

MAB O&M Manual

Installation, Operation & Maintenance Instructions



Read this manual carefully before commencing installation.

Please leave this instruction booklet with the end user as it contains important warranty, maintenance and safety information.

Instruction manual Type: MAB

Pump controller : S-No.:

System controller for pumps

MAB Software Version 2.00 (1-xxx) Stand 14.08.2017

with frequency converter



pressure

<u>con</u>	tent	<u>page</u>
1.	Safety Precautions	2
2.	General / Mode of Operation	3
3.	Installation and Mounting	5
4.	Wiring and Connections / GSM - Wiring	6
5.	panel Description	8
6.	Programming instructions / operation / startup messages	9
7.	Display / operational messages	11
8.	Operating Indicators / Main Menu / Setup	14
9.	Trip history monitor	26
10.	Expert mode / GSM	30
11.	Customer Settings	31

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 MA 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

A back-flow preventer is mandatory and can be used in the suction line before the pump or in the Pressure pipe be installed behind the pump! The expansion vessel must be fitted if required.



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



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



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. Because of convection, the frequency control during installation of at least



Be installed 15 cm from side walls or other facilities. 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 MA Controller

Plastic housing: Holes for wall mounting are located on the sides.

4. Wiring and Connections



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

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. 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. No manipulation of the sensor signal to make! No other users connect to the 24V supply! Warning! The used pressure sensor 4. .20 mA, is connected to the respective terminals! The respective pin assignment, refer to the respective diagram. In systems with several pumps are used again and 0. .10 V sensors. Notice! Here you can optionally one or more sensors are connected. The respective pin assignment, refer to the respective diagram. If the motor cable longer than 50 meters, it is advisable to install an motor reactor.

Caution!

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4.1 Motor Protection

The MA Frequency converter controller has a monitoring function for the motor current. This motor current is set via the control menu.

Verify the correct connection of the network, sensor, and control lines.

4.2 Connection of inputs / outputs

In the lower portion of the cabinet MA ... 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	Funktion				
Clamp	Function		Descrip	otion	
L1	Power Supply		L1 Pha	se	
Ν	look		N Nei	ıtral	
PE	Type plate		PE Gro	ound	
or:	D		0 41 45 6	N 1	Power Supply
P24+	Power Supply		24VDC	voltage	
P24-	Power Supply		24VDC	Cvoltage	
4.5 Port for the fau	ılt signal relav per invert	er		Г	
Function	Description				
Alarm relay	Alarm contact 1				— • 2
changer	Alarm contact 2			3	3
230V 1 A limit	Alarm contact 3 (n.c.)				
				Power On, no failure	Power Off or failure
4.6 Port for the ev	ternal innuts				
Function	ter nar inputs	Description			
external on/off"		Ext 1	4		
external Hand"/	Reset"	Ext. 1 Ext. 2	5		
external " mana 7,	,100001	EAt. 2	5		external
					Input
					input
4.7 Port for the ext	<u>ternal outputs / relays</u>				
This version has no	separate digital outputs / r	elays			
					external

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

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U V W

Description

Description Transducer

<u>4.8</u>	Port	for	the	<u>transducer</u>	
Г					

Function		
1x Transducer signal	OI	4-20mA
1x Reference voltage	L	VDC -

Transducer

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

Function
3 phase motor
look
wiring diagram

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 9.5 Troubleshooting note!



Output/ Relay



4.10 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 MA -controller.



4.11 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.





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.



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 MA menu the SIM card!

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

5. panel Description MAB

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



The backlight can be switched off with a delay.



The red LED flashes when warning. The red LED will light up if a fault occurs.

The green LED flashes with inactive control The green LED is lit when the control is active.

Output displays:

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



These icons are displayed depending on the function in the display.



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.



Bluetooth is active: Data is currently being queried



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

6. Programming instructions / operation / startup messages

<u>6.1 General operation of the displays</u>

If operated from the output side of the \checkmark arrow key so you can access the desired values Here the nominal values of the system are set. If the \checkmark 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 \blacktriangle arrow key so you can access the various operational indicators. Pressing the \blacktriangle 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.



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:



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.



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 display to this main:



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.

GSM-INIT

wait !

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

GSM-INIT OK ! sample system phone number +49160xxxxxx		
GSM-INIT OK !	GSM-INIT OK !	GSM-INIT OK !
Mobil 1	Mobil 2	Mobil 3
phone number	phone number	phone number
+49150xxxxxx	+49170xxxxxx	+49171xxxxxx

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 Bluetooth, this is indicated with the corresponding icon. Bluetooth with active data output Bluetooth with



Bluetooth with active data output 01,50 bar Auto P1 Auto P2 P1: 000Hz, 000,0A

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 during active test run



Active Power indicator while "internal" set-point



Active Power indicator



7. Operating messages

7.1 Select operating indicators



With the \blacktriangle arrow key, the next screen is displayed.

