INSTRUCTION MANUAL REGARDING USE AND MAINTENANCE

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TO BE KEPT BY THE USER

1. INTRODUCTION

Observe the instruction contained therein to obtain best results from the product. If you need further information, get in touch with your nearest authorized dealer.

NO PART OF THESE ILLUSTRATIONS AND/OR TEXT MAY BE REPRODUCED FOR ANY REASON.

The following symbols have been used in the compilation of this instruction booklet to make the reader aware of what can happen if instructions are not complied with:

WARNING! **Risk of damaging the pump or system**

Risk of causing injury or damaging property

Electrical hazard

2. MANUFACTURER IDENTIFICATION DATA

2.1 MANUFACTURER DATA

EBARA Pumps Europe S.p.A.

Registered office:
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Phone: 0463/660411 - Telefax: 0463/422782

Assistance Service:
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Tel. +39 0444 706968

2.2 See NAMEPLATE chapter 7.3

3. GUARANTEE AND TECHNICAL ASSISTANCE

FAILURE TO OBSERVE THE INSTRUCTIONS GIVEN IN THIS MANUAL AND WORK DONE ON THE PRODUCT BY ANYONE OTHER THAN OUR SERVICE CENTRES VOID THE WARRANTY AND RELIEVE THE MANUFACTURER OF ALL LIABILITY FOR PERSONAL INJURY AND DAMAGE TO THE PRODUCT.

When you receive the product, make sure that the packaging has not been damaged externally (breaks/large dents); if so, immediately report the damage to the shipping agent. Remove the product from its packaging and check it for shipping damage; report any such damage to the retailer within 8 days of delivery. Check that the ratings on the product's nameplate match those of your order.

The following parts, being normally subject to wear, have a limited guarantee:
- bearings
- mechanical seals
- grommets
- capacitors

If a fault that is not listed in the "TROUBLESHOOTING" table (chapter 14) occurs, please contact the nearest authorised retailer.

4. GENERAL SAFETY WARNINGS

Before using the product, you must be sure you can follow the instructions given in this manual and apply them whenever using or servicing it.

4.1 PREVENTIVE MEASURES TO BE TAKEN BY THE USER

The user must observe all local safety and accident prevention regulations; he must also observe the product's specifications (see "TECHNICAL DATA").
Always wear protective gloves when handling the pump or performing maintenance.

When repairing or servicing the product, shut off its power supply to prevent the risk of accidental startup, which can result in injury and damage.

The device can be used by children aged above 8 years and by persons with reduced physical, sensory or mental abilities, or who lack adequate experience and knowledge of the product, provided that they are supervised or have been adequately instructed on its safe use and the relevant risks involved. Children must not play with the device. Cleaning and maintenance to be carried out by the user must not be effected by unsupervised children.

Attempting to service, install or handle the product while its electrical equipment is live can result in serious and even fatal injury.

When starting up the product, make sure you are wearing shoes, not standing in water, and that your hands are dry.

Users must not operate or carry out any work on the motor-driven pump that is not permitted in this manual.

Stop operation in case pump is in failure. Operation of broken pumps can cause injury or damage property.

Do not touch the pump when the liquid handled is hot water. Burns may result from high temperatures.

Do not touch the motor. The motor's surfaces will be hot, and you could get burned if you touch them.

Do not touch the rotating parts such as the spindle, shaft couplings, V-pulleys, etc. while the pump is running. Since these parts rotate at high speed, doing so could result in injury.

Do not touch the live parts when the power is on. There is a risk of electric shock.

4.2 IMPORTANT PROTECTIONS AND CAUTIONS

All products are designed with guards over their moving parts. The manufacturer declines any responsibility in the event of damages caused by the removal of said protections.

Each conductor or powered part is electrically insulated with regards to earth. Extra security is also added by connecting the accessible conducting parts to an earth conductor. This ensures that accessible parts cannot become dangerous should the main insulation become faulty.

4.3 RESIDUAL RISKS FOR SURFACE PUMPS

Residual risks include the following:

a) The possibility of coming into contact (even if not accidentally) with the motor's cooling fan by inserting thin objects (e.g. screwdrivers, sticks and similar) through the fan cover holes.

5. HANDLING AND STORAGE

5.1 HANDLING

Apply established accident prevention regulations Crushing hazard. The product may be heavy; use proper lifting equipment and work apparel.

The following must be done when moving or dismantling the motor pump:

a) disconnect the electric supply;
b) remove the delivery and suction pipes (where present) if too long or bulky;
c) if present, unscrew the screws that secure the motor-driven pump to its supporting surface;
d) lift the motor-driven pump using equipment suitable to the pump weight and dimensions (refer to the plate).

The product is packed horizontally:

- or in a cardboard box, with handles on request. If its weight and size demand it, it will be packed on a wooden pallet,
- or in a wooden case for some models.

Handling the electric pump

To move the pump from its horizontal packed position, simply attach a suitable strap securely to the base of motor and lift it slowly with a hoist while checking that the load remains balanced.

WARNING! **Check that the product is properly secured to the motor and that it cannot tip over or fall.**

Handling the pump alone

Follow the same procedure as for the electric pump; in this case, the strap must be attached to the motor mount.

5.2 STORAGE

a) The product must be stored in a covered and dry place, far away from heat sources and protected against dirt and vibrations.
b) Protect the product against damp conditions, heat sources and mechanical damage.
c) Do not place heavy objects on the packaging.
d) The product must be stored at an ambient temperature between +5°C and +40°C (41°F – 104°F) with a relative humidity of 60%.

6. TECHNICAL-PRODUCTION CHARACTERISTICS

6.1 DESCRIPTION

Your product is a vertical multi-stage non-self-priming pump designed for coupling to standard electric motors. The abbreviations EVMS identify a wide range of vertical multi-stage pumps with in-line ports, sized for ten nominal flow rates (EVMS 1, 3, 5, 10, 15, 20, 32, 45, 64 and 90 m^3/h), and a various number of stages, designed to satisfy the most varied requirements for pressure; they are available either as an electric pump (pump and motor) or pump alone.
For the product code identifying see technical appendix. **[-F-]**

If you have purchased a pump without motor, make sure your motor is suited to coupling with the pump.

6.2 USE FOR WHICH PUMPS ARE DESIGNED

The pump is designed for:

- civil and industrial water distribution systems
- washing systems
- water treatment
- fire systems
- cooling systems
- pressurisation systems
- irrigation systems

6.2.1 USE OF DRINKING WATER

If the product is constructed with materials suited for pumping drinking water, Before being used, the pump must be run with clean water at its nominal flow rate for the time indicated in the following table:

EVMS1	60 minutes (minimum)
EVMS3	60 minutes (minimum)
EVMS5	30 minutes (minimum)
EVMS10	30 minutes (minimum)
EVMS15	15 minutes (minimum)
EVMS20	15 minutes (minimum)
EVMS32	15 minutes (minimum)
EVMS45	15 minutes (minimum)
EVMS64	15 minutes (minimum)
EVMS90	15 minutes (minimum)

6.3 USE FOR WHICH PUMPS ARE NOT DESIGNED

Improper use of the pump is hazardous and can result in personal injury and damage to property

WARNING! **Improper use of the product may void the warranty**

The pumps may not be used for:

- dirty water
- highly acidic water
- corrosive fluids
- water at temperatures higher than indicated in "TECHNICAL DATA"
- sea water
- flammable/explosive fluids
- fluids incompatible with the pump's materials
- installation outdoors without protection against atmospheric agents
- dry running

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7. SPECIFICATIONS

7.1 PUMP SPECIFICATIONS

	U.M.	EVMS1-20	EVMS32-90
Max. temperature of liquid pumped	°C	depends on the mechanical seal (see Data Book)	
Max. qty. / max. size of solids	Ppm/ mm	50 / 0.1 ÷ 0.25	
Max. working pressure	MPa	1.6 ÷ 2.5	1.6 ÷ 3.0 ÷ 3.5
Delivery diameter	*	G 1" ÷ Ø 100mm	
Suction diameter			

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* = threading according to ISO 228

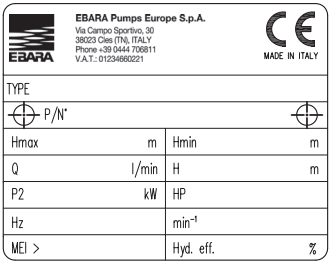
7.2 MOTOR SPECIFICATIONS

Type	IC411 - T.E.F.C.	
IP rating	IP 55 IP 56 (only for EVMS1-90 ≥ 15 kW)	
Max. starts per hour	N.° 100 60 30 15 8	kW ≤ 0.55 0.75 ÷ 3.0 4.0 ÷ 11 15 ÷ 30 37 ÷ 45
Insulation class and temperature rise	F (class B for teperature rise)	
Type of duty	Continuous S1	
Ratings	see motor rating plate	

This list shows specification of Ebara motors. In case of using other motors, please see nameplate of motors and check the motor manufacturer's specification.

7.3 PUMP RATING PLATE

The nameplate is an aluminium label applied to the pump which bears its technical specifications.
Relevant numbers:



"TYPE"	Pump model
"P/N°"	Pump item number
"Hmax"	Maximum head
"Hmin"	Minimum head
"Q"	Indicates upper and lower flow rate limits
"H"	Indicates head limits corresponding to minimum and maximum flow rate
"P2"	Rated power of the motor (output at shaft)
"HP"	Rated power of the motor expressed in HP (Horse Power)
"Hz"	Frequency
"min-1"	Speed of rotation
"MEI"	Index of the pump's quality in relation to its efficiency
"Hyd. Eff."	Hydraulic efficiency of the pump

7.4 INFORMATION ON AIRBORNE NOISE

Power [Kw]	Motor size	50 Hz		60 Hz	
		LpA [dB]*	LwA [dB]**	LpA [dB]*	LwA [dB]**
0.37	71	52	–	57	–
0.55	71	52	–	57	–
0.75	80	52	–	57	–
1.1	80	52	–	57	–
1.5	90	60	–	65	–
2.2	90	60	–	65	–
3.0	100	62	–	67	78
4.0	112	66	–	71	82
5.5	132	68	79	73	84
7.5	132	68	79	73	84
11	160	73	84	78	89
15	160	72	83	75	86
18.5	160	70	81	75	86
22	180	70	81	74	85
30	200	70	81	75	86
37	200	73	84	77	88
45	225	75	86	79	90

The table gives maximum sound emission values for motor-driven pumps.

* Sound pressure level - Mean value of measurements taken one metre from the pump. Tolerance ± 2.5 dB.

** Sound power level. Tolerance ± 2.5 dB.

THE MANUFACTURER RESERVES THE RIGHT TO AMEND TECHNICAL DATA FOR THE PURPOSE OF PRODUCT IMPROVEMENTS AND UPDATING.

8. PREPARING FOR USE

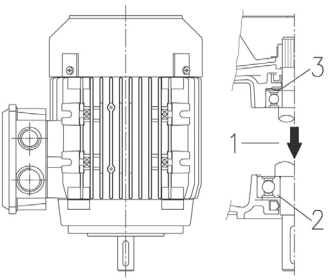
WARNING!

Installation must be carried out by a qualified engineer.

Free the pump from the packaging and lift it and lower it with suitable lifting gear in compliance with safety rules. Note that the motor's lifting hooks are not suitable for lifting the motor-driven pump.

8.1 COUPLING TO THE MOTOR

The motors to be coupled to the EVMS pumps must meet IEC standards and must have the preload spring positioned as illustrated:



1. Load direction
2. Thrust bearing
3. Preload spring

WARNING!

