

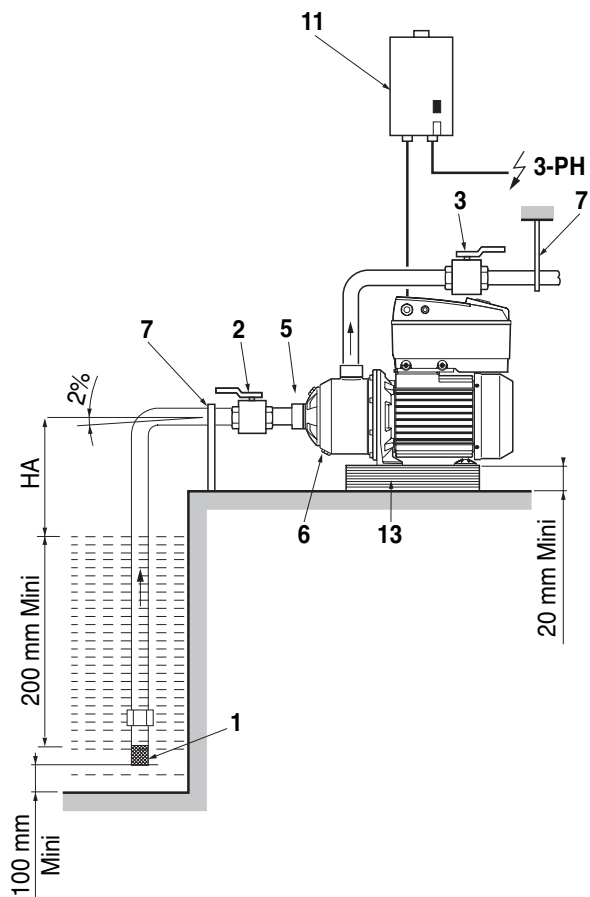
## Wilo-Economy MHIE



**de** Einbau- und Betriebsanleitung  
**en** Installation and operating instructions  
**fr** Notice de montage et de mise en service

**nl** Inbouw- en bedieningsvoorschriften  
**ru** Инструкция по монтажу и эксплуатации

Fig. 1



**Fig. 3**

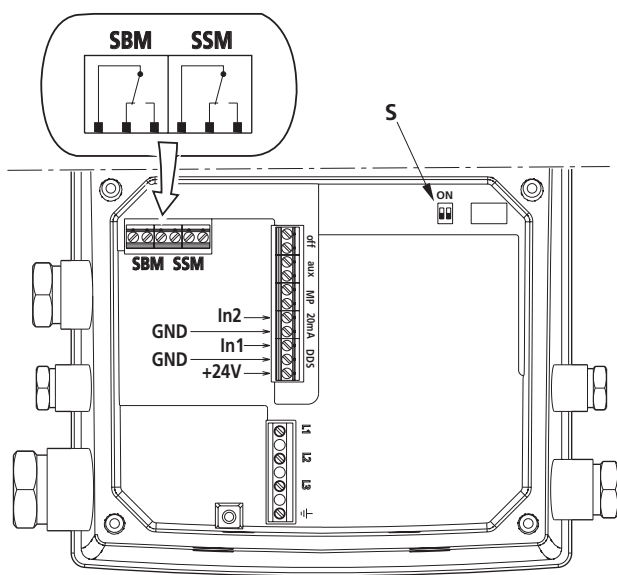
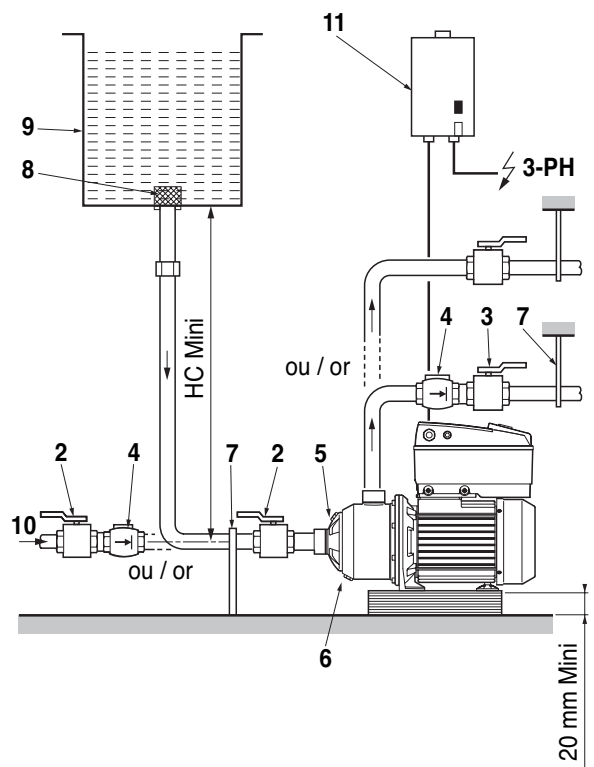