Pressing the same arrow key the next screen is displayed.

Use the $\mathbf{\nabla}$ arrow key, the previous screen is displayed.



If the display is "hours of operation" is displayed and the \blacktriangle arrow key is pressed, so you get to the error memory.

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

active messages

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



Operational status MARH: Manual operation with FU, pressure, speed, current.

01.50 bar Hand P1 Hand P2 Hand P3 13:48:32 P1: 035Hz, 015,0A P2: 035Hz, 015,0A P3: 000Hz, 000,0A



7.4 Time / Date

MAR 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 \blacktriangle button, arrow \forall button and the SET / RESET button can be set. After confirming "OK", the change is adopted.

	RESET	ESET RESET	
Monday Auto P1 14:59:17 Auto P1 16.01.17 Auto P2 S/W - A P1: 048Hz, 015,0A P2: 000Hz, 000,0A P3: 000Hz, 000,0A	Monday Auto P1 14:59:17 Auto P2 16.01.17 Auto P3 S/W - A P1: 048Hz, 015,0A P2: 000Hz, 000,0A P3: 000Hz, 000,0A	Monday Auto P1 15:59:17 Auto P2 16.01.17 Auto P3 S/W - P P1: 048Hz, 015,0A P2: 000Hz, 000,0A P3: 000Hz, 000,0A OK	

7.5 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 \notin 99.99.

If the cursor is flashing, the value using the arrow \blacktriangle button, arrow \checkmark button and the SET / RESET button can be set. After confirming "OK", the change is adopted.

Set user $\begin{array}{c} \text{contract} & : \text{P S } 20 \text{all} \\ \text{credit} & : 15,25 \\ \text{Be.1} & : \text{E} \text{Be.2} : \text{E} \\ \end{array} \qquad \begin{array}{c} \text{contract} \\ \text{Be.1} \\ \text{Be.1} \\ \end{array}$	act : P S 20 t : 15,25€ : <u>E</u> Be.2 : E	contract : P S 20 credit : $11,85 \in$ Be.1 : Be.2 : E	

7.6 Option Page Counter:

Set Counter / Counter Delay:

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 \blacktriangle button, arrow \lor button and the SET / RESET button can be set. After confirming "OK", the change is adopted.

Set counter		
Water counter: Z1 / 10001 : 154 sqm Z2 / 100 1 : 100.0 sqm Counter Delay : 5s	Water counter: Z1 / <u>10001</u> : 154 sqm Z2 / 100 1 : 100.0 sqm Counter Delay : 5s	Water counter: Z1 / 10001 : 154 sqm Z2 / 100 1 : 100.0 sqm Counter Delay : 5s

Reset the counter:

To reset the counters to **"0"**, the following procedure: Go to the page "water meter" and hold the **SET / RESET button** for about 10sec. pressed!

Between the displays operation can be changed with the arrow keys \blacktriangle and ∇ .

When disturbances to the notes under 9.5 Troubleshooting note!

7.7 Information displays

Pumps off

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

01,50 bar external off P1: 000Hz, 000,0A

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.

01,50 bar low water

P1: 000Hz, 000,0A

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.

01,50 bar fill mode active

P1: 035Hz, 002,0A

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.

01,50 bar Safety-Start P1: 035Hz, 002,0A

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.

01,50 bar ^{top} pressure P1: 000Hz, 000,0A

System stopped

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

01,50 bar system P1: 000Hz, 000,0A

8. Menu

The menus are the same for all.

When storing the values is queried on demand,

if the values for pump 1, pump 2 or 3 pump or pumps for all to be saved..

8.2 Adjust set-points

set-points

top value setpoint Start difference overrun time	: <u>05,00bar</u> : 04,00bar : 00,50bar : 5s	top value setpoint Start difference differential value overrun time	: <u>05,00bar</u> : 04,00bar : 00,50bar : 00,10bar : 5s
maximum value setpoint Start difference differential value *minimum value	: <u>05,00bar</u> : 04,00bar : 00,50bar : 00,10bar : 00,50bar	maximum value setpoint 1 Start difference 1 setpoint 2 Start difference 2 differential value *minimum value	: <u>05,00bar</u> : 04,00bar : 00,50bar : 03,00bar : 00,50bar : 00,10bar : 00,50bar
overrun time	: 5s	overrun time	: 5s

Parameter: xxx.xx

TT ()T

save: Yes / No

Explanation of parameters:

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

Enter the setpoint at which the system is to operate.

