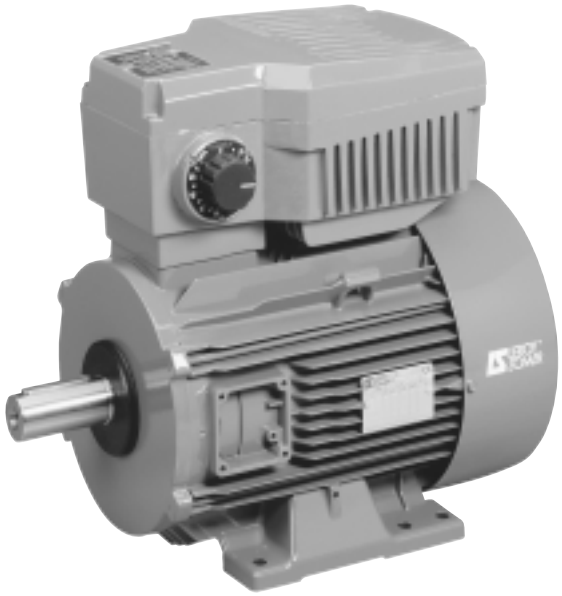
LEROY SOMER®

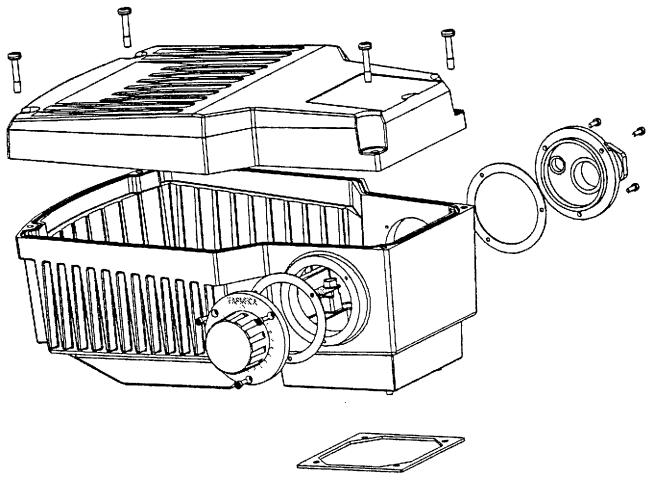
Ref. 3415 - 4.33/c - 01.02



18

en

This manual is to be given to the end user



VARMECA 14 (5.5 - 7.5 kW)

Variable speed motor or geared motor

Installation and maintenance

VARMECA 14 (5.5 - 7.5 kW)
Variable speed motor or geared motor

NOTE

LEROY-SOMER reserves the right to modify the characteristics of its products at any time in order to incorporate the latest technological developments. The information contained in this document may therefore be changed without notice.

LEROY-SOMER gives no contractual guarantee whatsoever concerning the information published in this document and cannot be held responsible for any errors it may contain, nor for any damage resulting from its use.

CAUTION

For the user's own safety, this VARMECA 14 motor must be connected to an approved earth (⏚ terminal).

It is imperative that the equipment is supplied via an isolating device and a circuit-breaking device (power contactor) which can be controlled by an external safety system (emergency stop, fault detector).

The VARMECA 14 motor is fitted with safety devices which, in the event of a fault, control stopping and thus stop the motor. The motor itself can become jammed for mechanical reasons. Voltage fluctuations, and in particular power cuts, may also cause the motor to stop.
The removal of the causes of the shutdown can lead to restarting, which may be dangerous for certain machines or installations. In such cases, it is essential that the user takes appropriate precautions against the motor restarting after an unscheduled stop.

The VARMECA 14 motor is a component designed to be integrated in an installation or electrical machine. It is therefore the responsibility of the user to take all necessary precautions to ensure that the system complies with current standards.

For safety reasons, LEROY-SOMER prohibits the use of VARMECA 14 for hoisting applications.
LEROY-SOMER declines all responsibility in the event of the above recommendations not being observed.

VARMECA 14 (5.5 - 7.5 kW)
Variable speed motor or geared motor

SAFETY AND OPERATING INSTRUCTIONS FOR ELECTRICAL ACTUATORS (In accordance with the low voltage directive 73/23/EEC modified by 93/68/EEC)

• Throughout the manual, this symbol warns of consequences which may arise from inappropriate use of the VARMECA 14, since electrical risks may lead to material or physical damage as well as constituting a fire hazard.

