

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL (rev. 2.0) MELOTTE SUBMERSIBLE BOREHOLE PUMPS

## **ATTENTION:**



**Before unpacking the submersible unit, please read this instruction manual very careful.**

*This submersible pump unit must be put into operation by qualified technical personnel only and these operation instructions and the effective regulations have to be strictly observed*

If you do not pay attention to these operating instructions:



- danger may be created for you and your colleagues,
- the pump or the pump unit may be damaged,
- the manufacturer is not liable for damages resulting from this non observance.

**Melotte Pumptechnology BV is and can't be hold responsible for damages caused by not following these instruction.**

**PLEASE BE AWARE OF YOUR RESPONSIBILITY TO YOUR FELLOW MAN WHEN WORKING AT THE PUMP OR THE PUMP UNIT AND OR -INSTALLATION.**

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## 1.0. Safety

This operating manual gives basic instructions which are to be observed during installation, operation and maintenance of the submersible pump. It is therefore imperative that this manual is read by the responsible personnel/operator prior to assembly and commissioning. It is always to be kept available at the installation site.

It is not only the general safety instructions contained under this main heading "Safety" to be observed, but also the specific information provided under the other main headings.

### 1.1. Identification of safety prescriptions in the operation instructions

Safety prescriptions given in these operation instructions, non compliance with which would affect safety are identified by the following symbols:



Danger symbol as per DIN 4844-Wg (ISO 3864 – B.3.1.) marks safety instructions where non-compliance with, among other things, can lead to personal injury or death.



Danger symbol as per DIN 4844 W-8 (ISO 3864 – B.3.6.) marks instructions concerning electrical safety where non-compliance with, among other things, can lead to personal injury or death.

### Attention

The word/symbol "attention" marks the safety regulations whose noncompliance may cause danger for the pump and/or -installation and its function, where non-compliance with, among other things, can lead to personal injury or death. It is imperative that signs affixed to the machine must be observed and kept legible.

### 1.2. Qualification and training of personnel



The personnel responsible for operation, maintenance, inspection and assembly must be adequately qualified. Scope of responsibility and supervision of the personnel must be exactly defined by the owner. If the staff does not have the necessary knowledge, they must be trained and instructed which may be performed by the manufacturer on behalf of the owner. Moreover, the plant owner is to make sure that the contents of the operation instructions are available and fully understood.

### 1.3. Hazards in case of non-compliance with the safety instructions



Noncompliance with the safety instructions may produce a risk to the personnel as well as to the environment and the submersible unit and results in a loss of any right to claim damages. For example non compliance may involve the following hazards:

- failure of important functions of the submersible unit;
- exposure of people to electrical and mechanical hazards;
- endangering the environment.

### 1.4. Compliance with regulations pertaining to safety at work



When operating the submersible unit the safety instructions contained in this manual, the relevant national accident prevention regulations and any other service and safety instructions issued by the owner are to be observed.

#### 1.5. Safety instructions relevant for operation



Hazards resulting from electricity are to be precluded (see for example the VDE-specifications and the by-laws of the local power supply utilities).

#### 1.6. Safety instructions relevant for maintenance, inspection and assembly work



It shall be the owner's responsibility to ensure that all maintenance, inspection and assembly work is performed by authorized personnel who have adequately familiarized themselves with the subject matter by studying this manual in detail.

Any work on the submersible unit shall only be performed when it is at a standstill and disconnected from the power supply.

On completion of work all safety and protective facilities must be re-installed and made operative again. Prior to re-starting the machine, the content of this manual needs to be taken not of and the instructions listed under "putting into operation" are to be observed.

#### 1.7. Unauthorized alterations and production of spare parts



Any modifications may be made to the submersible unit only after consultations with the manufacturer. Using spare parts and accessories authorized by the manufacturer is in the interest of safety. Use of other parts will exempt the manufacturer from any liability.

#### 1.8. Unauthorized mode of operation



The reliability of the submersible unit delivered will only be guaranteed if it is used in the manner intended and in accordance with the instructions of this manual. The limit values specified in the data sheet must under no circumstances be exceeded.

#### 1.9. Warranty/guarantee



Melotte Pumptechnology guarantees, according the Melotte (FME and/or Orgalime) delivery terms, for a long term, satisfactory operation if:

- the submersible unit is installed and operated in compliance with these instructions and under conditions approved by Melotte Pumptechnology;
- modifications only will be carried out with Melotte Pumptechnology agreement.

#### 1.10. Exclusion of liability



Melotte Pumptechnology has made an effort in this manual to mention reliable and necessary information however can provide no guarantee for completeness and accuracy. The in use safety of the submersible pump is only guaranteed when used as described in this manual.

## 2.0. Introduction Melotte submersible pump units

The pumping unit consists of a special under water electric motor coupled directly to a centrifugal pump. The unit is designed to operate completely submerged under water, for pumping clean cold water only. By nature of its application and design, the unit is generally small in diameter, but long, forming an integral “in line” unit suitable for installation under water in relative small diameter boreholes, booster or via a shroud in sumps identified further in this manual as “locations”

### 2.1. Electrical supply

Electric supply is by lengths of flexible cable which may be single or four core of sufficient length to suit installation setting depth. The units may be supplied with or without flexible cable attached depending on customer's requirements. It is recommended however that Melotte Pumptechnology supply and connect the cable via vulcanised joint to the motorlead, to ensure selection of the power cable is adequate and connection is fully waterproof. In case the cable selection and connection is made by a third party, the cable size needs to be dimensioned according the remarks mentioned under the heading “cable connection” of this manual



Fig 1. Melotte submersible pump



The submersible pump must not be connected to the electrical supply until the full installation of the unit in its location has taken place.