setpoint :04,00bar - 0,01bar - 99,99bar (1-4) Enter the start difference value at which the system will start again after the "Standby" Start difference :00,50bar - 0,01bar - 99,99bar (1-4) Enter the differential pressure at which the next pump will be switched on. - 0,01bar - 99,99bar differential value :00,10bar Enter the minimum value at which the system will be governed immediately. :00,50bar - 0,01bar - 99,99bar (1-4) *minimum value Enter the delay time until the pump to stop. overrun time - 0s - 999s :5s

8.3 adjust times

times	
reduction	: 000%
Reduction time On	: 20:00h
Reduction time Off	: 23:00h
test time	: 10:00h
duration	: 99s
test interval	: 0 days

Password Code: xxx	
Parameter: xxx.xx	
save: Yes / No	SET/ RESE

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.				
:0	-0 - 100 % / 0 = off			
:xx:xx h	- 00:00 - 23:59 h			
: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.				
:10:00h	- 00:00 - 23:59 h			
:20s	- 0 - 999s with manual frequency			
:0 days	-0 - 30 days (0 days = Off)			
	ability to reduce :0 :xx:xx h :xx:xx h mp. This feature giv zing of the pump. :10:00h :20s :0 days			

8.4 Base Setting

Base Setting

number INV	:	<u>3</u>
FU 1	:	AW
FU 2	:	AW
FU 3	:	AW
setpoints	:	1
operating mode	:	DR

Explanation of parameters:

Enter the number of the frequency converter (FU) 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 :1 - 1 - 2 (3)

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

Meaning of abbreviations:

A 1-2	=	Active Pump in System	(always active as needed)
*G 1-1	=	Synchronous pump in System	(Always active as required in synchronisation)
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)
*S 0-1	=	Suction pump in System	(Only active with an active pump)
W 1-2	=	Changing the pump in System	(after running, hours of operation., fault)
F 1-2	=	Fix position in System	(always at the same position)
*R 1-2	=	Reserve pump im System	(active only on fault of another pump)

Enter the number of the set-points, at which the system is to operate. **Number of set-points** :1/2/3 -1 =one setpoint, 2 =two setpoints, 3 = setpoints 1x jockey + 2x AW

Select the operating mode of the system.

operating mod	e	:DR	- DR
DR	=	Pressure	The system works as a pressure regulator / pressure switch (bar)
ME	=	Volume	The system operates as a flow regulator (1 / min)
ST	=	Flow	The system operates as a flow regulator (%)
TH	=	Heating	The system operates as a temperature controller / thermostat (° C)
TK	=	Cooling	The system operates as a temperature controller / thermostat (° C)
NF	=	Level Filling	The system operates as a level controller / float switch (cm)
NL	=	Level Empty	The system operates as a level controller / float switch (cm)
VR	=	Vacuum regulator	The system operates as a vacuum regulator (mbar)

8.5 Set electric pump / electric motor

Pump/Motor/ inver

Read INV rotating direction acceleration time deceleration time Rated current rated voltage rated frequency min frequency max frequency hand frequency	: P1 : R : 01,0s : 02,0s : 005.0A : 400V : 050Hz : 020Hz : 050Hz : 035Hz : 050Hz
rated frequency	: 050Hz
min frequency	: 020Hz
max frequency	: 050Hz
hand frequency	: 035Hz
fix frequency	: 050Hz
Characteristic	: K
Boost	: 04%
vario - carrier frequency Motor protection	: 5000Hz : A : A
sine filter	: A
phase error output	: A

Only adjustable in "stop"!

Caution!

Explanation of parameters:

Select whether you want to read the data from the respective frequency inverter. read INV - P1 / P2 / P3 / P4 :P1 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 - 0,01s - 99,9s / only manual operation :05,0s Enter the motor rated current of the pump (s). Data: See nameplate. - 0,01Å - 199,9A rated current :xxx,0A Enter the motor voltage to the pump (s). The setting they found on the nameplate of the motor. - 200V - 480V rated voltage :400V Enter the rated frequency of the pump (s). Data: See nameplate. With this function, the nominal frequency of the pump is set. rated frequency - 1Hz - 200Hz :50Hz 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. - 1Hz - 200Hz max frequency :50Hz Enter the hand frequency in Hz, a hand, in which the respective engine in manual mode is to move up and down... - 1Hz - 200Hz hand frequency :35Hz 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. - Constant / quadratic / specific motor characteristic :K Enter the value of the boost pump (s). This function is needed to better run the pump for heavy start-up. Boost :04% - 00% - 20% 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 - 2000Hz - 9999Hz :5000Hz 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 - off / on :A Select the motor protection function. :A/K - off / PTC / (PT100) motor protection Adjust the function of the sine-wave filter if it is installed between the controller and the pump. sine filter : A / E - Off / On Select the phase failure detection output of the pressure control. The phase loss detection protects the motor cable against interruption. phase error output - off// on :A

Password Code: xxx Parameter: xxx.xx save: Yes / No

8.6 Adjustment of transducer

transducer

Main sensor	: S 1
Sensor range	: 10.00bar
Main sensor offset	: 00.00bar

Password Code: xxx	
Parameter: xxx.xx	
save: Yes / No	SET/ RESET

Notice!

