



20

en

This manual is to be given
to the end user



VARMECA - 20

Variable speed motor or geared motor

Installation and maintenance

VARMECA - 20

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 be therefore changed without prior notice.



For the user's safety, this VARMECA 20 must be connected to a proper earthing (⊕ terminal).

If the accidental starting of the installation is likely to cause a risk to the personnel or to the machines being driven, it is necessary to supply the equipment via a circuit-breaking device (power contactor) which can be controlled via an external safety system (emergency stop, detection of errors on the installation).

VARMECA 20 is fitted with safety devices which in case of a fault may control its stopping and consequently the motor stopping. This motor itself can be also subject to stopping as result of the mechanical blocking. Finally, the voltage fluctuations, in particular the power cuts, may also cause the motor stopping.

The removal of the shutdown causes can lead to a restart which may be dangerous for certain machines or installations, especially for those which must comply with appendix 1 of decree no. 902.767 of 29th July, 1992 on safety.

In such cases, it is important for the user to take the appropriate precautions against the motor restarting after an unscheduled motor stopping. The variable speed drive is designed to be able to supply with power a motor and the driven machine above its rated speed.

If the motor or the machine are not mechanically designed to withstand such speeds, the user may be exposed to a serious risk due to their mechanical deterioration. It is important for the user to check, before setting a high speed, if the installation can withstand it.


The variable speed drive making the object of this manual is a component designed to be integrated into an installation or into an electrical machine and it can under no circumstances be considered in any case a safety device. It is therefore the responsibility of the machine manufacturer, the installation designer or the user to take the necessary precautions in order to ensure that the installation complies with the standards in force and to provide any devices required to ensure the safety of the equipment and personnel.

LEROY-SOMER declines all responsibility in case the above mentioned recommendations are not observed.

VARMECA - 20

Variable speed motor or geared motor

SAFETY AND OPERATING INSTRUCTIONS RELATED TO VARIABLE SPEED DRIVES (According to the low voltage directive 73/23/CEE amended by 93/68/CEE)

 **Throughout this manual the symbol warns of the consequences arising from the misuse of the variable speed drive, since the electrical risks may lead to material damages or to body injuries, as well as to fire hazards.**

1 - General

Depending on their degree of protection, VARMECA - 20 motors may contain, during their operation, live parts that are powered up, which may be moving or rotating, as well as hot surfaces.

The improper removal of the protection devices, an inadequate use, a faulty installation or an inappropriate handling could represent a serious risk to the equipment, the animals and the personnel.

For further information, read this documentation.

All the works related to the transportation, installation, commissioning and maintenance must be performed by a qualified and authorised personnel (CEI 364 or CENELEC HD 384, or DIN VDE 010, as well as the national provisions regarding the installation and the accident prevention).

Within the scope of these basic safety instructions, qualified personnel means persons having competence as regards the installation, the assembling, the commissioning and the product exploitation, and possessing the relevant qualifications.

2 - Use

VARMECA - 20 motors are components designed to be integrated into installations or electrical machines.

In case of integration into a machine, their commissioning is forbidden if the compliance of the machine with the provisions of the Directive 89/392/CEE (machine directive) has not been checked. It is also necessary to observe the EN 60204 standard stipulating mainly that the electrical actuators (which include the variable speed drives) cannot be considered as circuit-breaking devices and certainly not as isolating switches.

Their commissioning is not allowed if the provisions of the Electromagnetic Compatibility Directive (89/336/CEE, amended by 92/31/CEE) are not observed. VARMECA - 20 motors meet the requirements of the Low Voltage Directive 73/23/CEE, amended by 93/68/CEE. The harmonised standards of the DIN VDE 0160 series along with the VDE 0660 standard, part 500 and EN 60146/VDE 0558 are applicable to them.

The technical characteristics and the instructions concerning the connection conditions specified on the nameplate and in the documentation provided must be observed.

3 - Transportation, storage

All the instructions concerning the correct transportation, storage and handling must be observed.

The climatic conditions specified in the technical manual must be observed.

4 - Installation

The equipment installation and cooling must comply with the provisions of the documentation supplied with the product. VARMECA - 20 motors must be protected against any excessive stress. In particular, the parts must not be damaged and/or the clearances between components must not be changed during the transportation and the handling. Do not touch the electronic components and the contact parts.

VARMECA - 20 motors contain parts which are sensitive to electrostatic stresses and may be easily damaged in case of an inadequate handling. The electrical components must not be exposed to mechanical damage or destruction (otherwise, your health is at risk!).

5 - Electrical connection

When works are performed on variable speed drives which are powered up, the national provisions related to the prevention of accidents must be observed.

The electrical installation must be executed according to the applicable provisions (for example, conductor section, protection by fused short-circuit, connection of the protection conductor). More detailed information is given in the manual.

The documentation accompanying VARMECA - 20 motors contains the instructions for an installation which meets the electromagnetic compatibility requirements, such as screening, earthing, presence of filters and adequate insertion of cables and conductors. These instructions must be observed in all cases, even if VARMECA - 20 motors carry the CE mark. The observation of the limit values imposed by the legislation on CEM is the responsibility of the installation or machine manufacturer.

6 - Operation

The installations with built-in VARMECA - 20 motors must be fitted with additional protection and monitoring devices as laid down in the safety provisions in force, such as the law on technical equipment, the provisions on accident prevention, etc. The modification of VARMECA - 20 motors by means of the control software are admitted.

The active parts of the device and the live power connections must not be touched immediately after the powering-down of the VARMECA - 20 motors, as the capacitors may still be loaded. In this regard the warnings attached to VARMECA - 20 motors must be observed.

During the operation, all the doors and protective devices must be kept in place.

7 - Maintenance and servicing

Refer to the manufacturer's documentation

VARMECA - 20

Variable speed motor or geared motor

CONTENTS

1 - GENERAL INFORMATION	25
1.1 - General principle.....	25
1.2 - Product name.....	25
1.3 - Characteristics	25
1.4 - Environment.....	27
1.5 - Radio-frequency interference.....	27
1.6 - Definition of cables and protection devices	30
1.7 - UL conformity.....	30
1.8 - Sizes and weight.....	30
2 -INSTALLATION.....	31
2.1 - General information	31
2.2 - Support reversing.....	31
2.3 - Adjustment of MINI DIP	31
3 - CONNECTIONS	32
3.1 - Wiring precautions	32
3.2 - Earth wiring	32
3.3 - Terminal blocks.....	33
3.4 - Diagram based on the standard configuration	34
3.5 - Power supply and control of the FCR brake motors	34
3.6 - Brake rectified voltage depending on the power supply network.....	35
3.7 - Case of power supply of 2 motors with or without brake in parallel with a single VARMECA	35
3.8 - Diagram of the SO VMA and VMA ESFR options	36
4 - COMMISSIONING	37
4.1 - Run command.....	37
4.2 - Speed control.....	37
5 - FAULTS - DIAGNOSTIC	37
6 - MAINTENANCE	38
6.1 - Maintenance	38
6.2 - Measurements	38
7 - OPERATION EXTENSION.....	39
7.1 - Speed control knob option (B)	39
7.2 - Control knob with integrated run-stop control option (B.MA)	39
7.3 - Control knob with forward/reverse/stop control option (B MAVAR)	39
7.4 - Internal speed control option (CVI VMA20)	39
7.5 - Braking resistor option (RF100 - RF200)	39
7.6 - External braking resistor option (RF - BRR - 800 - 200).....	39
7.7 - Power supply and electromechanical brake control option (SO VMA)	40
7.8 - Additional input/output interface and sequential brake control option (VMA ESFR).....	40
7.9 - Parameter-setting micro-console option (CDC-VMA20).....	40
7.10 - Parameter-setting software option (PEGASE VMA 20).....	40
7.11 - CEM filter option (FLT VMA21M).....	40
7.12 - CEM filter option (FLT VMA20).....	40
7.13 - Fielbus option.....	40

VARMECA - 20

Variable speed motor or geared motor

GENERAL INFORMATION

1 - GENERAL INFORMATION



- This manual describes the characteristics and the installation of VARMECA A20 and B20.
- VARMECA A20 and B20 are designed to operate in an industrial environment.
- If the run command has been enabled, the motor starts as soon as it is powered up.