1 - General
Depending on their degree of protection, VARMECA 14 motors may contain moving parts, as well as hot surfaces, during operation.
Unjustified removal of protection devices, incorrect use, faulty installation or inappropriate operation could represent a serious risk to personnel, animals and equipment.
For further information, consult the manual.
All work relating to transportation, installation, commissioning and maintenance must be performed by experienced, qualified personnel (see IEC 364, CENELEC HD 384, or DIN VDE 0100 and national specifications for installation and accident prevention).
In these basic safety instructions, qualified personnel means persons competent to install, mount, commission and operate the product and possessing the relevant qualifications.

2 - Use
VARMECA 14 motors are components designed for integration in installations or electrical machines.
When integrated in a machine, commissioning must not take place until it has been verified that the machine conforms with directive 89/392/EEC (Machinery Directive).
It is also necessary to comply with standard EN 60204, which stipulates in particular that electrical actuators (which include VARMECA 14) cannot be regarded as circuit-breaking devices and certainly not as isolating switches.
Commissioning can take place only if the requirements of the Electromagnetic Compatibility Directive (89/336/EEC, modified by 92/31/EEC) are met.
VARMECA 14 motors meet the requirements of the Low Voltage Directive 73/23/EEC, modified by 93/68/EEC. The harmonised standards of the DIN VDE 0160 series in connection with standard VDE 0660, part 500 and EN 60146/ VDE 0558 are also applicable.
The technical characteristics and instructions concerning the connection conditions specified on the nameplate and in the documentation provided must be observed without fail.

3 - Transportation, storage
All instructions concerning transportation, storage and correct handling must be observed.
The climatic conditions specified in the technical manual must be observed.

4 - Installation
The installation and cooling of equipment must comply with the specifications in the manual supplied with the product.
VARMECA 14 motors must be protected against excessive stress. In particular, there must be no damage to parts and/or modification of the clearance between components during transportation and handling. Avoid touching the electronic components and contact parts.
VARMECA 14 motors contain parts which are sensitive to electrostatic stress and may be easily damaged if handled incorrectly. Electrical components must not be exposed to mechanical damage or destruction (risks to health!).

5 - Electrical connection
When work is performed on VARMECA 14 motors which are powered up, national accident prevention specifications must be respected.
The electrical installation must comply with the relevant specifications (for example conductor cross-sections, protection via fused circuit-breaker, connection of protective conductor). More detailed information is given in the manual.
Instructions for an installation which meets the requirements for electromagnetic compatibility, such as shielding, earthing, presence of filters and correct insertion of cables and conductors, are given in the documentation supplied with the VARMECA 14. These instructions must be followed in all cases, even if the VARMECA 14 carries the CE mark.
Adherence to the limits given in the EMC legislation is the responsibility of the manufacturer of the installation or the machine.

6 - Operation
Installations incorporating VARMECA 14 motors must be fitted with additional protection and monitoring devices as laid down in the current relevant safety regulations: law on technical equipment, accident prevention regulations, etc. Modification of VARMECA 14 motors using control software is permitted.
Active parts of the device and live power connections must not be touched immediately after the VARMECA 14 is powered down, as the capacitors may still be charged. In view of this, the warnings fixed to VARMECA 14 motors must be observed.
During operation, all protection devices must remain fixed in place.

7 - Servicing and maintenance
Refer to the manufacturer's documentation.

VARMECA 14 (5.5 - 7.5 kW)
Variable speed motor or geared motor

CONTENTS

en

1 - GENERAL INFORMATION

1.1 - General operating principle

The VARMECA 14 is the physical association of a 3-phase induction motor and an integrated variable speed drive.
The motor allows all kinds of mounting arrangements (foot or flange) and can be combined with standard gearboxes from the LEROY-SOMER range.
In the standard version, the integrated drive does not require any connection other than the power supply.
The options may be used to broaden the application range of the VARMECA 14.
Thanks to the advanced technology of the IGBT power module, very high efficiency and reduced noise levels are possible.

1.2 - Product name

VARMECA 14 rating	
Rating	**Power (kW)**
VMA 14 - 550	5.5*
VMA 14 - 750	7.5**

* 4 kW for 6-pole motor
** 5.5 kW for 6-pole motor

Cable gland position	
Code	**Position**
BD	Control knob on left side Cable gland: right side
BG	Control knob on right side Cable gland: left side

Option	
Code	**Option**
SD	Without control knob, cable gland: right side
SG	Without control knob, cable gland: left side
FLT VMA 14	External EMC filter

