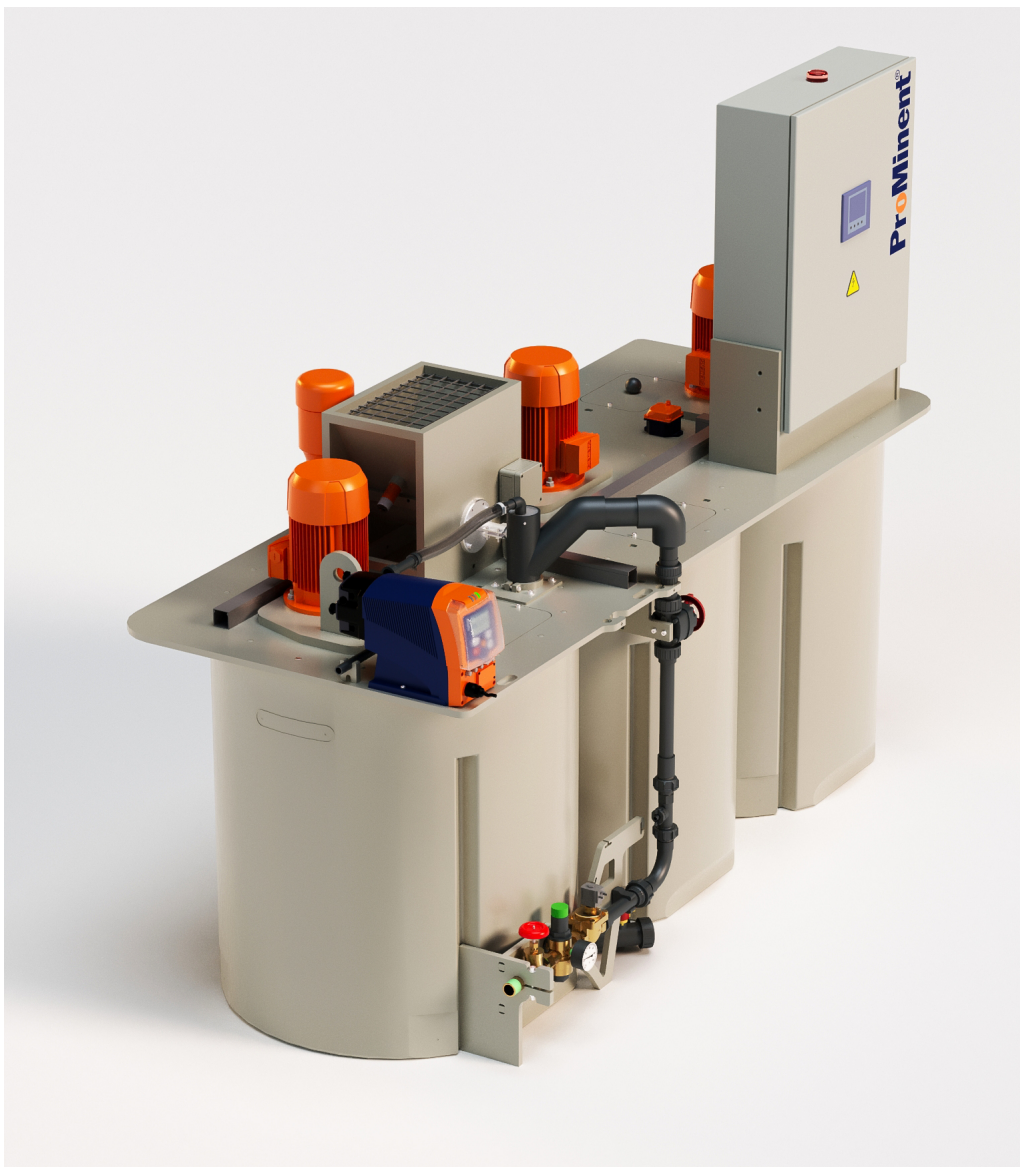


Assembly and operating instructions

DULCODOS® ULFb

Continuous flow system

EN

Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. The document is always aimed equally at women, men and gender-neutral persons. We kindly ask readers for their understanding in this simplification of the text.

Supplementary information

➡ Please read the supplementary information in its entirety.

Information



This provides important information relating to the correct operation of the unit or is intended to make your work easier.

Warning information

Warning information includes detailed descriptions of the hazardous situation, see 🔗 *Chapter 2.1 'Labelling of Warning Information' on page 9.*

The following symbols are used to highlight instructions, links, lists, results and other elements in this document:

Tab. 1: More symbols

Symbol	Description
1. ➡	Action, step by step.
⇒	Outcome of an action.
🔗	Links to elements or sections of these instructions or other applicable documents.
■	List without set order.
[Button]	Display element (e.g. indicators). Operating element (e.g. button, switch).
'Display/GUI'	Screen elements (e.g. buttons, assignment of function keys).
CODE	Presentation of software elements and/or texts.

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1 Product identification

1.1 DULCODOS ULFb identity code

Tab. 2: DULCODOS ULFb identity code

Version					
S	Standard version				
P	Premium version				
C	Customised version				
		Preparation volume / maturing time 60 and 45 min.			
	0500	Continuous flow system / 500 l/h / 625 l/h			
	1000	Continuous flow system / 1000 l/h / 1250 l/h			
	2000	Continuous flow system / 2000 l/h / 2500 l/h			
	4000	Continuous flow system / 4000 l/h / 5000 l/h			
	6000	Continuous flow system / 6000 l/h / 7500 l/h			
	8000	Continuous flow system / 8000 l/h / 10000 l/h			
	10000	Continuous flow system / 10000 l/h / 12500 l/h			
		Construction			
	N	Input on left / output on right			
	M	Input on right / output on left / components mirrored			
			Powder type		
		0	Without powder metering		
		C	Cationic powder		
		A	Anionic powder / gear stirrer chamber 1		
			Stirrers / propellers (PP and PS) and motors (Innomotics/SI and AM)		
		1	Prop. PP Si/In-Mot. 500-2000		
		2	Prop. PS+PP Si/In-Mot. 4000-10000		
		3	Prop. PS Si/In-Mot. 500-10000		
		4	Prop. PP AM-Mot. 500-2000		
		5	Prop. PS+PP AM-Mot. 4000-10000		
		6	Prop. PS AM-Mot. 500-10000		
			Electrical connection		
		A	380 - 420 V AC, 50 Hz, (3-phase, N, PE)		
		B	440 - 480 V AC, 60 Hz, (3-phase, N, PE)		
			Control		
		0	PLC+HMI Siemens S7-1200		
		1	PLC S7-1200 with PROFIBUS® + DP/DP coupler		
		2	PLC+HMI Siemens S7-1200 with Profinet (PN/PN coupler)		
		3	PLC+HMI Siemens S7-1200 with Modbus TCP		
		4	With terminal box / without control cabinet		
		5	PLC+HMI Schneider TM 241		
		6	PLC+HMI Schneider TM 241 with Profibus (DP slave)		
		7	PLC+HMI Schneider TM 241 with Profinet IO		
		8	PLC+HMI Schneider TM 241 with Modbus TCP		
			Level gauge		
		P	Pressure sensor		
		D	Dulcolevel radar sensor		

										Electrical options	
										0	none
										1	Overflow sensor for chamber 3
										2	External concentration setting via 4-20 mA signal
										3	Combi metering (powder and liquid) - special software
										4	Control ext. chemical transfer pump
										5	Control cabinet with higher degree of protection / plastic housing IP65
										Mechanical options	
										0	none
										1	Drainage pipework for 500 - 10000 l/h (automatically selected)
										Powder feeder unit	
										P0	none
										PX	Drainage pipework for 500 - 10000 l/h (automatically selected)
										Vibration motor for powder feeder unit	
										1	none
										0	With vibration motor for powder feeder unit
										Add-on hopper + powder conveyor	
										0	none
										1	With 50 l add-on hopper (for 500/1000/2000)
										2	With 75 l add-on hopper (for 4000/6000)
										3	With 100 l add-on hopper (for 8000,10000)
										4	With 50 l add-on hopper and conveyor FG205 (for 500/1000/2000)
										5	With 75 l add-on hopper and conveyor FG205 (for 4000/6000)
										6	With 100 l add-on hopper and conveyor FG205 (for 8000/10000)
										7	With adapter cover and conveyor FG205
										8	With 30 l add-on hopper (for 500/1000/2000)
										9	With 30 l add-on hopper and conveyor FG205 (for 500/1000/2000)
										Liquid concentrate pump	
										L0	none
										L1	With DFXa (500 - 2000) and Sigma (4000 - 10000) l/h
										L2	With Spectra 4000 - 10000 l/h
										L3	Prepared for Spectra 4000 - 10000 l/h
										L4	With DFBa peristaltic pump 4000 - 10000 l/h
										Monitoring of liquid concentrate	
										0	none
										1	With capacitive sensor for ext. concentrate tank
										2	With flow sensor for Spectra
										3	With 1 and 2 for Spectra
										Flushing system	
										1	Y-flushing system PVC 500 - 10000 l/h (automatically selected)

[illegible]

2 Safety and responsibility

About this product

The polymer preparation system DULCODOS® ULFb is a continuous flow system and processes powdered and liquid polymers to produce a matured polymer solution.

Automatic operation guarantees consistent and reliable preparation with minimal product carry-over.

Fields of application:

- Sludge dewatering and sludge thickening
- Waste water treatment (industry and local authorities)
- Drinking water treatment

2.1 Labelling of Warning Information

Introduction

These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed warning information and are provided as clear step-by-step instructions.

The warning information and notes are categorised according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.



DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

Description of hazard

- Denotes an immediate threatening danger. If the situation is disregarded, it will result in fatal or very serious injuries.



WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

- Denotes a possibly hazardous situation. If the situation is disregarded, it could result in fatal or very serious injuries.



CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries. Material damage.

Measure to be taken to avoid this danger.

- Denotes a possibly hazardous situation. If the situation is disregarded, it could result in slight or minor injuries. May also be used as a warning about material damage.



NOTICE!

Nature and source of the danger

Damage to the product or its surroundings.

Measure to be taken to avoid this danger.

- Denotes a possibly damaging situation. If the situation is disregarded, the product or an object in its vicinity could be damaged.



Type of information

Hints on use and additional information.

Source of the information. Additional measures.

- *Denotes hints on use and other useful information. It does not indicate a hazardous or damaging situation.*

2.2 Intended use



WARNING!

Danger caused by incorrect use!

Incorrect use of the DULCODOS® ULFb system can result in hazardous situations.

- The DULCODOS® ULFb system is only designed to produce a polymer solution as a flocculation aid from powdered polymer or liquid concentrate with drinking water.
- All other uses or a modification of the system are only permitted with the written authorisation of ProMinent GmbH, Heidelberg
- The system is not designed for use in areas at risk from explosion!
- The correct and proper operation of the system cannot be guaranteed if non-genuine parts or third-party accessories are used.
- Please observe the relevant national regulations and the information provided in the operating instructions at all phases of the system's life!
- Only permit adequately qualified personnel to operate the DULCODOS® ULFb system

2.3 Users' qualifications



WARNING!

Danger of injury with inadequately qualified personnel!

The operator of the plant / device is responsible for ensuring that the qualifications are fulfilled.

If inadequately qualified personnel work on the unit or loiter in the hazard zone of the unit, this could result in dangers that could cause serious injuries and material damage.

- All work on the unit should therefore only be conducted by qualified personnel.
- Unqualified personnel should be kept away from the hazard zone

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from ProMinent or another authorised distribution partner.
Trained qualified personnel	A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognize possible hazards based on his/her training, knowledge and experience, as well as knowledge of pertinent regulations. The assessment of a person's technical training can also be based on several years of work in the relevant field.
Electrician	Electricians are deemed to be people, who are able to complete work on electrical systems and recognize and avoid possible hazards independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations. Electricians should be specifically trained for the working environment in which they are employed and know the relevant standards and regulations. Electricians must comply with the provisions of the applicable statutory directives on accident prevention.
Customer Service department	Customer Service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the system.



Note for the system operator

The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to!

2.4 Safety information for the DULCODOS® ULFb



WARNING!

Personnel qualification

Danger due to incorrect operation of the system

The operating personnel must be instructed by a ProMinent service technician! (This must happen during initial commissioning)

The operating instructions must be available by the system!



WARNING!

Danger of electrocution!

Possible consequence: fatal or very serious injuries

Make sure that the control cabinet is always locked during operation.

Ensure that the main switch is set to "0" and secured against restarting before any installation or maintenance work can begin.



CAUTION!

Propellers are rotating in the tanks!

Slight or minor injuries.

Switch off the system and only then remove the screwed cover of an inspection opening!



CAUTION!

A conveyor screw and a release wheel are located under the safety guard of the dry material feeder!

Slight or minor injuries. Material damage.

Do not reach into the dry material feeder.



CAUTION!

Hot surface!

Incorrectly set heating on the feeder screw pipe may become hot!

Ensure that the feeder screw pipe heating is correctly set!

2.5 Description and testing of safety equipment

Safety equipment

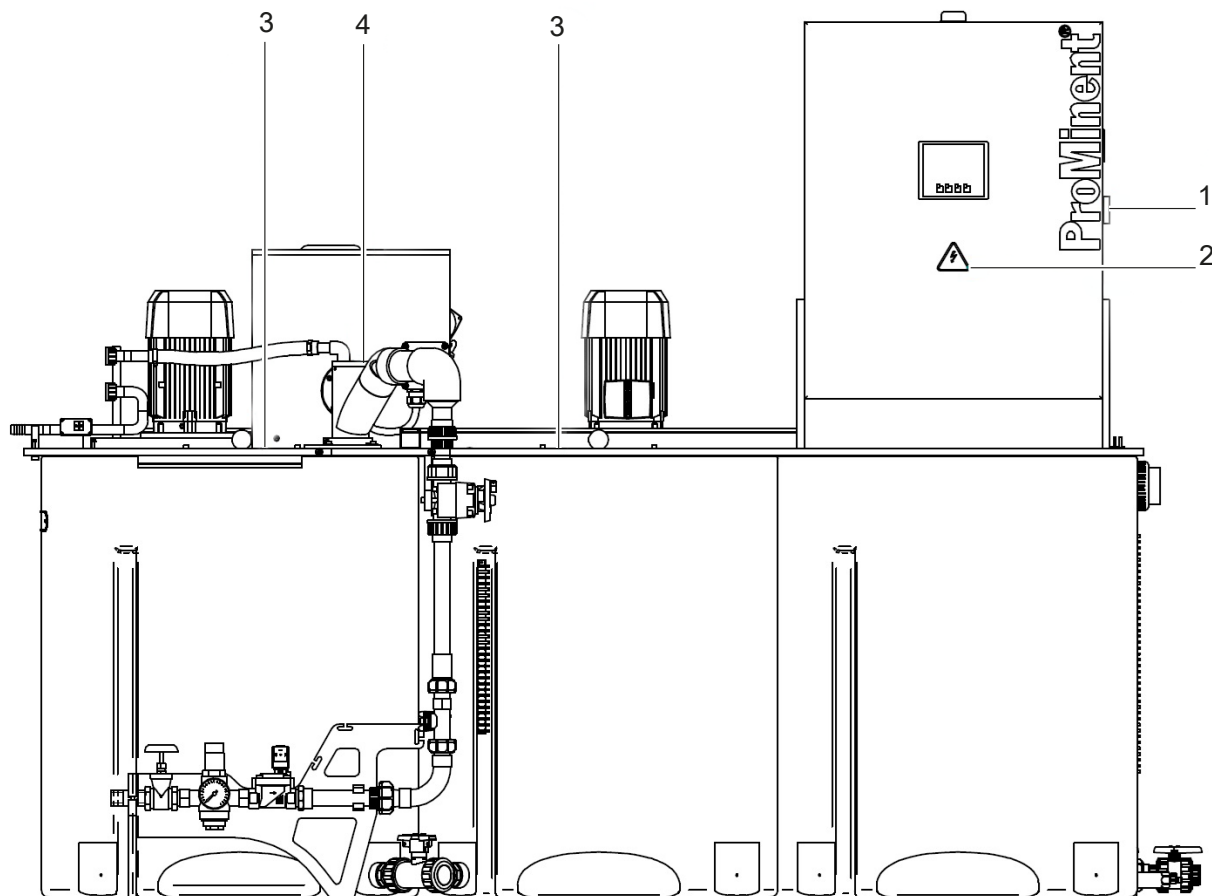


Fig. 1: Safety equipment - ULFb 1000 with DFXa pump and dry material feeder with Y-pipework

- 1 Main switch
- 2 "Warning of hazardous electrical voltage" warning label
- 3 Cover of inspection openings with "Warning of injury to hands" warning label
- 4 "Warning of hot surfaces" warning label

Main switch

The red-yellow main switch on the right-hand side of the control cabinet de-energises the system and any connected units.

Test: while all parts of the system are working, switch the main switch to 'Off' - all of the parts must stop - all the lights must go out.

Covers of inspection openings

The screw covers of the inspection openings prevent people injuring their hands on the rotating propellers of the stirrers.

Test: Check that the covers of the inspection openings are in place and secured with screws

Dry material feeder heating

We use a heating system that prevents the penetration of moisture to heat up the outlet of the feeder screw pipe.

Test: make sure that the heating sleeve is firmly attached to the feeder screw pipe and that the cable insulation is undamaged.



Required CE labelling measures

2.6 Sound Pressure Level

The sound pressure level is < 70 dB (A) for powdered polymer, according to EN ISO 11202:1997 (Acoustics - Noise emission from machinery and equipment)

3 Transporting and storing the system

User qualification: instructed user, see  Chapter 2.3 'Users' qualifications' on page 11

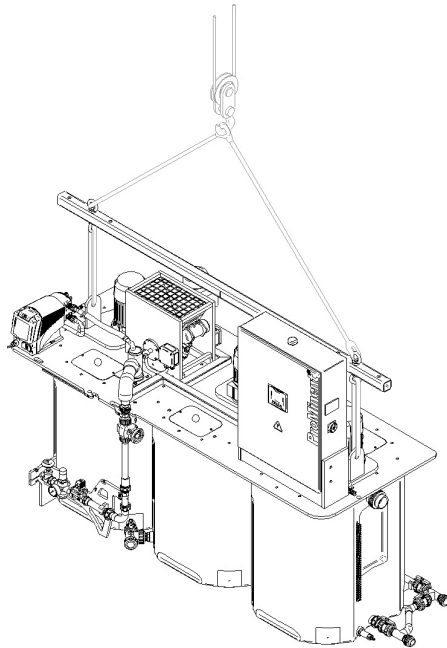


Fig. 2: Lifting the ULFb 500 - 2000



WARNING!

Heavy weight of the system

Possible consequence: death or severe injuries if the floor cannot support the system and breaks.

Measure: ensure that the floor of the installation site can support the weight of both the empty and full system.