1.1 - General principle

VARMECA - 20 is the physical association of a three phase asynchronous motor and of an integrated variable speed drive. The motor allows all kinds of assembling arrangements (foot or flange) and can be combined with standard geared motors from the LEROY-SOMER range.

In the standard version, the variable speed drive with integrated control does not require any connection other than the power supply.

The options may be used to broaden the applications range of VARMECA - 20.

Due to the advanced technology of the IGBT power module, very high technology and reduced noise levels are possible.

1.2 - Product name

VARMECA - 20					
Single phase power supply 200/240V ± 10%		Three phase power supply 200/240V ±		Three phase power supply 400/480V ±	
VMA Rating	Power (kW)	VMA Rating	Power (kW)	VMA Rating	Power (kW)
A or B 21M - 025	0.25	A or B 21TL - 025	0.25	A or B 21T - 025	0.25
A or B 21M - 037	0.37	A or B 21TL - 037	0.37	A or B 21T - 037	0.37
A or B 21M - 055	0.55	A or B 21TL - 055	0.55	A or B 21T - 055	0.55
A or B 21M - 075	0.75	A or B 21TL - 075	0.75	A or B 21T - 075	0.75
A or B 22M - 090	0.9	A or B 22TL - 090	0.9	A or B 21T - 090	0.9
A or B 22M - 110	1.1	A or B 22TL - 110	1.1	A or B 21T - 110	1.1
A or B 22M - 150	1.5	A or B 22TL - 150	1.5	A or B 22T - 150	1.5
		A or B 22TL - 180	1.8	A or B 22T - 180	1.8
		A or B 22TL - 220	2.2	A or B 22T - 220	2.2
				A or B 22T - 300	3
				A or B 22T - 400	4

Options	
Name	Description
B	Integrated speed control knob
BMA	Speed control knob and integrated run-stop control knob
BMAVAR	Speed control knob and integrated forward/reverse/stop control knob
CVI VMA 20	Integrated speed control
RF100 - RF200	Braking resistor with a power of 100 and 200W
RF - BRR - 800 - 200	Braking resistor with a power of 800W - External assembling
SO VMA	Power supply and fixed brake control - (only three phase mains supply of 400-480V)
VMA ESFR	Additional input/output interface and sequential brake control
CDC VMA 20	VARMECA 20 micro-console
PEGASE VMA 20	VARMECA 20 PC software
VMA COM PB	Fieldbus: PROFIBUS DP
VMA COM IS	Fieldbus: INTERBUS S
VMA COM DT	Fieldbus: DEVICENET
VMA COM CN	Fieldbus: CAN OPEN
FLT VMA 21 M	CEM filter for residential environment - Internal assembling (only for VMA21M)
FLT VMA 20	CEM filter for residential environment - Internal assembling for VMA22M/21T-TL/22T-TL

1.3 - Characteristics

1.3.1 - Power characteristics

Single phase

Power supply	Single phase mains supply 200V -10 % to 240V +10 % 50-60Hz
Output voltage	From 0V to the power supply voltage
Power range	0.25 - 0.37 - 0.55 - 0.75 - 0.9 - 1.1 - 1.5 kW
Maximum number of power-ups by hour	10

Three phase

Power supply	Three phase mains supply 200V -10 % to 480V +10 %, 50 - 60 Hz ± 5 %
Output voltage	From 0V to the power supply voltage
Power range	0.25 - 0.37 - 0.55 - 0.75 - 0.9 - 1.1 - 1.5 - 1.8 - 2.2* - 3 - 4 kW
Maximum number of power-ups by hour	limited

* 2.2 kW maximum for the 230V mains supply.

VARMECA - 20

Variable speed motor or geared motor

GENERAL INFORMATION

1.3.2 - Characteristics and functions

CHARACTERISTICS	VARMECA - 20
Overcharge	150 % In during 40s 10 times by hour
Motor frequency variation range	<ul style="list-style-type: none"> - from 12 to 80Hz at constant torque (the factory setting can be modified by means of the parameter-setting option) - from 12 to 50 Hz for general applications (the factory setting can be modified by means of the parameter-setting option) - from 6 to 220 Hz (VARMECA A20) or from 6 to 100 Hz (VARMECA B20)**
Efficiency	97.5 % x motor efficiency

PILOT CONTROL	VARMECA - 20
Speed reference	<ul style="list-style-type: none"> • Analogue reference (0V or 4mA = minimum speed) (10V or 20mA = maximum speed) <ul style="list-style-type: none"> - 0 - 10V by integrated potentiometer (option B) - 0 - 10V by remote potentiometer option - 0 - 10V by external reference* - 4 - 20mA by external reference* - Reference by internal potentiometer (option CVI - VMA 20) - Maximal speed limitation by the internal potentiometer (option CVI-VMA 20) • Digital reference <ul style="list-style-type: none"> - 1 to 4 preset speeds** • By fieldbus
Speed regulation	Regulation of a reference with integrated PI loop** (only VARMECA A20) Characteristics of the PI sensor: signal 0 - 10V ou 4 - 20 mA*
Run/Stop	<ul style="list-style-type: none"> • By power supply • By remote volt-free contact • By integrated run/stop control (option BMA) • By fieldbus
Forward/Reverse	<ul style="list-style-type: none"> • By internal connection to the terminal block • By remote volt-free contact • By integrated forward/reverse/stop control (option BMAVAR) • By fieldbus
Stop mode	<ul style="list-style-type: none"> • By ramp (by volt-free contact or integrated run/stop control) • Freewheel stop (by cutting the power supply)** • Freewheel stop (by volt-free contact or integrated run/stop control)** • By electromechanical brake (option SO VMA or VMA ESFR)
Ramps	<ul style="list-style-type: none"> • Selection by volt-free contact of the acceleration and deceleration ramps 2s or 5s (factory setting 5s for F max 80 Hz) • Ramps adjustable from 0 to 100s (VARMECA A20) or from 0 to 40s (VARMECA B20)**
Fieldbus	PROFIBUS DP, INTERBUS S, DEVICENET, CAN OPEN

