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Lovato electric

LOVATO ELECTRIC S.P.A.

24020 GORLE (BERGAMO) ITALIA
VIA DON E. MAZZA, 12
TEL. 035 4282111
E-mail: info@LovatoElectric.com
Web: www.LovatoElectric.com

(GB) QUICK GUIDE FOR THE CONFIGURATION OF VARIABLE SPEED DRIVES

VT1…

GB

WARNING!
– Carefully read the manual before the installation or use.
– This equipment is to be installed by qualified personnel, complying to current standards, to avoid damages or safety hazards.
– Before any maintenance operation on the device, remove all the voltages from measuring and supply inpu and short-circuit the CT input terminals.
– The manufacturer cannot be held responsible for electrical safety in case of improper use of the equipment.
– Products illustrated herein are subject to alteration and changes without prior notice. Technical data and descriptions in the documentation are accurate, to the best of our knowledge, but no liabilities for errors, omissions or contingencies arising there from are accepted.
– A circuit breaker must be included in the electrical installation of the building. It must be installed close by the equipment and within easy reach of the operator. It must be marked as the disconnecting device of the equipment: IEC /EN/BS 61010-1 § 6.11.3.1.
– Clean the device with a soft dry cloth; do not use abrasives, liquid detergents or solvents.

ATTENZIONE!
– Leggere attentamente il manuale prima dell'utilizzo e l'installazione.
– Questi apparecchi devono essere installati da personale qualificato, nel rispetto delle vigenti normative impiantistiche, allo scopo di evitare danni a persone o cose.
– Prima di qualsiasi intervento sullo strumento, togliere tensione dagli ingressi di misura e di alimentazione e cortocircuitare i trasformatori di corrente.
– Il costruttore non si assume responsabilità in merito alla sicurezza elettrica in caso di utilizzo improprio del dispositivo.
– I prodotti descritti in questo documento sono suscettibili in qualsiasi momento di evoluzioni o di modifiche. Le descrizioni ed i dati a catalogo non possono pertanto avere alcun valore contrattuale.
– Un interruttore o disgiuntore va compreso nell'impianto elettrico dell'edificio. Esso deve trovarsi in stretta vicinanza dell'apparecchio ed essere facilmente raggiungibile da parte dell'operatore. Deve essere marchiato come il dispositivo di interruzione dell'apparecchio: IEC/EN/BS 61010-1 § 6.11.3.1.
– Pulire l'apparecchio con panno morbido, non usare prodotti abrasivi, detergenti liquidi o solventi.

ATTENTION !
– Lire attentivement le manuel avant toute utilisation et installation.
– Ces appareils doivent être installés par un personnel qualifié, conformément aux normes en vigueur en matière d'installations, afin d'éviter de causer des dommages à des personnes ou choses.
– Avant toute intervention sur l'instrument, mettre les entrées de mesure et d'alimentation hors tension et court-circuiter les transformateurs de courant.
– Le constructeur n'assume aucune responsabilité quant à la sécurité électrique en cas d'utilisation impropre du dispositif.
– Les produits décrits dans ce document sont susceptibles d'évoluer ou de subir des modifications à n'importe quel moment. Les descriptions et caractéristiques techniques du catalogue ne peuvent donc avoir aucune valeur contractuelle.
– Un interrupteur ou disjoncteur doit être inclus dans l'installation électrique du bâtiment. Celui-ci doit se trouver tout près de l'appareil et l'opérateur doit pouvoir y accéder facilement. Il doit être marqué comme le dispositif d'interruption de l'appareil : IEC/ EN/BS 61010-1 § 6.11.3.1.
– Nettoyer l'appareil avec un chiffon doux, ne pas utiliser de produits abrasifs, détergents liquides ou solvants.

UWAGA!
– Przed użyciem i instalacją urządzenia należy uważnie przeczytać niniejszą instrukcję.
– W celu uniknięcia obrażeń osób lub uszkodzenia mienia tego typu urządzenia muszą być instalowane przez wykwalifikowany personel, zgodnie z obowiązującymi przepisami.
– Przed rozpoczęciem jakichkolwiek prac na urządzeniu należy odłączyć napięcie od wejść pomiarowych i zasilania oraz zewrzeć zaciski przekładnika prądowego.
– Producent nie przyjmuje na siebie odpowiedzialności za bezpieczeństwo elektryczne w przypadku niewłaściwego użytkowania urządzenia.
– Produkty opisane w niniejszym dokumencie mogą być w każdej chwili udoskonalone lub zmodyfikowane. Opisy oraz dane katalogowe nie mogą mieć w związku z tym żadnej wartości umownej.
– W instalacji elektrycznej budynku należy uwzględnić przełącznik lub wyłącznik automatyczny. Powinien on znajdować się w bliskim sąsiedztwie urządzenia i być łatwo osiągalny przez operatora. Musi być oznaczony jako urządzenie służące do wyłączania urządzenia: IEC/ EN/BS 61010-1 § 6.11.3.1.
– Urządzenie należy czyścić miękką szmatką, nie stosować środków ściernych, płynnych detergentow lub rozpuszcza nikow.

ACHTUNG!
– Dieses Handbuch vor Gebrauch und Installation aufmerksam lesen.
– Zur Vermeidung von Personen- und Sachschäden dürfen diese Geräte nur von qualifiziertem Fachpersonal und unter Befolgung der einschlägigen Vorschriften installiert werden.
– Vor jedem Eingriff am Instrument die Spannungszufuhr zu den Messeingängen trennen und die Stromwandler kurzschließen.
– Bei zweckwidrigem Gebrauch der Vorrichtung übernimmt der Hersteller keine Haftung für die elektrische Sicherheit.
– Die in dieser Broschüre beschriebenen Produkte können jederzeit weiterentwickelt und geändert werden. Die im Katalog enthaltenen Beschreibungen und Daten sind daher unverbindlich und ohne Gewähr.
– In die elektrische Anlage des Gebäudes ist ein Ausschalter oder Trennschalter einzubauen. Dieser muss sich in unmittelbarer Nähe des Geräts befinden und vom Bediener leicht zugänglich sein. Er muss als Trennvorrichtung für das Gerät gekennzeichnet sein: IEC/ EN/BS 61010-1 § 6.11.3.1.
– Das Gerät mit einem weichen Tuch reinigen, keine Scheuermittel, Flüssigreiniger oder Lösungsmittel verwenden.

警告！
- 安装或使用前，请仔细阅读本手册。
- 本设备只能由合格人员根据现行标准进行安装，以避免造成损坏或安全危害。
- 对设备进行任何维护操作前，请移除测量输入端和电源输入端的所有电压，并短接 CT 输入端。
- 制造商不负责因设备使用不当导致的电气安全问题。
- 此处说明的产品可能会有变更，恕不提前通知。 我们竭力确保本文档中技术数据和说明的准确性，但对于错误、遗漏或由此产生的意外事件概不负责。
- 建筑电气系统中必须装有断路器。断路器必须安装在靠近设备且方便操作员触及的地方。必须将断路器标记为设备的断开装置：IEC/EN/BS 61010-1 § 6.11.3.1
- 请使用柔软的干布清洁设备；切勿使用研磨剂、洗涤液或溶剂。

ADVERTENCIA
- Leer atentamente el manual antes de instalar y utilizar el regulador.
- Este dispositivo debe ser instalado por personal cualificado conforme a la normativa de instalación vigente a fin de evitar daños personales o materiales.
- Antes de realizar cualquier operación en el dispositivo, desconectar la corriente de las entradas de aliment ción y medida, y cortocircuitar los transformadores de corriente.
- El fabricante no se responsabilizará de la seguridad eléctrica en caso de que el dispositivo no se utilice de forma adecuada.
- Los productos descritos en este documento se pueden actualizar o modificar en cualquier momento. Por consiguiente, las descripciones y los datos técnicos aquí contenidos no tienen valor contractual.
- La instalación eléctrica del edificio debe disponer de un interruptor o disyuntor. Éste debe encontrarse cerca del dispositivo, en un lugar al que el usuario pueda acceder con facilidad. Además, debe llevar el mismo marcado que el interruptor del dispositivo (IEC/ EN /BS 61010-1 § 6.11.3.1).
- Limpiar el dispositivo con un trapo suave; no utilizar productos abrasivos, detergentes líquidos ni disolventes ni disolventes.