### **Attention**

The unit is designed to operate completely under water and to ensure satisfactory cooling, the pumped liquid must pass over the motor exterior with a velocity of minimum 0,2 mtrs./second (lower speeds only allowed after agreement with Melotte Pumptechnology).

### 2.2. General precautions

No components from the pump unit should be removed. Removal will invalidate warranty and no responsibility will be taken by Melotte Pumptechnology to possible personal injuries.

### 2.3. Normal conditions of use

- Maximum 25 degrees Celsius
- Minimale velocity over the motor by nominal speed: >0,2m/sec. (0,5m/sec. for motors ≥10")
- Maximum 25mgr/ltr. Sand contant in pumped water
- No water hammer present and the submersible pump has to be executed with non-return valve.
- Maximum 1 minute operation against closed valve
- No excessive pollution leading to deposits and blockages in the pump and/or on the motor casing and suction strainer
- Power tension/frequencies within the applicable tolerances
- Use within minimum 40% and maximum 125% of the optimum Best Efficiency Point.
- Equipped with correctly selected and set motor protection
- Holding the maximum permitted switch-on frequency and minimum duration between start and stop

At conditions other than mentioned above Melotte Pumptechnology should be consulted if these are permissible.

### 3.0. Unpacking, handling and transportation



The unloading, transportation and moving of the pumpunit has to be carried out under the utmost care. In view of the long cylinder shape of the pump unit it is emphatically stressed, that the pump unit in no case should drop and when laying it down it should be supported at several points over the entire length. Immediately after reception of the shipment it has to be checked whether this is supplied complete and with no defects.

#### **Attention**

**Should the pump unit in spite of everything drop during transportation or become damaged, the unit then shall NOT be installed in the location before consulting our Service department or our agent/sales-engineer.**

### 3.1. Unpacking



New pump units which are packed for despatch require to be supported in the packing case at several points over the entire length of the unit, by means of suitable wooden "V" blocks. In case units are longer than approximately 2½ metres, these "V" blocks will have recesses at approximately the centre of both the pump-end and the motor, enabling lifting straps to be inserted, ensuring that these lifting straps are approximately at the weight centre of the pump-end and the motor (see figure 2).

When lifting from the packing case and during all horizontal lifting operations, the lifting straps are to be inserted at same locations in order to minimise bending action to the unit. No lifting eyes are available due to the special nature of the unit (narrow)

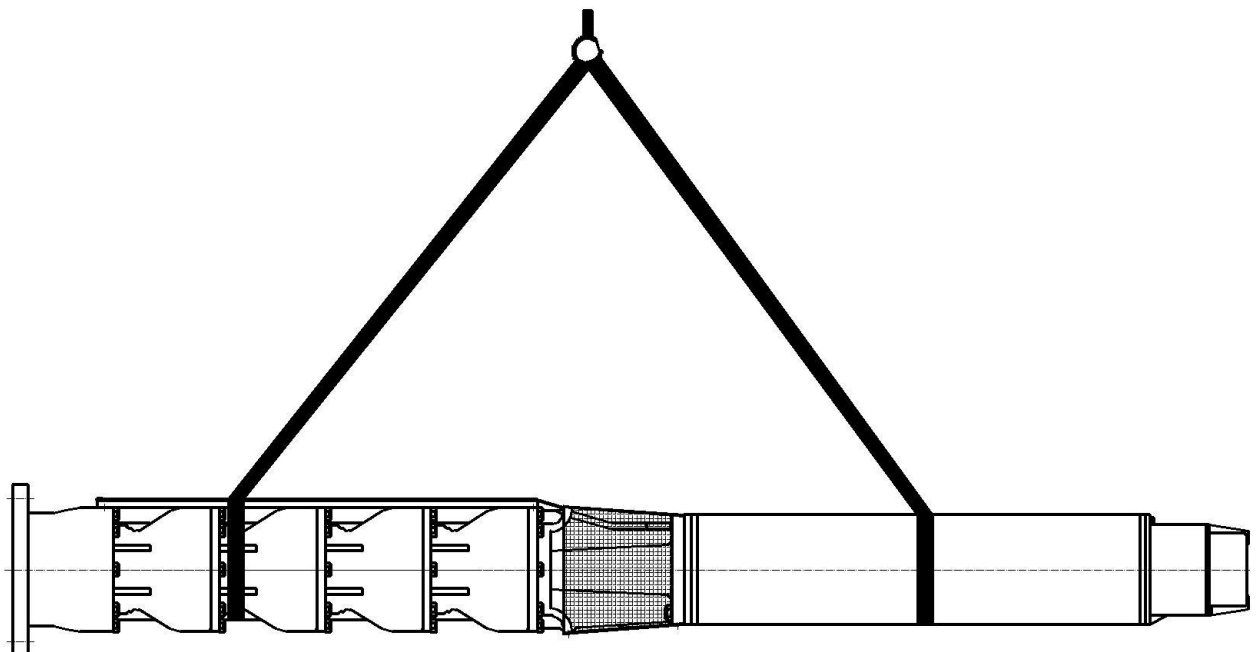


Figure 2: Lifting the unit from its case

During the horizontal lifting operation, the cable protector and power cable should be positioned on the topside of the pump unit and due care should be taken that this will not be clamped between the lifting straps.