SIGNALLING	VARMECA - 20
Visualisation with options: - B - BMA - BMAVAR - CVIVMA20	By indicator lamps <ul style="list-style-type: none"> • Steady green: mains supply presence • Flashing green: overcharge • Flashing green and red: current limitation • Flashing red: fault with or without voltage • Steady red: other fault
Relays	<ul style="list-style-type: none"> • Variable speed drive fault (other possible assignments**) <ul style="list-style-type: none"> volt-free contact - 1A - 250V - open contact, variable speed drive faulty or powered down
Analogue output	<ul style="list-style-type: none"> • Speed image 0 - 10V, 3mA / Current image*** / Power image*** • 0V = zero speed / 0V = 0A / 0V = 0 kW • 10V = maximum speed / 10V = 10A / 10V = 5 kW *** only VARMECA A20 **

PROTECTIONS	VARMECA - 20
Power	<ul style="list-style-type: none"> • Powered up • Overvoltage • Overcharges : <ul style="list-style-type: none"> - thermal variable speed drive and motor - blocked rotor protection • Short-circuit <ul style="list-style-type: none"> - motor windings
Torque limitation	• VARMECA B20 exclusively**
Control	• Short-circuit on 0 - 10V - 24V inputs or outputs
Fault reset	• By powering down VARMECA

* Adjustment by mini DIP (see par. 2.3)

** Accessible by the parameter-setting option (see VARMECA 20 manual - Parameter-setting).

VARMECA - 20

Variable speed motor or geared motor

IGENERAL INFORMATION & INSTALLATION

1.4 - Environment characteristics

Characteristics	Level
Index of protection	IP 65
Storage temperature	-40 °C to +70 °C (CEI 68.2.3). According to the CEI 60068-2-1 standard.
Transport temperature	-40 °C to +70 °C
Operating temperature	-20 °C to +50 °C (with power derated by 1% per °C, above 40 °C)
Altitude	< 1000 m without derating. The maximum authorised altitude is of 4000 m, but above 1000 m, the continuous output current should be derated by 1% by additional 100m over 1000 m (e.g.: for an altitude of 3000 m, derate by 20%).
Ambient humidity	95% without condensation
Humidity during storage	93%, 40 °C, 4 days
Vibrations	- Unpacked product : 0.01 g ² /Hz 1hr according to the CEI 60068-2-34 standard. - Sinusoidal vibration: 2-9 Hz 3.5 ms ⁻² – 9-200 Hz 10 ms ⁻² – 200-500 Hz 15 ms ⁻² according to the CEI 60068-2-6 standard.
Shocks	Packed product: 15 g, 6 ms, 500 times/direction in all 6 directions according to the CEI 60068-2-29 standard.
Immunity	According to EN 61000-6-2
Conducted and radiated emissions	According to EN 61000-6-4
UL standards	According to UL 508 C (E211799)

1.5 - Radio-frequency interference

1.5.1 - General

The variable speed drives use high-speed switches (transistors, semi-conductors) which switch high voltages (around 550V for the three phase variable speed drives) at high frequencies (several kHz). This provides better efficiency and a low motor noise.

Therefore, they generate radio-frequency signals which may disturb the operation of other equipment or the measurements taken by the sensors:

- due to high-frequency leakage currents which escape to earth via the leakage capacity of the variable speed drive/motor cable and that of the motor by the metal structures holding the motor.
- by R.F. signal conduction or feedback on the power supply cable: conducted emissions,
- by direct radiation near to the mains supply power cable or the variable speed drive/motor cable: radiated emissions.

These phenomena are of direct interest to the user.

The frequency range concerned (radio-frequency) does not disturb the energy distributor.



The conformity of the variable speed drive is assured only if the mechanical and electrical installation instructions described in this manual are observed.

VARMECA - 20

Variable speed motor or geared motor

GENERAL INFORMATION & INSTALLATION

1.5.2 - Electromagnetic compatibility (CEM)

CAUTION :

The conformity of the variable speed drive is assured only if the mechanical and electrical installation instructions described in this manual are observed.

Immunity			
Standard	Description	Application	Conformity
EN 61000-4-2	Electrostatic discharges	Product casing	Level 3 (industrial)
EN 61000-4-3	Immunity standards for the radiated radio-frequency	Product casing	Level 3 (industrial)
EN 61000-4-4	Fast transient burst	Control cable	Level 4 (hard industrial)
		Power cable	Level 3 (industrial)
EN 61000-4-5	Surges	Power supply lines between phase and earth	Level 4
		Power supply lines between phases	Level 3
		Signal circuit to earth (see par. 1.5.5)	Level 2
EN 61000-4-6	Generic immunity standards for the conducted radio-frequency	Control and power cables	Level 3 (industrial)
EN 61000-6-1	Generic immunity standards for the residential, commercial and light industrial environments	-	In conformity
EN 61000-6-2	Generic immunity standards for the industrial environment	-	In conformity
EN 61800-3	Variable speed drive standards	In conformity with the first and second environment	

Emission				
Standard	Description	Application	Conformity conditions according to the switching frequency	
			With RFI filter	
			Internal (standard)	Integrable (option) FLT VMA 21 M FLT VMA 20
EN 61800-3	Variable speed drive standards	Second environment with unrestricted distribution (DENR)	≤ 11 kHz	≤ 11 kHz
		Second environment with restricted distribution (DER)	≤ 11 kHz	≤ 11 kHz
		First environment with unrestricted distribution (R)	NON	≤ 11 kHz
		First environment with restricted distribution (I)	≤ 4 kHz	≤ 11 kHz
EN 61000-6-3	Generic emission standards for the residential, commercial and light industrial environments	A.C. mains supply	NO	≤ 11 kHz
EN 61000-6-4	Generic emission standards for the industrial environment	A.C. mains supply	VMA 21T ≤ 8 kHz VMA 22T ≤ 4 kHz	≤ 11 kHz

⚠ The second environment includes the industrial networks supplied with low voltage but which do not serve buildings for domestic use. The operation of a variable speed drive without RFI filter in such an environment may cause interference on certain electronic appliances located close to the variable speed drive whose level of immunity might not be compatible with the industrial conditions. It is impossible to filter the disturbed element, add an external RFI filter.

VARMECA - 20

Variable speed motor or geared motor

GENERAL INFORMATION

1.5.3 - Earth leakage current

The earth leakage current may depend on the type of the RFI filter used. VARMECA 20 is supplied with its filter integrated and cabled. The leakage current levels depend also on the voltage and/or of the power supply frequency and of the motor dimension.

In all cases in order to assure the conformity with the immunity standards, a voltage limiting device is connected to earth. The shunt current is insignificant in normal circumstances.

! When the internal filter is disconnected a permanent earth connection must be provided or any other appropriate measure must be taken in order to avoid any risk of electric shock in case of earth continuity loss.

1.5.3.1 - Use of leakage current detector (differential circuit breaker)

There are 3 types of detectors:

- 1- AC type: which detects the AC faults. Not to be used with the variable speed drives.
- 2- A type: which detect the AC faults and the pulsed DC faults (provided that the DC is cancelled out at least once by cycle). Only for use with single phase variable speed drives.
- 3 - B type: which detects the AC faults, the pulsed DC faults and the smoothed DC faults. **Only this type is suitable for use with nvariable speed drives.**

Note: In case of an external RTI filter, a delay of 50 ms must be applied in order not to take into account the accidental faults.