Required the presence and the installation of the preload spring as indicated in the drawing above.

Motor/pump coupling operations must be carried out with the motor disconnected from the power supply.
Since it is best to perform a trial run following coupling to check operation, if there is enough room, we suggest you perform coupling once the pump has been fastened down in its working position and connected to the suction and delivery lines. Otherwise the trial run can be performed with fluid piping connected in a makeshift manner.

8.1.1 ASSEMBLING THE MOTOR TO THE PUMP [-A-]

WARNING! **The following procedure must be done with the unit disconnected from its electrical power supply.**

1. Position and secure the pump vertically on a flat, rigid surface.
2. Unscrew the four coupling guard screws, then remove the two coupling guards and the locking insert. [A-1]
3. Remove the no.4 fixing screws of the half coupling and the half coupling. [A-2]
4. Evenly loosen the three set screws in the seal holder. [A-3]
5. Remove the motor key from the motor. [A-4]
6. Insert the half-key into the slot in the motor shaft. [A-4]

WARNING! **The half-key should not protrude from the slot in the motor shaft.**

7. Set the motor vertically with its shaft downwards and place it over the pump. The half-key must be positioned away from the gap between the coupling halves. [A-5]
8. Insert and evenly tighten down the four motor bolts. [A-6]
9. Use a suitable lever to pry the coupling connected with the pump shaft upward to the correct position as follows:
   - for 4.0 kW motor and below, lift up the coupling until the end of the pump shaft touches the end of the motor shaft;
   - for 5.5 kW motor and above, lift up the coupling until it is snug against the end of the motor shaft. [A-7a]
10. Tighten the four coupling bolts evenly to the specified torque. [A-7b]
11. Rotate the coupling by hand to check that the gap between the coupling halves is even. If not, repeat from step 9. [A-8]
12. Evenly tighten the three set screws on the seal holder to the specified torque. [A-9]
13. Temporarily connect the suction and delivery lines; then open the delivery valve.
14. Fill the pump with water as described in Chapter 10.
15. Assemble the two coupling guards (4 screws). [A-10]
16. Connect the motor to its power supply as described in Chapter 9.
17. Run the pump for a few minutes. [A-11]
18. Check that the running noise and vibration are not excessive.
19. Shut off power to the motor and wait for the coupling to come to a standstill.
20. Unscrew the four screws and remove the two coupling guards. [A-12]
21. Inspect the interior of the mount for water. [A-13]
22. If you find any water, drain the pump and reposition the coupling. Repeat the process from step 4 to step 20.
23. Assemble the two coupling guards (4 screws). [A-14]
24. Permanently connect the delivery and the suction lines.
25. The pump is now installed.

Procedure for models without bearing: follow steps 1-25
Procedure for models with bearing: skip steps 2-6, 9-12, 15 and 20-23

8.2 GENERAL INSTALLATION PRECAUTIONS

WARNING! **Remove the delivery and suction caps before hooking the product up to the lines**

a) Use metal or rigid plastic pipes in order to avoid their yielding because of the depression created at suction;
b) support and align pipes so that they do not put any stress on the pump;
c) avoid throttlings caused by bending suction and delivery hoses;
d) seal any piping connections: air infiltration in the suction pipe negatively affects pump operation;
e) we recommend that a non-return valve and a gate are installed on the delivery pipe at the motor-driven pump outlet;
f) fix the piping to the reservoir or to any fixed parts so that it is not supported by the pump;
g) do not use a lot of bends (goosenecks) and valves;
h) on PUMPS installed above head, the suction pipe should be fitted with a foot valve and filter in order to prevent foreign matter from entering and its end should be immersed at a depth that is at least twice the diameter of the pipe; its distance from the bottom of the reservoir should also be one and a half times its diameter.
   For suctions longer than 4 metres use an oversized pipe (1/4" wider at suction for improved efficiency).

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8.2.1 INSTALLATION

a) Position the pump on a flat surface that is as close as possible to the water source. Leave enough space around the pump to allow safe use and maintenance. A free space of at least 100 mm must be kept in front of the cooling fan of surface pumps in all cases;
b) use pipes of suitable diameters fitted with threaded sleeves that must be screwed onto the pump suction and delivery unions or its threaded counterflanges;

8.2.2 POSITIONING THE PRODUCT

WARNING! **Install the pump in a ventilated area protected from the elements (rain, frost.....).**

Bear in mind the ambient temperature and altitude ranges given in chap. 15.2.
Place the pump away from walls, the ceiling or other obstacles so that the pump can be fastened, operated and serviced safely.
The pump must be installed upright only.

8.2.3 FASTENING DOWN

Fasten the electric pump with bolts to a suitably rigid base fit to support the weight of the pump or to an appropriate metal structure. If the concrete base is an integral part of the reinforced concrete structure of buildings with occupants, we recommend using anti-vibration supports so as not to disturb anybody. When fastening, use a drill bit to mark the centres of the 4 holes in the base of the pump on the surface it is due to be installed on. Move the electric pump temporarily and use a drill to make 4 holes (dia. 12 for EVMS 1, 3, 5, 10, 15, 20 pumps and dia. 14 for EVMS 32,45, 64, 90 pumps). Move the pump back into position, line it up with the pipes and tighten the screws all the way. The position of the fastening holes is also illustrated in chap. 15.5.

8.2.4 PIPEWORK

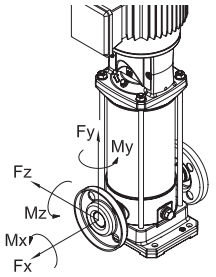
In addition to the instructions given below, also comply with the general instructions found in sect. 15.6 of the manual and with the directions in the fig. 1.

Pipework must be sized to withstand the pump's maximum working pressure.

On the delivery line, before the nonreturn valve and isolating valve, we recommend you also install a pressure gauge.
Use suitable supports for the suction and delivery lines so that they do not subject the pump's flange to too much stress.
If the pump is installed with a suction lift arrangement (level of liquid lower than the pump) and it feeds an open circuit, you will need to install a foot valve at the end of the suction line. In this case it is advisable to use a hose connected to the pump.

WARNING! **Make sure that the sum of the difference in height between the water and suction port and pressure losses along the suction line is lower than the pump's theoretical suction lift. Water temperature and altitude also have a negative effect on the pump's theoretical suction lift. If the sum of the various factors affecting suction lift exceeds the actual pump's theoretical suction lift, we are faced with the cavitation problem, which compromises hydraulic performance and results in damage to some of the pump's vital parts. Chap. 15.4 Gives specific information on how to check that the pump's operation is not being affected by cavitation.**

8.3 FLANGE LOADING AND TIGHTENING TORQUES



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Flange tightening torques

Model				Flange DN	Bolt	n° Bolt	Tightening torque [Nm]
EVMS	(L)(G)	1	N	25	M10	2	30
EVMS	(L)(G)		F	25	M12	4	50
EVMS	(L)(G)		LF	25	M12	4	50
EVMS	(L)(G)	3	N	25	M10	2	30
EVMS	(L)(G)		F	25	M12	4	50
EVMS	(L)(G)		LF	25	M12	4	50
EVMS	(L)(G)	5	N	32	M10	2	30
EVMS	(L)(G)		F	32	M16	4	70
EVMS	(L)(G)		LF	32	M16	4	70
EVMS	(L)(G)	10	N	40	M12	2	50
EVMS	(L)(G)		F	40	M16	4	70
EVMS	(L)(G)		LF	40	M16	4	70
EVMS	(L)(G)	15	N	50	M12	2	50
EVMS	(L)(G)		F	50	M16	4	70
EVMS	(L)(G)		LF	50	M16	4	70
EVMS	(L)(G)	20	N	50	M12	2	50
EVMS	(L)(G)		F	50	M16	4	70
EVMS	(L)(G)		LF	50	M16	4	70
EVMS	(L)	32	LF	65	M16	4	80
				65	M16	8	80
	(G)		F	65	M16	4	80
				65	M16	8	80
EVMS	(L)	45	LF	80	M16	8	80
				80	M16	8	80
	(G)		F	80	M16	8	80
				80	M16	8	80
EVMS	(L)	64	LF	100	M16	8	80
				100	M20	8	100
	(G)		F	100	M16	8	80
				100	M20	8	100
EVMS	(L)	90	LF	100	M16	8	80
				100	M20	8	100
	(G)		F	100	M16	8	80
				100	M20	8	100

Admissible strain on the flange

Model				Flange DN	Strain X [N]	Strain Y [N]	Strain Z [N]
EVMS	(L)(G)	1	N	25	230	200	180
EVMS	(L)(G)		F	25	230	200	180
EVMS	(L)(G)		LF	25	230	200	180
EVMS	(L)(G)	3	N	25	230	200	180
EVMS	(L)(G)		F	25	230	200	180
EVMS	(L)(G)		LF	25	230	200	180
EVMS	(L)(G)	5	N	32	270	230	210
EVMS	(L)(G)		F	32	270	230	210
EVMS	(L)(G)		LF	32	270	230	210
EVMS	(L)(G)	10	N	40	370	330	300
EVMS	(L)(G)		F	40	370	330	300
EVMS	(L)(G)		LF	40	370	330	300
EVMS	(L)(G)	15	N	50	490	450	400
EVMS	(L)(G)		F	50	490	450	400
EVMS	(L)(G)		LF	50	490	450	400
EVMS	(L)(G)	20	N	50	490	450	400
EVMS	(L)(G)		F	50	490	450	400
EVMS	(L)(G)		LF	50	490	450	400
EVMS	(L)	32	LF	65	2100	1850	1700
				65	2100	1850	1700
	(G)		F	65	1050	925	850
				65	1050	925	850
EVMS	(L)	45	LF	80	2500	2250	2050
				80	2500	2250	2050
	(G)		F	80	1250	1125	1025
				80	1250	1125	1025
EVMS	(L)	64	LF	100	3350	3000	2700
				100	3350	3000	2700
	(G)		F	100	1675	1500	1350
				100	1675	1500	1350
EVMS	(L)	90	LF	100	3350	3000	2700
				100	3350	3000	2700
	(G)		F	100	1675	1500	1350
				100	1675	1500	1350

Admissible torque on the flange

Model				Flange DN	Torque X [Nm]	Torque Y [Nm]	Torque Z [Nm]
EVMS	(L)(G)	1	N	25	190	240	160
EVMS	(L)(G)		F	25	190	240	160
EVMS	(L)(G)		LF	25	190	240	160
EVMS	(L)(G)	3	N	25	190	240	160
EVMS	(L)(G)		F	25	190	240	160
EVMS	(L)(G)		LF	25	190	240	160
EVMS	(L)(G)	5	N	32	230	280	190
EVMS	(L)(G)		F	32	230	280	190
EVMS	(L)(G)		LF	32	230	280	190
EVMS	(L)(G)	10	N	40	310	390	270
EVMS	(L)(G)		F	40	310	390	270
EVMS	(L)(G)		LF	40	310	390	270
EVMS	(L)(G)	15	N	50	340	420	300
EVMS	(L)(G)		F	50	340	420	300
EVMS	(L)(G)		LF	50	340	420	300
EVMS	(L)(G)	20	N	50	340	420	300
EVMS	(L)(G)		F	50	340	420	300
EVMS	(L)(G)		LF	50	340	420	300
EVMS	(L)	32	LF	65	1200	1500	1100
				65	1200	1500	1100
	(G)		F	65	600	750	550
				65	600	750	550
EVMS	(L)	45	LF	80	1300	1600	1150
				80	1300	1600	1150
	(G)		F	80	650	800	575
				80	650	800	575
EVMS	(L)	64	LF	100	1450	1750	1250
				100	1450	1750	1250
	(G)		F	100	725	875	625
				100	725	875	625
EVMS	(L)	90	LF	100	1450	1750	1250
				100	1450	1750	1250
	(G)		F	100	725	875	625
				100	725	875	625

9. ELECTRICAL CONNECTION [-B-]

- **ELECTRICAL CONNECTION MUST BE CARRIED OUT BY A QUALIFIED ENGINEER.**
- **IT IS ADVISABLE TO INSTALL A HIGH INTENSITY DIFFERENTIAL SWITCH (0.03 A) ON BOTH THE THREEPHASE AND SINGLE PHASE VERSIONS.**

WARNING!