Example

VMA 14 - 550	**BD**	

1.3 - Characteristics

1.3.1 - Electrical data

Power supply	3-phase supply 400 V – 10% to 440 V + 10%, 50-60 Hz ± 5 %
Output voltage	From 0 V to the supply voltage
Power range	5.5 - 7.5 kW (2 and 4 poles); 4 - 5.5 kW (6 poles)
Maximum number of power-ups per hour	10

1.3.2 - Characteristics and functions

CHARACTERISTICS	VARMECA 14
Overload	150% of In for 40 s, 10 times per hour
Motor frequency variation range	- from 12 to 80 Hz at constant torque* - from 12 to 50 Hz for general applications* - from 6 to 220 Hz - range adjustable using parameter-setting option** (see VARMECA 10 manual - parameter-setting)
Efficiency	97.5% × motor efficiency

PILOT CONTROL	VARMECA 14
Speed reference	- Analogue reference (0 V or 4 mA = min. speed) (10 V or 20 mA = max. speed) - 0 - 10 V with built-in potentiometer - 0 - 10V with remote potentiometer option* - 0 - 10 V with external reference* - 4 - 20 mA with external reference* • Digital reference - 1 to 3 preset speeds (accessible with the parameter-setting option**)
Speed regulation	Regulation of a reference with the integrated PI loop (accessible with the parameter-setting option**) PI sensor characteristic: 0 - 10 V signal
Run/Stop	• With 3-phase power supply (max. 10 per hour) • With remote volt-free contact
Forward/Reverse	• With internal connection on the terminal block • With remote volt-free contact
Stop mode	• On ramp (with volt-free contact or integrated Run/Stop command) • Freewheel stop (by cutting the 3-phase power supply) • Freewheel stop (with volt-free contact) - (accessible with parameter-setting option**)
Ramps	• Selection of acceleration and deceleration ramps with volt-free contact: 2 s or 10 s (factory setting 10 s for F max 80 Hz) • Ramps adjustable from 0 to 20 s (accessible with the parameter-setting option**)

INDICATIONS	VARMECA 14
Display	Indicator lamp • Permanent green light: mains connected • Flashing green light: current limit • Permanent or flashing orange light: overload • Flashing red light: under/overvoltage fault • Permanent red light: other fault
Relays	• Volt-free contact - 1 A - 250 V - volt-free contact open: drive faulty or drive switched off
Analogue output	• Speed signal 0 - 10 V, 3 mA • 0 V = zero speed / 10 V = max. speed

* Adjust using mini-DIP switch (see section 2.3)
** See VARMECA 10 manual - Parameter-setting.

Characteristics and functions (continued)

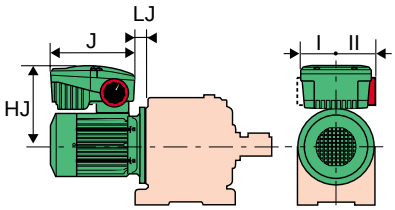
PROTECTION	VARMECA 14
Power	• Undervoltage • Overvoltage • Overloads: - overheating, drive and motor - protection against locked rotor • Short-circuit - motor windings - phase-earth
Control	• Short-circuit on 0 - 10 V inputs or outputs
Trip clearance	• By switching off the VARMECA

OPTIONS	VARMECA 14
Without control knob	• For remote control. Indicator lamp on the VARMECA
EMC filter	• External
Parameter-setting console	• Provides access to the VARMECA programming (see VMA 10 manual - Parameter-setting)
Parameter-setting software	

1.4 - Environmental characteristics

Characteristics	Level
Protection index	IP 55
Storage temperature	– 40 °C to +70 °C (IEC 68.2.3)
Transport temperature	– 40 °C to +70 °C
Operating temperature	– 20 °C to +40 °C (+50 °C with derating)
Altitude	≤ 1000 m without derating
Ambient humidity	Without condensation
Vibration	IEC 68-2-34 (acceleration 0.01 g^2/Hz)
Shocks	IEC 68-2-27 (peak acceleration 50 g)
Immunity	Conforming to EN 50082-2
Conducted and radiated emissions (with integrated filter option)	Conforming to EN 50081-2, and EN 55011 class A

1.5 - Weight and dimensions



Type	Dimensions in mm							Weight of VARMECA (kg)
	HJ	J	I	II	LJ			
					B3/B14	B5	B5 with	
LS 112 MG	264	324	112	112	38	38	68	6.1
LS 132 S	264	324	112	112	38	38	68	6.1
LS 132 M	264	324	112	112	16	16	68	6.1

2 - INSTALLATION

• It is the responsibility of the owner or the user to ensure that the installation, operation and maintenance of the inverter and its options comply with legislation relating to the safety of personnel, animals and equipment, and with the current regulations of the country of use.