1.5.4 - Control cable immunity

The control cable immunity can be increased outside VARMECA 20 by one of the following 2 methods:

- The use of a shielded twisted pair cable with a shielding connected to earth on its circumference at less than 100 mm of VARMECA 20.
- Running the cable through a ferrite ring at maximum 100 mm from VARMECA 20.

Note: Several control cables can pass through a single ferrite.

1.5.5 - Control circuit immunity when overvoltage occurs

The immunity to control circuit overvoltages or long cable lengths and connection to the outside of a building.

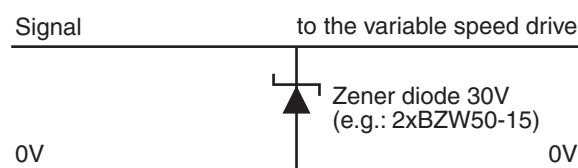
The various variable speed drive input and output circuits are in compliance with the EN61000-6-2 (1kV) standard on overvoltages.

There are some exceptions, where the installation may be exposed to overvoltage peaks which exceed the levels determined by the standard. This may be the case of lightning strikes or earth faults associated with long cable

lengths (>30 m). In order to limit the risks of damaging the variable speed drive, the following precautions could be taken:

- input/output galvanic isolation,
- duplication of the cable shielding with an earth wire of minimum 10mm². The cable shielding and the earth wire must be linked at both ends and connected to earth by the shortest possible connection. This stratagem allows the running of high currents into the earth wire, rather than into the shielding.
- reinforcement of the logic and analogue inputs/outputs by adding a zener or a peak limiter.

Elimination of uni-directional logic and analogue input/output overvoltages



This circuit is available in module (assembling on rail), eg. at Phoenix Contact (uni-directional: TT UKK5 D/24 DC).

These circuits are not suitable for encoder signals or for high speed logic data networks, since the diode may affect the signal. Most of the encoders have a galvanic isolation between the motor casing and the encoder circuit and, in this case, no precautions are necessary. For the data networks, follow the network specific recommendations.

VARMECA - 20

Variable speed motor or geared motor

GENERAL INFORMATION

1.6 - Definition of cables and protection devices

! It is the responsibility of the user to connect and provide protection for VARMECA 20 according to the legislation and regulation in force in the country of use. This is particularly important as regards the size of the cables, the type and the rating of fuses, the earth or ground connection, the powering down, the fault settlement, the insulation and the protection against overcurrents.

- These tables are given for information only and must under no circumstances be used instead of the standards in force.
- If a circuit-breaker is used, this must be of the motor circuit-breaker type (curve D).
- The differential circuit-breaker must be of type B. A too high number of devices connected to a single differential circuit-breaker may switch it on. It is important to make sure that the differential protects only VARMECA 20.
- Observe the sizes of the protection fuses.

P (kW)	Single phase power supply 230V				Three phase power supply 230V				Three phase power supply 400V			
	VMA rating	I (A)	gl fuses or circuit breaker (A)	Cables (mm ²)	VMA rating	I (A)	gl fuses or circuit- breaker (A)	Cables (mm ²)	VMA rating	I (A)	gl fuses or circuit- breaker (A)	Cables (mm ²)
0.25	A or B 21M-025	3.5	8	1.5	A or B 21TL-025	2	4	1.5	A or B 21T-025	1	4	1.5
0.37	A or B 21M-037	4	10	1.5	A or B 21TL-037	3	6	1.5	A or B 21T-037	1.5	4	1.5
0.55	A or B 21M-055	4.5	10	1.5	A or B 21TL-055	4	6	1.5	A or B 21T-055	2	6	1.5
0.75	A or B 21M-075	7	16	2.5	A or B 21TL-075	5	8	1.5	A or B 21T-075	3	6	1.5
0.9	A or B 22M-090	9	16	2.5	A or B 22TL-090	5.5	10	1.5	A or B 21T-090	3.5	8	1.5
1.1	A or B 22M-110	11	20	2.5	A or B 22TL-110	6	10	1.5	A or B 21T-110	4	10	1.5
1.5	A or B 22M-150	14	25	2.5	A or B 22TL-150	7	16	2.5	A or B 22T-150	5	10	1.5
1.8					A or B 22TL-180	7.5	16	2.5	A or B 22T-180	5.5	10	2.5
2.2					A or B 22TL-220	8	16	2.5	A or B 22T-220	6	10	2.5
3									A or B 22T-300	7	16	2.5
4									A or B 22T-400	8	16	2.5

Note:

- The mains supply current is a typical value which depends on the source impedance. The higher the impedance, the lower the current.
- The fuses (UL certified) are provided for installations able to provide maximum 5000A under 480V.

1.7 - UL conformity

1.7.1 - Specified mains supply

The variable speed drive may be incorporated in an installation which can deliver maximum 5000A rms at a voltage of maximum 264Vca rms for 230V (TL) variable speed drives or of maximum 528Vca rms for 400V (T) variable speed drives.

1.7.2 - Cables

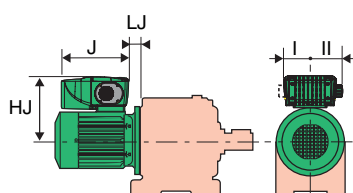
Only 60/75°C (140/167° F) class 1 copper cables should be used.

1.7.3 - Fuses

The UL conformity is assured if the fuses used are UL-listed, fast-blow fuses, (class CC up to 30A and class J up to 30A thereafter) with a rating as indicated in the table above, and if the symmetrical short-circuit current does not exceed 5kA.

Example of fast-blow fuses: Limitron KTK de Bussman, Amp - trap ATM by Gould.

1.8 - Sizes and weight



Type	Sizes in mm							Weight of VARMECA (kg)
	HJ	J	I	II	LJ			
					B3/B14	B5	B5	
LS 71 L	181	216	75	94	8	8	34	4.2
LS 80 L	191	216	75	94	12	12	39	4.2
LS 90 S et L	201	216/230	75	94	12	32	32	4.2
LS 100 L	206	230	75	94	12	12	33	4.2
LS 112 M	206	230	75	94	12	12	33	4.2
LS 112 MG	215	230	75	94	20	20	16.5	4.2

VARMECA - 20

Variable speed motor or geared motor

INSTALLATION & CONNECTIONS

2 - INSTALLATION



• It is the responsibility of the owner or of the user to make sure that the installation, the operation and the maintenance of the modulator and of its options are made in compliance with the legislation relating to the safety of the equipment and personnel and with the regulation in force in the country of use.

• Before carrying out any work, disconnect and lock the variable speed drive power supply and wait 2 minutes to make sure that the single phase range capacitors are completely discharged.

• After connection, make sure that the seals are firmly in place and that the screws and the cable glands are watertight to ensure the IP 65 protection.

2.1 - General information

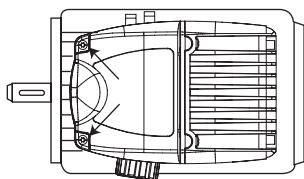
VARMECA - 20 is fitted to the machine like a standard motor by means of flanges or foots.