Fig. 2



**Fig. 4**

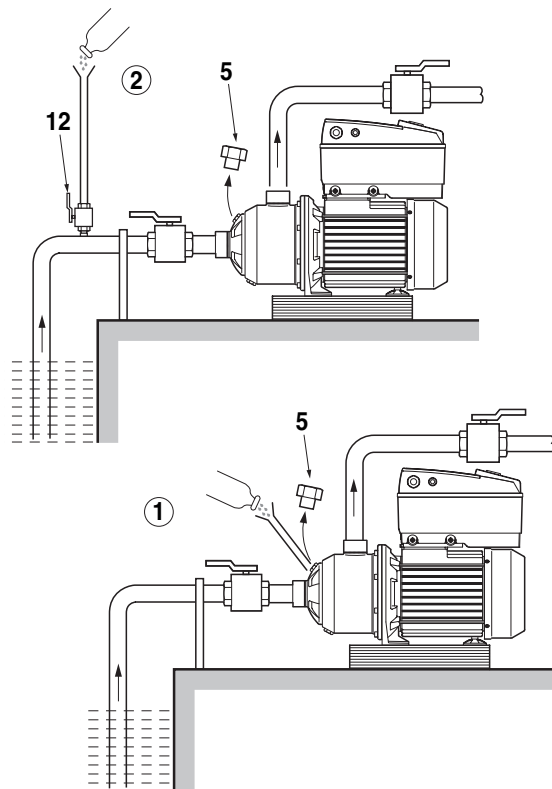


Fig. 5

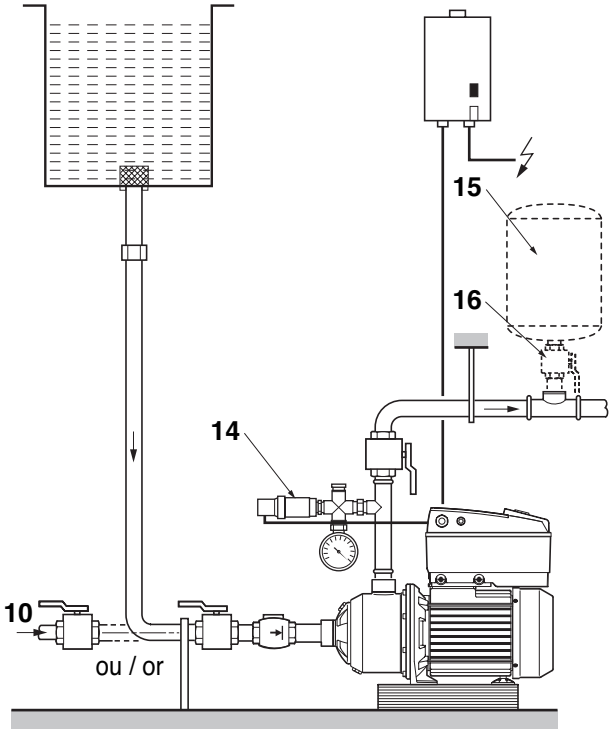


Fig. 7

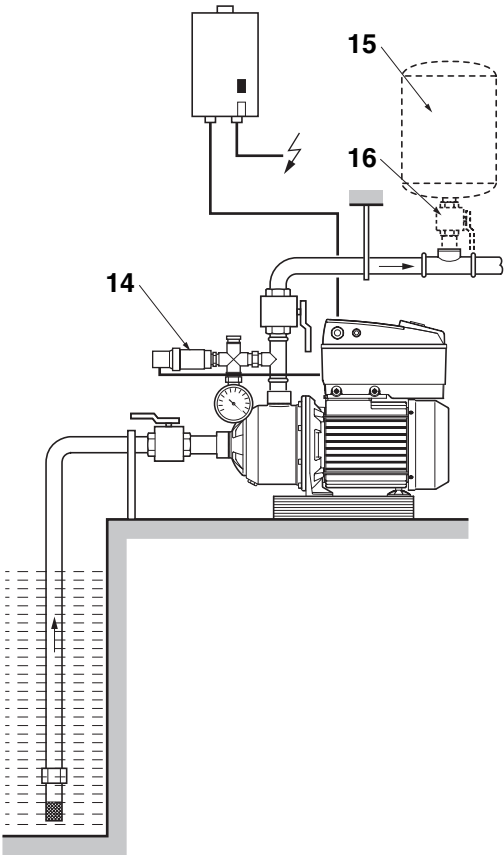


Fig. 6

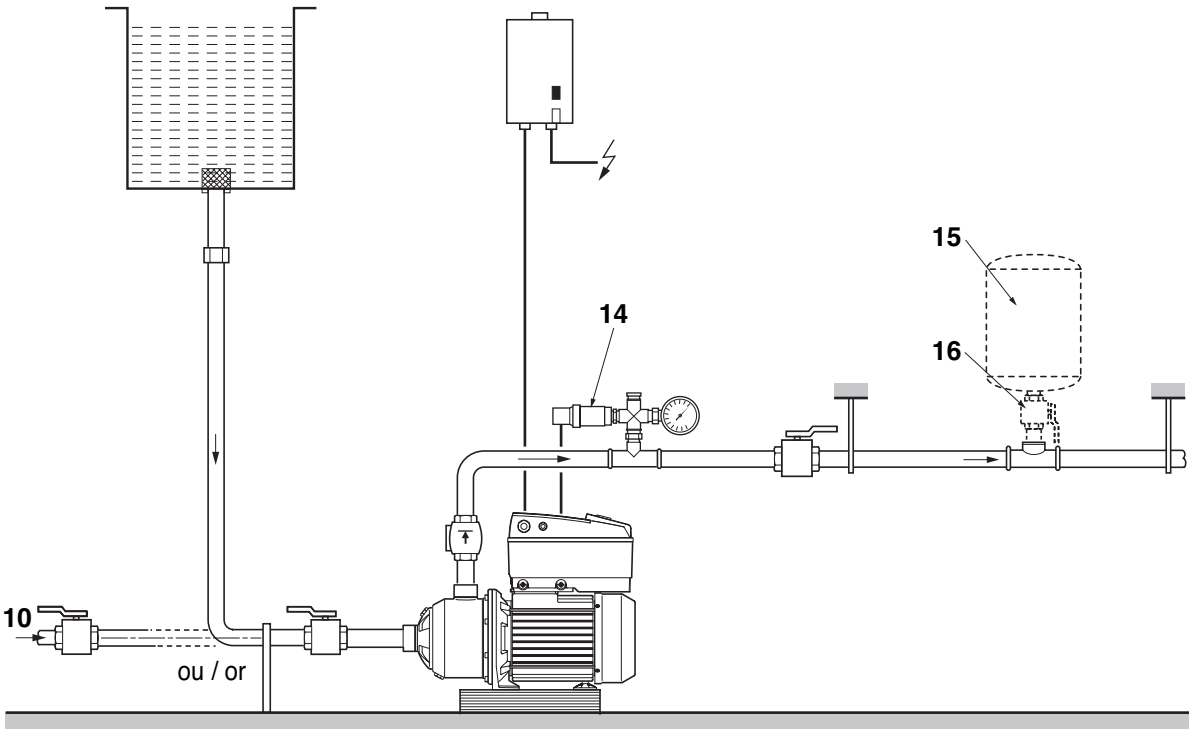


Fig. 8

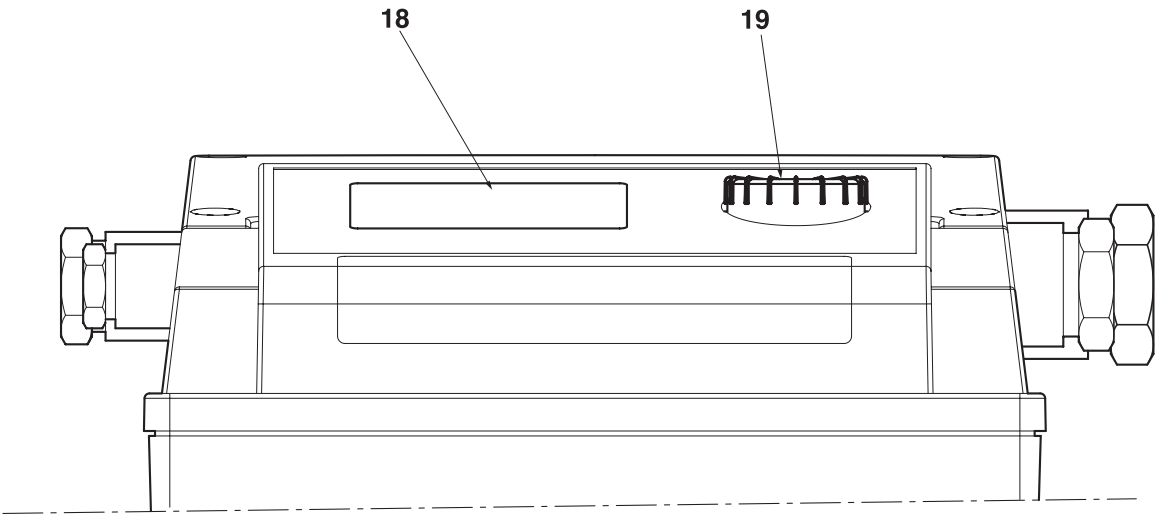


Fig. 9

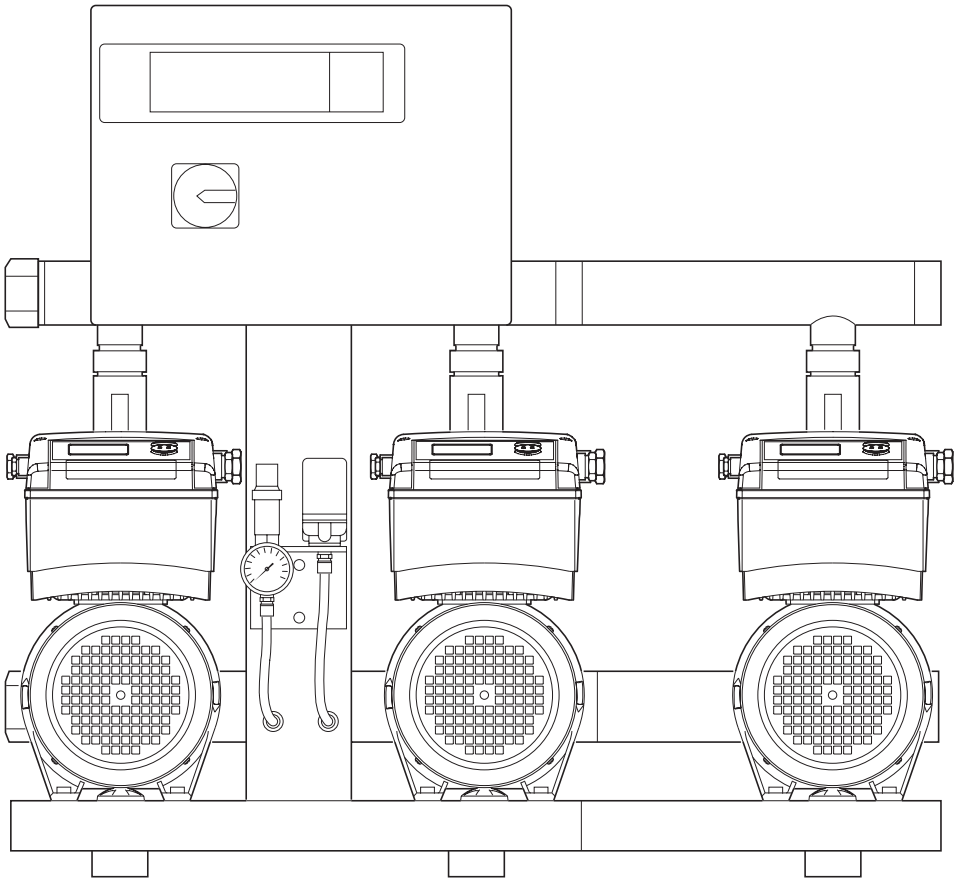
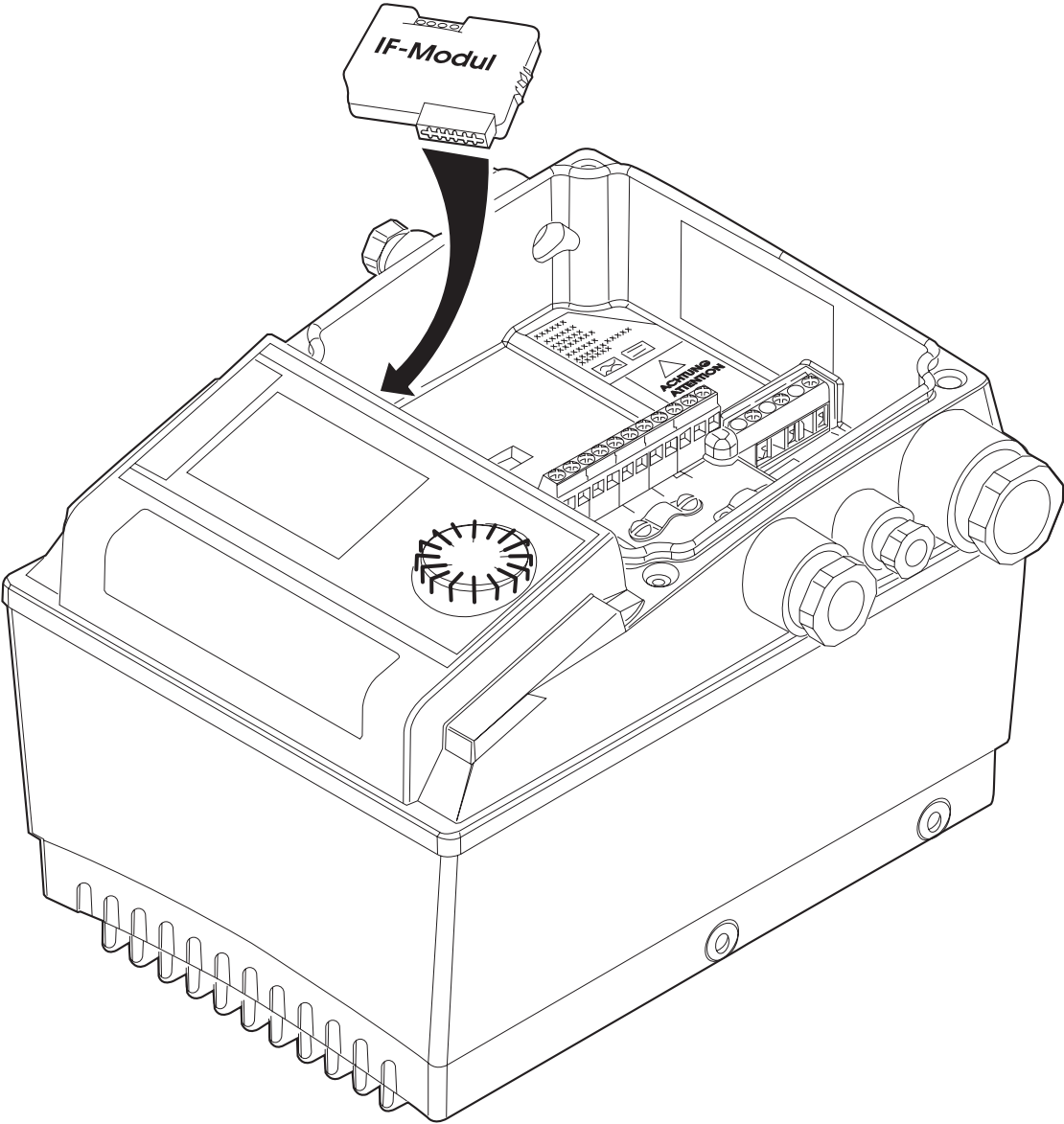


Fig. 10





## 1. General

### About this document

The language of the original operating instructions is French. All other languages of these instructions are translations of the original operating instructions.

These installation and operating instructions are an integral part of the product. They must be kept readily available at the place where the product is installed. Strict adherence to these instructions is a precondition for the proper use and correct operation of the product.

These installation and operating instructions conform to the relevant version of the product and the underlying safety standards valid at the time of going to print.

### 1.1 Applications

Pumps aimed at pumping clear liquids in building, agriculture and industry areas...

Catching from a well, a source, a river, a pond ..., it is forbidden to use it with an Abyssinian well (tube, driven well).

### 1.2 Technical characteristics

- Pressure
  - Max. operating pressure : 10 bar
  - Max. suction pressure : 6 bar
- Temperature range
  - Version EPDM O'ring and seal (KTW/WRAS\*) : - 15° to + 110°C
  - Version Viton O'ring and mechanical seal VITON : - 15° to + 90°C
- Ambient temperature (standard product) : +40 °C max.
- Max. suction head : depend NPSH of the pump
- Ambient humidity : <90%
- Sound pressure level dB(A) 0/+3 dB(A) :
 

| Power (kW) |     |     |     |
|------------|-----|-----|-----|
| 0.75       | 1.1 | 1.5 | 2.2 |
| 65         | 66  | 67  | 69  |
- \* KTW : German standard  
WRAS : British standard

Electromagnetic compatibility EN 61800-3:  
residential emission – 1st environment  
industrial immunity – 2nd environment  
In the frequency range between 600MHz and 1 GHz, the display or the pressure indication in the display might be disturbed in the direct vicinity (< 1 m from the electronic module) of radio transmission installations, transmitters or similar devices working in this frequency range. The functioning of the pump is at no time affected.

## 2. Safety

These operating instructions contain basic information which must be adhered to during installation and operation. For this reason, these operating instructions must, without fail, be read by the service technician and the responsible operator before installation and commissioning. It is not only the general safety instructions listed under

the main point «safety» that must be adhered to but also the special safety instructions with danger symbols included under the following main points.



### 2.1 Indication of instructions in the operating instructions

#### Symbols

General danger symbol.

Danger due to electrical voltage.

NOTE: ....

#### Signals:

**DANGER! Acutely dangerous situation. Non-observance results in death or the most serious of injuries.**

**WARNING! The user can suffer (serious) injuries. 'Warning' implies that (serious) injury to persons is probable if this information is disregarded.**

**CAUTION! There is a risk of damaging the pump/unit. 'Caution' implies that damage to the product is likely if this information is disregarded.**

NOTE: Useful information on handling the product. It draws attention to possible problems.

### 2.2 Personnel qualifications

The installation, operating, and maintenance personnel must have the appropriate qualifications for this work. Area of responsibility, terms of reference and monitoring of the personnel are to be ensured by the operator. If the personnel are not in possession of the necessary knowledge, they are to be trained and instructed. This can be accomplished if necessary by the manufacturer of the product at the request of the operator.

### 2.3 Danger in the event of non-observance of the safety instructions

Non-observance of the safety instructions can result in risk of injury to persons and damage to pump/unit. Non-observance of the safety instructions can result in the loss of any claims to damages.

In detail, non-observance can, for example, result in the following risks:

- Failure of important pump/unit functions,
- Failure of required maintenance and repair procedures
- Danger to persons from electrical, mechanical and bacteriological influences,
- Property damage.

### 2.4 Safety consciousness on the job

The safety instructions included in these installation and operating instructions, the existing national regulations for accident prevention together with any internal working, operating and safety regulations of the operator are to be complied with.

### 2.5 Safety instructions for the operator

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience

and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

- If hot or cold components on the product/the unit lead to hazards, local measures must be taken to guard them against touching.
- Guards protecting against touching moving components (such as the coupling) must not be removed whilst the product is in operation.
- Leakages (e.g. from the shaft seals) of hazardous fluids (which are explosive, toxic or hot) must be led away so that no danger to persons or to the environment arises. National statutory provisions are to be complied with.
- Highly flammable materials are always to be kept at a safe distance from the product.
- Danger from electrical current must be eliminated. Local directives or general directives [e.g. IEC, VDE etc.] and local power supply companies must be adhered to.

## 2.6 Safety instructions for installation and maintenance work

The operator must ensure that all installation and maintenance work is carried out by authorised and qualified personnel, who are sufficiently informed from their own detailed study of the operating instructions.

Work on the product/unit must only be carried out when at a standstill. It is mandatory that the procedure described in the installation and operating instructions for shutting down the product/unit be complied with.

Immediately on conclusion of the work, all safety and protective devices must be put back in position and/or recommissioned.

## 2.7 Unauthorised modification and manufacture of spare parts

Unauthorised modification and manufacture of spare parts will impair the safety of the product/personnel and will make void the manufacturer's declarations regarding safety.

Modifications to the product are only permissible after consultation with the manufacturer. Original spare parts and accessories authorised by the manufacturer ensure safety. The use of other parts will absolve us of liability for consequential events.

## 2.8 Improper use

The operating safety of the supplied product is only guaranteed for conventional use in accordance with Section 4 of the operating instructions. The limit values must on no account fall under or exceed those specified in the catalogue/data sheet.