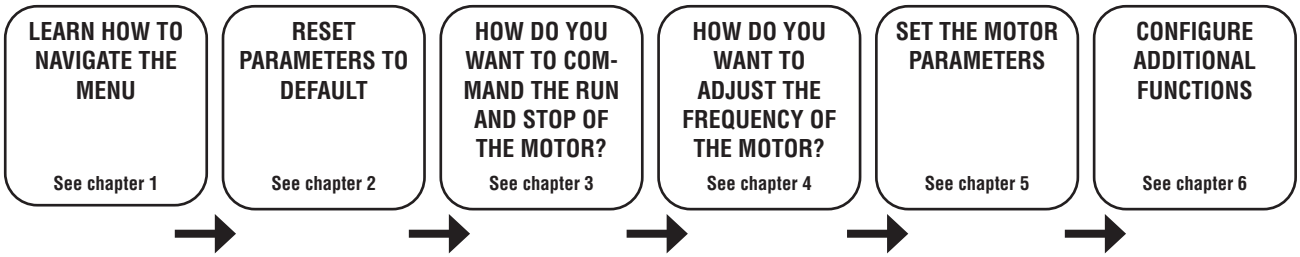
ПРЕДУПРЕЖДЕНИЕ!
– Прежде чем приступать к монтажу или эксплуатации устройства, внимательно ознакомьтесь с одержанием настоящего руководства.
– Во избежание травм или материального ущерба монтаж должен существляться только квалифицированным персоналом в соответствии с действующими нормативами.
– Перед проведением любых работ по техническому обслуживанию устройства необходимо обесточить все измерительные и питающие входные контакты, а также замкнуть накоротко входные контакты трансформатора тока (TT).
– Производитель не несет ответственность за обеспечение электробезопасности в случае ненадлежащего использования устройства.
– Изделия, описанные в настоящем документе, в любой момент могут подвергнуться изменениям или усовершенствованиям. Поэтому каталожные данные и описания не могут рассматриваться как действительные с точки зрения контрактов
– Электрическая сеть здания должна быть оснащена автоматическим выключателем, который должен быть расположен вблизи оборудования в пределах доступа оператора. Автоматический выключатель должен быть промаркирован как отключающее устройство оборудования: IEC /EN/BS 61010-1 § 6.11.3.1.
– Очистку устройства производить с помощью мягкой сухой ткани, без применения абразивных материалов, жидких моющих средств или растворителей.

UPOZORNĚNÍ
– Návod se pozorně pročtěte, než začnete regulátor instalovat a používat.
– Tato zařízení smí instalovat kvalifikovaní pracovníci v souladu s platnými předpisy a normami pro předcház ní úrazů osob či poškození věcí.
– Před jakýmkoli zásahem do přístroje odpojte měřicí a napájecí vstupy od napětí a zkratujte transformátory proudu.
– Výrobce nenese odpovědnost za elektrickou bezpečnost v případě nevhodného používání regulátoru.
– Výrobky popsané v tomto dokumentu mohou kdykoli projít úpravami či dalším vývojem. Popisy a údaje uvedené v katalogu nemají proto žádnou smluvní hodnotu.
– Spínač či odpojovač je nutno zabudovat do elektrického rozvodu v budově. Musejí být nainstalované v těsné blízkosti přístroje a snadno dostupné pracovníku obsluhy. Je nutno ho označit jako vypínací zařízení přístroje: IEC/ EN /BS 61010-1
§ 6.11.3.1.
– Přístroj čistěte měkkou utěrkou, nepoužívejte abrazivní produkty, tekutá čistidla či rozpouštědla

DİKKAT!
– Montaj ve kullanımdan önce bu el kitabını dikkatlice okuyunuz.
– Bu aparatlar kişilere veya nesnelere zarar verme ihtimaline karşı yürürlükte olan sistem kurma normlarına göre kalifiye personel tarafından monte edilmelidirler
– Aparata (cihaz) herhangi bir müdahalede bulunmadan önce ölçüm girişlerindeki gerilimi kesip akım transformatörleri ede kısa devre yaptırınız.
– Üretici aparatın hatalı kullanımından kaynaklanan elektriksel güvenliğe ait sorumluluk kabul etmez.
– Bu dokümanda tarif edilen ürünler her an evrimlere veya değişimlere açıktır. Bu sebeple katalogdaki tarif ve değerler herhangi bir bağlayıcı değeri haiz değildir.
– Binanın elektrik sisteminde bir anahtar veya şalter bulunmalıdır. Bu anahtar veya şalter operatörün kolaylıkla ulaşa ileceği yakın bir yerde olmalıdır. Aparatı (cihaz) devreden çıkartma görevi yapan bu anahtar veya şalterin markası: IEC/EN/BS 61010-1 § 6.11.3.1.
– Aparatı (cihaz) sıvı deterjan veya solvent kullanarak yumuşak bir bez ile siliniz aşındırıcı temizlik ürünleri kullanmayınız.

AVERTIZARE!
– Citiţi cu atenţie manualul înainte de instalare sau utilizare.
– Acest echipament va fi instalat de personal calificat, în conformitate cu standardele actuale, pentru a evita deteriorări sau pericolele.
– Înainte de efectuarea oricărei operaţiuni de întreţinere asupra dispozitivului, îndepărtaţi toate tensiunile de la intrările de măsurare şi de alimentare şi scurtcircuitaţi bornele de intrare CT.
– Producătorul nu poate fi considerat responsabil pentru siguranţa electrică în caz de utilizare incorectă a echipamen tului.
– Produsele ilustrate în prezentul sunt supuse modificărilor şi schimbărilor fără notificare anterioară. Datele tehnice şi descrierile din documentaţie sunt precise, în măsura cunoştinţelor noastre, dar nu se acceptă nicio răspundere pentru erorile, omiterile sau evenimentele neprevăzute care apar ca urmare a acestora.
– Trebuie inclus un disjunctor în instalaţia electrică a clădirii. Acesta trebuie instalat aproape de echipament şi într-o zonă uşor accesibilă operatorului. Acesta trebuie marcat ca fiind dispozitivul de deconectare al echipamentului: IEC/EN/BS 61010-1 § 6.11.3.1.
– Curăţaţi instrumentul cu un material textil moale şi uscat; nu utilizaţi substanţe abrazive, detergenţi lichizi sau solvenţi.

STEPS TO FOLLOW FOR THE CONFIGURATION OF THE VARIABLE SPEED DRIVE:



INDEX

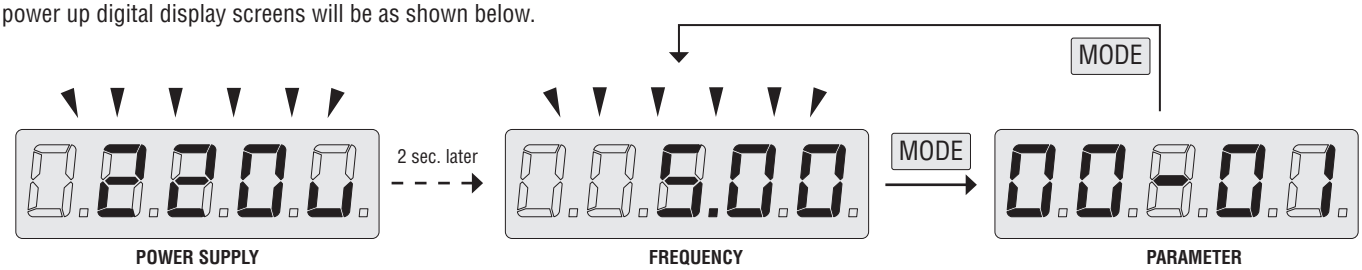
1 NAVIGATION IN THE MENU

1.1 OPERATOR PANEL FUNCTIONS

TYPE	ITEM	FUNCTION
Digital display and LEDs	Main views	Frequency, parameters, voltage, current, temperature, fault messages.
	LED Status	– Hz/RPM: ON when the frequency or line speed is displayed. OFF when the parameters are displayed. – FWD: ON while the drive is running forward. Flashes while stopped. – REV: ON while the drive is running reverse. Flashes while stopped. – FUN: ON when the parameters are displayed. OFF when the measures are displayed.
Potentiometer	FREQUENCY	Used to set the frequency
Keys on keypad	RUN	RUN: run at the set frequency.
	STOP/RESET (dual function)	- STOP: Decelerate or coast to stop. - RESET: Use to reset alarms or resettable faults.
	▲	Increment parameter number and preset values.
	▼	Decrement parameter number and preset values.
	MODE	Switch between available displays
	V (Dual function: a short press for left shift function, a long press for ENTER function)	– Left Shift: used while changing the parameters or parameter values – ENTER: used to display the preset value of parameters and for saving the changed parameter values.

