VARIABLE SPEED DRIVES

VT1 SERIES

Lovato electric

ENERGY AND AUTOMATION

SIMPLE | ESSENTIAL | COMPACT | BUILT-IN COMMUNICATION PORT

VT1 is a variable speed drive with single phase input provided with built-in RS485 communication port.
Simple, compact and versatile, it can be used for innumerable applications such as the control of pumps, fans, air conditioning systems, packaging machines, belt conveyors, automatic doors.
The extremely compact dimensions make it particularly suited for the installation in electrical panels and machines with limited space availability.
The integrated RS485 communication port allows the remote control and monitoring from a supervision system or a controller like a PLC or HMI.
It supports the communication protocols Modbus-RTU, Modbus-ASCII and BACnet.
VT1 is extremely simple to install and configure. It can be programmed from the frontal keypad with digital display.
Alternatively, it is possible to program the variable speed drive from a PC with VT1XSW software and VT1XC01 USB programming cable.
It integrates several motor control modes, such as V/f linear or quadratic, multi-point custom curve and sensorless vector control, which makes it perfectly suitable for the different types of controlled loads.

- Single-phase input 200...240VAC (50/60Hz)
- Three-phase output 240VAC max 0...599Hz
- Three-phase motor power from 0.2 a 2.2kW
- Built-in RS485 communication port
- Built-in EMC filter, cat. C2 (EN 61800-3)

BUILT-IN RS485 COMMUNICATION PORT

VT1 variable speed drive integrates an RS485 communication port on front with RJ45 connector, for the remote control and monitoring from a supervision system or alternatively from a PLC or HMI controller.
Are supported the widely used Modbus-RTU industrial communication protocol and BACnet, typically used in building management and HVAC applications.

Modbus BACnet

PROGRAMMING SOFTWARE FOR PC

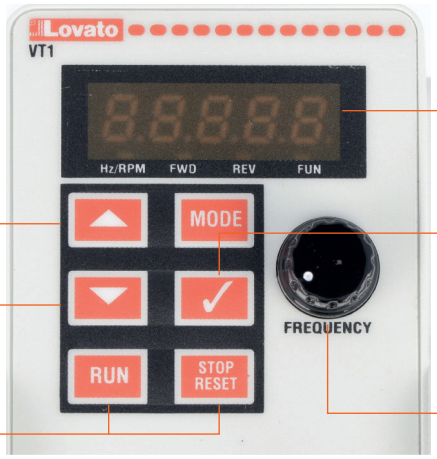
As an alternative to conventional programming with the frontal keyboard, the VT1 drive can be programmed from a PC using the VT1XSW software, which allows the setting or parameters and the monitoring of the status of the drive and the main electrical measures.
The connection between VT1 drive and the PC is done with the optional VT1XC01 USB cable, while the VT1XSW software is freely available for download from the website www.LovatoElectric.com.

COMPACT AND ESSENTIAL

VT1 is the ideal variable speed drive for simple and essential applications. The compact enclosure makes it particularly suitable for the installation in electric panels or machinery with limited spaces.
The range consists of two mechanical sizes: the first one, which includes the power sizes from 0.2 to 0.75kW, has extremely compact dimensions, while the second mechanical size, which includes the power sizes 1.5 and 2.2kW, it is provided with an integrated cooling fan.
It is also possible to install several VT1 drives in the same electric panel providing a small distance of 5cm between each drive to allow an adequate ventilation.

SIMPLE TO PROGRAM

The VT1 drive is programmable from the frontal keyboard with display and built-in potentiometer.
The parameters are divided in functional groups to facilitate the research by the user, allowing a simple and fast commissioning.



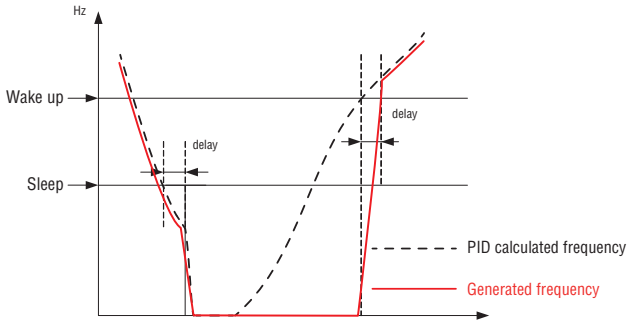
- Digital display with status LEDs:
  - Hz/RPM: motor speed
  - FWD: running forward
  - REV: running reverse
  - FUN: programming.
- Keys for the navigation between parameters or speed adjustment
- Keys for display mode changing and parameter confirmation
- Potentiometer on front for motor speed adjustment
- Keys for motors RUN and STOP commands