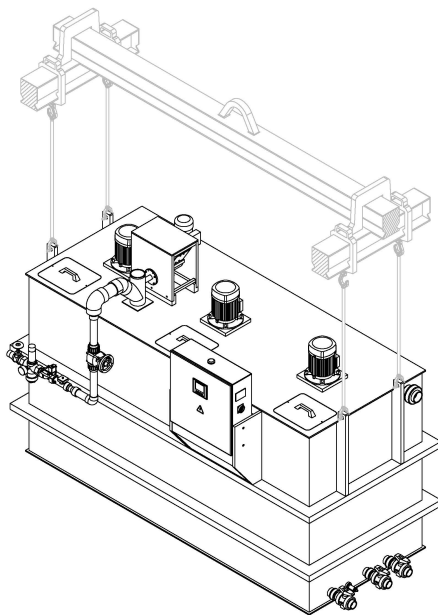


Fig. 3: Lifting the ULFb 4000 - 10000



WARNING!

Never stand under suspended loads

Possible consequence: fatal or very serious injuries

- Walking or standing under suspended loads is prohibited
- Secure the ULFb system when lifting and transporting it to prevent it from slipping or tipping over
- Use suitable and approved lifting equipment. Observe the information given in the data sheets for the lifting equipment
- DULCODOS® ULFb systems of type 4000 and 8000 may only be lifted with a beam if they are fitted with lifting lugs. Ensure that the length of the beam is at least 10 - 20 cm longer than the tank



CAUTION!

Possibility of damage to the system during transport

Improper transport can result in damage to the system.

- Only move the DULCODOS® ULFb system when empty
- Ensure that there are not point loads on the tank wall
- Avoid heavy vibration and impact loads
- Only use suitable hoisting and lifting equipment to move the system
- When using forklift trucks, use long forks, which extend across the entire depth of the tank
- If using a crane, attach the slings, even if lifting lugs are fitted, to avoid shear forces

Ambient conditions for storage and transport

Permissible ambient temperature: +5 °C up to +50 °C.



NOTICE!

Important:

Do not store the system outside in the standard packaging used for truck transport!

Storing the system outdoors should only be done in optional non-standard packaging designed specifically for this.

Avoid the following influences:

- Humidity
- Rain, hail or condensation
- Dust and storm
- Frost and cold
- Overheating
- Direct sunlight and UV radiation

4 Information on the system

The ProMinent ULFb is an automatic polyelectrolyte preparation system.

The DULCODOS® ULFb polymer preparation system is a continuous flow system and processes powdered and liquid polymers to produce a matured polymer solution.

Automatic operation guarantees consistent and reliable preparation with minimal product carry-over.

Fields of application:

- Sludge dewatering and sludge thickening
- Waste water treatment (industry and local authorities)
- Drinking water treatment

4.1 Design

Fully automatic preparation of commercially available polymers

Concentrations

The following concentrations can be set using the control of the DULCODOS® ULFb systems:

- Powder metering from 0.05% to 0.5%
- Liquid concentrate metering from 0.05% to 1.0% with a 50% active ingredient

Types of powder

The following types of polymer can be processed:

- Cationic or anionic types

However, the viscosity of the polymer solution produced must not exceed 1500 mPas, as the integral stirrers would be overloaded. Please refer to the polymer suppliers' application data sheets for information about the viscosity of the different polymer solutions.



Guarantee the required flow of raw water to make full use of the preparation range.

Refer to the technical data table ↗ Further information on page 19.

Maturing times

The systems are designed for a maximum maturing time of 60 minutes. Maturing times of 45 minutes can also be achieved with correspondingly higher feed water volumes and the use of faster maturing powdered polymers.

Liquid polymers can be prepared with maturing times of 15 or 30 minutes.

Extraction rates

The capacities of the systems range from 500 l/h to 10,000 l/h.

4.2 Technical data



Please refer to the dimensional drawing for the precise dimensions of your DULCODOS ULFb system

Tab. 3: DULCODOS ULFb

Parameter	Unit	Values						
Max. extraction rate with a maturing time of 60 min.	l/h	500	1000	2000	4000	6000	8000	10000
Raw water feed required	l/h	750	1500	3000	6000	9000	12000	15000
Max. extraction rate with a maturing time of 45 min.	l/h	625	1250	2500	5000	7500	10000	12500
Raw water feed required	l/h	937	1875	3750	7500	11250	15000	18750
Max. extraction rate with a liquid maturing time of 15 min. *	l/h	875	1750	3500	7000	10500	14000	17500
Raw water feed required *	l/h	1313	2625	5250	10500	15750	2100	26250
* Special version								
Polymer solution concentration	max. 0.5% for powdered polymer / max. 1.0% for liquid polymer							
Viscosity of the polymer solution	max. 1500 cP as standard, higher viscosities available on request							
Raw water quality	Drinking water or softened water							
Raw water input pressure	bar	3...5	3...5	3...5	3...5	3...5	3...5	3...5
Approx. length	(mm)	2100	2300	2750	3301	4120	4605	5500
Approx. width	(mm)	900	950	1175	1456	1651	1910	2100
Approx. height	(mm)	1560	1800	2040	2182	2182	2100	2100
Weight when empty	(kg)	170	380	420	600	900	1200	1600
Total weight with water	(kg)	670	1380	2420	4600	6900	9200	11600
Raw water connector	Inch	1	1	1	1 1/2	1 1/2	2	2
Extraction/product connector	DN	25	25	32	40	40	65	80
Liquid polymer connector	DN	15	15	15	20	20	25	25
Overflow connector	DN	DN 40	DN 50	DN 50	DN 65	DN 65	DN 80	100
Nominal voltage/3-phase frequency / N / PE	V AC/Hz	400/50	400/50	400/50	400/50	400/50	400/50	400/50
		460/60	460/60	460/60	460/60	460/60	460/60	460/60
Approx. power consumption	kW	1.5	2.6	3.2	5	5	9.5	12
External fuse	A	32	32	32	32	32	32	32
ULFb degree of protection		IP 55 **	IP 55 **	IP 55 **	IP 55 **	IP 55 **	IP 55 **	IP 55 **
** IP54 for 460 V AC/60 Hz with ventilation								

Information on the system

Parameter	Unit	Values						
Max. extraction rate with a maturing time of 60 min.	l/h	500	1000	2000	4000	6000	8000	10000
** without powder conveyor								
Powder feeder unit		Dry material feeder 11	Dry material feeder 11	Dry material feeder 18	Dry material feeder 55	Dry material feeder 55	Dry material feeder 110	Dry material feeder 110
Max. dosing rate	kg/h	11	11	18	55	55	110	110
Material no.		1036201	1036201	1020800	1021030	1021030	1021031	1021031
Liquid polymer pumps								
DFXa / Sigma S2Cb		DFXa 0565	DFXa 0565	DFXa 0565	S2Cb 07120	S2Cb 07120	S2Cb 07220	S2Cb 04350
Max. dosing rate	l/h	65	65	65	120	120	220	350
Material no.		1116369	1116369	1116369	1115591	1115592	1115592	1115593
Spectra		12/13 F	12/33 F	12/100 F	12/100 F	6/300 F	6/300 F	6/650 F
Max. dosing rate		13	33	100	100	300	300	650
Material no.		1025285 and 1125067	1025286 and 1125069	1025287 and 1125070	1025287 and 1125070	1025288 and 1125071	1025288 and 1125071	1025289 and 1125072
DFBa					016C41	016C43	016C43	016C43
Max. dosing rate	l/h				188	381	381	381
Material no.					1075894	1115895	1115895	1115895
Level gauge								
Pressure sensor / 4-20 mA		IFM PM1608	IFM PM1608	IFM PM1608	IFM PM1608	IFM PM1608	IFM PM1608	IFM PM1608
Material no.		1103520	1103520	1103520	1103520	1103520	1103520	1103520
optional: Radar sensor / 4-20 mA		Dulcolevel	Dulcolevel	Dulcolevel	Dulcolevel	Dulcolevel	Dulcolevel	Dulcolevel
Material no.		1124074	1124074	1124074	1124074	1124074	1124074	1124074
Flow measurement								
Vortex type / 4-20 mA		210.92544 1K	210.92544 1K					
Material no.		1110206	1110206	1110206	1110206	1110206	236.932441K	IFM SM9000
						or 1141165	1141165	1105213
Stirrers								
Standard version								
RPM 750/900 / 8-pin / IP55	Efficiency	IE2	IE2	IE3	IE3	IE3	IE3	IE3
Chamber 1								
Output at 50/60 Hz	kW	0.25 / 0.33	0.55 / 0.68	0.75 / 0.86	1.1 / 1.27	1.1 / 1.27	2.2 / 2.55	3.0 / 3.45
Chambers 2 and 3								

Parameter	Unit	Values						
Max. extraction rate with a maturing time of 60 min.	l/h	500	1000	2000	4000	6000	8000	10000
Output at 50/60 Hz	kW	0.18 / 0.25	0.55 / 0.68	0.75 / 0.86	1.1 / 1.27	1.1 / 1.27	2.2 / 2.55	3.0 / 3.45
Gear version								
RPM 70/84 / 4-pin / IP55	kW	0.37	0.37	0.37	0.75	0.75	1.1	1.5
only for chamber 1 / anionic powder								
Miscellaneous								
Connecting cable								
For pressure sensor, capacitive sensors		IFM EVC005						
Identical for all types		1117428						

5 Construction and function

5.1 Construction of the system

All system parts for powder storage, powder metering, wetting, dissolving and maturing of the powder polymers are combined in a compact unit.

The ULFb system is assembled using the identity code from the following functional units:

5.1.1 DULCODOS ULFb 0500 - 2000

The round tank design of the DULCODOS ULFb 0500 - 2000 consists of 3 rotationally sintered beige PE-LD tanks.