1.2 DIGITAL DISPLAY DESCRIPTION

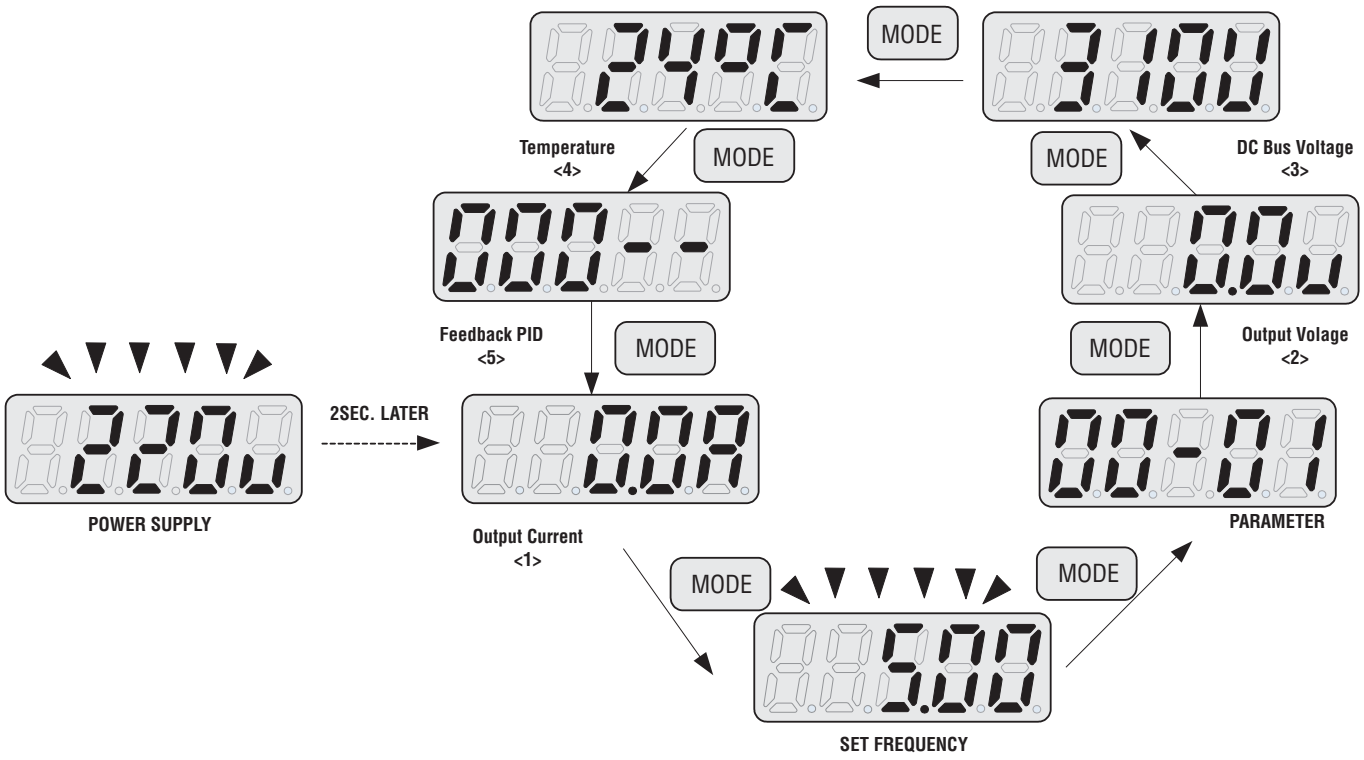
On power up digital display screens will be as shown below.



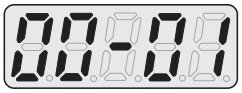
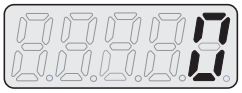
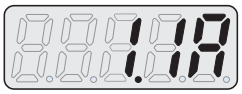
The measures available on the display can be selected with the parameter 12-00. For information about how to modify the parameters refer to chapter 1.3.

PARAMETER	DESCRIPTION	RANGE	DEFAULT
12-00	Extended display mode	00000 ~77777. Each digit can be set to 0 to 7 0: Default display (frequency and parameters) 1: Output current 2: Output voltage 3: DC Bus voltage 4: Heat sink temperature 5: PID feedback 6: AVI analog signal input 7: ACI analog signal input	00321

For example, by setting 12-00 = 12345 is enabled the display format shown below.



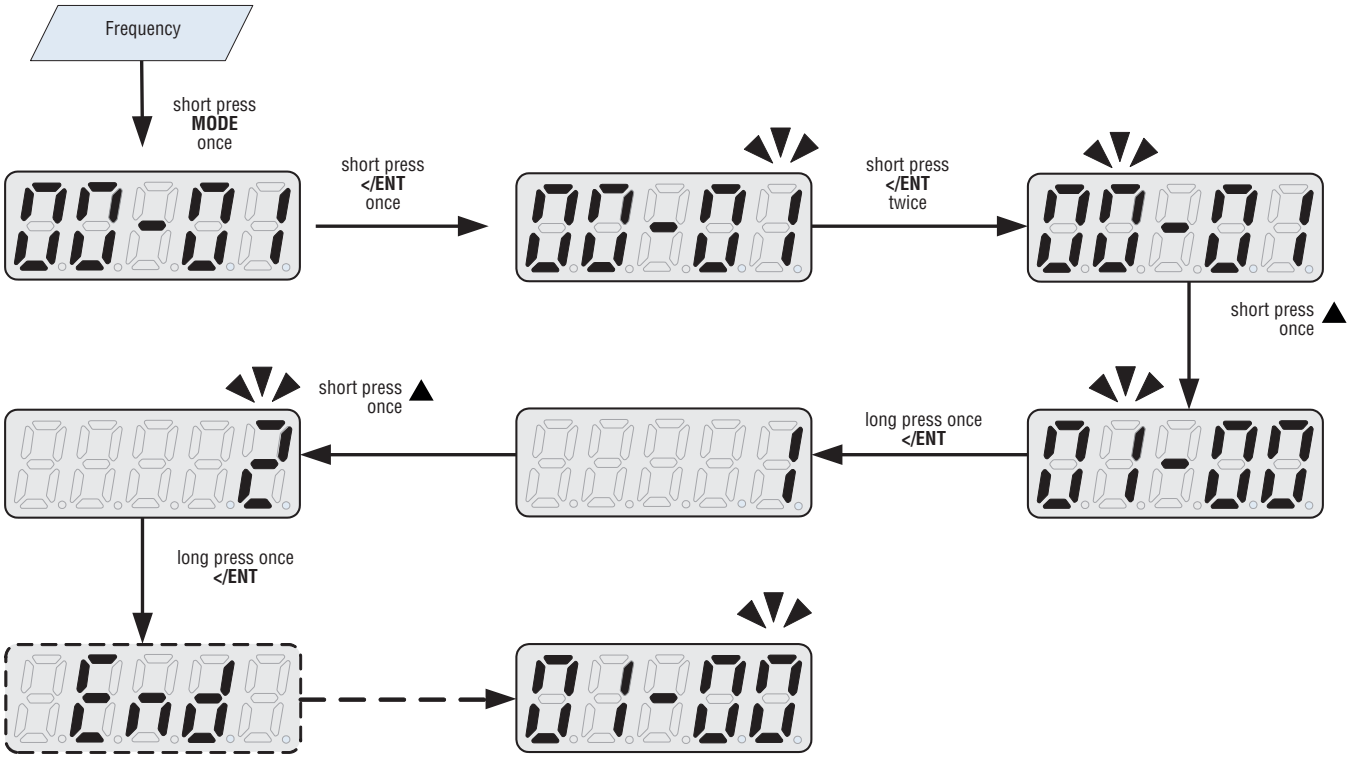
LED display examples

DISPLAY	DESCRIPTION
	In stop mode shows the set frequency In run mode shows the actual output frequency
	Selected parameter
	Parameter value
	Output voltage [VAC]
	Output current [A]
	DC Bus voltage [VDC]
	Temperature [°C]
	PID feedback value
	Error Code
	Analog signal value of AVI voltage input or ACI current input. Range (0~1000)

1.3 MODIFYING PARAMETERS

To modify the parameters, use the following keys of the frontal keypad:

- **MODE**: it allows to switch from the measures view to the parameter view
- ▲ / ▼ : with a quick pressing it is incremented or decremented the selected digit by one (parameter index or value). With an extended pressing it is incremented or decremented the selected digit continuously
- **</ENT** : a quick pressing allows to move between the digits of the selected parameter or to access to the parameter to see its value. With an extended pressing it is saved the value of the modified parameter.