PID CONTROL

In some applications, for instance pumps or fans, the output frequency of the drive is defined by the target to keep pressure or flow constant. Typically, by using the analog input, feedback is monitored and, with the PID offset control, the motor drive sets motor speed to obtain the target setpoint.
PID control of VT1 series motor drives also includes the following functions:

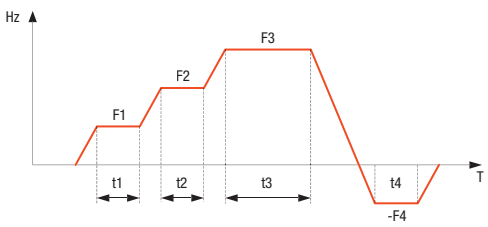
- **Sleep**: when the PID output frequency is lower than a programmed limit, that is the motor speed is close to the allowable minimum when propulsion is not needed, the motor drive completely stops the motor for energy saving.
- **Wake-up**: during sleep phase, when the PID output frequency is higher than the programmed limit, the motor drive picks up motor control again at a suitable speed to reach the target setpoint without a manual starting.

Each function also has a programmable delay time to avoid inopportune and repetitive start-stop motor cycles.



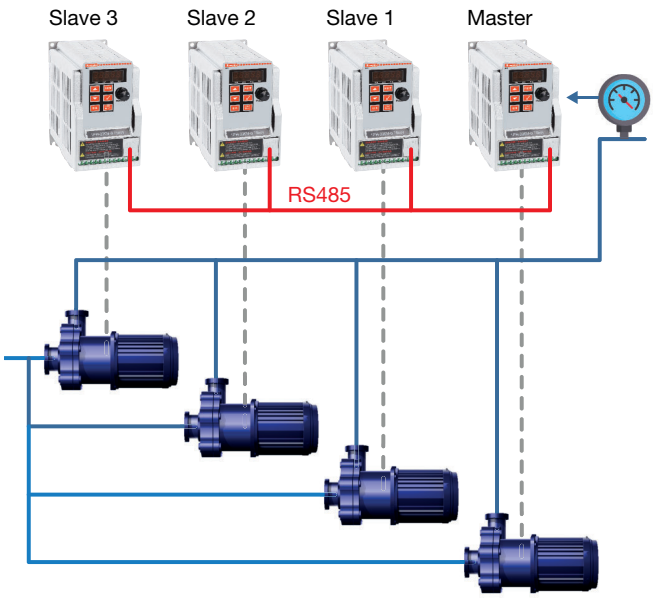
SEQUENCER

The user can program frequency-time cycles made up of a maximum of 8 steps, each characterised by motor speed, rotation direction and step duration.



MULTI-PUMP PID CONTROL

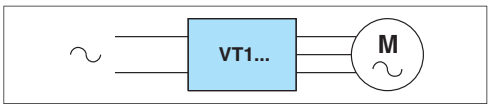
In many hydraulic plants are installed several pumps for the maintaing of a constant pressure. The VT1 variable speed drives can be connected each other through the integrated RS485 communication port for a multi-pump PID control in master-slave configuration. Each drive commands one specific pump, up to a maximum of 4 drives.
One VT1 drive (master) monitors the value of the plant pressure through a pressure transducer connected to its analog input and commands the activation of one or more of the other drives (slave) in case of necessity to reach the pressure setpoint.
It is possible to manage the alternance of the master role between the VT1 drives to balance the operating time of the pumps.



VT1...
(ultracompact with RS485)

VT1...

Order code	Output current	3-phase motor power at 240VAC		Qty per pkg	Weight
	[A]	[kW]	[HP]	n°	[kg]
Single-phase supply 200...240VAC 50/60Hz. Three-phase motor output 240VAC max. Built-in EMC filter cat. C2.					
VT102A240	1.8	0.2	0.25	1	1.0
VT104A240	2.6	0.4	0.5	1	1.0
VT107A240	4.3	0.75	1	1	1.0
VT115A240	7.5	1.5	2	1	2.0
VT122A240	10.5	2.2	3	1	2.0



Accessories

VT1XC01

VT1XC02

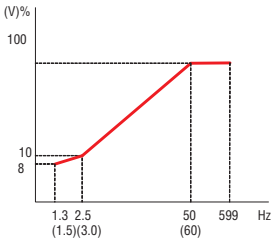
Order code	Description	Qty per pkg	Weight
		n°	[kg]
VT1XC01	Cable RS485/USB for the connection VT1-PC ❶, 1.8m length	1	0.080
VT1XC02	Remote keypad (Ethernet connection cable ❷ not included),IP20, IP65 on front	1	0.122

❶ Software for programming and monitoring VT1XSW freely downloadable from the website www.LovatoElectric.com.
❷ Use a standard Ethernet cable (CAT5 or higher), max.5m length.