### 3.2. Horizontal to vertical transfer



Transfer of the units from horizontal to vertical position should be executed with the utmost care. The special lifting plate complete with lifting eye, to be provided by the installer, should be screwed into the end of the outlet screw thread or bolted onto the outlet flange. Lifting plates must be rated for the complete weight of the unit and take into account additional forces resulting from the transfer from horizontal to vertical position.

For transfer of the unit from horizontal to vertical position, the top lifting strap should be fitted to the lifting eye of the lifting plate and the bottom lifting strap should be fitted to the centre of the motor part, with a chain tackle between these lifting straps. The lifting strap length should be adaptable in such a way that the horizontal lifting can be completed. The chain tackle then should be released gradually, allowing the motor side of the unit to move downwards, while at the same time the lifting hook should be lifted higher, ensuring the motor base will not touch the ground. When the unit is in vertical position, the lifting strap fitted to the motor can be released carefully.

When units are in vertical position, care should be taken that these do not swing or touch surrounding objects or personnel. The units can be lowered to stand on the motor base but must be fully supported when in this position to avoid toppling.

During all lifting operations care should be taken that this is executed gradually and directly, without sudden pulling movements.

It is recommended that installation handling personnel wear protection gloves and footwear.

### 3.3. Lifting equipment



Lifting equipment depending on pump unit weight can consist of the following: mobile crane, chain block and tackle, electric hoist, overhead beam etc. All lifting equipment must be in a good, safe condition and also be capable of carrying the load involved. The hook of the lift equipment must have a swivel hook.

The net bare unit weight excluding attached power cable will be shown on the E.C. declaration of Conformity included in this manual. Assure yourselves that all lifting equipment is suitable for this weight. In case in the same time the power cable will be lifted, the lifting equipment should of course be suitable also for this additional weight.

### 4.0. Installation preparations

Take the lid of the package of the supplied submersible pump unit and check well in advance to the installation day or the implementation, the execution is correct and all accessories ordered are included. If not please contact us

#### 4.1. Electrical check on receipt



Check the insulation resistance to earth. This should read to at least 500 Megohms with cable attached. Examine the unit, motor leads and pump cable for any possible damage.

#### 4.2. Priming the submersible motor (except FAD#, FT## and FU## types)

##### **Attention**

The motors are filled in the factory with a pharmaceutical grade 50/50 glycerine/water emulsion. However, before the submersible pump is installed into the location, the motor, **EXCEPT FOR THE 4" FAD#, the 6" FT## and the 8" FU## TYPES MOTORS**, has to be completely topped up with emulsion above the location to compensate for possible leakage of emulsion during transportation from our factory to the location site. This filling up has to be carried out as described below in this installation manual. The used emulsion consists of 50 % glycerine and 50 % distilled water and provides the lubrication of the motor bearings during operation.

The total amount of emulsion needed to fill up the motors is shown below but this quantity is only required if the motor is completely empty. Normally the amount included with the unit is sufficient for topping up:

Motortype	Range		Quantity Litres
	From kW/HP	To kW/HP	
FTRS – FTGS – FTDG	4,0/5,5	30,0/40,0	Approx. 2,0
TPDR – TPDG	2,2/3,0	30,0/40,0	Approx. 2,5
TPWR – TPWG	2,2/3,0	30,0/40,0	Approx. 4,0
FUDG	30,0/40,0	75,0/100,0	Approx. 4,0
UPDR – UPDG	22,0/30,0	93,0/125,0	Approx. 4,0
UPWR – UPWG	22,0/30,0	93,0/125,0	Approx. 8,0
FVWS – FVWG	75,0/100,0	185,0/250,0	Approx. 17,0

The priming of the motor should not be carried out before the pump is hanging vertical in the tackle over the location. In the packing case a bottle with filling emulsion is included for topping up the motor filling liquid but this emulsion has a shelf life of only 1 year, provided this is stored in a dark and cool location.

Topping up should take place as follows (see figure 3):

Remove plug A (closed plug) and B (filter plug) indicated by means of an arrow-sticker on the motor. Before starting to fill the motor, the rubber filling pump supplied must be filled already with glycerine emulsion to prevent the air which is present in the filling pump from being pumped into the motor. Screw the nipple of the filling pump into opening A (see also figure 3). The motor should be filled upto the level where the emulsion emerges from relief valve B. Then first plug A and afterwards plug B can be fitted again and tightened. The closed plug A is then situated on bottom of the motor.