The motor fan cools the whole assembly. Make sure that the ventilation air inlet is not obstructed.

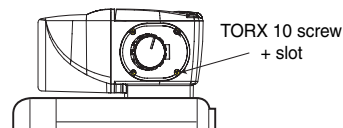
The position of the potentiometer/cable gland supports is established when controlling, however they may be reversed if necessary.

2.2 - Reversing the supports

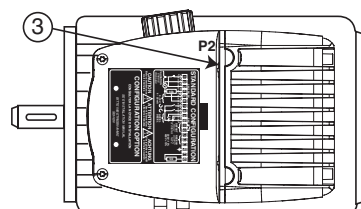
1) Unscrew the 2 TORX 20 screws + slot and remove the cover.



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



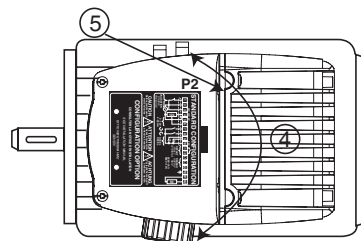
3) Disconnect the P2 connector layer if the option is connected.



4) Reverse the option and cable gland supports.

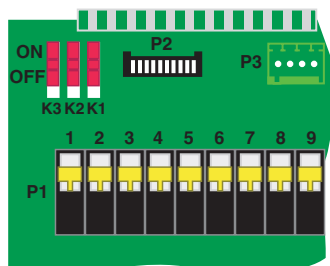
5) Reconnect the layer to P2 of the printed circuit and put the fastening screws in their place.

6) Put the cover in place.



2.3 - MINI DIP adjustments

Allow the reference selection, the U/F law selection and the choice of the order on the terminal 2 analogue input. (see VARMECA-20 manual - Parameter-setting).



MINI DIP	OFF	ON
K1 Speed reference	Reference 4 - 20mA	Reference 0 - 10V
K2 Analogue input terminal 2	4 - 20mA	0 - 10V
K3 Loi U/F	U/F Law factory settings	U/F Law constant

Factory adjustments

CAUTION :

This handling must be made adequately and by a qualified and authorised personnel.

VARMECA - 20

Variable speed motor or geared motor

CONNECTIONS

3 - CONNECTIONS

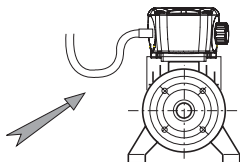
- ⚠ • All connection works must be performed in accordance with the laws in force in the country in which it is installed. This includes the earthing or the grounding in order to make sure that no directly accessible part of the variable speed drive can be connected to the mains supply voltage or to any other voltage which may be dangerous.
- The voltages existing on the cables or the mains supply connections, the motor, the braking resistor or the filter may cause fatal electric shocks. Contract must be avoided in all circumstances.
- The variable speed drive must be supplied with power via a circuit-breaking device so that it can be powered down in a safe manner.
- The variable speed drive contains capacitors which remain loaded at a fatal voltage, even if the power supply has been cut off.
- Wait 2 minutes after powering down the variable speed drive before removing the protection devices.
- The variable speed drive must be protected against overcharges and short-circuits.
- It is vital to comply with the rating of the protection devices.
- Connection exclusively by copper conductor.
- Check to see if the voltage and the current of the variable speed drive, the motor and the mains supply are compatible.
- After the variable speed drive operation, the heater may be very hot, therefore avoid touching it.

3.1 - Wiring precautions

- When VARMECA 20 is remotely controlled, avoid the parallel routing of the power cables and of the control cables.
- All the remote control cables must be shielded and have a section between 0.22 mm² and 1 mm². The shielding must be connected to earth at both sides.

- ⚠ • VARMECA 20 has a positive logic configuration. The use of a variable speed drive with a control system having different control logic may cause an accidental starting of the motor.
- In the variable speed drive the control circuits are isolated from the power circuits by a simple insulation. (CEI 664-1). The installer must ensure that the external control circuits are isolated against any human contact.
- If the control circuits need to be connected to circuits complying with the SELV safety requirements, an additional insulation must be inserted in order to maintain the SELV classification.

- Run the cables towards the cable gland with a curve radius allowing it to avoid the water intrusion.
- Tighten well the cable gland.



3.2 - Earth wiring

The 0V of the control terminal is connected to the terminal block grounding. Make sure that the earthing connected to VARMECA is adequate. Check to see if the voltage between the phase and the earthing is balanced. If the earthing is not adequate, VARMECA 20 may be subject to a "safe" stopping. In this case remove the green / yellow wire getting out from the variable speed drive (together with the black, red and the white wire) and **connect the earth directly to the motor casing and not to the PE terminal of the P1 power terminal block.**

- ⚠ If this wiring modification is made, the integrated filter is no longer active and VARMECA is no longer in compliance with the CEM directive (art. 1.5.2).

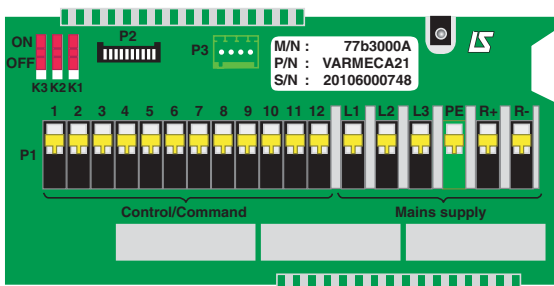
VARMECA - 20

Variable speed motor or geared motor

CONNECTIONS

3.3 - Terminal blocks

3.3.1 - Terminal block integration



3.3.2 - P1 terminal block

Standard configuration

Ref.point	Functions - Characteristics
L1, L2 L1, L2, L3	Connection of the mains supply protected phases 200V to 240V ± 10 %, 50-60Hz in single phase 200V to 480V ± 10% 50-60Hz in three phase
PE	Earth connection
R1, R2	Braking resistor connection Resistor minimum value = 180 Ohms
** 1	Locking logic input Unconnected terminals 1 and 3: locked drive Connected terminal 1 and 3: unlocked drive
2	Speed analogue output 0 to +10V, 3mA 0V = zero speed 10V = maximum speed Analogue input: see VARMECA - 20 manual - Parameter-setting
3	Source +24V, 30mA (± 10 %) Common to terminal 10
4	Source +10V, 30mA (± 10 %)
5	0V - Connected to the terminal block ground*
6	Reference input 0 to +10V or 4-20mA 0-10V: input impedance = 100 kOhms 4-20mA: iinput impedance = 0.5 kOhms
7	Reverse/stop logic input
** 8	Forward/stop logic input
** 9	Ramp selection logic input 1s(for 0 to 50Hz):unconnected terminals 9 and 10 3s (for 0 to 50Hz):conected terminals 9 and 10
10	Source +24V - 30mA Common to terminal 3
11, 12	Fault relay - volt free contact 250V 1A Open contact: powered down or in trip status Closed contact: in operation

* Make sure that the signals connected to the control terminals are voltage free.

** VARMECA 20motors are delivered accompanied by a shunt. The inputs are thus validated for the forwarding.

3.3.3 - Connector P2

It allows the option connection by knob (B), Integrated run/stop (BMA), integrated forward/reverse/stop (BMAVAR),...

