Leybold

SOGEVAC® SV40 BI

Single-stage, oil-sealed rotary vane pump

Original operating instructions 300270128_002_C0

Ref.:
960331V3002
960331V3005
960331V3009
960359V

Contents

Important Safety Information

Warning

Indicates procedures that must be strictly observed to prevent hazards to persons.

Caution

Indicates procedures that must be strictly observed to prevent damage to, or destruction of the product.

Note

Emphasises additional application information and other useful information provided within these Operating Instructions.

The Leybold® SV40 BI has been designed for safe and efficient operation when used properly and in accordance with these Operating Instructions. It is the responsibility of the user to carefully read and strictly observe all safety precautions described in this section and throughout the Operating Instructions. The Sogevac® SV40 BI **must only be operated indoor in the proper condition and under the conditions described in the Operating Instructions**. If not, the protection provided by the equipment may be impaired. It must be operated and maintained by trained personnel only. Consult local, state, and national agencies regarding specific requirements and regulations. Address any further safety, operation and/or maintenance questions to our nearest office.

Warning

Failure to observe the following precautions could result in serious personal injury!

Sogevac® pumps are not designed:

- for pumping of dusty, aggressive, corrosive, flammable or explosive gases or gases mixtures,
- for pumping of oxygen or other highly reactive gases with a greater concentration than atmospheric concentration (>20%),
- for working in flammable, explosive or dusty environment.

For all these cases, special materials must be used. In case of doubt, please contact Leybold.

See also the limits of use indicated in the CE declaration of conformity.

Never expose part of the body to the vacuum. There is a danger of injury. Never operate the pump with an open and thus accessible inlet. Vacuum connections as well as oil filling and oil draining openings must not be open during operation of the pump.

When operating pump is hot and some surfaces could reach a temperature higher than 80 °C (176 °F). There is a risk of burn by touching.

Warning

Depending on the process involved, dangerous substances and oil may escape from the pump. Take the necessary safety precautions !

Pump must not be operated above 2000 m sea level.

Disconnect the unit from the power supply before starting any work.

Safety Information

Warning

These installation and operating instructions are valid for mass spectrometer use of the Sogevac® pumps, model SV40 BI.
The Sogevac® vacuum pumps have been manufactured according to the latest technical standards and safety regulations. If not installed properly or not used as directed, dangerous situations or damages could occur.

It is mandatory that these operating instructions be read and understood prior to vacuum pump installation and start-up.

The pump complies to the standard EN 61010-1-2004.

Warning

Take appropriate precautions to insure that the pump cannot start.

If the pump has pumped hazardous gases it will be absolutely necessary to determine the nature of the hazard involved and take the appropriate safety precautions.

Observe all safety regulations!

Take adequate safety precautions prior to opening the intake or exhaust port.

Caution

Failure to observe the following precautions could result in damage to the equipment!

Liquid and solid particles must not enter the pump. Install the adequate filters, separators and/or condensers. In case of doubt consult Leybold.

The intake line of the pump must never be connected to a device with over atmospheric pressure. Design the exhaust line so that no pressure higher than 1,15 bar abs. (0,15 bar rel.) can occur.

Operating of the pump without oil or operating with incorrect direction of rotation can destroy the pump.

Note

Never use discarded seals. Always assemble using new seals.

Respect the instructions concerning environment protection when discarding used oil or exhaust filters!

The pump must be packaged in such a way that it will not be damaged during shipping, and so that no harmful substances can escape from the package.

We reserve the right to alter the design or any data given in these Operating Instructions. The illustrations are not binding.

Caution

Caution : hot surface ! In normal operation, the pump surface temperature can exceed 80°C. There is a risk of burning. Switch off the pump and let it cool down before any intervention or take appropriate precautions.

1 Description

Sogevac® pumps are designed for pumping of inert gases in the range of rough vacuum, between atmospheric pressure and ultimate pressure of the pump.

When removing condensable vapours, periodic opening of the gas ballast valve is required.

1.1 Principle of operation

The Sogevac® pumps SV40 BI are single-stage oil-sealed rotary vane vacuum pumps.

The rotor, having three slots in which the vanes are sliding, is eccentrically installed in a pump cylinder (stator).

The vanes separate the interior space into 3 chambers. The volume of these chambers varies with the rotation of the rotor.

The gas sucked into the inlet chamber is compressed and then pushed out at the exhaust valve.

The oil injected in the inlet chamber guarantees the air-tightness, the lubrication and cooling of the pump. It is dragged off by the compressed gases and roughly separated by gravity when entering in the oil sump. A fine separation is then operated in the exhaust filter. An internal transfer pushes the collected oil back into the vacuum generator, the transfer is operated by a float valve to avoid atmospheric air coming from the oil casing to the inlet of the pump when no oil is present in the recovery system.

The oil circulation functions by differential pressures.

The pumps are equipped with a gas ballast valve for pumping condensable vapours.

The anti suckback valve at the inlet flange avoids oil coming back into the inlet line when the pump is stopped.

This is valid for working pressures below 100 mbar and under the condition that the valve is kept clean and in good condition. The anti suck-back valve is not a safety valve. If oil back streaming is to be avoided by all means, it is necessary to mount a separate safety valve on the pump inlet.

The pump drive consists of a three phase squirrel cage mortor driven by a frequency converter.

Information to user

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Description

Note : This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The pump is equipped with two electrical sectionning elements : the breaker and the power line cord. These two elements allow to section the line and neutral leads.