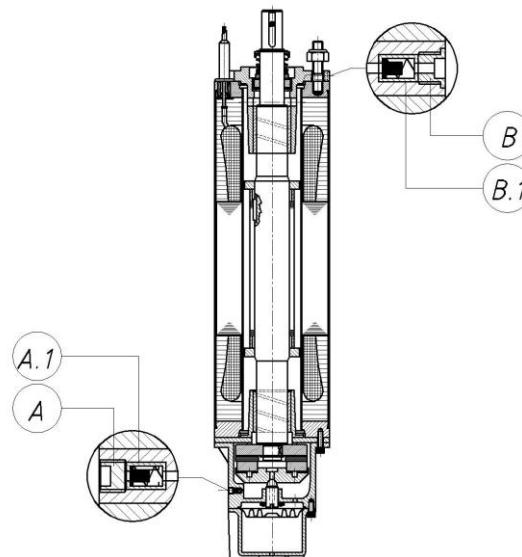


Fig. 3 – Priming of the motor

**REMARK:**

On some motors a plug “C” is present near relief valve “B”. This plug “C” in no case is to be removed



## 5.0. Electrical cable connection



The unit is normally supplied with the required length of power cable jointed by a waterproof connection to the motor leads. No terminal box is available on submersible electric motor due to the special purpose use.

### 5.1. Cable selection

#### **Attention**

If the cable is to be selected and fitted by the customer or a third party, cable selection must take into account:

- the local electrical safety regulation;
- insulation suitability for continuous under water operation;
- maximum current consumption of the submersible pump;
- voltage drop that will occur over the entire cable length involved.

The maximum voltage drop over the full length of power cables until motor inside terminals should not exceed 5 % of nominal volts as mentioned on unit name plate. The earth conductor size must comply to local and/or international standards. Local regulations may require a lower allowable voltage drop.

### 5.2. Cable jointing

The cable joints between power cable and motorleads must ensure complete insulation from surrounding water (waterproof) and must be robust enough to prevent damage.



Earth connections must be to the earth core on the motor and also insulated from the surrounding water to prevent corrosion in service.

## 6.0. Installation of the pump unit

A submersible unit can be used in various positions as shown on figure 4. However, it is basically designed for fitment to boreholes and the following describes a typical method of installation in such a location.

After the preliminary actions have been taken, the installation of the pump unit in the location may be started with the aid of lifting equipment.

#### **Attention**

Lifting equipment must be selected by the installer with consideration of total installed weight including the rising main (column piping) if full of water and also considering the strength of the surrounding ground areas on which lifting equipment is positioned.

### 6.1. Electrical power cable

#### **Attention**

During the installation, all electrical cables should be completely rolled out on the surface, or otherwise coiled away in such a position that personnel cannot stand on and is not allowed to stand in the coil(s). During installation the cables need to be guided accordingly (use hand gloves!)

The electric power cable which is attached at the pump unit, is fixed to the supply pipe (rising main) with cable clips at distances of  $\pm 1.5$  meter and immediately above or below the flanges or sockets. Care should be taken that the cable will not be pinched between the supply pipe and the well casing. Therefore, when using flanges, these should be provided with a recess of sufficient size adapted to the cable diameter.

