

High-Performance AC Motor Drives

0.2 TO 630KW

A host of available functions along with the constructive features allow to use the new **VF motor drives** in the most diversified applications: cement, paper, chemical, petrochemical plants, waterworks and gas ducts and many others.

Careful design of the front control panel and menu configuration warrant flexible selections along with easy and clear installation and set-up of the motor drive.

- Built-in EMC filter
- Built-in DC reactor for 18.5 to 630kW types
- Configurable type of motor control: linear V/f, vector control, energy saving, variable torque
- Special functions for pump and fan control using PID algorithm and SLEEP function
- Programming and supervision software
- IP54 version available on request
- Versions available up to 690VAC on request
- HVAC version, compliant with IEC/EN 61000-3-12 standards, available on request
- Certifications obtained: UL for USA and Canada, CSA, C-Tick
Compliant with standards: EN 50178 and IEC/EN 61800-3
- Operation up to 50°C with no derating.

| AC motor drive type | | VFNC3 | VFS15 | VFPS1 |
|--------------------------|---------------|-----------------------|-------------------------|------------------------|
| Single-phase supply | | ● | – | – |
| Three-phase supply | | – | ● | ● |
| For three-phase motor | Standard load | 0,2-2.2kW (230VAC) | 0.75-18.5kW (400VAC) | 18.5-630KW (400VAC) |
| | Heavy load | | 0.4-15kW (400VAC) | ① |
| Maximum output frequency | | 400Hz | 500Hz | 500Hz |

① Consult our Customer Service (Tel. +39 035 4282422; email: service@LovatoElectric.com) for details.



VFPS1
18.5-630kW
THREE-PHASE



VFNC3
0.2-2.2kW
SINGLE-PHASE



VFS15
0.4-18.5kW
THREE-PHASE



General characteristics



VFNC3

VFS15

VFPS1

Main characteristics

| | VFNC3 | VFS15 | VFPS1 |
|------------------------------------|---------------------------------------|--|--|
| Built-in surge suppressor | IEC 61800-3 1° environment cat. C1 | IEC 61800-3 1° environ. cat. C2, 2° environ. cat. C3 | IEC 61800-3 1° environ. cat. C2, 2° environ. cat. C3 |
| Built-in DC reactor | – | – | • |
| Instantaneous overload | 200% (0.5s) | Normal load: 165% (0.5s) Heavy load: 200% (0.5s) | 135% (2s) |
| Overload for 60 seconds | 150% | Normal load: 120% Heavy load: 150% | 120% |
| Low speed torque | 150% 1Hz | 200% 0.3Hz | 130% 1Hz (18.5-220kW) |
| Integrated dynamic braking circuit | – | • | • |
| Capacitor pre-charge circuit | • | • | • |
| DC-bus access | • | • | • |
| Maximum output frequency | 400Hz | 500Hz | 500Hz |

Interface

| | | | |
|---------------------------------|-------|-------|-------------|
| Digital inputs | 4+1 ① | 6+2 ① | 6+1 ① |
| Digital outputs | 1 | 2 | 1 |
| Static relay outputs | 1 | 1 | 2 |
| Analog inputs 0-10VDC/4-20mA | 1 | 2+1 ① | 2+1 ① |
| Analog outputs 0-10VDC/4-20mA | 1 | 1 | 2 |
| I/O logic PNP or NPN switchable | – | • | • |
| Serial port | RS485 | RS485 | RS485 (n°2) |

Front keyboard

| | | | |
|-----------------------|---|---|---|
| Display | • | • | • |
| Operation keys | • | • | • |
| START/STOP keys | • | • | • |
| Speed adjustment keys | • | • | • |
| Potentiometer | • | • | – |

Protections

| | | | |
|---|---|---|---|
| Over-current | • | • | • |
| Over-voltage | • | • | • |
| IN/OUT phase failure | • | • | • |
| Motor overload | • | • | • |
| Drive overload | • | • | • |
| Dynamic braking resistor overload | – | • | • |
| Drive over-heating | • | • | • |
| Over-torque | • | • | • |
| Output short circuit and earth leakage protection | • | • | • |