1.2 Technical characteristics

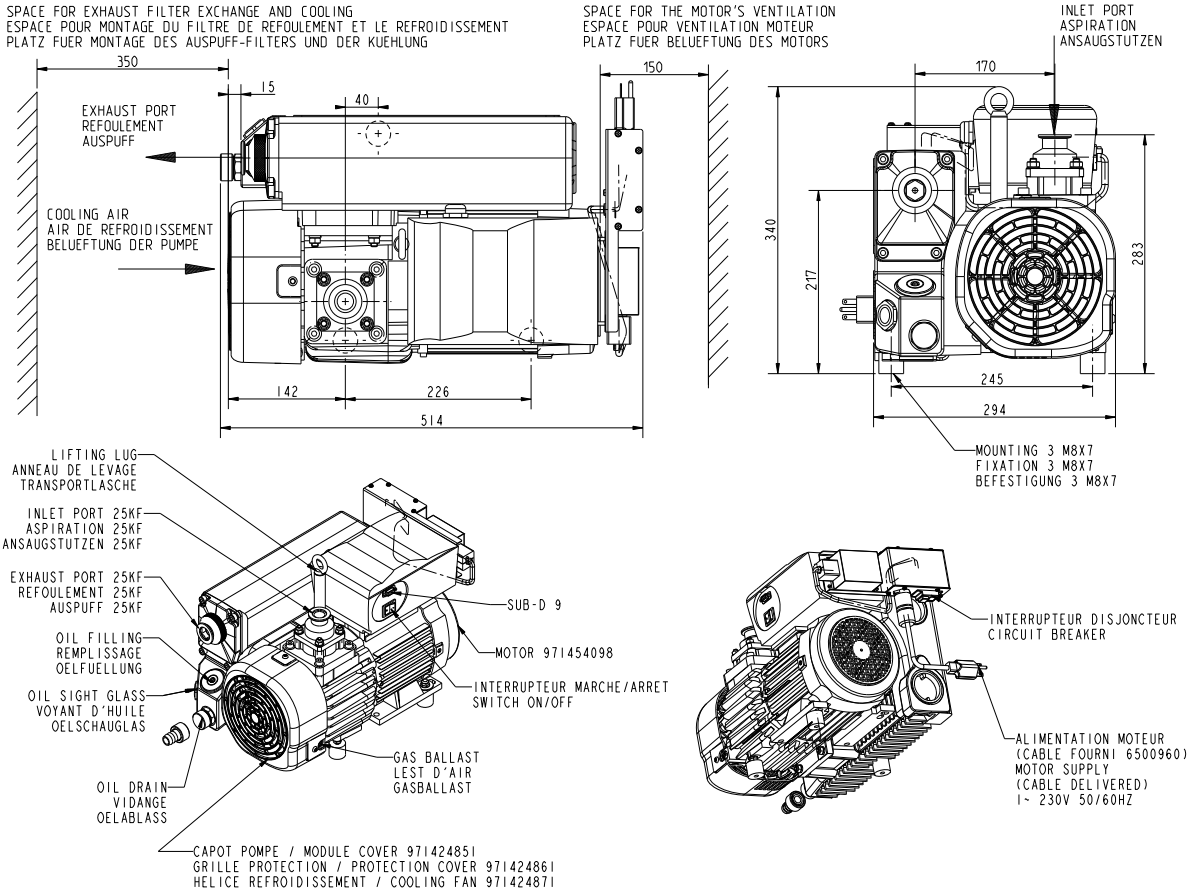
SV40 BI

Technical data		50 Hz	60 Hz
Nominal pumping speed	m^3/h	50	50
Pumping speed (according to PNEUROP)	m^3/h at 2 mbar	> 36	> 36
Ultimate partial pressure without gas ballast	mbar	≤ 0,25	≤ 0,25
Ultimate total pressure with small gas ballast	mbar	≤ 0,8	≤ 0,8
Water vapour tolerance: ■ with small gas ballast	mbar	10	10
Water vapour tolerable load: ■ with small gas ballast	$kg.h^{-1}$	0,34	0,34
Noise level (according to ISO 2151:2004(1)	dB (A)	59 (1φ)	59 (1φ)
Motor power - Rated rotational speed	kW - min^{-1}	1,5-1800 (1φ)	1,5-1800 (1φ)
Main voltage (+/- 10 %) AC~	V	200 - 240	
Protection - Insulation		IP 40 - F	IP 40 - F
Leak rate	$mbar.l.s^{-1}$	$<1 \times 10^{-3}$	$<1 \times 10^{-3}$
Oil type / Capacity	l	See pump / 1 l	
Intake connection		25 KF	
Exhaust connection		25 KF	

See pump name plate for further data

(1) At ultimate pressure without GB

SV40 BI



Pumping speeds curves SV40 BI

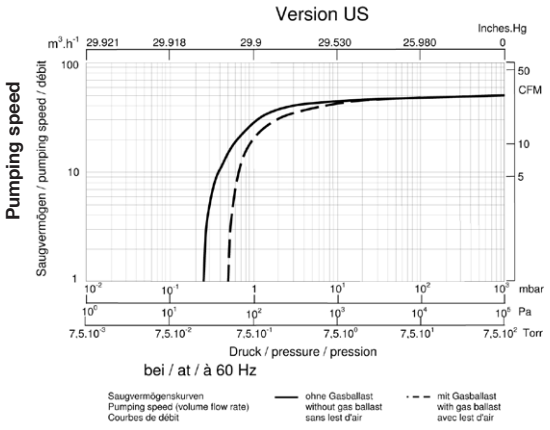


fig. 1

1.3 Accessories

SV40 BI

Specification	Cat. Nr.
Barbed hose connection	712 41 608

1.4 Lubricants

Below oils shall be used:

Use only oil GS495/LVO200 for pump P/N 960331V3005

LVO200/GS495 oil:	Conditioning	Reference
	1 l	9 714 30 541 / L20001
	2 l	711 17 763 / L20002
	5 l	200 03 452 / L20005
	20 l	711 17 766 / L200200

Use only oil LVO700 for pump P/N 960359V

LVO700 oil:	Conditioning	Reference
	1 l	L70001

Use only oil PFPE for pump P/N 960331V3009

PFPE oil:	Conditioning	Reference
LVO420	1 l	9 714 66 761 / L42001

2 Transport and Storing

2.1 Transport and packaging

Sogevac® vacuum pumps pass a rigorous operating test in our factory and are packaged to avoid transport damages.

Please check packaging on delivery for transport damages.

The outer package bears a shock indicator, turning red at 50 g. Should the shock indicator have reacted, a transportation damage may have occurred and the freight forwarder must be advised.

Packing materials should be disposed off according to environmental laws or re-cycled. These operating instructions are part of the consignment.

The connection ports are blanked off by plastic protective caps or self-adhesives. Take these caps or self-adhesives away before turning on the pump.

The necessary oil is supplied in cans beside the pump.

2.2 Mounting orientation

See required space on drawings in paragraph 1.2.

Pumps which have been filled with oil must only be moved in the upright position (horizontally). Otherwise oil may escape. The angle of slope may not be over 10° max. Avoid any other orientations while moving the pump.

Only use the lifting lugs which are provided on the pump to lift the pump with the specified lifting devices.

Make sure that these have been installed safety. Use suitable lifting equipment. Make sure that all safety regulations are observed.

2.3 Storing

Before stocking the pump for a long time put it back in its original condition (blank off inlet and exhaust ports with the shipping seals, drain the oil) and store the pump in a dry place at room temperature.
Storage temperature: - 15°C to +50°C, without condensation.

Caution

Until the pump is put back in to service again, the pump should be stored in a dry place, preferably at room temperature (20 °C - 168 °F). Before taking the pump out of service, it should be properly disconnected from the vacuum system, purged with dry nitrogen and the oil should be exchanged too. The gas ballast must be closed and if the pump is to be shelved for a longer period of time it should be sealed in a plastic bag together with a desiccant (Silicagel).

If the pump has been shelved for over one year, standard maintenance must be done and the oil must be exchanged too before the pump is put in to service once more.

We recommend that you contact the service from Leybold.

Installation

Warning

3 Installation

It is essential to observe the following instructions step by step to ensure safe start-up. Start-up may only be conducted by trained specialists.

The standard pump is not suitable for installation in explosion hazard ATEX areas. Please contact us, if you are planning such an application. Before installing the pump you must reliably disconnect it from the electrical power supply and prevent the pump from running up inadvertently.

Observe all safety regulations.

3.1 Setting up

The pump must be set up or mounted horizontally on a flat surface. Special mounting is not required.

The pump must be levelled within a tolerance of ± 2 degrees.

The following ambient operating environment must be observed:

- Pollution degree CSA 2,
- Ambient temperature: 12 °C to 35 °C (54 °F to 95 °F),
- Ambient pressure = Atmospheric pressure.
- Rel. humidity ≤ 95% w/o condensation.

In order to avoid over-heating of the pump, an undisturbed fresh airflow to the pump is necessary.

Additional warning note : consider changes in ambient temperatures that might occur when air conditioning is turned down, such as nights and week-ends.

Do not place the pump for having a difficult access to the electrical sectionning elements.

Caution

Inlet connection

See safety instructions page 3.

- The inlet flange can be connected with a vacuum-tight flexible hose and/or pipe.
- The pipes should cause no stresses on the pump's flanges. If necessary, compensators must be installed.
- Restriction of the pipes must be avoided in order not to decrease the pumping speed of the pump. The nominal diameter of the pipes has to be at least the same as the diameter of pump's inlet flange.
- When removing condensable vapours, a gas ballast valve must be open periodically to avoid solvent build up in the oil.

Warning

- Additional warning note: additional air flow may be needed during ballast, as this increases pump temperature.
- The inlet pressure must not be above indications on the CSA pump nameplate.

Warning

Connection to exhaust side

■ No valve or restricting devices should be installed in the exhaust line of the pump. If an exhaust line is installed, it must at least have the same diameter as the exhaust flange. It should be installed in a manner so that no condensate can enter the pump (siphon, slope).

The maximum exhaust pressure must neither exceed 1.15 bar absolute (0.15 bar relative), nor fall under atmosphere pressure minus 15 mbar.

3.2 Electrical connections

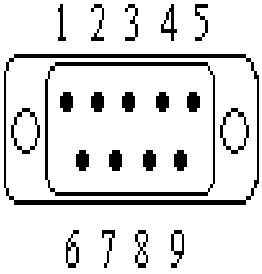
Warning

The pump is connected to the mains through a power cord having a NEMA 6-15 P plug. A ferrite is also on the power cable and must remain on it.

Even if the pump is not operating, live voltage is present in the motor frequency converter !

Voltage and frequency mentioned on the pump nameplate must be compliant with the supply voltage.

A Sub-D socket on the frequency converter allows to access to the frequency converter data and parameters.



D-SUB CONNECTOR

pin 1 : 24V
pin 2 : NC
pin 3 : Rx Tx
pin 4 : NC
pin 5 : 0 V
pin 6 : valid Tx
pin 7 : Rx Tx
pin 8 : NC
pin 9 : 0 V

The power socket and cord are disconnection elements which must remain accessible to the users.

Caution

3.3 Oil filling

For SV40 BI, the necessary GS495 or PFPE oil is supplied in cans beside the pump.

To fill in the oil, unscrew the oil fill plug (58) and fill in until the oil level reaches the “MAX” mark beside the oil sight glass.

Typically the whole 1 l oil can is used.

3.4 Start-up

Always verify proper oil level before operating the pump.