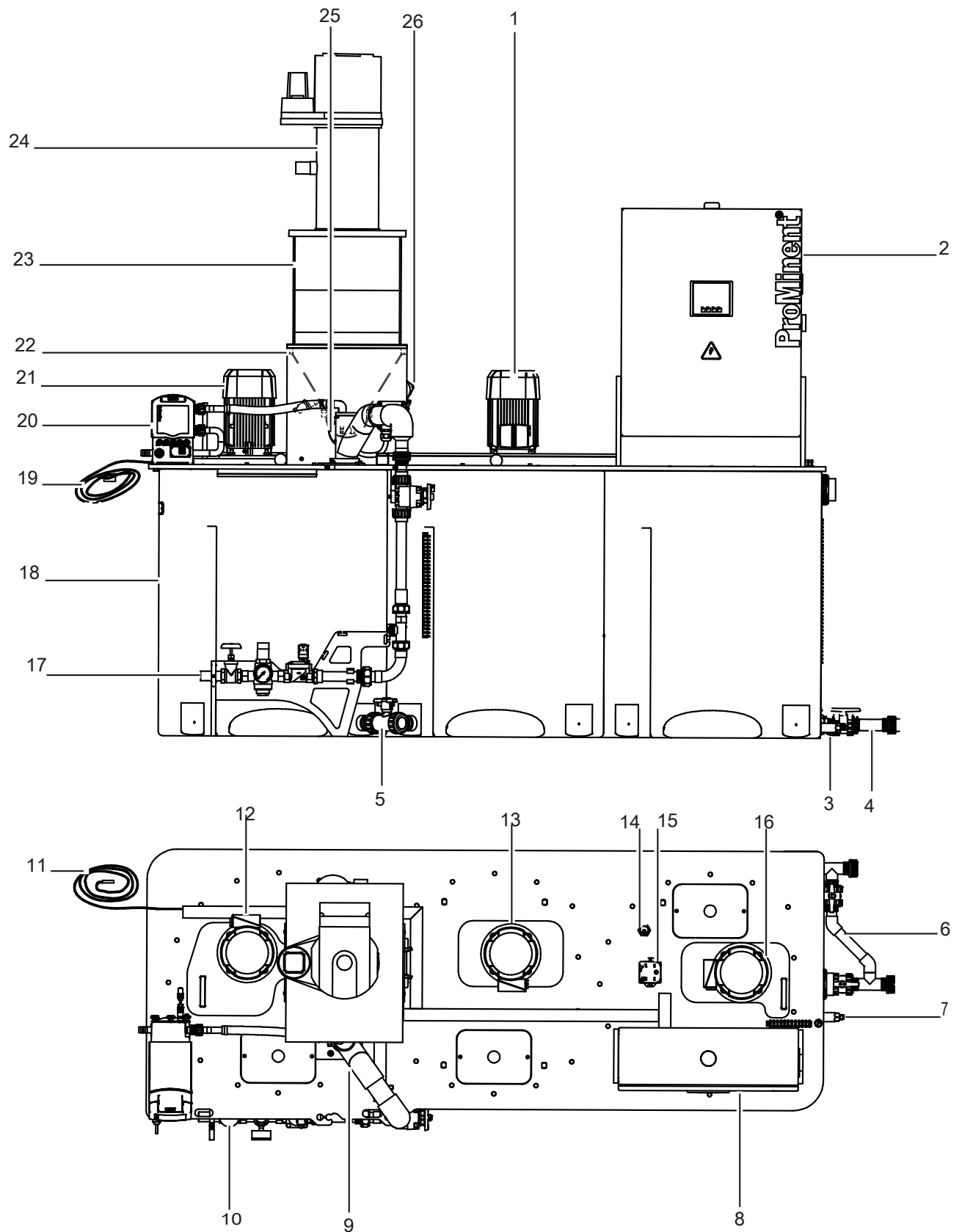


Fig. 4: Overview of the ULFb

Tab. 4: Positions and description - ULFb 500-2000

Pos .	Description	Type
1	Stirrer 2	Standard
2	Control cabinet	Standard
3	Pressure sensor (level measure- ment)	Standard
4	Product outlet	Standard
5	Chamber 1 +2 con- nection	Standard
6	Chamber 1 +2 drain	Standard
7	Pressure sensor (level measure- ment)	Standard
8	Control cabinet	Standard
9	Y-flush system	Standard
10	Water pipework	Standard
11	Concentrate tank sensor	Optional
12	Stirrer 1	Standard
13	Stirrer 2	Standard
14	Overflow sensor	Optional
15	DULCOLEVEL radar sensor (level measurement)	Optional
16	Stirrer 3	Optional
17	Water pipework	Standard
18	Preparation tank with 3 chambers	Standard
19	Concentrate tank sensor	Optional
20	Liquid concentrate pump	Optional
21	Stirrer 1	Standard
22	Dry material feeder	Optional
23	Add-on hopper	Optional
24	Powder conveyor	Optional
25	Heating sleeve	Optional
26	Powder sensor	Optional

5.1.2 DULCODOS ULFb 0500 - 10000

The rectangular design is made of beige-coloured reinforced welded PP panels.

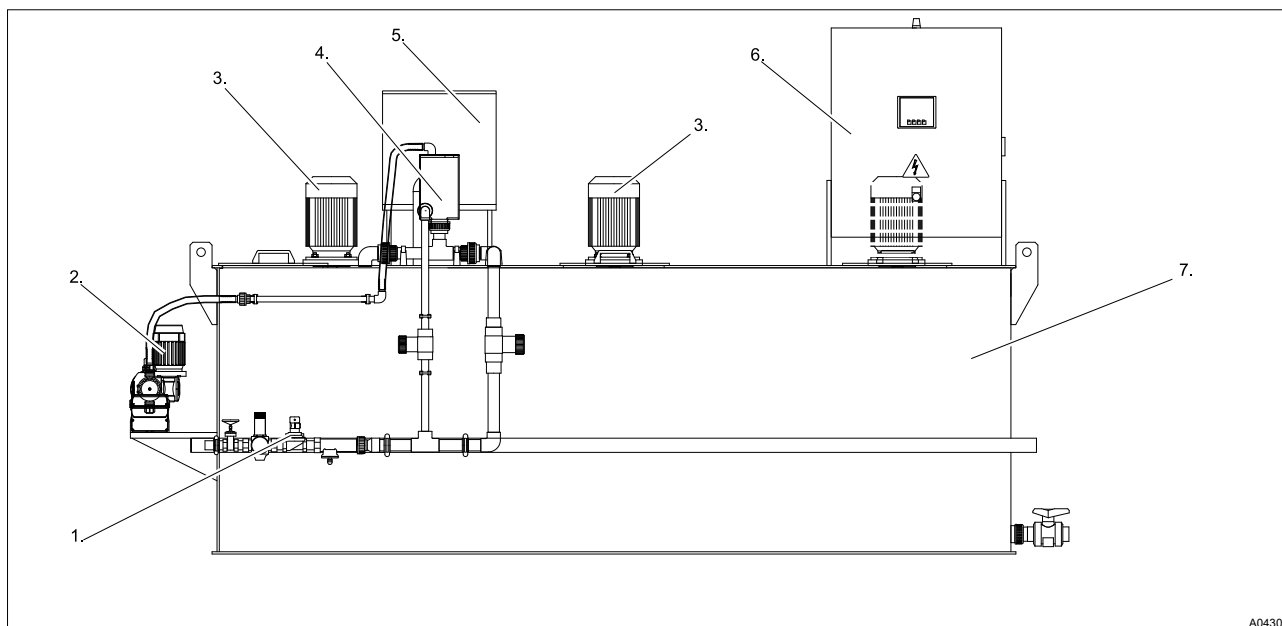


Fig. 5: Construction of the system

- | | |
|--------------------|-----------------------|
| 1 Water pipework | 5 Powder feeder unit |
| 2 Concentrate pump | 6 Control cabinet |
| 3 Stirrers | 7 Triple chamber tank |
| 4 Flushing system | |

Materials of the ULFb 500 – 10000

PVC-U or PP materials are available for the flushing systems and water pipework.

The seals are made of EPDM as standard.

5.2 Description of the assemblies



The assemblies are only available if they have been selected with the identity code.

5.2.1 3-chamber preparation tank

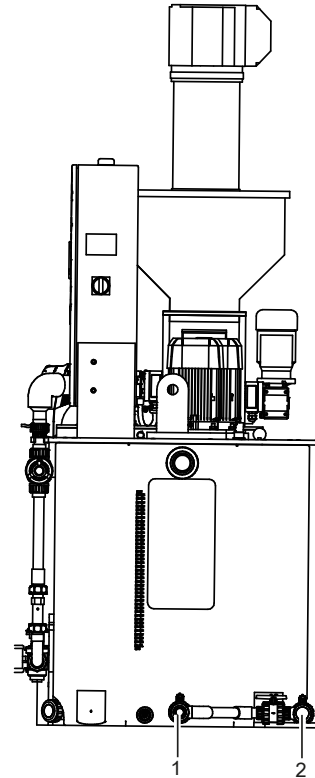


Fig. 6: Hydraulic outlets of the ULFb 500-2000

- 1 Extraction cock for the matured polymer (chamber 3)
- 2 Chamber 1 and 2 drain / combined

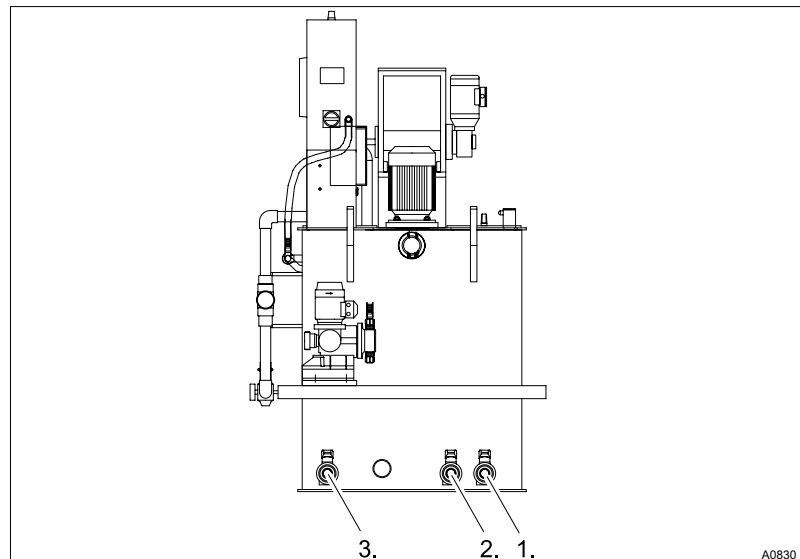


Fig. 7: Hydraulic outlets of the ULFb 4000-10000

- 1 Chamber 1 drain
- 2 Chamber 2 drain
- 3 Extraction cock for the matured polymer (chamber 3)

The closed design of the PE / PP tank with brackets for the powder feeder unit and control cabinet, as well as overflow, drainage and extraction connectors, is divided into three separate chambers.