The setpoints change after transducer value change!

S1 = Transducer 1 MAB

explanation of parameters:

Enter the sensor type for the Main transducer. With the MA controller, transducer 1 is the main transducer.

Main sensor		:A - ED	
A =	off	transducer does not function	(Basic setting)
S1 =	on	transducer works as controller	(Basic setting)

Enter the work area for the main and site sensor. Data: See type plate sensor. Sensor range bar /m /C / mbar :10,0 - 0,00 - 99,99

Enter the offset of sensor 1/2. At level (VN), enter the terrain altitude, at temperature the negative temperature value. This function gives you the possibility to display the actual water level or the actual temperature. **sensor offset bar /m /C / mbar** :00,0 - 0,00 - 100 (bar / $^{\circ}$ C / m / mbar)

8.7 adjust controller

controller

PID P gain	:	0,50
PID-I time	:	0,50s
control ramp	:	1,0s
Actual value tolerance	:	01%
set point adjustment	:	1,00
testing phase	:	050%
load factor	:	050%
speed factor	:	050%
switch-off frequency	:	035Hz
switch-off delay	:	02s
Standby	:	E
switch-on delay	:	01s
switchover time	:	5s
pump changeover time	:	300Min
top value	:	15%
top value time	:	20s
-		

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 control ramp of pressure control. The regulation changes the ramp adjustment of the pump. control ramp :1,0s - 0,1s - 99,99s

Enter the setpoint tolerance for zero amounts shutdown Actual value tolerance :01% - 0% - 10%

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 Testing phase for the null sets a shutdown. Recommendation: 20%. See also "zero flow cutoff" -1% - 99% = 0,1 - 0,99bar absolute testing phase :20% Enter the load factor for the null sets shutdown. Recommendation: 50%. See also "zero flow cutoff" - 1% - 99% from Inverter load factor :50 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 :2s - 1s - 99s

Enter the standby function. (Stop when the controller is balancing or basic speed)Standby:E- E(on) / A(off)Enter the time delay for the zero quantities shutdown.switch-on delay:1s- 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

The electronic protection monitoring for dry running. Special function in target guardian.top value:25%-0% - 50% (0% = off)top value time:20s-1% - 99%

rd Code: xxx	
ter: xxx.xx	
es / No	SET/ RESET

Passwo

Parame

save: Y

8.8 Setting the safety

safety

Sensor limit	: 95%
Limit Delay	: 30s
Auto Reset	: A
Safe Start	: 0Min
Safe frequency	: 35Hz
dry run	: A
dry delay	: 180s
low water	: A
water delay	: 180s
flow shortage	: A
flow delay	: 180s
maximum detector	: O
maximum delay	: 180s
*minimum detector	: A
*minimum delay	: 180s
pressure monitor	: K
pressure monitor	: 50%
pressure delay	: 180s
submersible pump guard	: A
Guard frequency	: 30Hz
Guard time	: 30s
leakage control	: 0
Runtime control	: 0Min

		Parameter: xxx.xx save: Yes / No
maximu A = S = W = O =	um detector off on restart regulate	No function Stop only active in automatic mode only active in automatic mode only for automatic / top value function
minimu A = S = W =	im detector off Stop Restart	No function only active in automatic mode only active in automatic mode
pressul A = E = I = K =	re monitor off on always Complete	No function only active in automatic mode active with automatic and manual with automatic and manual active plus electronic dry run (<0.5bar in 30s)

Password Code: xxx

Explanation of parameters:

Enter the sensor limit value for the MA controller as well as the delay time at which the system is to switch off. Sensor limit value monitoring is always active. Sensor limit :95% - 1% - 99% 100% = protection > 20mA off 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	- A(off) / E(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 b	e 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 di	y run protectio	n, in which the system will shut down when running dry.
If the pressure / level bel	ow or the corre	sponding digital input is operated, shut down due to "dry run".
If "Always" is selected, t	he dry run is al	so active in manual mode. No automatic restart after dry run!
dry run	:A	- A(off) / E(on)
dry delay	:180s	- 1s - 999s

