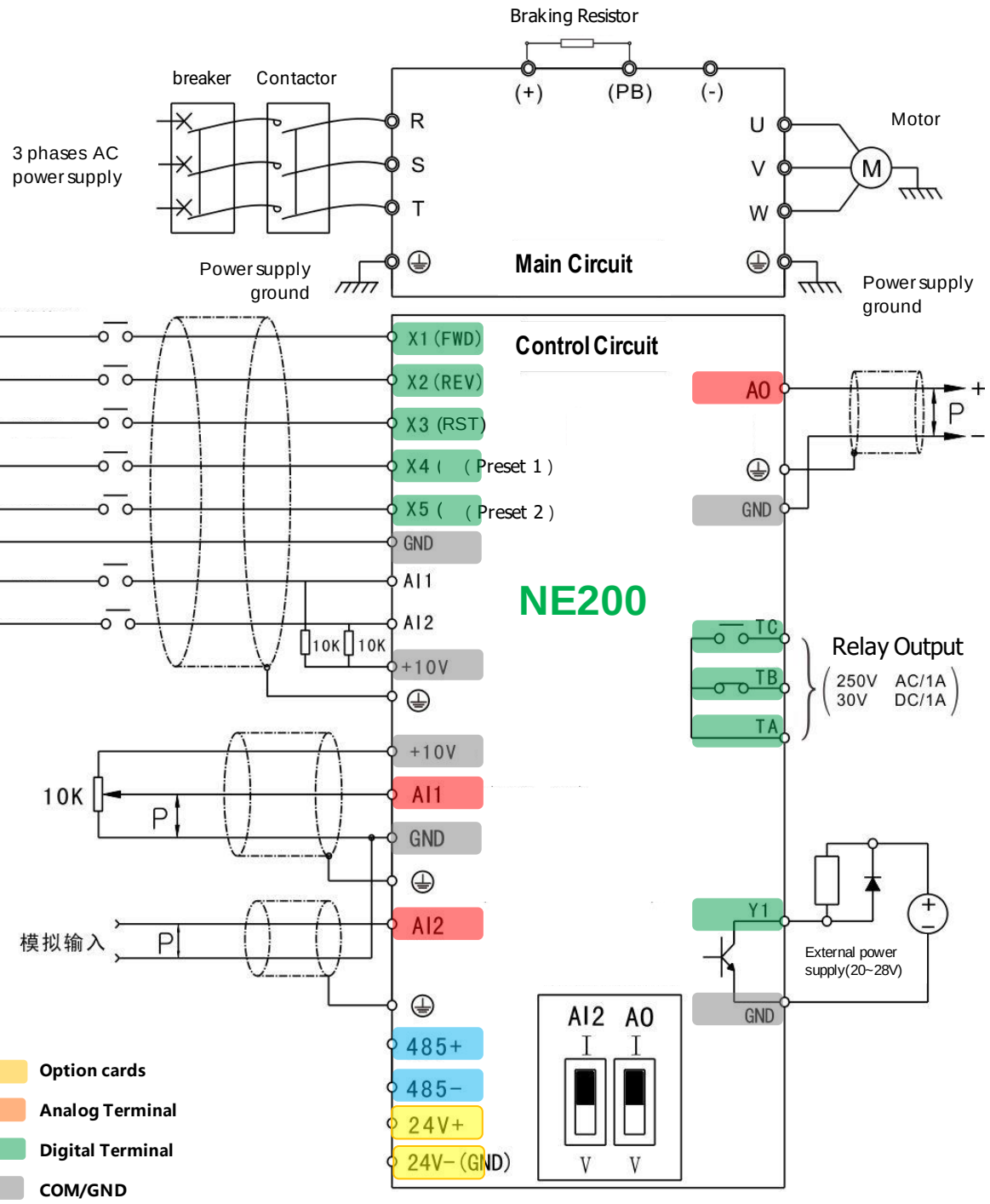
- 4 line LCD display
- Multi-Function-Key
  (can be customized as a FWD/REV button

LED fitted as standard, LCD only support Chinese language.

