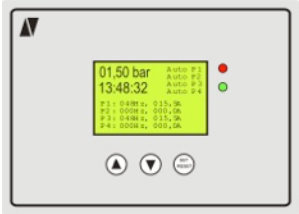
Instruction manual Pump controller :

Type: _____ S-No.: _____

System controller for pumps MAR/MARH Software Version 1.03 Stand 23.12.2014

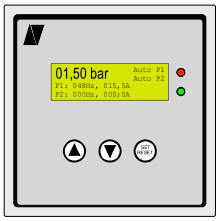
with frequency converter, contactor or soft starter

MARH



Execution:	pressure control
	pressure switch
	limits
	level control
	level switch
	temperature controller
	temperature switch
	Fire mode
	Data Logger
	Modbus 485 RTU
Option:	GSM

MAR



Execution:	pressure control
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1. Safety Precautions

Before installing and commissioning of the frequency converter controller, please read the product manual carefully and observe all warnings and safety instructions. Keep this manual is always easily accessible in the vicinity of the frequency converter controller.

Definition of Information

Warning !
Disregarding the safety severe to fatal injuries can occur or considerable material damage!

Caution!
Failure to follow these instructions severe to fatal injuries can occur or considerable material damage!

Notice!
Failure to follow these instructions may result in malfunction of the system!

Warning!
The drive controller contains dangerous voltages and controls potentially dangerous rotating mechanical parts. The installation, commissioning and maintenance of this equipment should be performed only by qualified personnel who are familiar with the operation. The installation, commissioning and maintenance of this equipment should be performed only by qualified personnel who are familiar with the operation.
Do you have particular caution if the automatic restart is activated. To avoid injury by possibly unintentional restart of the drive controller after a power failure, turn off the automatic restart in case of doubt. When repairing or servicing this equipment, make sure that the system can not be switched on by others again! **The frequency controller have DC link capacitors, which carry hazardous voltage even after the mains supply is switched off. Therefore, always wait after switching off the mains voltage for at least 5 minutes before working on the machine or turn on the unit again.** It is important to ensure that no live parts are touched when power is applied or the intermediate circuit capacitors are charged.
Do not work on the wiring and check any signals when power is applied.
The Inverter - Regulator has a leakage current.
Ground the frequency controller on the connections provided.

The customer-supplied GFCI should be in the Inverter - Regulator **universal current sensitive / selective RCD (FI) - Circuit breaker type: B, B + be with rated current 300mA.**

Caution! An RCD (FI) - switch can not work sometimes in certain plants (eg long cable).

t is recommended that the frequency converter - controllers separately fused.

Make sure that the input voltage of the registered on the nameplate voltage.

Caution!
All frequency controllers are tested for dielectric strength and insulation resistance. Before the insulation measurement in the pump station, for example within the scope of the inspection frequency controller must be disconnected!

It is strongly recommended that all electrical equipment conforms to the National Electrical Codes and local regulations.

Factors such as high temperatures, high humidity as well as dust, dirt and corrosive gases. The installation should be a well-ventilated, not exposed to direct sunlight place.
Put them no mains voltage to the transducer terminals or to the control terminals. Enter the operating signals Hand/0/Auto via the selector switch on or about the driving of external contacts and not by switching on and off of a line or motor contactor.
It is strongly recommended that all electrical equipment conforms to the National Electrical Codes and local regulations. Only qualified personnel should perform installation, alignment and maintenance. The manufacturer reserves the right to alter the technical data in order to make improvements or update information.
As these provisions are handled differently, the user must observe the respectively valid for Him requirements. The manufacturer can not release you from the obligation to comply with the latest safety standards the user..

Notice!
The technical data and descriptions in this guide are correct to the best knowledge and belief. Technical improvements have been continuously carried out - that's why the manufacturer reserves the right, without prior notice to carry out such changes.
The manufacturer can not be held liable for errors in the manual.
Warranty is within Germany and within the
incorporated statutory warranty period and applies only to the product itself and not for any consequential loss or damage or costs associated with the occurrence of a Warranty claim arise at other plants or plant parts. The operator
shall, in each case to ensure that a failure or defect in the product can not lead to further damage.

2. General / Mode of Operation

2.1 MAR.... Pressure Control System

Congratulations on purchasing this high-quality pump control. This product complies with the latest technology and is continually developed and improved. The device was subjected to the production of an extensive examination and therefore functions properly. To read to ensure optimal function and observe these operating instructions.
This frequency inverter controller operates as an automatic pressure regulator, tested.
The speed of the pump (s) will be adjusted continuously. The actual pressure in the system is determined by pressure transducer (sensor). A PI controller regulates the pressure by analogy.
The pressure regulator is programmable and can be adapted to the respective operating conditions. The parameters are displayed on the display in plain text. Commissioning is menu driven. During commissioning, some data must be entered to ensure the smooth operation of the pumping plant. An adjustment of specific parameters (expert mode) requires special knowledge of pump technology. This should be done by a competent person or the manufacturer.
.

2.2 Benefits of speed control:

- almost constant pressure
- Continuous adjustment of pump power to the changing operating conditions
- Energy saving
- no large pressure vessel longer required
- low mechanical wear of pumps and maintenance free

2.3 Principles of speed control

To operate a speed control can be accurately and effectively, the following points to consider::

- the pump (s) must be construed in accordance with the plant / Requirement
- the pump (s) shall have power reserves available (80. .90%) = system reserve capacity at rating
- Submersible Pumps in the frequency or operating range between 30. .99 (200) Hz should be restricted (hydrodynamic bearing)
- with submersible pumps must be based on an output reduction of about 5. .10%

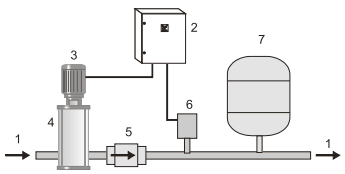
2.4 Construction of a pressure control system

Non-return valve preventer is imperative and must be in the pressure behind the Pump will be installed! The expansion tank is to be fitted if required.

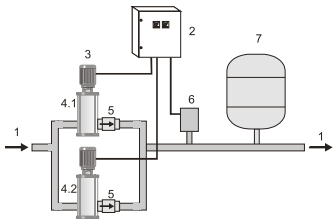
Caution!

1 Flow direction	5 Non-return valve
2 Controller	6 Pressure Transducer
3 Motor	7 Pressure vessel
4 Pump	

Example 1 pump System



Example 2 pumps System



2.5 Note for the operation of the system with Pressure vessel!

If the plant is operated with a pressure vessel, the vessel must be pre-pressed in normally state.
The pre-squeezing pressure should be checked regularly. The amount of pre-squeezing pressure is: Start pressure bar minus 0.50.

e.g.:	Nominal System Pressure:	4.00 bar
	Vessel Air Pressure:	3.50 bar

2.6 Booster Sets

Notice!

Booster units are ready plumbed and wired pump installations. For them, the installation cost is minimal - connect to the existing network of pipes, mains and commissioning. The regulator is factory set at these facilities.
This manual refers only to the electrical control of the system is therefore possibly the pump consult the manual (s) note the / partition. See manufacturers data sheet.

3. Installation and Mounting

Caution!

Environmental conditions such as high temperatures, high humidity should be avoided as well as dust, dirt and corrosive gases. The installation should be a well-ventilated and not exposed to direct sunlight location.

Warning!

Because of convection, the frequency control during installation of at least
Be installed 15 cm from side walls or other facilities.

Warning!

The allowable temperature range of +5 ° C to +30 ° C must not be under-or exceeded
Do not install the Inverter controller near heat-radiating bodies

3.1 Mounting the MAR.... Controller

Metal box: In the rear contains holes for wall mounting of the cabinet.
The sole assembly recommended hung stud to the electrical cabinet.
Mounting Dimensions: See manufacturers data sheet MAR- ... .
Compact box: In the rear there are 4 holes with d = 7 mm for wall mounting the switch box.
Mounting Dimensions: See manufacturers data sheet MAR- ... .

4. Wiring and Connections

Warning!

Make sure that the input voltage corresponds to the nameplate voltage registered.

Warning!

Be sure to supply voltage and terminal assignment instructions!
The installation, commissioning and maintenance of the actuators may be of
an expert who is familiar with the pump system will be implemented.

Caution!

Shielded cables use! Screen to the grounding clamps in the cabinet and connected to the pump! For submersible pumps combine the screen with a ground potential in the vicinity of the pump.
Do they no mains power to the sensor - or control terminals.

Warning!

No manipulation of the sensor signal to make!
No other users connect to the 24V supply!
The used pressure sensor (0. .10 V) or (4. .20 mA),
is connected to the respective terminals!
The respective pin assignment, refer to the respective diagram.

Notice!

In systems with several pumps are used again and 0. .10 V sensors.
Here you can optionally one or more sensors are connected.
The respective pin assignment, refer to the respective diagram**.**

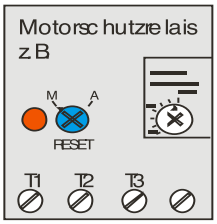
Caution!

If the motor cable longer than 150 meters, it is advisable to install an motor reactor..
Verify the correct connection of the network, sensor, and control lines.

4.1 Motor Protection

The MA .... Frequency control has a monitoring function for the motor current.
This motor current is set via the EDR-1 display.A special version of PTC thermistor to monitor the temperature can be used.This monitoring is set via the EDR-1 display.
The fixed pumps can have with overload relays or motor circuit breakers, a soft starter or contactor.
This motor current must be set on each engine protection. See the manufacturer's instructions.

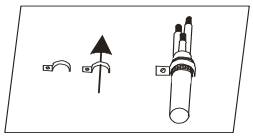
Motor protection (such as Siemens)



3RW40 soft starter (such as Siemens)

4.2 Connection of inputs / outputs

In the lower portion of the cabinet MAR ... is the terminal strip.



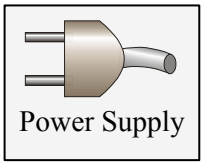
The line to the pump, the sensor cable and wires for the external contacts must be provided with shielded cable and are connected to the adjacent principle with the grounding clamps. Expose The shielding and fasten by means of the grounding clamp on rail. Only with proper installation of the screen trouble-free operation is guaranteed!

4.3 Terminals

Connection to the mains, Fault relay, signal relay (option) External inputs (option) External outputs (option), sensor (s), pump (s), they look at the diagram or schematic or the terminal screen of the respective controller.

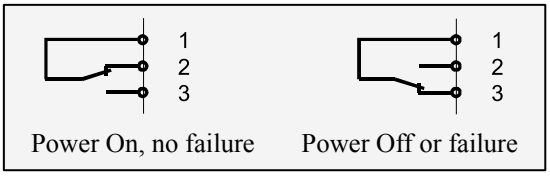
4.4 Power Supply

Clamp	Function	Description
L1		L1 Phase
L2	**look**	L2 Phase
L3	**Type plate**	L3 Phase
N		N Neutral
PE	**Power Supply**	PE Ground
or:		
PE	**Power Supply**	PE Ground
L1	**look**	L1 Phase
N	**Type plate**	N Leiter
PE	**Power Supply**	PE Ground


Power Supply

4.5 Port for the fault signal relay per inverter

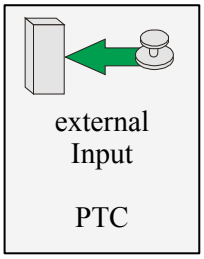
Function	Description	
Alarm relay	Alarm contact	1
changer	Alarm contact	2
230V 1 A limit	Alarm contact	3



Power On, no failure Power Off or failure

4.6 Port for the external inputs

Function	Description	
external „Start“	Ext. 1	4
external „ Fix speed“ / „Reset“	Ext. 2	5
external „low water“	Ext. 3	6 (only MARH)
external „set point 2“	Ext. 4	7 (only MARH)
PTC +	Pump 1-x	08/18/28/38 (only MARH)
PTC -	Pump 1-x	79/79/79/79 (only MARH)

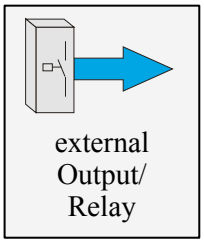

external Input

PTC

4.7 Port for the external outputs / relays

Function	Description	
External Out 1 active fan 230V/1A	Ext. 1	98/N
Fixed function as an active fan relay with power> 5.4 kW		
External Out as 2,3,4 P.F. parameterised	Ext. 2,	90/91
parameterised, P.F. 230V 1 A maximum	Ext. 3,4	92/93/94/95 (only MARH)

The external input and outputs can be parameterised. Function, see "Messages" menu.

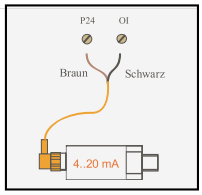

external Output/ Relay

Caution!

Use shielded cable and connect it to the grounding clamps in the cabinet! The maximum length of the signal lines must not exceed 20 meters.

4.8 Port for the transducer

	Function		Description	
1x Transducer signal	OI	4-20mA	Transducer	86
1x Reference voltage	L	VDC -	Transducer	87
1x Transducer signal	OI	4-20mA	Transducer	88 (only MARH)
1x Reference voltage	L	VDC -	Transducer	89 (only MARH)

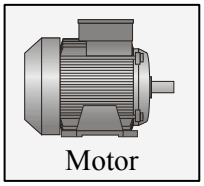


Caution!

Use shielded cable and connect it to the grounding clamps in the cabinet!
Terminal assignment note (see transducer plate)!

4.9 Port for the motor / pump

Clamp	Function	Description
U	**3 phase motor**	U
V	**look**	V
W	**wiring diagram**	W


Motor

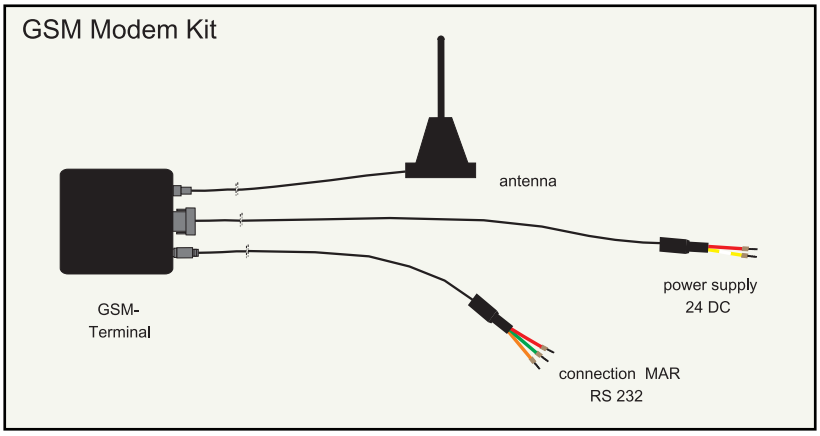
Caution!

The motor must be connected according to the output voltage: star or triangle.
The nameplate on the motor note!
Check the correct connection of power, sensor, and control lines.
Check once again before switching on the mains voltage, all connections are correct!

When disturbances to the notes under 9.2 Troubleshooting note!

4.11 Port from GSM Modem

Connect the controller to the GSM modem (terminal) with the appropriate cable. Connect the antenna and power cord. Eat a good alignment of the antenna for proper cellular data connection. Set the power is always active together safely with the MAR-controller.



4.14 SIM card

You need a registered SIM card. Put the SIM card into the modem. Turn on the modem / plant one.
If you activate the "GSM / User" menu GSM, they can set the phone book and the GSM - Modem use.

Notice!

There are currently 3 users allowed as phonebook entry.
User 3 has permission for the remote adjustment.. A remote adjustment of the set points is possible.A separate operating instructions for Card reader is supplied with the GSM modem.
At any time you a SIM card from the manufacturer can be preset.
If you have questions or special solutions, please contact to the manufacturer.

Caution!

When setting the SIM card, ensure that you disable the PIN code!
In case of wrong input of data, the SIM card is not detected correctly!
The power supply from the GSM modem must always be active together with the EDR-1!
Pay attention to proper cellular data connection!

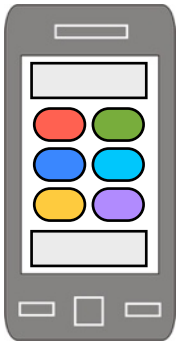
Set only with the MAR menu the SIM card!

SMS commands: see 10.3
Complete SMS commands: see operating manual MAR ..- GSM2.

A smartphone app for Android from: 4.xx

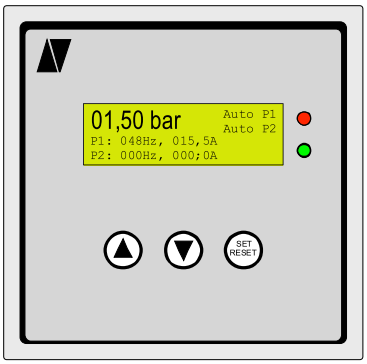
stands for simple SMS service available.