Functions

| | | | |
|---|------------------------|------------------------|------------------------|
| Constant motor torque control V/f | • | • | • |
| Variable motor torque control | • | • | • |
| Automatic motor torque boost control | • | • | • |
| Sensorless vector (speed) control | • | • | • |
| Closed loop motor control | – | – | • |
| Preset speed operation | 15 | 15 | 15 |
| PID function | • | • | • |
| Regenerative energy control | • | • | • |
| DC injection braking | • | • | • |
| Auto-tuning | • | • | • |
| Auto-restart and speed adjustment | • | • | • |
| Frequency potentiometer (speed adjustment via 2 external pushbuttons) | • | • | • |
| Different motor controls with ind. sets of parameter | 2 | 2 | 4 |
| Automatic fast speed search and detection | • | • | • |
| Communication protocol | Proprietary and Modbus | Proprietary and Modbus | Proprietary and Modbus |
| Override function | – | • | – |
| Sleep function | • | • | • |
| PTC input | – | Integrated | Integrated |
| Speed maintained operation during alarm conditions | – | • | • |

① Input configurable as analog or digital.

AC motor drives V

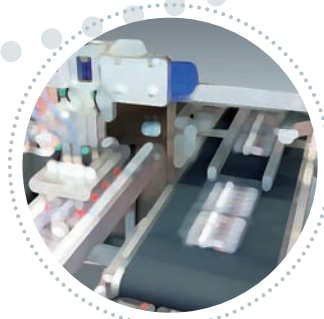
EXAMPLES OF APPLICATION

VF series motor drives can be used in a variety of applications in diversified industrial and civil fields.



Food processing industry

Machinery for bread, bakery and fresh pasta, confectionary equipment, mixers and blenders, flour and liquid dispensing equipment, etc.



Conveyance machinery

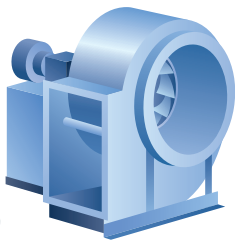
Product conveyor belts for warehouses, trade businesses, etc.



Pumps

Fans, dryers, water purification systems, waterworks, etc.

EXAMPLES OF FUNCTIONS AND FEATURES



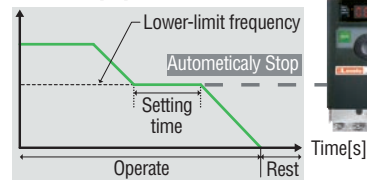
AUTO-TUNING

Allows to set motor constant in a quick and simple way to ensure an efficient and optimal motor load supervision.

SLEEP FUNCTION

Allows to automatically stop the motor to save energy after it continues to run at low working frequency.

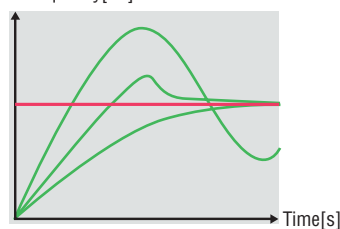
Output frequency[Hz]



PID CONTROL

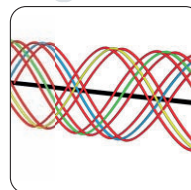
The integrated control is used to constantly maintain pressure, temperature, airflow and motion control in a system.

Output frequency[Hz]



ADVANCED PERMANENT-MAGNET (PM) MOTOR CONTROL

The new VFS15... includes a sophisticated open-loop technology for PM synchronous motors. The control method is the best for PM motor applications with pumps, fans and compressors.



COMPLIANCE WITH MAJOR INTERNATIONAL STANDARDS



F series



Medical and fitness equipment

Equipment for fitness centres and for healthcare.



Vehicle washing machines

Automatic car washing equipment.



Commercial ironing equipment

Automatic machines used in numerous laundry and service industries.



Packaging

Automatic and semi-automatic packaging machines in cartons, plastic bags or cases or with cellophane, etc.

LESS INSTALLATION SPACE



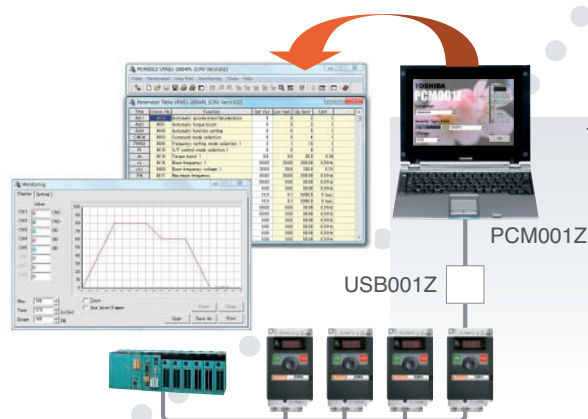
Side by Side installation
All AC motor drives can be installed without side clearance for space saving.

Traditional installation with side clearance between AC motor drives.