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** -A(off) / F(on)

low water	:180s	- A(01) / E(01) - 1s - 999s
If necessary, select the flow a If the flow falls below or ope flow shortage is also active i flow shortage flow delay	shortage - protection, in wh erated the corresponding dig n manual operation. No aut A :180s	ch the plant is shut down for lack of flow. ital input is switched off due to "lack of fluid". If "Always" is selected, the omatic restart after flow shortage! - A(off) / E(on) - 1s - 999s
If necessary, select the maxim maximum detector maximum delay	mum detector function. The : O : 180s	maximum detector is only active in "Auto" mode! - A / S / W / O - 1s - 999s
A = off; O = top value; S = Stop, W = Restart.	the maximum detector is o when the upper value is re- when the maximum value Note ! No automatic rest The system is stopped whe Attention ! Automatic rest	ut of order No Text ached, the system is immediately de-regulated. Text "top value" is reached, the system is stopped. Text "Maximum value" art! n the maximum value is reached. Text "Maximum value" tart!
* If necessary, select the mir * minimum detector * minimum delay	himum detector function. Th : A : 180s	e minimum detector is only active in "Auto" mode! - A / S / W / R - 1s - 999s
A = Off; * R = control value S = Stop, W = Restart.	the minimum detector is or ; when the control value is r when the minimum value is Note ! No automatic rest The system is stopped whe Attention ! Automatic rest	at of order No Text eached, the system is immediately de-regulated. Text "Control value" s reached, the system is stopped. Text "Minimum value" art! n the minimum value is reached. Text "Minimum value" tart!
Enter the% value of the presset pressure value. Example: "0%" is set, the under-pressu In addition, the electronic pr If the pressure of at least 0.5 The dry run is also active in pressure monitor pressure monitor pressure delay	sure monitoring, in which th 50% of 4.0 bar. The under- ire monitoring is disabled. otection against dry running bar is not reached after 30 s manual mode. No automation :K :50% :180s	he system will shut down if the pressure deficiency. The% value refers to the pressure is from <2.0 bar active and switches to 3 minutes delay the pump. If i, in which the system will shut down if the dry run, are elected to do so. seconds, it will shut down due to "dry run". e restart after a under-pressure / dry run. - A(off) / E(On) / I(always) / K(Complete) - 0% - 100% 0% = off - 1s - 999s delay
	low- pressure has no fund low- pressure is active in low- pressure is active in low- pressure is electronic dry run (<0.5 H d ensures the safe shutdown lard with a submersible pure	ction automatic automatic and manual in automatic and manual active plus var in 30s) of the pump at low speed. The function is important to protect submersible p operation.
submersible pump guard Guard frequency Guard time	:A - A(off :25Hz - 25Hz :99s - 9s - 9)/ E(On) - 200Hz 9s
The leakage control ensures To protect submersible pump	the safe shutdown of the pu ps from overheating. The sw	mp at to higher switching frequency. The function is important for example, itching 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=off

8.9 adjust messages

messages

IN1-COM-04	: EAS
IN2-COM-05	: WMO
Relais-FUx	: GLO

Explanation of parameters:

Digital inputs 1-2: (4, 5)

The digital inputs are adjustable.

external inputs external inputs external inputs external inputs external inputs external inputs external inputs external inputs	:XXX :SO1 /SO2 :ZW1 /ZW2 :WMS /WMO :TRS /TRO :EAS /EAO :RSS /RSO :ESS /ESO :SIS /EIO	 no function set-point 1+2 (closer) counter Eingang (closer) low water (closer/opener) dry run (closer/opener) extern on /off (Closer/opener) Reset multiple possible (closer/opener) extern Trip (closer/opener) Failed main firse (Closer(opener))
external inputs external inputs external inputs external inputs external inputs	:THS :HNS :ANS :SMS :AKS	 Thermostat for bypass (opener) (firefighting) Hand refill (closer) output NSS Auto refill (closer) output NSS flow shortage (closer) battery operation (Closer)

Digital outputs 1- 2: (90 / 91, 92 / 93)

These outputs are not available in the basic version.

Inverter Relay : (AL1) (1 / 2, 11 / 12, 21 / 22)

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

relay	FU1-FUx	: xxx	 no function (free setting directly at the inverter) Global alarm (can be changed closer/opener) inverter Alarm (can be changed closer/opener)
relay	FU1-FUx	: ALO / ALS	
relay	FU1-FUx	: FAO / FAS	
relay	FU1-FUx	: GAO / GAS	 Global Alarm (can be changed closer/opener) low water (can be changed closer/opener) dry run (can be changed closer/opener)
relay	FU1-FUx	: WMS /WMO	
relay	FU1-FUx	· TRS / TRO	
relay relay	FU1-FUx FU1-FUx FU1-FUx	: DMS / DMO : BES /BEO	 - low pressure active (can be changed closer/opener) - operating signal (can be changed closer/opener)
relay	FU1-FUX FU1-FUX	: ODS/ LAO	 - Kun signal (Pump 1/2/3) (can be changed closer/opener) - maximum value (top value) active (can be changed closer/opener)

Password Code: xxx Parameter: xxx.xx save: Yes / No A V R

8.9 adjust communication

Communication

setpoint	: I	setpoint Minimum setpoint Maximum setpoint	: P : 20% : 80%
GSM / users	: A	GSM / users	: A
*Bluetooth	: A	*Bluetooth	: A

Password Code: xxx

Parameter: xxx.xx

save: Yes / No

Explanation of parameters:

Select the input for the set-point of the pressure control.