Check with the manufacturer.



5. panel Description MAR

Control panel with two-line **LCD display** for parameters and operating data:



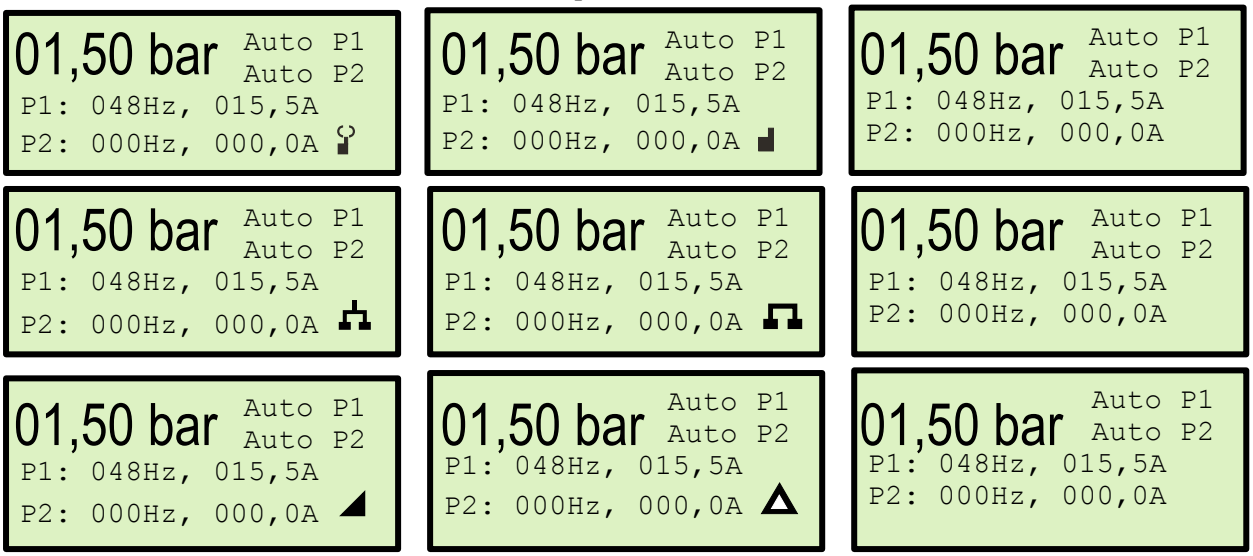
The **arrow keys**
Select the functions (scrolling)
Enter / change data.

The **SET / RESET - keys**
Storing input data,
Error acknowledgment

The red LED lights when the disorder.
The green LED lights when active control.

Output displays:

Active main screen for "external" / "internal" setpoint status



GSM is active: a mobile network connection.
GSM is inactive: There are no cellular network connection.
In addition, the alarm lamp will light and the display we "no network" message.

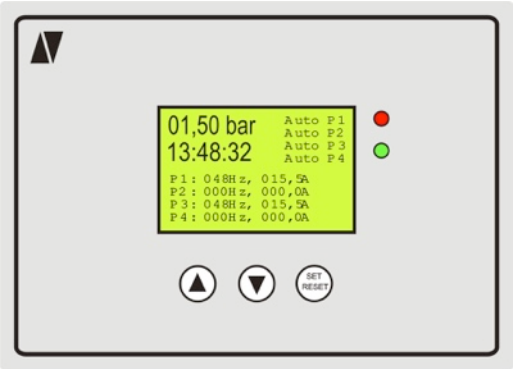
Modbus is active: Currently data can be queried.
Modbus is inactive: No data is retrieved.

Analog set-point: The set-point values are given by the analog input.

Test mode is active: All monitoring functions are disabled!

5.1 panel Description MARH

Control panel with four -line **LCD display** for parameters and operating data:



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Error acknowledgment

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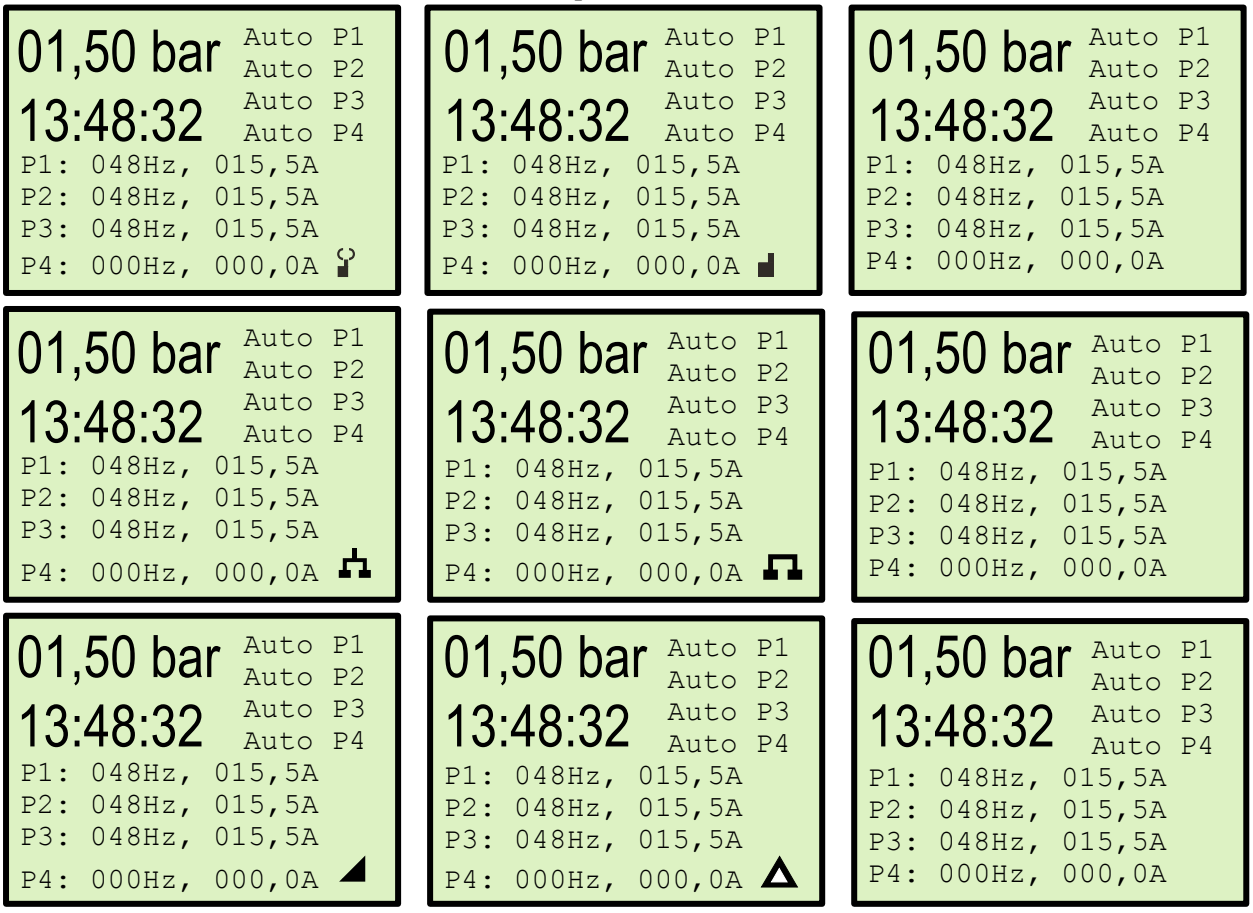

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Modbus is inactive: No data is retrieved.

Analog set-point: The set-point values are given by the analog input.

Test mode is active: All monitoring functions are disabled!

6. Programming instructions / operation / startup messages

6.1 General operation of the displays

If operated from the output side of the ▼ arrow key so you can access the desired values
Here the nominal values of the system are set.
If the ▼ arrow key is pressed again, we come to the operating parameters.
Here, the operating parameters of the system are set.

If operated from the output side of the ▲ arrow key so you can access the various operational indicators.
Pressing the ▲ arrow key the next operation screen appears.

The pump control is made by turning the switch Hand/0/Auto- in operation.
If the system is via an external command, the external contact must also be started to be closed.

Notice!

The pump control MA .... can optimally be adapted to all possible operating conditions by adjusting various functions and operating parameters in individual cases. The system is programmed at the time of delivery to keep the cost of commissioning as low as possible. To enter the necessary data, a menu item can be called at any operating parameters. The menu items can be called as described below. Each parameter has a setting in which selected either an option or a range of values can be set.

6.2 Requirements for the commissioning of the MA .... Controller

Before the control is put into operation, the following requirements must be met:
Plant / pump suction and pressure side is connected to the pipe! Piping and pumps are vented!
Electrical connection is made and checked!

6.3 First turn on the MA .... Controller

Caution!
When the safely start is chosen, it comes after turning on the power or after a power failure, automatic restart of the pump!
Switch on the power! After turning on the main switch / the mains voltage, the stored operating data in the drive controller (Modbus) are compared.

The following message appears on the display:

```
Molitor
Antriebstechnik GmbH
EDR2-MARH S-Nr.xxxxx
Version: 1.xx[x-xxx]
```

The MA-controller searches the GSM query image
according to a GSM modem and tries to establish a connection.

The wait time is about 30 seconds.

```
   -- GSM-INIT --

  wait !
```

Message if no modem is connected!

```
   -- GSM-INIT --

No modem
connected !
```

f there is no modem connected,
changes the EDS 2 to this main:

```
01,50 bar    Hand P1
             Aus  P2
13:48:32     Aus  P3
             Aus  P4
P1: 000Hz, 000,0A
```

The wait time is about 30 seconds.

```
   -- GSM-INIT --

  wait !
```

Message when an error has occurred!

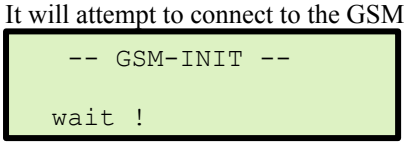
```
   -- GSM-INIT --

Error
SIM / phone book !
```

If an error occurred during the modem,
change the EDS-2 to this main:

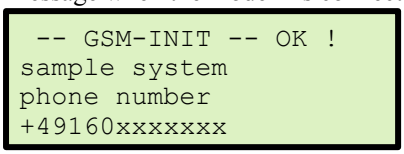
```
01,50 bar    Error
             modem !
13:48:32
P1: 000Hz, 000,0A
```

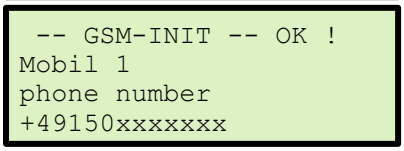
6.4 Correct connection from the modem with / without network coverage

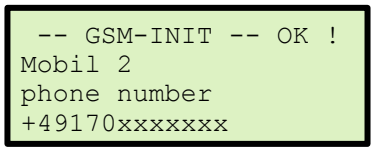
The MA-regulator starts up after the splash screen! with the GSM query image:
It will attempt to connect to the GSM module. The wait time is about 30 seconds.

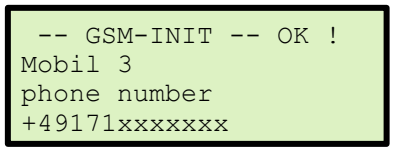


Message when the modem is connected correctly! The modem sends the status.

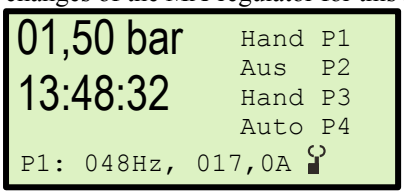




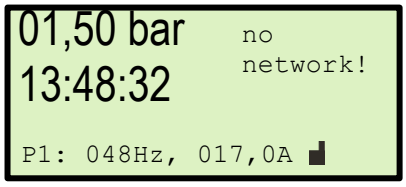




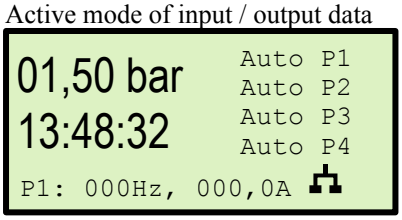
If a modem connected to network coverage,
changes of the MA-regulator for this main:



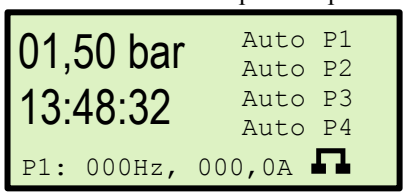
If the modem is connected without network,
changes of the MA-regulator for this main



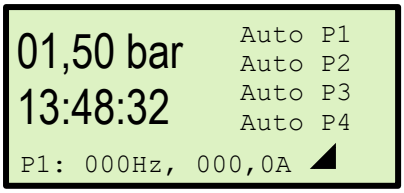
If the communication is set to Modbus this is indicated by the appropriate symbol.
Active mode of input / output data



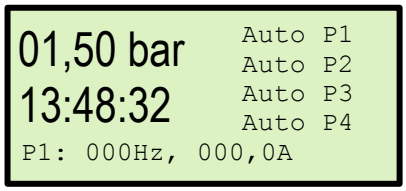
Mode with inactive input / output data



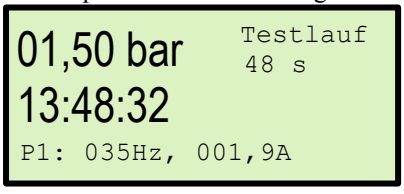
If the communication is set to analog, this is indicated by the appropriate symbol.
After the initialisation is complete, the power indicator will appear:
Active Power indicator while "Poti" set-point



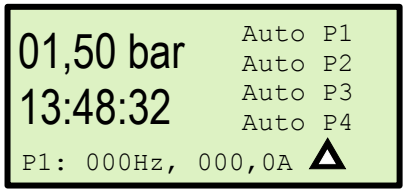
Active Power indicator while "internal" set-point



Active power indicator during active test run



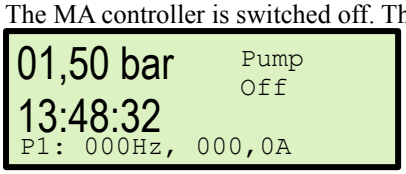
Active Power indicator while active fire mode

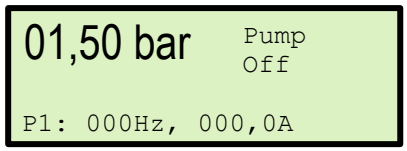


7. Display / operational messages

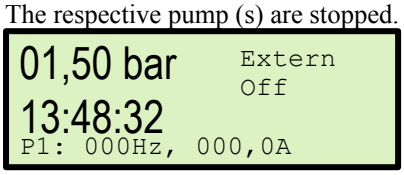
7.1 Information displays

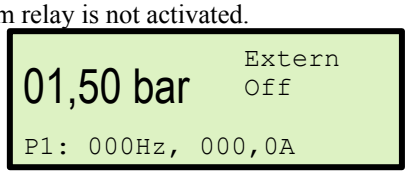
Pumps off
The MA controller is switched off. The message "Pump Off".



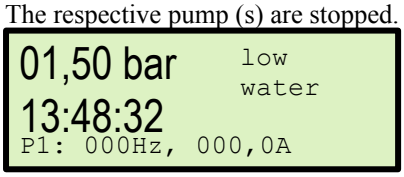


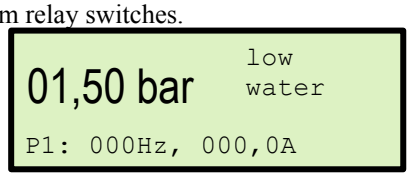
External off
The MA controller is connected via an external input. If the connection is open, the message "External Off" appears. The respective pump (s) are stopped. The red LED lights. The alarm relay is not activated.



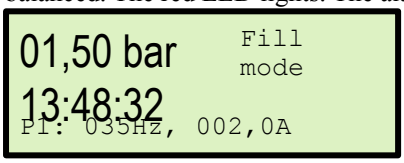


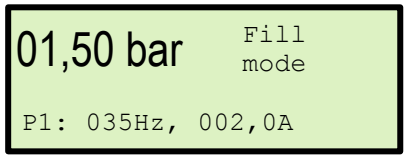
External low water
The MA controller is connected via an external input. If the connection is open, the message "low water" will appear. The respective pump (s) are stopped. The red LED lights. The alarm relay switches.