Motor-driven pumps not equipped with a plug must be powered by connecting them permanently to the electrical cabinet equipped with a switch, fuses and thermal cut-out calibrated to the pump's absorbed current.

The mains must be reliably earthed, according to the electrical regulations in force in the user's country: this is the installer's responsibility.

If the motor-driven pump is supplied without a power cable, use a cable that complies with the regulations in force and the necessary section according to length, power and mains voltage.

If present, the plug of the single phase version must be connected to the mains far from sprays, water jets or rain and it must be accessible.

The pump does not have an internal motor protector, therefore overload protection must be provided by the user. From 1.5 kW to 45 kW, the motor is equipped with a PTC. It is recommended to connect the protection to an electronic board.

WHILE CONNECTING, MAKE SURE THAT BOTH THE TERMINAL BOARD AND THE MOTOR DO NOT GET WET.

– For threephase versions, after connecting the star or triangle cable to the terminal board, looking at the pump from the motor side, check that the cooling fan turns in the same way as the arrow on the label applied on the fan cover. If it is incorrect, swap two of the three wires over on the motor's terminal strip.

MOTOR-DRIVEN EVMS
Before starting to make electrical connections, make sure that line voltage and frequency match the motor's values given on the rating plate.
You must insert a control panel between the line and the motor-driven pump featuring the following devices (unless otherwise specified by local standards);
- Switch with at least a 3mm gap between contacts;
- Short-circuit protection device (fuse or thermomagnetic circuit breaker);
- High-sensitivity (0.03 A) residual current circuit breaker;
- We recommend installing a device to protect against dry running, which must be connected to a float, sensors or other such equipment;

Connect the protective conductor to the PE terminal first, leaving it longer than the others so that it will be the last wire to be pulled out if accidentally tugged.
If the terminal box is in an awkward position for connecting the cable, you can change its position by turning the motor 90° or 180° or 270°. To do this, it is necessary to remove the 4 screws holding the motor to the motor mount, lift the engine just enough to allow rotation, without removing the coupling between the motor shaft and the pump shaft. Then screw the 4 screws back in.

10. FILLING THE PUMP [-C-]

WARNING!

Do not start the pump until it has been positioned and installed in its final place of operation to be performed with the motor's terminal strip fully closed.

The pump and suction line must be filled with water. As specified earlier, running the pump without water inevitably causes serious damage to a number of the pump's internal parts.
Fill the pump with the terminal box closed and the power supply disconnected.

10.1 FILLING PUMP IN SUCTION LIFT ARRANGEMENT

a) Unscrew the hexagonal cap located above the outer jacket on a level with the upper mount (remove coupling covers if necessary);
b) With the aid of a funnel, fill the suction line and pump casing with water to overflowing;
c) Screw the hexagonal cap back on until it is locked tight;
d) Areas that have become wet as a result of water leaks must be dried thoroughly;
e) Refit the coupling covers if they have been removed;

10.2 FILLING PUMP IN A FLOODED INSTALLATION

a) Unscrew the hexagonal cap;
b) Open the suction gate valve until the water comes out;
c) Screw the cap back on until it is locked tight. Starting and operation;

11. USE, STARTING AND RUNNING [-D-]

NEVER ALLOW THE MOTOR-DRIVEN PUMP TO OPERATE WITHOUT WATER. DOING SO CAN SERIOUSLY DAMAGE THE INTERNAL COMPONENTS.

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11.1 GENERAL WARNINGS

a) Our surface pumps are designed to operate at a temperature no higher than 40°C and a level no higher than 1000 metres;
b) our motor-driven pumps cannot be used in swimming pools or similar plants;
c) prolonged motor pump operation with the delivery pipe closed can cause damage;
d) If operate the pump on and off more than 50,000 times per year, the pump life may be shortened and there is a risk of premature failure. Regarding the maximum number per hour, please refer also Chapter 7.2.;
e) during power cuts, it is advisable to disconnect the power to the pump.
f) select the pump so that it will operate close to the best efficiency point, at least between minimum and maximum rated flow rate.

11.2 STARTING

Once the unit has been hooked up electrically and to the water circuit and charged with water, check its direction of rotation before using it.
a) Start the electric pump with the delivery valve closed.
b) Check that the motor rotates clockwise (starting from the fan end the direction is also marked by an arrow on the top mount) by looking through the slots in the fan cover. This is best seen when starting or stopping the motor.
c) If it is rotating in the wrong direction (counterclockwise), shut off power and swap two of the motor's power phases in the electrical enclosure or terminal block.
d) Start the pump two or three times to check system conditions;
e) restrict the delivery to cause a rapid pressure increase for a few times;
f) make sure that the noise, vibration, pressure and electrical voltage levels are normal.
g) while driving loosen the vent cap until the water comes out; screw the cap back on until it is locked tight.

11.3 RUNNING

Start the pump with the isolating valve on the delivery line closed, then open it gradually. The pump must operate smoothly and quietly. Close the isolating valve again and make sure that the reading on the delivery line's pressure gauge is close to the Hmax value as indicated on the rating plate. (This approximation is mainly attributable to tolerances and to possible suction lift). If the pressure gauge reading is much lower than Hmax, repeat filling (air in pump).
If the two values are close, it means the pump is working properly and any trouble with the isolating valve open is almost always a result of motor system problems of an electrical or mechanical nature or, much more commonly, of pump cavitation due to:
– excessive difference in height or excessive pressure loss along suction line,
– delivery line backpressure too low;
– problems associated with liquid temperature.

For more information on the factors that reduce and/or compromise suction lift and hence the pump's performance, see the troubleshooting section in chap. 14. Note that for temperatures and altitudes higher than those specified, the motor's output is reduced and you will need to have a motor with greater output or is necessary to reduced the request motor's performance. See chap. 15.2 on the subject. Make sure there is no water hammer or pressure peaks in the system caused by fast-closing valves exceeding 1.5 times the pump's nominal pressure. In the long run, they can cause damage to the actual pump. Avoid operating the pump with the isolating valve on the delivery line closed for any more than a few seconds. You should also avoid using the pump for continuous duty with a flow rate below the minimum rate indicated on the rating plate as this may result in the liquid being pumped overheating and in the unnecessary overloading of pump or motor bearings.

11.4 STOPPING

a) Gradually interrupt water circulation in the delivery section to avoid

overpressure in the piping and pump caused by water hammering;
b) Cut off the power supply.

12. MAINTENANCE AND REPAIRS

Before commencing any maintenance work on the motor-driven pump, turn off the power.

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The electric pump has no need of scheduled maintenance; however, you should periodically check that it is running properly depending on the fluid being pumped and the operating conditions; check in particular for abnormal running noise and vibration.
Said checks may give you a rough idea of what preventive repairs are required, if any, instead of having to perform repairs following sudden problems.
The main and most common special maintenance operations are generally as follows:
- replacement of mechanical seals
- replacement of grommets
- replacement of bearings
- replacement of capacitors. (where present)

Nonetheless, even these parts typically subject to wear may last a very long time if the pump is used correctly.

When the pump remains inactive for a long period, it should be emptied completely, removing the discharge and filling caps, washed carefully with clean water then emptied. Do not leave water deposits inside. This operation must always be carried out whenever there is a chance of frost in order to avoid the breakdown of the pump components.

When performing repair work, order original spare parts from our sales and customer support network.
Non-original spare parts can damage the product and are a hazard for persons and property.

12.1 REPLACEMENT OF SHAFT SEAL [-E-]

In case of explanations, contact our assistance centre.

13. DISPOSAL

This product falls within the scope of Directive 2012/19/EU regarding the management of electrical and electronic equipment waste (WEEE).
Electronic-electrical equipment must not be disposed of with domestic waste as it is made of various materials that can be recycled at the appropriate facilities. Inquiries should be made through the municipal authorities regarding the location of the ecological platforms that receive products for disposal and their subsequent correct recycling.
Furthermore, it is worth remembering that, upon purchase of an equivalent appliance, shops are obliged to collect the product for disposal free of charge.
This product is not potentially dangerous for human health and the environment, since it does not contain harmful substances as per Directive 2011/65/EU (RoHS), yet if abandoned in the environment it has a negative impact on the ecosystem.
Read the instructions carefully before using the appliance for the first time. It is recommended that you do not use this product for any purpose other than that for which it was intended; there is danger of electric shock if used improperly.

The crossed-out bin symbol found on the appliance label indicates the compliance of this product with the regulations regarding electrical and electronic equipment waste.
Abandoning the appliance in the environment or its illegal disposal is punishable by law.

14. TROUBLESHOOTING

14.1 THE PUMP DOES NOT WORK

the motor does not turn

No electricity	Check the electrical supply meter
Plug not inserted	Check the connection to the power supply
Incorrect electrical connection	Check the terminal board and the electrical panel
Automatic switch triggered or fuses blown (*)	Reset the switch or replace the fuses and verify the cause
Float sticking	Check that the float reaches the level ON
Thermal protection activated (single phase)	It reactivates automatically (single phase only)
Built-in thermal overload protection device (if fitted) or thermal cutout in control panel tripped (*)	Wait for built-in thermal overload protection device to reset or reset thermal cutout in control panel
Device protecting against dry running tripped (*)	Check water level and/or correct connection of system devices
Hydraulics blocked	Check the hydraulic part. Remove the foreign bodies, blocking the impeller.
Overload protection tripped or not properly calibrated.	Check whether the calibration of the amperometric protection has been properly calibrated (maximum line current value of the motor).
Undersized or damaged capacitor (motor 1 ~).	Verify proper functioning of the capacitor. If necessary, provide for a larger capacitor.
Motor burned down due to insulation fault, overheating or overload (unsuitable liquid).	Measure the insulation resistance of the winding towards the grounding and make sure it is greater than 10MΩ
Powered by 2 phases (motor 3~).	Check how many stages have been connected in the terminal box of the motor and check the actual presence of voltage on the 3 stages using a voltmeter, during pump operation.

the motor turns

Decrease in the line voltage	Wait for voltage to return to normal
Suction filter / hole blocked	Clean the filter / hole
Foot valve blocked (**)	Release or clean the valve and check that it works properly
Pump has not been filled (**)	Fill (sect. 10)
Water level low (if no protection system is fitted) (**)	Restore water level
Pump not primed	Prime the pump Check any delivery non-return valves Check the liquid level
Pressure too low	Restrict the delivery gate

(*) If you encounter the same trouble again, call our Servicing Department
(**) Caution: mechanical seal could be damaged

14.2 THE PUMP WORKS

with a reduced flow rate

System undersized	Reviewing the system
System dirty	Clean the piping, valves, filters
Water level too low	Switch off the pump or immerse the foot valve

Incorrect motor rotation direction (only three-phase).	Reverse phases
Incorrect supply voltage	Supply the pump with the voltage indicated on the ate
Leaks from piping	Check the joints
Pressure too high	Recheck the system
Incorrect priming / No priming	Correctly prime the suction pipe section (check instructions on the manual)
Non-return valve blocked	Verify proper non-return valve functioning. If necessary, replace.
Wear of the hydraulic part.	Check the status of the impeller (check the compatibility of the material with the pumped liquid)
Improper liquid	Check the density and viscosity of the pumped liquid (contact sales department).