This feature gives them the opportunity to fill pressure "I" on your keyboard or "A" on a 4-20mA / 0-10V signal or "M" via Modbus pretend.

*With analog setpoint low sensor with the "SO" 4-20mA can handle.

This function is possible for controllers with / without frequency.

Is not active low sensor, the analog signal is used by the drive 0-10.

setpoint :I - I-Intern / A-Analog / P- Poti

Specify the limits for the analog setpoint range. Within these limits, the analogue setpoint can be adjusted.Minimum setpoint:20%- 0 - 50%Maximum setpoint:80%- 0 - 99%

Select the GSM - to function.

This function returns them to use the GSM function the way. SMS commands, refer to 10.3. GSM / users :A - (A) on / (E) off

*Select the Bluetooth function.

*This function	allows you to exchange	data via Bluetooth.
*Bluetooth	:A	- Aus / Ein

For a new phone card, enter the PIN.

system name : irrigation system number : +49155xxxxxxx	Set the phone book on the SIM - card: Enter the system - the names and the facilities - telephone number by one overwrite.With this name, the system reports via SMS. system name : irrigation (z.B.) system number : +49155123456789 (z.B.)
user 1: on +49150xxxxxxx user 2: off +49160xxxxxxxx user 3: off +49170xxxxxxxx user 4: off	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)
+49177xxxxxxx credit : *100# card Contract : Prepaid	Select the SIM - card Contract. With this, the SIM card - a management. SIM - card :Prepaid / contract

8.10 Setting the Phone Book:

To set the system name or phone number, press **SET / RESET button** on the ad.Use the **arrow key** \blacktriangle **button**, **arrow key** \checkmark **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** \vee **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...+*#...<

Special function: **=** delete Special function: **=** finish

Enter phone number Example:

Station number: +49	Number 1 is selected and confirmed with "OK".
Station number: +491 <mark>5</mark>	Number 5 is selected and confirmed with "OK".
Station number: +4915≤	Delete "<" is selected and the number "5" is deleted.
Station number: +491 <mark>6</mark>	Number 6 is selected and confirmed with "OK".
Station number:	End "!" Selected to complete the entry +491621234578 and confirm with "OK".
Station number: +491621234578	Entry ended.

Name and other users can be set as well.

Example User Off - On - Switch:

user x : off	"OK"
<u>user x : off</u>	"OK"
<u>user x : on</u>	" ▲ " or " ▼ "
user x : on	"OK"

8.11 Error messages GSM "error modem"

0	=	SIM telephone book incomplete. Causes: 1. All "Users" are set to "Off", 2. No valid "User" telephone number is entered
1	=	SIM lock: Enter PIN
2	=	Communication between EDS and modem interfered, received musks.
		Cause: Interference source or cable damaged?
3	=	S.O.
4	=	Problem with SIM card: No SIM inserted?
5.6	=	Signal strength interrogation (every 10 sec.) Interfered. Cause: Interference source or cable damaged?
7	=	No response to signal strength query (every 10 sec.): Modem disconnected or off?
11	=	SMS transmission failed (after 10 attempts).
		Causes: 1. Prepaid credit blank, 2nd card blocked at provider, 3. Invalid phone number on SIM
12	=	Timeout when reading or writing the SIM. One reason: too old and slow SIM or SIM removed?
13	=	Cable problem (when starting) detected: cable damaged?
14	=	Error acknowledgment from modem, cause depends on context
15	=	Communication between EDS and modem interfered, received musks.
		Cause: source of interference or cable damaged?
16	=	Modem in wrong mode. Possible cause: Modem was short-circuit-free. Solution: Re-enable GSM in the menu
20	=	"ERROR" from the modem when attempting to clean the SIM of SMS. Cause: SIM removed?