NE200 wiring diagram

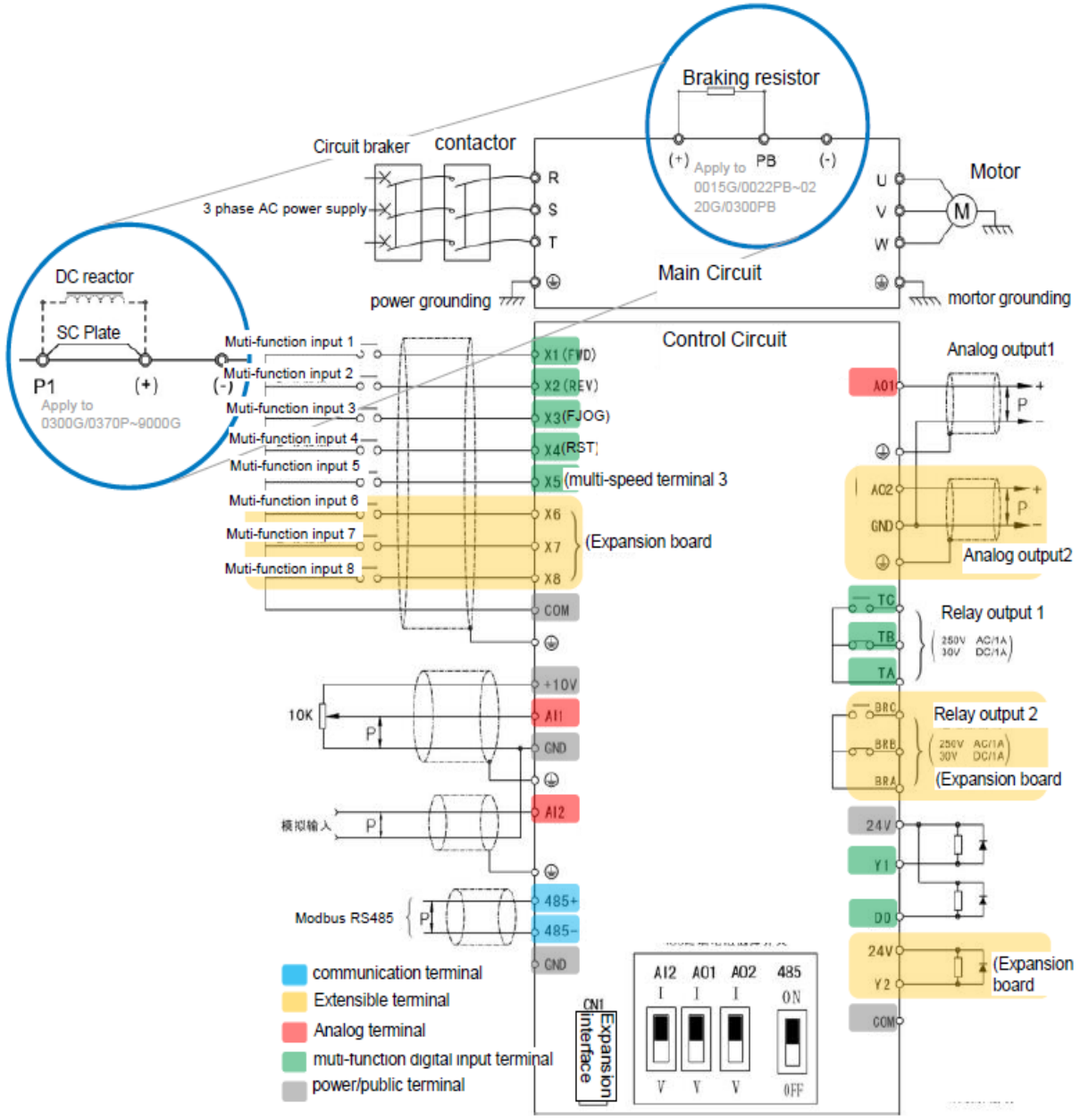
QR code

		10V	AI1	AI2	X1	X2	X3			
485+	485-	GND	GND	AO	X4	X5	Y1	TA	TB	TC

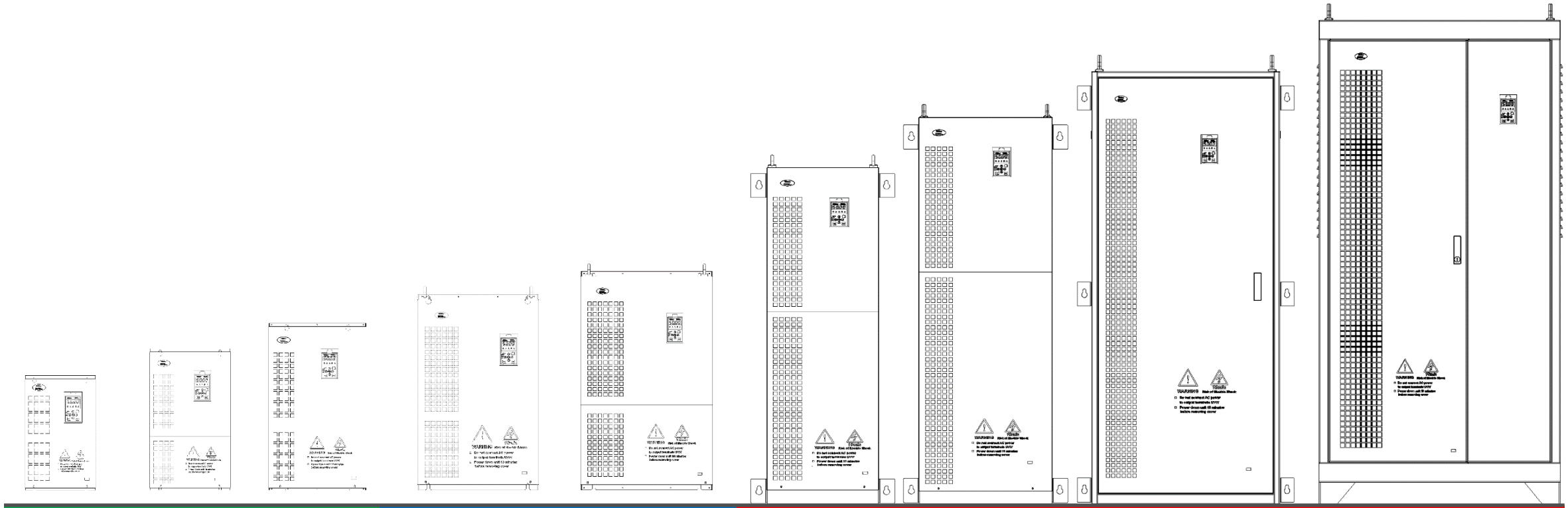


NE300 wiring diagram

485+	485-	X1	X2	X3	X4	X5		TA	TB	TC	
10V	GND	GND	AI1	AI2	AO1	DO	Y1	COM	COM	24V	



NE300 Frame Sizes



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Input & Output Chokes

Input Choke

Output Choke

	3 Phase AC Input Choke Technical Data			
nverter Power（KW）	Current(A）	Voltage Drop（%）	Inductance（mH）	Insulation Level
30	80	2	0.17	F
37	90	2	0.16	F
45	120	2	0.12	F
55	150	2	0.095	F
75	200	2	0.07	F
90	240	2	0.06	F
110	250	2	0.06	F
132	290	2	0.05	F
160	330	2	0.042	F
185	390	2	0.039	F
200	490	2	0.028	F
220	490	2	0.028	F
250	530	2	0.026	F
280	600	2	0.023	F
315	660	2	0.022	F
355	800	2	0.018	F
400	1000	2	0.014	F
450	1130	2	0.013	F
500	1250	2	0.012	F

	3 Phase AC Output Choke Technical Data			
Inverter Power（KW）	Current(A）	Voltage Drop（%）	Inductance（mH）	Insulation Level
30	80	1	0.35	F
37	90	1	0.32	F
45	120	1	0.24	F
55	150	1	0.19	F
75	200	1	0.14	F
90	240	1	0.12	F
110	250	1	0.12	F
132	290	1	0.1	F
160	330	1	0.087	F
185	390	1	0.075	F
200	490	1	0.058	F
220	490	1	0.058	F
250	530	1	0.054	F
280	600	1	0.048	F
315	660	1	0.044	F
355	800	1	0.036	F
400	1000	1	0.028	F
450	1130	1	0.026	F
500	1250	1	0.024	F

Choke、EMI filter please contact third-party source

DC Chokes

DC Choke

	DC Choke Technical Data		
Inverter Power（KW）	Current（A）	Inductance（mH）	Insulation Level
30	65	1.2	F
37	78	1	F
45	95	0.8	F
55	120	0.7	F
75	160	0.5	F
90	180	0.5	F
110	250	0.3	F
132	340	0.3	F

Braking Unit & Resistors

Brake Unit：

- TDB－4C01－0300　30KW (380V)
- TDB－4C01－0550　55KW (380V)

Brake Resistor：

- TDB－4R01－0030－0400　3.0KW、20W
- TDB－4R01－0050－0400　5.0KW、10W

For NE300-4T0900G and above inverters,
Please use multiple braking units (TDB-4C01-0550) in parallel.

Transfer price list

NE Series Product’ s Design Philosophy

Apply the most advanced control technology shared by “Control Techniques”

Summarize 2,000,000 cases of successful application experience

Focus on customers' future demand for general-purpose inverters

- **Demand for high performance**
- **Demand for high reliability**
- **Industrialized demand**
- **Individual Demand**

Providing solutions for customers

Enhancing core competitiveness for customers

High performance

Field Oriented Control (FOC)

The vector control algorithm, selecting a certain rotating magnetic field axis of the motor as the coordinate axis.

There are three choices of magnetic field orientation axis: rotor magnetic Field orientation; air gap magnetic field orientation and stator magnetic field orientation.

FOC

Model Reference Adaptive Control (MRAC)

Application of adaptive observer, effective identification Rotor resistance, rotor flux linkage and speed;

MRAC

HIGHLIGHTS

Compact size (high power density); Independent air duct design, adapt to harsh working environment ;Wall-mounted machines can be widely used in metallurgy, construction, petrochemical, and plastic machines , municipal construction and other industries .

DTAC

Direct Torque Control

Analyze the mathematical model in the stator coordinate system ;

Control the flux linkage and torque of the motor;

Observing the stator flux linkage by detecting the stator resistance.

Best Price/Performance & Powerful Solution for the General Purpose AC Drives Market !

Best Price/Performance ratio

Your Trusted Partner

Global Support

24 Hour Service

Industries NE focus on

Commercial Refrigeration

Crane & Hoist

Entertainment

Forestry & Wood

HVAC

Lift & Elevators

Material Handling

Metals

Mining Cement & Aggregate

OEM machine Manufactures

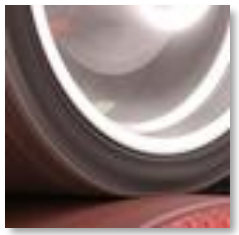
Packaging Machinery

Port Machinery

Printing

Renewable Energy

Rubber & Plastics



Test Rigs

Water & Waste Water

Wire & Cable

NE200 NE300 Target Markets

- Textile
- Metal machining
- HVAC (Air conditioner ; Fan; Pump; Support Permanent magnet synchronous fan Motor)
- Chemical (Support Permanent magnet synchronous mixer motor ,

  Three-phase asynchronous fan motor)
- Utility & Energy (Pump)
- Machinery etc. (Support High Speed Spindle)

Industrialized demand

The equipment manufacturing industry puts forward more and more industry needs for inverters:

- Textile: Swing frequency control、 Fixed length control、 Multi-speed control、 Slip control、 Synchronous control
- Cable manufacturing： Fixed length control、 Constant line speed control
- Papermaking, chemical fiber： Synchronous control、 Droop control
- Water supply： PI Closed-loop control、 Sleep control、 Multi-stage pressure setting control
- HVAC: Manual/automatic switch control、 Zero frequency hysteresis control、 Temperature difference control、 Automatic energy-saving operation

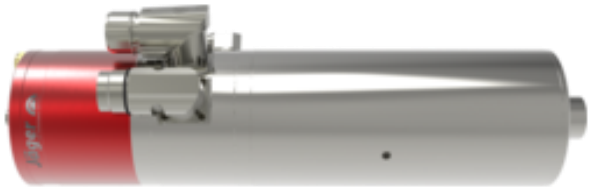
Problems:

General-purpose inverters cannot meet the special needs of the industry.