14.3 PUMP STOPS AFTER RUNNING FOR SHORT TIME

as a result of thermal overload protection tripping

Supply voltage outside motor's accepted range	Check whether there are excessive drops in voltage due to undersized line or cables
Inadequate thermal calibration	Check whether the calibration of the amperometric protection has been properly calibrated (maximum line current value of the motor)
Motor overload due to dense and/or viscous liquid	- Reduce flow rate, throttling the delivery line or replace motor with more powerful one - Check actual power absorbed by the pump based on liquid pumped
Pump delivers liquid at higher rate than max. flow rate on rating plate	Reduce flow rate by throttling delivery line
Panel exposed to sun or other sources of heat	Protect panel from sun or sources of heat.
Foreign matter brakes impeller rotation	- Disassemble and clean pump - Call our nearest Servicing Department to do the job
Worn motor bearings	Replace bearings.
Liquid temperature too high	The temperature exceeds the technical limits of the pump
Internal fault	Contact the nearest retailer

for pressure applications

The difference between maximum and minimum pressure is minimal	Increase the difference between the two pressures

14.4 THE PUMP DOES NOT STOP

Electrical / electronic components faulty/not working.	Contact our sales network.
Level sensors not working.	Verify proper operation of level sensors.
Non-compliant / unsuitable use.	Contact our sales network.

for pressure applications

Maximum pressure too high	Set maximum pressure at a lower value

14.5 THE PUMP VIBRATES

is too noisy during operation

Flow rate too high	Reduce the flow rate
Cavitation	Contact the nearest retailer
Irregular piping	Fix in a better way
Noisy bearing	Contact the nearest retailer
Foreign bodies sliding along the motor fan	Remove the foreign bodies
Incorrect priming	Bleed the pump and/or fill it again

unusually noisy

Motor bearings worn	Replace bearings
Foreign matter between fixed and rotating parts	- Disassemble and clean pump - Call our nearest Servicing Department to do the job
Pump operation affected by cavitation	Reduce flow rate by throttling delivery line. If cavitation persists, check: - Suction height - Pressure loss along suction line (diameter of pipe, elbows etc.) - Liquid temperature - Delivery line backpressure

14.6 WHEN THE SWITCH CLOSES, THE PUMP DOES NOT MANAGE TO COMPLETE EVEN ONE TURN OR STRUGGLES TO TURN THE ODD HALF TURN BEFORE THE CIRCUIT BREAKER TRIPS OR FUSES BLOW

Motor short-circuited	- Check and replace - Call an electrician specialized
Short-circuit due to incorrect connection	- Check and reconnect correctly - Call an electrician specialized

14.7 RESIDUAL CURRENT CIRCUIT BREAKER TRIPS AS SOON AS SWITCH CLOSES

Leakage current owing to damaged insulation of motor, cables or other electric components	- Check and replace electric component with ground fault - Call an electrician specialized - Condensate build-up in the motor - Presence of foreign bodies

14.8 PUMP PERFORMS A FEW TURNS IN OPPOSITE DIRECTION WHEN STOPPING

Foot valve leaking	Check, clean or replace
Suction pipe leaking	Check and repair

15. SUPPLIED TECHNICAL DOCUMENTATION

15.1 STANDARD VOLTAGES SHOWN ON THE PLATE WITH THEIR RESPECTIVE TOLERANCES

[kW]	Frequency [Hz]	Phase [~]	UN [V] ± %
≤ 0.55	50	1 ~	230 ± 10%
	60		220 ± 10%
0.37 ÷ 4.0	50	3 ~	230 Δ / 400 Y ± 10%
	60		220 Δ / 380 Y - 5% /+ 10% 460 Y ± 10%
≥ 5.5	50	3 ~	400 Δ / 690 Y ± 10%
	60		380 Δ - 5% /+ 10% 460 Δ ± 10%

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15.2 MOTOR OUTPUT REDUCTION FACTORS

When the motor-driven pump is installed in a site where the ambient temperature is higher than 40°C and/or its altitude is over 1000 m above sea level, the motor's output decreases.
The table attached features the reduction factors based on temperature and altitude. To prevent overheating, you must replace the motor with a different version whose rated output multiplied by the factor corresponding to the temperature and altitude is greater than or equal to that of the standard motor.
The standard motor can only be used if the relevant application can accept a reduction in flow rate, achieved by throttling the delivery line so as to reduce the current absorbed by an amount equal to the correction factor.

T(°C)	Altitude (m.a.s.l.)			
	1000	1500	2000	2500
40	1	0.96	0.94	0.90
45	0.95	0.92	0.90	0.88
50	0.92	0.90	0.87	0.85
55	0.88	0.85	0.83	0.81
60	0.83	0.82	0.80	0.77
65	0.79	0.76	0.74	0.72

15.3 MAXIMUM WORKING PRESSURE CHART

Pressure indicated according to the number of impellers.

Pmax	50 Hz				
	EVMS1	EVMS3	EVMS5	EVMS10	EVMS15
1.6	2 ÷ 26	2 ÷ 21	2 ÷ 17	2 ÷ 15	1 ÷ 11
2.5	27 ÷ 39	23 ÷ 33	19 ÷ 27	16 ÷ 23	12 ÷ 17

Pmax	50 Hz				
	EVMS20	EVMS32	EVMS45	EVMS64	EVMS90
1.6	1 ÷ 9	1 ÷ 7	1 ÷ 5	1 ÷ 5	1 ÷ 4
2.5	10 ÷ 16	8 ÷ 11	6 ÷ 9	6 ÷ 8	5 ÷ 6
3.0	-	12 ÷ 14	-	-	-
3.5	-	-	10 ÷ 13	-	-

Pmax	60 Hz				
	EVMS1	EVMS3	EVMS5	EVMS10	EVMS15
1.6	2 ÷ 18	2 ÷ 15	2 ÷ 12	1 ÷ 10	1 ÷ 7
2.5	20 ÷ 29	16 ÷ 23	13 ÷ 19	11 ÷ 16	8 ÷ 12

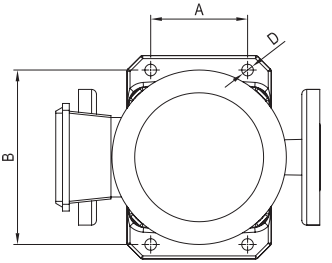
Pmax	60 Hz				
	EVMS20	EVMS32	EVMS45	EVMS64	EVMS90
1.6	1 ÷ 6	1 ÷ 5	1 ÷ 4	1 ÷ 3	1 ÷ 3
2.5	7 ÷ 10	6 ÷ 8-2	5 ÷ 6	4 ÷ 5	4
3.0	-	8-0 ÷ 10	-	-	-
3.5	-	-	7	-	-

15.4 CAVITATION

Cavitation, as you may know, is a destructive problem for pumps, a phenomenon that is encountered when the water drawn in is transformed into steam inside the pump. EVMS pumps, fitted with internal hydraulic parts made from stainless steel, suffer less than other pumps built with materials of poorer quality, though they are not entirely immune to the damage that cavitation brings.
Hence pumps must be installed in compliance with the laws of physics and with rules relating to fluids as well as to the actual pumps.
Below we give you just the practical results of the above-mentioned rules and laws of physics.
Under standard environmental conditions (15°C, at sea level), water turns into steam when subjected to a negative pressure greater than 10.33 m. Hence 10.33 m is the water's maximum theoretical suction height. EVMS pumps, like all centrifugal pumps, cannot exploit theoretical suction height to the full owing to their internal loss, known as NPSHr, which has to be deducted. Hence the theoretical suction lift of each EVMS pump is 10.33 m less its NPSHr at the work point in question.
The NPSHr can be determined by consulting the standard curves featured in the brochures and must be taken into consideration when first selecting the pump.
When the pump is part of a flooded installation or has to draw cold water from 1 or 2 m with a short pipe with one or more wide bends, NPSHr can be disregarded. Consequently, the more difficult the installation, the more the NPSHr value has to be taken into consideration. Installation becomes difficult when:

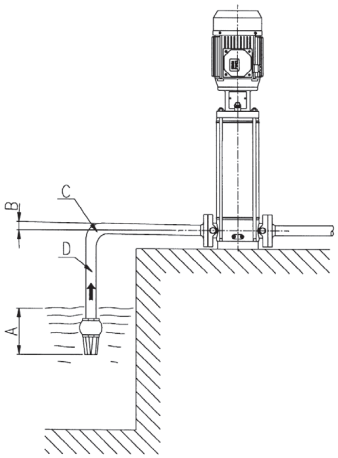
a) Suction height is high;
b) Suction line is long and/or has lots of bends and/or has several valves (high pressure losses along suction line);
c) Foot valve has high flow resistance (high pressure losses along suction line);
d) Pump is used with a flow rate close to the maximum rated flow rate (NPSHr increases as flow rate increases over the rate where efficiency is highest);
e) Water temperature is high. (It is likely you will have to install the pump with a flooded arrangement where values approach 80-85°C);
f) Altitude is high (in the mountains).

15.5 POSITIONING OF HOLES FOR FASTENING DOWN



Model	D mm	A mm	B mm
EVMS1	12	100	180
EVMS3			
EVMS5			
EVMS10		130	215
EVMS15			
EVMS20			
EVMS32	14	170	240
EVMS45		190	266
EVMS64			
EVMS90			

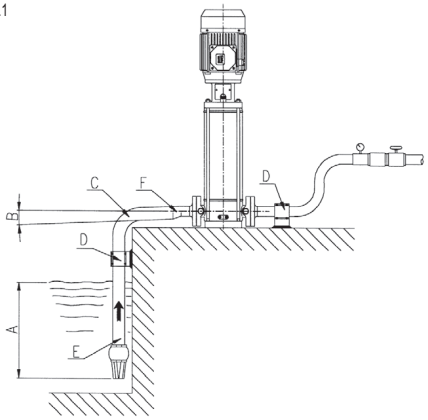
FIG.2



A Insufficient immersion
B Negative slope, air pockets created
C Tight bend, pressure loss
D Pipe diameter < pump port diameter, pressure loss

15.6 WARNINGS FOR CORRECT OPERATION OF EVMS MOTOR-DRIVEN PUMPS (FIG. 1 - FIG. 2)

FIG.1



A Good immersion
B Positive slope
C Wide-radius bend
D Pipework with independent supports
E Suction pipe diameter ≥ pump port diameter
F Reducing coupling for eccentric pipes

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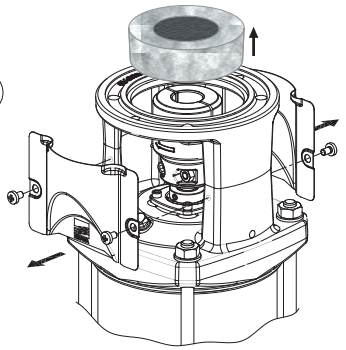
1



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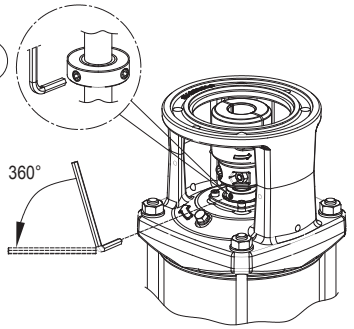
360°