## 3. Transport, handling and storage

When receiving the material, check that there has been no damage during the transport. If any defect has been stated, take all necessary steps with the carrier within the allowed time.



**CAUTION!** If the delivered material is to be installed later on, store it in a dry place and protect it from impacts and any outside influences (humidity, frost etc...).

Handle the pump carefully so as not to alter the geometry and the alignment of the unit.

In no case the pump must be lifted by the converter.

## 4. Products and accessories

### 4.1 Description (Fig. 1, 2, 4, 5, 6, 7, 8)

- 1 – Strainer-foot valve
  - 2 – Pump suction valve
  - 3 – Pump discharge valve
  - 4 – Non-return valve
  - 5 – Venting and filling plug
  - 6 – Drain-priming plug
  - 7 – Pipe supports or brackets
  - 8 – Strainer
  - 9 – Storage tank
  - 10 – Town water supply
  - 11 – Switch and section switch with fuses
  - 12 – Cock
  - 13 – Foundation block
  - 14 – Pressure sensor
  - 15 – Tank
  - 16 – Insulation valve of the tank
  - 17 – Display
  - 18 – Adjustment button
- HA: Maximum suction head  
HC: Minimum inlet pressure

### 4.2 The pump

- Centrifugal with horizontal axis.
- Multistage.
- Not self-priming.
- Tapped suction/delivery ports.  
Axial suction, radial delivery upwards.
- Shaft sealing with standardized mechanical seal.  
Materials: see technical description.

### 4.3 The motor and its speed variator

- 3 phases asynchronous motor, 2 poles, fitted with its converter.
- Protection index motor-variator: IP 54
  - Insulation class: F

#### Operating voltages and frequencies:

- 400V :  $\pm 10\%$  – 50 Hz
- 380-480V :  $\pm 6\%$  – 60 Hz

### 4.4 Accessories

Accessories must be ordered separately.

- IF-Module PLR for connecting to PLR/interface converter.
- IF-Module LON for connection to the LONWORKS network. The IF Modul PLR is connected directly inside the connection area of the converter (Fig. 10).
- By-pass kit.
- Insulating valves.
- Bladder or galvanised tank.
- Tank for antihammer blow effect.

- Weld-on (Steel) or screw-on (Stainless Steel) counterflange.
- Non-return valves (with nose or spring ring when operating in constant pressure).
- Strainer-foot valve.
- Vibrationless sleeves.
- Protection kit against dry-running
- Sensor kit for pressure regulation (accuracy :  $\leq 1\%$  ; use between 30 % and 100 % of the reading range).

## 5. Installation

Two standard types.

Fig. 1: pump in suction

Fig. 2: pump in load on storage tank (item 9) or town water supply (item 10).

| Altitude | Loss of head | Temperature | Loss of head |
|----------|--------------|-------------|--------------|
| 0 m      | 0 mCL        | 20 °C       | 0.20 mCL     |
| 500 m    | 500 mCL      | 30 °C       | 0.40 mCL     |
| 1000 m   | 1000 mCL     | 40 °C       | 0.70 mCL     |
|          |              | 50 °C       | 1.20 mCL     |
|          |              | 60 °C       | 1.90 mCL     |
|          |              | 70 °C       | 3.10 mCL     |
|          |              | 80 °C       | 4.70 mCL     |
|          |              | 90 °C       | 7.10 mCL     |
|          |              | 100 °C      | 10.30 mCL    |
|          |              | 110 °C      | 14.70 mCL    |
|          |              | 120 °C      | 20.50 mCL    |

### 5.1 Montage

- Install the pump in a place easy to reach, protected against frost and as close as possible from the drawing point.
- Install the pump on a concrete block (rep. 13) or directly on a very smooth and horizontal ground.
- Fixing of the pump through two holes for  $\varnothing$  M8 bolts.



NOTE: Keep in mind that the altitude of the installation place and the water temperature may reduce the suction possibilities of the pump.

| Ports    | Tapped ports |              |              |              |
|----------|--------------|--------------|--------------|--------------|
|          | 200          | 400          | 800          | 1600         |
| Suction  | 1"(26-34)    | 1"1/4(33-42) | 1"1/2(40-49) | 2"(50-60)    |
| Delivery | 1"(26-34)    | 1"(26-34)    | 1"1/4(33-42) | 1"1/2(40-49) |



NOTE: Beyond 80° C, plan to install the pump in load.

### 5.2 Hydraulic connections



**CAUTION!** Danger of material damage!

The installation has to bear the pressure reached when the pump runs at maximum frequency and zero flow rate.

- Connection by flexible hose with reinforcement or rigid propeller.



**CAUTION!** Danger of material damage!

Connections has to correctly sealed: No air entrance is allowed on the suction pipe which is showing a mounting declivity 2 % (Fig. 1).

- With rigid pipe, avoid the pump to bear the weight of the pipes, use supports (Fig. 1).
- The diameter of the pipe must never be smaller than the suction/delivery ports.
- Limit the length of the suction pipe and avoid all features that cause losses of head (bends, valves, tapers).



**CAUTION!** Danger of material damage!

When the pump is under pressure, it is recommended to connect the non-return valve to the pump discharge to protect it against hammer blow effects.

### 5.3 Electric connections



**WARNING!** Electrical connections shall only be made by approved specialised electricians and in compliance with the applicable regulations.

The electric characteristics (frequency, voltage, nominal current) of the motor-converter are mentioned on the pump identification sticker (item 19). Check that the motor-converter complies with the mains supply used.

- The electric protection of the motor is integrated into the converter. The parameters take into account the characteristics of the pump and must ensure its protection and the one of the motor.
- In case of impedance between earth and neutral point, install a protection before motor-converter.
- Provide a fuse-disconnecting switch (type gF) to protect the mains installation (Fig. 1, 2, item 11).



NOTE: If you have to install a differential circuit-breaker for users protection, it must have a delay effect. Adjust it according to the current mentioned on the variator label.

Use power cables conforming with standards.



**DANGER!** Danger of death!

Do not forget to connect to earth.

The electric connection of the variator (Fig. 3), according to its operating modes (see chapter 6 for starting) has to comply with the schemes of the following table.



**CAUTION!** A connection error would damage the variator.

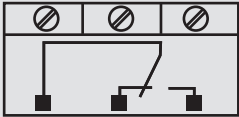
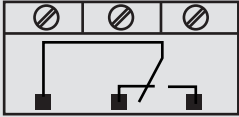


**CAUTION!** The power cable must never touch the pipe or the pump; make sure that it is sheltered from any humidity.

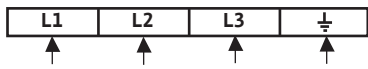
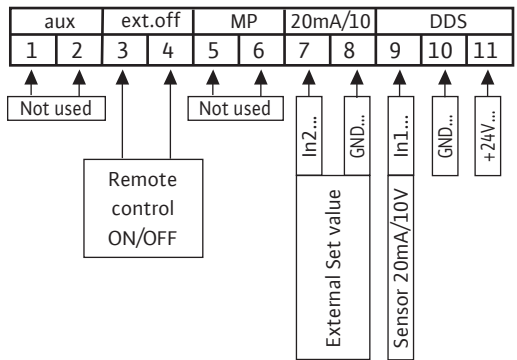
- You can change the orientation of the motor-variator by quarter turn when removing the fixing screws of the motor and reorientating the motor to the wished position.
- Place the screws back.

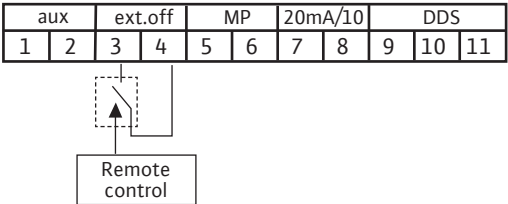
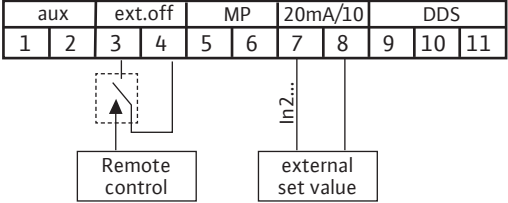
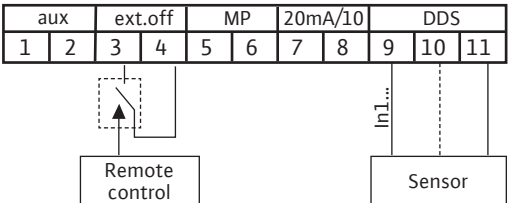
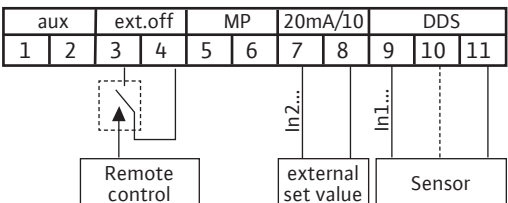
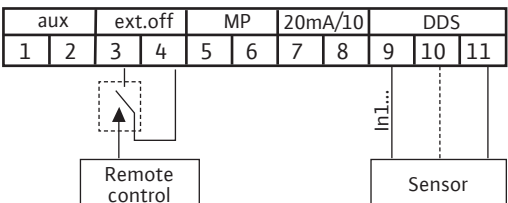
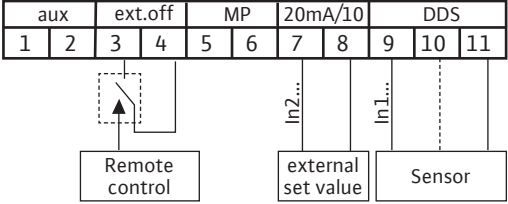
### Connection terminal allocation

- Loosen the screws and remove the converter cover.

| Designation                  | Allocation  | Notes   |
|------------------------------|---|---|
| L1, L2, L3                   | Mains connection voltage  | Three-phase current 3 ~ IEC38   |
| PE                           | Earth connection  |   |
| IN1<br>(DDS-terminal 9)      | Sensor input  | Type of signal: Voltage (0 – 10 V, 2 – 10 V)<br>Input resistance: $R_i \geq 10 \text{ k}\Omega$<br>Type of signal: current (0 – 20 mA, 4 – 20 mA)<br>Input resistance: $R_B = 500 \Omega$<br>Can be configured in the « Service » menu <5.3.0.0>  |
| IN2<br>(10V/20mA-terminal 7) | External setpoint input   | Type of signal: Voltage (0 – 10 V, 2 – 10 V)<br>Input resistance: $R_i \geq 10 \text{ k}\Omega$<br>Type of signal: current (0 – 20 mA, 4 – 20 mA)<br>Input resistance: $R_B = 500 \Omega$<br>Can be configured in the « Service » menu <5.4.0.0>  |
| GND (x2)                     | Ground connections  | For both inputs IN1 and IN2.  |
| + 24 V                       | DC voltage for sensor   | Load max. : 60 mA<br>The voltage is short-circuit proof.  |
| Ext. off                     | Control input ON/OFF<br>« Overriding OFF »<br>For external potential-free switch                                    | The pump can be switched on/off via the external potential-free contact.<br>In systems with a high switching frequency (> 20 switch-ons/off/day), switching on/off is to be done via « ext. off ».  |
| SBM                          | « Available transfer » relay<br> | In normal operating, the relay is activated when the pump runs or is in a position to run.<br>When a first defect appears or by main supply cutoff (the pump stops), the relay is deactivated.<br>Information is given to the control box, regarding the availability of the pump, even temporarily.<br>Can be configured in the « Service » menu <5.7.6.0><br>Contact load:<br>minimum: 12 V DC, 10 mA<br>maximum: 250 V AC, 1 A |
| SSM                          | « Failure transfer » relay<br>   | After a series of detection (from 1 to 6 according to significance) of the same type of defect, the pump stops and this relay is activated (up to manual action).<br>Contact load:<br>minimum: 12 V DC, 10 mA<br>maximum: 250 V AC, 1 A   |

The terminals IN1, IN2, GND and Ext. Off meet the requirement for « safe isolation » (in acc. with EN61800-5-1) to the mains terminals, as well as to the SBM and SSM terminals (and vice versa).

| Connection to mains supply   | Power terminals   |
|--|---|
| Connect the 4 wires cable on the power terminals (phases + earth).   |   |
| Connection of inputs / outputs   | Inputs / outputs terminals  |
| <ul style="list-style-type: none"> <li>The sensor, external setpoint and [ext.off] inputs cable must be necessarily screened.</li> </ul>   |   |
| <ul style="list-style-type: none"> <li>The remote control allows the switching On or Off of the pump (free contact), this function has priority on the others.</li> <li>This remote control can be removed by shunting the terminals (3 and 4).</li> </ul> | Example: Float switch, pressure gauge for dry-running...  |
| Connection terminals of the interface  |   |
| PLR  | <p>The optional IF-Module PLR is to be pushed into the multiplug in the connection area of the converter.</p> <p>The connection is twist-proof.</p> |
| LON  | <p>The optional IF-Module LON is to be pushed into the multiplug in the connection area of the converter.</p> <p>The connection is twist-proof.</p> |

| « Constant pressure » connection   | Inputs / outputs terminals   |
|--|--|
| Setting of the frequency by hand:  |    |
| Setting of the frequency by external control:  |    |
| « Constant pressure » connection   |  |
| Regulation through a pressure sensor:<br>• 2 wires ( [20mA/10V] / +24V )<br>• 3 wires ( [20mA/10V] / 0V / +24V )<br>and setting point by the encoder                           |   |
| Regulation through a pressure sensor:<br>• 2 wires ( [20mA/10V] / +24V )<br>• 3 wires ( [20mA/10V] / 0V / +24V )<br>and setting point by the external set value                |  |
| « P.I.D. control » connection  |  |
| Regulation through a sensor (temperature, flow,...):<br>• 2 wires ( [20mA/10V] / +24V )<br>• 3 wires ( [20mA/10V] / 0V / +24V )<br>and setting point by the encoder            |  |
| Regulation through a sensor (temperature, flow,...):<br>• 2 wires ( [20mA/10V] / +24V )<br>• 3 wires ( [20mA/10V] / 0V / +24V )<br>and setting point by the external set value |  |

**DANGER! Danger of death!**

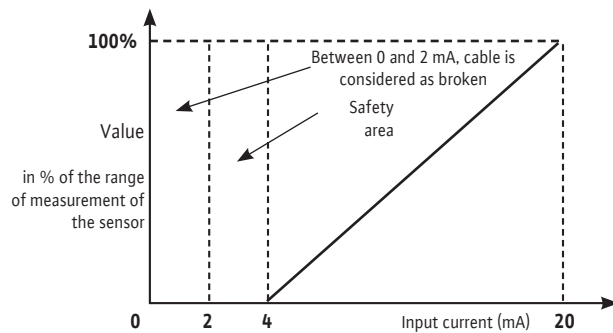
Contact voltage hazardous due to the discharge of the converter capacitors.