This ensures sufficient maturing time for the polymer solution. The division of the tank largely prevents the mixing of matured and freshly prepared solution and facilitates continuous extraction.

All inspection openings of the tank are secured with tight screw covers.

The liquid level in chamber 3 is continuously measured by:

- A pressure sensor (standard) and
- A DULCOLEVEL radar sensor (optional)

5.2.2 Crane lifting lugs

Appropriate hoisting equipment can be attached to the lifting lugs for easier installation of the system.



*For further details and requirements see
🔗 Chapter 3 'Transporting and storing the system'
on page 15.*

5.2.3 Water apparatus with flush valve

The water pipework supplies the system with the required preparation water.



*For more information on the raw water volumes,
see 🔗 Chapter 4.2 'Technical data' on page 18.*

A manual shut-off valve enables the supply of water to be separated for maintenance work.

A pressure reducer with filter insert ensures that the operating pressure is limited and maintained at the correct level.

A solenoid valve automatically opens and closes the water supply.

The flow meter used continuously transmits the current flow rate to the control.

The switching on of the powder feeder unit is controlled to occur at a time delay after activation of the solenoid valve so that no powder deposits can occur in the flush valve at the start of the preparation process. Water flows for a few seconds before the powder feeder unit starts. At the end of the preparation process, the reverse occurs. The powder feeder switches off immediately once the upper level is reached. However, the water continues to run for a few seconds after this.

There are two types of flushing systems:

- Y-flush inlet
- Wetting cone

5.2.3.1 Water apparatus with Y-flush system

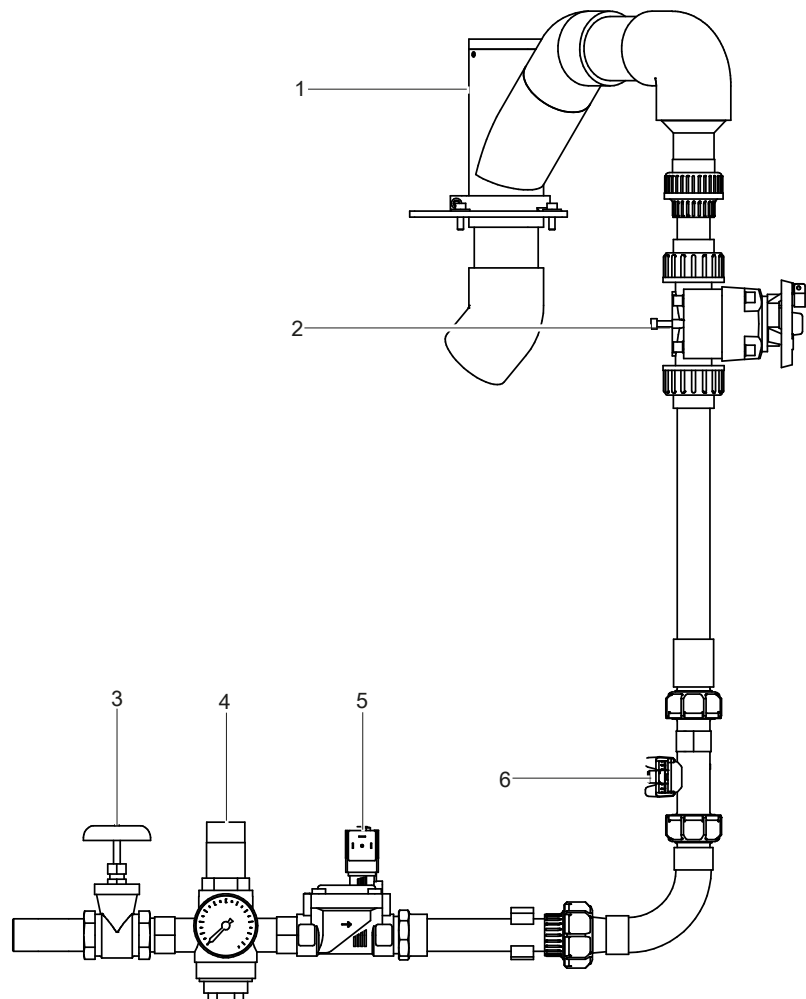


Fig. 8: Water apparatus with Y-flush inlet

- 1 Y-flush system
- 2 Adjusting valve
- 3 Shut-off valve
- 4 Pressure reducer with pressure display
- 5 Solenoid valve
- 6 Flow meter

The adjusting valve is used to adjust the water throughput during commissioning and display this on the HMI.

The Y-shaped flushing system guarantees blockage-free wetting. The polymer is mixed directly with the water flow and entrained into the preparation chamber.

Simple control and maintenance by the removable cover of the Y-part.

5.2.3.2 Water apparatus with wetting cone

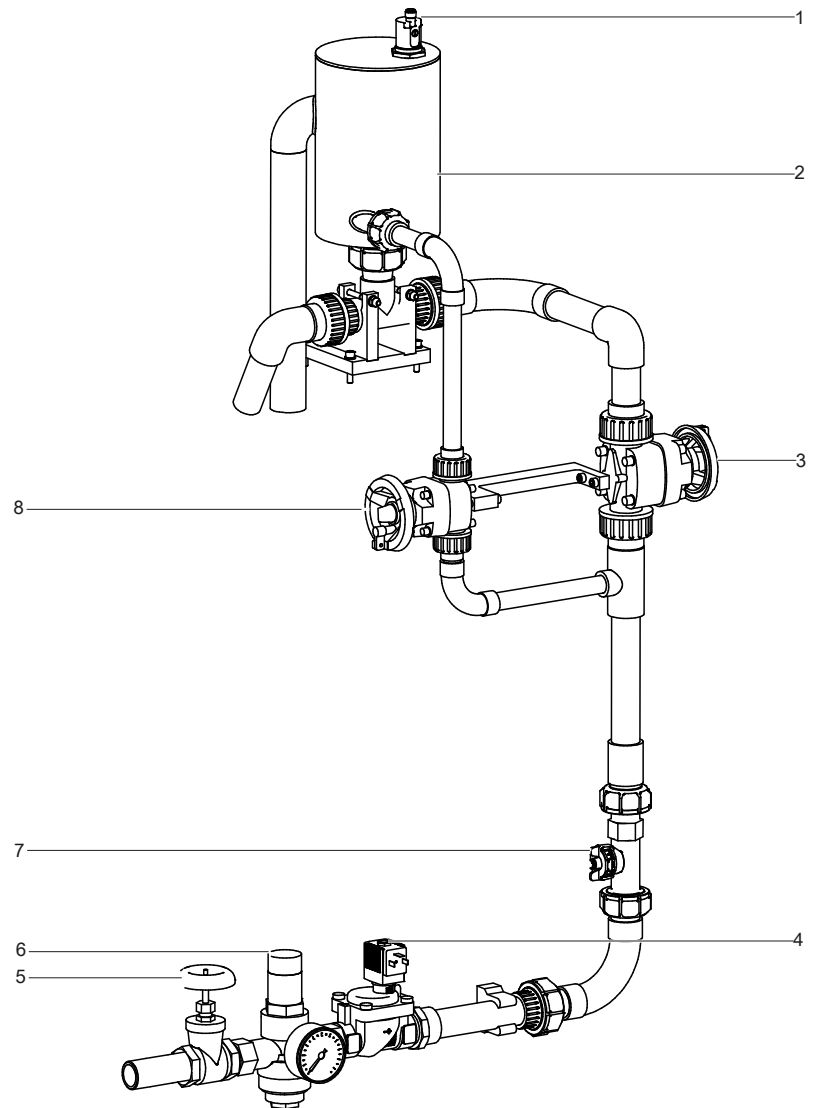


Fig. 9: Water apparatus with wetting cone

- 1 Overflow sensor
- 2 Wetting cone
- 3 Primary flow adjusting valve
- 4 Solenoid valve
- 5 Shut-off valve
- 6 Pressure reducer with pressure display
- 7 Flow meter
- 8 Partial flow adjusting valve

Both adjusting valves are used to adjust the water throughput during commissioning and display this on the HMI.

The polymer falls into the wetting cone, which pre-mixes it, and is then evenly wetted with the adjustable partial flow of the preparation water.

This prevents clumping of the feed chemical.

Mixing equipment causes the primary flow of the preparation water to produce slight negative pressure at the outlet of the cone. The wetted powder is thus drawn out by suction and is then entrained with the preparation water into chamber 1.

5.2.4 Powder feeder unit

Please refer to the separate "Dry material feeder" operating instructions for detailed information about the construction and function of the unit.