8.12 adjust Internal

Intern

operating hours reset : 0	Overheating On Temperature warning On Ventilator On Ventilator Off Frost warning On Heating On Heating Off frame Language Dynamic Threshold electronic protection electronic delay Version	: 55C : 45C : 35C : 30C : 0C : 5C : 10C : A : D : 000% : 5% : 30s : 2
	Factory reset	: 0

Password Code: xxx Parameter: xxx.xx save: Yes / No

Explanation of parameters:

If the values for the control cabinet temperature monitoring. This function protects the cabinet from overheating. - 55°C - 70°C (99°C=Off) overheating On :55C **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. - 25°C - 35°C Ventilator On :35C Ventilator Off - 20°C - 30°C :30C If the values for the control cabinet frost monitoring. This function protects the cabinet against frost or condensation. $-0^{\circ}C - 8^{\circ}C (9^{\circ}C = Off)$ **Frost warning On** :0C The cabinet heater is at the set temperature and off. This function depends on prior to installation. **Heating On** : 5C - 1°C - 15°C :10C - 6°C - 20°C **Heating Off** To the frame on the display appears around the display foil stick better (active until power "Off"). frame :A - E / A Set the menu language. Language : E - German / English The dynamic threshold is active when the pressure switch operation. Special mode without conservator. **Dynamic Threshold** :0% - 0 - 100% The electronic protection monitoring for dry running. Special function in target guardian. electronic protection :5% - 0 - 50% - 0 - 99s :30s electronic delay Enter the polarity of the DS board. - 1 / 2 Version :2 Enter to clear the total hours of the code. (Code: Ask the manufacturer) operating hours reset :0 - 0 ..Code" Enter the time for the under-voltage delay is to the frequency set to failure. - 0-999s under-voltage delay :30s Enter the time for the display backlight. In setting 0s the light is switched on permanently. Light (Display) :180s - 0 -999s This function gives you the possibility to adjust the contrast of the display. **Display contrast** :41% - 0 - 99% The custom settings are saved or loaded. Save / load settings - L(laden) / S(save) / A (Aus) ٠A The MB-debug-S status indicates internal error. There is no setting. Debug - internal use only :0 Select whether the system works with or without expansion vessel. **Expansion vessel.** :Y - no / yes

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 error - 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	error	no
Modbus	Modem	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	Er051P1	Er051P1
Er051P2	Hand P2	Er051P2

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

9.2 Error Messages Inverter

The error "Er001" to "Er199" are error messages. The red LED lights. The alarm relay switches. Display examples:

Terminar Reset Teset.		
Auto P1	Er004P1	Er004P1
$F_{r} \cap 0 / D^{2}$	Hand D2	$E_{r}00/1P_{2}$
E1004F2	naliu F2	E1004F2
error Er002 · Motor over		
Motor protection tripping. Redu	ice pump performance. Set motor protectio	n!
error Er003 : Over-volta	ge in the DC link with frequency (O.E.)	
Generator operation, power surg	ge, check check valves. Call service!	
error Er004 : Phase error	r power input (P.F1)	
Phase failure. Check the fuses.	Check mains voltage.	
error Er005 : Overload i	nverters (O.L1)	
error Fr006 : under-volt	age (L LL)	
Grid voltage fault. Check fuses,	check mains voltage.	
error Er007 : Inverter ov	er temperature (O.H.)	
Inverter is too hot. Reduce carri	er frequency. Cooling defective??	
error Er008 : Overload i	nverters (O.L2)	
error Er009	I frequency (Err) ?	
Motor load too low during oper	ation Increase engine power! Pumps delive	er too little?
error Er011 : External fa	ult ESP	
Enter Wrong password on the fr	requency	
error Er012 : incorrect p	assword frequency (ERR1)	
Frequency defective. FU exchai	nge. Call service!	
Error Er013 : Errors mot	or parameters ERR2	
error Er014 : Over curre	nt at standstill ERR3	
Motor load at a standstill too high	gh. Pump is blocked! Call service!	
error Er015 : Fault curre	nt measurement ERR4	
Frequency defective. FU exchan	nge. Call service!	
error Er016 : Motor over	rload (OC1)	
error Fr017 · Phase error	r motor (PE0)	n!
Motor phase interrupted Check	motor cable check motor	
error Er018 : Broken wit	re analog signal (AErr)	
Inverter set at the factory setting	g! Call service!	
error Er019 : Under load	l frequency (EP3)	
Motor load too low during oper	ation. Increase engine power! Pumps delive	er too little?
error Er020 : Under load	I Irequency (EP)	er too little?
error Er021 · Under load	frequency (EP2)	
Motor load too low during oper	ation. Increase engine power! Pumps delive	er too little?
error Er022 : Sleep mod	e nP	
Inverter set at the factory setting	g! Call service!	
error Er023 : Inverter pa	rameter incorrect (ERR5)	
error Fr026 Ground fai	g! Call service!	
Check the wiring, the inverter a	nd the drive! Call service!	
error Er032 : Incorrect in	nverter parameters! (PCE)	
Inverter set at the factory setting	g! Call service!	
error Er035 : Error PTC	tripping (O.H1)	
The PTC thermistor has tripped	. Reduce engine power. Improve cooling.	
Inverter set at the factory setting	rameter incorrect (ERK5)	
error Er045 Communic	ation error with the frequency inverter (CF	3)
ModBus address wrong; ModB	us connection faulty. Check connection or a	address?
error Er046 : Master - Sl	lave connection defective (FL)	
F930 is not set correctly. Check	Check keypad setting at FU	
error Er047 : EEPROM	error in frequency (EEEP)	
error Fr049 Watchdog	an service! error (Em6)	
Check inverter settings! call ser	vicel	
error Er050 : Error torqu	ie control (?)	
Check inverter settings!	· ·	