Warning

4 Operation

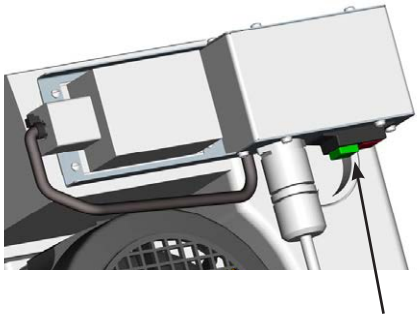
4.1 Operation

Take note of warning labels on the pump.

The pump is equipped with an ON/OFF switch and an overcurrent protection breaker.

See Fig. 1 for the location of the switch and breaker.

The ON/OFF switch is located on the F/C side, below the Sud-D and is to be used for normal switching ON and OFF.
The switch is marked 0/I.



Breaker

The breaker is beside the F/C power line filter and shall NOT be used for turning the pump ON and OFF.

If the breaker switches, the pump can be restarted after the fault has been reset (see § 4.3) by pushing the green button. Pumps are delivered with breaker on "ON" position

Pumping of non-condensable gases

If the pump system contains mainly non condensable gases, the pumps should be operated without gas ballast.

If the composition of the gases to be pumped is not known and if condensation in the pump cannot be ruled out, run the pump with gas ballast valve open in accordance with section below.

Pumping of condensable gases and vapors

With the gas ballast valve open and at operating temperature, the Sogevac® pumps can pump pure water vapor up to the values indicated in the Technical Data.

The gas ballast valve is open by a screwdriver. The running noise of the pump is slightly louder if the gas ballast valve is open. Before pumping vapors ensure that the pump has warmed up for approx. 30 min. with closed intake line and with open gas ballast valve.

Caution

Don't open the pump to condensable vapors until it has warmed to operating temperature (approximately); pumping process gas with a cold pump results in vapors condensing in the oil.

For processes with a high proportion of condensable vapors, the intake line should be open only slowly after reaching the operating temperature.

One sign of condensation of vapors in the pump is a rise of the oil level during operation of the pump.

When vapors are pumped, the pump must not be switched off immediately after completion of the process because the condensate dissolved in the pump oil may cause changes or corrosion. To prevent this, the pump must continue to operate with open gas ballast valve and closed intake port until the oil is free of condensate. We recommend operating the pump in this mode for at least 30 min. after completion of the process.

Caution

Daily ballasting is recommended when continuously pumping larger volumes of condensable vapors.

Note

In cycle operation, the pump should not be switched off between the cycles but should continue to run with gas ballast valve open and intake port closed (if possible via a valve). Power consumption is minimal when the pump is operating at ultimate pressure.

Once all vapors have been pumped off from a process (e. g. during drying), the gas ballast valve can be closed in order to improve the ultimate pressure.

4.2 Working in cycles in / out

We recommend strongly to limit starting of the pump to 5 or 6 per hour.
If the process need it, we recommend utilization of a pneumatic or electromagnetic valve and to let the pump run continously.

4.3 Switching off / Shutdown

The intake port of the Sogevac® pumps contains an anti-suckback valve which closes the intake port when the pump is switched off, thus maintaining the vacuum in the connected apparatus and preventing oil from being sucked back into the apparatus. The valve's functioning is not impaired by gas ballast operation.

If the pump has to be shutdown for a long period, drain the oil flush out the pump with fresh oil and fill in the required amount of clean oil (see § 5.4). Close the connection ports. Special preservation or flushing oils do not need to be used.

When the pump has been switched off due to over heating, initiated by the motor or its temperature detector, the pump must be cooled down to the ambient temperature, and must only be switched on again manually after having eliminated the cause.

Caution

Close the gas ballast.

5 Maintenance

5.1 Safety Information

Observe all safety regulations.

Warning

Caution

Before all maintenance works, disconnect the pump from the power supply.

All work must be done by suitably trained personnel. Maintenance or repairs carried out incorrectly will affect the life and performance of the pump and may cause problems when filling warranty claims.

Never mount used seals; always mount new seals.

5.2 Maintenance Intervals

The intervals stated in the maintenance schedule are approximate values for normal pump operation. Unfavourable ambient conditions and/or aggressive media may significantly reduce the maintenance intervals.

Maintenance job	Frequency	Section
Check the oil level	Daily	**A**
1st oil change	Depends on the process	**B**
Subsequent oil changes	Depends on the process	**B**
Exhaust filter replacement	Annually	**C**
Gas ballast valve	Monthly checking	**D**
Inlet flange sifter cleaning	Annually	**E**
Anti-suck back valve checking	Annually	**F**
Fan cover cleaning	Annually	**G**

In order to simplify the maintenance work we recommend to combine several jobs.

Only genuine Leybold spares and consumables shall be used.

A general pump overhaul by Leybold is to be planned every 3 years.

After maintenance operations, make sure the device is in a safe condition before putting back into operation

5.3 Leybold Service

Contamination

Whenever you send us in equipment, indicate whether the equipment is contaminated or is free of substances which could pose a health hazard.

If it is contaminated, specify exactly which substances are involved. You must use the form we have prepared for this purpose.

Formulaire

A copy of the form has been reproduced at the end of these Operating Instructions: “Declaration of Contamination for Compressors, Vacuum Pumps and Components”. Another suitable form is available from www.leybold.com → Documentation → Download Documents.

Attach the form to the equipment or enclose it with the equipment.

This statement detailing the type of contamination is required to satisfy legal requirements and for the protection of our employees.

We must return to the sender any equipment which is not accompanied by a contamination statement.

Caution

The pump must be packaged in such a way that it will not be damaged during shipping, and so that no harmful substances can escape from the package.

When disposing of used oil, please observe the relevant environmental regulations.

5.4 Maintenance Work

Checking the oil

A. Oil level

The oil level shall be checked at least once a day and must be, while the pump is in operation, close to the MAX marks. Should the oil level be below the MIN mark switch off the pump, check it (see chapter 4) and add the required amount of oil.
Oil level may drop when pump is operating due to oil distribution in the pump.

B. Oil Change

Oil changing must be done with a switched off and still warm pump. Open the oil drain plug and let the used oil run out into an appropriate container. Refasten the oil drain plug when oil runs slowly. Switch ON the pump briefly (5 sec. max.) and switch OFF immediately. Reopen the oil drain plug and drain the rest of the oil.

Additional warning note: more frequent oil changes may be necessary if the ambient temperature is above 30 °C.

Before refastening the oil drain plug, inspect the o-ring and verify that it is free of particulate and is seated properly. Replace if necessary.

The pump should be "flushed" if there is considerable pollution.

To flush the pump, for clean oil up to the minimum level, let the pump run for a few minutes and drain the oil. Install a full charge of oil, 1 liter.

C. Replacing the exhaust filters

Oil mist escaping from the exhaust during operation indicates that the filter is probably clogged. Increased energy intake by the motor could also be the result of a soiled exhaust filter. Open the exhaust hood, take out the filter and replace it. Also check the gasket of the exhaut flange and change it if necessary.

D. Gas ballast valve cleaning

To clean the gas ballast valve, disassemble the fan cover and the fan. Unscrew the lateral pressure screw, remove the plug and the gas ballast valve by using an appropriate M10 screw screwed in the valve by pulling on the screw.

Clean the membrane, the seat and the RILSAN tube.

Reassemble in the reverse sequence.

E. Inlet flange sifter cleaning

To clean the inlet flange sifter, disconnect the inlet flange and clean the sifter with blast air or an appropriate solvent.

F. Anti-suck back valve checking

The anti-suck back valve should be checked at the same time as the inlet flange sifter and if dirty, be cleaned with an appropriate solvent.

Also check, if there is no damage on the sealing part of the valve.

G. Fan cover cleaning

Soiling of the fan cover may lead to overheating of the motor and the pump.

Put off the cover and clean it with blast air.

Before starting the pump again, be sure that the cover has been reassembled.

H. Checking the float valve

When replacing the exhaust filter, check the cleanliness and the proper operation of the float valve. After having disassembled the exhaust flange and oil casing, remove screw (pos. 57d), pull on the float valve (pos. 57), clean the nozzle and check that the float itself oscillates free around its axle and that the valve is tight. Clean the float chamber of the oil casing. Reassemble in the reverse sequence.