The use of additional controllers will increase costs

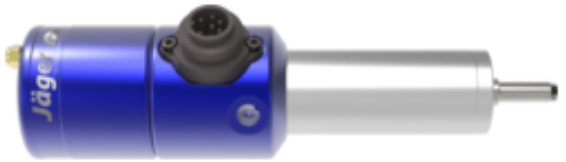
Industrialization: high speed spindle

Demand Specification:



Machine tool spindles can be divided into two categories: mechanical spindles and electric spindles.

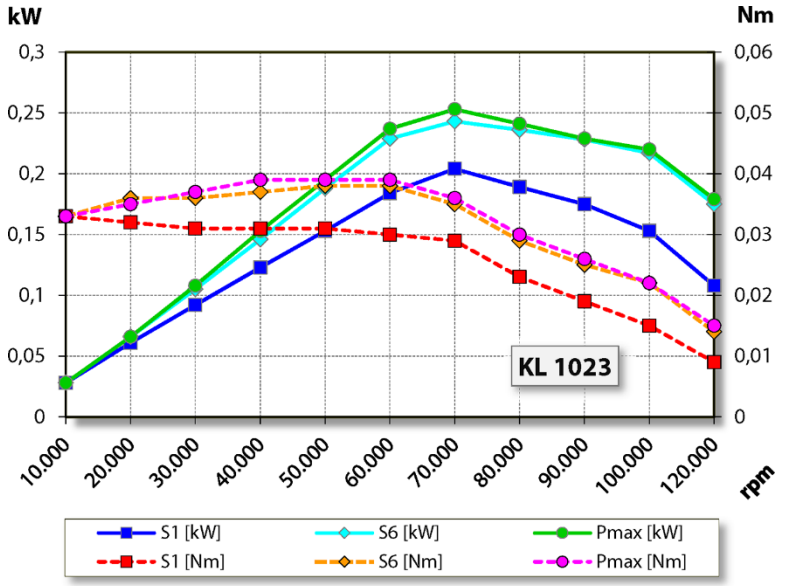
The high-speed electric spindle eliminates the transmission links of belts, gears, and couplings, and truly realizes "zero transmission"



Need to rotate at 80,000rpm, 100,000rpm or even higher

The frequency of the inverter is at least 1000Hz to meet the needs of high-speed spindles

Frequency	550Hz	1000Hz	1333Hz	1667Hz	2000Hz	3200Hz
Rotation rpm	33,000	60,000	80,000	100,000	120,000	192,000



Features :

- NE200, 300 default maximum frequency 550Hz (Trade Compliance)
- The frequency of NE non-standard version is up to ...3200Hz

F0.10 Basic Frequency 0 ~ 550.0Hz
F2.27 Frequency resolution 0.01Hz 0.1Hz
The output frequency is 3200Hz after modifying the resolution to 0.1Hz.

Industrialization: Permanent magnet synchronous fan motor control

Demand Specification :

Permanent magnet synchronous motor direct drive without gear box

Large warehouse/workshop/logistics park

Features :

- Permanent magnet synchronous motor mode
- High-density power
- Synchronous Sensorless

New : Optimized Sensorless mode with higher operation performance

Higher Performance

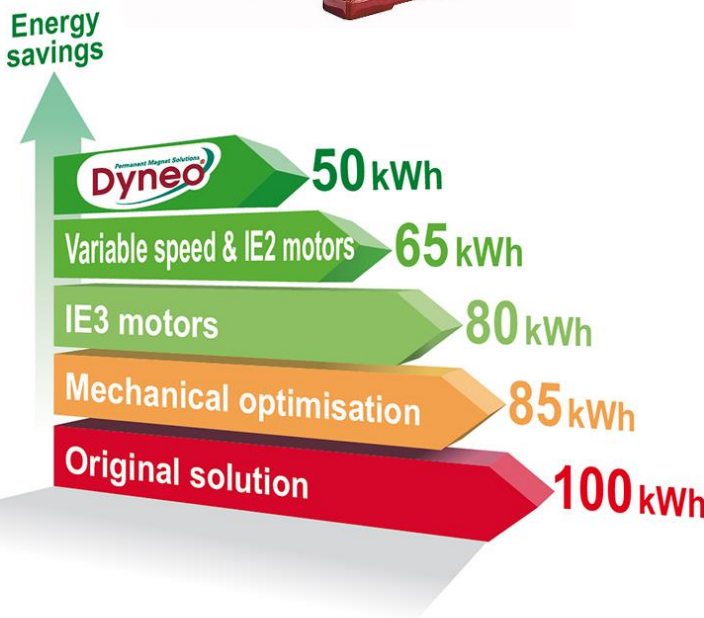
- Energy saving/ Energy efficiency/ ROI
- Ensure torque performance over a wide speed range
- Higher maximum speed

Integrated in the device

- Compact
- Light weight
- Good adaptability

Easier to maintain

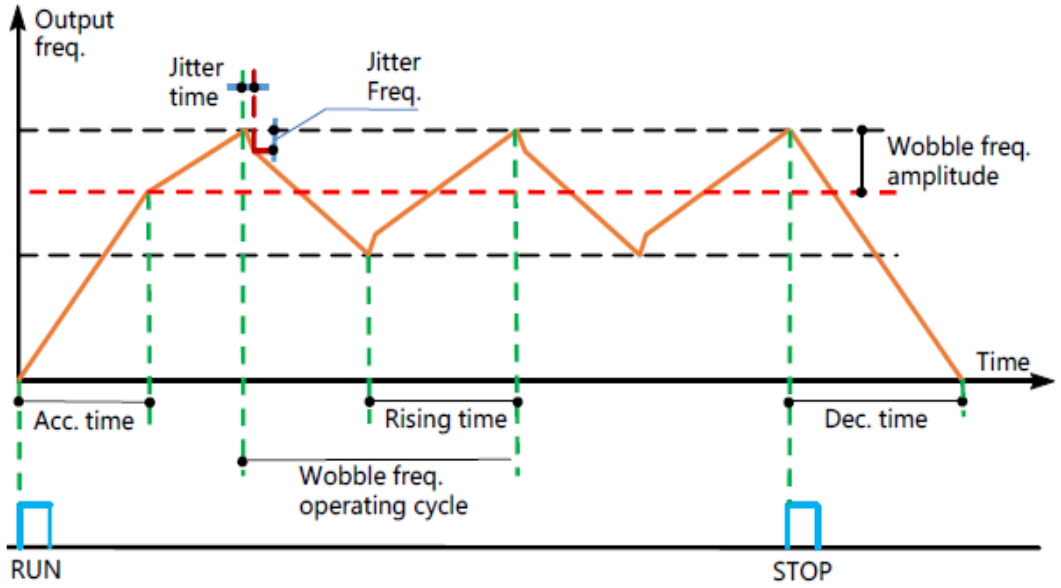
- Reducing maintenance costs
- Longer lubrication intervals