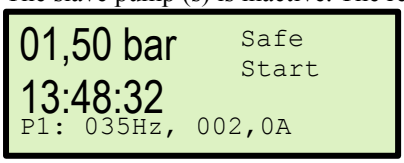


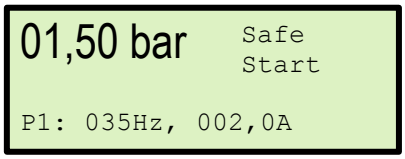
Fill in active
If the "under-pressure" to be active, the MA-regulator is operated in fill mode until the pressure for the first time is balanced. The red LED lights. The alarm relay is not activated.



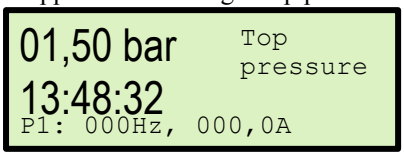


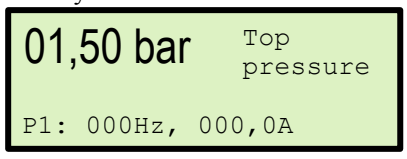
Safe Start is active
If the function "Safe Start" to be selected, the MAR controller is operated in fill mode. The master pump is active. The slave pump (s) is inactive. The red LED lights. The alarm relay is not activated.



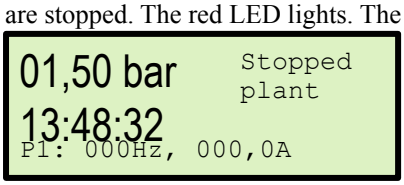


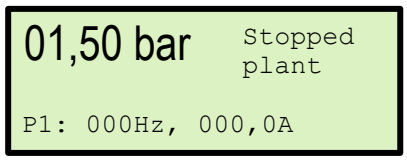
Top pressure
The current pressure is above the set upper pressure. The MA controller controls off to prevent a further rise in pressure. It appears the message "top pressure". The red LED lights. The alarm relay is not activated..





Stopped plant
The MA-controller is connected via an external emergency stop. It appears the message "Stopped plant". The pump (s) are stopped. The red LED lights. The alarm relay switches. "Restart" via GSM or reset - function.





8. Operating Indicators / Main Menu / Setup

8.1 Select MARH operating indicators

Caution!

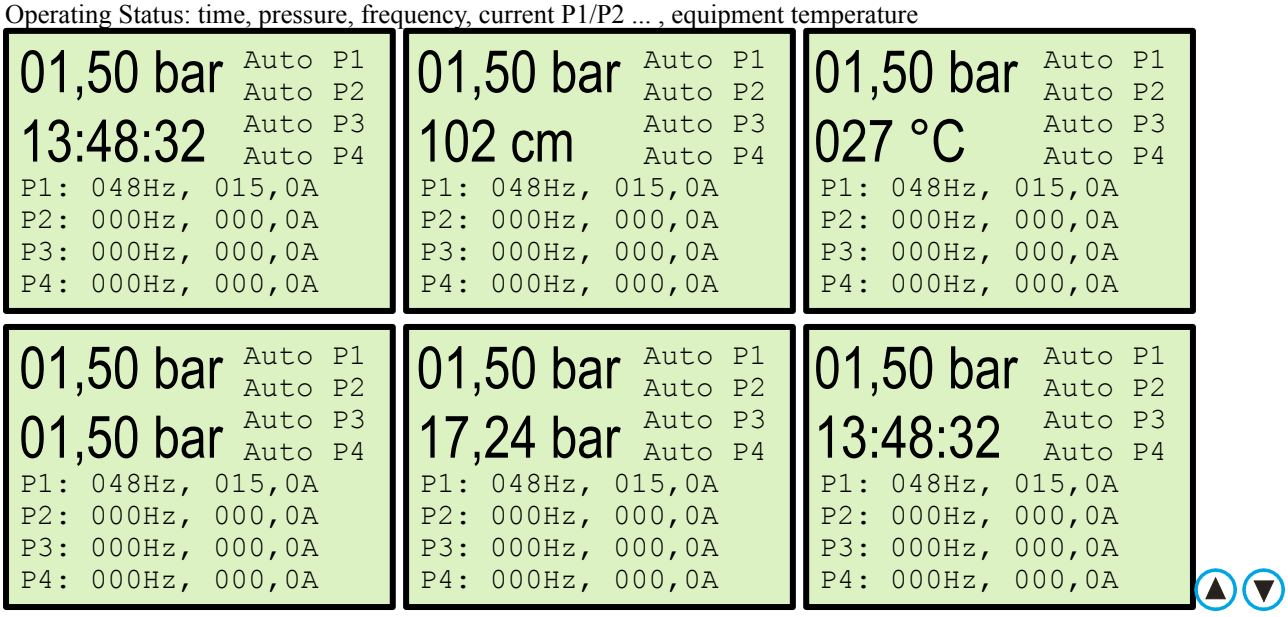
With the ▲ arrow key, the next screen is displayed.
Pressing the same arrow key the next screen is displayed.
Use the ▼ arrow key, the previous screen is displayed.
If the display is "hours of operation" is displayed and the ▲ arrow key is pressed, so you get to the error memory.

Notice!

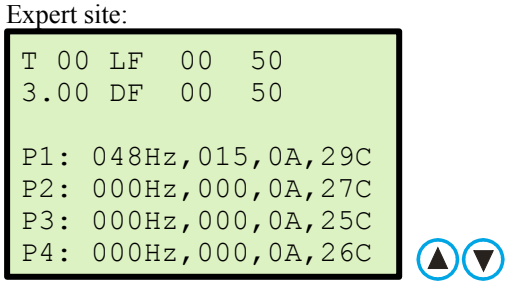
From the fault memory of the **SET / RESET** button must be pressed to return to the initial display.

MARH active messages

Operating Status: time, pressure, frequency, current P1/P2 ... , equipment temperature

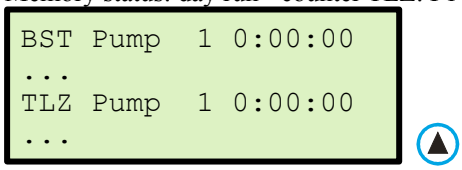


Expert site:

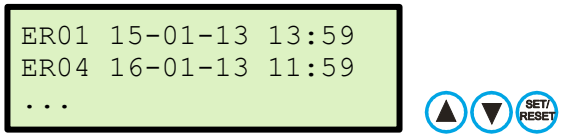


memory messages

Memory status: Hour meter BST: P1-P4
Memory status: day run - counter TLZ: P1-P4



Error memory: 1 - x with date stamp P1 - P4 last 1-16 error
For each error, the pressure and the pump status is stored on a separate page.
Switch for 2 seconds press the SET button.



Between the displays operation can be changed with the arrow keys ▲ and ▼.

8.2 Select MAR operating indicators

Caution!

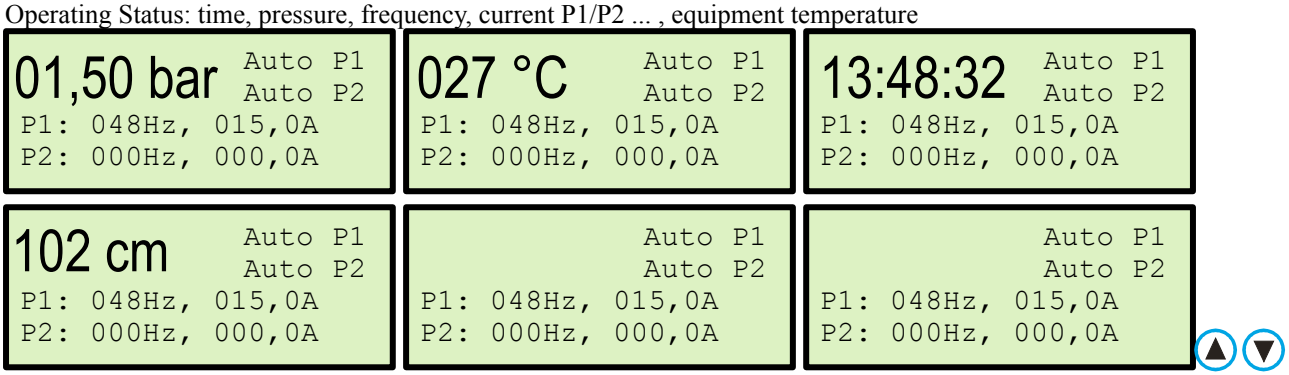
With the ▲ arrow key, the next screen is displayed.
Pressing the same arrow key the next screen is displayed.
Use the ▼ arrow key, the previous screen is displayed.
If the display is "hours of operation" is displayed and the ▲ arrow key is pressed, so you get to the error memory.

Notice!

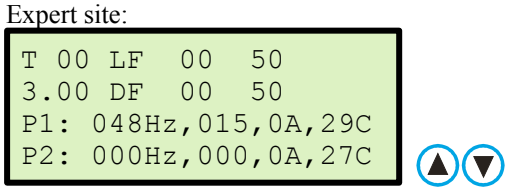
From the fault memory of the **SET / RESET** button must be pressed to return to the initial display.

MAR active messages

Operating Status: time, pressure, frequency, current P1/P2 ... , equipment temperature

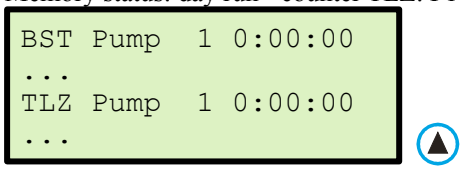


Expert site:

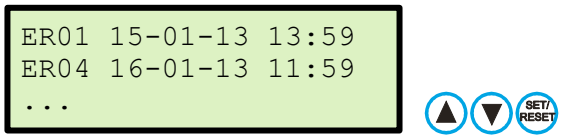


memory messages

Memory status: Hour meter BST: P1-P4
Memory status: day run - counter TLZ: P1-P4



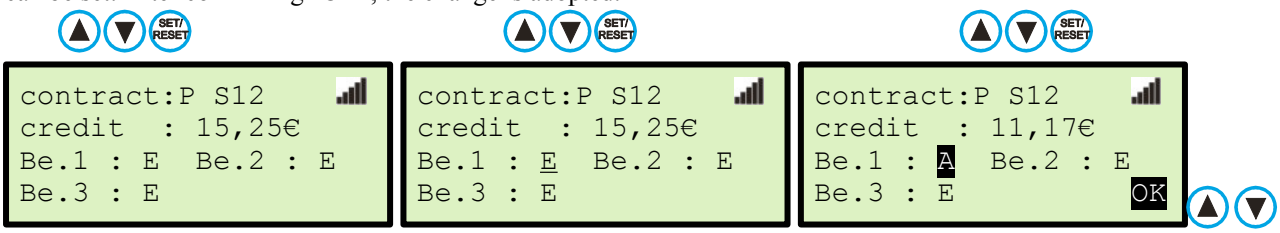
Error memory: 1 - x with date stamp P1 - P4 last 1-16 error
For each error, the pressure and the pump status is stored on a separate page.
Switch for 2 seconds press the SET button.



Between the displays operation can be changed with the arrow keys ▲ and ▼.

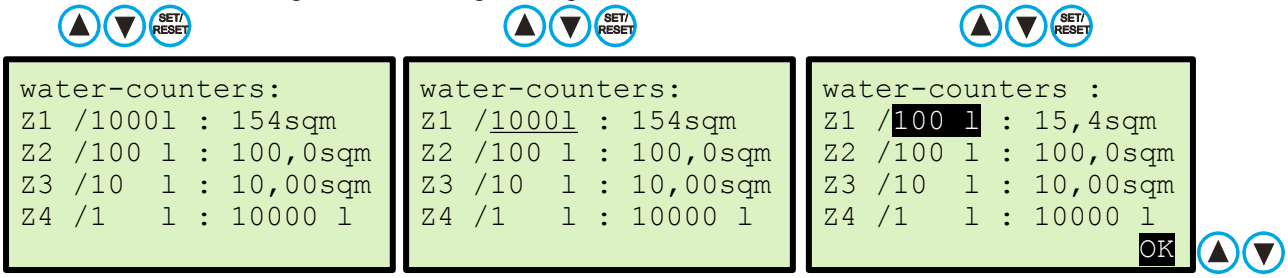
Option page GSM:

GSM modem:
You can use the "Communication" menu, activate a GSM modem
and set in the phonebook, the system and the user and provide input or output.
On this page you can change the Contract, see the signal strength (0-30), to interrogate their accounts and each user (Be.x) "A" or turn "off". When the credit card contract is always at € 99.99.
If the cursor is flashing, the value using the **arrow ▲ button, arrow ▼ button** and the **SET / RESET button** can be set. After confirming "OK", the change is adopted.



Option Page Counter:

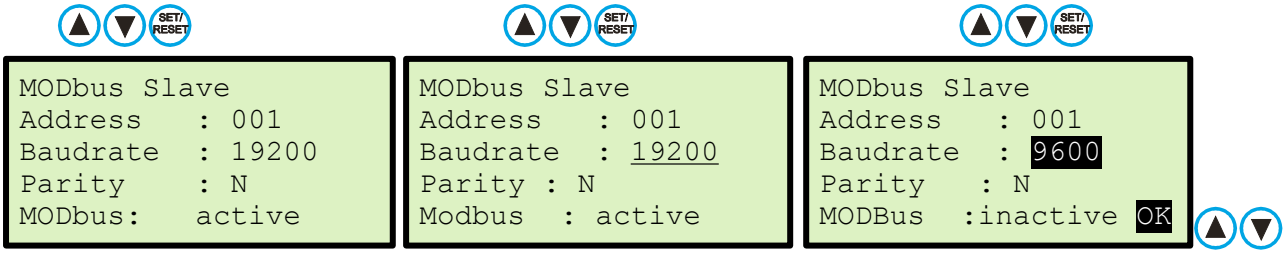
Set Counter:
You can configure via the menu "Messages" inputs as counter
To put the meter on, press **SET / RESET button** for 5 seconds when displaying water meter.
If the cursor is flashing, the value using the **arrow ▲ button, arrow ▼ button** and the **SET / RESET button** can be set. After confirming "OK", the change is adopted.



Reset the counter:
To reset the counters to **00000** , the following procedure:
Go to the page "water meter" and hold the **SET / RESET button** for about 10sec. pressed!

Option MODbus page (only MARH):

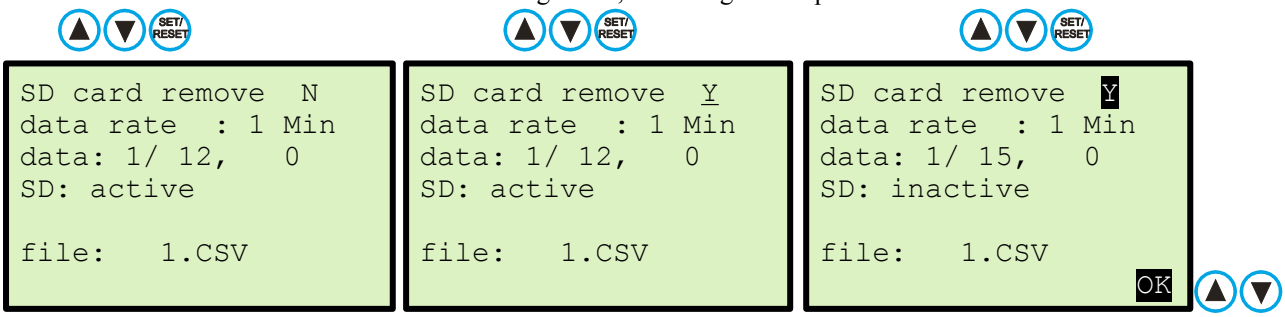
MODbus set:
You can activate the MODbus slave via the "Communication" menu.
For the data list, use the manual: "EDR MODbus".
MODbus Address: 1-250, Parity: N, U, G, Baud Rate: 9600, 19200, 38400.
To set the MODbus data rate, press **SET / RESET button** for 5 seconds when viewing Modbus.
If the cursor is flashing, the value using the **arrow ▲ button, arrow ▼ button** and the **SET / RESET button** can be set. After confirming "OK", the change is adopted.



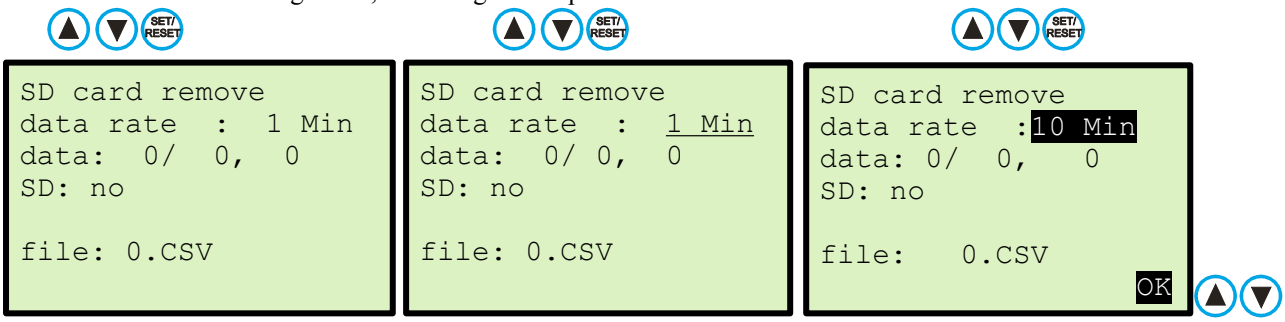
Between the displays operation can be changed with the arrow keys ▲ and ▼.