6 Troubleshooting

Fault	Possible cause	Remedy	Reference section *
Pump does not start.	Pump is connected incorrectly.	Connect the pump correctly.	3.3
	Motor protection switch incorrectly set.	Set motor protection switch properly.	3.3
	Operating voltage does not match motor.	Replace the motor.	
	Motor is malfunctioning.	Replace the motor.	
	Oil temperature is below 12 °C (54 °F).	Heat the pump and pump oil or use different oil.	1.4
	Oil is too viscous.	Use appropriate oil grade.	5.4-B
	Exhaust filter / exhaust line is clogged.	Replace the filter or clean the exhaust line.	B.4-D
Pump does not reach ultimate pressure.	External leak	Repair the pump.	
	Float valve does not close.	Repair the valve.	5.4-H
	Anti-suckback valve is malfunctioning.	Repair the valve.	5.4-F
	Inadequate lubrication due to:		
	■ unsuitable or contaminated oil,	Change the oil (degas it, if necessary).	5.4-C
	■ clogged oil filter,	Replace the oil filter.	5.4-C
	■ clogged oil lines.	Clean the oil casing.	
	Vacuum lines are dirty.	Clean vacuum lines.	
	Pump is too small.	Check the process date; replace the pump, if necessary.	
Pumping speed is too low.	Dirt trap in the intake port is clogged.	Clean the dirt trap ; Precaution : install a dust filter in intake line.	5.4-E/1.2/3.2
	Exhaust filter is clogged.	Install new filter elements.	5.4-D
	Connecting lines are too narrow or too long.	Use adequately wide and short connecting lines.	3.2
	Anti-suckback valve is hard to open.	Check spring free length.	
After switching off pump under vacuum, pressure in system rises too fast.	System has a leak.	Check the system.	
	Anti-suckback is malfunctioning.	Repair the valve.	5.4-F
Pump gets too hot	Cooling air supply is obstructed.	Set pump up correctly.	3.1
	Cooler is dirty.	Clean the cooler.	
	Ambient temperature is too high.	Set pump up correctly.	3.1
	Process gas is too hot.	Change the process.	
	Oil level is too low.	Add oil to reach the correct oil level.	5.4-C
	Oil is unsuitable.	Change the oil.	5.4-C
	Oil cycle is obstructed.	Clean or repair the oil lines.	
	Exhaust filter / exhaust line is obstructed.	Replace the exhaust filter, clean the exhaust line.	5.4-D
	Pump module is no longer usable.	Replace the pump module.	5.4-K

Troubleshooting

Fault	Possible cause	Remedy	Reference section *
Oil in intake line or in vacuum vessel.	Oil comes from the vacuum system.	Check the vacuum system.	
	Anti-suckback valve is obstructed.	Clean or repair the valve.	5.4-F
	Sealing surfaces of anti-suckback valve are damaged or dirty.	Clean or repair the intake port and valve.	5.4-F
	Oil level is too high.	Drain the excess oil.	5.4-B
Pump's oil consumption too high, oil mist at exhaust.	Exhaust filters are clogged or damaged.	Replace the filters.	5.4-C
	Nozzle of float valve is clogged.	Check the valve, clean the nozzle.	5.4
	Oil level is too high.	Drain the excess oil.	5.4-B
Oil is turbid.	Condensation.	Degas the oil or change the oil and clean the pump. Precaution : open the gas ballast valve or insert a condensate trap.	4.1/5.4-B
		Clean the gas ballast intake filter.	5.4-G
Pump is excessively noisy.	Oil level is very low (oil is no longer visible).	Add oil.	5.4-B
	Oil filter is clogged.	Change the oil and filter.	5.4-B
	Large vacuum leak in system.	Repair vacuum leak. Contact Leybold.	

* Reference section : This column refers to the section in the Operating Instructions that contains the applicable repair information.

Never mount used seals. Always mount new seals.

7 Spare parts

To guarantee safe operation of the Leybold pump, only original spare parts and accessories shall be used. When ordering spare parts and accessories, always state pump type and serial number. You can find part numbers in the spare parts list.

Consumables and main spare parts kits for Sogevac® pumps are usually available on stock at Leybold's service centers. The list of these parts is given hereafter and in the spare parts table where the contents of each kit is detailed.

- Exhaust demisters
- Oil GS495 or PFPE
- Service kit
- Set of seals
- Repair kit

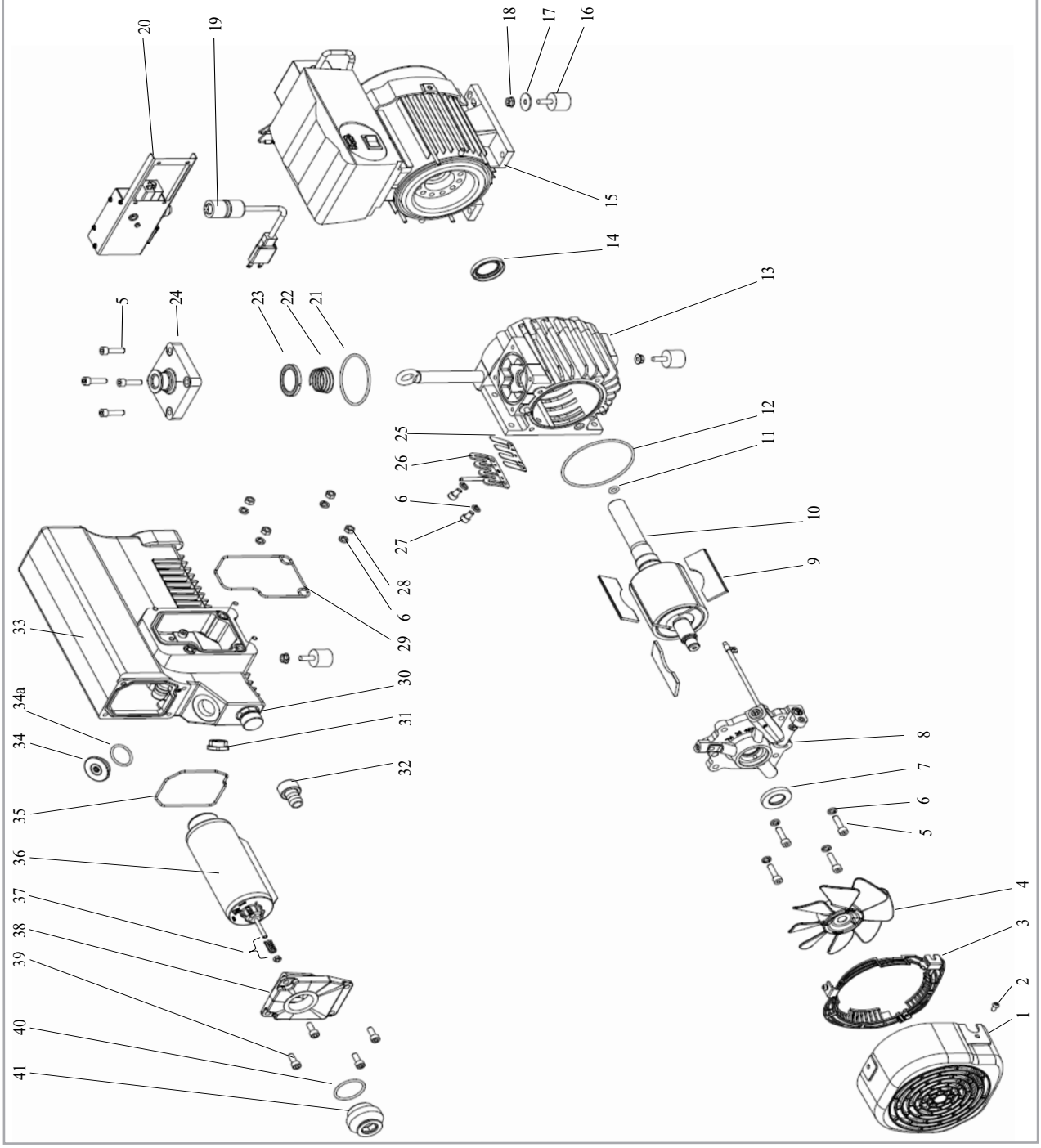
We recommend using these kits which have been defined to allow an optimal maintenance or repair. Individual spare parts may need longer delivery time.