SEVERAL MOTOR CONTROL MODES

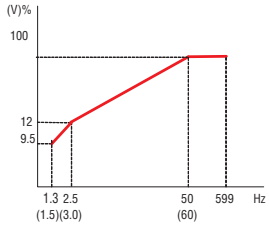
The VT1 variable speed drives integrates several motor control modes, which makes them perfectly adaptable to the different type of controlled loads.
In addition to the generic V/f linear mode, used for the most common application such as conveyor belts or assembling machines, it is available the quadratic control, tipically suitable for the command of pumps and fans, and the sensorless vector controll, to achieve optimal performances especially at low frequencies or for applications with highly dynamic speed variation.
For applications with special requirements, it is possible to define a custom multi-point curve or apply a boost to the starting torque.

Linear V/f curve - general use



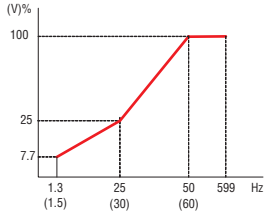
Conveyor belts and assembly machinery

High starting torque



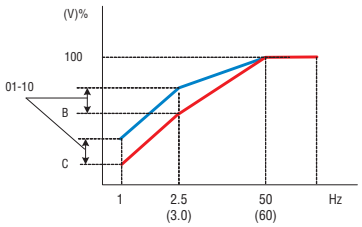
Hoisting/lifting, grinders/mills and agitators

Quadratic curve



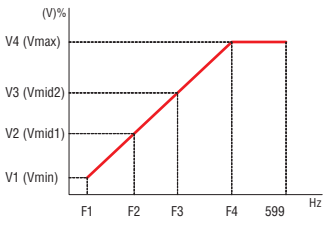
Pumps and fans

Boost



Torque boost can be applied on all preset curves with up to 10% voltage to overcome very high inertia load conditions

Programmable multi-point V/f curve



The user can customise a curve by defining 4 voltage / frequency points

General characteristics

VT1 is an ultra-compact variable speed drive with single phase input and built-in RS485 communication port. Simple and versatile, it can be used in several applications such as pumps and fans control, conditioning systems, packaging machines, conveyor belts, control of automatic doors, etc.
The extremely compact dimensions make it suitable for the installation in panels or machinery with limited space.
The integrated RS485 communication port allows the remote control and monitoring of the drive from supervision system or a controller such as a PLC or HMI. It supports the communication protocols Modbus-RTU, Modbus-ASCII and BACnet.
VT1 is extremely simple to install and configure. It can be programmed from the frontal keypad with digital display. Alternatively, it is possible to program the parameters from a PC with software VT1XSW and dedicated USB connection cable VT1XC01.
The different integrated motor control modes, like the linear or quadratic V/f control, multipoint curve and sensorless vector control, make it perfectly suitable for several type of loads and applications.

SPEED REFERENCE SIGNALS
Reference signals for speed adjustment are obtained by:
- Front jog dial control (potentiometer)
- External potentiometer 1...10kΩ
- Voltage signal 0...10V or current signal 0/4...20mA
- 8 preset speeds via digital inputs
- Optional remote keypad VT1XC02
- RS485 serial signals.

PROGRAMMABLE INPUTS AND OUTPUTS
- 5 multifunction digital inputs
- 1 voltage analog input 0...10VDC
- 1 current analog input 0/4...20mA
- 1 relay output with NO contact
- 1 voltage analog output 0...10VDC.

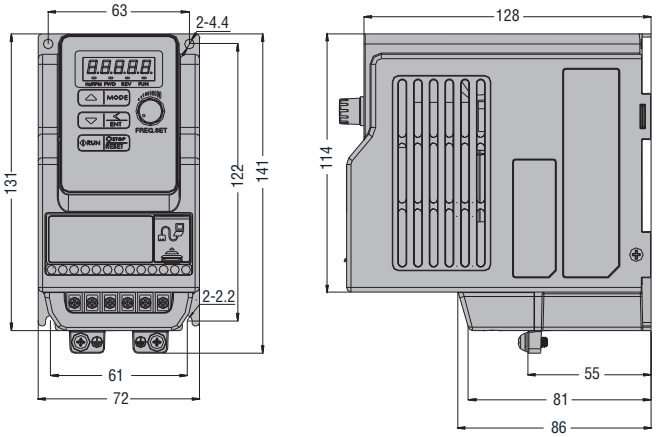
PROTECTIONS
- Motor and drive overload
- Overvoltage and undervoltage
- Phase loss
- Overtemperature
- Overspeed.

FUNCTIONS
- Speed control
- V/f linear or squared curves
- V/f customizable multipoint curve
- Sensorless (open loop) vector control
- Preset speeds
- Built-in PID with sleep and wake-up thresholds
- Sequencer (programmable frequency/time cycles)
- DC braking and DC injection at start
- Multi-pump PID for the control of up to 4 VT1... drives in master-slave configuration
- Software for programming and monitoring VT1XSW freely downloadable from the website www.LovatoElectric.com.