EASY SETTING MODE

EASY key allows to directly switch to the specific parameter setting mode to scroll through the most frequently used parameters for specific applications and to lock out all the other existing ones.



software

The built-in RS485 interface port is equipped for Modbus®-RTU or proprietary protocol communications.

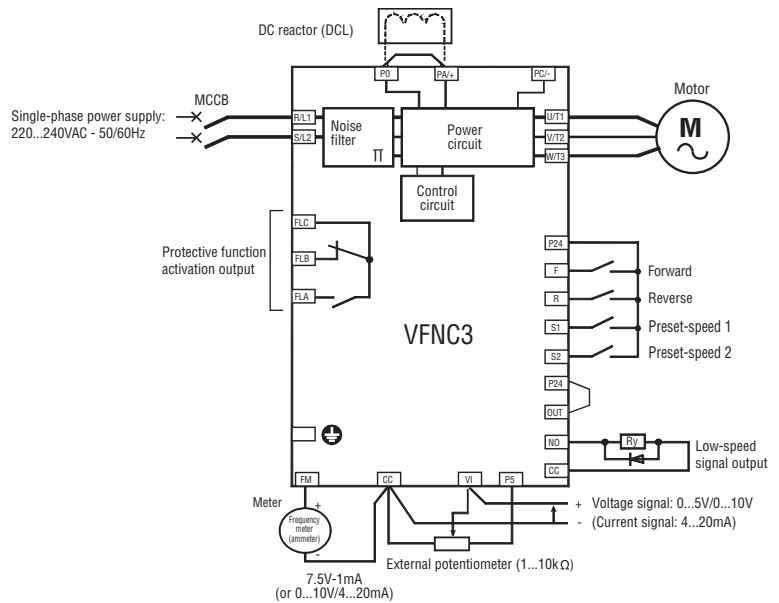
A software is available for communications between VF series motor drives and a PC which permits:

- To edit and monitor parameters
- To supervise the motor drive and motor
- To generate trend graphs
- To print the list of modified parameter settings.

Single-phase 0.2 to 2.2kW

VFNC3... TYPE

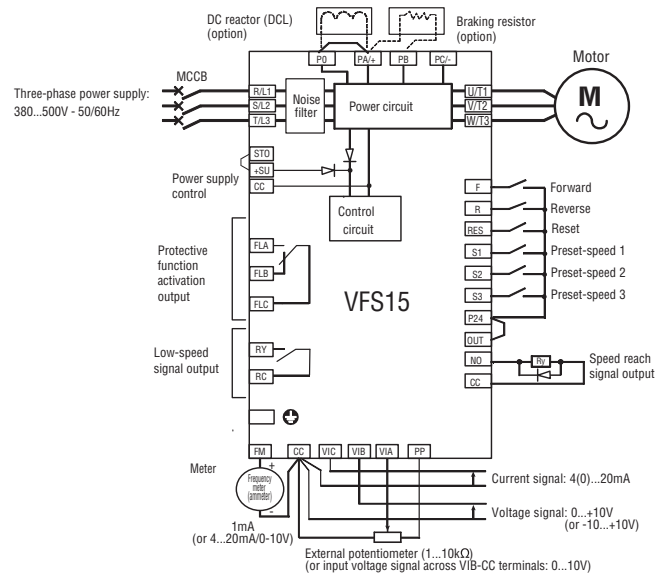
- 200-240VAC single-phase supply
- Built-in EMC suppressor for noise immunity (IEC/EN 61800-3, 1° environment cat. C1, class B)
- Integrated RS485 interface
- Built-in Jog Dial for programming and control.