• Before carrying out any work, disconnect and lock the drive power supply and wait 2 minutes to make sure that the capacitors have discharged.

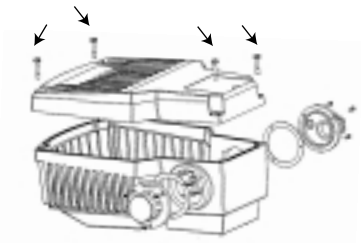
• After connection, ensure that the seals are firmly in place, and that the screws and cable glands are tight to ensure IP 55 protection. Clear any condensation from the drain holes.

2.1 - General

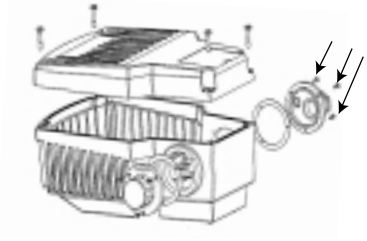
The VARMECA 14 motor is fitted to the machine like a standard motor, with flange or foot mounting.
The motor ventilation cools the whole assembly. Make sure that the ventilation air inlet is free of obstruction.
The positions of the potentiometer/cable gland supports are specified at the time of ordering. However they may be reversed if necessary.

2.2 - Reversing the control knob supports

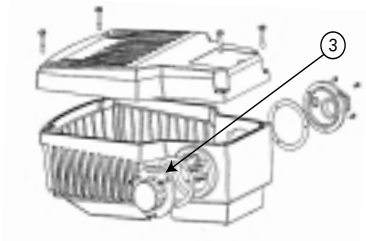
1) Undo the 4 TORX 20 + slot type screws and remove the cover.



2) Remove the control knob and cable gland support fastening screws (TORX 10 + slot type screws).

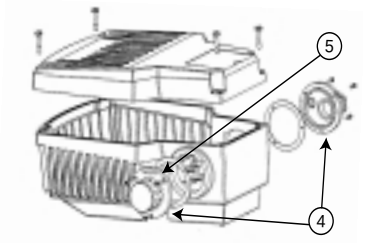


3) Disconnect the printed circuit layer holding the control knob potentiometer.



4) Reverse the control knob and cable gland supports.

5) Reconnect the printed circuit layer holding the control knob potentiometer and replace the fastening screws.

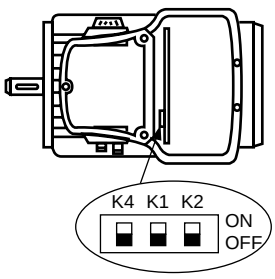


6) Replace the cover.

2.3 - Adjusting the mini-DIP switches

Used to select the reference, F max., and control the speed.

Remove the rear cover to access the Mini-dip switches.



	K4	K1	K2
- Speed adjustment via local control knob	OFF	-	-
- Speed adjustment via remote potentiometer	ON	ON	-
- Speed reference via 0-10 V external reference	ON	ON	-
- Speed reference via 4-20 mA external reference	ON	OFF	-
- Max. frequency 50 Hz	-	-	OFF
- Max. frequency 80 Hz	-	-	ON

CAUTION:
These operations should only be performed in exceptional circumstances and must be carried out by experienced and qualified personnel.

3 - CONNECTIONS

⚠ • The voltages on the power terminal blocks and the cables connected to them may cause fatal electric shocks. The drive stop function does not protect against these high voltages.

• The drive contains capacitors which remain charged at a fatal voltage even after the power supply has been switched off.

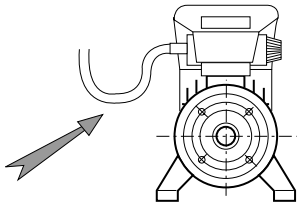
• After the drive has been switched off, wait for 2 minutes (so that the internal circuits discharge the capacitors) before removing the protective covers.

• The drive power supply must be protected against overloads and short-circuits.

• It is vital to respect the rating of protection devices.