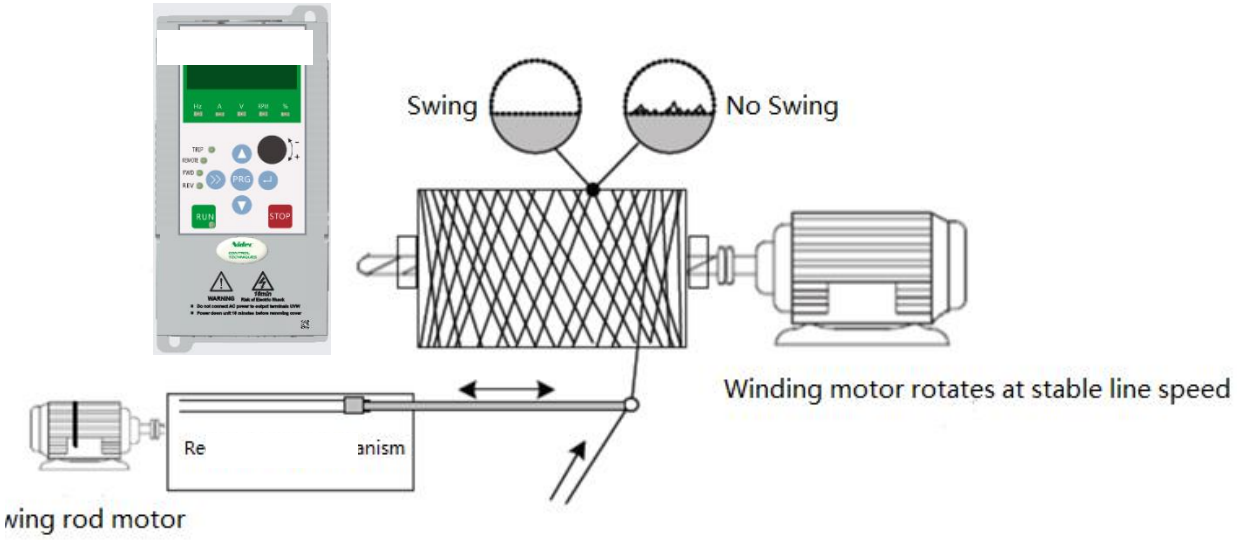


Industrialization : Swing frequency control

Demand Specification : In the traverse and winding process of textile, chemical fiber and other industries, the swing frequency (disturbance) function is required

FA.00 Swing frequency amplitude
FA.01 Jump frequency
FA.02 Jump Time
FA.03 Swing frequency rise time
FA.04 Swing frequency fall time
FA.05 Swing frequency amplitude setting method





Industrialization ： Process closed loop

The process closed loop is divided into analog closed loop and pulse closed loop according to the feedback signal.

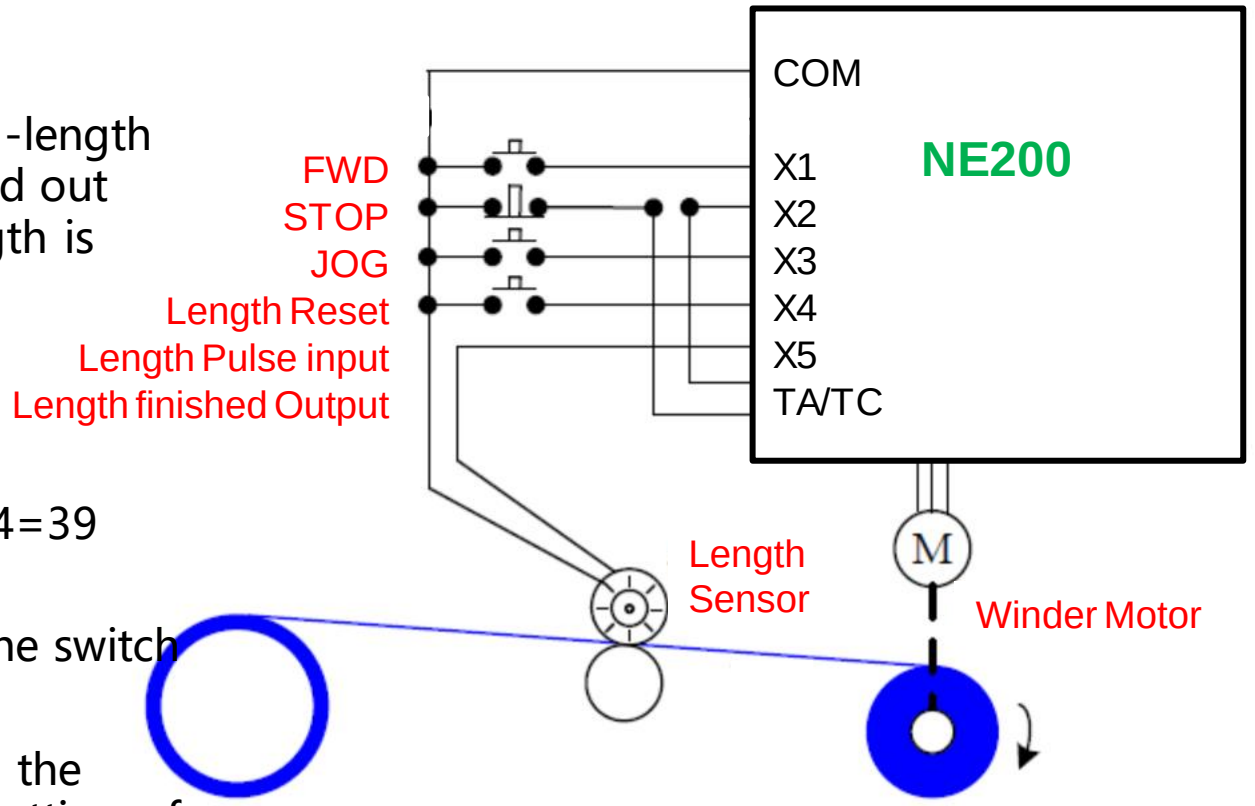
Analog feedback Generally used for constant pressure water supply, constant pressure gas supply etc.

Pulse feedback Generally used for speed closed loop, linear speed closed loop etc.

Industrialization : Process Close Loop_ (Pulse feedback)

Demand Specification : (Cut to length)

Many industries such as textiles and cables need fixed-length control, that is, real-time length accumulation is carried out through speed measurement pulses. After the set length is reached, output the length reaching signal



Features :

- X4 or X5 is set as length counting input terminal, F6.04=39 (counter signal input)
- The actual length is calculated by the pulse signal of the switch input terminal
- The actual length exceeds the set length then output the reaching indication (valid after the count reaches the setting of F7.13)
- Available terminal control and reset
- Only need to set 3 parameters

FB.00 Preset Length

FB.01 Actual Length

FB.02 Pulses number per unit

Industrialization : Process Close Loop_ (Analogue feedback)

Demand Specification :

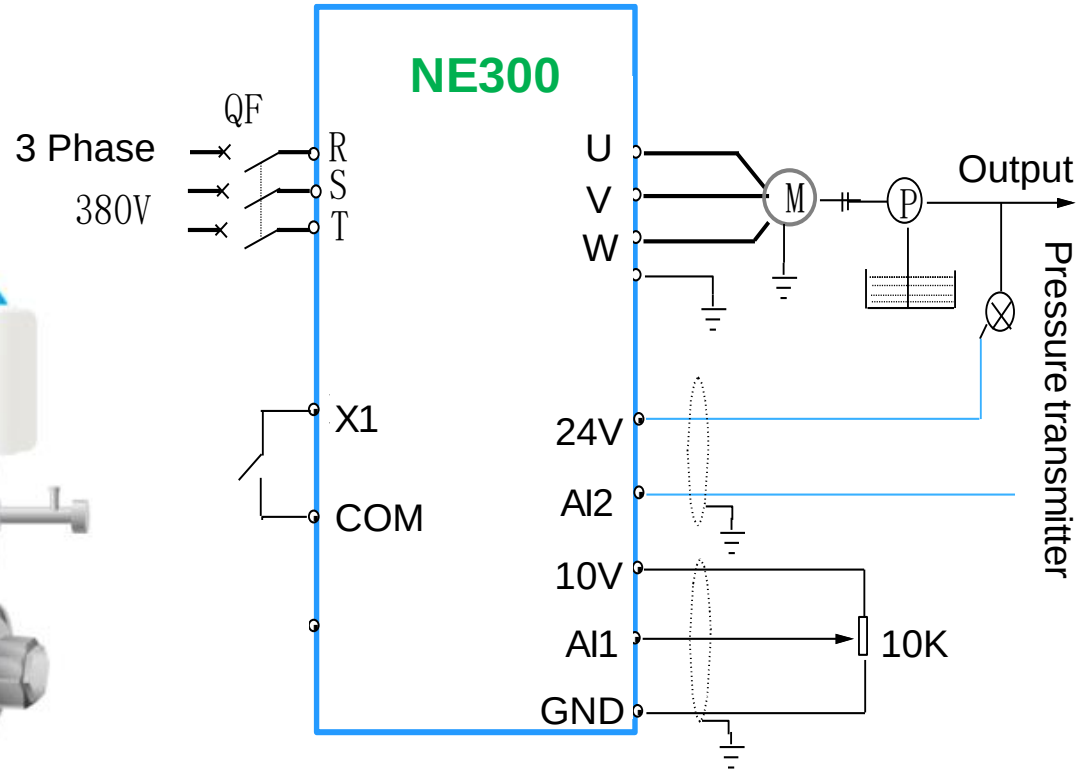
Water supply and petrochemical industries need PI closed-loop control