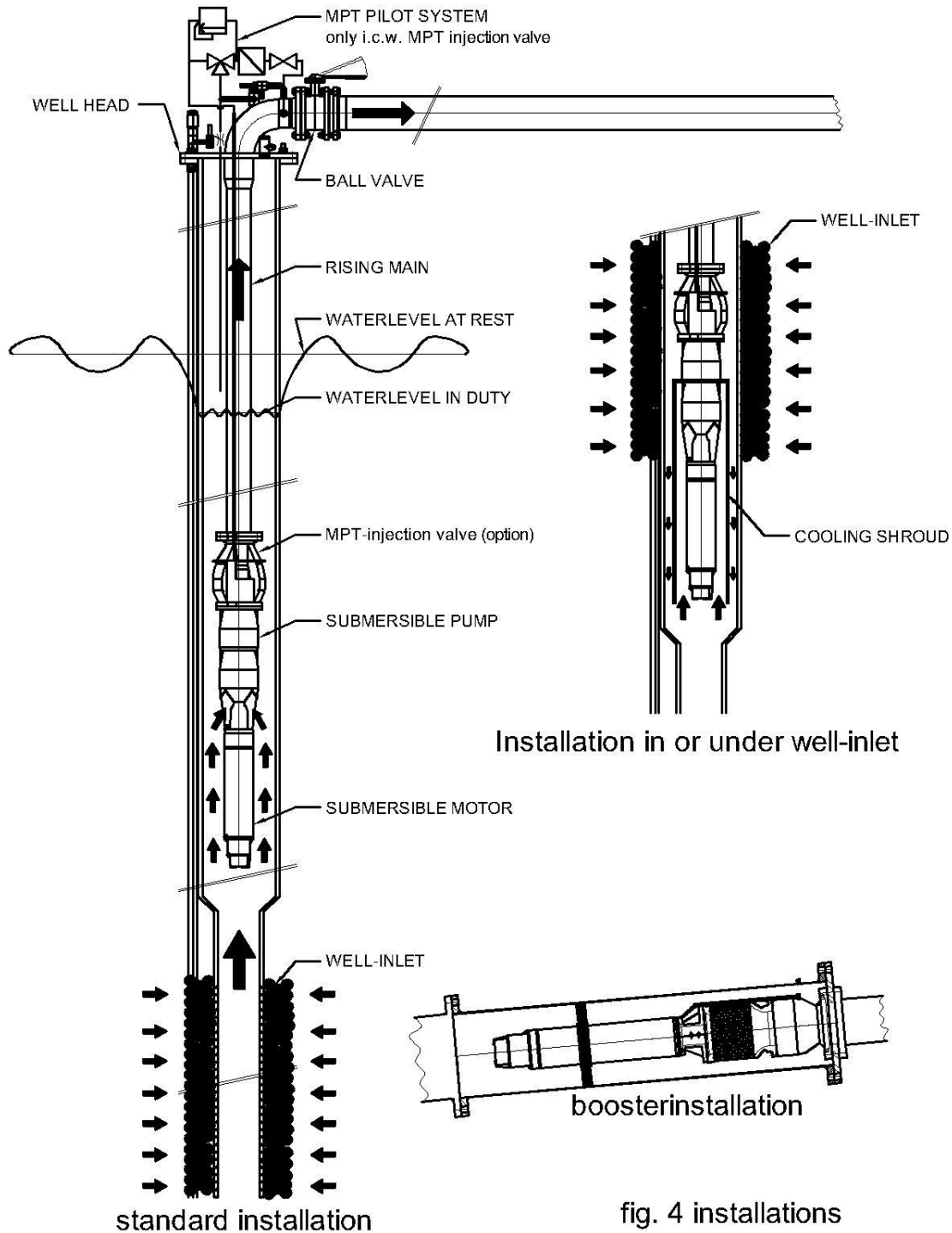


fig. 4 installations

**Remark:** in case of booster units the pump must be placed under an angle of minimum 5 degrees (motor below).

## 6.2. Borehole installation

The pump outlet is connected with the first pipe length of the rising main. At the top of this, underneath the installed socket or flange, a supporting clamp is fixed, and this assembly lowered carefully until the supporting clamp rests on the surface of the location. Then a second pipe length is fixed onto the first, also with a supporting clamp at the top.

The first supporting clamp is removed, the unit further lowered and this is repeated until the pump has reached the required predetermined installation depth. Final connection is usually made to a well head plate completed with right angled bend etc.

It is recommended to make sure beforehand, that the total length of the rising main (column piping) is sufficient to install the pump unit at the required depth in the location. When determining this also take into account the required water column above the submersible pump unit inlet during operation with regard to the N.P.S.H. characteristics of the submersible unit and the draw down characteristics of the well. Since the pump unit is to be suspended from the rising main piping (column piping), it is necessary to pay close attention to a solid connection of the pipes and the selection of the required piping and gasket strength must be based on the required working and close valve pressure and the total live installed weight .

### **Attention**

If instead of robust fixed risers (by e.g. stainless steel material) is chosen for flexible hose lines, one must keep in mind that when you turn on the submersible pump this pump will be twisted in the opposite direction of rotation. This can have an adverse effect that the pump cable(s) etc. are twisted and damaged. Melotte Pumptechnology is therefore not in favour of the application of flexible hose lines for fixing the submersible pump, however should this be applied anyway, Melotte Pumptechnology advises a check valve is fitted in the pump to provide that the submersible pump remains filled continues, even after disabling it. Also the cable(s) etc. must be protected in such a way that no damage can occur.

### **Attention**

The pump unit must not be allowed to operate out of the water, amongst others due to the fact that the pumps have bearings which are lubricated by the pumped water.

The installation depth of the pump unit must be set in such a way that no part of the pump unit will be exposed, even at the lowest water level during the pumping operation in the location; also the NSPHreq. should be taken into account.

The entire pump unit may be used as a surface water booster inside a booster shroud, with no pump bowls or non return valve housing exposed outside the booster shroud.

If the unit is used for surface boosting, once commissioned the booster shroud must be kept full of pumped liquid. If the shroud should be partially or fully empty for a period of time the motor must be re-primed as described in section 4.2.

If so desired, we will have our sales engineer or a pump engineer available to assist with the installation of the pump.

## **7.0. Connection of the electrical supply**



**Electrical connections are to be carried out acc. to the regulations of the local public utilities and to the ElexV standards. Only personnel, authorized correspondingly, may carry out this work**

Prior to the electrically connect as well as for 1st commissioning, the insulation resistance of the motor and the cable(s) need to be measured against earth. Prior to this measurement it should be secured there is no tension present on the terminals. However, we recommend that you always perform this measurement to the loose pump cable ends, which have to be dried and freed from contaminants etc.; the measurement voltage is up to maximum 500 volts. After measuring the charged cables and motor windings need to be discharged via the insulation meter (megger). New supplied units should be > 500Mohm. At insulation values below 0,4Mohm, the submersible pump no longer may be used/started. Refer also to the applicable local current legislation.

The following connections are possible in case of:

### **7.1. 3-Phase motors**

The motors are in this case supplied with four or seven motor leads (1 or 2 supply cables). See fig. 5 for connection diagrams in case of 3 phase motors either in DOL or Star-delta connection.