Option Page SD card (only MARH):

Remove SD card:
You can take notes information on the onset of an SD card.
To remove the SD card, press **SET / RESET button** for 5 seconds when displaying SD card.
If the cursor is flashing, remove the SD card with the **arrow ▲ button, arrow ▼ button** and the **SET / RESET button** can be set. After confirming "OK", the change is adopted.



SD card set:
To set the data rate of the SD card, press **SET / RESET button** for 5 seconds at the display SD card and navigate with **arrow ▼ button** to the second line.
If the cursor is flashing, the value using the **arrow ▲ button, arrow ▼ button** and the **SET / RESET button** can be set. After confirming "OK", the change is adopted.



SD card notifications:

Data Rate:	1 Min	:1 min / 10 min / 1 hr / 10 sec
Specifications:	1/15, 0 (display example) 1 / = Current file is written to the 15 = Number of written data in the current file , 0 = number of erroneous data	
SD:	Err map (Display example)	
Message:	SD: no	: no SD card inserted
Message:	SD: active	: data is written
Message:	SD: active + full	: data is overwritten
Message:	SD: Inactive	: data is not written
Message:	SD: Err Card Type	: SD Card is defective
Message:	SD: format	: no DS card inserted
File: 1.CSV	file name and file format for analysis in Numbers (MAC) or Excel (Microsoft)	

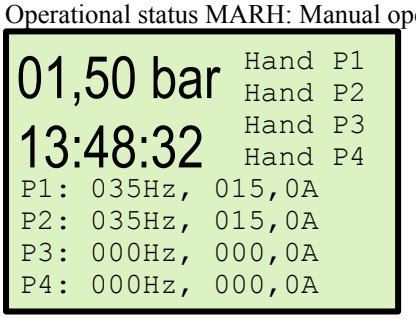
Caution!

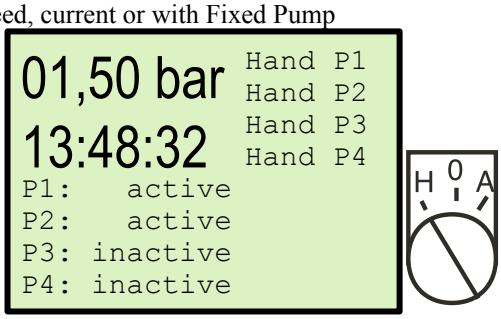
Caution: When setting the SD card, make sure the card is formatted. Empty SD card can not be read. The SD card must be described with matching empty files.
If necessary, if you opt for empty files to the manufacturer.

Between the displays operation can be changed with the arrow keys ▲ and ▼.

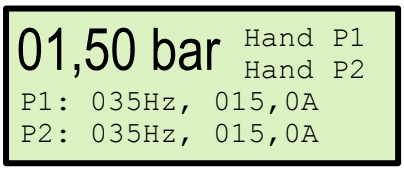
8.2 Select the manual mode

Operational status MARH: Manual operation with FU, pressure, speed, current or with Fixed Pump





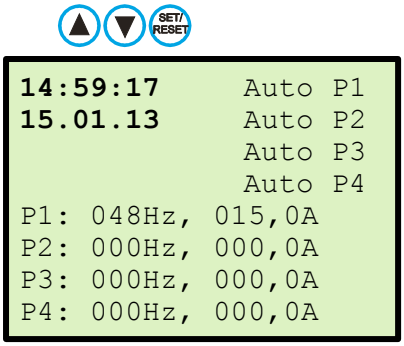
Operational status MAR: Manual operation with FU, pressure, speed, current or with Fixed Pump

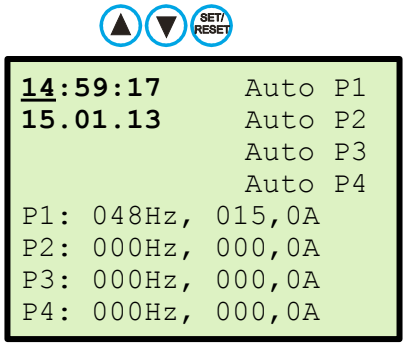


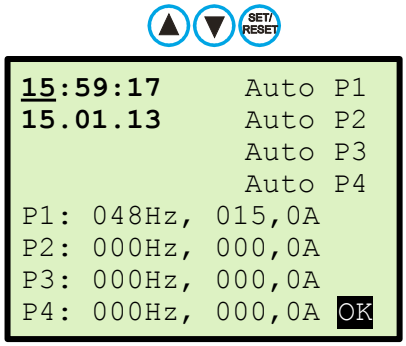
8.3 Time / Date

MARH Set time:

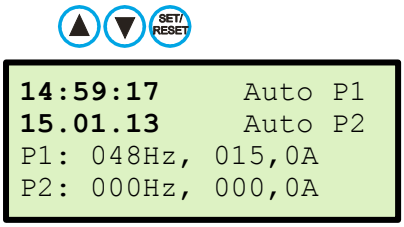
Press **SET / RESET button** for 5 seconds at the operating display time / date.
If the cursor is flashing, the time and date using the
Arrow ▲ button, arrow ▼ button and the **SET / RESET button** can be set.
After confirming "OK", the change is adopted.

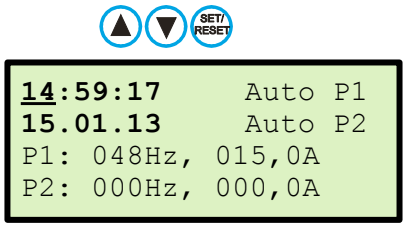


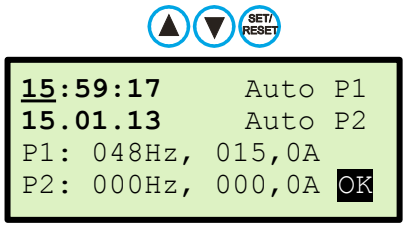




MAR Set time:





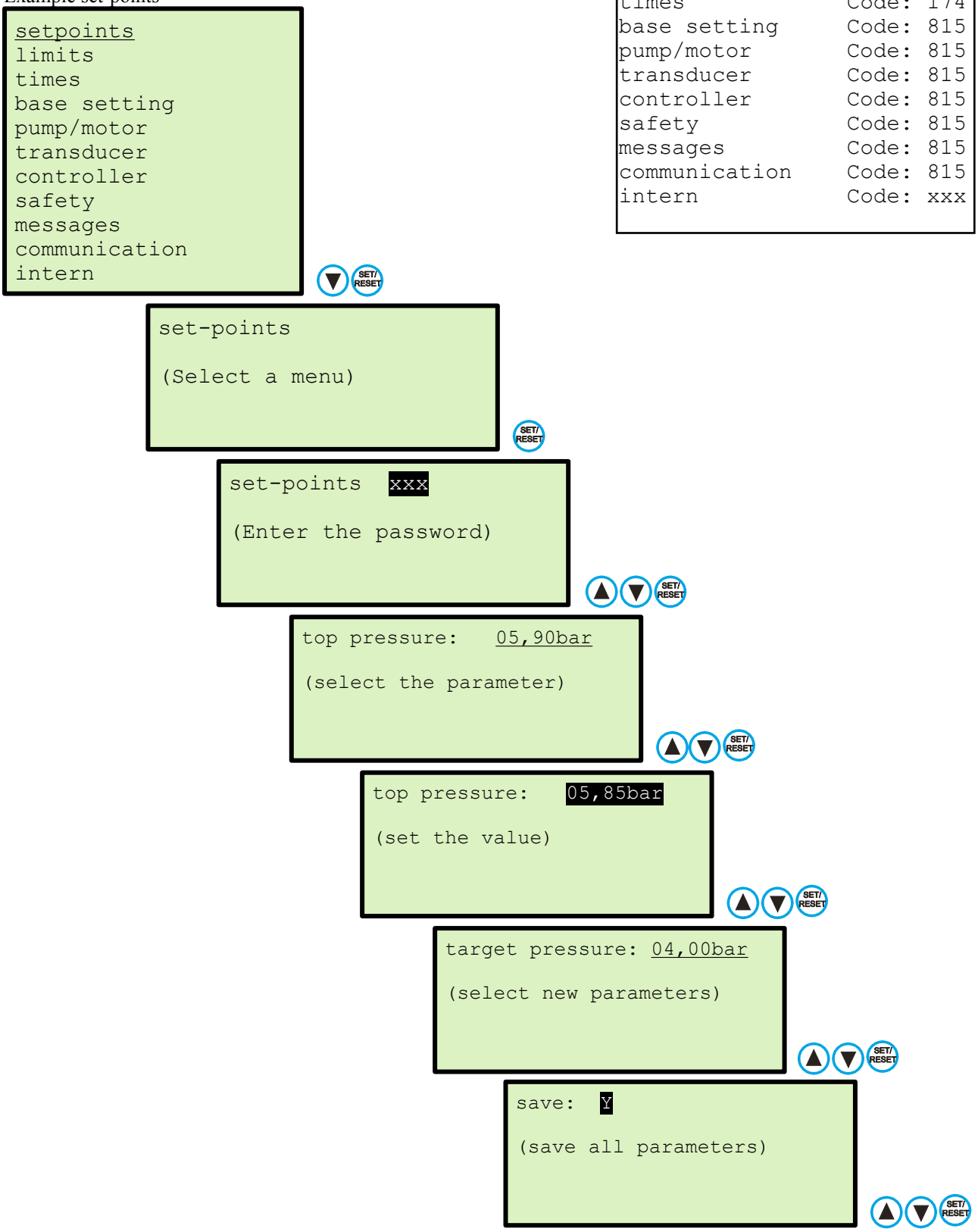


Between the displays operation can be changed with the arrow keys ▲ and ▼.

8.4 Using the Menu

setpoints	Code: 174
limits	Code: 174
times	Code: 174
base setting	Code: 815
pump/motor	Code: 815
transducer	Code: 815
controller	Code: 815
safety	Code: 815
messages	Code: 815
communication	Code: 815
intern	Code: xxx

Example set-points



The menus are the same for all.
When storing the values is queried on demand,
if the values for pump 1, pump 2, pump 3 or 4 pump or pumps for all to be saved.

8.5.1 Adjust set-points

Caution!

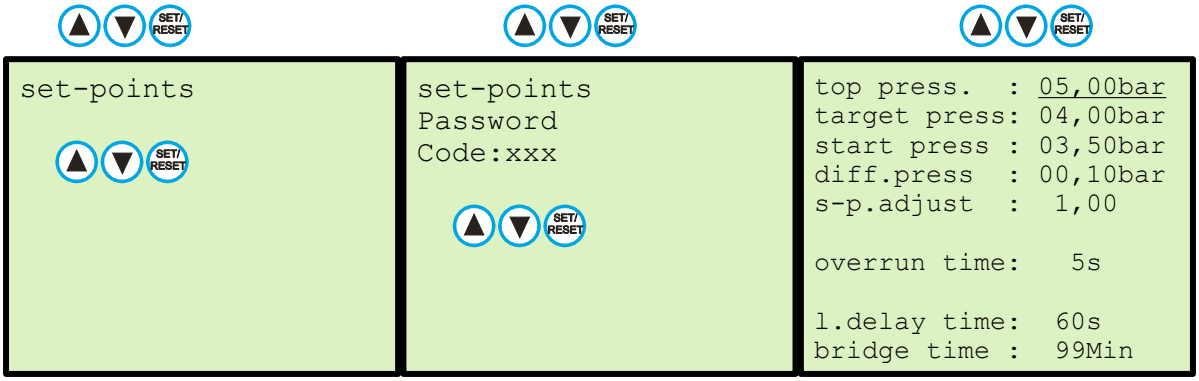
The set-points are set for the plant. The code (___), see page 17.

The set-points menu is in limits "GW" inactive!

Notice!

The set-points are inactive with external set-point!

Note: By pressing the SET/RESET - button for 5 seconds, the menu can be interrupted.



Explanation of parameters:

Enter the top pressure value at which the system will be governed immediately.
top pressure :05,00bar - 0,01bar - 99,99bar (1-4)

Enter the target pressure value at which the system is to operate.
target pressure :04,00bar - 0,01bar - 99,99bar (1-4)

Enter the start pressure value at which the system will start again after the "Standby"
start pressure :03,50bar - 0,01bar - 99,99bar (1-4)

Enter the differential pressure at which the next pump will be switched on.
differential pressure :00,10bar - 0,01bar - 99,99bar

Enter the set-point adjustment, in which the target pressure should be adjusted to the pipe.
Small 1 = target pressure drop; Larger 1 = target pressure increase.
set point adjustment :1,0 - 0,2 - 2,0 / 1,0=Aus

Enter the delay time until the pump to stop.
overrun time :5s - 0s - 999s

If the limit function is active, the MA must - regulator after every shutdown to "Standby"
by the zero flow cut-off, reboot with the external command.
With this function, they prevent the irrigation a "run dead" of the pump after the end of irrigation.
Monitoring for broken pipe or water shortage is active after the bridge time.

Enter the limit delay time until the plant is to go to "standby".
limit delay time :60s - 9s - 199s

Enter the bridging time until the pressure monitoring is active.
bridging time :1 - 1Min - 99Min

Set-points for pressure switch operation (Fix pump operation):

Enter the Stop pressure value at which the system will stop..
stop pressure :04,00bar - 0,01bar - 99,99bar (1-4)

Enter the start pressure value at which the system will start again after the "Standby"
start pressure :03,50bar - 0,01bar - 99,99bar (1-4)

8.5.2 limit setting

The limits are set for the plant. The code (___), see page xx.

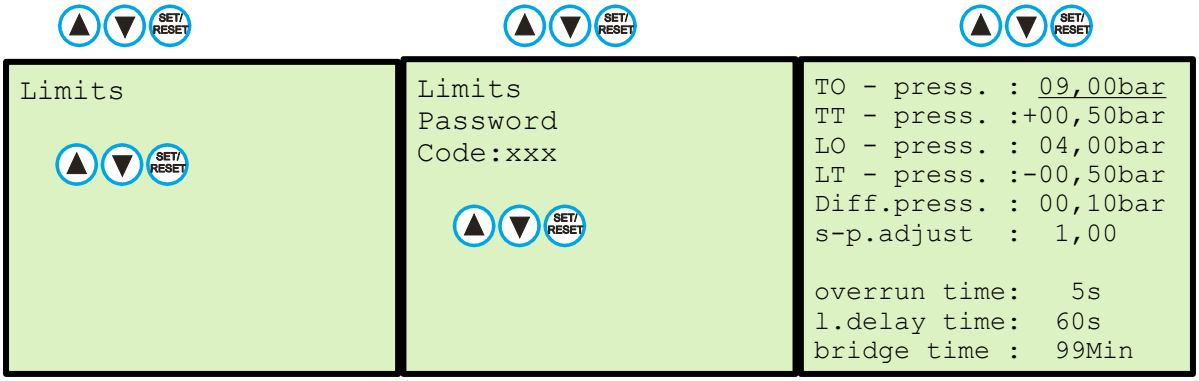
Caution!

The Limits menu is only in limits "GW" active!

Notice!

These limits are inactive with external setpoint!

Note: By pressing the SET/RESET - button for 5 seconds, the menu can be interrupted.



Explanation of parameters:

Enter the low OFF pressure at which the system will turn off.
low off pressure :04,00bar - 0,01bar - 99,99bar (1-4)

Enter the low test pressure at which the system will turn off when the pressure drops.
low test pressure (-) :00,50bar - 0,01bar - 09,99bar (1-4)

Enter the top OFF pressure at which the system will turn off.
top off pressure :09,00bar - 0,01bar - 99,99bar (1-4)

Enter the top test pressure at which the system will turn off when the pressure rises.
top test pressure (+) :00,50bar - 0,01bar - 09,99bar (1-4)

Enter the differential pressure at which the next pump will be switched on.
differential pressure :00,10bar - 0,01bar - 99,99bar

Enter the set-point adjustment, in which the target pressure should be adjusted to the pipe.
Small 1 = target pressure drop; Larger 1 = target pressure increase.
set point adjustment :1,0 - 0,2 - 2,0 / 1,0=Aus

If the Limits menu is active, the MA must - regulator after every shutdown
by the "limits" to reboot with the external command.
With this function, they prevent the irrigation a "fizzle" of the pump after the end of irrigation.