- Before any intervention on the converter, wait for 5 minutes after disconnecting of the supply voltage.
- Check whether all electrical connections and contacts are voltagefree.
- Check the right allocation of the connection terminals.
- Check the right earth connection of the pump and installation.

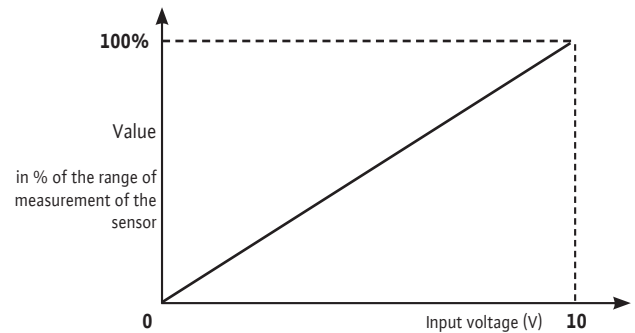
**Control laws**

IN1 : Input signal in « Constant pressure » and « P.I.D. control » mode

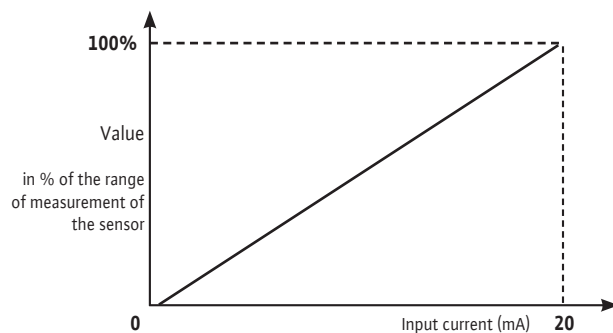
Sensor signal 4–20mA



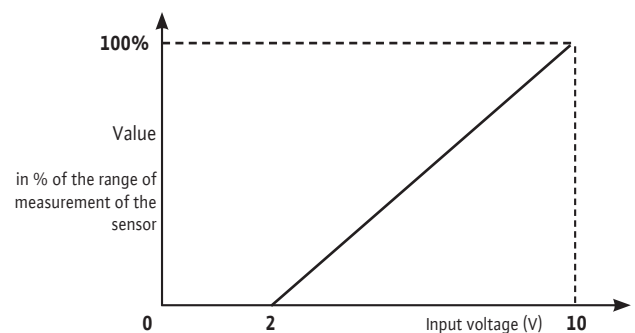
Sensor signal 0–10V

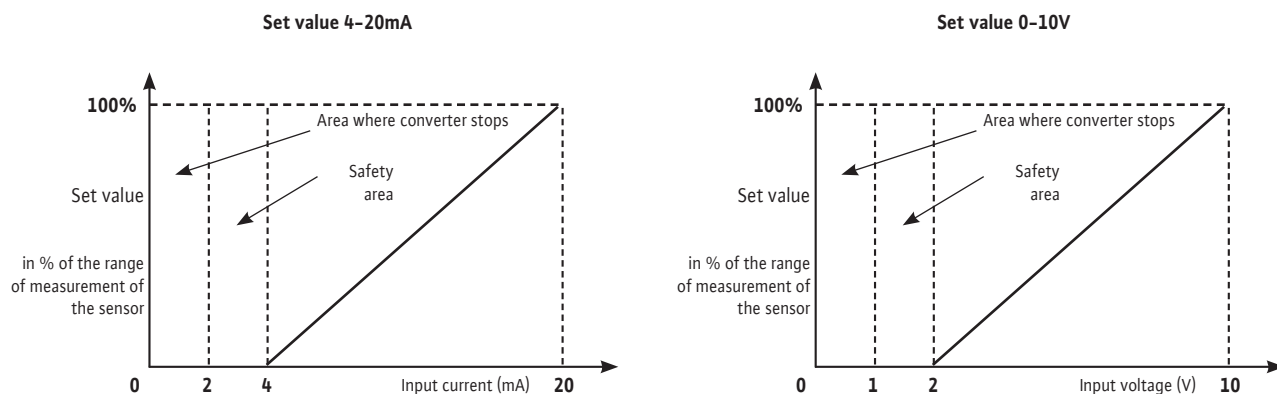
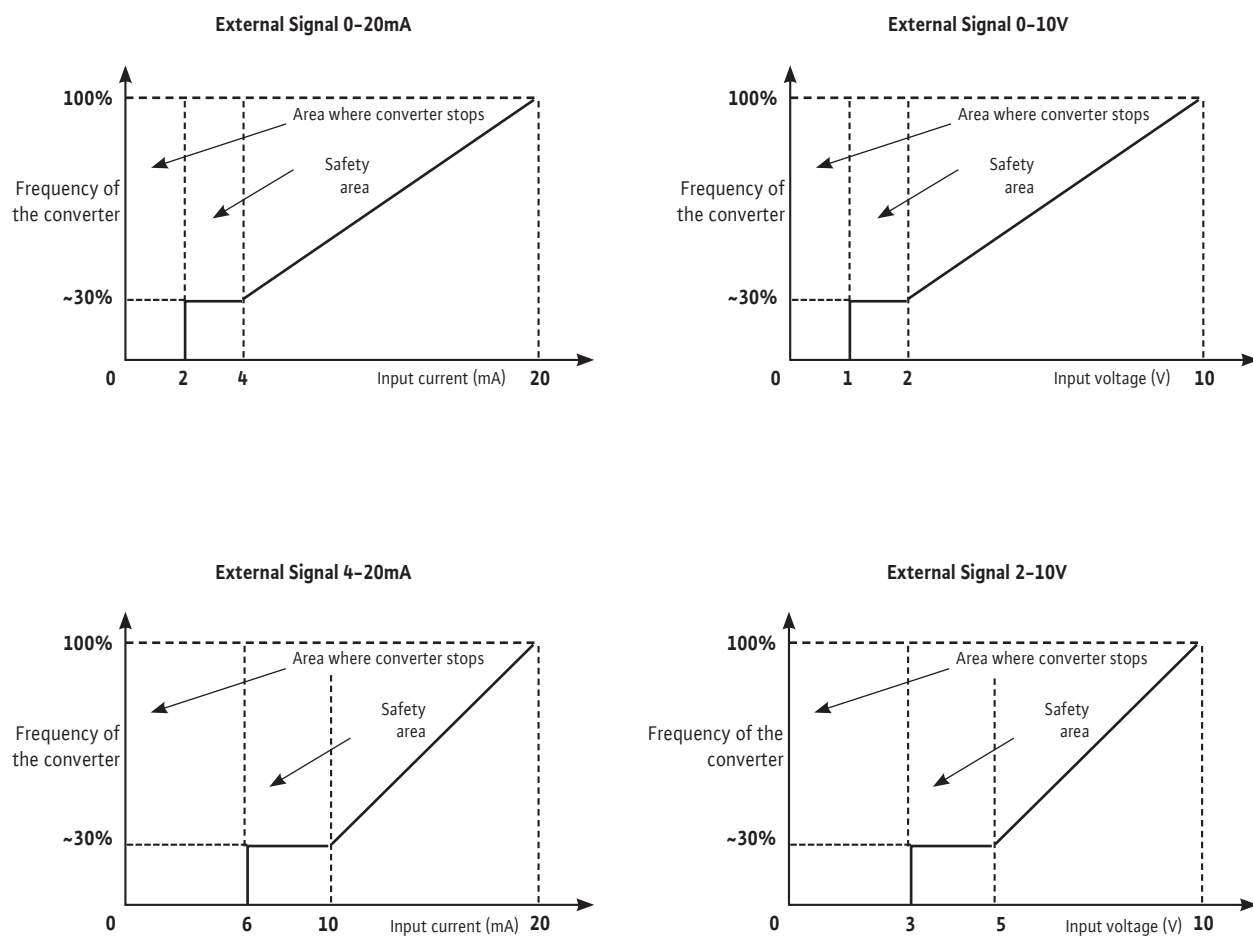


Sensor signal 0–20mA



Sensor signal 2–10V



**IN2 : Entrée de la consigne externe en mode « Pression constante » et « Contrôle P.I.D. »**

**IN2 : Input of external frequency control in « Speed control » mode**


6. Operation

6.1 Setting

6.1.1 Control elements

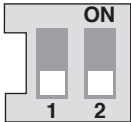
The converter operates using the following control elements:

Setting with encoder

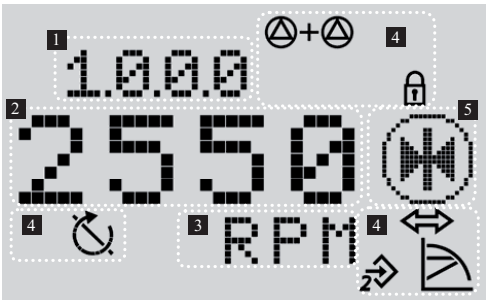


- The selection of a new parameter is done only with a simple rotation, « + » on right and « - » on left.
- A short impulse on the encoder validates this new setting.

Switch



- This converter has got a block with two switches with two positions each (Fig. 4, item 18):
- Switch 1 allows to change the « OPERATION » mode [switch 1->OFF] to « SERVICE » mode [switch 1->ON] and conversely. The « OPERATION » position allows the selected mode to run and hinders the access to parameters input (normal operating). The « SERVICE » position is used to enter the parameters of the different operations.
- Switch 2 is for activating or deactivating the « Access lock ».



6.1.2 Display structure

- As soon as the power supply of the converter has been activated, a 2 second display test is carried out, where all characters on the display are shown.

| Pos. | Description      |
|------|------------------|
| 1    | Menu number      |
| 2    | Value display    |
| 3    | Units display    |
| 4    | Standard symbols |
| 5    | Icon display     |

6.1.3 Description of standard symbols

| Symbol | Description   |
|--------|---|
|        | Operating in « Speed control » mode.  |
|        | Operating in « Constant pressure » or « P.I.D. control » mode.  |
|        | Input IN2 activated (external setpoint).  |
|        | Access locked.<br>When this symbol appears, current settings or measurements cannot be changed. Information displayed is only in reading. |
|        | BMS (building management system) PLR or LON is active.  |
|        | Pump runs.  |
|        | Pump stops.   |

6.1.4 Display

Display status page

- The status page is shown as the standard view on the display. The currently set setpoint is displayed. Basic settings are displayed using symbols.





Example of display status page



NOTE: If the encoder is not activated within 30 seconds in all menus, the display returns to the status page and the change is not registered.

**Navigation element**

- The arborescence of the menu allows to call the functions of the converter. A number is attributed to every menu and submenu.
- The rotation of the encoder allows the scrolling of a same menu level (example 4000→5000).
- Any blinking elements (value, menu number, symbol or icon) allow the choice of a new value, a new menu number or a new function.

| Symbol  | Description  |
|---|--|
|  | When the arrow appears:<br>• An impulse on the encoder allows the access to the submenu (example 4000→4100). |
|  | When the arrow appears:<br>• An impulse on the encoder allows the access to the submenu (example 4000→4100). |

**6.1.5 Menu description****List (Fig. 11)**

## &lt;1.0.0.0&gt;

| Position  | Switch 1 | Description   |
|-----------|----------|---|
| OPERATION | OFF      | Adjustment of the setting point, possible for both cases. |
| SERVICE   | ON       |   |

- To adjust the setting point, turn the encoder. The display changes to menu <1.0.0.0> and the set-point begins to blink. The new rotation allows to increase it or decrease it.
- To confirm the change, give an impulse on the encoder, the display returns to the status page.