1.4 STATUS LEDS DESCRIPTION

DESCRIPTION	LED status			
Frequency / speed indicator	Hz/RPM	On while displaying frequency or line speed		
Menu mode indicator	Fun	On while displaying parameters		
Forward run indicator (FWD)	FWD	On while running forward	FWD	Flashing while stopped in Forward mode
Reverse run indicator (REV)	REV	On while running reverse	REV	Flashing while stopped in Reverse mode

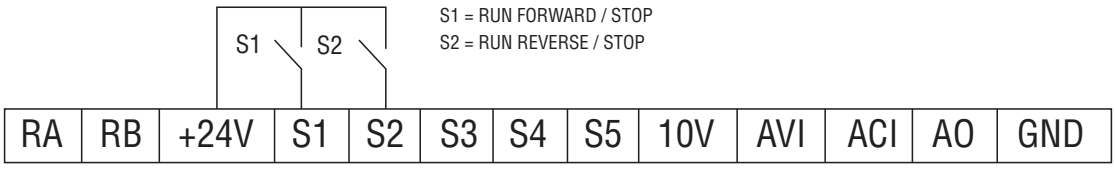
2 RESET PARAMETERS TO DEFAULT SETTINGS

To reset the drive parameters to the factory settings set the parameter 13-08 to one of the following values according to the system rated voltage and frequency (typical value: 1250).

1150: initialization (50Hz,220V/380V)
1160: initialization (60Hz,220V/380V)
1250: initialization (50Hz,230V/400V)
1260: initialization (60Hz,230V/460V)
1350: initialization (50Hz,220V/415V)
1360: initialization (60Hz,230V/400V)

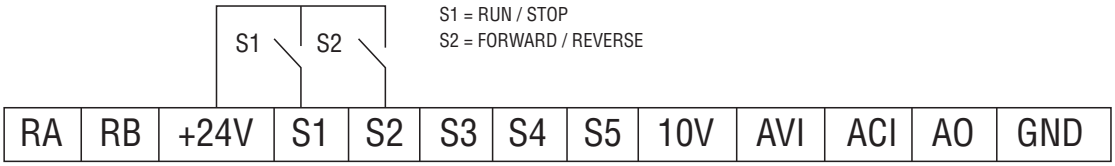
3 COMMAND THE RUN AND STOP OF THE MOTOR

3.1 EXTERNAL TERMINAL BLOCK, 2-WIRE MODE, RUN FORWARD / STOP INPUT + RUN REVERSE / STOP INPUT



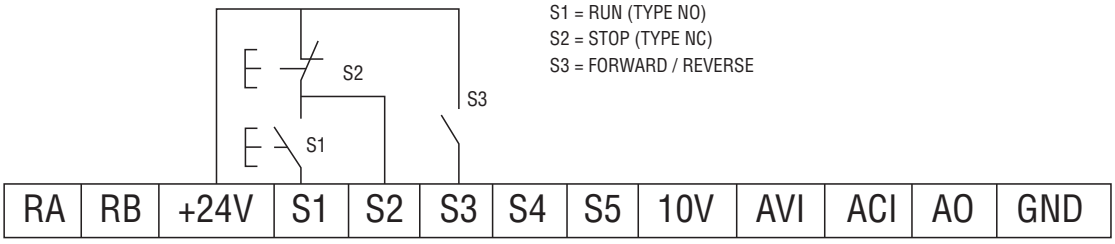
PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-02	Main run command source selection	1	External run/stop control (terminal block)
00-04	Operation modes for external terminals	0	Forward/stop - Reverse/stop
03-00	Multifunction input S1	0	Forward/stop command (OFF = stop, ON = run forward)
03-01	Multifunction input S2	1	Reverse/stop command (OFF = stop, ON = run reverse)

3.2 EXTERNAL TERMINAL BLOCK, 2-WIRE MODE, RUN/STOP INPUT + FORWARD/REVERSE DIRECTION INPUT



PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-02	Main run command source selection	1	External run/stop control (terminal block)
00-04	Operation modes for external terminals	1	Run/stop - Reverse/forward
03-00	Multifunction input S1	0	Run/stop command (OFF = stop, ON = run)
03-01	Multifunction input S2	1	Reverse/forward direction command (OFF = forward, ON = reverse)

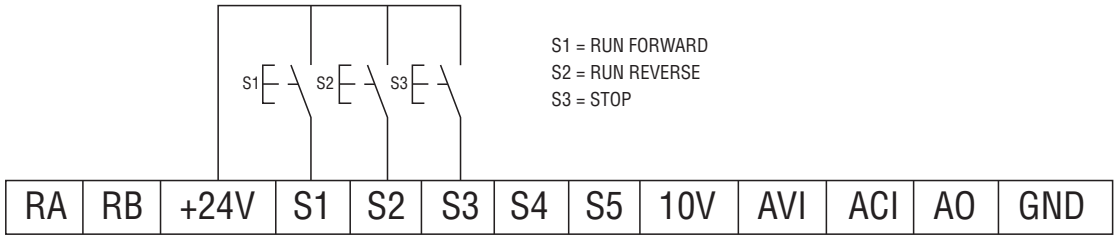
3.3 EXTERNAL TERMINAL BLOCK, 3-WIRE MODE



PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-02	Main run command source selection	1	External run/stop control (terminal block)
00-04	Operation modes for external terminals	2	3-wire control mode

Note. In this mode the terminals S1, S2 and S3 are dedicated to this function according to the diagram above and the preset selections for parameters 03-00, 03-01 and 03-02 have no effect.

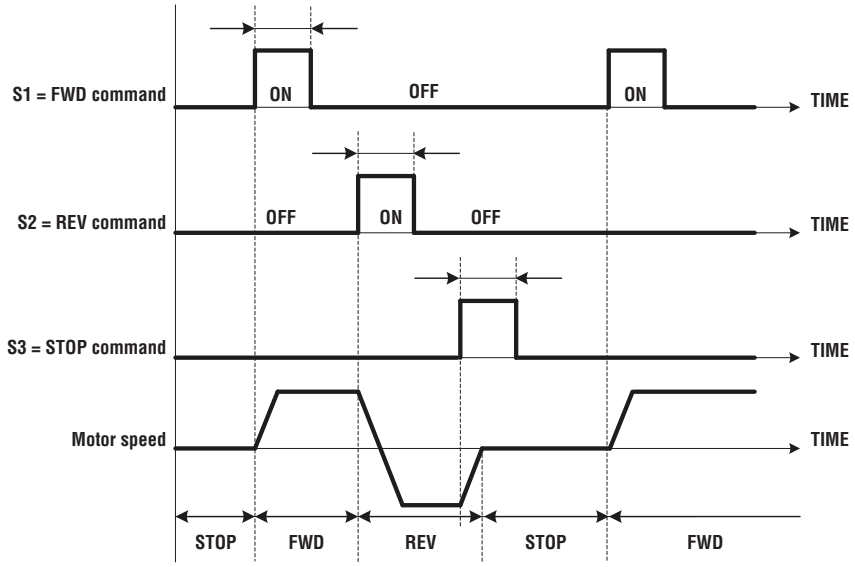
3.4 EXTERNAL TERMINAL BLOCK, 2-WIRE SELF-HOLDING RUN/STOP



PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-02	Main run command source selection	1	External run/stop control (terminal block)
00-04	Operation modes for external terminals	3	2-wire self-holding run/stop

Note. In this mode the terminals S1, S2 and S3 are dedicated to this function according to the diagram above and the preset selections for parameters 03-00, 03-01 and 03-02 have no effect.

Timing chart



3.5 FROM THE FRONTAL KEYPAD

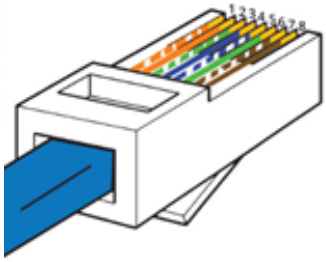
RUN = RUN MOTOR

STOP RESET = STOP MOTOR

PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-02	Main run command source selection	0	Keypad

3.6 FROM RS485 COMMUNICATION PORT

RJ45 connector pinout



1: Data+
2: Data-
3: Data+
4: Reserved
5: Reserved
6: Data-
7: 5V
8: GND

PARAMETER	FUNCTION	SETTNG	DESCRIPTION
00-02	Main run command source selection	2	Communication (RS485)
09-00	Assigned communication station number (serial node)	1	Set the serial node 1…32
09-01	Communication protocol	0	Modbus RTU
09-02	Baudrate	2	Set the communication speed: 0=4800bps, 1=9600bps, 2=19200bps, 3=38400bps
09-03	Stop bit selection	0	Set the number of stop bit: 0=1 stop bit, 1=2 stop bit
09-04	Parity selection	0	Set the parity: 0=none, 1=even parity, 2=odd parity
09-05	Data format selection	0	Set the data format: 0=8bit, 1=7bit

For information about Modbus or BACnet messages refer to the instruction I646-VT1 communication manual, downloadable from the website www.LovatoElectric.com