Monitoring for broken pipe or gas shortage is active after the bridging time.

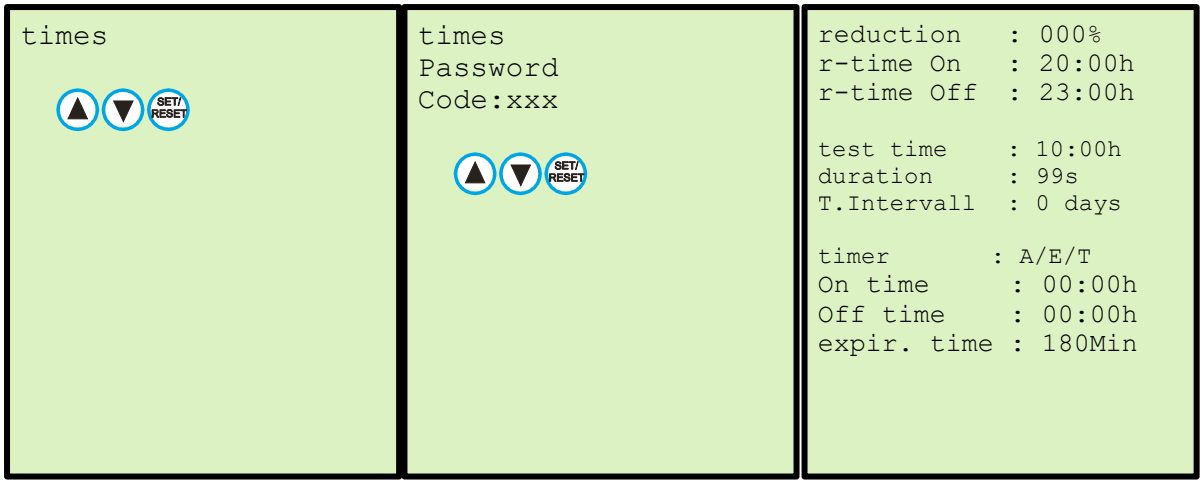
The pressure limit for the water shortage are 50% of the upper limit pressure.

Enter the delay time until the pump to stop.
overrun time :5s - 0s - 999s

Enter the limit delay time until the plant is to go to "standby".
limit delay time :60s - 9s - 199s

Enter the bridging time until the pressure monitoring is active.
bridging time :1 - 1Min - 99Min

8.5.3 MAR adjust times



Explanation of parameters:

Enter the percentage of the set pressure for the pressure drop, at which the system is to operate.
This feature gives you the ability to reduce the energy consumption of the pump.

pressure reduction :0 - 0 - 100 % / 0=off

Reduction time on :xx:xx h - 00:00 - 23:59 h
Reduction time off :xx:xx h - 00:00 - 23:59 h

Select the test run for the pump. This feature gives you the ability to run the pump once every 24 hours with manual frequency.
This function can prevent seizing of the pump.

test time :10:00h - 00:00 - 23:59 h
duration :20s - 0 - 999s with manual frequency
T.Intervall :0 days - 0 - 30 days (0 days = Off)

Enter the mode for the timer, at which the system is to operate.

Timer - A/E/T :0 - 0 - 100 % / 0=off

A	**=**	**off**	**System operates without timer**
E	**=**	**on**	**System operates with timer**
T	**=**	**on exp.**	**System operates with expiration time (egg timer)**

Enter the values for the timer. This feature gives you the ability to control the pump by time. The timer is active every day.

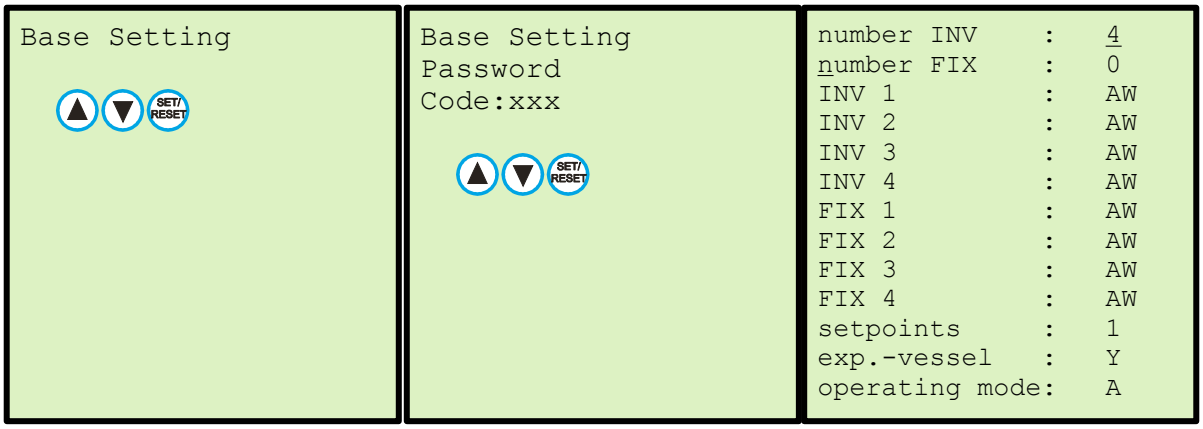
On time :xx:xx h - 00 - 23 h
Off time :xx:xx h - 00 - 23 h

Enter the values for the countdown timer (egg timer). This feature gives you the ability to control the pump by time. The countdown timer is always active with the start command.

Enter the values for the expiry timer (egg timer). This feature gives you the ability to control the pump after time. The countdown timer is always active with the start command. **With an additional button "Timer Set", which is activated via a digital input "TIS", the set time let's count up.** Example: base time T = 10min. Briefly press the key: new time: 20min; Button press: new time now 30min. A longer press and hold the button, the timer value is reset to the base setting eg 10min. reset. The set time is active only once. Thereafter, the base is always active time. The time base can be set "times" in the menu.

expiration time :10 Min - 001 - 999 Min

8.6 Base Setting



Explanation of parameters:

Enter the number of the frequency converter (FU) and the number of direct (contactor / soft starter) (FIX) pumps. In the parameter in the parameter FIX FU and they determine the function of the pump. When multi-operation **every 300 minutes (adjustable) are changed**, the pump between master and slave.

Enter the Number of frequency inverter (IV) pumps.
Number INV :4 - 1 - 2 (4)

Enter the number of direct (contactor / soft starter) (FIX) pumps.
Number FIX :0 - 0 - 2

Enter the function of each frequency inverter pump.
INV x :AW - AW - PW - AF - PF

Enter the function of the respective direct (contactor / soft starter) pump.
FIX x :AW - AW - PW - AF - PF

Meaning of abbreviations:

A 1-4 =	**Active Pump in System**	**(always active as needed)**
P 1-4 =	**Passive Pump in System**	**(active only on fault of another pump)**
W 1-4 =	**Changing the pump in System**	**(after running, hours of operation., fault)**
F 1-2 =	**Fix position in System**	**(always at the same position)**
B 0-1 =	**Booster Pump in System**	**(last pump in the system switches on)**
J 0-1 =	**Jockey Pump in System**	**(first pump in the system turns off)**

Enter the number of the set-points, at which the system is to operate.
Number of set-points :1/2 - 2-MAR-Input 1.1 - S1

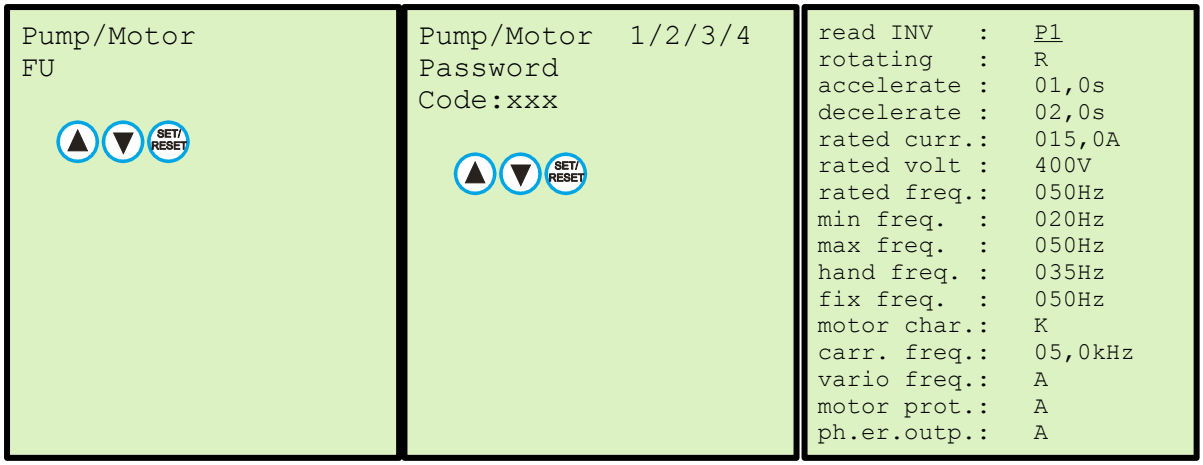
Select whether the system works with or without expansion vessel.
Expansion vessel. :Y - no / yes

Turn the limit function by the irrigation systems as required.
If the limit function is active, the system turns off and has to be restarted with the external command.

Select the operating mode of the system.
operating mode :DR - (DR) pressure control

DR	**pressure**	**A transducer is active for pressure regulator**
DF	**Pressure + firefighting**	**special function**
DG	**Pressure + limit**	**with restart inhibit is active**
GW	**Limit control**	**with restart inhibit is active**
ME	**Volume**	**A MID is for volume control**
DU	**flow**	**A transducer is active for flow control**
TH	**heating**	**A transducer is active for temperature control**
TK	**cooling**	**A transducer is active for temperature control**
NF	**level filling**	**A transducer is active for level control**
NL	**level empty**	**A transducer is active for level control**

8.7 Set electric pump / electric motor



Explanation of parameters:

Select whether you want to read the data from the respective frequency inverter.
read INV :P1 - P1 / P2 / P3 / P4

Enter the rotation direction of the pump (s). AC phase angle does not matter!
rotating direction :R / L - Right / Left

Enter the Acceleration time of the pump (s). Recommendation: 1-3 seconds.
acceleration time :03,0s - 0,01s - 99,9s / only manual operation

Enter the deceleration time of the pump (s). Recommendation: 2-10 seconds.
deceleration time :05,0s - 0,01s - 99,9s / only manual operation

Enter the motor rated current of the pump (s). Data: See nameplate.
rated current :xxx,0A - 0,01A - 199,9A

Enter the motor voltage to the pump (s). The setting they found on the nameplate of the motor.
rated voltage :400V - 200V - 480V

Enter the rated frequency of the pump (s). Data: See nameplate.
With this function, the nominal frequency of the pump is set.
rated frequency :50Hz - 1Hz - 200Hz

Enter the minimum frequency of the pump (s). This feature gives you the option of the minimum frequency of the pump for operation entered. This way of setting the pump power can be limited.
min frequency :25Hz - 1Hz - 200Hz

Enter the maximum frequency of the pump. This feature gives you the option to enter the maximum frequency of the pump for operation. This way of setting the pump power can be limited.
max frequency :50Hz - 1Hz - 200Hz

Enter the hand frequency in Hz, a hand, in which the respective engine in manual mode is to move up and down..
hand frequency :35Hz - 1Hz - 200Hz

Enter the fixed frequency for the respective pump with the limit switch is to operate. This rate can be expressed by SMS - command (option) for the current operation to change. If a SMS - start command sent without a value, the system works with the fixed frequency.
fix frequency :50Hz - 1Hz - 200Hz

Select the motor characteristic (Constant / quadratic / specific) of the pump. With this function, the power consumption of the pump can be changed. Recommendation: Square for centrifugal pumps; constant for submersible pumps; specifically at frequency inverter problems.
motor characteristic :K - Constant / quadratic / specific

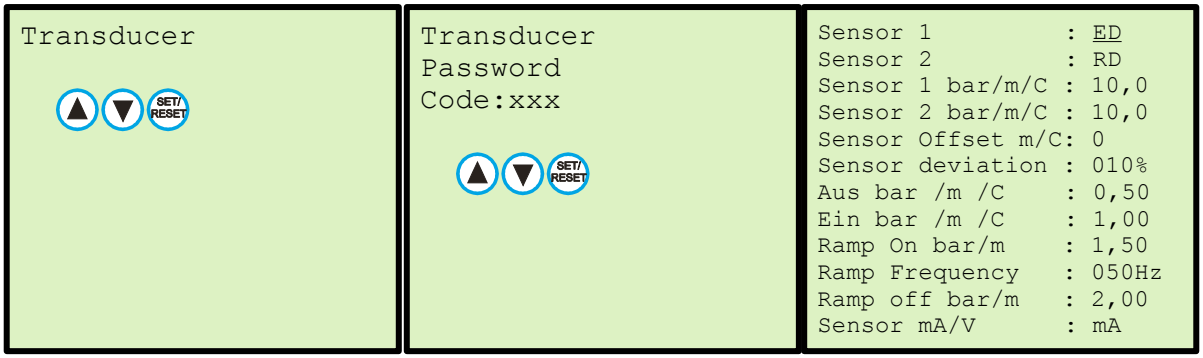
Enter the carrier frequency of the pump (s). Low carrier frequencies result in higher engine noise. This function is used to tune the carrier frequency to use with different cable lengths between pump and drive.
carrier frequency :5000Hz - 2000Hz - 9999Hz

Select the Vario - carrier frequency of the pressure control. The Vario - carrier frequency cause changes in engine noise to the soundscape for people to improve.
vario - carrier frequency :A - off / on

Select the motor protection function.
motor protection :A / K - off / PTC / (PT100)

Select the phase failure detection output of the pressure control. The phase loss detection protects the motor cable against interruption.
phase error output :A - Aus / Ein

8.8 Adjustment of transducer



explanation of parameters:

Enter the transducer type one for pressure control.
sensor 1 :A - A - ED - VD - VN - RD - RN - ET - TW - MD* - S
Enter the transducer type one for pressure control.
sensor 2 (only MARH):A - A - ED - VD - VN - RD - RN - ET - TW - MD* - S

A =	**off**	**transducer has no function Attention!System will not function!**
E =	**on**	**transducer acting as a master sensor**
D =	**pressure**	**transducer works with 4-20mA and bar scale**
N =	**level**	**transducer works with 4-20mA and cm scale**
M =	**mass sensor**	**transducer operates with a flow (sqm / h)**
T =	**temperature**	**transducer operates with temperature (C°)**
S =	**remote setpoint**	**transducer works with 4-20mA for a Remote set-point (%)**
DD =	**Difference**	**transducer 2-1 operates with the differential (only MARH)**
VD =	**inlet pressure**	**transducer 2 operates as a pressure monitoring (only MARH)**
VN =	**inlet level**	**transducer 2 operates as a level monitoring (only MARH)**
RD =	**redundant**	**transducer operates on comparison press.(Redundant)(only MARH)**
RN =	**redundant**	**transducer operates on comparison level (Redundant)(only MARH)**
TW =	**temperature**	**transducer 2 operates as temperature monitors (only MARH)**

Enter the operating range for the transducer. Data: See type plate sensor.
sensor value 1 bar /m :10,0 - 0,00 - 99,99

Enter the operating range for the transducer. Data: See type plate sensor.
sensor value 2 bar /m :10,0 - 0,00 - 99,99

Enter the offset value for the display. At level is the ground level, at temperature of negative temperature value, enter. This feature gives them the opportunity to display the actual water level and the actual temperature.
Sensor Offset :0 - 0 - 100 (°C / m)**(only sensor 2!)(only MARH)**

If necessary, select the dry run protection, in which the system will shut down when running dry.
If the pressure / level below or operated the digital input is switched off due to a "dry run". If "Always" is selected,
the dry run is also active in manual mode. No automatic restart after the dry run!