3.3.4 - Connector P3 of RS232 series link type

It allows the connection of the CDC VMA 20 micro-console or of a PC for the use of the PEGASE VMA 20 programming software or of the fieldbus option cards.

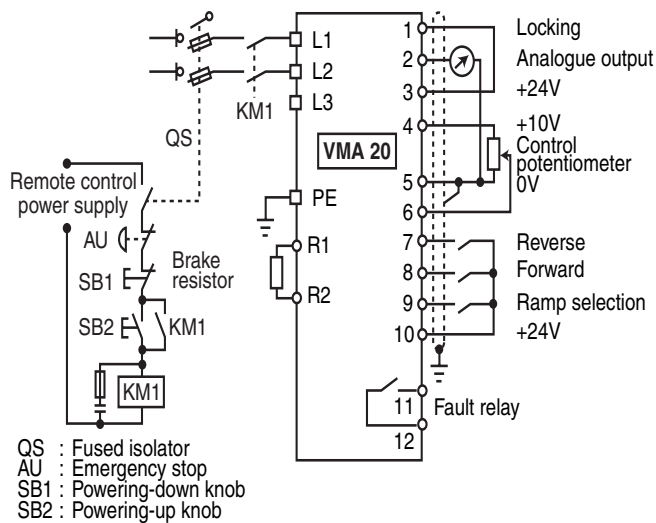
VARMECA - 20

Variable speed motor or geared motor

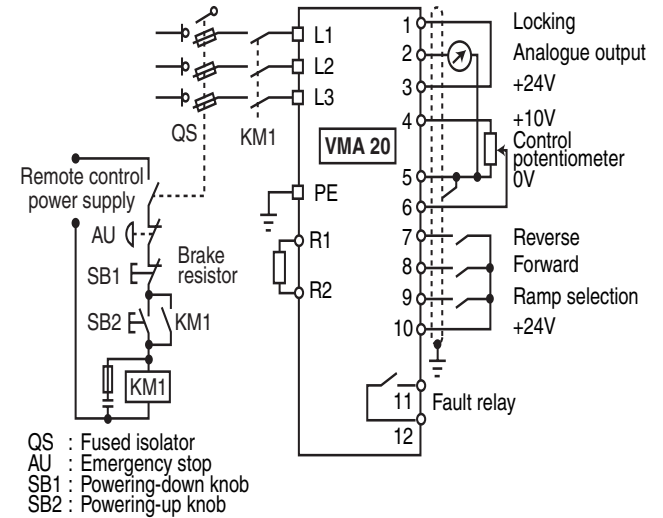
CONNECTIONS

3.4 - Diagram based on the standard configuration

3.4.1 - VARMECA - 20 single phase connection



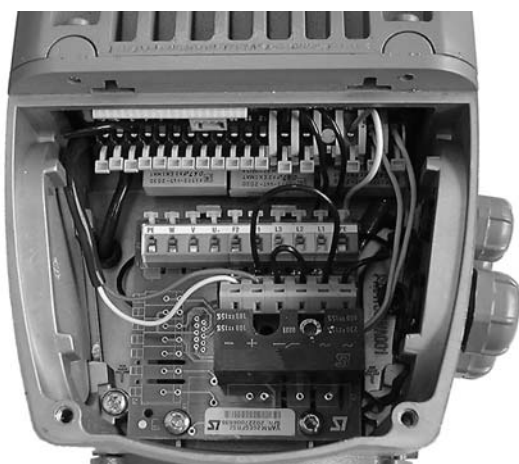
3.4.2 - VARMECA - 20 three phase connection



3.5 - Power supply and control of the FCR brake motors

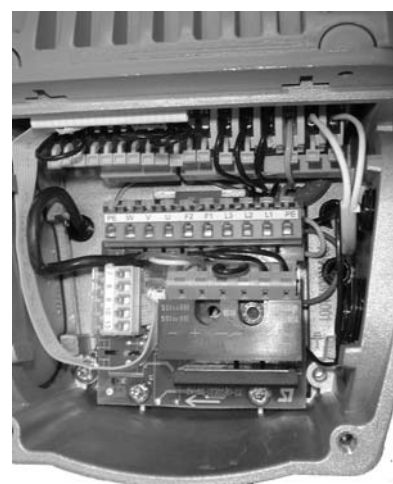
3.5.1 - Power supply of the fixed control integrated brake (SO VMA option)

- The brake is supplied with power by means of a rectifier fixed on the SO VMA connection card. The connection is made according to the factory configuration.
- The rectifier is supplied with power by a mains supply phase and by the motor star point.
- No VARMECA parameter-setting is necessary.
- The brake putting on takes place since the validation of the VARMECA run command. The brake release is effective after a stop command, at the end of the deceleration ramp or on the mains supply circuit-breaking.



3.5.2 - Power supply of the sequential control integrated brake (VMA ESFR option)

- The brake is supplied with power by means of a rectifier and of a static relay fixed on the VMA ESFR connection card. The connection is made according to the factory configuration.
- The rectifier is supplied with power by two mains supply phases.
- The brake is controlled starting with a sequence adjustable by means of the VARMECA parameters.



3.5.3 - Separated power supply

The brake is supplied with power and controlled by an external source.

VARMECA - 20

Variable speed motor or geared motor

CONNECTIONS

3.6 - Brake rectified voltage depending on the mains supply

Mains supply	VMA rating	Power (kW)	FCR brake voltage	
			SO VMA option	VMA ESFR option (only VMA B20)
Single phase power supply 200/240V	A or B 21M-025	0.25	NR	180V DC
	A or B 21M-037	0.37		
	A or B 21M-055	0.55		
	A or B 21M-075	0.75		
	A or B 22M-090	0.9		
	A or B 22M-110	1.1		
Three phase power supply 200/240V	A or B 21TL-025	0.25	NR	180V DC
	A or B 21TL-037	0.37		
	A or B 21TL-055	0.55		
	A or B 21TL-075	0.75		
	A or B 22TL-090	0.9		
	A or B 22TL-110	1.1		
	A or B 22TL-150	1.5		
	A or B 22TL-180	1.8		
Three phase power supply 400/480V	A or B 21T-025	0.25	120V DC	180V DC
	A or B 21T-037	0.37		
	A or B 21T-055	0.55		
	A or B 21T-075	0.75		
	A or B 21T-090	0.9		
	A or B 21T-110	1.1		
	A or B 22T-150	1.5		
	A or B 22T-180	1.8		
	A or B 22T-220	2.2		
	A or B 22T-300	3		
A or B 22T-400	4	100V DC		

NR : Not performed, provide a separate power supply.

3.7 - Case of power supply of 2 motors with or without brake in parallel with a single VARMECA

3.7.1 - VARMECA size determination must be made for the total motor power

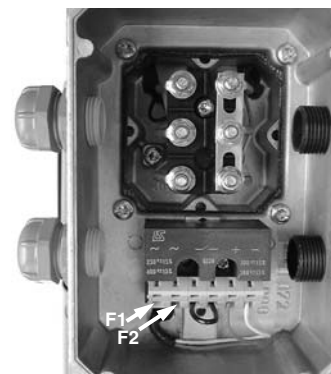
- It is necessary to use the 4 cable gland flabby option in order to facilitate the wiring of the second motor.