3.1 - Wiring precautions

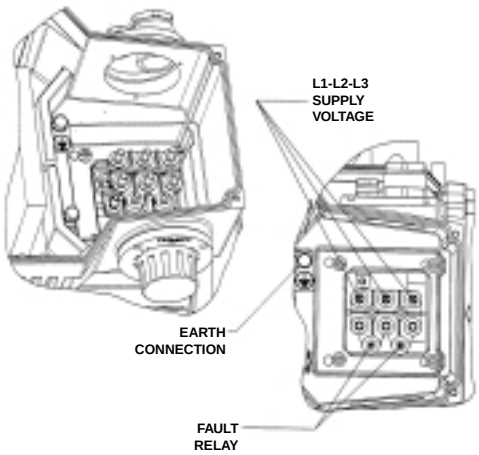
- When the VARMECA 14 is controlled remotely, avoid parallel routing of power cables and control cables.
- All remote control cables must be shielded and have a cross-section between 0.22 mm² and 1 mm². The shielding should be connected at both ends.
- Check that the different earth points are actually at the same voltage.
- Incorporate a bend where the cables enter the cable glands so that water cannot penetrate the terminal box.
- Tighten the cable glands firmly.



3.2 - Connectors

3.2.1 - Mounting

• Standard: Connection is made on a block with 8 terminals, 3 for the power supply and 2 for the fault relay (3 terminals are reserved for internal LEROY-SOMER use).

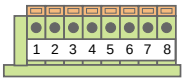


3.2.2 - Connecting the mains supply

Marking	Function
L1 L2 L3	Connection of the 3 mains protected phases defined in section 1.3.1 via M6 terminals on a block (132 M) and via M5 terminals on a block (132 S)
PE	Compulsory connection to earth

3.2.3 - Connecting the control

This is located on the side printed circuit and used for remote control.
To open blade terminals use a flat screwdriver (maximum width 2.5 mm).



Standard configuration

Marking	Characteristics
1	Source +10 V, 3 mA of the 10 kΩ potentiometer
2	0 to + 10 V or 4-20 mA reference input 0 -10 V: impedance = 100 kΩ 4 -20 mA: impedance = 0.5 kΩ
3	Speed analogue output 0 to +10 V, 3 mA 0 V = zero speed 10 V = max. speed
4	0 V common with terminal 6
5	Ramp selection logic input 10 s: terminals 5 and 6 connected 2 s: terminals 5 and 6 not connected
6	0 V common with terminal 4
7	Reverse/stop control logic input
8	Forward/Stop control logic input

On leaving the factory, terminals 5 and 6 are connected together (ramp 10 s) as are terminals 6 and 8 (forward).

Optional configuration
It is possible to control the motor using preset speeds, PI feedback, etc, by setting the parameters using the console or the PEGASE VMA 10 option (see VARMECA 10 manual - Parameter-setting).

3.2.4 - Connecting the fault relay

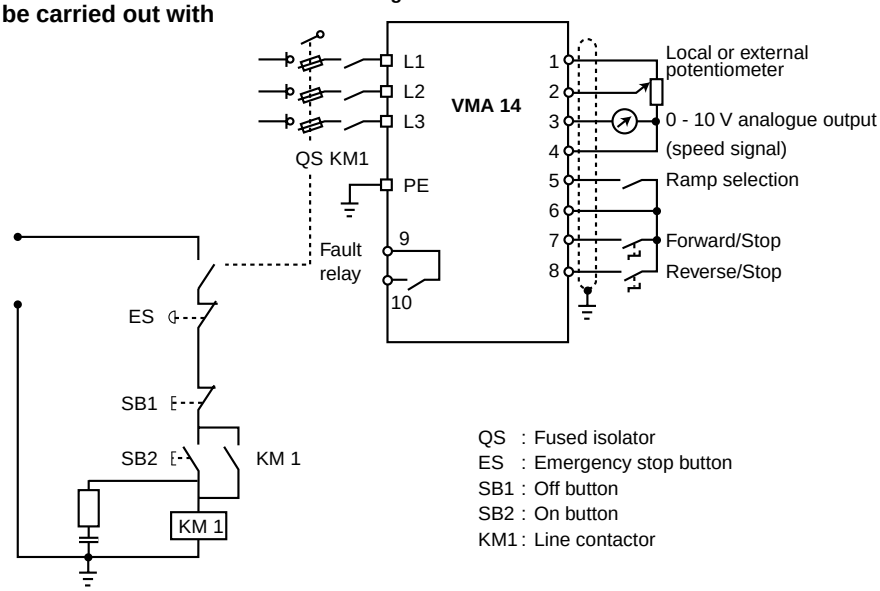
It is connected to the two terminals on the terminal block as indicated in the diagram in section 3.2.1 (M4 terminals).

VARMECA 14 (5.5 - 7.5 kW)
Variable speed motor or geared motor
CONNECTIONS

3.2.5 - Connection (standard configuration)

• All connections and work must be carried out with the power switched off.