Spare parts

Pos.	Stück. Qty Qté	BENENNUNG	SPECIFICATION	DESIGNATION	Abmessungen (mm), Werkstoff Dimensions (mm), Material Dimensions (mm), matière	Bestell-Nr Ref, No, N° de réf	Bemerkungen Notes Remarques				
1	1	GEHÄUSEDECKEL	MODULE COVER	CAPOT POMPE		971424850					
2	3	SCHRAUBE	SCREW	VIS BOMBEE PLATE	HC M6X12						
3	1	SCHUTZBLECH	PROTECTIVE COVER	GRILLE PROTECTION POMPE		971424860					
4	1	LUEFTER	COOLING FAN	HELICE DE REFROIDISSEMENT		971424870					
5	8	SCHRAUBE	SCREW	VIS	CHC M8 X 30 Q8.8					●	
6	10	UNTERLEGSCHEIBE	WASHER	RONDELLE	W8					●	
7	1	RADIAL-DICHTRING	RADIAL SHAFT SEAL	JOINT A LEVRE	25/47X7 FKM		*960331V3005*	●		●	
7	1	RADIAL-DICHTRING	RADIAL SHAFT SEAL	JOINT A LEVRE	25/47X7 PTFE	EK971467958	*960331V3009*				
8	1	LAGERDECKEL MIT GB	END PLATE WITH GB	FLASQUE BAGUE AVEC L.A	FKM	971431800	Incl. 5 ,6 ,7(FKM), 11,12			●	
9	1	SCHIEBER SATZ VON 3	VANES SET OF 3	JEU DE 3 PALETTES		971429680			●	●	
10	1	ANKER MIT RINGEN	ROTOR WITH RINGS	ROTOR BAGUE		971431810				●	
11	2	O-RING	O-RING	JOINT TOR	FKM			●		●	
12	1	O-RING	O-RING	JOINT TOR	FKM			●		●	
13	1	PUMPENRING AUSGERUESTET	PUMP CYLINDER EQUIPPED	STATOR EQUIPE						●	
14	1	RADIAL-DICHTRING	RADIAL SHAFT SEAL	JOINT A LEVRE	35/52X7 FKM		*960331V3005*	●		●	
14	1	RADIAL-DICHTRING	RADIAL SHAFT SEAL	JOINT A LEVRE	35/52X7 PTFE	EK971467968	*960331V3009*				
15	1	MOTOR + FREQUENZREGLER	MOTOR + FREQUENCY CONVERTER	MOTEUR + VARMECA	1.5/1.5KW 50/60HZ 230V	E971454098					
16	3	GUMMIFUSS	RUBBER MOUNT	AMORTISSEUR	DN30 H25	71212640					
17	1	SCHEIBE	WASHER	RONDELLE	LL8						
18	3	SECHSKANTMUTTER	HEXAGONAL FLANGE NUT	ECROU EMBASE CRANTEE	H M8						
19	1	LEISTUNGSKABEL	POWER CORD	CABLE ALIM.		971457NEMA	NEMA				
19	1	LEISTUNGSKABEL	POWER CORD	CABLE ALIM.		971457EUR	EUROPE				
19	1	LEISTUNGSKABEL	POWER CORD	CABLE ALIM.		971457GB	GREAT BRITAIN				
19	1	LEISTUNGSKABEL	POWER CORD	CABLE ALIM.		971457CH	SWITZERLAND				
19	1	LEISTUNGSKABEL	POWER CORD	CABLE ALIM.		971457WW	WITHOUT PLUG				
20	1	SCHÜTZGEHÄUSE SV40 BI	BREAKER BOX	INTERDISJONCTEUR		E6500724					
21	1	O-RING	O-RING	JOINT TOR	FKM			●			
22	1	FEDER	SPRING	RESSORT CLAPET ASPIRATION		71212400					
23	1	ANSAUGVENTIL	INTAKE VALVE	CLAPET ASPI.	FKM			●			
24	1	ANSAUGFLANSCH	INTAKE FLANGE	BRIDE ASPIRATION		EK6503402					
25	1	VENTILPLATTE	VALVE	LAME					●	●	
26	1	VENTILANSCHLAG	VALVE STOP	CONTRE LAME					●	●	
27	4	SCHRAUBE	SCREW	VIS	CHC M8X30 Q8.8				●	●	
28	4	MUTTER	NUT	ECROU	H M8 Q6						
29	1	DICHTUNG	GASKET	JOINT DE FORME CARTER STATOR	FKM			●			
30	1	ÖLWECHSEL VENTILSCHRAUBE	DRAIN PLUG VALVE	CLAPET VIDANGE	G3/4	71236838					
31	1	ÖLSCHAUGLAS	OIL LEVEL GLASS	VOYANT HUILE	G3/4				●		
32	1	ABLAßKUPPLUNG	DRAIN COUPLING	EMBOUT DRAINAGE	G3/4	71241608					
33	1	ÖLKASTEN	OIL CASING	CARTER EQ.							
34	1	STOPFEN + O-RING	PLUG + O-RING	BOUCHON AVEC JOINT	G 1	971448940	Incl. 34a				
34a	1	O-RING	O-RING	JOINT TOR	FKM			●			●
35	1	O-RING	O-RING	JOINT DE FORME BRIDE REFOULEMENT	FKM			●			●
36	1	AUSPUFF-FILTER MIT BYPASS	EXHAUST FILTER WITH BYPASS	CARTOUCHE REFOUL. AVEC BY-PASS		971471470			●		●
37	1	FEDER KOMPLETT	SPRING UNIT	RESSORT DE COMPRESSION ENS.		71420370			●		●
38	1	AUSPUFFFLANSCH	EXHAUST FLANGE	BRIDE REFOULEMENT	G1 1/4	71420440					
39	7	SCHRAUBE	SCREW	VIS	CHC M8X20						
40	1	O-RING	O-RING	JOINT TOR	FKM			●			
41	1	VERBINDUNGGTUCK	EXHAUST	RACCORD	G1 1/4 M - 25KF	EK971443480	Incl. 40				
		DICHTUNGSSATZ	SET OF SEALS	JEU DE JOINTS	FKM	971452150			●		
		REPARATUR KIT	REPAIR KIT	KIT REPARATION	FKM	971452300					
		PUMPENTEIL KOMPL. MIT GB	VACUUM GENERATOR WITH GB	GENERATEUR DE VIDE LA	FKM	971443160					
		WARTUNGSSATZ	SERVICE KIT	KIT DE MAINTENANCE		971454330					

SV40 BI

960331V3005
960331V3009



Leybold

CE

EU Declaration of Conformity

(Translation of original Declaration of Conformity)

The manufacturer: Leybold GmbH
Bonner Strasse 498
D-50968 Köln
Germany

herewith declares that the products specified and listed below which we have placed on the market, comply with the applicable EU Council Directives. This declaration becomes invalid if modifications are made to the product without agreement of Leybold GmbH.

Product designation: SOGEVAC

Type designation: SV16, SV25, SV16D, SV25D, SV200, SV1200, SV16B, SV25B, SV40B, SV65B, SV100B, SV120B (I FC), SV300B, SV470B, SV500B, SV570B, SV630B, SV750B, SV28BI (FC), SV40BI (FC), SV65BI (FC), and their variants, excepted pumps delivered without motor

The products complies to the following European Council Directives:

Machinery Directive (2006/42/EC)

The safety objectives of the Low Voltage Directive 2014/35/EU were complied with in accordance with Appendix 1 No. 1.5.1 of Machinery Directive 2006/42/EC.

Electromagnetic Compatibility (2014/30/EU)

RoHS Directive (2011/65/EU) & (2015/863/EU)

The following harmonized standards have been applied:

EN 1012-2:1996+A1:2009	Compressors and vacuum pumps — Safety requirements — Part 2: Vacuum pumps
EN 60204-1:2006/A1:2009	Safety of machinery — Electrical equipment of machines — Part 1: General requirements requirements
EN 61000-6-2:2005/AC:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007/A1:2011	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

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Cologne, November 14, 2016

ppa. Martin Tollner
Head of Product Lines

Cologne, November 14, 2016

ppa. Dr. Monika Mattern-Klosson
Head of Quality & Business Process Management

Leybold

Declaration of Contamination of Compressors, Vacuum Pumps and Components

The repair and / or servicing of compressors, va cuum pumps and components will be carried out only if a correctly completed declaration has been submitted. Non-completion will result in delay. The manufacturer can refuse to accept any equipment without a declaration.

A separate declaration has to be completed for each single component.

This declaration may be completed and signed only by authorized and qualified staff.

Customer/Dep./Institute :

Address :

Person to contact:

Phone : Fax:

End user:

Reason for return: ☒ applicable please mark

Repair: ☐ chargeable ☐ warranty

Exchange: ☐ chargeable ☐ warranty

☐ Exchange already arranged / received

Return only: ☐ rent ☐ loan ☐ for credit

Calibration: ☐ DKD ☐ Factory-calibr.