3.7.2 - The connection of the second motor is to be made on the located terminal block U, V, W and PE of the SO VMA and VMA ESFR options.

3.7.3 - Connection of the second motor brake

- With the SO VMA option, the rectifier is supplied with power between the motor star point and a mains supply phase coming from the terminal F1 of the SO VMA option.

- With the VMA ESFR option, the rectifier is supplied with power between 2 mains supply phases and the static relay, connection to be made on the terminals F1 and F2 of the VMA ESFR option.



Terminals F1 and F2 of VMA ESFR option



Terminal F1 of SO VMA option

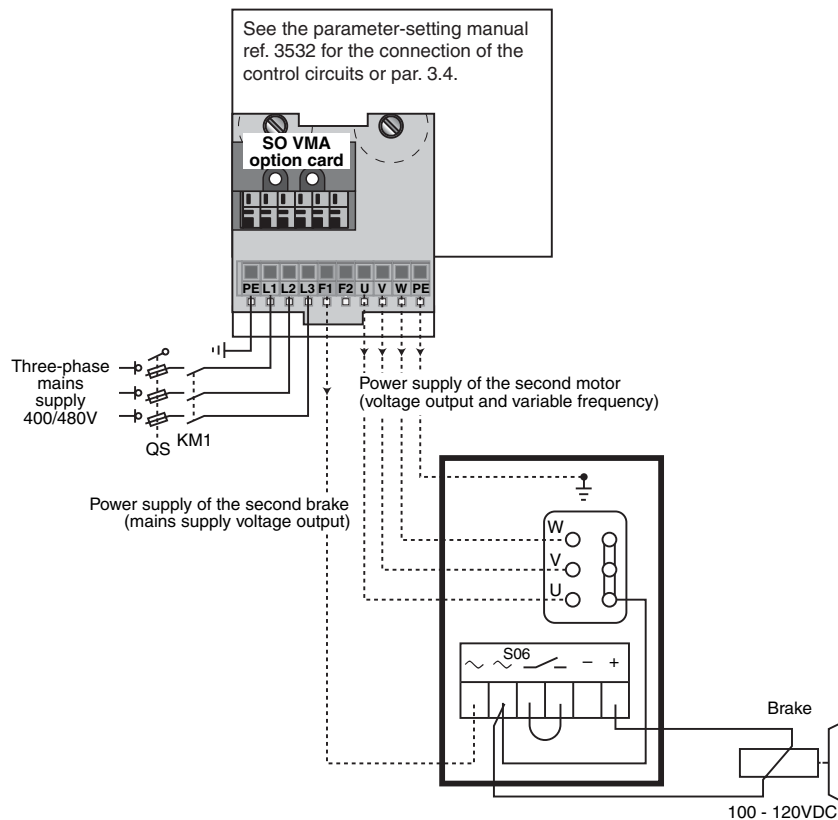
VARMECA - 20

Variable speed motor or geared motor

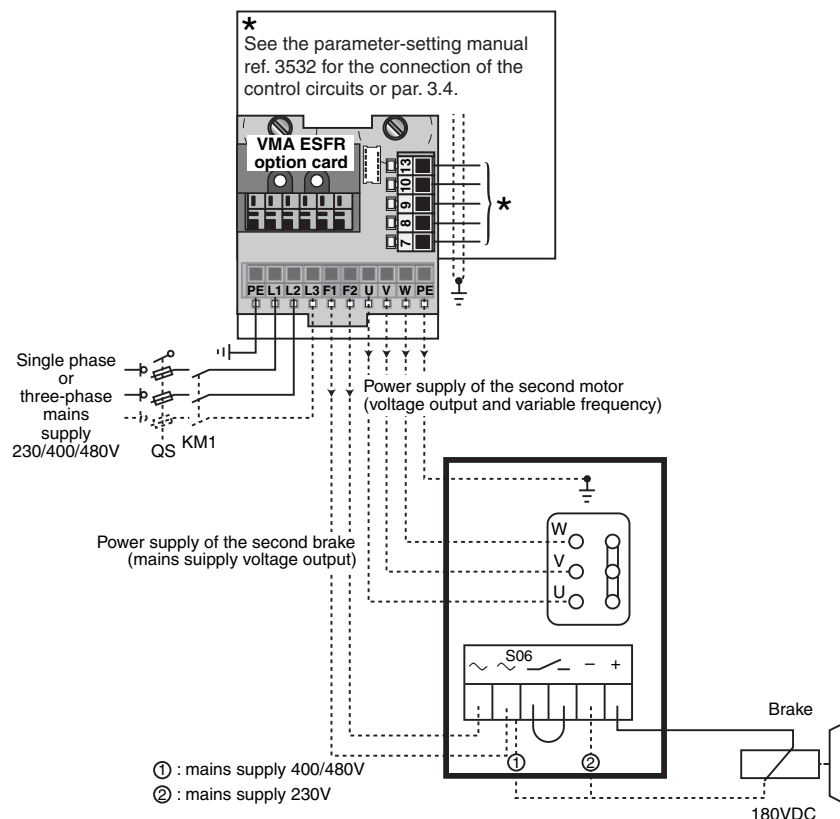
CONNECTIONS

3.8 - Diagram of SO VMA and VMA ESFR options

3.8.1 - Connection of SO VMA option



3.8.2 - Connection of VMA ESFR option




VARMECA - 20


Variable speed motor or geared motor

COMMISSIONING & FAULTS - DIAGNOSTIC

4 - COMMISSIONING

 • Before powering on VARMECA - 20, check to see if the electrical connections are correct and if the driven parts are mechanically protected.

• For the safety of the personnel, VARMECA - 20 must not be powered on with the protection cover removed.

 • The run command being validated, the motor starts since its powering on.

4.1 - Run command

- Powering on: the green indicator lamp is steadily lit up.
- The control terminals 1 and 3 are connected (unlocking).

4.1.1 - Automatic start

- By letting the wire between the control terminals 8 and 10, the motor starts forwarding.

4.1.2 - Remote control start

- Close the turned off course contact (control terminals 8 and 10 or 7 and 10) in order to control the start of the motor in the selected direction.

4.1.3 - Start by integrated key

- With the BMA option (integrated run/stop) or BMAVAR (forward/reverse/stop) the motor start is made by pressing for 1s on the run key.

4.2 - Speed control

4.2.1 - External order

- Adjust the speed order by means of the chosen reference (0/10V or 4/20mA).

4.2.2 - Adjustment knob (B) and remote potentiometer option

- Adjust the speed order by means of the adjustment knob or of the remote potentiometer 10 kΩ.

4.2.3 - Internal speed control option (CVI VMA20)

- Adjust the speed order by means of the internal speed potentiometer
- Control the maximum speed or the minimum speed potentiometer if it is not possible to reach the selected speed.

5 - FAULTS - DIAGNOSTICS

The indications related to VARMECA - 20 status are provided by 2 indicator lamps located on the command option.