Three-phase 0.4 to 18.5kW

VFS15... TYPE

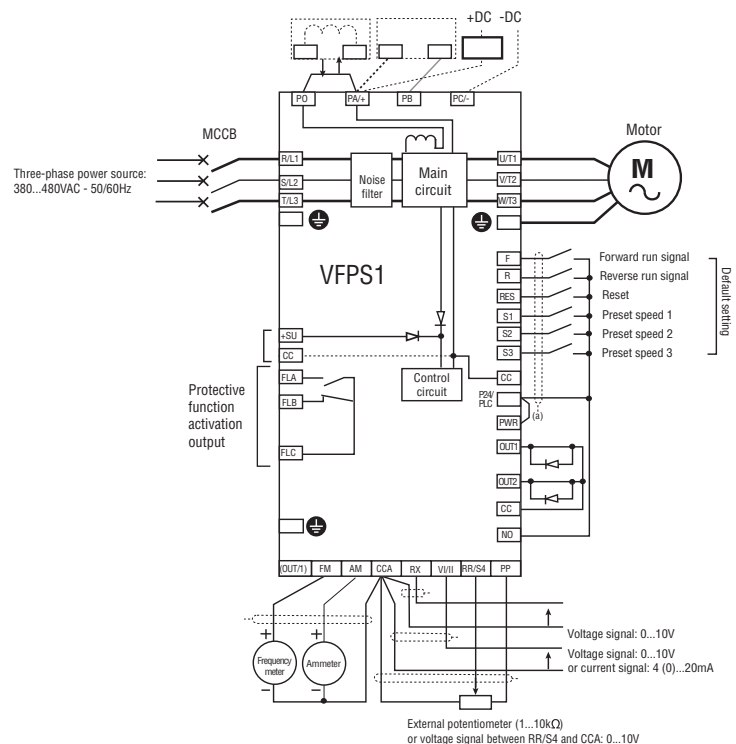
- 380-500VAC three-phase supply
- Built-in EMC suppressor for noise immunity (IEC/EN 61800-3, 1° environment cat. C2 or 2° environment cat. C3, class A)
- Double set of current ratings for normal and heavy load conditions
- Integrated DC braking board
- Built-in RS485 interface
- Integrated PTC sensor supervision
- Emergency input per EN ISO 13849-1 cat. 3
- In-rush torque higher than 200% at 0.5Hz
- Advanced control technology for synchronous motors
- Programmable logic blocks (My Function)
- Built-in Jog Dial for programming and control
- Recovery function for roomless elevators
- Thread-Guide function for textile machinery.



Three-phase 18.5 to 630kW

VFPS1... TYPE

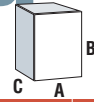
- 380-480VAC three-phase supply
- EMC suppressor built in for noise immunity (IEC/EN 61800-3, 1° environment cat. C2 or 2° environment cat. C3, class A)
- Integrated dynamic braking board up to 220kW
- Integrated DC reactor
- Integrated RS485 interface
- Integrated PTC thermistor sensor input
- Emergency input per IEC/EN 61508 standards SIL 2 (Security Integrity Level 2)
- Programmable logic blocks (My Function).



N.B. For heavy load conditions consult our Customer Service (Tel. +39 035 4282422; email: service@LovatoElectric.com).

Order code

AC motor drives



| Order code | Current [A] | 3-phase 240VAC motor power | | Dimensions [mm] | | | Q.ty per pkg [n°] | Weight [kg] |
|------------|-------------|----------------------------|------|-----------------|---|---|-------------------|-------------|
| | | [kW] | [HP] | A | B | C | | |



VFNC3

SINGLE-PHASE SUPPLY 200-240VAC 50/60HZ - THREE-PHASE MOTOR OUTPUT 240VAC MAX

| Order code | Current [A] | 3-phase motor power [kW] | 3-phase motor power [HP] | — | — | — | A [mm] | B [mm] | C [mm] | Q.ty per pkg [n°] | Weight [kg] |
|-----------------|-------------|--------------------------|--------------------------|---|---|---|--------|--------|--------|-------------------|-------------|
| VFNC3S 2002PL W | 1.4 | 0.20 | 0.25 | — | — | — | 72 | 130 | 102 | 1 | 0.900 |
| VFNC3S 2004PL W | 2.4 | 0.40 | 0.54 | — | — | — | 72 | 130 | 121 | 1 | 1.000 |
| VFNC3S 2007PL W | 4.2 | 0.75 | 1 | — | — | — | 72 | 130 | 131 | 1 | 1.300 |
| VFNC3S 2015PL W | 7.5 | 1.50 | 2 | — | — | — | 105 | 130 | 156 | 1 | 2.000 |
| VFNC3S 2022PL W | 10.0 | 2.20 | 3 | — | — | — | 105 | 130 | 156 | 1 | 2.000 |

| Order code | NORMAL LOAD ① 400VAC | | | HEAVY LOAD ② 400VAC | | | Dimensions [mm] | | | Q.ty per pkg [n°] | Weight [kg] |
|------------|----------------------|--------------------------|--------------------------|---------------------|--------------------------|--------------------------|-----------------|---|---|-------------------|-------------|
| | Current [A] | 3-phase motor power [kW] | 3-phase motor power [HP] | Current [A] | 3-phase motor power [kW] | 3-phase motor power [HP] | A | B | C | | |