☐ Quality test certificate DIN 55350-18-4.2.1

A. Description of the Leybold product:

Material description :

Catalog number:

Serial number:

Type of oil (ForeVacuum-Pumps) :

Failure description:

Additional parts:

Application-Tool:

Application- Process:

B. Condition of the equipment

	No [1]	Yes	No
1. Has the equipment been used	☐	☐	
2. Drained (Product/service fluid)		☐	☐
3. All openings sealed airtight		☐	
4. Purged		☐	☐

If yes, which cleaning agent

and which method of cleaning

[1] If answered with "No", go to **D**.

Contamination :	No [1]	Yes
toxic	☐	☐
corrosive	☐	☐
flammable	☐	☐
explosive [2]	☐	☐
radioactive [2]	☐	☐
microbiological [2]	☐	☐
other harmful substances	☐	☐

C. Description of processed substances (Please fill in absolutely)

1. **What substances have come into contact with the equipment** ?
   Trade name and / or chemical term of service fluids and substances processed, properties of the substances
   According to safety data sheet (e.g. toxic, inflammable, corrosive, radioactive)

X	Tradename:	Chemical name:
a)		
b)		
c)		
d)		

	No	Yes
2. **Are these substances harmful ?**	☐	☐
3. **Dangerous decomposition products when heated ?**	☐	☐

If yes, which ?

[2] **Components contaminated by microbiological, explosive or radioactive products/substances will not be accepted without written evidence of decontamination.**

D. Legally binding declaration

I / we hereby declare that the information supplied on this form is accurate and sufficient to judge any contamination level.

Name of authorized person (block letters) :

Date

signature of authorized person

firm stamp

17200001_002_C0 © Leybold

LEROY SOMER

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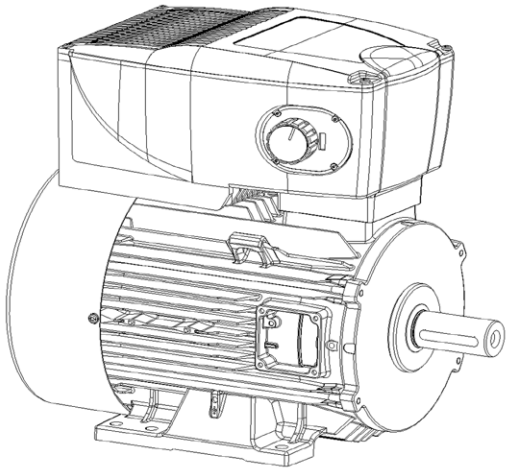
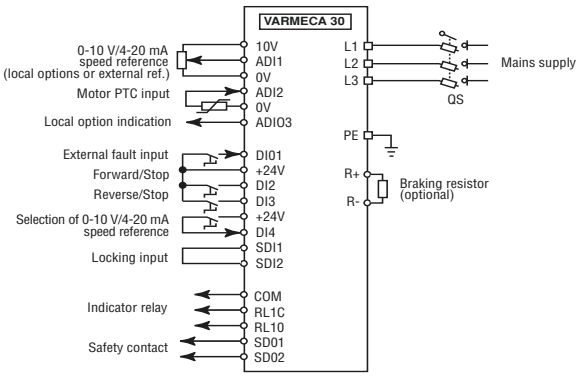
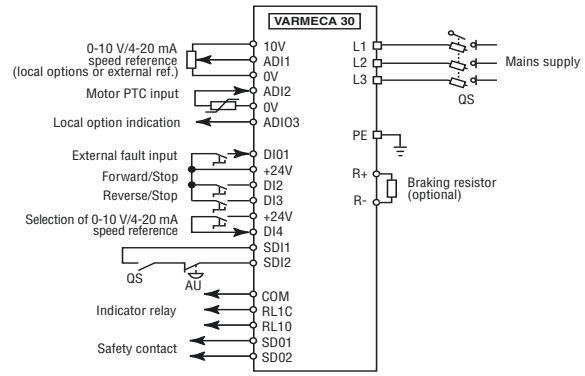






VARMECA 30

Installation and maintenance

VARMECA 30
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.

CAUTION

For the user's own safety, this VARMECA 30 motor must be connected to an approved earth (⏚ terminal).
If accidentally starting the installation is likely to cause a risk to personnel or the machines being driven, it is essential 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).

The VARMECA 30 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 variable speed drive is designed to be able to supply 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 serious danger resulting from their mechanical deterioration. It is important that the user checks that the installation can withstand it, before programming a high speed.
The variable speed drive which is the subject of this manual is designed to be integrated in an installation or an electrical machine, and can under no circumstances be considered to be a safety device. It is therefore the responsibility of the machine manufacturer, the designer of the installation or the user to take all necessary precautions to ensure that the system complies with current standards, and to provide any devices required to ensure the safety of equipment and personnel.

LEROY-SOMER declines all responsibility in the event of the above recommendations not being observed.

VARMECA 30
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 30, 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 30 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 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 or 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 30 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 30) 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 30 motors meet the requirements of the Low Voltage Directive 73/23/EEC, modified by 93/68/EEC. The harmonised standard 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 30 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 30 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 30 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 screening, earthing, presence of filters and correct insertion of cables and conductors, are given in the documentation supplied with the VARMECA 30. These instructions must be followed in all cases, even if the VARMECA 30 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 30 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 30 motors using control software is permitted.
Active parts of the device and live power connections must not be touched immediately after the VARMECA 30 is powered down, as the capacitors may still be charged. In view of this, the warnings fixed to VARMECA 30 motors must be observed.
During operation, all protective covers must remain closed.

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

VARMECA 30
Variable speed motor or geared motor

CONTENTS

VARMECA 30
Variable speed motor or geared motor
GENERAL INFORMATION

1 - GENERAL INFORMATION

• This manual describes the characteristics and installation of the VARMECA 31ML, 31M, 31TL, 31T, 32M, 32TL, 32T, 33TL, 33T, 34TL, 34T.
• The VARMECA 30 is designed to operate in an industrial environment.
• If the run command has been enabled, the motor starts as soon as it is switched on.

1.1 - General operating principle

The VARMECA 30 is the physical association of a 3-phase induction motor and an integrated variable speed drive.
The motor allows all kinds of mounting arrangement (foot or flange) and can be combined with standard gearboxes from the LEROY-SOMER range.
In the standard version, the drive with integrated control does not require any connection other than the power supply.

The options may be used to broaden the application range of the VARMECA 30.
Thanks to the advanced technology of the IGBT power module, very high efficiency and reduced noise levels are possible.

1.2 - Product name

Single-phase power supply 115 V ±10% - 50/60 Hz		**Single-phase power supply 200/240 V ±10% - 50/60 Hz**		**3-phase power supply 200/240 V ±10% - 50/60 Hz**		**3-phase power supply 400/480 V ±10% - 50/60 Hz**	
Rating	Power (kW)	Rating	Power (kW)	Rating	Power (kW)	Rating	Power (kW)
31 ML 025	0.25	31 M 025	0.25	31 TL 025	0.25	31 T 025	0.25
31 ML 037	0.37	31 M 037	0.37	31 TL 037	0.37	31 T 037	0.37
		31 M 055	0.55	31 TL 055	0.55	31 T 055	0.55
		31 M 075	0.75	31 TL 075	0.75	31 T 075	0.75
		32 M 090	0.90	32 TL 090	0.90	31 T 090	0.90
		32 M 110	1.1	32 TL 110	1.1	31 T 110	1.1
		32 M 150	1.5	32 TL 150	1.5	32 T 150	1.5
				32 TL 180	1.8	32 T 180	1.8
				32 TL 220	2.2	32 T 220	2.2
				33 TL 300	3	32 T 300	3
				33 TL 400	4	32 T 400	4
				34 TL 550	5.5	33 T 550	5.5
				34 TL 750	7.5	33 T 750	7.5
						34 T 900	9
						34 T 111	11