## &lt;2.0.0.0&gt;

| Position  | Switch 1 | Description                          |
|-----------|----------|--------------------------------------|
| OPERATION | OFF      | Only on reading for operating modes. |
| SERVICE   | ON       | Setting for operating modes.         |

- The operating modes are the « Speed control », the « Constant pressure » and the « P.I.D. control ».

## &lt;3.0.0.0&gt;

| Position  | Switch 1 | Description                   |
|-----------|----------|-------------------------------|
| OPERATION | OFF      | Setting ON / OFF of the pump. |
| SERVICE   | ON       |                               |

## &lt;4.0.0.0&gt;

| Position  | Switch 1 | Description                                |
|-----------|----------|--|
| OPERATION | OFF      | Only reading for the « Information » menu. |
| SERVICE   | ON       |  |

- The « Information » menu displays measuring, device and operating data, (Fig. 12).

## &lt;5.0.0.0&gt;

| Position  | Switch 1 | Description                            |
|-----------|----------|--|
| OPERATION | OFF      | Only reading for the « Service » menu. |
| SERVICE   | ON       | Setting for « Service » menu.          |

- The « Service » menu allows to get access to the converter parameter setting.

## &lt;6.0.0.0&gt;

| Position  | Switch 1 | Description                |
|-----------|----------|----------------------------|
| OPERATION | OFF      | Display of the error page. |
| SERVICE   | ON       |                            |

- If one or several defects arise, the page of defects appears.  
The letter « E » followed by three digit code appears, see <chapitre 8>.

## &lt;7.0.0.0&gt;

| Position  | Switch 1 | Description                        |
|-----------|----------|------------------------------------|
| OPERATION | OFF      | Display of « Access lock » symbol. |
| SERVICE   | ON       |                                    |

- The « Access lock » is available when the switch 2 is in the ON position.

**CAUTION! Material damage!**

Inadequate setting changes can lead to pump operation defects, which can lead to material damage on the pump or installation.

- Settings in « SERVICE » mode should only be made during commissioning and only by skilled technicians.

Fig. 11

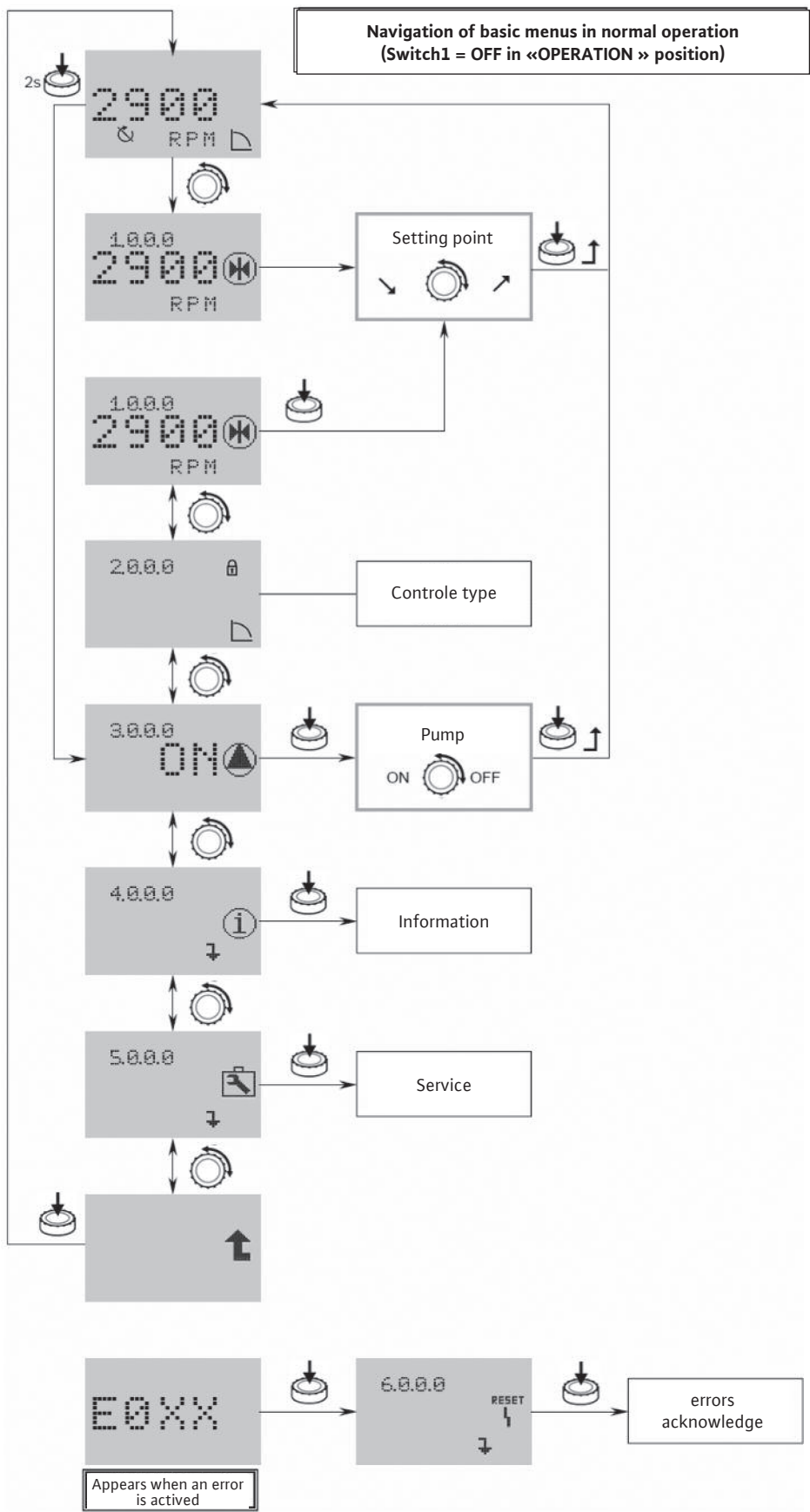
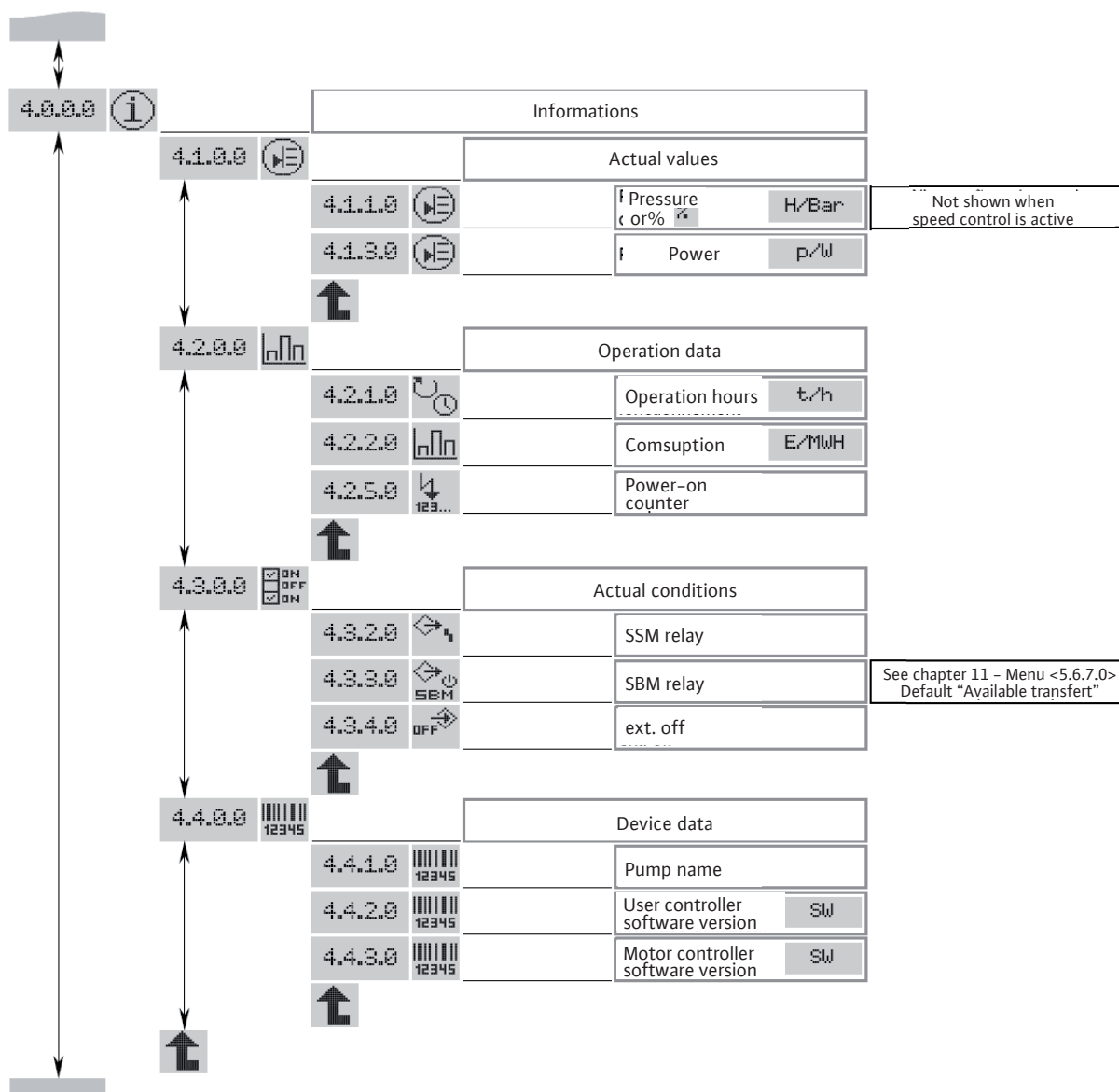


Fig. 12

## Navigation du menu &lt;4.0.0.0&gt; « Informations »



### Parametrization of <2.0.0.0> and <5.0.0.0> menu

In « SERVICE » mode, the menu parameters <2.0.0.0> and <5.0.0.0> can be modified.

Two setting modes exist:

- The « **Easy Mode** » : fast mode to get access to the 3 operating modes.
- The « **Expert Mode** » : mode to get access to all parameters.

- Put the switch 1 on ON position (Fig. 4, item S).

- The « SERVICE » mode is activated.

This symbol blinks on the status page of the display (Fig. 13).

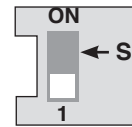
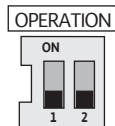
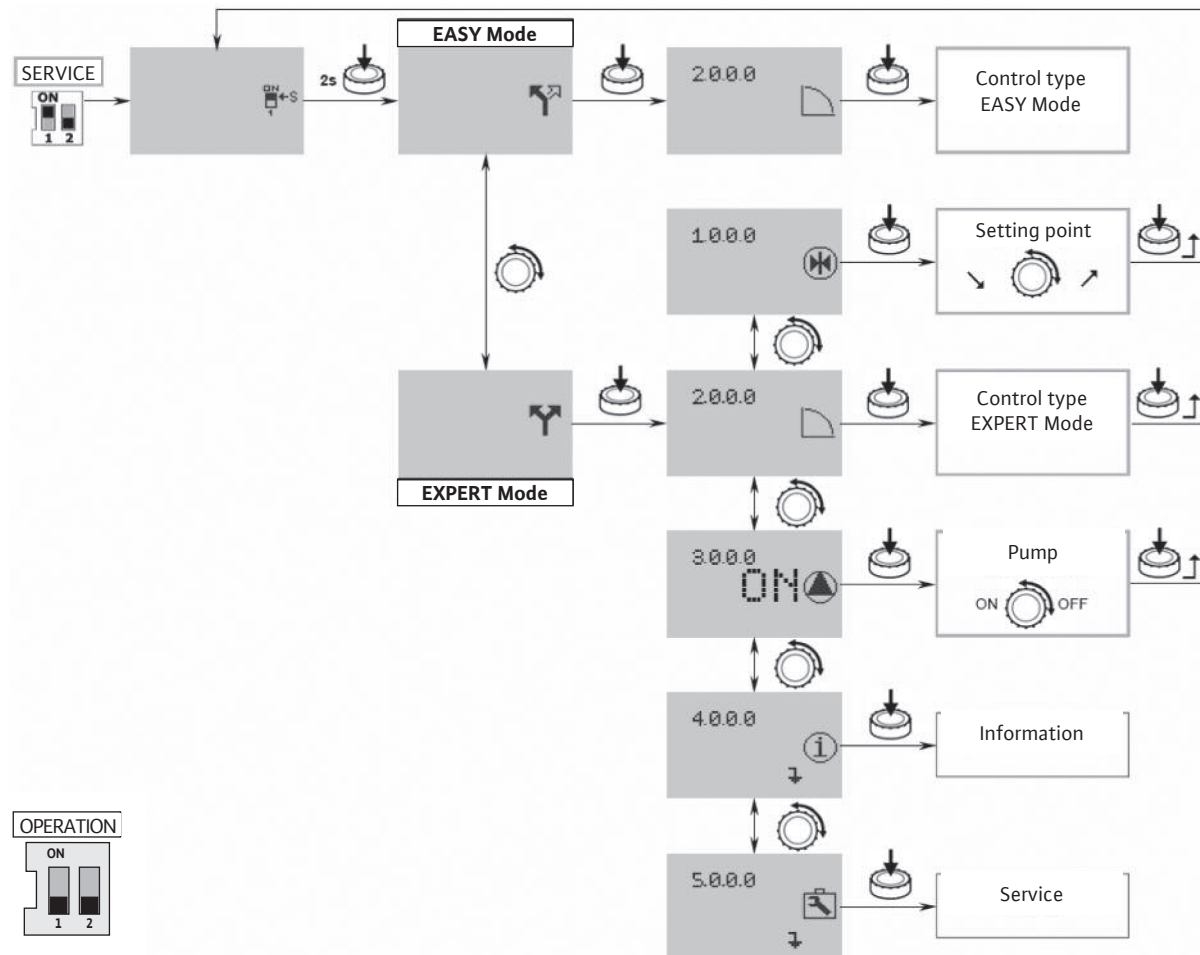


Fig. 13



#### Easy Mode

- Press the encoder during 2 secondes. The symbol « Easy Mode » appears (Fig. 13).
- Press the encoder to validate this choice. The display changes to menu number <2.0.0.0>.