VFS15

THREE-PHASE SUPPLY 380-500VAC 50/60HZ ③ - THREE-PHASE MOTOR OUTPUT 500VAC MAX

| Order code | Current [A] | 3-phase motor power [kW] | 3-phase motor power [HP] | Current [A] | 3-phase motor power [kW] | 3-phase motor power [HP] | A [mm] | B [mm] | C [mm] | Q.ty per pkg [n°] | Weight [kg] |
|----------------|-------------|--------------------------|--------------------------|-------------|--------------------------|--------------------------|--------|--------|--------|-------------------|-------------|
| VFS15 4004PL W | 2.1 | 0.75 | 1 | 1.5 | 0.4 | 0.54 | 107 | 130 | 153 | 1 | 1.400 |
| VFS15 4007PL W | 3 | 1.1 | 1.5 | 2.3 | 0.75 | 1 | 107 | 130 | 153 | 1 | 1.500 |
| VFS15 4015PL W | 5.4 | 2.2 | 3 | 4.1 | 1.5 | 2 | 107 | 130 | 153 | 1 | 1.500 |
| VFS15 4022PL W | 6.9 | 3 | 4 | 5.5 | 2.2 | 3 | 140 | 170 | 160 | 1 | 2.400 |
| VFS15 4037PL W | 11.1 | 5.5 | 7.5 | 9.5 | 4 | 5 | 140 | 170 | 160 | 1 | 2.600 |
| VFS15 4055PL W | 17 | 7.5 | 10 | 14.3 | 5.5 | 7.5 | 150 | 220 | 170 | 1 | 3.900 |
| VFS15 4075PL W | 23 | 11 | 15 | 17 | 7.5 | 10 | 150 | 220 | 170 | 1 | 4.000 |
| VFS15 4110PL W | 31 | 15 | 20 | 27.7 | 11 | 15 | 180 | 310 | 190 | 1 | 6.400 |
| VFS15 4150PL W | 38 | 18.5 | 20.5 | 33 | 15 | 20 | 180 | 310 | 190 | 1 | 6.500 |



VFPS1

THREE-PHASE SUPPLY 380-480VAC 50/60HZ ④⑤ - THREE-PHASE MOTOR OUTPUT 480VAC MAX

| Order code | Current [A] | 3-phase motor power [kW] | 3-phase motor power [HP] | — | — | — | A [mm] | B [mm] | C [mm] | Q.ty per pkg [n°] | Weight [kg] |
|------------------|-------------|--------------------------|--------------------------|---|---|---|--------|--------|--------|-------------------|-------------|
| VFPS1 4185PL WP | 41 | 18.5 | 25 | — | — | — | 230 | 400 | 191 | 1 | 22.200 |
| VFPS1 4220PL WP | 48 | 22 | 30 | — | — | — | 240 | 420 | 212 | 1 | 23.700 |
| VFPS1 4300PL WP | 66 | 30 | 40 | — | — | — | 240 | 550 | 242 | 1 | 32.500 |
| VFPS1 4370PL WP | 79 | 37 | 50 | — | — | — | 240 | 550 | 242 | 1 | 32.800 |
| VFPS1 4450PL WP | 94 | 45 | 60 | — | — | — | 320 | 630 | 290 | 1 | 54.000 |
| VFPS1 4550PL WP | 116 | 55 | 75 | — | — | — | 320 | 630 | 290 | 1 | 54.000 |
| VFPS1 4750PL WP | 160 | 75 | 100 | — | — | — | 320 | 630 | 290 | 1 | 54.000 |
| VFPS1 4900PC WP | 179 | 90 | 125 | — | — | — | 310 | 920 | 370 | 1 | 100.000 |
| VFPS1 4110KPC WP | 215 | 110 | 150 | — | — | — | 310 | 920 | 370 | 1 | 100.000 |