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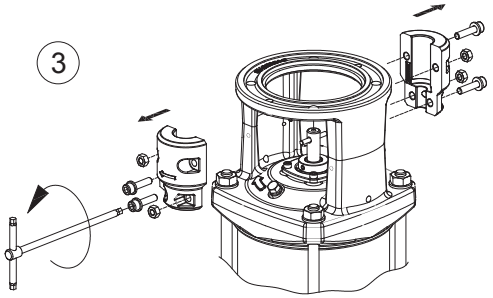

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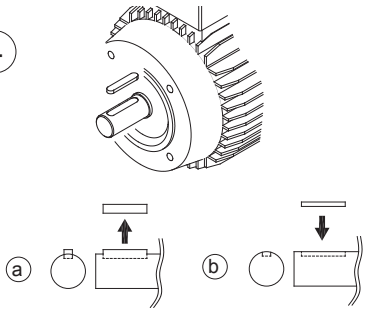
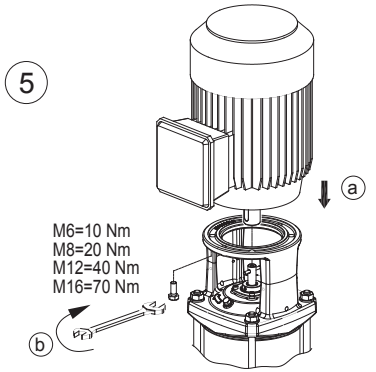
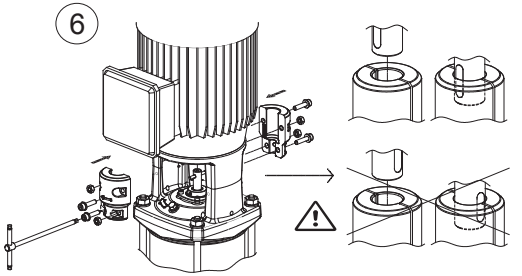

a
b

5


a
M6=10 Nm
M8=20 Nm
M12=40 Nm
M16=70 Nm
b

6



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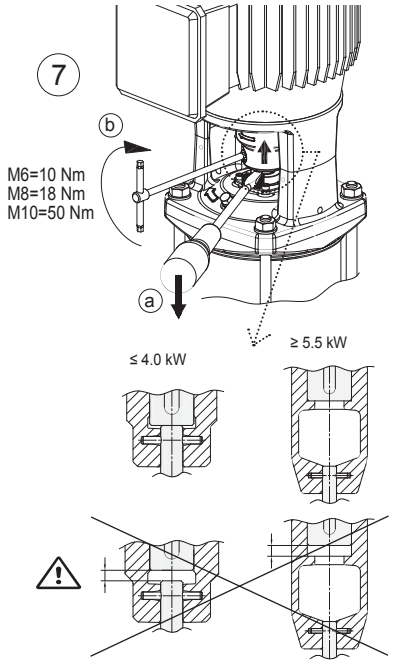
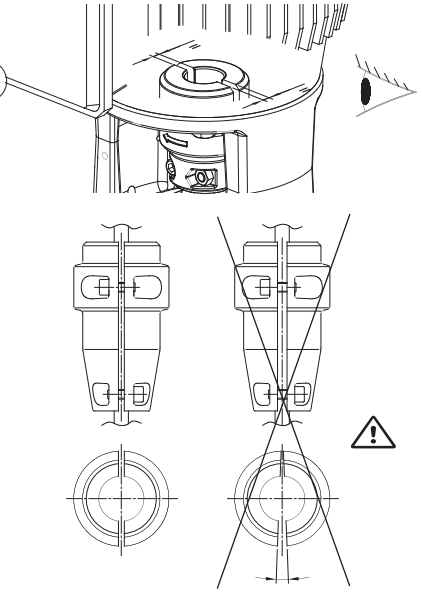

b
M6=10 Nm
M8=18 Nm
M10=50 Nm
a
≤ 4.0 kW
≥ 5.5 kW

8



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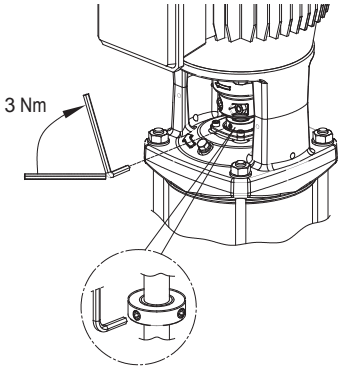

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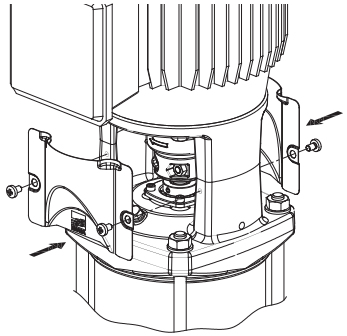

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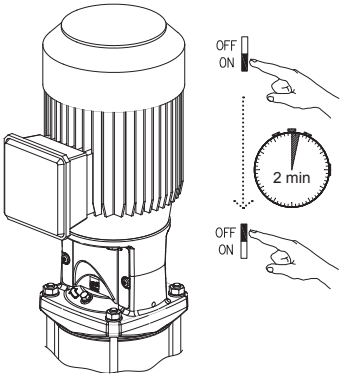

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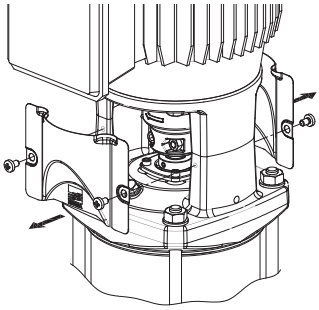

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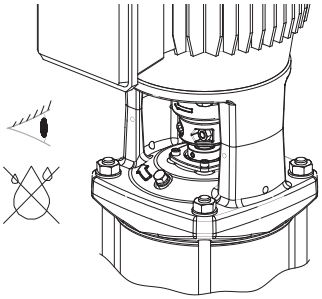

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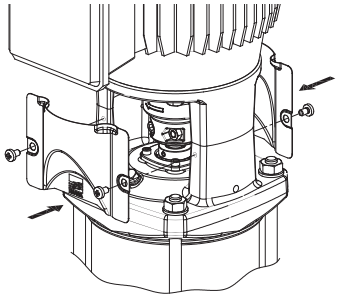
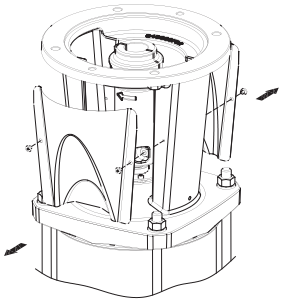


- A -
EVMS 32 - 45 - 64 - 90 without ball bearing

1



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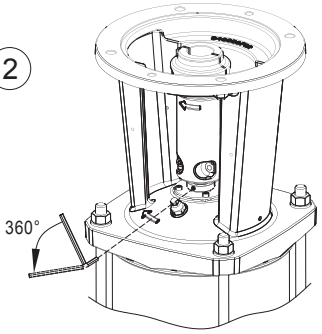

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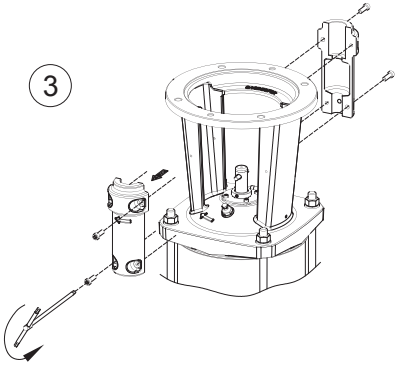

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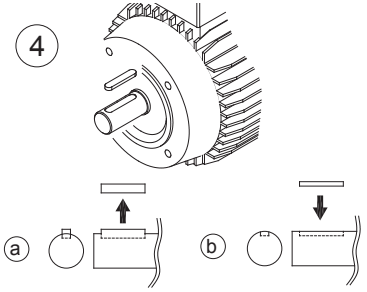

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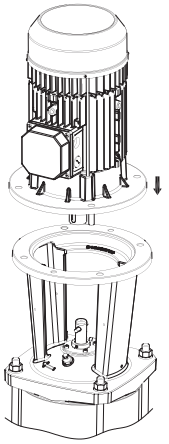

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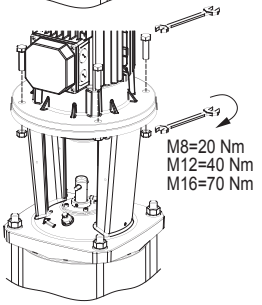

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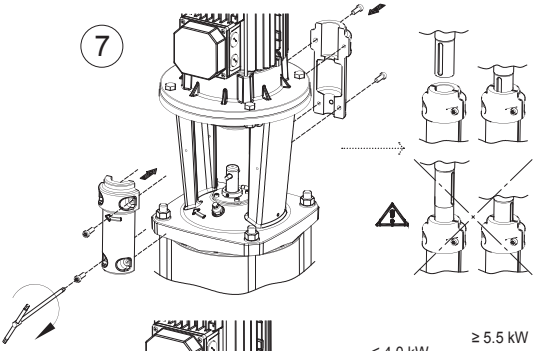

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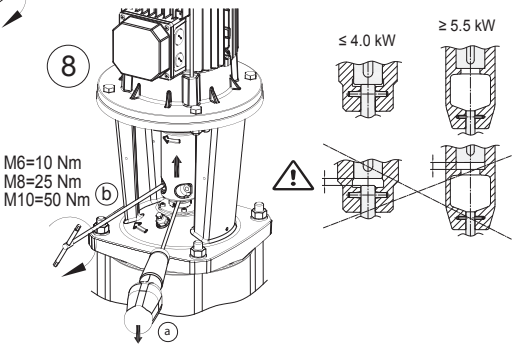

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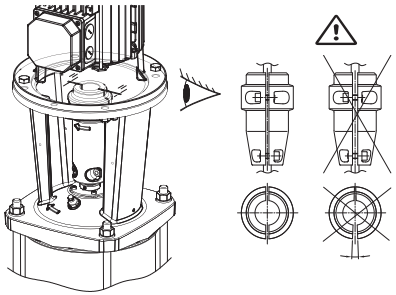

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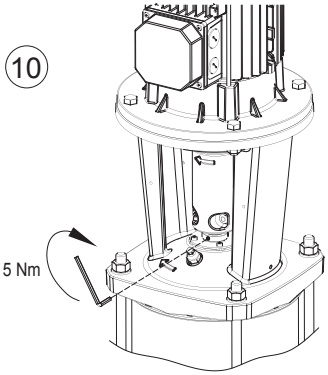

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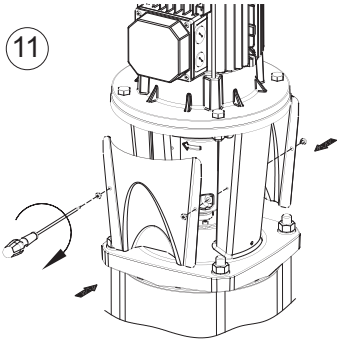

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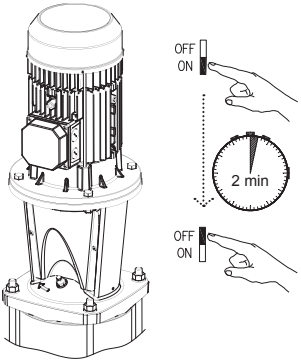

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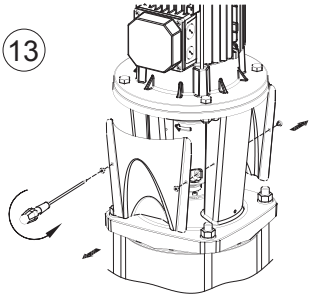