The « Easy Mode » allows, quickly, the setting of the 3 operating modes (Fig. 14)

- « Speed control »
- « Constant pressure »
- « P.I.D. control »
- After setting, put the switch 1 on OFF position (Fig. 4, item S).



#### Expert Mode

- Press the encoder during 2 secondes. Go to the expert mode, the symbol « Expert Mode » appears (Fig. 13).
- Press the encoder to validate this choice. The display changes to menu number <2.0.0.0>.

At first, select the operating mode in menu <2.0.0.0>.

- « Speed control »
- « Constant pressure »
- « P.I.D. control »

Then in menu <5.0.0.0>, the expert mode gives access to all the converter parameters (Fig. 15).

- After setting, put the switch 1 on OFF position (Fig. 4, item S).



Fig. 14

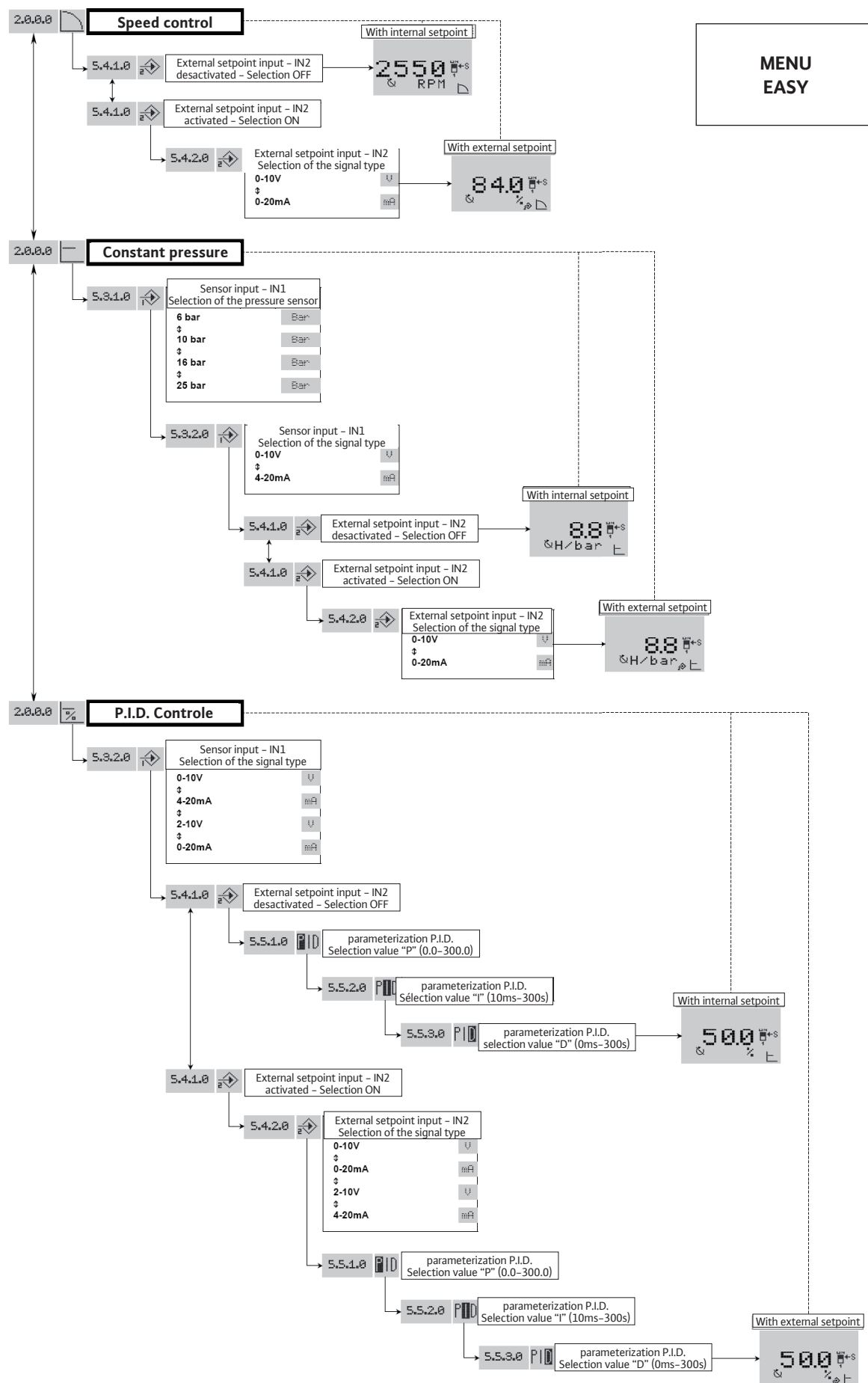
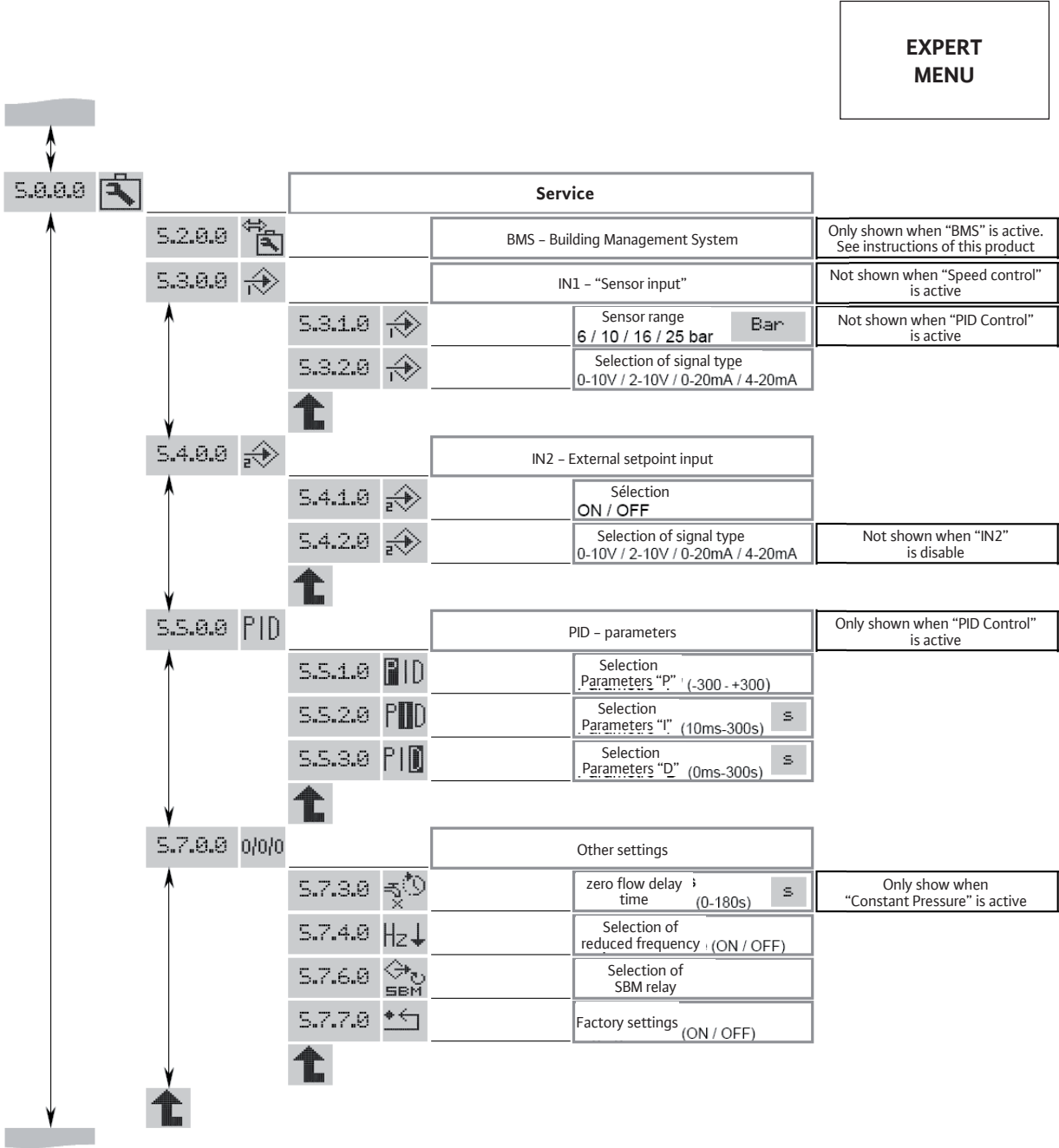


Fig. 15



### Access lock

In order to lock the pump settings, it is possible to use the « Access lock ».

To activate or deactivate it, proceed as follows:

- Put the switch 2 on ON position (Fig. 4, item 5). The <7.0.0.0> menu is called up.
- Turn the encoder / Press on arrows of the touch pads to activate or deactivate the locking. The current state of the locking is represented with the following symbols:



Lock active: Parameters are locked, the access to menus is allowed only on reading.



Lock inactive: Parameters can be changed, the access to menus is allowed for setting.

- Return the switch 2 on OFF position (Fig. 4, item 5). The display returns to the status page.

### 6.1.6 Configurations



NOTE: If the pump is delivered as separate part, not integrated into a system we mounted, the standard configuration mode is « Speed control ».

#### « Speed control » mode (Fig. 1, 2)

Setting of the frequency by hand or external control.

- For the starting up, we recommend to set the motor speed at 2400 RPM.

#### « Constant pressure » mode (Fig. 6, 7, 8)

Regulation with a pressure sensor and setting point (internal or external).

- The addition of a pressure sensor (with tank; sensor kit delivered as accessories) allows a pressure regulation of the pump.
- The accuracy of the sensor shall be  $\leq 1\%$  and it is used between 30 % and 100 % of the measuring scale range. The tank must have a useful volume of 8L minimum.
- For the starting up, we recommend a pressure set value at 60% of its maximum pressure.

#### « P.I.D. control » mode

Regulation with a sensor ( temperature, flow,...) by P.I.D. control and setting point (internal or external).

### 6.2 Preliminary rinsing



The hydraulic features of every pump is tested in factory, some water may remain in them. It is recommended for hygien purposes, to carry out a rinsing of the pump before any using with potable water supply.

### 6.3 Filling – degassing



**CAUTION!** Danger of material damage!  
Never operate the pump dry, even briefly!

#### Pump in load (Fig. 2).

- Close the discharge valve (item 3).
- Open the venting plug (item 5), the suction valve (item 2) and completely fill the pump.
- Close the venting plug only after water flows out and complete aeration.



#### **WARNING!** Danger of burn!

In hot water, a stream of water may escape from the venting plug port.

- Take all required precautions as regards persons and motor-converter.

#### Pump in suction (Fig. 1, 4).

Two possible cases:

1st case (Fig. 4.1).