Standard configuration



QS : Fused isolator
ES : Emergency stop button
SB1 : Off button
SB2 : On button
KM1 : Line contactor

When connecting a 10 kΩ potentiometer for remote control, use the "without control knob" option. Nevertheless, for the standard version "with control knob", a potentiometer can be used for remote control by setting the mini-DIP switch K4 to ON.

3.3 - Electrical and electromagnetic phenomena

Radio-frequency interference: emission

3.3.1 - General

Variable speed drives use high-speed switches (transistors, semiconductors) which switch high voltages (around 550 V for 3-phase drives) at high frequencies (several kHz). This provides better efficiency and a low level of motor noise.
Hence, they generate radio-frequency signals which may disturb the operation of other devices or measurements taken by sensors:
- due to high frequency leakage currents which escape to earth via the stray capacity of the drive/motor cable and that of the motor via the metal structures which support the motor
- by conduction or feedback of RF signals on the power supply cable: **conducted emissions**
- by direct radiation near to the mains supply power cable or the drive/motor cable: **radiated emissions**

These phenomena are of direct interest to the user.
The frequency range concerned (radio-frequency) does not affect the energy distribution company.

3.3.2 - Standards

The maximum emission level is set by the generic industrial (EN 50081-2) and domestic (EN 50081-1) standards.
The VARMECA 14 equipped with an FLT VMA 14 filter conforms to the EN 50081-2 standard.

3.4 - Description of cables and protection devices

• When using a circuit-breaker, it must be a motor circuit-breaker (D curve).
• Comply with the size of protection fuses.
• The cable size may vary according to legislation applicable in the country, which will take precedence over the values given in the table below without exception.
• These tables should never be used instead of current standards.

VARMECA rating	Power (kW)	3-phase mains supply 400 V – 10% to 440 V + 10%		
		Current (A)	gI fuses (A)	Cables (mm²)
14 - 550	5.5*	13	16	2.5
14 - 750	7.5**	16	20	4

* same value for 4 kW 6-pole version
* same value for 5.5 kW 6-pole version

Note: The mains current value is a typical value which depends on the source impedance. The higher the impedance, the lower the current.

4 - COMMISSIONING

⚠ **• Before switching on the VARMECA 14, check that the electrical connections are correct, and that any moving parts are mechanically protected.**

• For the safety of personnel, the VARMECA 14 must not be powered up with the protective cover removed.

4.1 - Standard VARMECA 14

4.1.1 - Starting on power-up

- Power-up: the green indicator lamp is lit continuously. As control terminals 6 and 8 are connected together, the motor starts running forward.
- Set the speed reference using the side control knob.

The number of power-ups is limited to 10 per hour.

4.1.2 - Starting with remote control

- Power-up: the green indicator lamp is lit continuously.
- Activate the run command corresponding to the required direction. The motor starts.
- Set the speed reference using the side control knob.

4.2 - VARMECA 14 with remote potentiometer option

- Power-up: the green indicator lamp is lit continuously.
- Select the required ramp.
- Set the reference using the 10 kΩ remote potentiometer.
- Select the required direction of rotation. The motor starts.

5 - FAULTS - DIAGNOSTICS

Information relating to the status of the VARMECA 14 is provided by a three-colour indicator lamp located on the control knob support.

Colour and state of indic. lamp	Reason for fault	Checks to be performed
Permanent green	No fault Mains present	
Flashing green	Current limiting	• Check that the motor is not overloaded or stalled.
Flashing or permanent orange	Overload	• The motor is overloaded: check the motor current using a clamp ammeter (see section 6.2.2).
Permanent red	• Short-circuit of a motor winding • Locked motor rotor • Faulty insulation of a winding • I^2t overheating • Internal fault	• Check that no incident has occurred. • Switch off and then on again to clear the fault. • Check that the deceleration ramp is long enough (10 s) for applications with high inertia. • If the fault remains, consult LEROY-SOMER.
Flashing red	• Undervoltage • Overvoltage	• Check the mains voltage. • Check that the deceleration ramp is long enough (10 s) for applications with high inertia. • Switch off and then on again.

Trips can be cleared by switching off the **VARMECA 14**.

6 - MAINTENANCE

⚠ **• All work relating to installation, commissioning and maintenance must be carried out by experienced and qualified personnel.**

• Before carrying out any work, disconnect and lock the VARMECA 14 power supply circuit and wait 2 minutes for the capacitors to discharge.

6.1 - Care

No special care is required on the VARMECA 14, apart from the regular removal of dust from the fan grille and the cooling fins located at the bottom of the box.
Do not dismantle the VARMECA 14 while it is still under guarantee, as this would then immediately become null and void.