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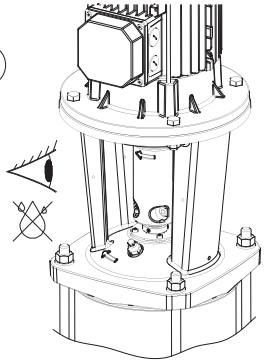

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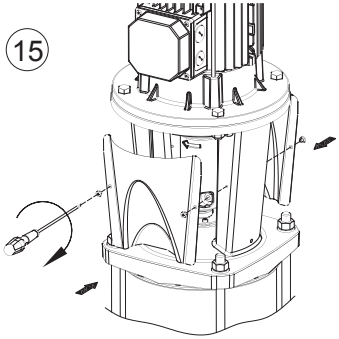

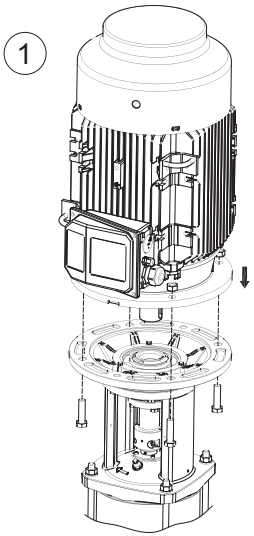
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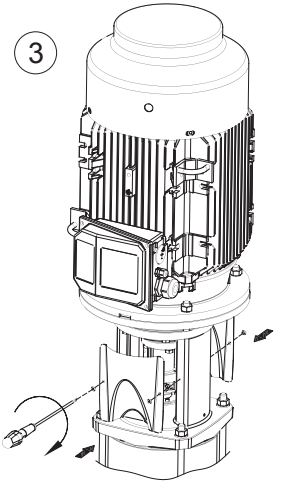
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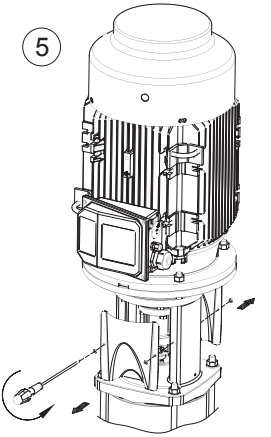
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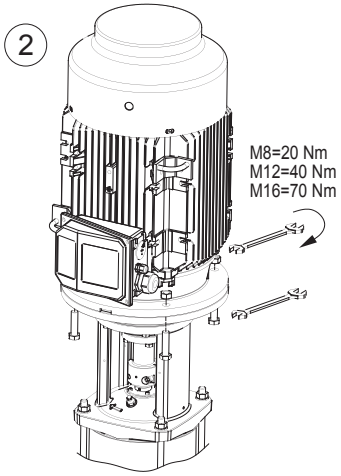
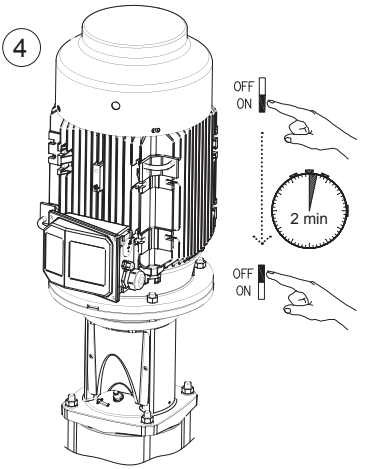
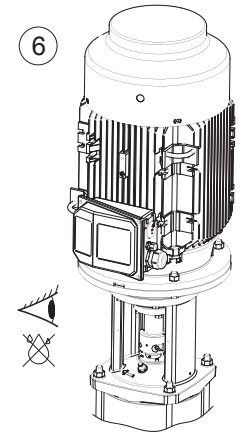

2
M8=20 Nm
M12=40 Nm
M16=70 Nm


4
OFF
ON
2 min
OFF
ON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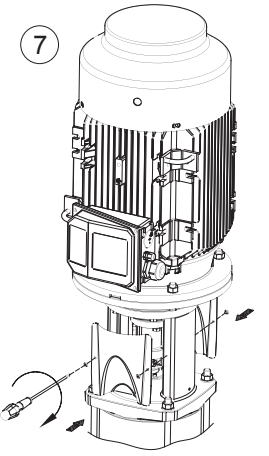
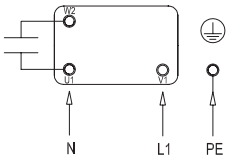
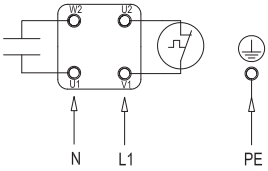

7

- B -

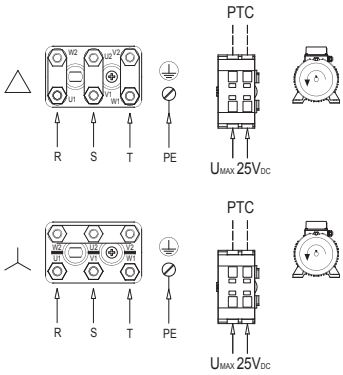
IT: Monofase
EN: Single phase
FR: Monophasé
DE: Einphasig
ES: Monofásico
NL: Monofase
PL: Jednofazowa
TR: Tek fazlı



IT: Monofase con moto protettore
EN: Single phase with motor protector
FR: Monophasé avec protection moteur
DE: Einphasig mit Motorüberlastschutz
ES: Monofásico con motoprotector
NL: Monofase met motorbeveiliging
PL: Jednofazowa z zabezpieczeniem silnika
TR: Motor koruma cihazıyla tek fazlı

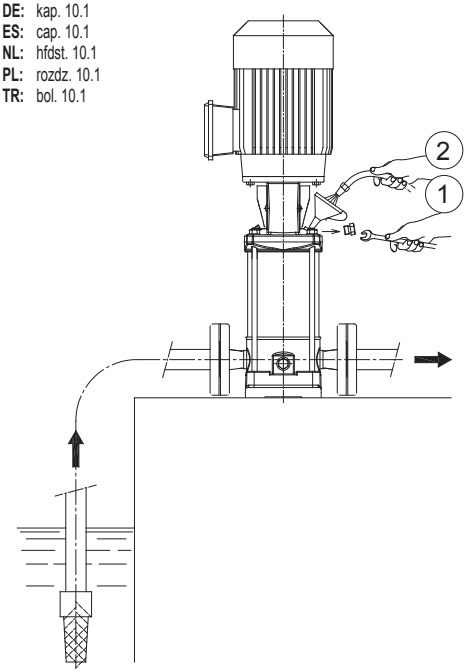


IT: Trifase
EN: Threee phase
FR: Triphasé
DE: Dreiphasig
ES: Trifásico
NL: Driefase
PL: Trójfazowa
TR: Üç fazlı



- C -

IT: cap. 10.1
EN: chap. 10.1
FR: chap. 10.1
DE: kap. 10.1
ES: cap. 10.1
NL: hfdst. 10.1
PL: rozdz. 10.1
TR: bol. 10.1



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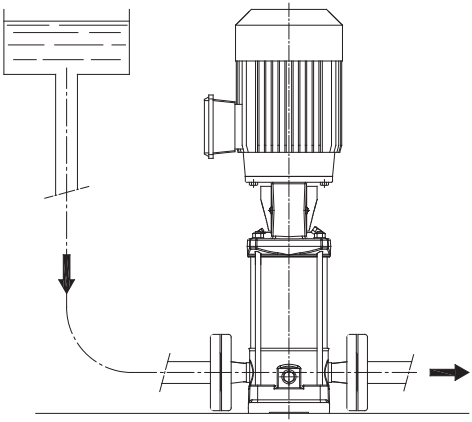