Enter the transducer deviation in% for redundant operation, or when the plant is shut down to "Sensor error".
This feature gives them the opportunity to compare two sensors.
sensor deviation :10% - 0% - 100%

Enter the switch-off of the form / level monitoring, with which the system will turn off.
off switch bar /m :1,00 - 0,00 - 99,99

Enter the switch-on of the form / level monitoring, with which the system will turn on.
on switch bar /m :1,50 - 0,00 - 99,99

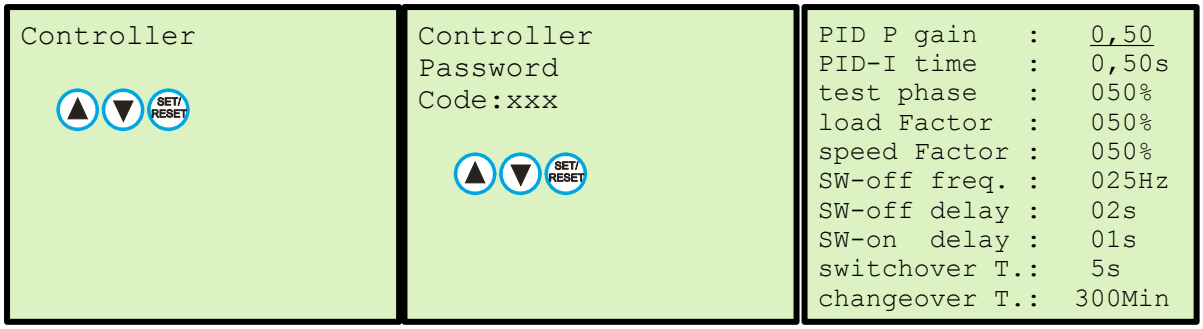
Enter the ramp value of the form / level monitoring, with which the system will operate at a lower frequency.
ramp on bar /m :1,80 - 0,00 - 99,99

Enter the frequency of the ramp form / level monitoring, with which the system will operate.
ramp frequency :50Hz - 030Hz - 200Hz

Enter the frequency of the ramp form / level monitoring, with which the system will operate.
ramp off bar /m :1,0 - 0,00 - 99,99

Select the signal input for the transducer. Data: See type plate sensor. This feature lets you choose
the option signal between 0-10V and 4-20mA. (See special connection diagram)
sensor input :mA - mA / V / mA=MAR / V=FU MOD-Address 101

8.9 adjust controller



Explanation of parameters:

Enter the PID P gain of pressure control.
Ensures the rapid adjustment of the pump to the desired value.
PID P gain :0,50 - 0,01 - 9,99

Enter the integration time of the PID controller.
Ensures the rapid adjustment of the pump to the desired value.
PID-I time :0,50s - 0,1s - 9,99s

Enter the Testing phase for the null sets a shutdown. Recommendation: 20%. See also "zero flow cutoff"
testing phase :20% - 1% - 99% = 0,1- 0,99bar absolute

Enter the load factor for the null sets shutdown. Recommendation: 50%. See also "zero flow cutoff"
load factor :50 - 1% - 99% from Inverter

Enter the speed factor for the null sets shutdown. Recommendation: 50%. See also "zero flow cutoff"
speed factor :50 - 1% - 99% from Inverter

Enter the cutoff frequency for the zero quantities shutdown.
switch-off frequency :35Hz - 1Hz - 200Hz

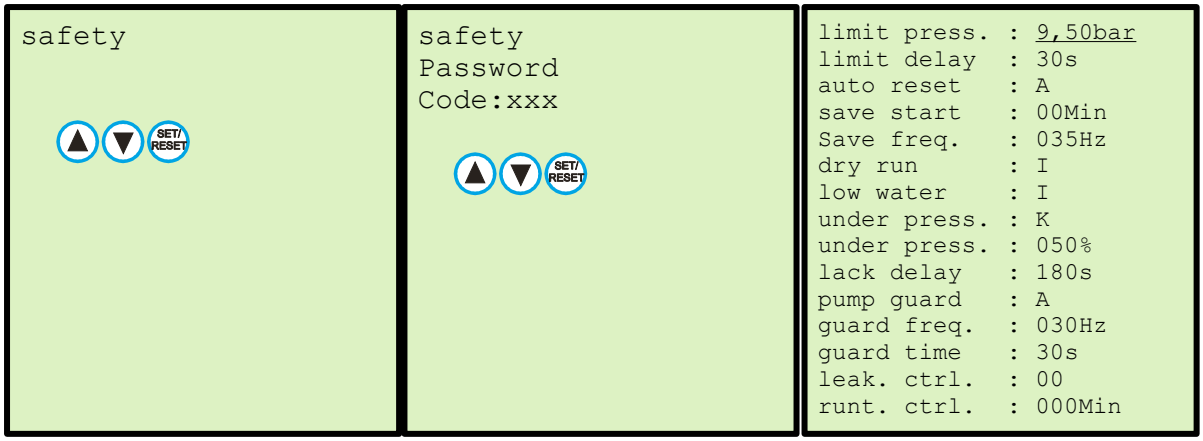
Enter the time delay for the zero quantities shutdown.
switch-off delay :5s - 1s - 99s

Enter the time delay for the zero quantities shutdown.
switch-on delay :8s - 1s - 99s

Enter the changeover time for the gentle pump change a
switchover time :5s - 1s - 19s

Enter the operating time until the pump change.
pump changeover time :300Min - 1Min - 999Min

8.10 Setting the safety



Explanation of parameters:

Enter the limit pressure value for the MA-regulator and the delay time at which the plant is off.
The limit pressure monitoring is always active.

limit pressure :99,99bar - 0,01bar - 99,99bar
limit delay :30s - 1s - 99s

Select the reset function for the MA-regulator.
This feature gives you the option at fault automatically to let **3 times in 20 minutes**, start up again.
Note: The system restarts automatically!

Auto Reset :A - Aus(off) / Ein(on) / 3x in 20 Min

If necessary, select the security start for the MA-regulator. If the Safe Start is selected, the pipe is after turning on the power or after a power failure, slowly and gently to fill. The Safe Start mode, only one pump operates at fixed speed for the time set. The next pump (s) is (are) stopped.
This function should be set by an expert, or after consultation with the manufacturer.

Safe Start :0 - 0 - 99 Min 0 Min = off
Safe frequency :35 - 0 -200Hz

If necessary, select the dry run protection, in which the system will shut down when running dry.
If the pressure / level below or the corresponding digital input is operated, shut down due to "dry run".
If "Always" is selected, the dry run is also active in manual mode. No automatic restart after dry run!

dry run :I - Aus / Ein / always

If necessary, select the low water protection, in which the system will shut down if the water shortage.
If the pressure / level below or the corresponding digital input is operated, shut down due to "low water". If "Always" is selected, the water shortage is also active in manual mode. Automatic restart after water shortage.

low water :I - Aus / Ein / always

Enter the% value of the pressure monitoring, in which the system will shut down if the pressure deficiency. The% value refers to the set pressure value. Example: 50% of 4.0 bar. The under-pressure is from <2.0 bar active and switches to 3 minutes delay the pump. If "0%" is set, the under-pressure monitoring is disabled.
In addition, the electronic protection against dry running, in which the system will shut down if the dry run, are elected to do so.
If the pressure of at least 0.5 bar is not reached after 30 seconds, it will shut down due to "dry run".
The dry run is also active in manual mode. No automatic restart after a under-pressure / dry run.

Under-pressure :E - Aus (off) / Ein (On) / always / Complete
Under-pressure :50% - 0% - 100% 0% = off
lack delay :180s - 1s - 999s delay

A = off **Under-pressure has no function**
E = on **Under-pressure is active in automatic**
I = always **Under-pressure is active in automatic and manual**
K = Complete **Under-pressure is in automatic and manual active plus Electronic dry run (<0.5 bar in 30s)**

The submersible pump guard ensures the safe shutdown of the pump at low speed. The function is important to protect submersible motors. Turn the U-pump guard with a submersible pump operation.

submersible pump guard :A - Aus (off)/ Ein (On)
Guard frequency :25Hz - 25Hz - 200Hz
Guard time :99s - 9s - 99s

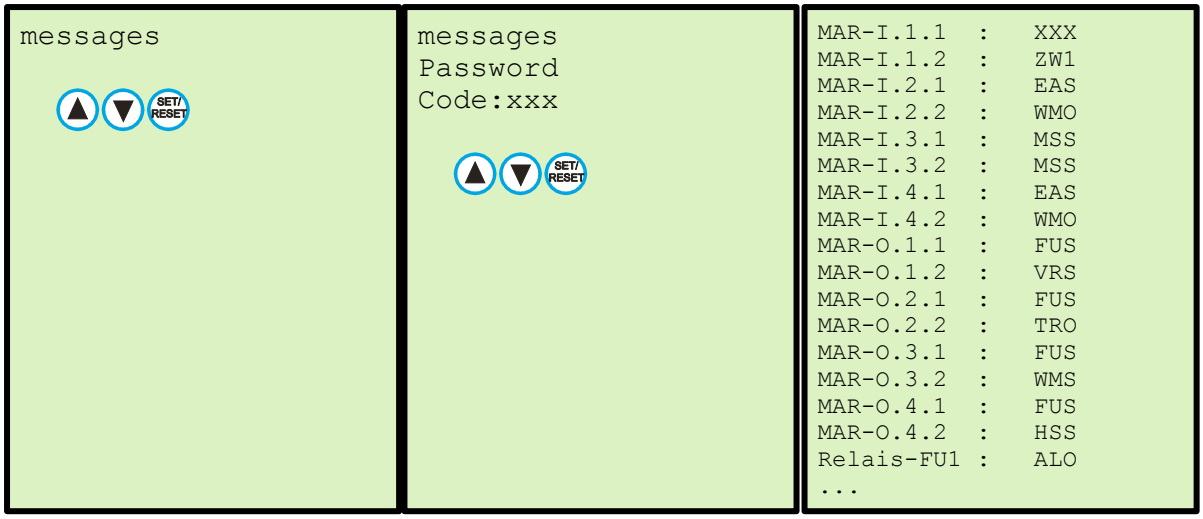
The leakage control ensures the safe shutdown of the pump at to higher switching frequency. The function is important for example, To protect submersible pumps from overheating. The switching frequency refers to one hour..

leakage control :0 - 0-99 per hour

Ensures the safe shutdown of the pump if running too long time. The function is important for example, To protect the pump against leakage.
Select the type of the runtime control.

Runtime control :0 - 0-999 Min / 0=Aus

8.11 MAR adjust messages



Explanation of parameters: EDR2 inputs and outputs (Picture above: example)

Digital inputs:
The digital inputs MAR-I 1.1 - 2.2 MARH-I 1.1 - 4.2 are adjustable.

```
external inputs 1.1-4.2   :xxx       - no function
external inputs 1.1-4.2   :MSS /MSO - motor protection (closer/opener)
external inputs 1.1-4.2   :SO1       - set-point 1 (closer)
external inputs 1.1-4.2   :SO2       - set-point 2 (closer)
external inputs 1.1-4.2   :WMS /WMO - low water (closer/opener)
external inputs 1.1-4.2   :TRS /TRO - dry run (closer/opener)
external inputs 1.1-4.2   :EAE /EAO - extern on /off (Closer/opener)
external inputs 1.1-4.2   :NAO       - Not-stop (opener)
external inputs 1.1-4.2   :RSS /RSO - Reset multiple possible (closer/opener)
external inputs 1.1-4.2   :STS /STO - extern Trip (closer/opener)
external inputs 1.1-4.2   :EHS /EHO - Extern Hand (closer/opener)
external inputs 1.1-4.2   :TIS       - set timer (closer)
external inputs 1.1-4.2   :SRS       - start/stop/reset (only limit function)
external inputs 1.1-4.2   :SDS       - Start/Stop (closer) switch Funktion
external inputs 1.1-4.2   :SPS       - Start/Stop (closer) pulse Funktion
external inputs 1.1-4.2   :SIS /SIO - Failed main fuse (Closer/opener)
external inputs 1.1-4.2   :HRS /HRO - Hunter relay only automatic (Closer/opener)
external inputs 1.1-4.2   :GFS /GFO - Limit Switches Fire Clear (Closer/opener)
external inputs 1.1-4.2   :EP1-4(2) - extern on / off pump 1-4(2) (closer)
external inputs 1.1-4.2   :ZW1       - counter Eingang (closer)
external inputs 1.1-4.2   :ZW2       - counter Eingang (closer)
external inputs 1.1-4.2   :EAP       - On/Off Pump (Fermanox) (closer)
```

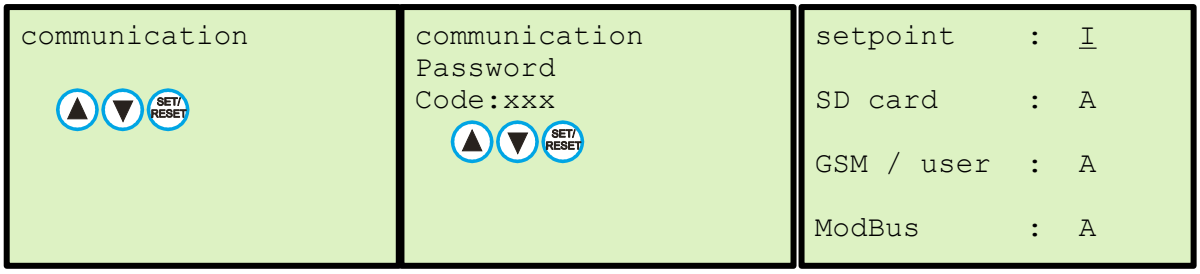
Digital outputs:
The digital outputs MAR-O 1.1 - 4.2 MAR-O 1.1 - 4.2 are adjustable.

```
external outputs 1.1-4.2  :ALO /ALS - alarm (closer/opener)
external outputs 1.1-4.2  :WMS       - low water (closer)
external outputs 1.1-4.2  :TRO       - dry run (opener)
external outputs 1.1-4.2  :DMS       - low pressure (closer)
external outputs 1.1-4.2  :NAS       - Refill function (closer)
external outputs 1.1-4.2  :SES       - transducer error (closer)
external outputs 1.1-4.2  :AFO /AFO - Fire alarm  (closer/opener) no auto reset
external outputs 1.1-4.2  :PAO /PAS - Pumps off (closer/opener)
external outputs 1.1-4.2  :LAS       - Run signal (Pump 1/2) (closer)
external outputs 1.1-4.2  :BES       - operating signal (closer)
external outputs 1.1-4.2  :FUS       - Ext.On/off FU1/2/3/4 (closer)
external outputs 1.1-4.2  :HZS       - heating (cabinet) (closer)
external outputs 1.1-4.2  :VRS       - cooling fan (cabinet) (closer)
```

Alarm relay:
The alarm relay FU 1 to FUx are preset as an opener and turn on power to "On".

```
alarm relay  FU1-FUx      : ALO / ALS - alarm (can be changed closer/opener)
```

8.12 adjust communication



Explanation of parameters:

Select the input for the set-point of the pressure control.
This feature gives them the ability to set pressure "I" on the keyboard or "A" on a 4-20mA signal or "M" via Modbus or "G" over GSM - pretend modem or select valid combinations.

setpoint :I - I-Intern / A-Analog / M -ModBus / G-GSM
:IG - IG-Intern+GSM / AG-Analog+GSM / MG-ModBus+GSM

Select the SD card to function.
Settings are made on the SD side.
This feature gives them the opportunity to collect data.

SD card :A - Aus (Off) / Ein (On)

Select the GSM - to function.
This function returns them to use the GSM function the way. SMS commands, refer to 10.3.

GSM / user :A - (A) on / (E) off

For a new phone card, enter the PIN.

```
plant name    :
irrigation

plant number :
+49155xxxxxxxxx

user     1 :  on
+49150xxxxxxxxx
user     2 :  off
+49160xxxxxxxxx
user     3 :  off
+49170xxxxxxxxx
user     4 :  off
+49177xxxxxxxxx

------------------
credit        :
*100#

card Contract :
Prepaid
```

Set the phone book on the SIM - card:
Enter the plants - the names and the facilities - telephone number by one overwrite.With this name, the system reports via SMS.

plant name :irrigation (z.B.)
plant number : +49155123456789 (z.B.)

Switch the user x "On" or "Off" and
enter the phone number of the user.
If this user is "on" he is entitled to operate the system.

user x : Aus / Ein :+49150123456789 (z.B.)

Change it if necessary free balance inquiry - phone number.

credit: :*100# (Germany)

Select the SIM - card Contract.
With this, the SIM card - a management.

SIM - card :Prepaid / contract

8.12.3 Setting the Phone Book

To set the system name or phone number, press **SET / RESET button** on the ad.Use the **arrow key▲ button, arrow key▼ button** and the **SET / RESET button** to change the letters or numbers. After confirming "OK", the change is accepted and the cursor jumps to the next field. To complete the name or phone number you provide a "!" And press "OK".
Now they can use the **arrow key ▼ button** to the next user or go to the end..
All values are only active when they are stored in the "Communication" menu.

Select these characters and numbers in circles: AB....YZ...ab...yz..._0123456789...+*#...<..!..AB...YZ...