CAUTION:
Certain components which are sensitive to electrostatic discharge may be destroyed simply by touching them.
Do not leave any metal object in the connection area, as this could cause a short-circuit.

6.2 - Measurements

6.2.1 - General

The input voltages can be measured using ordinary instruments.
The motor current **is not measured on the VARMECA 14 power supply (L1, L2, L3)**. It is measured using an ordinary clamp ammeter on the longest wire, which forms a loop on the side of the connection circuit.

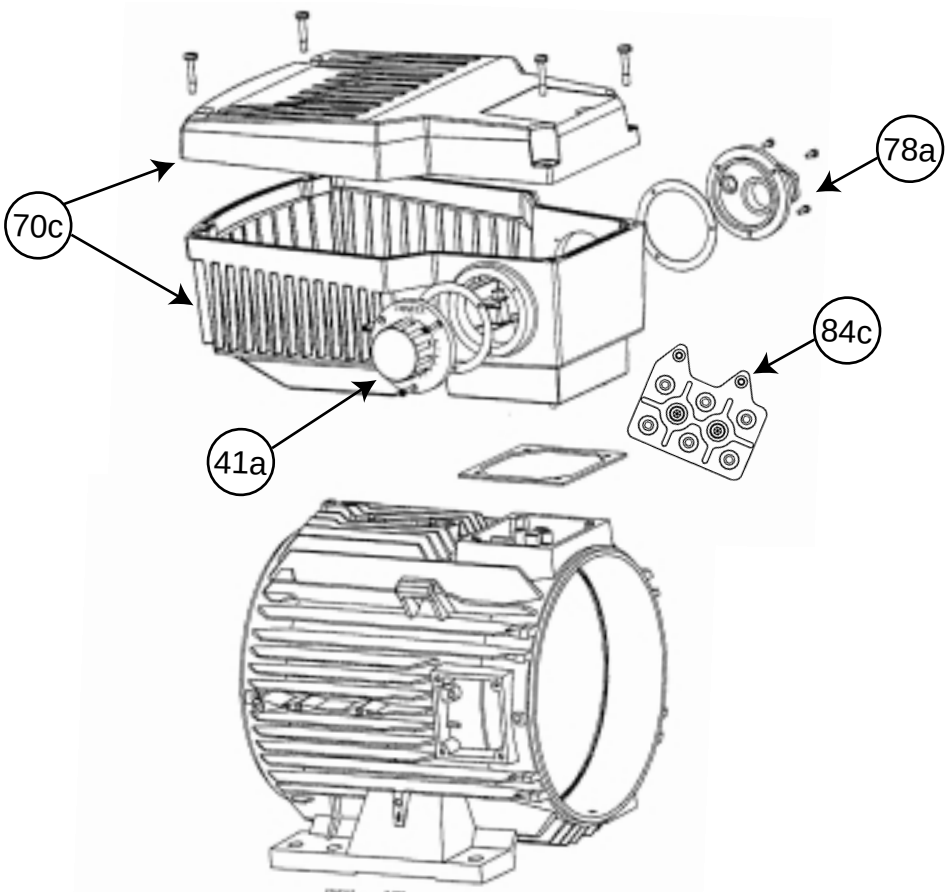
6.2.2 - Procedure for measuring the motor current (if the motor wire loop is inaccessible)

- Open the VARMECA 14 power supply circuit and lock it.
- Wait 2 minutes for the capacitors to discharge.
- Open the cover of the VARMECA 14.
- Remove the mains cable (L1, L2, L3).
- Pass the longest motor wire along the side of the connection circuit.
- Reconnect the mains (L1, L2, L3).
- Pass the clamp ammeter through the motor wire loop.

6.3 - Spare parts

Description		Part code	Marking
Control knob + indicator lamp kit (BD or BG)		AEM905KB001	41a
Kit without control knob (SD or SG)		AEM905KB002	41b
Cable gland kit		AEM907KE007	78a
Standard drive unit kit with cover	VMA 14 550 / 750 / 4 / 5.5 / 7.5 kW	AEM902CB104	70c
Connection kit		MAF700KV001	84c

When ordering spare parts, specify the serial number and type of the motor and gearbox on which the VARMECA 14 is installed.



7 - OPERATING EXTENSIONS

7.1 - Option without control knob (SD or SG)

The speed control knob is no longer located on the VARMECA 14, but beside the operator (the indicator lamp remains).
Ramp selection and selection of running direction can also be positioned beside the operator.