4 FREQUENCY ADJUSTMENT

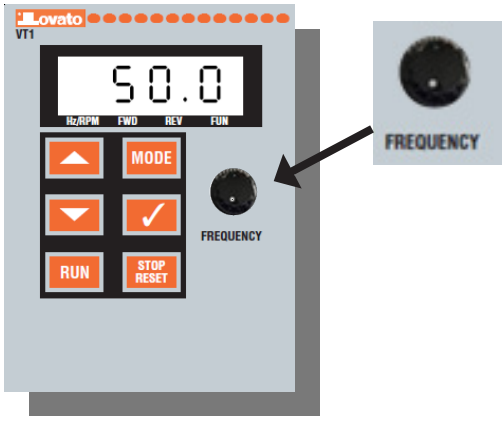
4.1 FROM THE FRONTAL KEYPAD

INCREASE THE FREQUENCY

DECREASE THE FREQUENCY

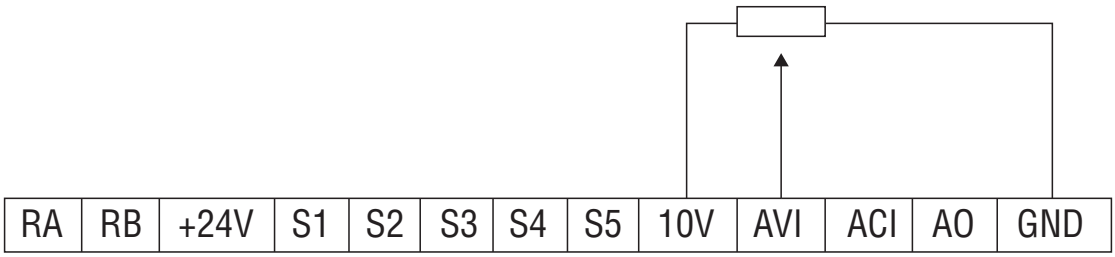
PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	0	Keypad
00-12	Frequency upper limit	50 Hz	Insert the maximum frequency limit
00-13	Frequency lower limit	0 Hz	Insert the minimum frequency limit
00-14	Acceleration time	10 sec	Insert the acceleration time
00-15	Deceleration time	10 sec	Insert the deceleration time

4.2 FROM THE POTENTIOMETER INTEGRATED ON FRONT



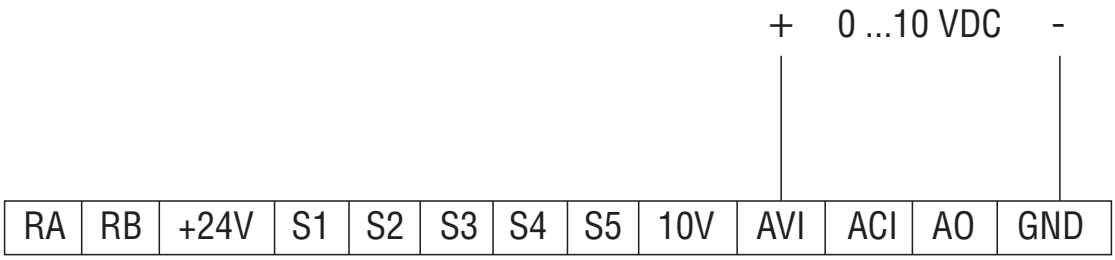
PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	1	Potentiometer on keypad
00-12	Frequency upper limit	50 Hz	Insert the maximum frequency limit
00-13	Frequency lower limit	0 Hz	Insert the minimum frequency limit
00-14	Acceleration time	10 sec	Insert the acceleration time
00-15	Deceleration time	10 sec	Insert the deceleration time

4.3 FROM EXTERNAL POTENTIOMETER



PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	2	AVI analog signal input
00-12	Frequency upper limit	50 Hz	Insert the maximum frequency limit
00-13	Frequency lower limit	0 Hz	Insert the minimum frequency limit
00-14	Acceleration time	10 sec	Insert the acceleration time
00-15	Deceleration time	10 sec	Insert the deceleration time
04-00	AVI/ACI analog input signal type select	0	AVI = signal type 0-10V

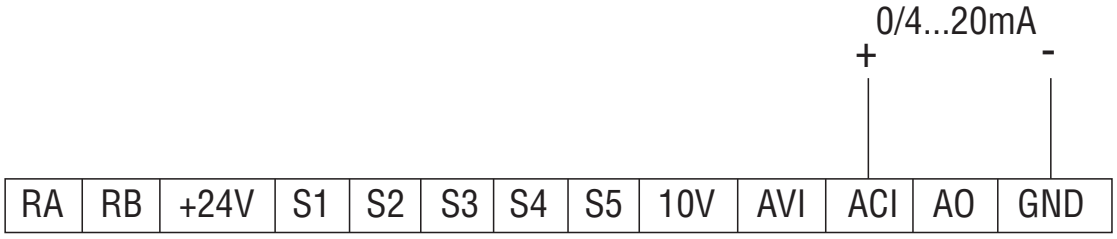
4.4 FROM VOLTAGE ANALOG INPUT SIGNAL TYPE 0-10VDC



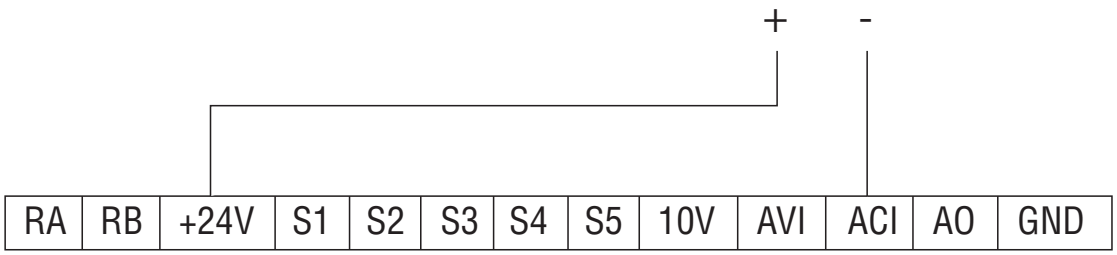
PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	2	AVI analog signal input
00-12	Frequency upper limit	50 Hz	Insert the maximum frequency limit
00-13	Frequency lower limit	0 Hz	Insert the minimum frequency limit
00-14	Acceleration time	10 sec	Insert the acceleration time
00-15	Deceleration time	10 sec	Insert the deceleration time
04-00	AVI/ACI analog input signal type select	0	AVI = signal type 0-10V

Note. If necessary, it is possible to customize the characteristic of the AVI analog input by adjusting the gain (04-02), bias (04-03) and slope (04-05). For more details refer to the VT1 complete manual I625 (downloadable from the website www.LovatoElectric.com), page 42-43.

4.5 FROM CURRENT ANALOG INPUT SIGNAL TYPE 0/4-20mA



2 WIRE SENSOR WITH OUTPUT 0/4-20mA, SUPPLIED 24VDC FROM THE DRIVE

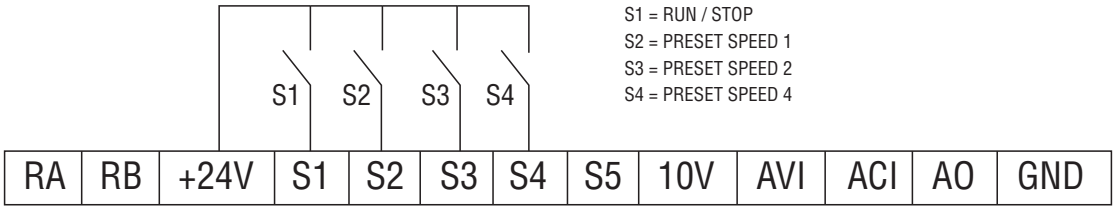


Note. Alternatively to the supply voltage 24VDC (terminal +24V) it is possible to supply the sensor with voltage 10VDC (terminal 10V).

PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	3	Regolazione da segnale analogico in corrente ACI
00-12	Frequency upper limit	50 Hz	Insert the maximum frequency limit
00-13	Frequency lower limit	0 Hz	Insert the minimum frequency limit
00-14	Acceleration time	10 sec	Insert the acceleration time
00-15	Deceleration time	10 sec	Insert the deceleration time
04-00	AVI/ACI analog input signal type select	0 or 1	0 = ACI signal type 0…20mA 1 = ACI signal type 4…20mA

Note. If necessary, it is possible to customize the characteristic of the ACI analog input by adjusting the gain (04-07), bias (04-08) and slope (04-10). For more details refer to the VT1 complete manual I625 (downloadable from the website www.LovatoElectric.com), page 42-43

4.6 WITH PRESET SPEED SELECTIONS

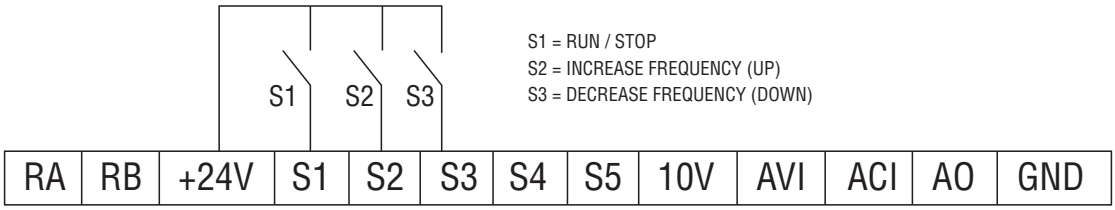


Selection table of preset speeds

S4	S3	S2	ACTIVATED PRESET SPEED
OFF	OFF	OFF	Preset speed 0 (frequency adjusted according to setting of 00-05)
OFF	OFF	ON	Preset speed 1 (05-02)
OFF	ON	OFF	Preset speed 2 (05-03)
OFF	ON	ON	Preset speed 3 (05-04)
ON	OFF	OFF	Preset speed 4 (05-05)
ON	OFF	ON	Preset speed 5 (05-06)
ON	ON	OFF	Preset speed 6 (05-07)
ON	ON	ON	Preset speed 7 (05-08)

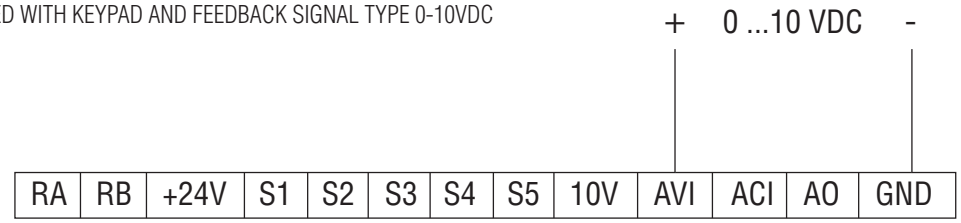
PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	0...6	Set the frequency source to use when all the preset speed inputs are OFF (0=keypad, 1=potentiometer on front, 2=AVI input, 3= ACI input, etc…)
00-12	Frequency upper limit	50 Hz	Insert the maximum frequency limit
00-13	Frequency lower limit	0 Hz	Insert the minimum frequency limit
00-14	Acceleration time	10 sec	Insert the acceleration time
00-15	Deceleration time	10 sec	Insert the deceleration time
00-02	Main run command source selection	1	External run/stop control (terminal block)
00-04	Operation modes for external terminals	0	Forward/stop - Reverse/stop
03-00	Multifunction input S1	0	Forward/stop command (OFF = stop, ON = run forward)
03-01	Multifunction input S2	2	Preset speed 1 (05-02)
03-02	Multifunction input S3	3	Preset speed 2 (05-03)
03-03	Multifunction input S4	4	Preset speed 4 (05-05)
05-02	Preset speed 1	...Hz	Insert preset speed 1
05-03	Preset speed 2	...Hz	Insert preset speed 2
05-04	Preset speed 3	...Hz	Insert preset speed 3
05-05	Preset speed 4	...Hz	Insert preset speed 4
05-06	Preset speed 5	...Hz	Insert preset speed 5
05-07	Preset speed 6	...Hz	Insert preset speed 6
05-08	Preset speed 7	...Hz	Insert preset speed 7

4.7 FROM EXTERNAL UP/DOWN DIGITAL INPUTS



PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	4	External up/down frequency control
00-12	Frequency upper limit	50 Hz	Insert the maximum frequency limit
00-13	Frequency lower limit	0 Hz	Insert the minimum frequency limit
00-14	Acceleration time	10 sec	Insert the acceleration time
00-15	Deceleration time	10 sec	Insert the deceleration time
00-02	Main run command source selection	1	External run/stop control (terminal block)
00-04	Operation modes for external terminals	0	Forward/stop - Reverse/stop
03-00	Multifunction input S1	0	Forward/stop command (OFF = stop, ON = run forward)
03-01	Multifunction input S2	8	Up command (increase frequency)
03-02	Multifunction input S3	9	Down command (decrease frequency)

4.8 PID CONTROL – SETPOINT ADJUSTED WITH KEYPAD AND FEEDBACK SIGNAL TYPE 0-10VDC



PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	6	PID output frequency
00-12	Frequency upper limit	50 Hz	Insert the maximum frequency limit
00-13	Frequency lower limit	0 Hz	Insert the minimum frequency limit
00-14	Acceleration time	5 sec	Insert the acceleration time
00-15	Deceleration time	5 sec	Insert the deceleration time
04-00	AVI/ACI analog input signal type select	0	AVI = signal type 0-10V
10-00	PID target value selection	4	PID setpoint set from keypad, parameter 10-02
10-01	PID feedback value selection	1	PID feedback = AVI analog signal input
10-02	PID target (keypad input)	...%	Set the value of PID setpoint (*)
10-03	PID mode selection	1	PID enabled
10-21	Max PID feedback	100	Insert the value of the PID feedback corresponding to the maximum value of the AVI input (10V). The unit of measure is defined by 12-02.
10-22	Min PID feedback	0	Insert the value of the PID feedback corresponding to the minimum value of the AVI input (0V). The unit of measure is defined by 12-02.
12-00	Extended display mode	01256	On the display are showing these measures: frequency, current, voltage, PID feedback, AVI signal input
12-01	PID feedback display format	1	0=integer, 1=1 decimal place, 2=2 decimal places
12-02	PID feedback display unit setting	1	Display of PID feedback in pressure (pb)

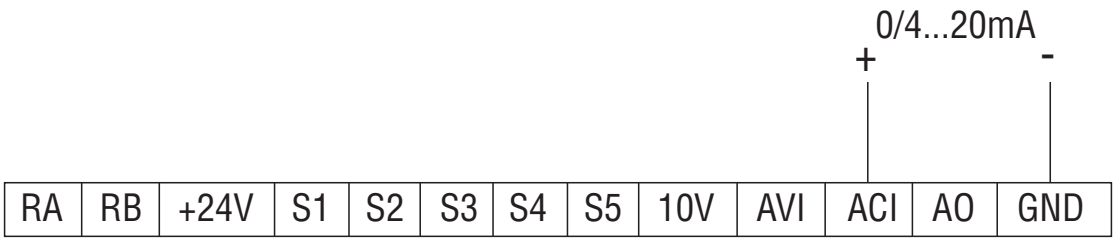
(*) Setting of the target PID setpoint

Example. Suppose to have a transducer with output 0-10V corresponding to a pressure 0-10Bar. To set a target of 3.5Bar, set 10-02=35% (which means 35% of the range 0-10V = 3.5Bar).
Note.

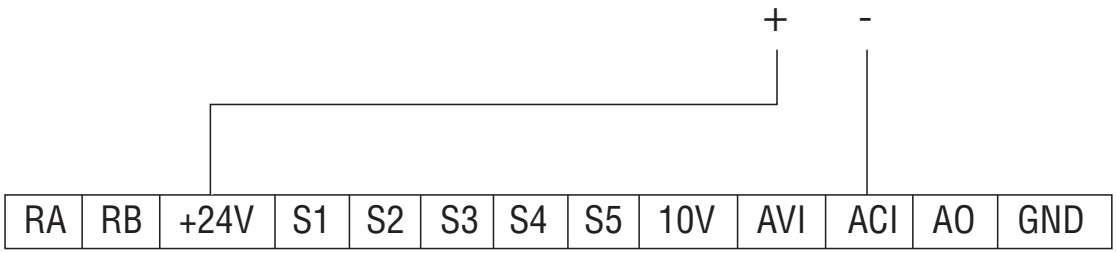
- If necessary, it is possible to adjust the PID control constants with the parameters 10-05 (proportional gain), 10-06 (integral time) and 10-07 (derivative time).
- It is also possible to enable the function sleep and wake up, which allows to decelerate the motor until it stops at the reaching of the PID setpoint value, with consequent energy saving.

For more information see the chapter 6.1 PID control: functions sleep and wake up.

4.9 PID CONTROL – SETPOINT ADJUSTED WITH KEYPAD AND FEEDBACK SIGNAL TYPE 0/4…20mA



2 WIRE SENSOR WITH OUTPUT 0/4-20mA SUPPLIED 24VDC FROM THE DRIVE



Note. Alternatively to the supply voltage 24VDC (terminal +24V) it is possible to supply the sensor with voltage 10VDC (terminal 10V).

PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	6	PID output frequency
00-12	Frequency upper limit	50 Hz	Insert the maximum frequency limit
00-13	Frequency lower limit	0 Hz	Insert the minimum frequency limit
00-14	Acceleration time	5 sec	Insert the acceleration time
00-15	Deceleration time	5 sec	Insert the deceleration time
04-00	AVI/ACI analog input signal type select	0 or 1	0 = ACI signal type 0…20mA 1 = ACI signal type 4…20mA
10-00	PID target value selection	4	PID setpoint set from keypad, parameter 10-02
10-01	PID feedback value selection	2	PID feedback = ACI analog signal input
10-02	PID target (keypad input)	...%	Set the value of PID setpoint (*)
10-03	PID mode selection	1	PID enabled
10-21	Max PID feedback	100	Insert the value of the PID feedback corresponding to the maximum value of the ACI input (20mA). The unit of measure is defined by 12-02
10-22	Min PID feedback	0	Insert the value of the PID feedback corresponding to the minimum value of the ACI input (0/4mA). The unit of measure is defined by 12-02.
12-00	Extended display mode	01257	On the display are showing these measures: frequency, current, voltage, PID feedback, ACI signal input
12-01	PID feedback display format	1	0=integer, 1=1 decimal place, 2=2 decimal places
12-02	PID feedback display unit setting	1	Display of PID feedback in pressure (pb)

(*) Setting of the target PID setpoint

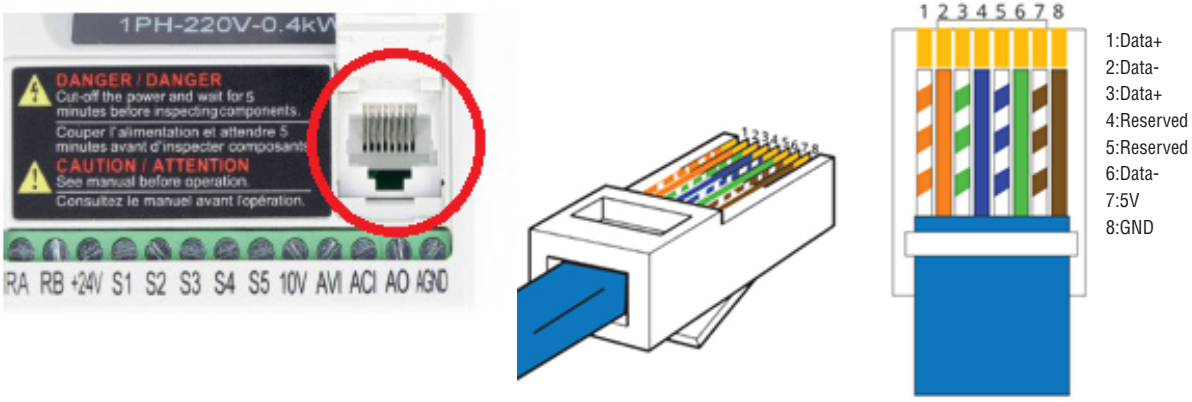
Example. Suppose to have a transducer with output 4-20mA corresponding to a pressure 0-10Bar. To set a target of 3.0Bar, set 10-02=30% (which means 30% of the range 4-20mA = 3.0Bar).

Note.

- If necessary, it is possible to adjust the PID control constants with the parameters 10-05 (proportional gain), 10-06 (integral time) and 10-07 (derivative time).
- It is also possible to enable the function sleep and wake up, which allows to decelerate the motor until it stops at the reaching of the PID setpoint value, with consequent energy saving. For more information see the chapter 6.1 PID control: functions sleep and wake up.

4.10 FROM RS485 COMMUNICATION PORT

RJ45 connector pinout



PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-05	Main frequency source selection	5	Communication (RS485)
09-00	Assigned communication station number (serial node)	1	Set the serial node 1…32
09-01	Communication protocol	0	Modbus RTU
09-02	Baudrate	2	Set the communication speed: 0=4800bps, 1=9600bps, 2=19200bps, 3=38400bps
09-03	Stop bit selection	0	Set the number of stop bit: 0=1 stop bit, 1=2 stop bit
09-04	Parity selection	0	Set the parity: 0=none, 1=even parity, 2=odd parity
09-05	Data format selection	0	Set the data format: 0=8bit, 1=7bit

For information about Modbus or BACnet messages refer to the instruction I646-VT1 communication manual, downloadable from the website www.LovatoElectric.com.

5 MOTOR PARAMETERS

PARAMETER	FUNCTION	SETTING	DESCRIPTION
00-00	Control mode	0	0 = V/f mode ❶ 1 = Sensorless vector mode (SLV) ❷
01-00	V/f characteristic	1	Set one of the following Volts/Hz patterns: ❸ 1 (50Hz) or 4 (60Hz) = linear (general use) 2 (50Hz) or 5 (60Hz) = linear with high starting torque 3 (50Hz) or 6 (60Hz)= decreasing torque (pumps, fans) 7 = customizable by the user
02-01	Motor rated current	___A	Set the motor rated current (see motor nameplate)
02-03	Motor rated speed	___rpm	Set the motor rated speed (see motor nameplate)
02-04	Motor rated voltage	___V	Set the motor rated voltage (see motor nameplate)
02-05	Motor rated power	___kW	Set the motor rated power (see motor nameplate)
02-06	Motor rated frequency	___Hz	Set the motor rated frequency (see motor nameplate)

All the other parameters must be left to default settings.

❶ In case of setting 00-00=0, the V/f characteristics shape can be set with parameter 01-00.

❷ SLV (Sensorless vector) control is used for obtaining best performance from a motor, especially at low speeds or for applications with dynamic speed change. To enable the sensorless vector control, follow these steps:

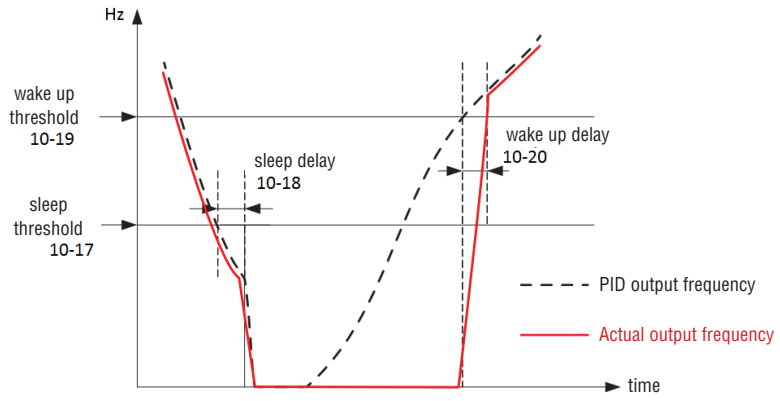
- Set 00-00=1.
- Set the motor parameters 02-01 and 02-03~02-06.
- Activate the motor auto tune function by setting 02-07=1. During the auto tune function the display will show AT and show END briefly when it is completed, then the display return to the frequency display.

❸ For more information about the characteristics of the available patterns refer to the description of the parameter 01-00 on the VT1 complete manual I625, downloadable from the website www.LovatoElectric.com.

6 ADDITIONAL FUNCTIONS

6.1 PID CONTROL: FUNCTIONS SLEEP AND WAKE UP

For the PID control it is possible to enable the function of sleep and wake up, which allows to decelerate the motor until it stops at the reaching of the PID setpoint value, with consequent energy saving. The functioning of the sleep and wake up function is showing in the following chart.

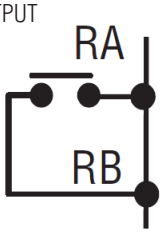


Sleep and wake up function operating chart.

• When the PID output frequency falls below the sleep frequency threshold (10-17) for a time longer than the sleep delay (10-18), the motor is decelerated up to 0Hz and the drive enter in the sleep mode.
• When the PID output frequency returns above the wake up frequency threshold (10-19) for a time longer than the wake up delay (10-20), the drive exits the sleep mode and automatically reactivates the motor to follow the setpoint.

PARAMETER	FUNCTION	SETTING	DESCRIPTION
10-17	PID sleep frequency level	... Hz	Set the frequency threshold for the activation of the sleep function
10-18	PID sleep function delay time	10 sec	Set the delay time for the activation of the sleep function
10-19	PID wake up frequency level	... Hz	Set the frequency threshold for the deactivation of the sleep function (wake up)
10-20	PID wake up function delay time	5 sec	Set the delay time for the deactivation of the sleep function (wake up)

6.2 CONFIGURATION OF THE FUNCTION OF THE RELAY OUTPUT



Relay output
250VAC/1A
(30VDC/1A)

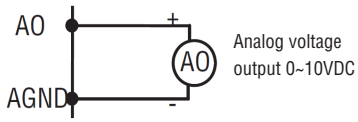
To configure the function of the relay output (terminals RA-RB) set the parameter 03-11.
The table below shows the most common used functions.