Special function: < = delete Special function: ! = finish

Enter phone number Example:

```
Station number:          Number 1 is selected and confirmed with "OK".
+491

Station number:          Number 5 is selected and confirmed with "OK".
+4915

Station number:          Delete "<" is selected and the number "5" is deleted.
+4915<

Station number:          Number 6 is selected and confirmed with "OK".
+4916

...

Station number:          End "!" Selected to complete the entry
+491621234578!           and confirm with "OK".

Station number:          Entry ended.
+491621234578
```

Name and other users can be set as well.

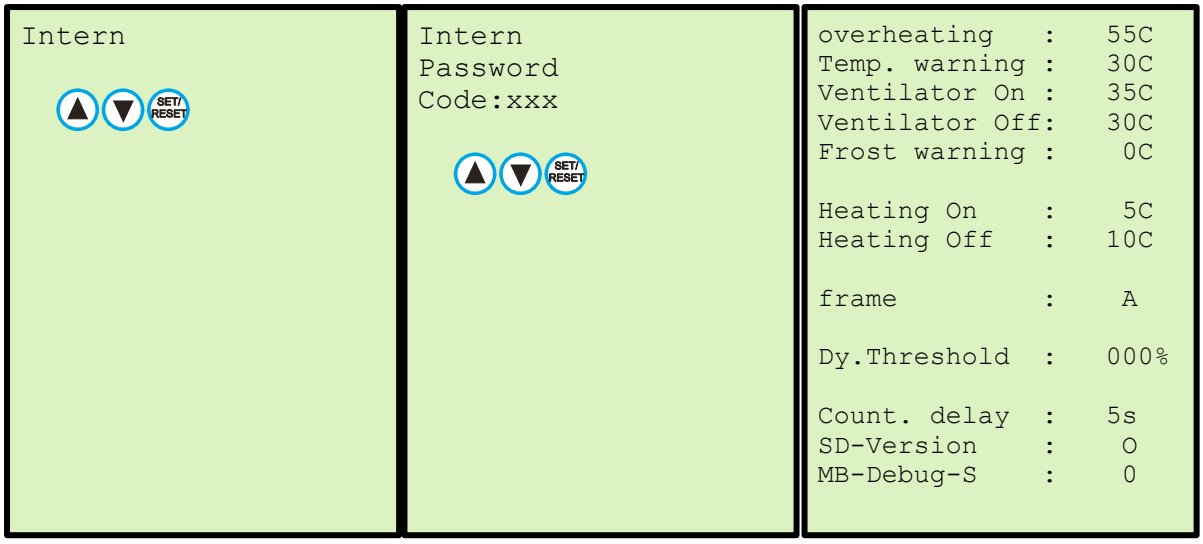
Example User Off - On - Switch:

```
user x :  off      „OK"
user x :  off      „OK"
user x :  on       „▲" or „▼"
user x :  on       „OK"
```

Select the Modbus slave - to function.
Settings are made on the MODbus page
This function returns them to use the ModBus function the way. Register see 10.2.

```
ModBus              :A          - Aus / Ein
```

8.13 adjust Internal



Explanation of parameters:

If the values for the control cabinet temperature monitoring. This function protects the cabinet from overheating.
overheating On :55C - 55°C - 70°C
Temperature warning On :30C - 20°C - 30°C

The cabinet fan is at the set temperature and off. This function depends on prior to the frequency line.
Ventilator On :35C - 25°C - 35°C
Ventilator Off :30C - 20°C - 30°C

If the values for the control cabinet frost monitoring. This function protects the cabinet against frost or condensation.
Frost warning On :0C - 0°C - 8°C (9°C = Off)

The cabinet heater is at the set temperature and off. This function depends on prior to installation.
Heating On : 5C - 1°C - 15°C
Heating Off :10C - 6°C - 20°C

To the frame on the display appears around the display foil stick better (active until power "Off").
frame :A - E / A

The dynamic threshold is active when the pressure switch operation. Special mode without conservator.
Dynamic Threshold :0% - 0 - 100%

Enter the delay time for the counter.
Counter delay :5s - 1s - 99s

Enter the polarity of the DS board.
SD-Version :O - O / S

The MB-debug-S status indicates internal error. There is no setting.
MB-Debug-S :0 - internal use only

END Menu

9. Trip history monitor

9.1 Error indications on the display

In case of failure, the controller switches off and the pump (s) running freely.

Error messages can be acknowledged by prolonged pressing the SET/RESET - button.

Error communication to external devices
The MA controller is connected via a serial link with an external device via the Modbus or the GSM modem. If the connection is interrupted or disturbed the pump (s) are not stopped.
The corresponding plain text error message appears on the display. The red LED lights. The alarm relay switches.
Display examples:

Error Modbus	Error Modem	no Network ....

Error Connection
The MA controller is connected via a serial connection with the drive.
If the connection is interrupted or the relevant frequency is disturbed stopped.
The error message "Er51" appears in the display. The red LED lights. The alarm relay switches.
Display examples:

Hand P1 Er51 P2	Er51 P1 Hand P2	Er51 P1 Er51 P2 ....

Error Transducer
The MA controller is connected via a cable to the sensor. If the connection is interrupted, the error message "sensor open". If the connection is disrupted, the error message "Sensor defective".
The respective pump (s) are stopped. The red LED lights. The alarm relay switches.
Display examples:

open Sensor	Error Sensor ....

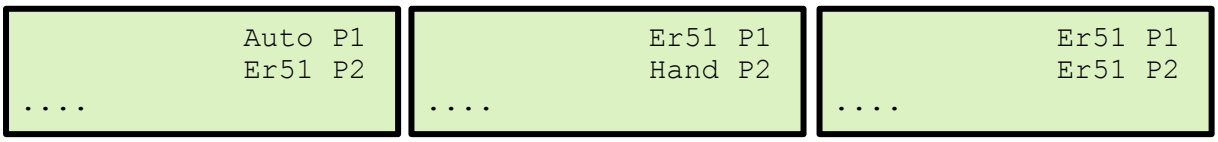
Error printing, switching game, borehole pump, dry run, lack of water, motor protection
These error messages are software-related shutdowns. The respective error code is displayed, alternating with the plain text message in the display. The respective pump (s) are stopped. The red LED lights. The alarm relay switches.
Display examples:

Dry- Run	low Water	PTC P1 PTC P2 ....
Temp.- alarm	Sensor deviate	over- heating ....
extern Alarm	MS P1 MS P2	low pressure ....

9.2 Error Messages Inverter MA-FU

The error "Er01" to "Er99" are error messages. The red LED lights. The alarm relay switches.
Display examples:

Error messages by pressing the SET/RESET -button or by short external control of the Terminal "manual mode / Reset" reset.



Inverter MA-FU

error Er04 : Motor overload (O.C.)
Motor protection tripping. Reduce pump performance. Set motor protection!
error Er05 : Over-voltage in the DC link with frequency (O.E.)
Generator operation, power surge, check check valves. Call service!
error Er06 : Phase error power input (P.F1)
Phase failure. Check the fuses. Check mains voltage.
error Er07 : Overload inverters (O.L1)
Check inverter power; reduce pump performance. Set the parameters!
error Er08 : under-voltage (L.U.)
Grid voltage fault. Check fuses, check mains voltage.
error Er09 : Inverter over temperature (O.H.)
Inverter is too hot. Reduce carrier frequency. Cooling defective??
error Er10 : Overload inverters (O.L2)
Check inverter power; reduce pump performance. Set the parameters!
error Er11 : Under load frequency (Err) ?
Motor load too low during operation. Increase engine power! Pumps deliver too little?
error Er13 : External fault ESP
Enter Wrong password on the frequency
error Er14 : incorrect password frequency (ERR1)
Frequency defective. FU exchange. Call service!
error Er15 : Errors motor parameters ERR2
Inverter set at the factory setting! Call service!
error Er16 : Over current at standstill ERR3
Motor load at a standstill too high. Pump is blocked! Call service!
error Er17 : Fault current measurement ERR4
Frequency defective. FU exchange. Call service!
error Er18 : Motor overload (OC1)
Motor protection tripping. Reduce pump performance. Set motor protection!
error Er19 : Phase error motor (PF0)
Motor phase interrupted. Check motor cable, check motor
error Er20 : Broken wire analog signal (AErr)
Inverter set at the factory setting! Call service!
error Er21 : Under load frequency (EP3)
Motor load too low during operation. Increase engine power! Pumps deliver too little?
error Er22 : Under load frequency (EP)
Motor load too low during operation. Increase engine power! Pumps deliver too little?
error Er23 : Under load frequency (EP2)
Motor load too low during operation. Increase engine power! Pumps deliver too little?
error Er24 : Sleep mode nP
Inverter set at the factory setting! Call service!
error Er25 : Inverter parameter incorrect (ERR5)
Inverter set at the factory setting! Call service!
error Er37 : Error PTC tripping (O.H1)
The PTC thermistor has tripped. Reduce engine power. Improve cooling.
error Er47 : Communication error with the frequency inverter (CE)
ModBus address wrong; ModBus connection faulty. Check connection or address?

Error MAR/MARH Controller

error Er51 : Communication error with the frequency inverter
ModBus address wrong; ModBus connection faulty. Check connection or address?
error Er52 : Transducer 1 open
The transducer connection is open. Check cable connection!
error Er53 : Error Transducer 1
The transducer value is out of tolerance. . The transducer is defective?
error Er54 : Transducer 2 open
The transducer connection is open. Check cable connection!
error Er55 : Error Transducer 2
The transducer value is out of tolerance. . The transducer is defective?
error Er56 : Error sensor difference
The values between transducer 1 and transducer 2 are outside the set tolerance. . The transducer is defective?
error Er57 : Error low pressure
The internal pressure failure triggered .. Check water level setting or the water supply!
error Er58 : Error dry run electronically
The run-dry protection has tripped .. Check water supply!
error Er59 : Error low water externally
The external low water protection has tripped .. Check water level setting or the water supply!
error Er60 : Error dry run externally
The external dry-running protection has tripped .. Check water supply!
error Er61 : Error limit pressure
The limit pressure is exceeded. Check system. Setting the limit pressure!

error Er62 : Error Not stop (SMS)
The plant was set via SMS to emergency stop. A reset is only possible on the system
error Er63 : Error lower limit
The set lower limit value is exceeded. Check system. Setting the limit!

error Er64 : External fault (Dig. Input)

error Er65 : Over-temperature control (Inverter)
The control is too hot. Reduce carrier frequency. Cooling defective?
error Er66 : On / Off Inverter missing (software))
Dig. Inverter input is missing, defective, or not configured. Call service!

error Er67 : Error Modem
An error has occurred for a modem connection. Call service!
error Er68 : free

error Er69 : Error switching
The switching frequency has been exceeded; stroke operation. Check non-return valves. Call service!
error Er70 : Error maximum runtime
The maximum runtime is exceeded. Check the running time setting, or leakage, or non-return valves.
error Er71 : Error submersible pump
The submersible pump monitor has tripped. Increase water consumption. Check non-return valves.

error Er72 : overheating cabinet
error Er73 : Temperature warning transducer 2

error Er74 : Error PTC tripping (software) PTC
The PTC thermistor has tripped. Reduce engine power. Improve cooling.
error Er75 : Error over temperature PT100 (Software) PT100
The PT100 has tripped. Reduce engine power. Improve cooling.
error Er76 : Error external motor protection
External motor protection tripping. Reduce pump performance. Set motor protection!
error Er77 : Error failed main fuse
External fuse failure. Check the main fuse!
error Er78 : Error test run
The test run has not been completed without error. Check the system!
error Er79 : free
.
.
error Er80-85 : special error fire extinguishing systems
.
error Er90 : free
.
error Er91-Er99 : SW-ERR (Call customer service!))

9.3 Reset the daily hours of operation

To the daily operating hours (TLZ) to "0" to reset the following procedure:
Go to the page "operating hours" and hold the SET / RESET button for about 10sec. pressed!

Messages in the display:

```
OPH Pump  1 1:17:08
DOH Pump  1 1:17:08
...
```

SET/ RESET

It appears this message after deleting the display:

```
OPH Pump  1 1:17:08
DOH Pump  1 0:00:00
...
```

If unsuccessful, repeat the process.

9.4 Reset the fault memory

To reset the fault memory, proceed as follows:
Go to the page "error memory" and hold the SET / RESET button for about 60sec. pressed!

Messages in the display:

```
ER01 18-01-13 13:59
ER04 19-01-13 11:59
...
```

SET/ RESET

It appears this message after deleting the display:

```
  -- ERR1 --
  -- ERR2 --
...
```

If unsuccessful, repeat the process.

9.5 Troubleshooting

The displays is dark
Mains voltage is present and turned on? If one or more fuses blown?
Plant does not start
The selector switch is not in operation! Set the selector switch to "Manual" or "Automatic"!
Is properly closed when operating from an external input cable?
It does not restart, even though the switch is set to "Automatic"..
Sensor not connected? (Message: "Sensor error")
The actual pressure is reached or exceeded the target pressure? The starting pressure is not set or too small?
Pumps do not switch to standby
If the set pressure is set too high (pumps create the pressure does not)? Is the pipeline of investment not vented properly? Non-return valve incorporated in the pressure line upstream of the sensor?
Zero flow cutoff is not set correctly? ***See: cut-off, test mode, load factor, speed factor!***
If the back-flow preventer leaking? In short rigid pipes, expansion vessel into the pressure line downstream of the back-flow preventer installed (pre-charge pressure check: starting pressure - 0.5 bar)!
Pressure indicator does not indicate the actual pressure
Pressure sensor type does not match the pressure sensor used (eg 10 bar - Sensor; 25 bar - sensor)?
Sensor or sensor plug is wet? Sensor cable is broken or connected incorrectly?
The control is too warm
Check ambient temperature! If necessary. provide cooling! Reduce carrier frequency!
Display shows no data and pump does not start
Connected pumps have the "power" switch on already ground fault.
Check frequency without pumps connected to function

9.6 pump change

Which starts the pump first, is not defined. Master / Slave - To ensure smooth operation of the pumps
every 300 minutes (999min adjustable 1 min) - A change is operating.
If a pump is stopped or fails because of a defect, the master status is indexed.

9.7 Forced pump change

For service purposes the pump change can be enforced by the respective master is stopped. By the stop of the master status on the next pump is advanced. Now you can proceed with the new master in the same way.
The pump alternation is interrupted by the following criteria:

Caution!

-The manual mode can be enabled with pump
-The programming process is not completed at a controller
-A pump is at fault.

10. Expert mode

The zero flow shut-off ensures safe shutdown output "0".
The zero flow cutoff requires when setting some experience and detailed knowledge of the operation of the controller.
If the system with the factory setting of zero flow cutoff does not operate satisfactorily,
please contact your dealer or the manufacturer.
The **test phase**: 1 - 99% 50% Recommendation: 50%.
manipulates the desired pressure while the pump is operating to constantly check whether it delivers.
The larger the test phase, the safer switches on the pump when pumping "0".

The **speed factor**: 1 - 99% 50% Recommendation: 60%.
and **the load factor**: 1 - 99% 50% Recommendation: 50%.

form a mathematical combination.

The logic of mathematical logic is to say:
Actual pressure = set pressure + speed value <+ speed factor load value <= load factor standby.


Notice!

This setting can be reproduced very well on the expert page.
For the setting of the system with load and speed factor expertise is required!

example:
Pump operates at 45% load (LF). The rotational speed (DF) is 82%. The pressure is controlled.
The test phase (T) increases with current value 78

```
T 78 LF  45  50
3.00 DF  82  50
P1: 041Hz, 017,2A, 34C
P2: 000Hz, 000,0A, 29C
```

10.1 cutoff frequency

The cutoff frequency is the lowest operating frequency in the pressure control. If the cutoff frequency is reached, waiting for the pressure regulator to minimize delay from before the particular pump into "Standby" is activated.
The cutoff frequency should be adjusted so that just no longer promotes the particular pump.
The power-off should be set so that does not get the pump at this operating point to oscillate.
This feature supports the zero flow cutoff.