7.2 - Parameter-setting console option (CDC-VMA)

The console option provides access to the drive internal settings (terminal block configuration, ramp settings, speeds, PI, etc).
See VARMECA 10 manual - Parameter-setting.

Description of the option:
1 CDC-VMA console
1 cable, L = 1.5 m
1 single-phase 230 V power supply

7.3 - Parameter-setting software option (PEGASE VMA 10)

This option provides access to the drive internal settings from a PC. The software is compatible with WINDOWS 95-98.
See VARMECA 10 manual - Parameter-setting.

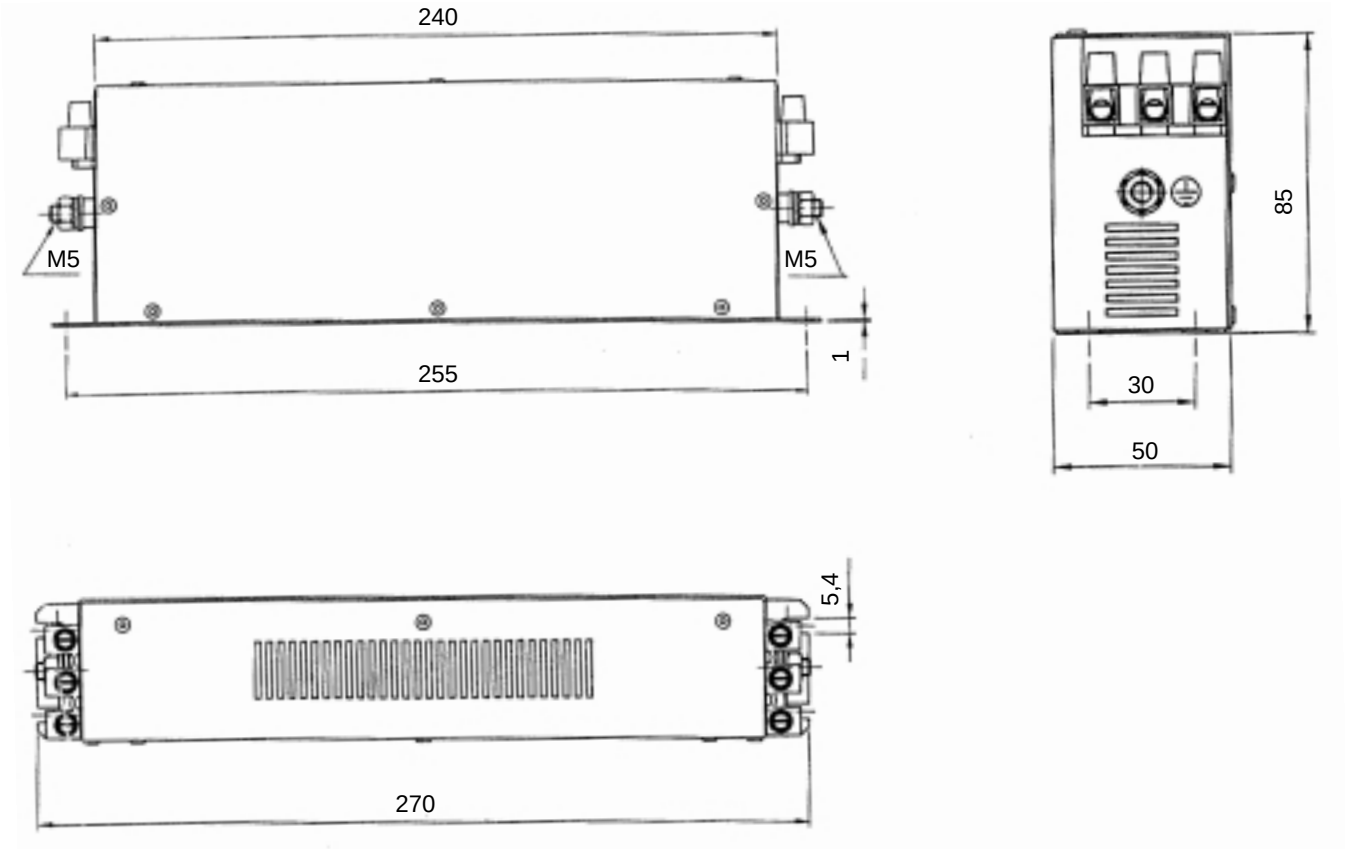
Description of the option:
1 software program
1 cable, L = 3 m

en

7.4 - EMC filter option

The filter is mounted outside the VARMECA 14.

7.4.1 - Dimensions (in mm)



7.4.2 - Connection

Mains