PARAMETER	FUNCTION	SETTING	DESCRIPTION
03-11	Relay output function (RA-RB)	0	Run: the relay is active as long as the motor is running
		1	Fault: the relay is active in presence of alarm
		4	The relay is active when the output frequency is greater than the frequency detection level 03-13
		5	The relay is active when the output frequency is below the frequency detection level 03-13
		10	Motor overload: the relay is active in presence of the alarm OL1 (motor overload protection)
		13	Output current reached: the relay is active when the motor current absorption is greater than the threshold 03-15 for a time longer than 03-16.
		14	Brake control: in accelerating mode, the relay will be ON as soon as the output frequency reaches the brake release level 03-17; in deceleration the output will be OFF as soon as the actual output frequency reaches the brake engage level 03-18.

The contact type of the relay output RA-RB can be configured with the parameter 03-19:

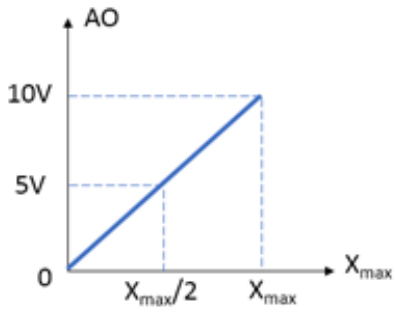
PARAMETER	FUNCTION	SETTING	DESCRIPTION
03-19	Relay output status type	0 or 1	0 = normally open contact (NO) 1 = normally closed contact (NC)

6.3 CONFIGURATION OF THE FUNCTION OF THE ANALOG OUTPUT AO



To configure the function of the analog output AO (0-10VDC, 1mA max) set the parameter 04-11.

PARAMETER	FUNCTION	SETTING	DESCRIPTION
04-11	Analog output (AO) mode	0	Output frequency
		1	Frequency setpoint
		2	Output voltage
		3	DC bus voltage
		4	Motor current



04-11	Measured assigned to AO	XmaX
0	Output frequency	Frequency upper limit 00-12
1	Frequency setpoint	Frequency upper limit 00-12
2	Output voltage	Motor rated voltage 02-04
3	DC bus voltage	400V
4	Motor current	2 times rated current of the drive

If necessary, it is possible to adjust the following characteristics of the analog output AO: gain (04-12), bias (04-13), bias selection (04-14) and slope (04-15). For more information refer to the VT1 complete manual I625, downloadable from the website www.LovatoElectric.com.

7 COMMON ERROR CODES

ERROR CODE	DESCRIPTION	POSSIBLE CAUSES	CORRECTIVE ACTIONS
– OU –	Voltage too high when stopped	Detection circuit malfunction	Consult with the supplier
– LU –	Voltage too low when stopped	1. Power voltage too low 2. Pre-charge resistor or fuse burnt out. 3. Detection circuit malfunction	1. Check if the power voltage is correct 2. Failed resistor or fuse. Consult with the supplier 3. Consult with the supplier
– OH –	The drive is overheated when stopped	1. Detection circuit malfunction 2. Ambient temperature too high or bad ventilation	Improve the ventilation conditions. If no results, consult with the supplier.
OH – C	The drive is overheated during running	– IGBT temperature is too high or poor ventilation – Temperature sensor error or circuit malfunctions	– Reduce carrier frequency (11-01) – Improve the ventilation conditions. If no results, consult with the supplier.
OC–A	Over-current at acceleration	1. Acceleration time too short 2. The capacity of the motor exceeds the capacity of the drive 3. Short circuit between the motor coil and the case 4. Short circuit between motor wiring and ground 5. IGBT module damaged	1. Set a longer acceleration time 2. Replace drive with one that has the same rating as that of the motor 3. Check the motor 4. Check the wiring 5. Consult with the supplier
OC–C	Over-current at fixed speed	1. Transient load change 2. Transient power change	1. Increase the capacity of the drive 2. Install inductor on the power supply input side
OC–d	Over-current at deceleration	The preset deceleration time is too short	Set a longer deceleration time
OC–S	Over-current at start	1. Short circuit between the motor coil and the case 2. Short circuit between motor coil and ground 3. IGBT module damaged	1. Check the motor 2. Check the wiring 3. Consult with the supplier
OU–C	Excessive voltage during operation or deceleration	1. Deceleration time setting too short or excessive load inertia 2. Power voltage varies widely (fluctuates)	1. Set a longer deceleration time 2. Check the power supply voltage
PF	Input phase loss	Abnormal fluctuations in the main circuit voltage	– Check the main circuit power supply wiring – Check the power supply voltage
OC	Over-current during stop	Detection circuit malfunction	Consult with the supplier
OL 1	Motor overload	Loading too large	Increase the motor capacity
OL 2	Drive overload	Excessive load	Increase the drive capacity
CL	Drive over current	Drive over current warning: drive current reached the level of over current protection	Check load condition and running period time. Wait 1 minute to reset. If it occurs CL or OL2 up to 4 successive times then wait 5 minutes to reset.
LU-C	Voltage too low during operation	1. Power voltage too low 2. Power voltage varies widely (fluctuates)	1. Improve power quality 2. Consider adding a reactor at the power input side
OUSP	Motor rotation over speed	The actual rotation speed is different to the set speed	1. Check for excessive load 2. Check weather frequency setting signal is right or not
OH4	Motor over heat error (PTC)	1. If temperature detected increases above the set limit in 08-13 and for the delay time set in 08-12 then the display will show OH4 and the motor will coast to stop 2. OH4 can be reset when the temperature detection level is lower than the set level in 08-14	1. Improve the ventilation conditions 2. Adjust the parameter 08-15

ERROR CODE	DESCRIPTION	POSSIBLE CAUSES	CORRECTIVE ACTIONS
OPErr	Operator setting error	The parameter 09-02 is set to 4 but the remote keypad (VT1X C02) is disconnected.	1. Use STOP/RESET key of drive to remove the error code 2. Set 09-02 to 0~3
LOC	1. Parameter locked active 2. Motor direction locked 3. Password enabled	1. Attempt to modify frequency parameter while 13-06>0 2. Attempt to reverse direction when 11-00=1. 3. Password enabled with parameter 13-07, set the correct password will show LOC	1. Modify 13-06 2. Modify 11-00 (set 0 to enable the reverse run direction)
Err1	Keypad operation error	1. Press ▲or ▼while 00-05/00-06 > 0 or running at preset speed. 2. Attempt to modify a parameter which cannot be modified during operation (refer to the parameter list on instruction I624 or I625)	1. The keys ▲ or ▼are available for modifying parameters only when 00-05 / 00-06=0 2. Modify the parameter in STOP mode.
Err2	Parameter setting error	1. 00-13 is within the range of [11-08 ± 11-11] or [11-09 ± 11-11] or [11-10 ± 11-11] 2. 00-12 ≤ 00-13 3. 00-05/00-06 or 10-00/10-01 set the same value 4. Modifying parameters 01-01~01-09 when 01-00≠7 5. If this parameter is parameterized for both functions (AVI/PTC) at the same time, PTC function is enabled by setting 08-10≠0 6. Parameter password 13-07 set incorrect	1. Modify 11-08~11-10 or 11-11. 2. Set 00-12>00-13 3. Set 00-05 and 00-06 to be different 4. Set 01-00=7 5. PTC function source can not be set the same source (AVI) with frequency command and PID command 6. Please set correct password
Err5	Modification of parameter is not available in communication	1. Control command sent during communication 2. Attempt to modify the function 09-02~09-05 during communication	1. Issue enable command before communication 2. Set parameters 09-02~09-05 function before communication
Err6	Communication failed	1. Wiring error 2. Communication parameter setting error 3. Communication ground disconnected 4. External noise	1. Check hardware and wiring of communication 2. Check the setting of parameters 09-00~09-05 3. CON2 connector needs to be connected to the earth 4. Increase the setting value of 09-08
Err7	Parameter conflict	1. Attempt to modify the function 13-00/13-08 2. Voltage and current detection circuit is abnormal	If reset is not possible, please consult with the supplier
StP0	Zero speed at stop	In V/f mode, StP0 comes out at less than 1.3Hz (50Hz set) or at less than 1.5Hz (60Hz set). In SLV mode, StP0 comes out at less than 1Hz.	
StP1	Fail to start directly on power up	If the drive is set for external terminal control mode (00-02/00-03=1) and the run input is active at power up but the direct start function is disabled (07-04=1) the drive cannot be started and will flash StP1. See description of 07-04 on the instruction I625.	
StP2	Keypad stop operated when drive is configured in external control mode	If the stop key is pressed while the drive is set to external control mode (00-02/00-03=1) then StP2 flashes after stop. Release and re-activate the run contact to restart the drive.	

For other error messages and information about the corrective actions refer to the chapter 4.TROUBLESHOOTING AND MAINTENANCE of the complete manual I625, downloadable from the website www.LovatoElectric.com.