Features :

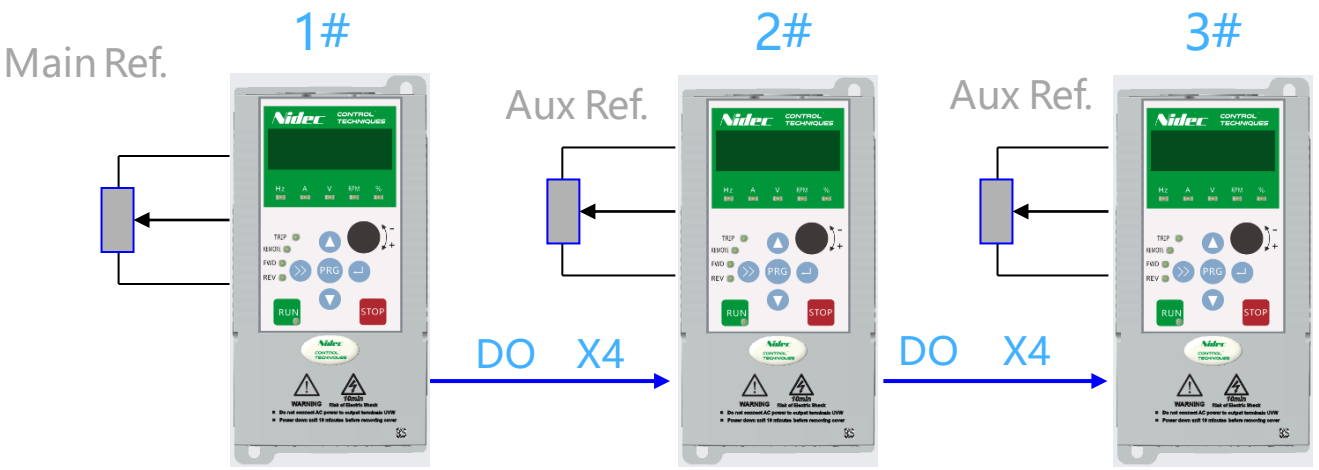
- Built-in 2 groups of PI (Switch through F8.11, optional switch with terminal or switch according to deviation)

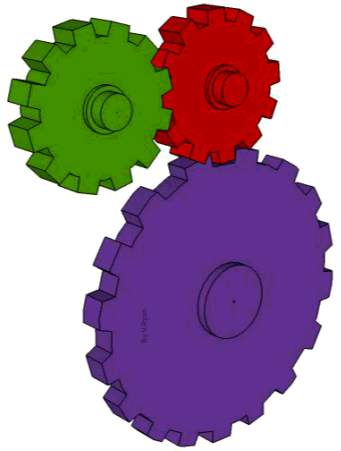
- Reference source select:
  Analog PID digital setup (F8.02)
  AI1terminal / AI2 terminal
  Pulse input
  Serial communication

- Feedback source select:
  AI1terminal / AI2 terminal
  Pulse input
  Serial communication
  AI1 – AI2
  AI1 + AI2
  MIN (AI1, AI2)
  MAX (AI1, AI2)



Industrialization： Synchronous control / master-slave control control





Pulse input/output interface can effectively solve the problem of analog signal interference

F0.03 Frequency reference 1

F0.04 Frequency reference 2

F0.05 Frequency setting selection

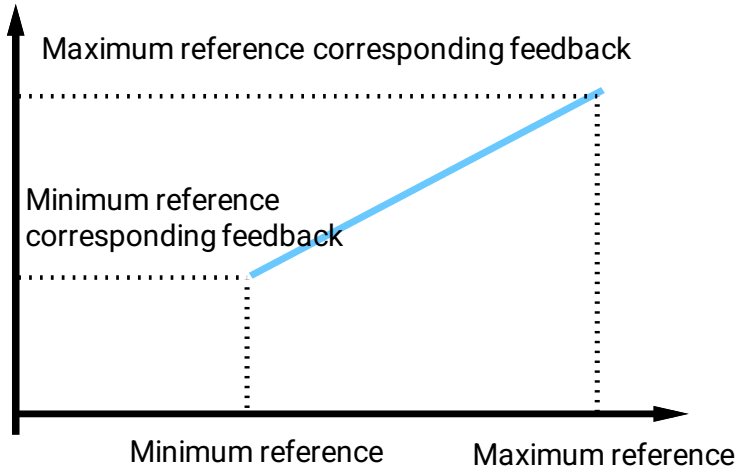
F7.21 DO output selection

F7.26 DO Maximum output pulse frequency 10 kHz (0 ~ 50 kHz)

F7.27 DO Minimum output pulse frequency 0 kHz

Industrialization ： PI control and it’ s features

•Directly define the relationship between the reference and the corresponding target feedback value. When the reference is an analog signal 0 ~ 10V, if the expected corresponding controlled item is pressure, the range is ~ 1MP, and the corresponding pressure sensor signal is 4 ~ 20mA, the relationship between the reference and the corresponding feedback value is shown in the figure

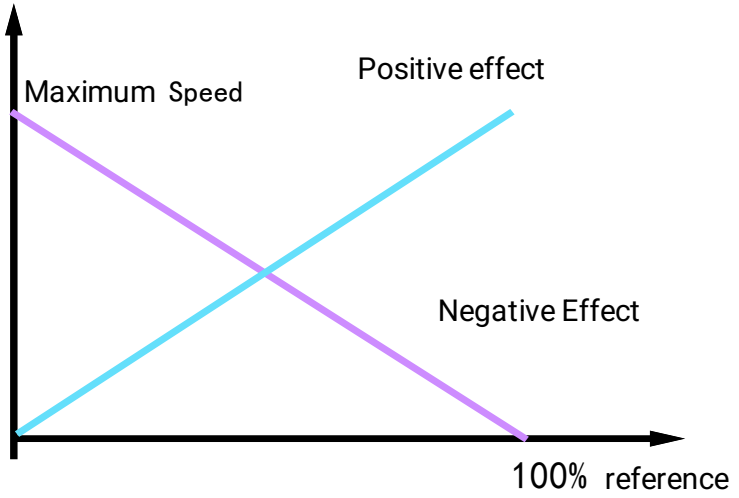


• Positive effect

Reference increase, the motor speed is required to increase, such as water supply system

•Negative Effect

Reference increase, the motor speed is required to decrease, such as a refrigeration system



For the same liquid level control, when pumping from the liquid storage tank, it is necessary to select the positive effect, and when it is poured into the liquid storage tank, it is a negative effect.