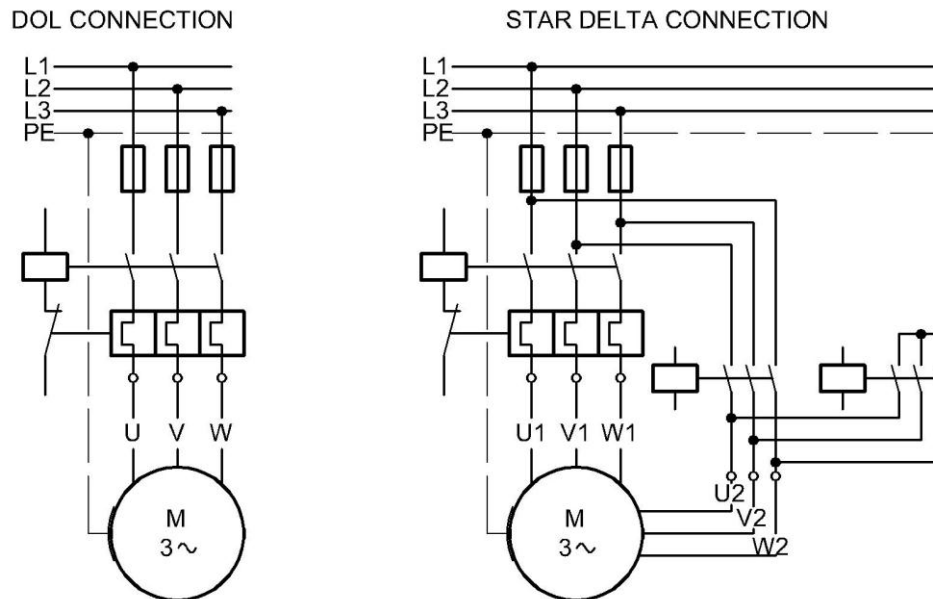


FIG. 5 Connection of the electrical supply

## 7.2. Single phase motors

These motors are fitted with only four cores for direct on line starting.

It should be noted that single phase electric motors require special starting equipment. Connect as instructed in these special starter boxes.

## 7.3. Earthing

**Attentie**



The submersible motor and its installation must be adequately earthed in accordance with local electrical regulations and international standards. The green/yellow earth cable core of the pump unit must be connected to earth connection within the starting and control equipment and the supply earth point. In addition, all rising main supporting the pump unit should also be earthed to the same point.

## 7.4. Starter control



The trailing cable must be connected to the electrical supply by means of a starter/control system. The following methods can be used:

- a) direct on line }
- b) star delta }
- c) auto transformer }
- d) soft start }
- e) variable frequency }

See section 7.1. to 7.2.

It is also recommended that low water protection is used and other required safety equipment such as overload trip – low volts relay – phase lost relay etc.

The low level probe must be installed into a PVC tube enabling this to be checked and also to clean this probe every month if necessary.

The maximum overload relay, which has to be phase loss control and temperature compensated, must be selected to ensure the unit will trip inside below mentioned time limits:

- 6,0 x FLC 4 to 6 seconds;
- 2,0 x FLC less than 40 seconds;
- 1,5 x FLC less than 80 seconds;
- 1,2 x FLC less than 180 seconds.

**NOTE:** FLC = Full Load Current.

#### 7.5. Criteria frequency control of Melotte submersible pump units (REV.1.0-101110)

- When starting the Melotte submersible pump unit the frequency control should be set in such a way that a constant torque ( $U/f = \text{constant}$ ) is present.
- The basis voltage should be equal to the nominal voltage of the motor.
- The maximum frequency is indicated on the type tag of the motor (in general 50 Hz. for motors wound for 50 cycles and 60 Hz. for motors wound for 60 cycles).  
Higher frequencies only possibly allowed after consultation with Melotte Pumptechnology.  
Maximum current consumption of the applied submersible motor as mentioned on the type-tag however, may never be exceeded.
- The minimal starting frequency is 30 Hz. (preferably 50 Hz. at motors wound for 50 Hz. and 60 Hz. for motors wound for 60 Hz.) and the start should simulate direct on line starting and should not exceed 0,5 seconds.  
The frequency during operation should not be chosen to be less than 20 cycles at Melotte type TP or UP motors and 30 cycles on all other motors, taking into account the other criteria mentioned in this summary.  
Lower frequencies only possibly allowed after consultation with Melotte Pumptechnology.
- Ramp down time of the submersible pump unit or motor also should not exceed 0,5 seconds.
- No slip compensation should be applied.
- The velocity of the water alongside the motor should in no case be less than 0,2 m/sec at nominal frequency. It may be possible to agree to lower velocities at lower frequencies, but only after consultation with and acceptance by Melotte Pumptechnology.
- The current protection should switch off the Melotte submersible pump unit according the
  - below mentioned prescriptions and within the time limits mentioned:
  - 6 x FLC 4 tot 6 sec.
  - 2 x FLC less than 40 sec.
  - 1,5 x FLC less than 80 sec.
  - 1,2 x FLC less than 180 sec.
 (Note: FLC = full load current).

#### **GENERAL:**

Submersibles motors on behalf of submersible pump units distinguish themselves from standard above ground motors, amongst others in the fact that bearing design requires slide bearings instead of ball bearings. In order to obtain sufficient lubrication film, a minimal number of rotations per minute is required, reason for some of the above mentioned criteria. An adequate operating output sinus filter should always be applied as close as possible behind the frequency control device to prevent possible occurring peak-currents and/or too high  $du/dt$ 's in the pump cable and the motorwindings.