The heater of the feeder screw pipe and the minimum level sensor for the dry material hopper are fitted as standard to the preparation systems. The powder feeder unit is controlled by a frequency converter to ensure the volume-proportional metering of the powdered polymer into the preparation water. A release wheel is fitted directly above the feeder screw for the continuous extraction of the powdered polymer. A feeder screw pipe heating system also removes any moisture that has penetrated the unit and thus prevents any caking of the powdered polymer.

5.2.5 Vibrator

The vibrator helps to prevent the powdered polymer from forming bridges in the dry material feeder and seriously vibrates the entire dry material feeder and optional add-on hopper.

The switching-on and -off times of the vibration motor can be parametrised.

5.2.6 Stirrers



CAUTION!

The stirrers can start up suddenly as soon as they are connected to mains power.

The ULFb is fitted as standard with two electric stirrers. The identity code can be used to select a third stirrer for chamber 3.

These stirrers ensure that the solution is gently agitated in the chambers of the tank.

5.2.7 Control cabinet

The control cabinet houses all the electrical control and command equipment, mains power unit and fuses required for the operation of the system, especially the ULFb control, consisting of the PLC and HMI and the frequency converter to control the powder feeder unit.



Please refer to the electrical wiring diagrams for further details.

5.2.8 Concentrate pipework

The ULFb is equipped with the following pipework to meter the liquid concentrate.



Refer to  Chapter 4.2 'Technical data' on page 18 for further details on metering pumps for the liquid concentrate polymer.

ULFb system type	Nominal width of pipework	Nominal width hose sleeve
500 - 2000	DN 15	DN 15
4000 - 8000	DN 20	DN 20

5.2.9 Assessment of water shortage for the post-dilution unit

The post-dilution unit is used to further dilute the prepared polymer solution. To do this, a feed pump draws the polymer solution out of the ULFb supply tank by suction into the post-dilution unit.

Dilution water is fed into the post-dilution unit via a solenoid valve. A downstream float flow meter with a minimum contact monitors the dilution water.

The ULFb provides a potential-free contact (feed pump enable) to control the feed pump. This contact is closed when the level exceeds the dry run level in chamber 3 and opens when the dry run level is transgressed. The feed pump is normally controlled by an external circuit (motor starter combination).

As the feed pump can be switched on and off externally, there is an additional input on the ULFb control to evaluate the motor starter (potential-free auxiliary contact). The min. contact at the flow meter is only evaluated if the feed pump is running and consequently the potential-free auxiliary contact on the motor starter has closed.

If the feed pump is stationary, the potential-free contact is not closed and the min. contact at the flow meter is not evaluated.

5.2.10 Concentrate tank monitor

This option includes a capacitive sensor with a 5-metre fixing tape.

The 5-metre fixing tape is used to simply fasten the sensor on the outside, i.e. around the delivery container. The response level can be freely selected.

5.2.11 Metering monitor for liquid concentrate

The ULFb can optionally be operated with liquid polymer. The concentrate pump meters the concentrate into chamber 1 through the flushing system.

The metering monitor can only be used when an eccentric screw pump is being used. The metering monitor consists of a flow adapter and a flow sensor with thermal measurement.

5.2.12 Add-on hopper 30 l, 50 l, 75 l and 100 l

If an enlarged powder reservoir is required, add-on hoppers with additionally holding 30, 50, 75 and 100 litres are available.



Refer to the operating instructions for the dry material feeder for this.

5.2.13 Powder conveyor for automatic top-up

A powder conveyor can optionally be selected for the automatic filling of the powder hopper with powdered polymer. A powder conveyor can be mounted directly onto the dry material feeder by means of an adapter plate or also using a special add-on hopper.

The installation of a 50-litre add-on hopper with a connecting adapter is recommended to overcome short periods of maintenance work on the powder conveyor or at time of high powder consumption.

When a powder conveyor is selected, the ULFb is equipped with a terminal box attached to the dry material feeder. The terminal box is electrically fused via a safety cut-out in the control cabinet.

Technically, powder conveyors with electric motor have a lower IP protection class as they draw in the ambient air by suction.

Powder conveyors with compressed air connector have a protection rating of IP54 or IP55.

This does not reduce the IP rating of the entire DULCODOS ULFb system with IP55 or IP54.

The IP rating of the system was tested and confirmed in conjunction with our CE labelling.

6 Assembly and installation

User qualification, mechanical installation: trained and qualified personnel, see  *Chapter 2.3 'Users' qualifications' on page 11*

User qualification, electrical installation: electrical technician, see  *Chapter 2.3 'Users' qualifications' on page 11*

The system is fully factory-assembled. Any cabling between the control cabinet and the electrical power units is fully installed.

6.1 Assembly



WARNING!

Heavy weight of the system

Possible consequence: death or severe injuries if the floor cannot support the system and breaks.

Measure: ensure that the floor of the installation site can support the weight of both the empty and full system.



NOTICE!

Important:

Ensure that the entire system is completely installed vertically on the floor. Make sure that there are no foreign objects on the floor where the system is installed.



Selection of the installation site

Ensure that the system is easily accessible at all times for operation, maintenance and filling.

Ambient conditions for operation	Values
Permissible ambient temperature:	+5 °C ... +40 °C.
Air humidity:	< 92% relative air humidity (non-condensing)
Sound pressure level of the system:	< 70 dB (A)
Earthquake zones:	not permitted
Important:	The complete system may not be installed outdoors. Dedicated parts of the system may be used outdoors only with special protection measures to be agreed with ProMinent.



NOTICE!

Avoid the following influences:

- Humidity
- Rain, hail, condensation
- Dust and storm
- Frost and cold
- Overheating
- Direct sunlight and UV radiation

6.2 Installation, hydraulic



CAUTION!

Environmental damage caused by the polymer solution is possible

Observe the material safety data sheet for the polymer, as well as statutory regulations for disposal, when draining the drainage lines and the overflow line.

Requirements:

- The preparation water must be of drinking water quality. It must be free of solids and suspended particles.
- The inlet water pressure must be between 3 and 5 bar
- The dimensioning of the process water, overflow and drainage lines must comply with the technical data sheet.



See  Chapter 4.2 'Technical data' on page 18.



NOTICE!

- Route the overflow and drainage lines on a slope. They must be operated without back pressure
- To drain the system, install a T-piece with a shut-off valve to provide a drainage option between the chamber 3 shut-off valve and the feed pump

1. ➤ Connect the preparation water line to the water apparatus
2. ➤ Connect the concentrate pump line for the liquid polymer
3. ➤ If fitted: Connect the feed pump (not included in the scope of delivery) to the extraction line
4. ➤ Connect up the drainage lines and route them into a suitable drain
5. ➤ Connect up the overflow line to the overflow connector and route the overflow line into a suitable drain

7 General operating information

The DULCODOS® ULFb system is equipped with the KTP 400 BASIC COLOUR operating panel to visualise the control process. Operate the control using the touch display and the 4 function keys.

The illustration of the ULFb system to be controlled is sufficient to represent the most important ULFb functions. Warnings and fault messages are also displayed as text and saved in an archive. A maximum of 100 text messages can be called up. Furthermore, changes in operation, parametrisation, ...are listed and stored in a data memory for a maximum of 100 individual diagnostics.

Intuitively input control parameters or perform calibration as well as other operating functions by calling up operating screens.

Brief instruction is enough to enable you to operate the ULFb system. Please carefully read the operating instructions prior to use.

Only permit experienced service technicians to operate the system in manual mode. Knowledge of the detailed control process is particularly important in this to avoid incorrect operation.

An alarm is issued audibly and visually by the ULFb system via the integral horn and alarm lamp. To switch off the horn, immediately press the Reset key *[F4]* on the panel. The horn alarm is cleared, however the alarm remains until the cause of the fault is rectified and the Reset key *[F4]* has been pressed again.

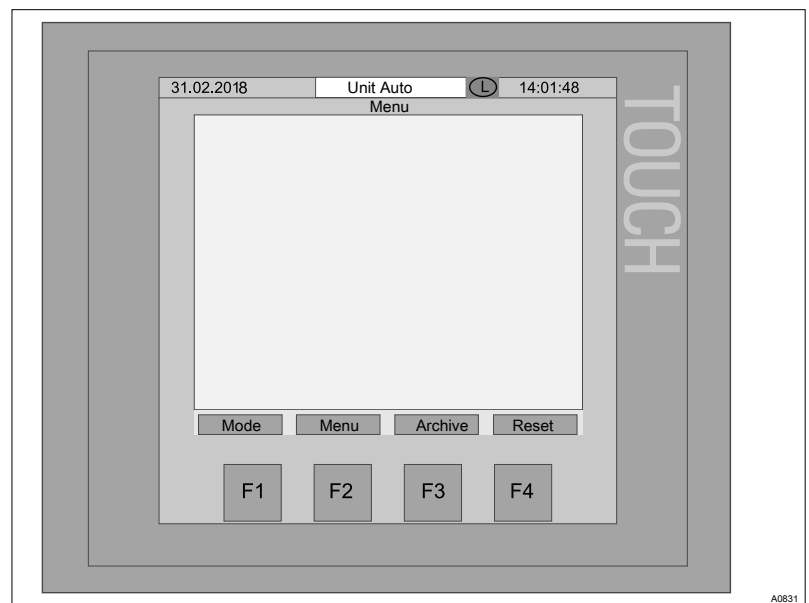


Fig. 10: Operating menu ULFb

7.1 Operating menu ULFb

Keys	Level 1	Level 2	Input
[F1] mode	STOP / AUTO / MANUAL / RUNNING EMPTY		[Change Powder/Liquid/Activate running empty]
[F2] mode	PARAMETER	Water	Pre-rinse; post-rinse period; min. flow
		Stirrer	Stirrer (1+2) On / Off
			Stirrer (3) On / Off
		Level	Max-Max; Max; Min; Min-Min
			First filling
		Powder	Heater ON/OFF
			Vibrator ON/OFF
		Liquid	Min. setpoint FC
	Calibration (F1 mode stop)	Powder/Liquid	Calibration time
			Elapsed time
			Enter weight
			Dosing capacity
		Liquid	Calibration time
			Elapsed time
			Enter weight
			Dosing capacity
		Flow monitor	Switching point
			START / STOP
		Water	Current flow
			Calibration Water START / STOP
	Concentration	Concentration	Powder
			Liquid
			Liquid active ingredient
			Internal / External (PROFIBUS® / PROFINET®, MODBUS®)
	System	Language	[DE], [EN], [FR], [ES], [PT], max. 10 languages, depending on language module selected.
			Select language
		Set date and time	31.02.2017, 12:13:14
			[dd.mm.yyyy hh:mm:ss]
			Input language-dependent
		Touch panel	Clean screen
			Calibrate touch
		PLC	Diagnostics, Overview