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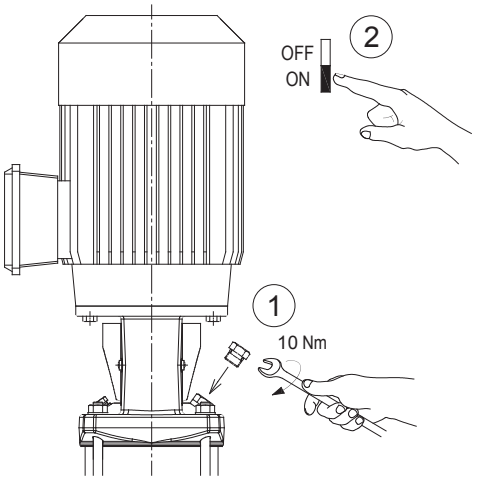
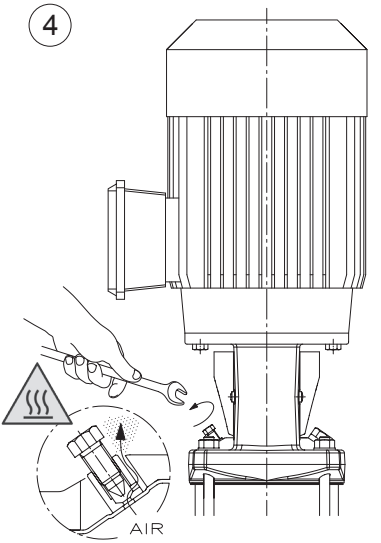
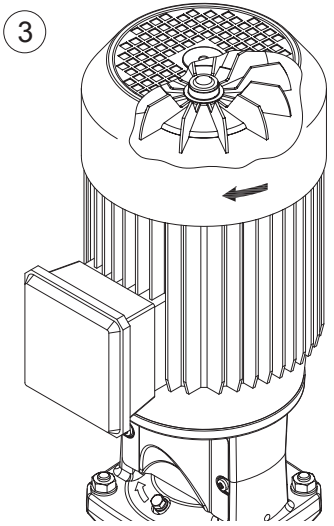
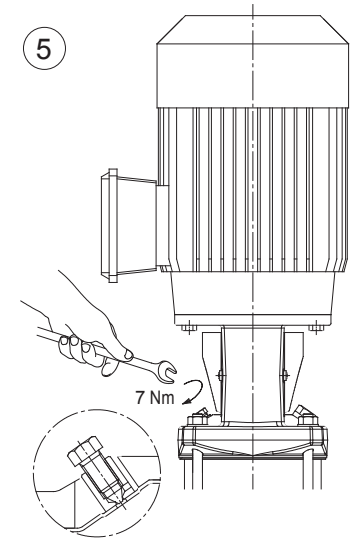
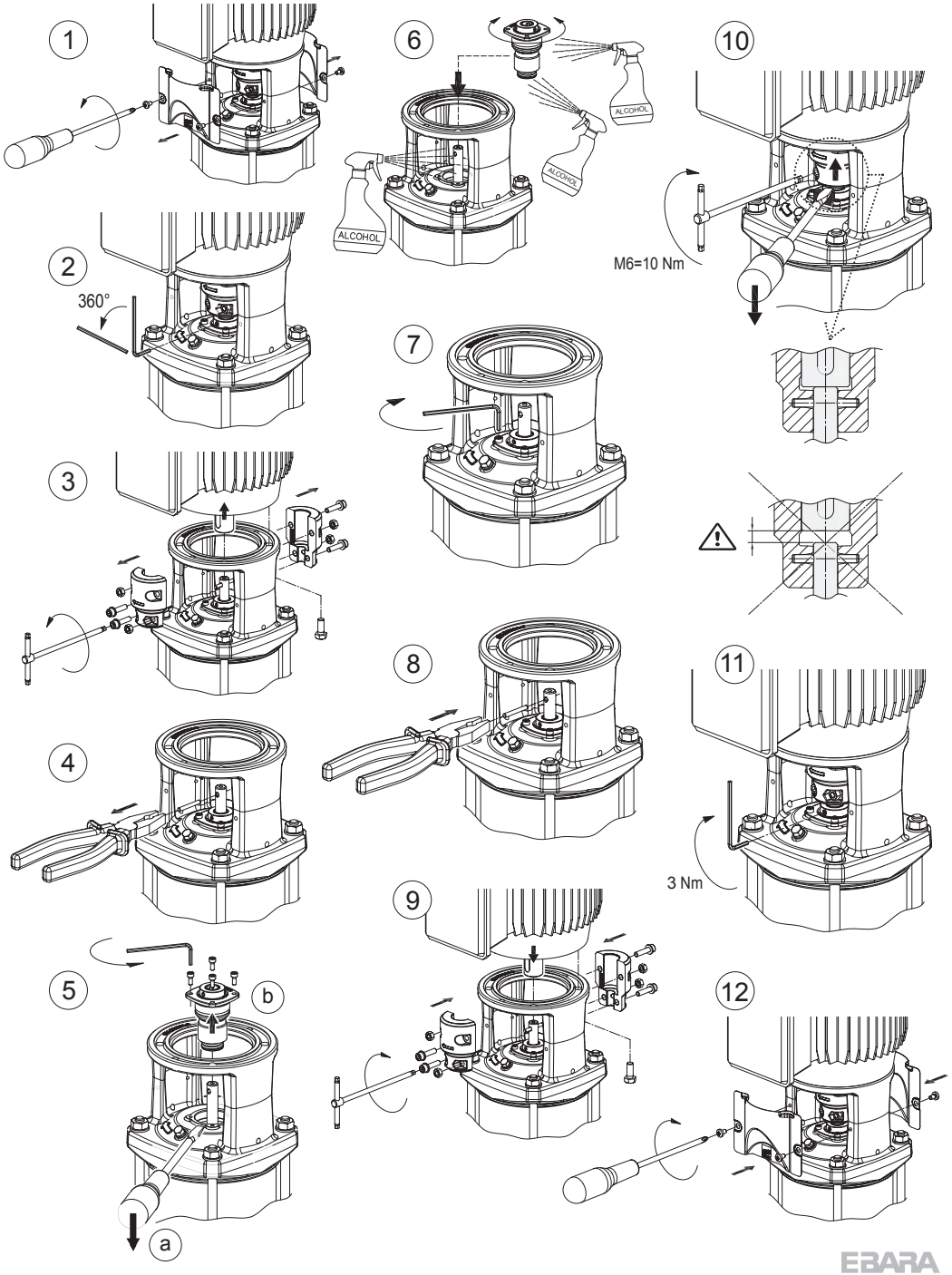
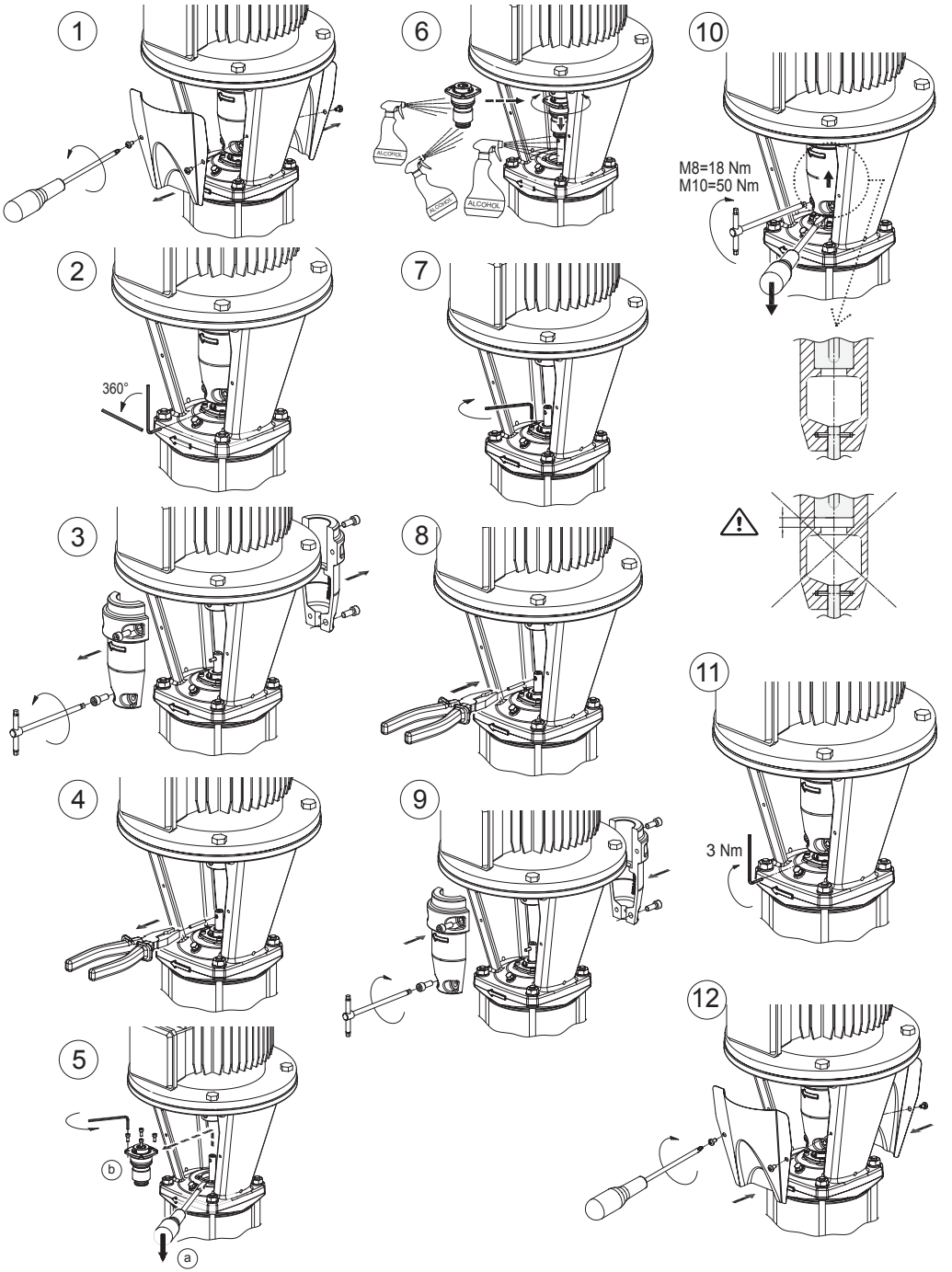