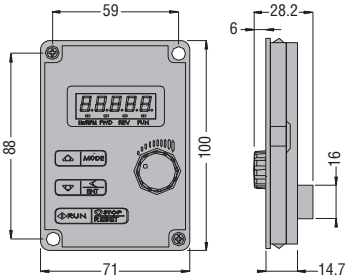
Operational characteristics
- Input voltage: 200...240VAC single-phase
- Output voltage: 0...240VAC three-phase
- Rated operational current Ie: 1.8...10.5A
- Mains frequency: 50/60Hz
- Output frequency: 0...599Hz
- Switching frequency: 1...16kHz
- Current overload: 150% for 60s
- IEC degree of protection: IP20
- Ambient conditions:
  - Operating temperature:
    - -10...+40°C (50°C with derating of 40% of the output current) for sizes 0,2…0,75kW
    - -10...+50°C (without derating) for sizes 1,5 and 2,2kW with built-in fan
  - Maximum altitude: 1000m (without derating), 3000m (with derating of 2% of the rated current every 100m)
  - Relative humidity <95% (without condensation)
- Built-in EMC filter (EN61800-3), cat. C2.

Certifications and compliance
Certifications: EAC; cULus, RCM (excluded VT1XC02).
Compliant with standards: EN 61800-5-1, UL 508C, CSA 22.2 No. 274.

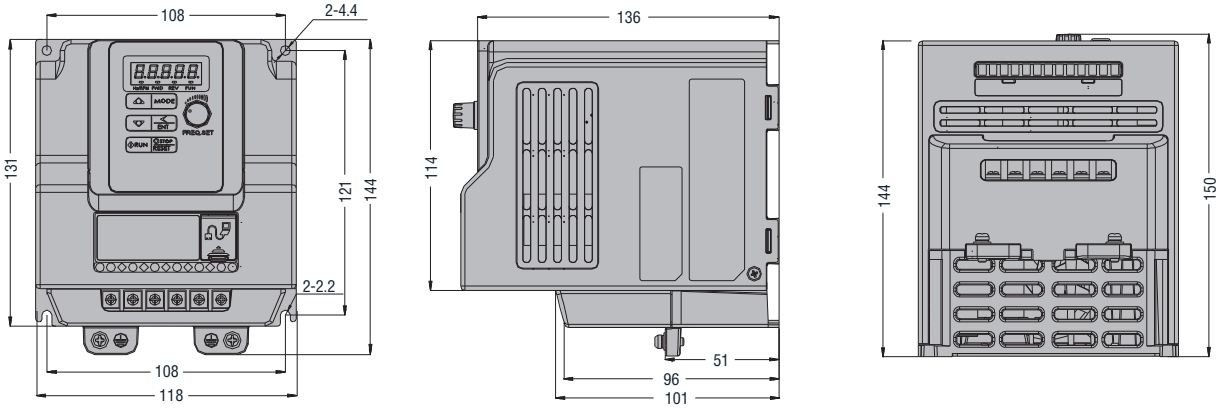
VT102A240 - VT104A240 - VT107A240



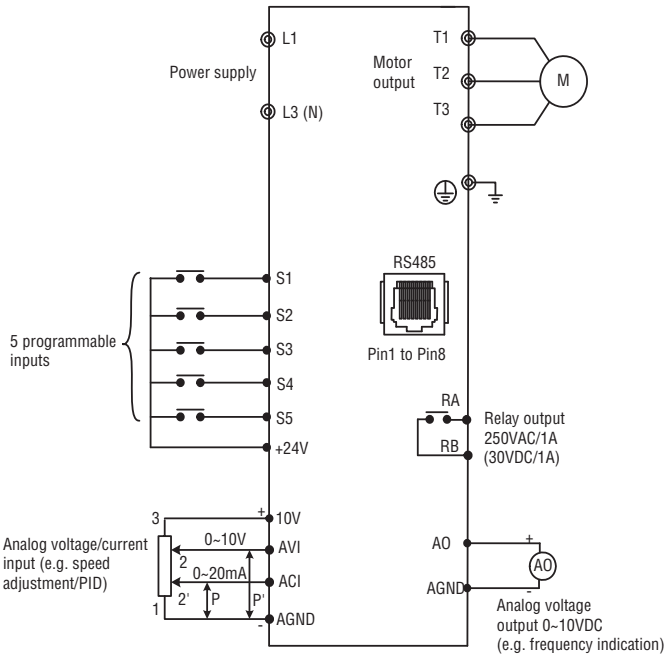
VT1XC02



VT115A240 - VT122A240



WIRING DIAGRAM



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