Keys	Level 1	Level 2	Input
	Info	Identcode	Type
			Size
			Polymer
			Options
		Version	Touch panel version
			Creation date
			Version S7 Project
			Creation date
			Project
		Info	Operating hours counter
			for stirrer 1-3, powder feeder unit,
			Liquid concentrate pump
	Service	Water meter	Mode measurement: Auto / Manual
			Manual value
			Flow meter data
		Pressure sensor	Sensor Value
			Measured Value
			Offset
		Factory setting	Factory setting reset
			Identcode: Change
		Frequency converter	Status display of frequency converter
[F3] Archive			
[F4] Reset			

7.2 Start screen

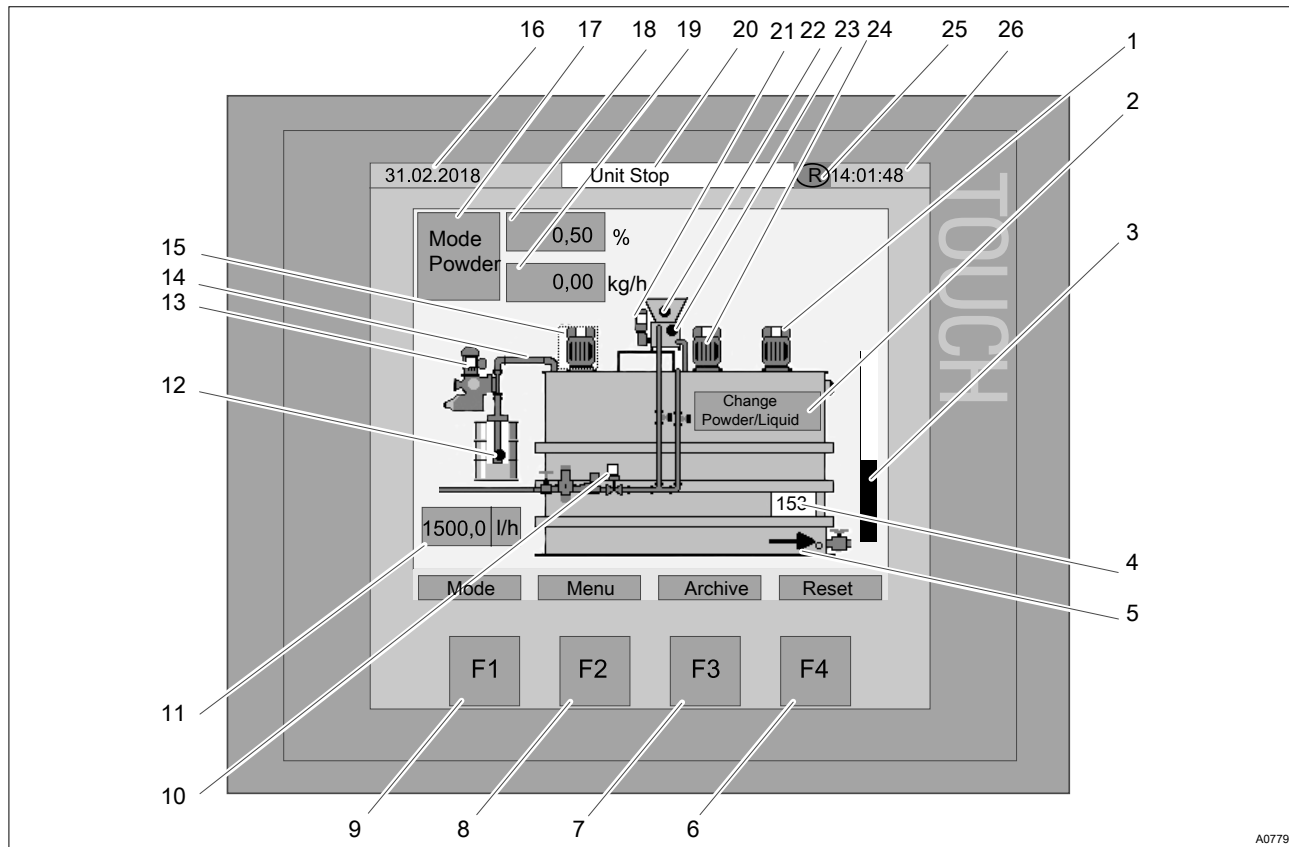


Fig. 11: Start screen

- | | |
|---|--|
| 1 Stirrer (white=off), (black=on), (flashing=fault) | 14 Liquid concentrate flow sensor (white=not OK), (black=OK), (flashing=fault) |
| 2 Switch-over (Powder / Liquid) | 15 Stirrer (white=off), (black=on), (flashing=fault) |
| 3 Level indicator for chamber 3 (0 ... 100%) | 16 Date |
| 4 Level display in [mm] | 17 Display of the current metering product (powder/liquid) |
| 5 Extraction enable display (no arrow=no enable // arrow=enable) | 18 Display of the required concentration |
| 6 Function key [F4] [RESET] | 19 Display of the current dosing rate in [kg/h] |
| 7 Function key [F3] jump to the [Archive] | 20 ULFb operating mode status bar: [STOP], [AUTO], [MANUAL], [RUNNING EMPTY] |
| 8 Function key [F2] jump to the [Menu] | 21 Dry material feeder (white=off), (black=on), (flashing=fault) |
| 9 Function key [F1] Operating mode switchover [STOP], [AUTO], [MANUAL], [RUNNING EMPTY] | 22 Dry material empty message (white=not OK), (black=OK), (flashing=fault) |
| 10 Water supply (white=valve closed) (black=valve open) | 23 Wetting cone overflow (white=not OK), (black=OK), (flashing=fault) |
| 11 Water supply display in [l/h] | 24 Stirrer (white=off), (black=on), (flashing=fault) |
| 12 Liquid concentrate empty message (white=not OK), (black=OK), (flashing=fault) | 25 Language switchover |
| 13 Pump-liquid concentrate (white=off), (black=on), (flashing=fault) | 26 Time |

7.3 Changing the operating mode

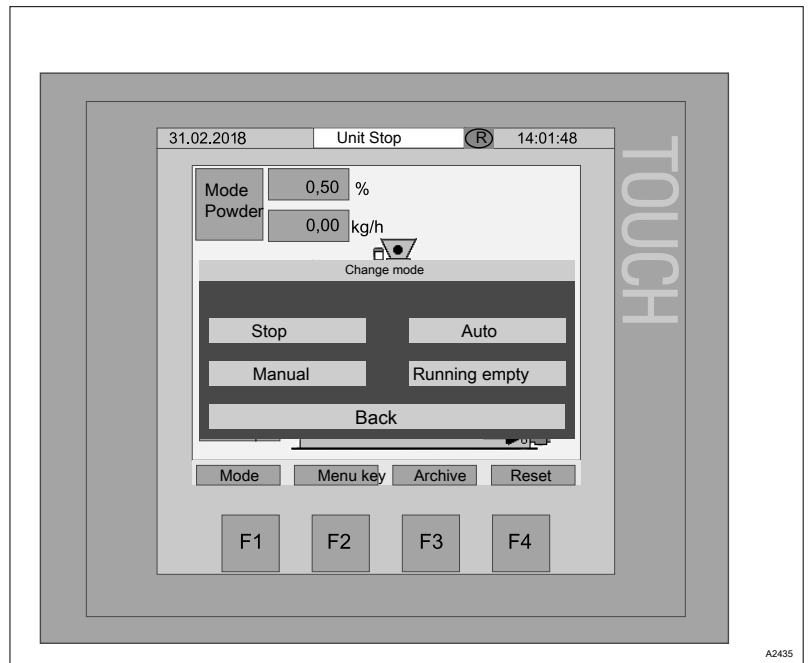


Fig. 12: Changing the operating mode

Changing the operating mode

Use the **[F1]** function key to switch operating mode.

➔ When you press **[F1]**,

- ⇒ a window opens with the buttons for the operating modes **[STOP]**, **[AUTO]**, **[MANUAL]**, **[RUNNING EMPTY]** and the button for **[BACK]**.



The current operating mode is displayed in the status bar.

[STOP] operating mode

Functionality:

- In **[STOP]** operating mode, all drives and the water supply valve (10) are switched off.
- No new preparation is started.
- The contents of chamber 3 can be extracted down to the level **[MIN MIN]**.
- If the level falls below this, the error message '**ULFb tank empty**' is displayed.

[AUTO] operating mode

In **[AUTO]** operating mode, the automatic preparation operation is started, as soon as the **[MIN]** level is undershot in chamber 3.

Exception:

- Pause enabled
- **[RUN EMPTY]** active operating mode

[MANUAL] operating mode



NOTICE!

This operating mode is only for service technicians. To avoid damage to the system, only permit service technicians to operate the system in [MANUAL] operating mode.