VARMECA 30
Variable speed motor or geared motor
GENERAL INFORMATION

OPERATING EXTENSIONS	
Designation	**Description**
B 31/32 or B 33/34	Integrated speed control knob
BMA 31/32 or BMA 33/34	Speed control knob and integrated run-stop control knob
BMAVAR 31/32 or BMAVAR 33/34	Speed control knob and integrated stop forward/reverse control knob
CVI VMA 31/32 or CVI VMA 33/34	Integrated speed control
ESFR VMA 31/32 or ESFR VMA 33/34	Brake control
RF100 – RF200 – RF600	Braking resistor Power 100, 200 and 600 W
RF – BRR – 800 – 200	Braking resistor Power 800 W – External mounting
PX LCD	Parameter-setting console
COD VMA 33/34	Encoder feedback
SOFTVMA 30	Parameter-setting software
PAD VMA 31/32 or PAD VMA 33/34	Local display unit
PX KEY	Copy key
SO VMA 31/32	Fixed brake control and power supply (3-phase supply 400-480 V only)
VMA COM PB 31/32 or VMA COM PB 33/34	Fieldbus: PROFIBUS DP
VMA COM IS 31/32 or VMA COM IS 33/34	Fieldbus: INTERBUS S
VMA COM DT 31/32 or VMA COM DT 33/34	Fieldbus: DEVICENET
VMA COM CN 31/32 or VMA COM CN 33/34	Fieldbus: CAN OPEN
FLT VMA 31M	EMC filter for residential environment – Internal mounting (for VMA 31M)
FLT VMA 31/32	EMC filter for residential environment – Internal mounting (for VMA 31TL/T 32/TL/T)
FLT VMA 33	EMC filter for industrial environment – Internal mounting (for VMA 33 TL/T)
FLT VMA 34	EMC filter for industrial environment – Internal mounting (for VMA 34 TL/T)

1.3 - Characteristics

1.3.1 - Electrical data

Power supply	Single-phase supply 115/240 V ± 10% 50-60 Hz	3-phase supply 200/480 V ± 10% 50-60 Hz
Phase voltage imbalance		3%
Output voltage	From 0 V to input voltage	From 0 V to input voltage
Power range (kW)	0.25 - 0.37* - 0.55 - 0.75 - 0.9 - 1.1 - 1.5	0.25 - 0.37 - 0.55 - 0.75 - 0.9 -1.1 - 1.5 - 4 - 5.5 - 7.5** - 9 - 11
Maximum number of power-ups per hour	10	100

*0.37 kW max. for 115 V supply
**7.5 kW max. for 230 V supply

1.3.2 - Characteristics and functions

Characteristics	VARMECA 30
Motor frequency variation range	- 10 to 80 Hz at constant torque (factory setting can be modified with parameter-setting option) - 10 to 50 Hz for general applications (factory setting can be modified with parameter-setting option) - 0 to Fmax depending on thermal and mechanical limits
Efficiency	97.5% motor efficiency
Overload	150% of In for 60 s 10 times per hour

VARMECA 30
Variable speed motor or geared motor
GENERAL INFORMATION

Pilot control	VARMECA 30
Speed reference	- Analogue reference (0 V or 4 mA) = Minimum speed (10 V or 20 mA) = Maximum speed - 0 to 10 V with integrated potentiometer (B31/32 – B33/34 option) - 0 to 10 V with remote potentiometer - 4 to 20 mA with external reference - Reference with internal potentiometer - Digital references - Fieldbus
Speed regulation	- Speed regulation with encoder feedback option for VMA 33 or 34 only - Regulation of a reference with integrated PI loop
Run/Stop	- With power supply - With remote volt-free contact - With fieldbus - With local run/stop control
Forward/Reverse	- With internal connection on the terminal block - With remote volt-free contact - With fieldbus - With local run/stop control
Stop mode	- On ramps (using volt-free contact or integrated control) - Freewheel - With electromechanical brake
Ramps	- Ramps adjustable from 0 to 600s
Fieldbus	- PROFIBUS DP, INTERBUS S, DEVICENET, CAN OPEN, MODBUS RTU, LS net

Protection	VARMECA 30
Power	- Undervoltage - Overvoltage - Overloads .thermal, drive and motor .protection against locked rotor - Short-circuit .motor windings - Overspeed
Control	- Short-circuit on 0-10 V/24 V inputs or outputs
Drive reset	- By switching off the VARMECA 30 or by opening/closing the connection between the 24V and ENA (VMA 31/32) terminals or SDI 1 and SDI 2 (VMA 33/34) terminals

1.4 - Environmental characteristics

Characteristics	Level
Index of protection	IP 65
Storage temperature	- 40 °C to + 70 °C Conforming to standard IEC 60068-2-1.
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 4000 m, but above 1000 m, the continuous output current should be derated by 1% per additional 100 m over 1000 m (eg: for an altitude of 3000 m, derate by 20%).
Ambient humidity	95% non condensing
Humidity during storage	93%, 40 °C, 4 days
Vibration	- Exposed product: 0.01 g^2/Hz 1 hr in accordance with standard IEC 60068-2-34. - Sinusoidal vibration: 2-9 Hz 3.5 ms^{-2} – 9-200 Hz 10 ms^{-2} – 200-500 Hz 15 ms^{-2} in accordance with standard IEC 60068-2-6.
Shocks	Packaged product: 15 g, 6 ms, 500 times/direction in all 6 directions in accordance with standard IEC 60068-2-29.
Immunity	Conforming to EN61000-6-2
Radiated and conducted emissions	Conforming to EN50081-2 with internal filter
UL standards	Conforming to UL 508 C (E211799)

1.5 - Radio-frequency interference

1.5.1 - General

Variable speed drives use high-speed switches (transistors, semi-conductors) 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.

As a result, they generate radio-frequency signals which may disturb operation of other equipment or distort 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 R.F. 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.

⚠ Conformity of the drive is only assured when the mechanical and electrical installation instructions described in this manual are adhered to.

1.5.2 - Standards (Emission)

The maximum emission level is set by the generic industrial (EN 50081-2) and residential (EN 50081-1) standards.
VARMECA 30 conforms to the following standards:
EN 50081-2, EN 61000-6-4 - EN 61800-3, IEC 61800-3.

Emission				
Standard	Description	Application	Conformity conditions according to the switching frequency	
			With RFI filter	
			Internal	External
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)	-	≤ 4.5 kHz
		First environment with restricted distribution (I)	VMA 31/32 ≤ 4.5 kHz VMA 33/34 ≤ 4 kHz	≤ 11 kHz
EN 50081-1 EN61000-6-3	Generic emission standards for residential, commercial and light industrial environments	A.C. supply	-	≤ 4.5 kHz (VAR 31/32) ≤ 11 kHz (VAR 33/34)
EN 50081-2 EN 61000-6-4	Generic emission standards for the industrial environment	A.C. supply	≤ 4.5 kHz VMA 31 T ≤ 8 kHz VMA 32 T ≤ 4 kHz	≤ 11 kHz

The second environment includes industrial networks supplied with low voltage but which do not serve buildings for domestic use. Operation of a drive without an RFI filter in this type of environment may result in interference on certain electronic appliances located near the drive whose immunity level might not be compatible with industrial conditions. If it proves impossible to filter the disturbed element, add an external RFI filter.

1.5.3 - Standards (Immunity)

The minimum immunity level is set by the generic industrial (EN 51000-6-2) and residential (EN 51000-6-1) standards.
VARMECA 30 conforms to the following standards:
EN 61000-4-2, IEC 61000-4-2 - EN 61000-4-3, IEC 61000-4-3 - EN 61000-4-5, IEC 61000-4-5 - EN 61000-4-6, IEC 61000-4-6 EN 61000-4-11, IEC 61000-4-11 - EN 61000-6-2, IEC 61000-6-2 - EN 61000-3, IEC 61000-3.

Immunity			
Standard	**Description**	**Application**	**Conformity**
IEC 61000-4-3 EN 61000-4-3	Immunity standards for radiated radio-frequency	Product casing	Level 3 (industrial)
IEC 61000-4-6 EN 61000-4-6	Generic immunity standards for conducted radio-frequency	Control and power cables	Level 3 (industrial)
EN 50082-1 IEC 61000-6-1 EN 61000-6-1	Generic immunity standards for residential, commercial and light industrial environments	-	Conforms
EN 50082-2 IEC 61000-6-2 EN 61000-6-2	Generic immunity standards for the industrial environment	-	Conforms
EN 61800-3 IEC 61000-6-2 EN 61000-6-2	Variable speed drive standards	Conforms to the first and second environment	
EN 61000-4-4	Bursts of fast transients	Control cable	Level 4 (hardened industrial)
		Power cable	Level 3 (industrial)
EN 61000-4-5	Shock waves	Phase-earth power supply cable	Level 4
		Phase-to-phase power supply cable	Level 3
		Earth signal circuits (refer to section 1.5.5)	Level 2

1.5.4 - Earth leakage current

Earth leakage currents may depend on the type of RFI filter used. The VARMECA 30 can be supplied with its filter integrated and wired-up. The levels of leakage current also depend on the voltage and/or the power supply frequency and the size of the motor.
In all cases, for conformity with immunity standards, a voltage limiting device is connected to earth. The shunt current is negligible in normal circumstances.