Indicator lamp colour and sta-	Fault reason	Control to be performed
Steady green	No fault mains supply present	If the motor does not run, check to see if: - the terminals 1 and 3 are connected, - a run command is well validated: the terminals 7 and 10 or 8 and 10 are connected.
Flashing green and red	Current limitation	• Check to see if the motor is not overloaded or stalled
Flashing green	Overcharge	• The motor is overloaded: check the motor current by using an ammeter clamp par. 6.2.2
Steady red	<ul style="list-style-type: none"> • Short-circuit of a motor winding • Motor rotor blocking • Winding insulation fault • Thermal I²t • Internal fault • Overvoltage 	<ul style="list-style-type: none"> • Check to see if any accident has occurred • Power down, then power up in order to clear the fault • Check to see if the deceleration ramp is long enough (5s) for the high inertia applications. • Check the earthing conformity • Check to see if the deceleration ramp is long enough (5s) for the high inertia applications. • If the fault is not eliminated, consult LEROY-SOMER
Flashing red	• Powered up	<ul style="list-style-type: none"> • Check the mains supply voltage • Power down, then power up

The fault is cleared by powering down VARMECA - 20.

VARMECA - 20

Variable speed motor or geared motor

OPERATION EXTENSIONS

7 - OPERATION EXTENSIONS

7.1 - Speed control knob option (B)

The speed is set by using a knob with graduations from 15 to 100%. With 2 indicator lamps. Connection to P2 connector.



7.2 - Control knob with integrated run/stop control option (BMA)

In addition to the speed control, a run key and a stop key allow the local control of VARMECA-20 as required, once it has been powered on. For a run command to be taken into account, the key must be held down for one second.

- Connection to P2 connector.
- Dot not wire the shunt between the terminals 7 - 10 and 8 - 10.
- 2 indicator lamps.



7.3 - Control knob with integrated forward/reverse/stop control option (BMAVAR)

In addition to the speed control, a forward key, a reverse key and a stop key allow the local control of VARMECA-20 as required, once it has been powered on. For a run command to be taken into account, the key must be held down for one second.

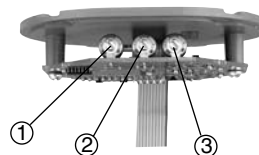
- Connection to P2 connector.
- Dot not wire the shunt between the terminals 7 - 10 and 8 - 10.
- 2 indicator lamps.



7.4 - Internal speed control option (CVI VMA20)

The speeds are set by potentiometers which are accessible once the cover has been removed.

- ① a minimum speed potentiometer: calibration of the minimum speed,
 - ② an internal speed potentiometer: speed control which replaces the control by the control knob.
 - ③ a maximum speed potentiometer: calibration of the maximum speed.
- There are also 2 indicator lamps.



7.5 - Braking resistor option (RF100 - RF200)

In order to operate in the 4 quadrants and to dissipate the energy, the resistors are fixed directly onto the VARMECA terminal block.

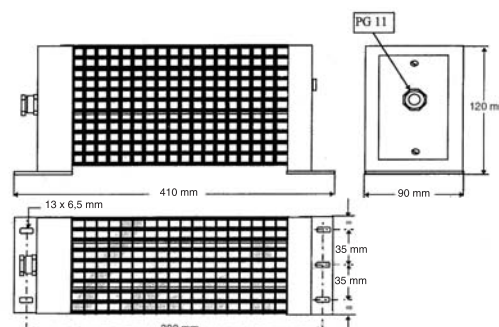


	RF 100			RF 200		
	Peak P kW	Thermal P kW	Value Ω	Peak P kW	Thermal P kW	Value Ω
VMA A or B 21T	2.8	0.1	200	2.8	0.2	200 (2x100 in series)
VMA A or B 21M/TL	0.65			0.65		
VMA A or B 22T	2.8			2.8		
VMA A or B 22M/TL	0.65			0.65		

External resistors with a greater thermal power can be used provided that the minimum ohmic value of 180 Ω be complied with.

7.6 - External braking resistor option (RF - BRR - 800 - 200)

	Peak P kW	Thermal P kW	Value Ω
VMA A or B 21/22T	2.8	0.8	200
VMA A or B 21/22M-TL	0.65		



VARMECA - 20

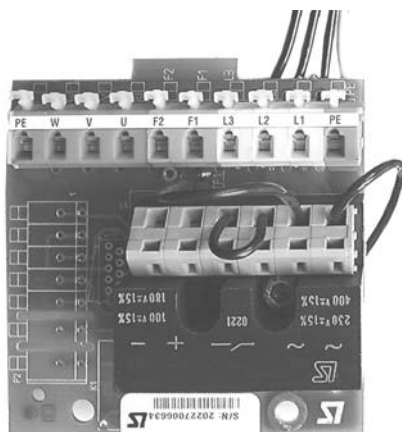
Variable speed motor or geared motor

OPERATION EXTENSIONS

7.7 - Power supply and electromechanical brake control option (SO VMA)

The motor must be fitted with a **FCR brake adapted** to VARMECA - 20.

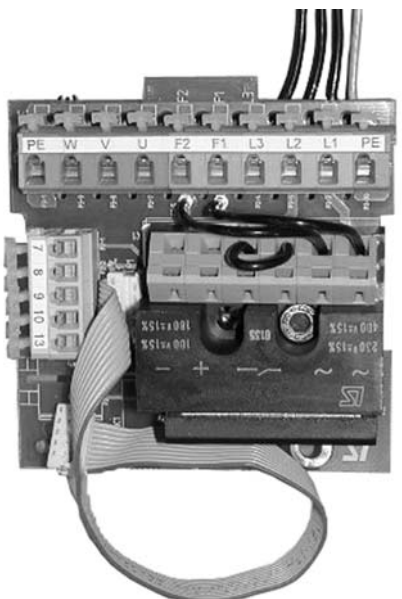
The brake power supply is integrated. The brake release takes place once the run command has been validated. The brake putting on taken place after a run command, at the end of the deceleration ramp or on the mains supply circuit-breaker.



7.8 - Additional input/output interface and sequential brake control option (VMA ESFR)

The brake power supply is integrated. The brake is controlled based on a sequence adjustable by VARMECA parameters. An additional logic input allows the obtaining of a preset speed or the brake electrical release.

See the parameter-setting manual, ref. 3532.



7.9 - Parameter-setting micro-console option (CDC-VMA20)

The micro-console option provides access to the variable speed drive internal settings (terminal block configuration, ramp, speed and PI settings...).

See VARMECA - 20 manual - Parameter-setting.

Option description:

1 CDC-VMA micro-console

1 cable of L = 3m



7.10 - Parameter-setting software option (PEGASE VMA 20)

This option provides access to the variable speed drive internal settings from a PC. The software is compatible with WINDOWS 95, 98, NT and the subsequent versions.

See VARMECA - 20 manual - Parameter-setting.

Option description:

1 software

1 cable of L = 3 m

7.11 - CEM filter option (FLT VMA21M)

The filter is mounted into the VMA21M terminal block. VARMECA is therefore adequate in a residential environment.

7.12 - CEM filter option (FLT VMA20)

The filter is mounted into the VMA 22M, 21/22 TL, 21/22T terminal block.

VARMECA is therefore adequate in a residential environment

7.13 - Fieldbus options

The interface card is fixed inside the terminal block casing. Protocols: PROFIBUS DP, INTERBUS S, DEVICENET, CAN OPEN.