- Close the discharge valve (Fig. 1, item 3), open the suction valve (Fig. 1, item 2).
  - Remove the venting plug (Fig. 1, item 5).
  - Unscrew about 4 turns the bottom drain-priming plug (Fig. 1, item 6) located on the pump casing.
  - Put a funnel into the venting plug port and completely fill the pump and the suction pipe.
  - After water flows out and total air exit, filling is achieved.
  - Screw the venting plug and the bottom drain-priming plug back in.
- 2st case (Fig. 4.2).
- Filling can be made easier by fitting a vertical pipe (Fig. 4, item 12) fitted with a  $\varnothing \frac{1}{2}$ » stopcock and a funnel, on the suction pipe of the pump.
  - Close the discharge valve (Fig. 1, item 3), open the suction valve (Fig. 1, rep. 2).
  - Open the stopcock (Fig. 4, item 12) and the filling plug (Fig. 1, item 5).
  - Fill the pump and the suction pipe completely until water flows out of the filling plug and air bubbles have completely disappeared.
  - Close the stopcock (Fig. 4, item 12) (which can be left in place), remove the pipe and screw the filling plug back in (Fig. 1, item 5).

### 6.4 Starting up



#### **WARNING!** Danger of burn!

Depending on conveyed fluid and the operating cycles of the pump, surface temperature (pump, motor) can exceed 68°C.

- Take necessary means to avoid injuries!



#### **CAUTION!** Danger of material damage!

The pump must not operate at zero flow (closed discharge valve) for more than 10 minutes with cold water ( $T^{\circ}\text{C} < 40^{\circ}\text{C}$ ) and more than 5 minutes beyond 60°C.

- We recommend to ensure a minimum flow of about 10 % of the pump nominal flow to avoid any vapour lock at the top of the pump.
- Open the discharge valve and start the pump.
- Check pressure stability at discharge with a manometer, if instability, perfect air draining.

- In case of failure, do the filling in again and start the operation again.
- Check that the current input does not exceed the value indicated on the motor-converter data plate.

7. Maintenance



**DANGER!** Before working on equipment, switch it off and prevent it from being switched on again!

- No special maintenance in operation.
- The bearing holding the coupling and the motor bearings are lubricated for their total lifetime and do not require any lubrication.
- Keep the pump and the motor-converter perfectly clean.
- In case of prolonged stopping, if there is no risk of frost, it is better not to drain the pump.

- To avoid any locking of the shaft and the hydraulic unit during the freezing period, drain the pump by removing the plug (item 6) and filling plug (item 5). Screw both plugs back in without tightening them.

Replacement frequencies



NOTE: These are only recommendations, the replacement frequency depends on the operating conditions of the unit, i.e.:

- Temperature, pressure and type of conveyed fluid for the mechanical seal.
- Load and ambient temperature for the motor and the other components.
- Starting frequency: continuous or intermittent running.

| Parts or components subject to wear |                                       | Mechanical seal      | Pump and motor bearings | Converter                    | Motor winding              |
|-------------------------------------|---------------------------------------|----------------------|-------------------------|------------------------------|----------------------------|
| Indicative operating lifetime       |                                       | 10 000 h to 20 000 h | 12 000 h to 50 000 h    | ≥ 15 000 h<br>Amb. maxi 40°C | 25 000 h<br>Amb. maxi 40°C |
| Replacement frequency               | Continuous                            | 1 to 2 years         | 1,5 to 5 years          | 1 to 3 years                 | 3 years                    |
|                                     | 15 hours per day<br>9 months per year | 2 to 4 years         | 3 to 10 years           | –                            | 6 years                    |

8. Faults, causes and remedies



Faults should only be remedied by qualified personnel! Observe the safety instructions.

Relays

The converter is fitted with 2 output relays aimed for an interface to centralized control. ex.: control box, pumps control.

SBM relay :

This relay can be configured in the « Service » menu < 5.7.6.0 > in 3 operating states.

State: 1 (factory setting)

« Available transfer » relay (normal operating for this pump type).

The relay is activated when the pump runs or is in a position to run.

When a first defect appears or by mains supply cutoff (the pump stops), the relay is deactivated. Information is given to the control box, regarding the availability of the pump, even temporarily.

State: 2

« Run transfer » relay.

The relay is activated when the pump runs.

State: 3

« Power on transfer » relay.

The relay is activated when the pump is connected to the network.

SSM relay:

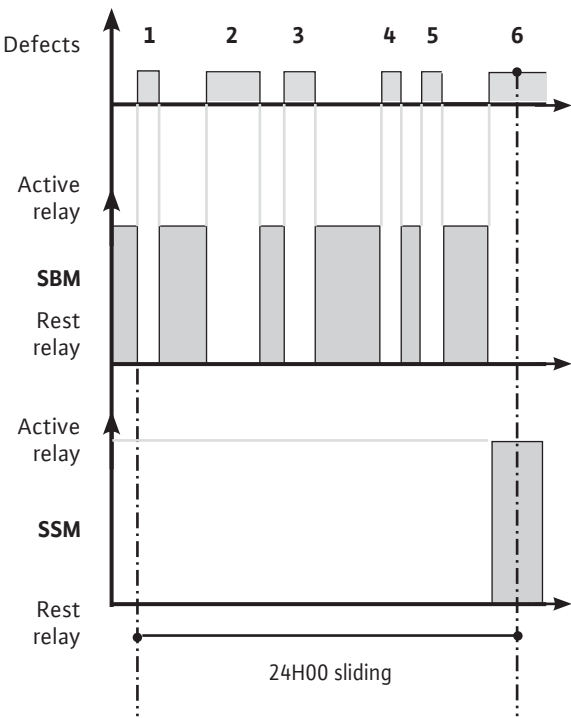
« Failures transfer » relay.

After a series of detection (from 1 to 6 according

to significance) of the same type of defect, the pump stops and this relay is activated (up to manual action).

Example: 6 defects with a variable time limit on 24 sliding hours.

State of SBM relay is « Available transfer ».



## 8.1 Error table

All incidents hereafter mentioned give rise to:

- The deactivation of the SBM relay (When this one is parametrized in « available transfer » mode).
- The activation of the SSM relay « failure transfer » when the maximum quantity of one type of defect is reached over a 24-hour range.
- Lighthening of a red LED.

| Error N°    | Reaction time before error signalisation | Time before consideration of the defect, after signalisation | Waiting time before automatic restart | Max defects over 24 hours | Faults Possible causes  | Remedies  | Waiting time before reset |
|-------------|--|--|---------------------------------------|---------------------------|---|---|---------------------------|
| E001        | 60s                                      | immediate  | 60s                                   | 6                         | The pump is in overload, defective.   | Density and/or viscosity of the conveyed fluid are too big.   | 300s                      |
|             |  |  |                                       |                           | The pump is obstructed by particles.  | Dismantle the pump and replace the defective components or clean them.  |                           |
| E004 (E032) | ~5s                                      | 300s   | Immediate if defect deleted           | 6                         | The converter supply is in under voltage.                                       | Check the converter terminals:<br>• error if network < 330V   | 0s                        |
| E005 (E033) | ~5s                                      | 300s   | Immediate if defect deleted           | 6                         | The converter supply is in over voltage.  | Check the converter terminals:<br>• error if network > 480V   | 0s                        |
| E006        | ~5s                                      | 300s   | Immediate if defect deleted           | 6                         | A supply phase is missing.  | Check the supply.   | 0s                        |
| E007        | immediate                                | immediate  | Immediate if defect deleted           | no limit                  | The converter runs like a generator. It is a warning, without stop of the pump. | The pump veers, check the tightness of the non-return valve.  | 0s                        |
| E010        | ~5s                                      | immediate  | no restart                            | 1                         | The pump is locked.   | Dismantle the pump, clean it and replace the defective parts. It may be a mechanical failure of the motor (bearings). | 60s                       |
| E011        | 15s                                      | immediate  | 60s                                   | 6                         | Pump is no more primed or runs dry.   | Prime the pump once again by filling it (see chapter 8.3).<br>Check the tightness of the foot valve.                  | 300s                      |
| E020        | ~5s                                      | immediate  | 300s                                  | 6                         | The motor heats.  | Clean the cooling ribs of the motor.  | 300s                      |
|             |  |  |                                       |                           | Ambient temperature higher than +40°C.  | The motor is foreseen to run at an ambient temperature of +40°C.  |                           |
| E023        | immediate                                | immediate  | 60s                                   | 6                         | The motor is in short-circuit.  | Dismantle the motor-converter of the pump, check it or replace it.  | 60s                       |
| E025        | immediate                                | immediate  | no restart                            | 1                         | Missing phase of the motor.   | Check the connection between motor and converter.   | 60s                       |
| E026        | ~5s                                      | immediate  | 300s                                  | 6                         | The thermal sensor of the motor is defective or has a wrong connection.         | Dismantle the motor-converter of the pump, check it or replace it.  | 300s                      |
| E030 E031   | ~5s                                      | immediate  | 300s                                  | 6                         | The converter heats.  | Clean the cooling ribs rearside and under the converter as well as the fan cover.                                     | 300s                      |
|             |  |  |                                       |                           | Ambient temperature higher than +40°C.  | The converter is foreseen to run at an ambient temperature of +40°C.  |                           |
| E042        | ~5s                                      | immediate  | no restart                            | 1                         | The cable of the sensor (4-20mA) is cut.  | Check the correct supply and the cable connection of the sensor.  | 60s                       |
| E050        | 60s                                      | immediate  | Immediate if defect deleted           | no limit                  | BMS communications time-out.  | Check the connection.   | 300s                      |
| E070        | immediate                                | immediate  | no restart                            | 1                         | Internal communication error.   | Call the after-sales technician.  | 60s                       |
| E071        | immediate                                | immediate  | no restart                            | 1                         | EEPROM error.   | Call the after-sales technician.  | 60s                       |
| E072 E073   | immediate                                | immediate  | no restart                            | 1                         | Problem inside converter.   | Call the after-sales technician.  | 60s                       |
| E075        | immediate                                | immediate  | no restart                            | 1                         | Inrush current relay defect.  | Call the after-sales technician.  | 60s                       |
| E076        | immediate                                | immediate  | no restart                            | 1                         | Current sensor defect.  | Call the after-sales technician.  | 60s                       |
| E077        | immediate                                | immediate  | no restart                            | 1                         | 24V defect  | Call the after-sales technician.  | 60s                       |
| E099        | immediate                                | immediate  | no restart                            | 1                         | Unknown pump type.  | Call the after-sales technician.  | Power off/on              |

## 8.2 Acknowledging errors



### CAUTION! Material damage!

Only acknowledge defect when they have been remedied.

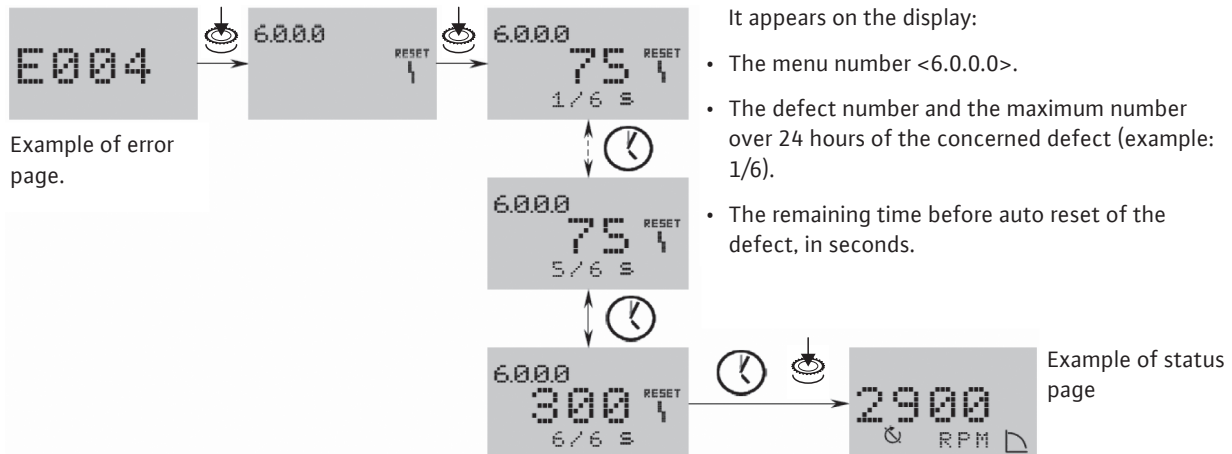
- Only skilled technicians are allowed to remedy the defect.
- If doubt, contact the manufacturer.
- In the event of an error, the error page is displayed instead of the status page.

To acknowledge, proceed as follows:

- Press the encoder.

It appears on the display:

- The menu number <6.0.0.0>.
- The defect number and the maximum number over 24 hours of the concerned defect (example: 1/6).
- The remaining time before auto reset of the defect, in seconds.



- Wait for the auto reset time.



A timer runs within the system. The remaining time (in seconds) is displayed until the error is automatically acknowledged.

- When the maximum number of the defect is reached and the last timer has elapsed, press the encoder to acknowledge.

The system returns to the status page.



NOTE: When there is a time before considering of the defect, after signalling (example: 300s), the defect must always be manually acknowledged. The auto reset timer is inactive and “- - -” is displayed.