error Er053 : Communication error with the drive to the control panel (CE1) F930 is not set correctly. Setting the FU check Check keypad! error Er067 : Inverter parameter wrong (OC2) Inverter set in factory setting! call service! Error MA Controller error Er101 : Communication error with the frequency inverter ModBus address wrong; ModBus connection faulty. Check connection or address? : Transducer 1 open error Er102 The transducer connection is open. Check cable connection! : Error Transducer 1 error Er103 The transducer value is out of tolerance. . The transducer is defective? error Er104 : Transducer 2 open The transducer connection is open. Check cable connection! error Er105 : Error Transducer 2 The transducer value is out of tolerance. . The transducer is defective? : Error sensor difference error Er106 The values between transducer 1 and transducer 2 are outside the set tolerance. The transducer is defective? Error low pressure error Er107 The internal pressure failure triggered .. Check water level setting or the water supply! error Er108 Error dry run electronically The run-dry protection has tripped .. Check water supply! error Er109 : Error low water externally The external low water protection has tripped .. Check water level setting or the water supply! error Er110 : Error dry run externally The external dry-running protection has tripped .. Check water supply! error Er111 : Error limit pressure The limit pressure is exceeded. Check system. Setting the limit pressure! : Error Not stop (SMS) error Er112 The plant was set via SMS to emergency stop. A reset is only possible on the system : Error lower limit error Fr113 The set lower limit value is exceeded. Check system. Setting the limit! : External fault (Dig. Input) error Er114 An external fault was triggered. The SMS message can be used for monitoring of external equipment. error Er115 : Error chaining The chaining of individual regulator is faulty longer than 99 min. Check the chain or chains consider setting! error Er116 On / Off Inverter missing (software)) Dig. Inverter input is missing, defective, or not configured. Call service! error Er117 : Error Modem An error has occurred for a modem connection. Call service! error Er118 : flow shortage The set flow is exceeded. Check system. Set flow limit! error Er119 : Error switching The switching frequency has been exceeded; stroke operation. Check non-return valves. Call service! Error maximum runtime error Er120 The maximum runtime is exceeded. Check the running time setting, or leakage, or non-return valves. : Error submersible pump error Er121 The submersible pump monitor has tripped. Increase water consumption. Check non-return valves. error Er122 : Overheating Cabinet (Warning / Shutdown) The cabinet has overheated. Check fans. Improve cooling. : Temperature Warning Sensor 2 error Er123 The temperature limiter has tripped. The SMS message can be used for frost protection monitoring. error Er124 : Error PTC tripping (software) PTC The PTC thermistor has tripped. Reduce engine power. Improve cooling. : Error over temperature PT100 (Software) **PT100** error Er125 The PT100 has tripped. Reduce engine power. Improve cooling. error Er126 : Error external motor protection External motor protection tripping. Reduce pump performance. Set motor protection! : Error failed main fuse error Er127 External fuse failure. Check the main fuse! : Error test run error Er128 The test run has not been completed without error. Check the system! : battery operation error Er129 The battery operation is active. Check the power supply! error Er131-179 : free error Er190-Er199 : 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 DOH Pump 1	1:17:08 1:17:08			

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 10sec. pressed!

> Messages in the display: ER01 18-01-13 13:59 ER04 19-01-13 11:59

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:

-The manual mode can be enabled with pump

-The programming process is not completed at a controller -A pump is at fault.

29

10. Expert mode

10.1 Zero flow cut-off

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 - 90% 50% Recommendation: 60%

1 - 99%	50%	Recommendation: 60%.
1 - 99%	50%	Recommendation: 50%.
	1 - 99% 1 - 99%	1 - 99% 50% 1 - 99% 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.

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	35
3.00 DF 82 50	
P1: 041Hz, 017,2A,	34C
P2: 000Hz, 000,0A,	29C

10.2 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 minimise 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.

10.3 expert site

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

Т	= Test	phase	value =	1-99
1	1030	phase	varue	1))

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 put	mp status:	Output freq	uency, motor	current, free	juency tem	perature
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T 000 = testing phase currently 0.00 = current pressure	T 00 LF 00 50 35 3.00 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 35 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

10.5 SMS commands

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	NOTSTOP
Start test run	TEST

SMS commands the MA - control mode "pressure, level, temperature":

If the emergency stop is triggered, no SMS reset is possible! The reset is only possible directly at the control unit!

11. customer settings :

Date: _____