Industrialization： Sleep Mode

Demand Specification：

- Fans and pumps are frequently started at low speeds, especially during PI closed-loop control, causing damage to the equipment
- Water supply system needs night sleep control

Implementation：

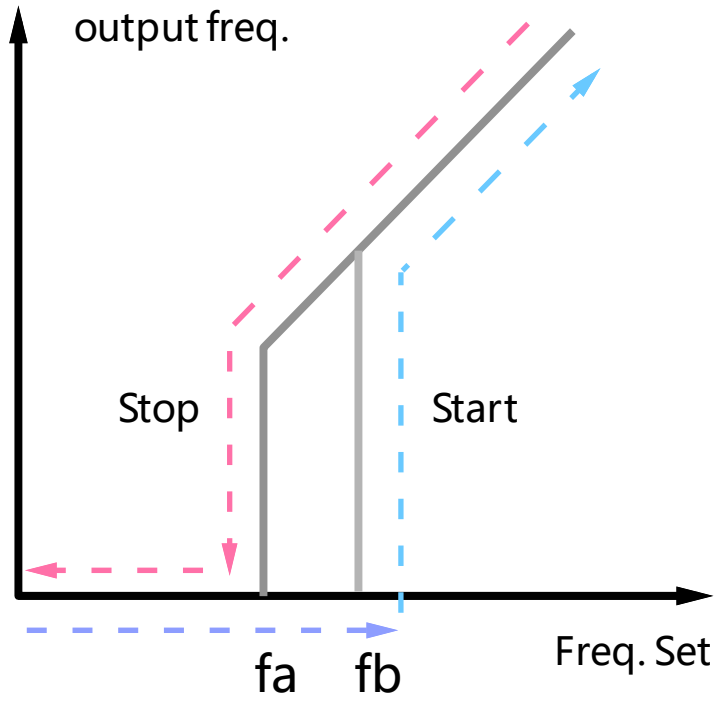
- Inverter running frequency <Sleep threshold， After sleep delay，

  Go to sleep status

Applicable：

Air conditioning, water supply industry

F8.20	Enable Sleep mode
F8.21	Sleep mode Delay
F8.22	Sleep mode threshold
F8.23	Awaken threshold



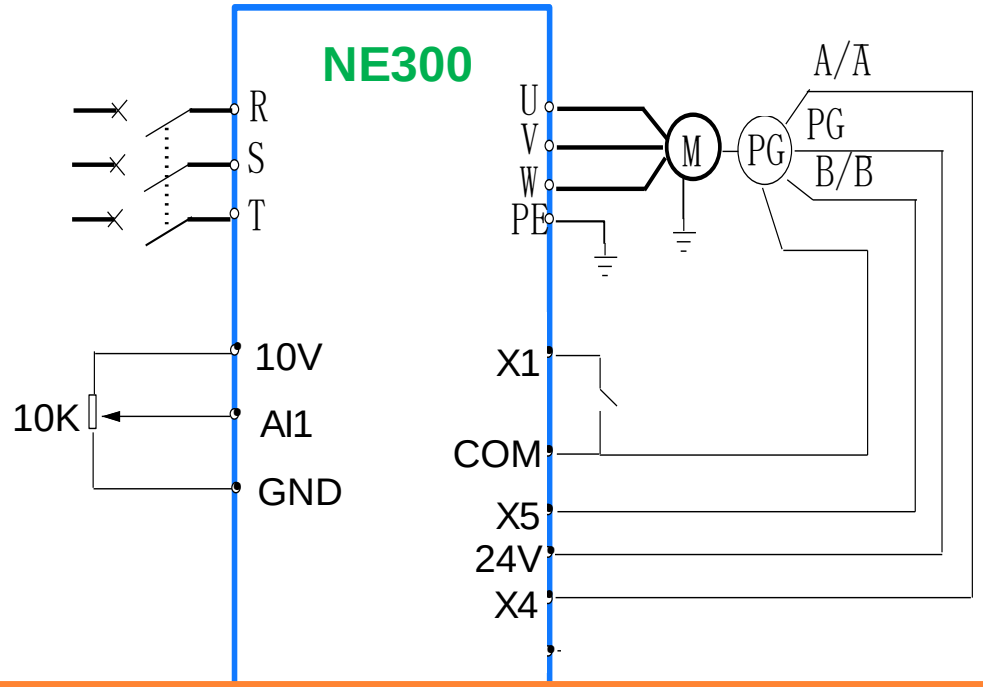
Industrialization ： PG Closed-loop control

Demand Specification :

Textile machinery, papermaking, and chemical fiber need speed closed-loop feedback, and require higher steady-state speed accuracy occasions, eg; 0.1%, PG closed-loop control is required

Features :

- Built-in encoder interface
- Single-phase pulse input or two-phase input (differential)



Maximum output speed of motor(rpm)/60 * PG < 50kHz

F3.14 Encoder pulse

F3.15 Motor and encoder gear ratio

F3.16 Encoder direction

For example: select 1024 line PG, 4-pole motor, Max operating frequency 50Hz

Maximum output speed of motor (rpm) = 60 * 50 / 2 = 1500rpm

1500 / 60 * **1024** = 25,600 Hz ≈ 25 kHz *Delta 33kHz*

1500 / 60 * **2048** = 51,200 Hz ≈ 50 kHz *NE, EV, invt 50kHz*

1500 / 60 * **4096** = 102,400 Hz ≈ 100 kHz *Inovance 100kHz*

- X4,X5 Maximum pulse input 50kHz

NE200无法PG闭环

Industrialization： Catch Spinning Motor

Demand Specification：

When the inverter start, the load motor is still running by inertia, and it uses speed tracking to start (start after detecting the speed and direction), which can avoid the occurrence of start-up overcurrent.

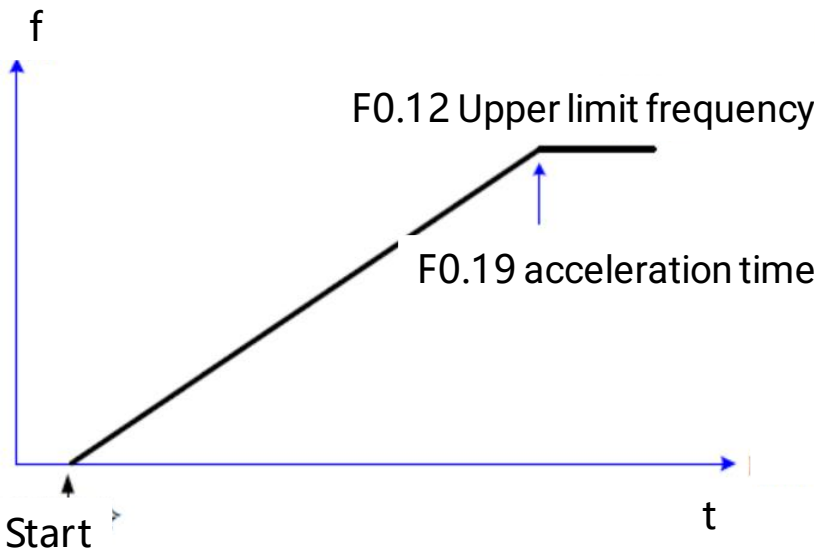
Features：

large inertia load applications

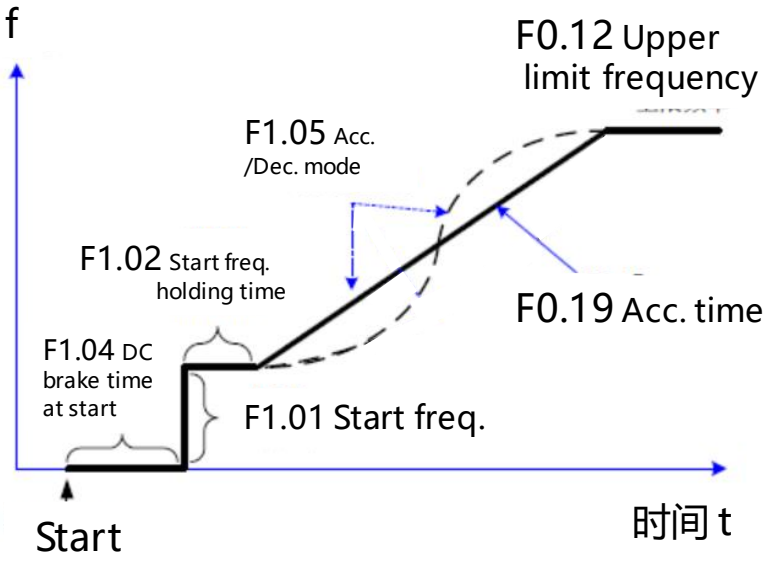
Applicable：

Fan, pump, paper machines etc.