Furthermore also please consult the suppliers of the frequency control devices with regard to further criteria such as maximum cable lengths, application of mains-interference filters etc. etc..

#### 7.6. Criteria softstarter with Melotte submersible pump units (Rev.01-01012007)

- Total allowed starting time is maximum 5 seconds.
- The minimum starting current should be 3 x I-nominal and/or minimum 58% of the nominal voltage
- Time to reach starting the starting current of 3 x I-nominal and/or 58% of the nominal voltage should be within 1 second
- Possible  $\cos. \phi$  improvers should be switched off during starting
- Stopping time for the submersible pumps or motors should not exceed 15 seconds maximum
- Submersible pumpunits are only allowed 6 starts per hour of which maximum 2 start/stops in short sequences
- Soft starters should be able to handle minimum 4x I-nominal to be able to provide a higher

starting torque if necessary

- The current protection should switch off the unit according the below mentioned prescriptions and within the time limits mentioned:

- 6 x FLC 4 tot 6 sec.
- 2 x FLC less than 40 sec.
- 1,5 x FLC less than 80 sec.
- 1,2 x FLC less than 180 sec.
- (Note: FLC = full load current).

**GENERAL:**

- Submersibles motors on behalf of submersible pumpunits distinguish themselves from standard above ground motors, amongst others in the fact that cooling of the motor is being achieved by means of the pumped water instead of by means of natural and/or forced convection. In order to obtain sufficient cooling, a short initial ramp starting time is applicable, reason for some of the above mentioned criteria.
- Furthermore also please consult the suppliers of the softstarters with regard to further specific criteria.

**7.7. Adjusting the overload trip**

**Attention**

Special attention should be paid to the consumed current by the unit and the setting of the overload protection.

The current consumption in all three phases of 3-phase motors and in one phase of single phase motors should not be more than the figure indicated on the name plate of the pump unit. As soon as a deviation is observed, the pump unit must be switched off immediately and our technical service or our agent/sales engineer has to be notified.

The overload relay must be adjusted to an amperage which is slightly higher, with a maximum of 5 % higher, than the actually consumed current of the unit, but must never exceed the maximum value mentioned on the type plate. Only full guarantee can be given on the motor unit if the overload protection complies with our recommendations.

**7.8. Temperature control / fi. PT100**

**Attentie**

Pumps equipped with a PT100 element or a temperature sensor such as type K must, by means of a suitable protection relay, be monitored and to be disabled in accordance with the following. The entire circuit should be such that when crossing the motor fluid-temperature of 5 degrees Celsius above the nominal temperature, the submersible pump is turned off and only by means of a hand-reset can be started again, to avoid commutating. The rated operating temperature is normally obtained after ca. 25 min run at nominal flow rate and head at the nominal frequency. In common cases (crossing the security monitoring temperature/intervention) the cause of the temperature increase needs to be further analysed and preventive measures need to be taken. The final rated operating temperature is dependent on the rate of flow of the pumped water, determined by the pumped capacity and the relationship between the inner diameter of the cooling jacket/well diameter and the motor diameter, as well as by applicable water temperature of the pumped water. As 1st setting we recommend to set the security temperature to 50 degrees Celsius and the pump can be started up and in line with the above after measurement (after 25 minutes) the right monitoring temperature should be set. If in the unlikely event that the operating temperature over 55 degrees Celsius fails, please contact Melotte Pumptechnology for advice.

**Attentie**

A PT100 or type K element should not be insulation but only Ohmic measured!

## 8.0. Commissioning

With the unit installed and electrically connected, the following should be carried out.

### 8.1. Checking the correct direction of rotation

**Attentie**



It will be noticed no direction of rotation can be indicated on the unit, as the unit must be installed completely under water.

The pump unit's power cable is connected to the electrical circuit by means of a starter executed with the required safety devices. Exchange of 2 out of the 3 phases (excluding the earth phase) changes the direction of rotation of the motor when connected to a 3-phase electrical supply system.

For single phase units consult our special connecting diagram included in the starting condensor switch box.

#### How to determine the correct direction of rotation:

In order to determine the correct direction of rotation, fit a pressure gauge onto the bend of the rising main (column piping) between the pump and the sluice valve. Start the pump with almost closed valve, after pumping flow has been established, close the valve completely for a maximum 60 seconds, read the pressure on the gauge and record this. Then exchange 2 phase (not the earth phase), whereby the pump starts rotating the other direction, establish flow, close valve and again read the pressure on the gauge. The direction of rotation indicating the highest pressure on the gauge is the correct direction and of course the submersible unit should be connected in accordance with this direction of rotation.

**Attention**

1. THE UNIT MUST NOT BE OPERATED FOR MORE THAN 2 MINUTES WHEN COMPLETING THE ABOVE CHECKS;
2. THE UNIT MUST NOT BE OPERATED CONTINUOUSLY IN THE REVERSE DIRECTION.

### 8.2. Commissioning a new well

**Attention**

In order to prevent that a new borehole could be damaged, the pump shall NOT be started at the first operation with entirely open sluice valve. After some operating hours, when the pump unit is put into operation again, such starts can be done with fully opened sluice valve.