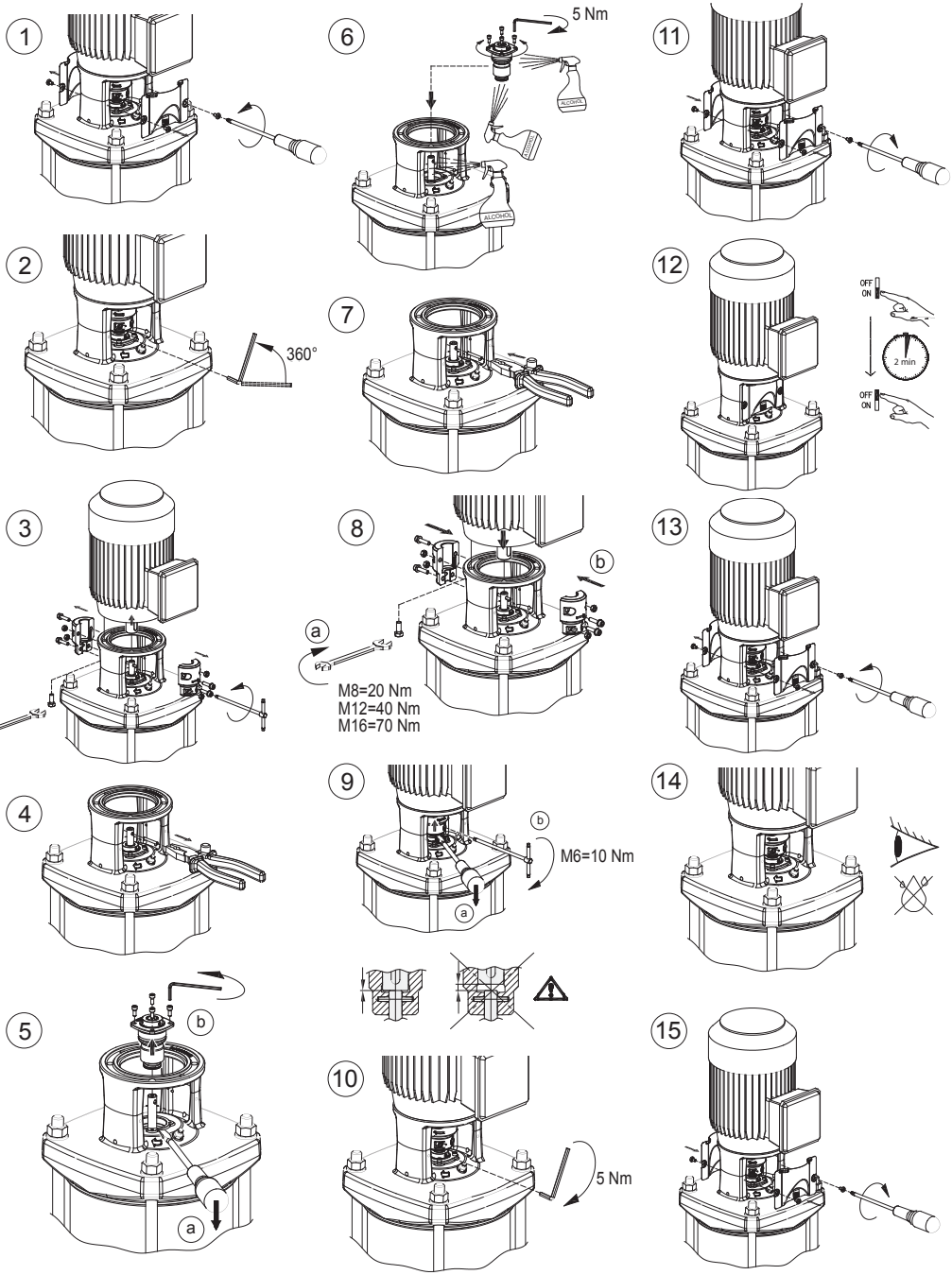







1
2
360°
3
4
5
b
a
6
ALCOHOL
ALCOHOL
ALCOHOL
7
8
9
10
M6=10 Nm
11
3 Nm
12


1
2
360°
3
4
5
b
a
6
ALCOHOL
7
8
9
10
M8=18 Nm
M10=50 Nm
11
3 Nm
12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360°
3
4
5
b
a
6
5 Nm
ALCOHOL
7
8
b
a
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M12=40 Nm
M16=70 Nm
9
b
M6=10 Nm
a
10
5 Nm
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2 min
OFF
ON
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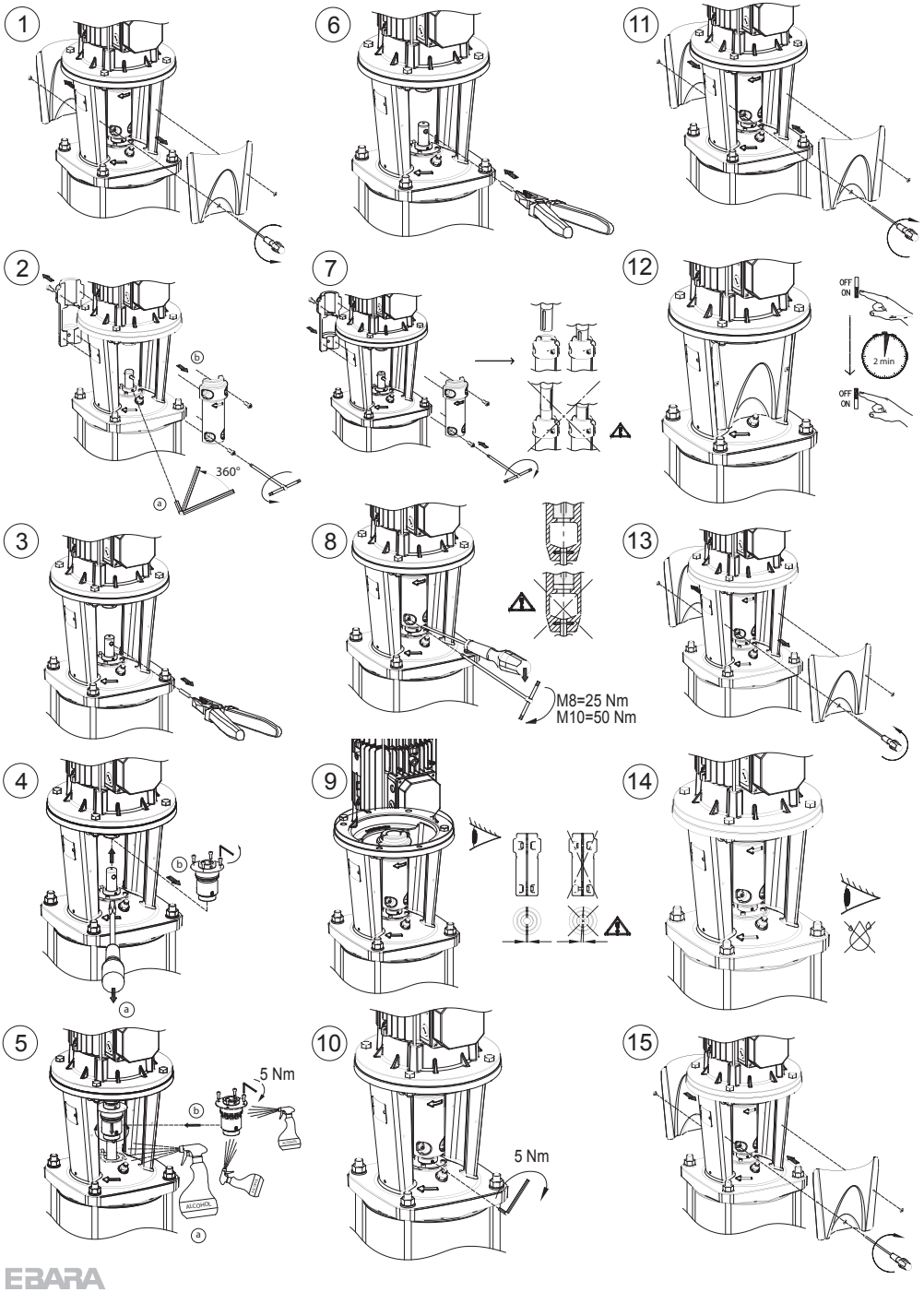
14
15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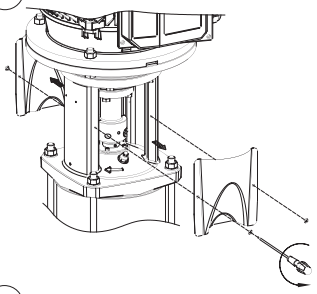
b
360°
a
3
4
b
a
5
5 Nm
b
ALCOHOL
a
6
7
8
M8=25 Nm
M10=50 Nm
9
10
5 Nm
11
12
OFF
ON
2 min
OFF
ON
13
14
15

1



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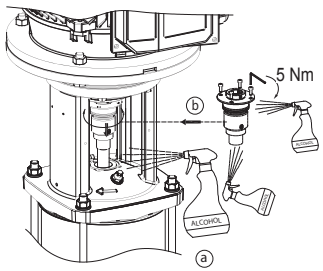

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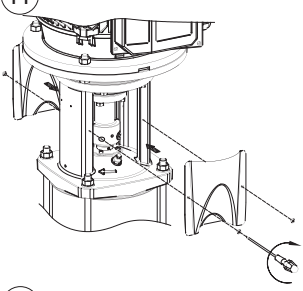

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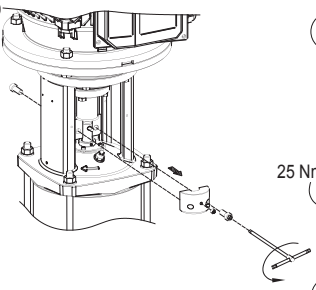

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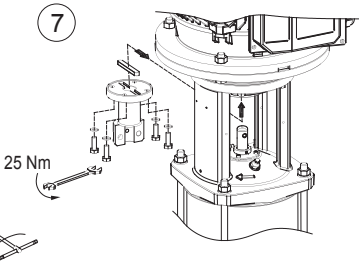

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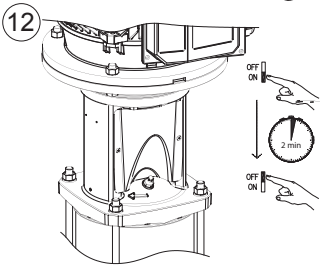

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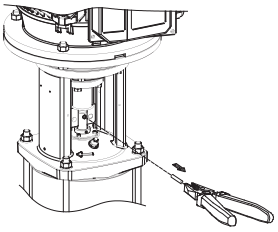

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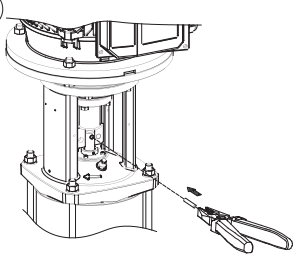

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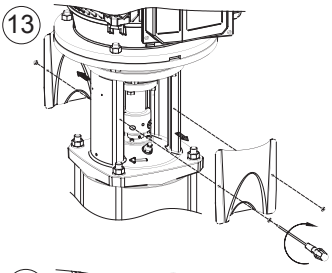

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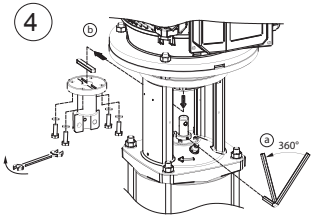

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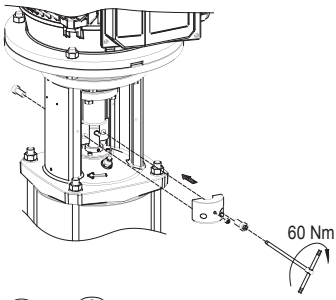

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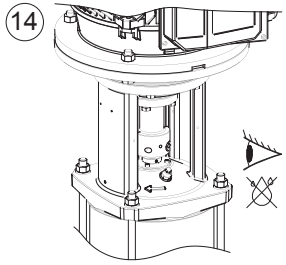

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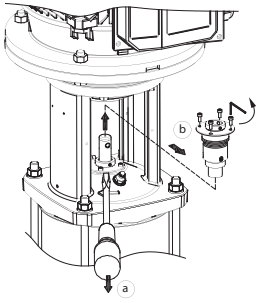

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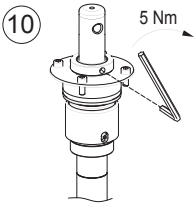

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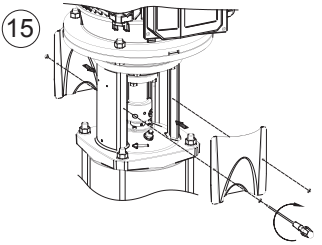
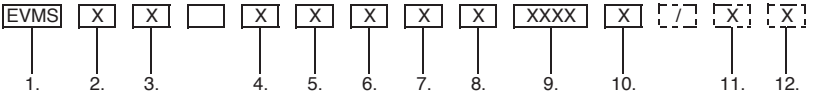
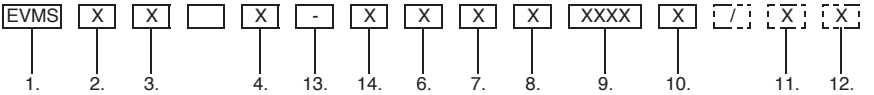


EVMS1-20



EVMS32-90



IT

1. Tipo di pompa
2. Codice per il modello di serie
3. Portata nominale [m³/h]
4. Numero di giranti
5. Codice della versione pompa
6. Codice del tipo di connessioni
7. Frequenza [Hz]
8. Poli
9. Codici materiali
10. Codici degli elastomeri
11. kW motore
12. Fasi motore
13. Trattino
14. Numero di giranti ridotte

DE

1. Pumpentyp
2. Art.-Nr. Serienmodell
3. Nennfördermenge [m³/h]
4. Anzahl Laufräder
5. Art.-Nr. Pumpenversion
6. Art.-Nr. Anschlusstyp
7. Frequenz [Hz]
8. Pole
9. Art.-Nr. Materialien
10. Art.-Nr. Teile aus Gummi
11. kW Motor
12. Motorphasen
13. Trennungsstrich
14. Anzahl Laufräder reduziert

PL

1. Typ pompy
2. Kod modelu seryjnego
3. Nominalne natężenie przepływu [m³/h]
4. Ilość wirników
5. Kod wersji pompy
6. Kod rodzaju przyłączy
7. Częstotliwość [Hz]
8. Bieguny
9. Kody materiałów
10. Kody elementów gumowych
11. kW silnika
12. Fazy silnika
13. Łącznik
14. Zredukowana ilość wirników

EN

1. Series name
2. Code for model series
3. Flow rate [m³/h]
4. Number of impellers
5. Code for pump version
6. Code for pipe connection
7. Frequency [Hz]
8. Pole
9. Code for shaft seal materials
10. Code for rubber parts
11. Motor in kW
12. Phase motor
13. Dash
14. Number of reduced diameter impellers

ES

1. Tipo de bomba
2. Código del modelo de serie
3. Caudal nominal [m³/h]
4. Número de rotores
5. Código de la versión de bomba
6. Código del tipo de conexión
7. Frecuencia [Hz]
8. Polos
9. Códigos de los materiales
10. Códigos de las partes de goma
11. kW motor
12. Fases motor
13. Guión
14. Número de rotores reducido

TR

1. Pompa tipi
2. Seri model kodu
3. Nominal akış hızı [m³/h]
4. Pompa dişlisi sayısı
5. Pompa sürümü kodu
6. Bağlantı parçası tipi kodu
7. Frekans [Hz]
8. Kutuplar
9. Malzeme kodları
10. Kuçuk parça kodları
11. Motor kW
12. Motor fazları
13. Çizgi
14. Azaltılmış pompa dişlisi sayısı

FR

1. Type de pompe
2. Code du modèle de série
3. Débit nominal [m³/h]
4. Nombre de roues
5. Code de la version pompe
6. Code du type de raccords
7. Fréquence [Hz]
8. Pôles
9. Codes matériaux
10. Codes des parties en caoutchouc
11. kW moteur
12. Phases moteur
13. Trait
14. Nombre de roues réduit

NL

1. Type pomp
2. Code voor het standaardmodel
3. Nominaal debiet [m³/h]
4. Aantal rotoren
5. Code van de pompversie
6. Code van het type aansluitingen
7. Frequentie [Hz]
8. Polen
9. Materiaalcodes
10. Codes van rubberen onderdelen
11. kW motor
12. Motorfasen
13. Streepje
14. Beperkt aantal rotoren