THREE-PHASE SUPPLY 380-440VAC 50HZ / 380-480VAC 60HZ ⑥ - THREE-PHASE MOTOR OUTPUT 440/480VAC MAX

| Order code | Current [A] | 3-phase motor power [kW] | 3-phase motor power [HP] | — | — | — | A [mm] | B [mm] | C [mm] | Q.ty per pkg [n°] | Weight [kg] |
|------------------|-------------|--------------------------|--------------------------|---|---|---|--------|--------|--------|-------------------|-------------|
| VFPS1 4132KPC WP | 259 | 132 | 200 | — | — | — | 350 | 1022 | 370 | 1 | 108.000 |
| VFPS1 4160KPC WP | 314 | 160 | 250 | — | — | — | 330 | 1190 | 370 | 1 | 118.000 |
| VFPS1 4220KPC WP | 427 | 220 | 350 | — | — | — | 430 | 1190 | 370 | 1 | 161.000 |
| VFPS1 4250KPC WP | 481 | 250 | 400 | — | — | — | 585 | 1190 | 370 | 1 | 194.000 |
| VFPS1 4280KPC WP | 550 | 280 | 450 | — | — | — | 585 | 1190 | 370 | 1 | 204.000 |
| VFPS1 4315KPC WP | 616 | 315 | 500 | — | — | — | 585 | 1190 | 370 | 1 | 204.000 |
| VFPS1 4400KPC WP | 759 | 400 | 600 | — | — | — | 880 | 1390 | 370 | 1 | 302.000 |
| VFPS1 4500KPC WP | 941 | 500 | 700 | — | — | — | 880 | 1390 | 370 | 1 | 330.000 |
| VFPS1 4630KPC WP | 1181 | 630 | 1000 | — | — | — | 1110 | 1390 | 370 | 1 | 462.000 |

- ① 120% overload for 60s.
- ② 150% overload for 60s.
- ③ 240VAC and 600VAC three-phase available on request.
- ④ 240VAC (VFPS1 4110KPC WP excluded) available on request.
- ⑤ 600VAC three-phase available on request.



Direct-on-line starters



Reversing and changeover contactors

Other starters for electric motors

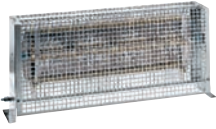
Accessories

| Order code | Description | Qty per pkg [n°] | Weight [kg] |
|--|--|------------------|-------------|
| 3-phase inductances. For motor drive rating | | | |
| IND2020 | 0.75-4 | 1 | 1.800 |
| IND2030 | 5.5-11 | 1 | 2.700 |
| IND3040 | 15-22 | 1 | 7.200 |
| IND4040 | 30-45 | 1 | 14.500 |
| IND4075 | 55-75 | 1 | 22.000 |
| IND4090 | 90-110 | 1 | 27.000 |
| IND5060 | 132-160 | 1 | 38.000 |
| IND5080 | 220-250 | 1 | 45.000 |
| IND7070 | 280-315 | 1 | 62.000 |
| Braking resistors. Power Capacity | | | |
| ROF20100 | 200W 100Ω | 1 | 0.220 |
| ROF20150 | 200W 150Ω | 1 | 0.220 |
| ROF35060 | 350W 60Ω | 1 | 0.510 |
| ROF50035 | 500W 35Ω | 1 | 0.620 |
| ROF80030 | 800W 30Ω | 1 | 1.400 |
| ROPPE11430 | 1300W 30Ω | 1 | 4.000 |
| ROPPE12515 | 2200W 15Ω | 1 | 5.000 |
| ROPPE14008 | 4000W 8Ω | 1 | 7.000 |
| ROPPE24003 | 8000W 3Ω | 1 | 11.000 |
| MITOSVT6 | Remote control panel with functions: motor running, inverse rotation, speed adjustment and quantities control. IP65. Cable excluded ❶ | 1 | 0.154 |
| MITOSVT6ECO | Remote control panel for quantities retention and control of a system (PID: pressure, temperature, etc). IP65. Cable excluded ❶ | 1 | 0.134 |
| RKP002Z | Remote control panel with functions: motor running, speed adjustment, quantities control and parameter setting. IP20. Cable excluded ❶ | 1 | 0.070 |
| USB001Z | Motor drive programming module ❶❷❸ | 1 | 0.260 |
| RJ45SH05000 | Connecting cable RJ45 for MITOSVT6, RKP002Z or USB001Z to motor drive. 5m long. | 1 | 0.142 |
| 51 PT25H101K | 1kOhm potentiometer 10 turns, complete with operating knob | 1 | 0.100 |
| 51 PT35H11K | 1kOhm potentiometer 1 turn, complete with operating knob | 1 | 0.052 |

❶ RJ45 cable to be purchased separately; order code RJ45SH05000.

❷ For USB001Z module → PC USB port connection, use a normal USB cable, USB1.1/2.0 compatible, type A-B connection, maximum recommendable 1m length only.

❸ Contact our Customer Service (Tel. +39 0354282422; email: service@LovatoElectric.com) to request the motor drive remote control software.



Star-delta starters



Soft starters



Lovato
electric



ENERGY AND AUTOMATION

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