### 8.3 Other defaults

Other defects, not detected by the converter,  
due to the pump.

| Defaults  | Possible causes  | Remedies  |
|---|--|---|
| The pump is running but no delivery                                       | The pump does not run quickly enough                               | Check the adequate adjustment of the requirement (conformity to the setpoint).  |
|   | The internal parts are obstructed by particles                     | Let dismantle the pump and clean it.  |
|   | Suction pipe is obstructed   | Clean the pipe.   |
|   | Air in suction pipe  | Check tightness of the whole pipe up to the pump and make it tight.   |
|   | Suction pressure is too low, it causes generally cavitation noise  | Too high losses of load on suction or suction head is too high (check the NPSH of the pump installed and the installation). |
| The pump is vibrating   | Pump is loosed on its foundation                                   | Check and tighten completely the nuts of the stud bolts.  |
|   | Particles obstructing the pump                                     | Have the pump dismantled and clean it.  |
|   | Difficult rotation of the pump                                     | Check the pump turns freely without abnormal sticking.  |
| No sufficient pressure for the pump                                       | The motor speed is not high enough                                 | Check if the setpoint is correctly adjusted.  |
|   | The motor is defective   | Replace it.   |
|   | Bad filling of the pump  | Open the venting device and vent until there are no more air bubbles.   |
|   | The drain-priming plug is not fully tightened                      | Check it and screw it again.  |
| The flow is irregular   | The suction head ( $H_a$ ) is not observed                         | Study again the installation conditions and the recommendations described in this instruction.                              |
|   | The suction pipe has a lower diameter than the one of the pump     | The suction pipe must have at least the same diameter as the suction pump port.   |
|   | The strainer and the suction pipe are partially obstructed         | Remove and clean.   |
|   | In « Constant pressure » mode, the pressure sensor is not adequate | Put a sensor with conforming pressure scale and accuracy, see <chapter 4.4>.  |
| In « Constant pressure » mode, the pump does not stop if the flow is zero | The non-return valve is not tight                                  | Clean it or change it.  |
|   | The non-return valve is not adequate                               | Replace it by an adequate non-return valve, see <chapter 4.4>.  |
|   | The tank has low capacity due to the installation                  | Change it or add an other one on the installation.  |



#### **WARNING!** Risk of wound!

The liquid is toxic, corrosive or dangerous for human being.

- The qualified person in charge of the repairing must be informed.
- Clean the pump to ensure complete safety of the operator.

### 9. Spare parts

Spare parts may be ordered via local approved technicians and/or the Wilo after-sales service. To avoid any questions or wrong orders, all data of the name plate should be mentioned when ordering.



#### **CAUTION!** Danger of material damage!

Perfect pump function can only be guaranteed when original spare parts are used.

- Only use original spare parts.

**Subject to technical alterations!**

**EU/EG KONFORMITÄTSERKLÄRUNG**  
**EU/EC DECLARATION OF CONFORMITY**  
**DECLARATION DE CONFORMITE UE/CE**

Als Hersteller erklären wir hiermit, dass die Pumpenbauarten der Baureihe

*We, the manufacturer, declare that the pump types of the series*

*Nous, fabricant, déclarons que les types de pompes de la série*

**MHIE**

(Die Seriennummer ist auf dem Typenschild des Produktes nach Punkten b) & c) von §1.7.4.2 und §1.7.3 des Anhanges I der Maschinenrichtlinie angegeben. / The serial number is marked on the product site plate according to points b) & c) of §1.7.4.2 and §1.7.3 of the annex I of the Machinery directive. / Le numéro de série est inscrit sur la plaque signalétique du produit en accord avec les points b) & c) du §1.7.4.2 et du §1.7.3 de l'annexe I de la Directive Machines.)

in der gelieferten Ausführung folgenden einschlägigen Bestimmungen entsprechen :

*In their delivered state comply with the following relevant directives :*

*dans leur état de livraison sont conformes aux dispositions des directives suivantes :*

— **Maschinenrichtlinie 2006/42/EG**

— **Machinery 2006/42/EC**

— **Machines 2006/42/CE**

und gemäss Anhang 1, §1.5.1, werden die Schutzziele der Niederspannungsrichtlinie 2014/35/EU ab 20 April 2016 eingehalten  
*and according to the annex 1, §1.5.1, comply with the safety objectives of the Low Voltage Directive 2014/35/EU from April 20th 2016*  
*et, suivant l'annexe 1, §1.5.1, respectent les objectifs de sécurité de la Directive Basse Tension 2014/35/UE à partir du 20/04/2016*

— **Elektromagnetische Verträglichkeit-Richtlinie 2014/30/EU ab 20 April 2016**

— **Electromagnetic compatibility 2014/30/EU from April 20th 2016**

— **Compatibilité électromagnétique 2014/30/UE à partir du 20 avril 2016**

— **Richtlinie energieverbrauchsrelevanter Produkte 2009/125/EG**

— **Energy-related products 2009/125/EC**

— **Produits liés à l'énergie 2009/125/CE**

Nach den Okodesign-Anforderungen der Verordnung 640/2009 für Ausführungen mit einem einstufigen Dreiphasen - 50Hz - Käfigläufer -  
Induktionselektromotor, der Verordnung 4/2014 "Geänderte

*This applies according to eco-design requirements of the regulation 640/2009 to the versions with an induction electric motor, squirrel cage, three-phase, single speed, running at 50Hz, amended by Regulation 4/2014 "*

*suivant les exigences d'éco-conception du règlement 640/2009 aux versions comportant un moteur électrique à induction à cage d'écureuil, triphasé, mono-vitesse, fonctionnant à 50Hz, amendé par le règlement 4/2014"*

und entsprechender nationaler Gesetzgebung,

*and with the relevant national legislation,*

*et aux législations nationales les transposant,*

sowie auch den Bestimmungen zu folgenden harmonisierten europäischen Normen :

*comply also with the following relevant harmonized European standards :*

*sont également conformes aux dispositions des normes européennes harmonisées suivantes :*

**EN 809+A1**

**EN 60034-1**  
**EN 60204-1**

**EN 61800-5-1**

**EN 61800-3+A1:2012**

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen ist:

*Person authorized to compile the technical file is :*

*Personne autorisée à constituer le dossier technique est :*

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**44263 Dortmund - Germany**

N°2117800.02 (CE-A-S n°4103172)

Original-erklärung / Original declaration / Déclaration originale

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| <p align="center"><b>(MT) - Malti</b><br/><b>DIKJARAZZJONI KE TA' KONFORMITÀ</b></p> <p>WILO SE jiddikjara li l-prodotti speċifikati f'din id-dikjarazzjoni huma konformi mad-direttivi Ewropej li jsegwu u mal-leġislazzjonijiet nazzjonali li japplikawhom:</p> <p>Makkinarju 2006/42/KE ; Kompatibbiltà Elettromanjetika 2004/108/KE ; Prodotti relatati mal-enerġija 2009/125/KE</p> <p>kif ukoll man-normi Ewropej armonizzati li jsegwu imsemmija fil-paġna preċedenti.</p>  | <p align="center"><b>(NL) - Nederlands</b><br/><b>EG-VERKLARING VAN OVEREENSTEMMING</b></p> <p>WILO SE verklaart dat de in deze verklaring vermelde producten voldoen aan de bepalingen van de volgende Europese richtlijnen evenals aan de nationale wetgevingen waarin deze bepalingen zijn overgenomen:</p> <p>Machines 2006/42/EG ; Elektromagnetische Compatibiliteit 2004/108/EG ; Energiegerelateerde producten 2009/125/EG</p> <p>De producten voldoen eveneens aan de geharmoniseerde Europese normen die op de vorige pagina worden genoemd.</p> |
| <p align="center"><b>(NO) - Norsk</b><br/><b>EU-OVERENSSTEMMELSESERKLÆING</b></p> <p>WILO SE erklærer at produktene nevnt i denne erklæringen er i samsvar med følgende europeiske direktiver og nasjonale lover:</p> <p>EG-Maskindirektiv 2006/42/EG ; EG-EMV-Elektromagnetisk kompatibilitet 2004/108/EG ; Direktiv energirelaterter produkter 2009/125/EF</p> <p>og harmoniserte europeiske standarder nevnt på forrige side.</p>   | <p align="center"><b>(PL) - Polski</b><br/><b>DEKLARACJA ZGODNOŚCI WE</b></p> <p>WILO SE oświadcza, że produkty wymienione w niniejszej deklaracji są zgodne z postanowieniami następujących dyrektyw europejskich i transponującymi je przepisami prawa krajowego:</p> <p>Maszyn 2006/42/WE ; Kompatybilności Elektromagnetycznej 2004/108/WE ; Produktów związanych z energią 2009/125/WE</p> <p>oraz z następującymi normami europejskich zharmonizowanymi podanymi na poprzedniej stronie.</p>   |
| <p align="center"><b>(PT) - Português</b><br/><b>DECLARAÇÃO CE DE CONFORMIDADE</b></p> <p>WILO SE declara que os materiais designados na presente declaração obedecem às disposições das directivas europeias e às legislações nacionais que as transcrevem :</p> <p>Máquinas 2006/42/CE ; Compatibilidade Electromagnética 2004/108/CE ; Produtos relacionados com o consumo de energia 2009/125/CE</p> <p>E obedecem também às normas europeias harmonizadas citadas na página precedente.</p>   | <p align="center"><b>(RO) - Română</b><br/><b>DECLARAȚIE DE CONFORMITATE CE</b></p> <p>WILO SE declară că produsele citate în prezenta declarație sunt conforme cu dispozițiile directivelor europene următoare și cu legislațiile naționale care le transpun :</p> <p>Mașini 2006/42/CE ; Compatibilitate Electromagnetică 2004/108/CE ; Produselor cu impact energetic 2009/125/CE</p> <p>și, de asemenea, sunt conforme cu normele europene armonizate citate în pagina precedentă.</p>   |
| <p align="center"><b>(RU) - русский язык</b><br/><b>Декларация о соответствии Европейским нормам</b></p> <p>WILO SE заявляет, что продукты, перечисленные в данной декларации о соответствии, отвечают следующим европейским директивам и национальным предписаниям:</p> <p>Директива ЕС по машинному оборудованию 2006/42/ЕС ; Директива ЕС по электромагнитной совместимости 2004/108/ЕС ; Директива о продукции, связанной с энергопотреблением 2009/125/ЕС</p> <p>и гармонизированным европейским стандартам, упомянутым на предыдущей странице.</p> | <p align="center"><b>(SK) - Slovenčina</b><br/><b>ES VYHLÁSENIE O ZHODE</b></p> <p>WILO SE čestne prehlasuje, že výrobky ktoré sú predmetom tejto deklarácie, sú v súlade s požiadavkami nasledujúcich európskych direktív a odpovedajúcich národných legislatívnych predpisov:</p> <p>Strojových zariadeniach 2006/42/ES ; Elektromagnetickú Kompatibilitu 2004/108/ES ; Energeticky významných výrobkov 2009/125/ES</p> <p>ako aj s harmonizovanými európskych normami uvedenými na predchádzajúcej strane.</p>  |
| <p align="center"><b>(SL) - Slovenščina</b><br/><b>ES-IZJAVA O SKLADNOSTI</b></p> <p>WILO SE izjavlja, da so izdelki, navedeni v tej izjavi, v skladu z določili naslednjih evropskih direktiv in z nacionalnimi zakonodajami, ki jih vsebujejo:</p> <p>Stroji 2006/42/ES ; Elektromagnetno Združljivostjo 2004/108/ES ; Izdelkov, povezanih z energijo 2009/125/ES</p> <p>pa tudi z usklajenimi evropskih standardi, navedenimi na prejšnji strani.</p>   | <p align="center"><b>(SV) - Svenska</b><br/><b>EG-FÖRSÄKRAN OM ÖVERENSSTÄMMELSE</b></p> <p>WILO SE intygat att materialet som beskrivs i följande intyg överensstämmer med bestämmelserna i följande europeiska direktiv och nationella lagstiftningar som inför dem:</p> <p>Maskiner 2006/42/EG ; Elektromagnetisk Kompatibilitet 2004/108/EG ; Energirelaterade produkter 2009/125/EG</p> <p>Det överensstämmer även med följande harmoniserade europeiska standarder som nämnts på den föregående sidan.</p>  |
| <p align="center"><b>(TR) - Türkçe</b><br/><b>CE UYGUNLUK TEYİD BELGESİ</b></p> <p>WILO SEbu belgede belirtilen ürünlerin aşağıdaki Avrupa yönetmeliklerine ve ulusal kanunlara uygun olduğunu beyan etmektedir:</p> <p>Makine Yönetmeliği 2006/42/AT ; Elektromanyetik Uyumluluk Yönetmeliği 2004/108/AT ; Eko Tasarım Yönetmeliği 2009/125/AT</p> <p>ve önceki sayfada belirtilen uyumlaştırılmış Avrupa standartlarına.</p>   |  |
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Pioneering for You

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