F1.00=0
(Start directly)

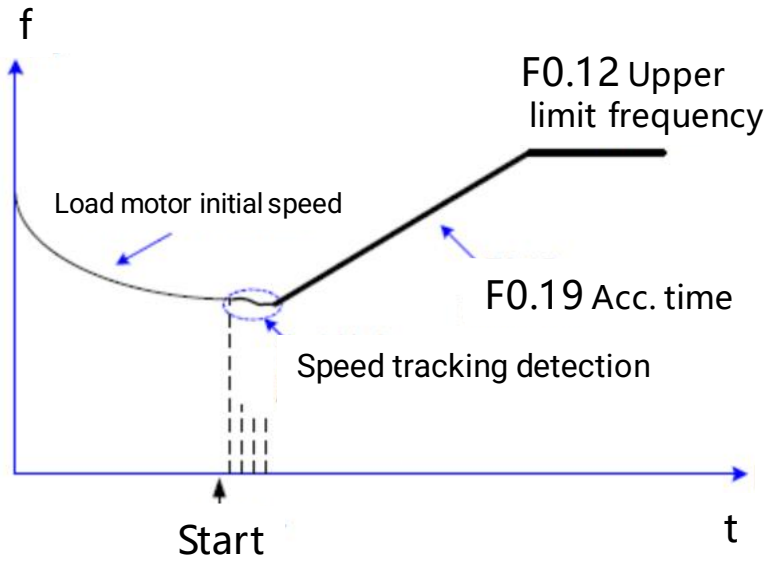


F1.00=1
(DC injection brake first and then start at start frequency)



F1.00=2
Speed tracking and start

>=18..5kW in built Catch spinning motor function
<18.5kW option card NE30-SP01



Industrialization : droop control

Demand Specification :

When multiple motors drive the same load, the load is required to be evenly distributed

Implementation :

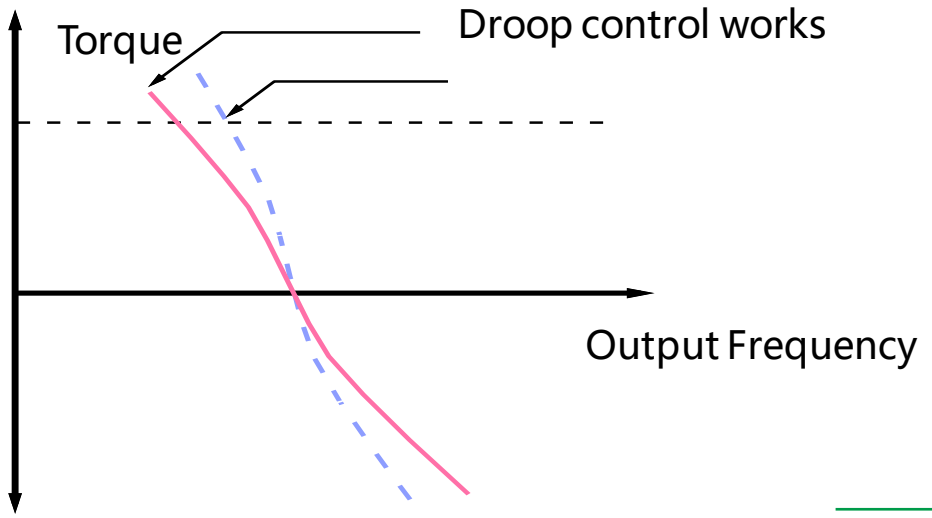
Droop control means that as the load increases, the output frequency of the inverter decreases, so that when multiple motors drive the same load, the output frequency of the motor with a heavy load will drop more. Thereby, the load of the motor can be reduced, and the load of multiple motors can be evenly realized.

F2.19 Droop control 0.00 ~ 10.00Hz

(NE200 does not have this function)

Applicable :

Draft control in chemical fiber and other industries, roller control in glass, metallurgy and other industries



Customer's individual needs

Due to the diversity of customer needs, new requirements are put forward for the personalized functions of general-purpose inverters:

- Whether the running status is stored during stop or power shutdown
- Whether the operation panel keys are locked
- User password setting selection
- Run timing and timing run to output
- Flexible choice of terminal input and output
- Jog interval
- Terminal UP/DN adjusts the speed or frequency
- Time unit selection
- Direct line speed display and operation

Personalization: Long acceleration time

Demand Specification :

Customers in textile and other industries demand uniform acceleration or uniform deceleration for a long time (usually 1 hour or several hours) operation

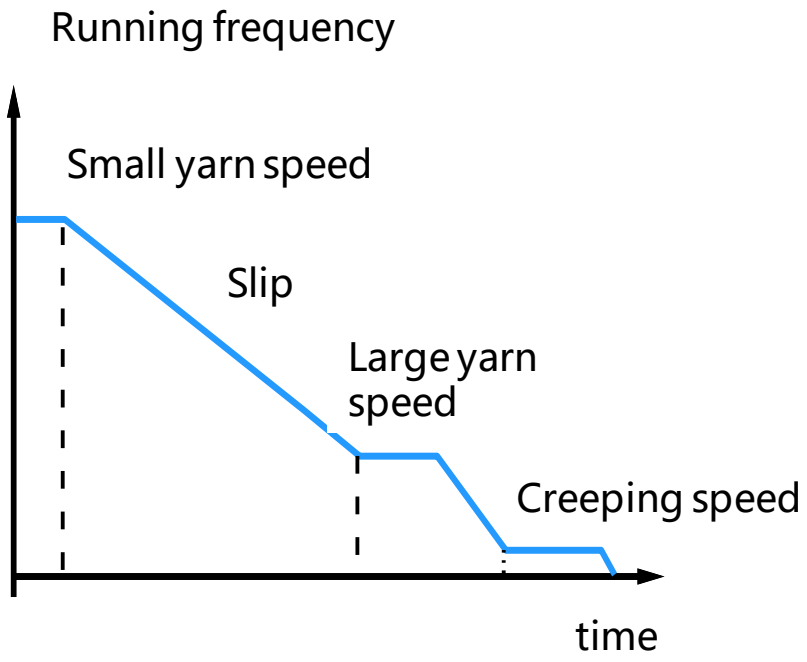
Implementation :