1.5.4.1 - use of earth leakage detector (residual current device)

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

Note: If an external RFI filter is being used, a delay of 50 ms should be incorporated to avoid spurious faults being taken into account.

1.5.5 - Control cable immunity

Control cable immunity can be increased outside the VARMECA 30 by one of the following 2 methods:
• Use of shielded twisted pair cable, with shielding connected to earth around its circumference within 100 mm of the VARMECA 30.
• Passing the cable through a ferrite ring at 100 mm maximum distance from the VARMECA 30.

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

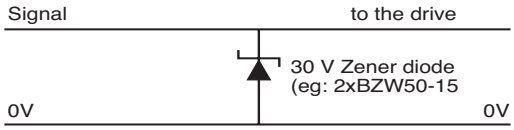
1.5.6 - Control circuit immunity when overvoltage occurs

Immunity to overvoltages in control circuits or in long cables connected to the outside of a building.
The various drive input and output circuits conform to standard EN61000-6-2 (1 kV) relating to 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 in the event of lightning strikes or earth faults associated with long cable lengths (>30 m). To limit the risks of damage to the drive, the following precautions could be taken:

- Galvanic isolation of the I/O.
- Duplication of the cable shielding with an earth wire of 10 mm² minimum. The cable shielding and the earth wire must be linked at both ends and connected to earth with the shortest possible connection. This stratagem enables high currents to pass into the earth wire, rather than into the shielding
- Reinforcement of the logic and analogue I/O protection by adding a zener diode or a peak limiter.

Elimination of uni-directional logic and analogue I/O overvoltages



These circuits are available in modules (DIN rail mounting). These circuits are not suitable for encoder signals or for high-speed logic data networks, because the diodes may affect the signal. The majority of encoders have galvanic isolation between the motor casing and the encoder circuit, and in this case, no precautions are necessary. For data networks, follow the specific network recommendations.

If a logic output is subjected to significant overvoltages, the drive trips on an "Old1" fault.

1.6 - Description of cables and protection devices

⚠ • It is the responsibility of the user to connect and provide protection for the VARMECA 30 in accordance with the legislation and regulations in force in the country of use. This is particularly important as regards the size of cables, the type and rating of fuses, the earth or ground connection, powering down, acknowledging faults, insulation and protection against overcurrents.
• These tables are given for information only, and must under no circumstances be used in place of the current standards.
• When using a circuit-breaker, it must be a motor circuit-breaker (D curve).
• The residual current device must be type B. Too many devices connected to a single residual current device can cause it to trip. Check that the circuit-breaker is only protecting the VARMECA.
• Comply with the size of protection fuses.

P (kW)	Single-phase power supply 115 V ± 10%					Single-phase power supply 230 V ± 10%				
	VMA rating	Fuses (gG)	I (A)	Cables (mm²)	PE	VMA rating	Fuses (gG)	I (A)	Cables (mm²)	PE
0.25	31 ML 025	8	6.8	1.5	M16 + M20	31 M 025	8	3.5	1.5	M16 + M20
0.37	31 ML 037	10	8.5	1.5	M16 + M20	31 M 037	10	4	1.5	M16 + M20
0.55						31 M 055	10	4.5	1.5	M16 + M20
0.75						31 M 075	16	7	2.5	M16 + M20
0.9						32 M 090	16	9	2.5	M16 + M20
1.1						32 M 110	20	11	2.5	M16 + M20
1.5						32 M 150	25	14	2.5	M16 + M20

VARMECA 30
Variable speed motor or geared motor
GENERAL INFORMATION

P (kW)	Single-phase power supply 200/240 V ± 10%					Single-phase power supply 400/480 V ± 10%				
	VMA rating	Fuses (gG)	I (A)	Cables (mm^2)	PE	VMA rating	Fuses (gG)	I (A)	Cables (mm^2)	PE
0.25	31 TL 025	4	2	1.5	M16 + M20	31 T 025	4	1	1.5	M16 + M20
0.37	31 TL 037	6	3	1.5	M16 + M20	31 T 037	4	1.5	1.5	M16 + M20
0.55	31 TL 055	6	4	1.5	M16 + M20	31 T 055	6	2	1.5	M16 + M20
0.75	31 TL 075	8	5	1.5	M16 + M20	31 T 075	6	3	1.5	M16 + M20
0.9	32 TL 090	10	5.5	1.5	M16 + M20	31 T 090	8	3.5	1.5	M16 + M20
1.1	32 TL 110	10	6	2.5	M16 + M20	31 T 110	10	4	1.5	M16 + M20
1.5	32 TL 150	16	7	2.5	M16 + M20	32 T 150	10	5	1.5	M16 + M20
1.8	32 TL 180	16	7.5	2.5	M16 + M20	32 T 180	10	5.5	2.5	M16 + M20
2.2	32 TL 220	16	8	2.5	M16 + M20	32 T 220	10	6	2.5	M16 + M20
3	33 TL 300	16	12	2.5	M20 + M25	32 T 300	16	7	2.5	M16 + M20
4	33 TL 400	20	15	4	M20 + M25	32 T 400	16	8	2.5	M16 + M20
5.5	34 TL 550	25	20	4	M20 + M25	33 T 550	16	12	2.5	M20 + M25
7.5	34 TL 750	32	24	4	M20 + M25	33 T 750	20	16	4	M20 + M25
9						34 T 900	25	19	4	M20 + M25
11						34 T 111	32	22	4	M20 + M25

Note:
- The mains current value is a typical value which depends on the source impedance. The higher the impedance, the lower the current.
- The fuses (UL approved) are intended for installations capable of delivering 5000 A maximum at 480 V.

1.7 - UL conformity

1.7.1 - Specified mains supply

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

1.7.2 - Cables

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

1.7.3 - Fuses

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

5 - FAULTS-DIAGNOSTICS

Information relating to the status of the VARMECA 30 is provided by two indicator lamps located on the local control options (B 31/32 or B 33/34, BMA 31/32 or BMA 33/34, BMAVAR 31/32 or BMAVAR 33/34, CVI VMA 31/32 or CVI VMA 33/34 options), or by the internal LED in VMA 31/32.

Colour and state of indic. lamp	VARMECA status	Checks to be performed
Steady green	No trip Mains present	
Flashing green	Current limiting	• Check that the motor is not overloaded or stalled
Flashing red	IGBT temperature alarm Motor overload Braking resistor option overload	• Check that air is able to circulate around the motor fins and VARMECA casing • The motor is overloaded: check the motor current using a clamp ammeter • Check that the deceleration ramp is long enough for applications with high inertia
Steady red	• Short-circuit of a motor winding • Locked motor rotor • Faulty insulation of a winding • I^2t overheating • Internal fault • Undervoltage • Overvoltage	• Check that no incident has occurred • Switch off and then on again to clear the fault. • Check the mains voltage • Check that the deceleration ramp is long enough for applications with high inertia • If the fault remains, consult LEROY-SOMER

The fault is cleared by switching off the VARMECA 30 or by opening/closing the connection between terminals 12: ENA and 11: +24 V (VMA 31/32) or SDI1 and SDI2 (VMA 33/34).

6 - MAINTENANCE

⚠ • All work relating to installation, commissioning and maintenance must be carried out by experienced, qualified personnel.
• Before carrying out any work, disconnect and lock the VARMECA 30 power supply circuit and wait 2 minutes for the capacitors to discharge.

6.1 - Care

No special care is required on the VARMECA 30, apart from the regular removal of dust from the fan grille and the cooling fins located at the bottom of the casing.
Do not dismantle the VARMECA 30 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 30 POWER SUPPLY (L1, L2, L3).
It is measured using an ordinary clamp ammeter on one of the wires which goes into the motor terminal block.

6.2.2 - Procedure for measuring the motor current on VMA 31/32 (if the motor wire loop is inaccessible)

- Open the VARMECA 30 power supply circuit and lock it.
- Wait 2 minutes for the capacitors to discharge (for the single-phase range).
- Open the cover of the VARMECA 30.
- Open the connection between terminals SDI1 and SDI2 (VMA 33/34) or 11 and 12 (VMA 31/32).
- Remove the TORX + slot type screws from the protection plate above the motor terminals.
- Pass the longest motor wire along the side of the protection circuit.
- Replace the protection plate and fasten it.
- Pass the clamp ammeter through the motor wire loop.
- Remake the connection between terminals SDI1 and SDI2 (VMA 33/34) or 11 and 12 (VMA 31/32).

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