#### CAUTION:

**Attention**

- NEVER let the pump operate with closed valve, except for determination of the correct direction of rotation as mentioned under the above heading "How to determine the correct direction of rotation", as at close valve condition, the submersible pump does not have adequate cooling and motor windings will be damaged;
- The maximum number of starts per hour allowed for the submersible pump unit with a motor of 2.2kW/3 HP and onwards is 6. For submersible pumps with smaller motor sizes 10 starts per hour can be allowed.

### 8.3. Putting into operation

**Attention**

Full details with regard to operation cannot be advised in this section due to the multitude of systems available. However, the following points should be noted:

- 8.3.1. Over pumping of the well should not occur;
- 8.3.2. Start/stopping should be minimised;
- 8.3.3. If temperature protection is fitted this should be adjusted firstly to 5 °C above indicated temperature;
- 8.3.4. Check pump performance and amperage input is correct.
- 8.3.5. Set the monitoring relay correctly

## **9.0. Maintenance and repair**

A submersible unit correctly installed will operate for many hours without maintenance, depending amongst others on the pumped water and the system quality. Melotte Pumptechnology, however, has an equipped workshop where, if needed, the relevant submersible pump appropriate (remedial) can be overhauled or repaired by an expert.

### **9.1. Checking interval**

On a half yearly basis the complete installation should be checked for capacity, pressure, voltage, current consumption, insulation and also on safety aspects.

### **9.2. Storage**

#### **Attention**

In case the unit will not be installed immediately after arrival, it is recommended to fill (top up) the motor, except for FAD#, FT## or FU## type motors, with emulsion as described under the heading "Priming of the submersible motor". Units supplied by us have already been filled with emulsion, so these units only need to be topped up to compensate for possible leakage of emulsion during transportation.

The unit must be stored vertically (motor beneath the pump). In case the unit has been or will be stored outside the location during the winter season, it is desired that this is effected in a FROSTPROOF room. In any case adequate measures must be taken that freezing of the unit is prevented.

### **9.3. Recycling / end of life**

At the end of the life cycle of the delivered items or parts of it, the materials should in an acceptable and ecologically responsible way be recycled and, in accordance with the local regulations, stored.

### **9.4. Assistance**

If further information is desired, please contact our service department or our agent/sales engineer.



## 10.0. EuP – Energy Using Products / MEI – Minimum Efficiency Index



Melotte submersible pumps are known due to the high pump efficiencies and meet the EuP Directive (Commission Regulation (EC) No 547/2012), which per 1 Januari 2013 has become effective.

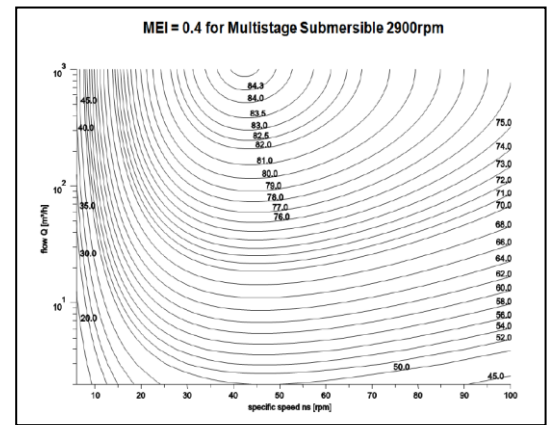
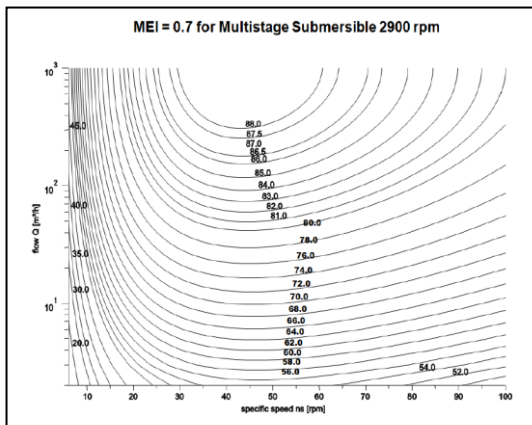
From this date all 4" and 6" submersibles must be classified according an new MEI-index.

This Minimum Efficiency Index (MEI) is a dimensionless representative number for the hydraulic pump efficiency at the Best Efficiency Point (BEP) of the pump type and also at part and overload.

The minimum EU-efficiency requirement is per 01-01-2013 set at  $MEI \geq 0.1$  while from 01-01-2015 onwards this  $MEI \geq 0.4$  needs to be.

### 10.1. Benchmark MEI

The benchmark for most efficient water pumps is  $MEI \geq 0,70$ . Information about the efficiency benchmarks is available at [www.europump.eu/efficiencycharts](http://www.europump.eu/efficiencycharts); for 4" en 6" submersibles with an  $MEI = 0.7$  and  $MEI = 0.4$  the following applies:



### 10.2. Efficiency with trimmed impeller

The efficiency of a pump with a trimmed impeller is usually lower than that of a pump with the full impeller diameter. The trimming of the impeller will adapt the pump to a fixed duty point, leading to reduced energy consumption. The minimum efficiency index (MEI) is based on the full impeller diameter.

### 10.3. Efficiency with inverter driven applications

The operation of this water pump with variable duty points may be more efficient and economic when controlled, for example, by the use of a variable speed drive that matches the pump duty to the system.