NE products can be set up to 3600s acceleration and deceleration time （1hr）

Commander C200/300 32000s （9hr）

~~Inovance , Delta, ZONCN up to 65000s/60000s (18hr/17hr)~~

Invt 全系3600s

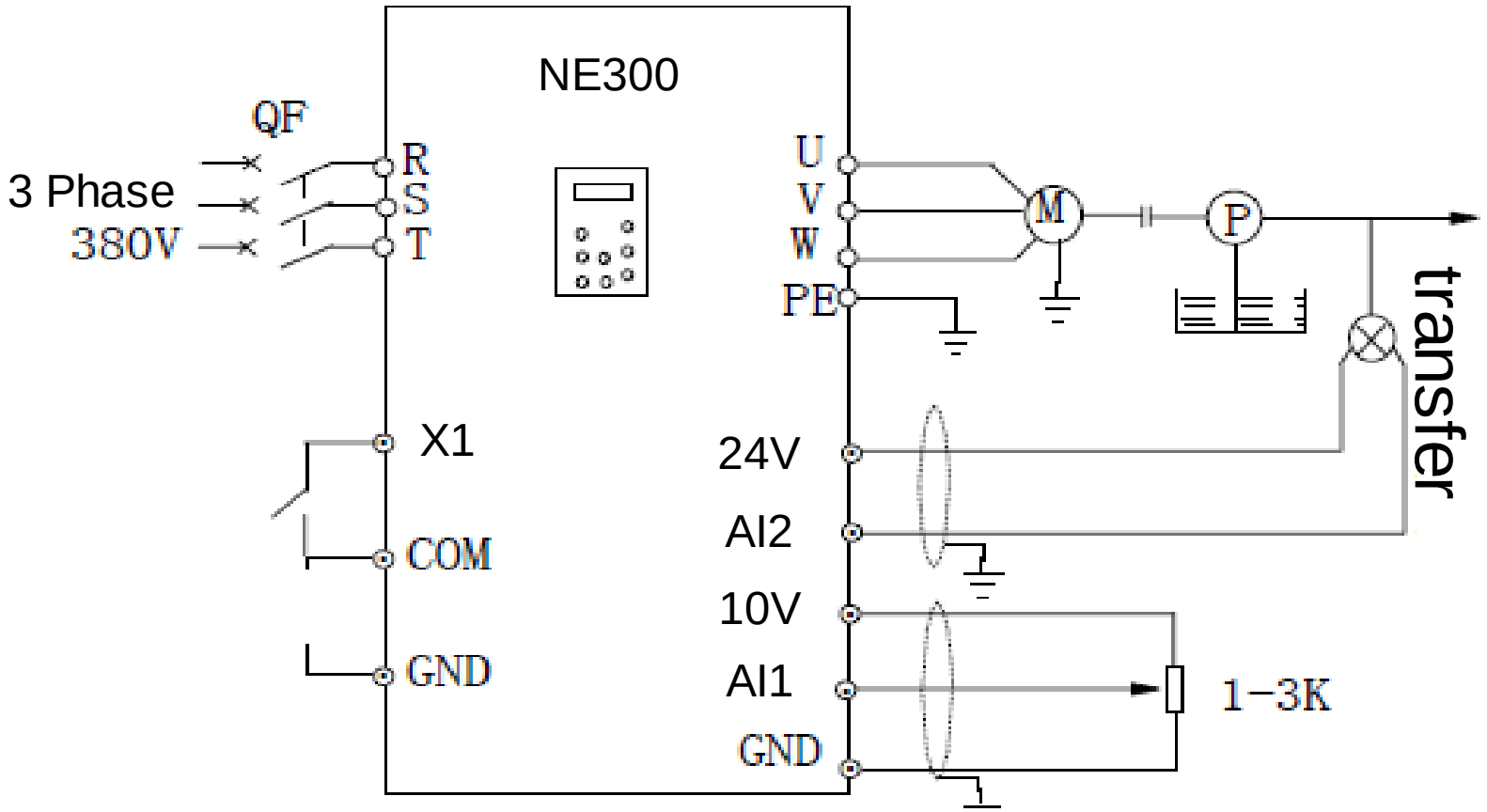


Coarse spinner process flow

Applicable :

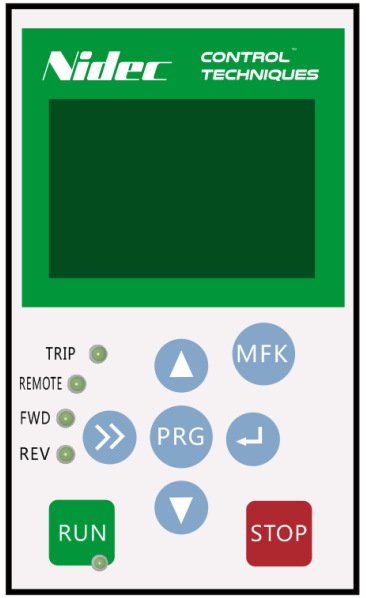
Where textile machinery and other industries require long acceleration and deceleration, it is generally used in conjunction with multi-speed

PID mode



F0.02=1 (X1---run forward), F0.03=7 (PID reference), F8.00=1(AI1 speed or press reference channel), F8.01=1(AI2 speed or press feedback channel), F8.03=???% (depend on the feedback value of transfer when the driver run in 50HZ, 100% equal to 20ma or 10V)

Personalization: LCD and parameter copy



Demand Specification ：

- Chinese or English display
- Mass production requires direct copy of parameters, hot swappable
- Long-distance keyboard external lead, operation

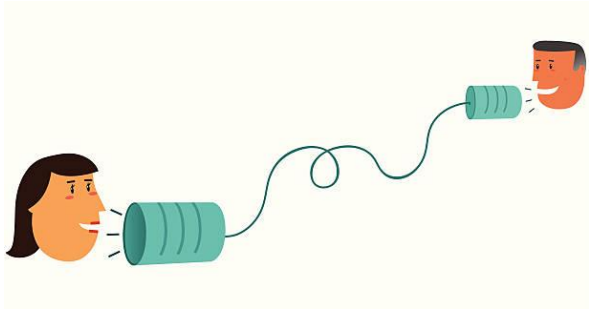
Implementation ：

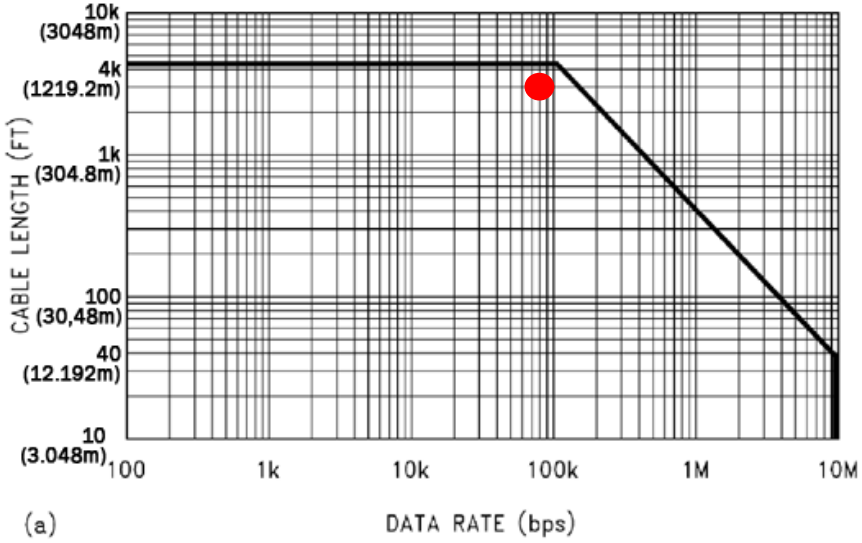
Select NEF-LCD01 keyboard

Protocol theory communication distance 1200m (twisted pair & no repeater)

Applicable ：

- Higher operating requirements
- Mass production of similar equipment
- Long-distance remote operation





High reliability requirements

The widespread using of inverter requires higher reliability：

- Good power supply adaptability (power supply distortion, shaking, voltage fluctuation, long-term low voltage etc.)
- Strong anti-electromagnetic interference ability (lightning strike, noise, static electricity)
- Strong adaptability to long-term operation in high temperature occasions
- Strong adaptability to long-term operation in high humidity and dusty occasions
- Emergency operation in failure state

Issue:

The general inverter needs the high cost to running in these occasions (IP54, external heat dissipation)

High reliability requirements-humid, corrosive environment

Demand Specification :

Long-term high humidity environment in water supply industry

Implementation :

- All boards and device pins are coated with three-proof paint (certified by an authority)
- Independent cooling air duct
- Sealed connector
- Recommendations for the best ventilation design

Applicable :

To work in harsh environments, multi-coat three-proof paint is required

Install dust-proof stickers on the inverter

Insulation strength	1 layer	2 layers	3 layers
Breakdown voltage	0.73KV	2.53KV	2.97KV
Coating thickness	40um	70um	120um

Dos and Don’ts

Permanent Magnet Motor Control (Open loop & Close loop)

Heavy Duty >200 kW

Competitive price

Protocols other than Modbus, Profibus,

Onboard PLC

100V, 690V

Applications with Modbus comm

Commander C + AI-485 adaptor

NE (in built Modbus)

Applications with Permanent Magnet Motor Control

M600 / M70X

NE (in built PM control)

Product Line

World - leading AC drives from Control Techniques

Who We Are Is Why We Win

联系我们 TALK TO US

CONTROL TECHNIQUES, A ***NIDEC*** BRAND

HTTP://WWW.CONTROLTECHNIQUES.COM

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