10.2 expert site

The expert page helps in determining the speed and load factor:

T	= Test phase value = 1-99	=	0,1 - 1 bar absolute,
LF	= Load factor current / comparison	=	values 0- 200% / Setting compared with 1-99%
DF	= Speed factor Current / comparison	=	values 0- 100% / Setting compared with 1-99%

P1/2 = Actual pump status: Output frequency, motor current, frequency temperature

T 000 = testing phase currently 0.00 = current pressure	T 00 LF 00 50 0.00 DF 00 50 P1: 000Hz, 000,0A, 27C P2: 000Hz, 000,0A, 29C	LF 00 = Current 50 = comparison DF 00 = Current 50 = comparison
T 075 = testing phase currently 3.92 = current pressure	T 75 LF 32 50 3.92 DF 78 50 P1: 039Hz, 011,2A, 32C P2: 000Hz, 000,0A, 29C	LF 32 = Current 50 = comparison DF 78 = Current 50 = comparison

10.3 Modbus register MARH- from Version 1.02 [5-145]

Reg.-No.	content	Cabinet number format and coding
0	Software-Version	
1	cabinet temperature	in °C
2	Status Flags	1 = deviation between redundant transducers 2 = pressure / level - low water 4 = pressure / level - frequency limit active 8 = low water (external) 16,32 = transducer 2 disturbed 64 = fill mode active 256 = Temperature warning ext. 512 = Detected zero flow 1024 = Top pressure shutdown 2048 = Pressure reduction active 4096 = stopped plant (DG, GW) 8192 = Test run active
3	Error Flags	1,2 = Main transducer open,Main Transducer defective 4.8 = transducer 2 open,Transducer 2 defective 16 = Error number of starts (leakage) 32 = dry run 64 = low pressure 128 = U-Pumpenwächter 256 = Max. Runtime 512 = limit pressure cut-off 1024 = Emergency stop (via GSM) 2048 = Over-temperature protection (*) 4096 = SW-Störung
10	Main transducer	e.g.: 478 = 4.78 bar oder 478 cm oder 4.78 °C
11	Besides transducer	e.g.: 478 = 4.78 bar oder 478 cm oder 4.78 °C
12	digital inputs	1=I.1.1, 2=I.1.2, 4=I.2.1, 8=I.2.2, …, 64=I.4.1, 128=I.4.2
13	digital Outputs	1=O.1.1, 2=O.1.2, 4=O2.1, 8=O.2.2,..., 64=O.4.1, 128=O.4.2
14	Pump-states and manual switch	1=P1 Hand, 2= P1 Auto, 4=P1 active, 8=P1 Error 16=P2 Hand, 32= P2 Auto, 64=P2 active, 128=P2 Error ...
50	Operating mode	0=DR, 1=DF, 2=DG, 4=GW, 5=NF, 6=NL, 7=TH, 8=TK
51	Operating size 1	Top pressure (DR) or TO-pressure (GW) or ...
52	Operating size 2	Target pressure / stop pressure (DR) or TT-pressure (GW) or ...
53	Operating size 3	Start printing (DR) or UG-pressure (GW) or ...
54	Operating size 4	Differential pressure (DR) or LT-pressure (GW) or ...
55	Setpoint adjustment	At full load: 100 = 100%, 70 = 70%, 130 = 130%
56	overrun time	in seconds
57	limit delay time	in seconds
58	bridging time	in minute

Modbus-RTU interface (Slave)

characteristics

- Baud rate: 9600, 19200, 38400
- Modbus-Address: 1-250
- Parity and stop bits:
  a) „N“ = no parity: „8N2“ (2 Stop bits)
  b) „U“ = Odd parity: „8O1“ (1 Stop bit)
  c) „G“ = Even parity „8E1“ (1 Stop bit)

Timing

- Response Time: Normal 50-200 ms (significantly longer during menu operation)
- There is a maximum answered one call per second

Modbus commands

- Currently only **03 = "Read Holding Registers"**
- Number of simultaneously readable register = 6
- Example query: "01 03 00 32 00 06 64 07" (hex)
  (Device address 1, command 03, from register No. 50, read 6 pieces, CRC: 64 07)
- Sample answer: "01 03 0C 00 00 01 F4 00 C8 00 B4 00 14 00 64 4C 48" (hex)
- holding register 50 is 0 = operating mode „DR“
- holding register 51 is 500 = top pressure 5.0 bar
- holding register 52 is 200 = target pressure 2.0 bar
- holding register 53 is 180 = start pressure1.8 bar
- holding register 54 is 20 = differential pressure = 0.2 bar
- holding register 55 is 100 = Set point adjustment: 100

10.4 SMS commands MAR / MARH- from Version 1.02 [5-148]

SMS commands the MAR / MARH - control mode "pressure, level, temperature“:

commands	Send SMS → ✆::
Status query	STATUS
system reset	RESET
Check values	WERTE
delete values	WRESET
Log on the system	ONLINE
Log off the system	OFFLINE
system emergency stop	NOTSTOPP
Start test run	TEST

SMS commands the MAR / MARH - control mode "Pressure control + limit":

commands	Send SMS → ✆::
system start	START
Start system with setpoint 1	START S1
Start system with setpoint 2	START S2
Start system for 40 minutes	START T40
Start system for 40 minutes with setpoint 1	START S1 T40
Start system for 40 minutes with setpoint 2	START S2 T40
stop system	STOPP
system reset and start	RESTART
Status query	STATUS
system reset	RESET
Check values	WERTE
delete values	WRESET
Log on the system	ONLINE
Log off the system	OFFLINE
Start test run	TEST

SMS commands the MAR / MARH - control mode "+ Adjustable frequency limit":

commands	Send SMS → ✆::
system start	START
system starting with 45Hz	START F45
Start system for 40 minutes	START T40
system starting with 45Hz for 40 minutes	START F45 T40
stop system	STOPP
system reset and start	RESTART
Status query	STATUS
system reset	RESET
Check values	WERTE
delete values	WRESET
Log off the system	ONLINE
Log off the system	OFFLINE
Start test run	TEST

SMS commands the MAR / MARH - control mode "Soft starter + limit":

commands	Send SMS → ✆::
system start	START
Start system for 40 minutes	START T40
stop system	STOPP
system reset and start	RESTART
Status query	STATUS
system reset	RESET
Check values	WERTE
delete values	WRESET
Log on the system	ONLINE
Log off the system	OFFLINE
Start test run	TEST

11. Presentation menu MAR/MARH Version 1.xx :

The **arrow keys** select the Functions (scrolling), input / Modification of data.

The **SET / RESET - button** save entered data or acknowledgment..

memory
Error memory / operating hours / cycles / etc.

displays
Main display + 4 + display pages provide clock

set-points

top pressure	:99,99bar	- 0,01bar-99,99bar (1-4)
target pressure	:04,00bar	- 0,01bar-99,99bar (1-4)
start pressure	:03,50bar	- 0,01bar-99,99bar (1-4)
Different pressure	:00,20bar	- 0,01bar-99,99bar
Set-point adjustment	:0	- 0 - 100 % / 0=Aus
Limit delay time	:60s	- 9s - 199s
Bridging time	:1	- 1 - 99Min
Stop pressure	:04,00bar	- 0,01bar - 99,99bar (1-4)
Start pressure	:03,50bar	- 0,01bar - 99,99bar (1-4)

limits

TO - Druck	:04,00bar	- 0,01bar - 99,99bar (1-4)
TT - Druck (+)	:00,50bar	- 0,01bar - 09,99bar (1-4)
LO - Druck	:04,00bar	- 0,01bar - 99,99bar (1-4)
LT - Druck (-)	:00,50bar	- 0,01bar - 09,99bar (1-4)
set point adjustment	:0	- 0 - 100 % / 0=Aus
overrun time	:5s	- 0s - 999s
limit delay time	:60s	- 9s - 199s
bridging time	:1	- 1 - 99Min

times

pressure reduction	:0	- 0 - 100 % / 0=off
Reduction time on	:xx:xx clock	- 00:00 - 23:59 clock
Reduction time off	:xx:xx clock	- 00:00 - 23:59 clock
test run	:A	- 10Uhr / 1Min / with manual frequency
test time	:10:00 clock	- 00:00 - 23:59 Uhr
duration	:99s	- 9s - 99s
Timer	:A	- Aus (off) / Ein (on) / expiration time
On time	:xx.xx clock	- 00:00 - 23:59 clock
Off time	:xx.xx clock	- 00:00 - 23:59 clock
expiration time	:180Min	- 0 - 999 Min

base setting

Number INV	:1	- 0 - 2(4)
Number FIX	:0	- 0 - 2(4)
INU x	:AW	- AW-PW-AF-PF-J-B
FIX x	:0	- AW-PW-AF-PF-J-B
Number of setpoints	:1	- MAR-Input 1.1-S1 / Input 2.1-S2
Expansion vessel	:N	- Nein / Ja
limit function	:A	- Aus / Ein

Pump/Motor

Read IN	:P1	- P1 - P4
rotating direction	:R	- Right / Left
Acceleration time	:xx,0s	- 0,01s - 99,9s / only manual operation
Deceleration time	:xx,0s	- 0,01s - 99,9s / only manual operation
rated current	:xxx,0A	- 0,01A - 199,9A
rated voltage	:400V	- 200V - 480V
Nennfrequenz	:050Hz	- 1Hz - 200Hz
Min frequency	:020Hz	- 1Hz - 200Hz
Max frequency	:050Hz	- 1Hz - 200Hz
Hand frequency	:35Hz	- 1Hz - 200Hz
Fix frequency	:50Hz	- 1Hz - 200Hz
Motor characteristic	:K	- Constant / quadratic / specific
carrier frequency	:9999Hz	- 1000Hz - 9999Hz
Vario - frequency	:A	- off / on
motor protection	:A	- off / PTC / (PT100)
Phase error output	:A	- off / on

Transducer

Sensor 1	:DE	- off / on EDR 4-20mA
Sensor 2	:A	- off / on EDR 4-20mA
Sensor value 1 bar/m	:010	- 0,0 - 99,99
Sensor value 2 bar/m	:010	- 0,0 - 99,99
Sensor deviation	:010%	- 0% - 100%
Off Switch bar /m	:1,00	- 0,00 - 99,99
On Switch bar /m	:1,50	- 0,00 - 99,99

```
      Ramp on bar /m      :1,80        - 0,00 - 99,99
      Ramp frequency      :50Hz        - 030Hz - 200Hz
      Ramp off bar /m     :1,0         - 0,00 - 99,99
      sensor input :mA          - mA / V / mA=MAR / V=FU  MOD-Address 101
```

Controller

```
      PID P gain          :1,00        - 0,01 - 9,99
      PID-I time          :1,00        - 0,1s - 9,99s
      Testing phase       :50%         - 1% - 100%
      Load Factor         :50          - 1 - 99
      Speed Factor        :50          - 1 - 99
      Switch-off frequency:20Hz        - 1Hz - 200Hz
      Switch-off delay    :5s          - 1s - 99s
      switch-on delay     :1s          - 1s - 99s
      Switchover time     :5s          - 1s - 9,99s
      Pump changeover time:300Min      - 1Min - 999Min
```

safety

```
      limit pressure      :99,99bar    - 0,01bar - 99,99bar
      limit delay         :30s         - 1s - 99s
      Auto Reset          :A           - Aus / Ein / 3x in 20 Min
      Safe Start          :E           - Aus / Ein
      Safe frequency      :35Hz        - 25Hz - 200Hz
      dry run             :E           - Off / On / < 0,5bar in 60s
      Under-pressure      :50%         - 0% - 100% 0% = off
      lack delay          :180s        - 1s - 999s delay
      sub. pump guard     :A           - off / On
      Guard frequency     :25Hz        - 25Hz - 200Hz
      Guard time          :99s         - 9s - 99s
      leakage control     :0           - 0 - 99
      Runtime control     :0           - 0 - 999 Min / 0=off
```

messages

```
      inputs 1.1-4.2      :xxx       - no function
      inputs 1.1-4.2      :MSS /MSO  - motor protection (closer/opener)
      inputs 1.1-4.2      :SO1       - set-point 1 (closer)
      inputs 1.1-4.2      :SO2       - set-point 2 (closer)
      inputs 1.1-4.2      :WMS /WMO  - low water (closer/opener)
      inputs 1.1-4.2      :TRS /TRO  - dry run (closer/opener)
      inputs 1.1-4.2      :EAE /EAO  - extern on /off (Closer/opener)
      inputs 1.1-4.2      :NAO       - Not-stop (opener)
      inputs 1.1-4.2      :RSS /RSO  - Reset multiple possible (closer/opener)
      inputs 1.1-4.2      :STS       - start/stop (only limit function)
      inputs 1.1-4.2      :EHS /EHO  - Extern Hand (closer/opener)
      inputs 1.1-4.2      :TIS       - set timer (closer)
      inputs 1.1-4.2      :SRS       - start/stop/reset (only limit function)
      inputs 1.1-4.2      :SDS       - Start/Stop (closer) switch Funktion
      inputs 1.1-4.2      :SPS       - Start/Stop (closer) pulse Funktion
      inputs 1.1-4.2      :SIS /SIO  - Failed main fuse (Closer/opener)
      inputs 1.1-4.2      :HRS /HRO  - Hunter relay only automatic (Closer/opener)
      inputs 1.1-4.2      :GFS /GFO  - Limit Switches Fire Clear (Closer/opener)
      inputs 1.1-4.2      :EP1-4(2)  - extern on / off pump 1-4(2) (closer)
      inputs 1.1-4.2      :ZW1       - counter Eingang (closer)
      inputs 1.1-4.2      :ZW2       - counter Eingang (closer)
      inputs 1.1-4.2      :EAP       - On/Off Pump (Fermanox) (closer)


      outputs 1.1-4.2     :ALO /ALS  - alarm (closer/opener)
      outputs 1.1-4.2     :WMS       - low water (closer)
      outputs 1.1-4.2     :TRO       - dry run (opener)
      outputs 1.1-4.2     :DMS       - low pressure (closer)
      outputs 1.1-4.2     :NAS       - Refill function (closer)
      outputs 1.1-4.2     :SES       - transducer error (closer)
      outputs 1.1-4.2     :AFO /AFO  - Fire alarm  (closer/opener) no auto reset
      outputs 1.1-4.2     :PAO /PAS  - Pumps off (closer/opener)
      outputs 1.1-4.2     :LAS       - Run signal (Pump 1/2) (closer)
      outputs 1.1-4.2     :BES       - operating signal (closer)
      outputs 1.1-4.2     :FUS       - Ext.On/off FU1/2/3/4 (closer)
      outputs 1.1-4.2     :HZS       - heating (cabinet) (closer)
      outputs 1.1-4.2     :VRS       - cooling fan (cabinet) (closer)


      alarm relay FU1-FUx : ALO / ALS - alarm (can be changed closer/opener)
```

communication

Set-point	:I	- I-Intern / A-Analog / M -ModBus / G-GSM
SD card	:A	- On / Off
GSM / user	: A	- On / Off
Plant name	: Irrigation (for example)	
Station number	: +49155123456789 (for example)	
User 1	: Off / On: +49150123456789 (for example)	
User 2	: Off / On: +49160123456789 (for example)	
User 3	: Off / On: +49170123456789 (for example)	
User 4	: Off / On: +49170123456789 (for example)	
Bonus	: * 100 #	
SIM - Card	: Prepaid / contract	
Modbus Slave	: A	- On / Off - see tab 10.2

Intern

Overheating A	: 55 C	- 55 ° C - 70 ° C
temperature warning A	: 45C	- 45 ° C - 50 ° C
Ventilator On	: 35C	- 25°C - 35°C
Ventilator Off	: 30C	- 20°C - 30°C
Heating On	: 5C	- 1°C - 15°C
Heating Off	: 10C	- 6°C - 20°C
Sensor dev.	: 0.5 bar	- 0.1 bar - 9.9 bar
frame	:A	- Aus / Ein
Dynamic Threshold	:0%	- 0 - 100%
Counter delay	:5s	- 1s - 99s
SD-Version	:O	- O / S
MB-Debug-S	:0	- internal use only

13. customer settings MAR / MARH :

Sensor value 1	_____	bar
Sensor value 2	_____	bar
Top pressure	_____	bar
Target pressure 1 / Stop pressure 1	_____	bar
Start pressure 1	_____	bar
Differential pressure 1	_____	bar
Target pressure 2 / Stop pressure 2	_____	bar
Start pressure 2	_____	bar
Differential pressure 2	_____	bar
Set-point adjustment	_____	1,00
pressure reduction	_____	
Reduction time on	_____	clock
Reduction time off	_____	clock
rotating direction	_____	
Acceleration time	_____	seconds
Deceleration time	_____	seconds
Motornennstrom	_____	A
carrier frequency	_____	kHz
rated frequency	_____	Hz
Min frequency	_____	Hz
Max frequency	_____	Hz
Hand frequency	_____	Hz
Testing phase	_____	%
Speed Factor	_____	%
Load Factor	_____	%
Switch-off frequency	_____	Hz
Switch-off delay	_____	seconds
Switch-on delay	_____	seconds
Switchover time	_____	seconds
Pump changeover time	_____	minute
limit pressure	_____	bar
Safe frequency	_____	Hz
Safe Start	_____	minute
dry run	_____	
Under-pressure	_____	%
Lack delay	_____	sec.
test time:	_____	clock
duration:	_____	minute
T.Intervall:	_____	days
submersible pump guard	_____	
Guard frequency	_____	Hz
Guard time	_____	seconds
leakage control	_____	
Runtime control	_____	minute