Functionality:

- In [MANUAL] operating mode, all drives and valves are initially switched off.
- Pressing the buttons (not currently visible) above the symbols, of the water supply valve (10), stirrers (1, 15, 24) and pump (13), lets you switch the drives on and off, and close and open the valves manually.
- In [MANUAL] operating mode you can set the dosing rate in the input field at from 0 ... 100%.

[RUNNING EMPTY] operating mode



This operating mode is protected and can be unlocked using the initial User Code.

Functionality:

- The contents of chamber 3 can be extracted down to the [Min Min] level.
- A preparation operation already under way is interrupted, unlike with the [PAUSE] and [STOP] function.
- No new polymer preparation operation is started.
- The [ULFb ready for preparation] signal [DQ A.0] is activated.

[RUNNING EMPTY] operating mode is deactivated by switching to [AUTO] operating mode.

7.4 User Administration

7.4.1 User Groups

Touch panel operation is subdivided into 3 groups:

- General operation
- Advanced operation ([User] + XXXX)
- Service ([Service] + XXXX)

Task	User rights for user groups		
	General operation	Advanced operation	Service
Code character	no code	operator code	customer code
Unit Stop - System Auto switchover	X	X	X
Switchover dry product/liquid concentrate	X	X	X
Change concentration	X	X	X
Change active ingredient liquid concentrate		X	X
Read parameter data	X		
Change parameter data		X	X
Perform calibration		X	X
Read calibration data	X	X	X
Read info	X	X	X
Change language	X		X
Set date and time	X		X
Change system functions		X	X
Reset factory settings			X
Switchover flow measurement Auto/Manual			X
Change flow measurement pulse parameter			X
Activate running empty		X	
Parameter Stirrer gentle operation			X

7.4.2 Login

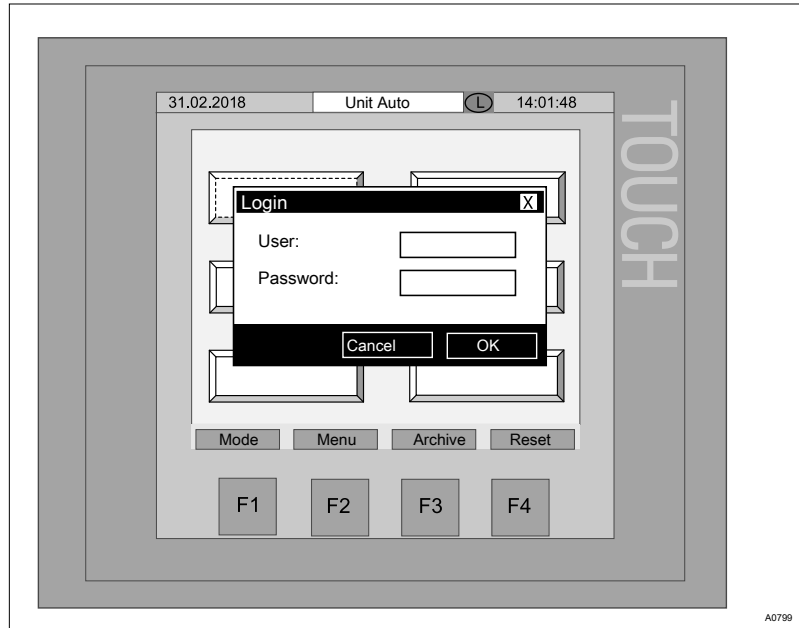


Fig. 13: User administration

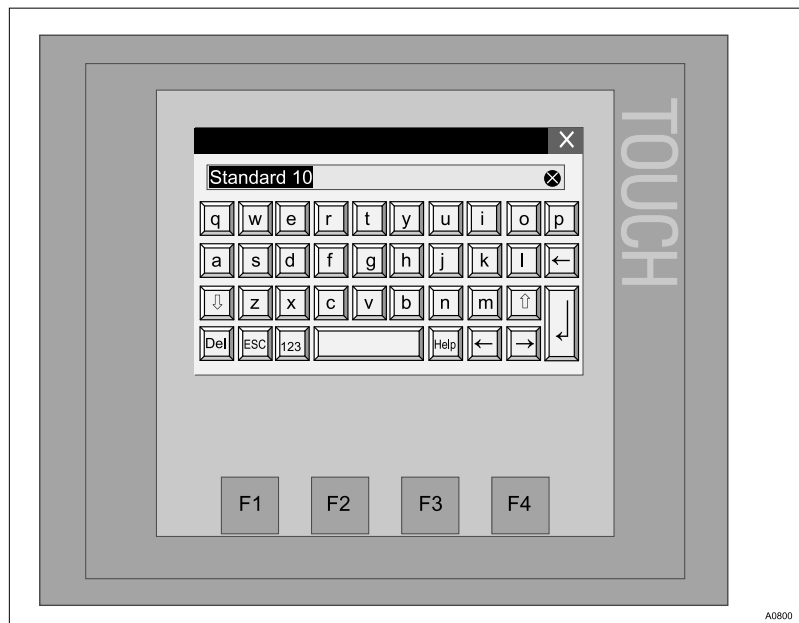


Fig. 14: Login screen keyboard

If you call up a function on the touch panel, which requires higher user rights, the login window appears automatically for entry of the user and password.

If you activate the *[User]* field, the screen keyboard appears and the username can be entered. Once entered, the name is confirmed with the ↵ key.

Then, using the same approach, you can fill in the *[password]* field. The password is not displayed in plain text

7.5 Entering Values on the Touch Panel

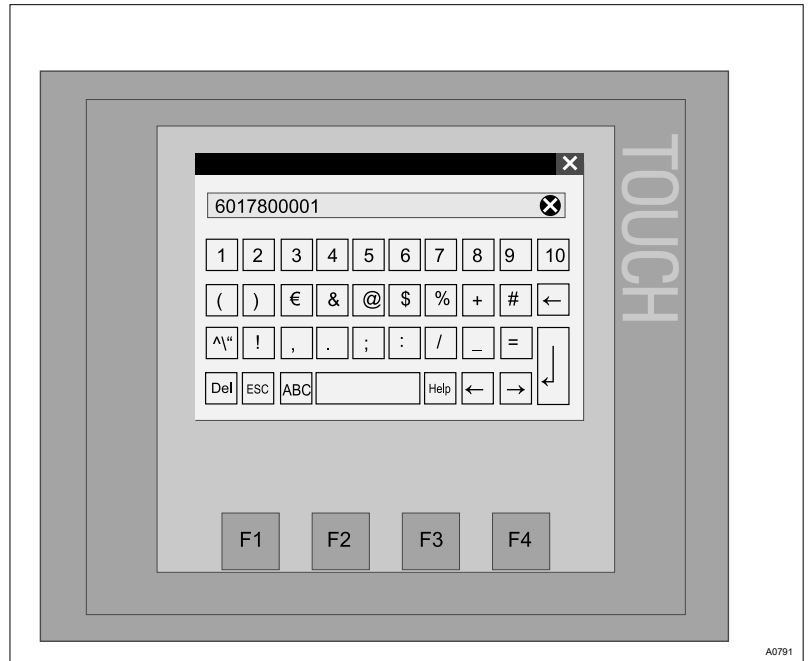


Fig. 15: Entering values on the touch panel

1. Tap an entry field on the touch panel
 - ⇒ The virtual keyboard appears for input of the value.



The MIN and MAX limits are displayed at the top left of the touch panel.

2. Enter the desired value and press the ↵ key.
 - ⇒ The value set is transferred to the PLC Programmable Logic Controller.
3. Press ESC to exit the menu without saving the value.

7.6 Selecting the Dosing Product

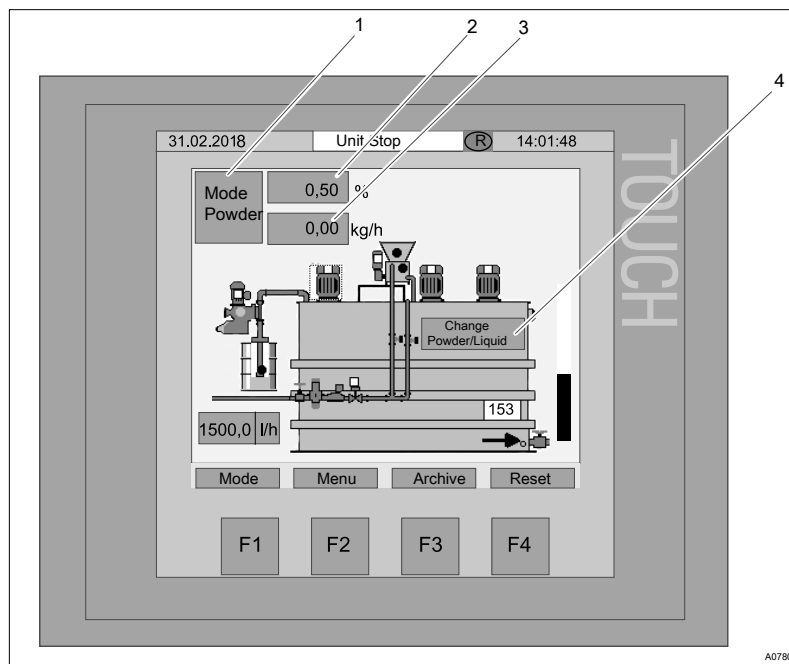


Fig. 16: Selecting the dosing product

- 1 Display of the dosing product currently used
- 2 Display of the concentration
- 3 Display of the feed rate
- 4 [Change Powder / Liquid] button



You can only change the dosing product when the system is switched off, [STOP] mode.

The change is actuated using [Change Powder / Liquid] (2).

The current status (1) is displayed at the top left of the display.

7.7 [PAUSE] operating mode

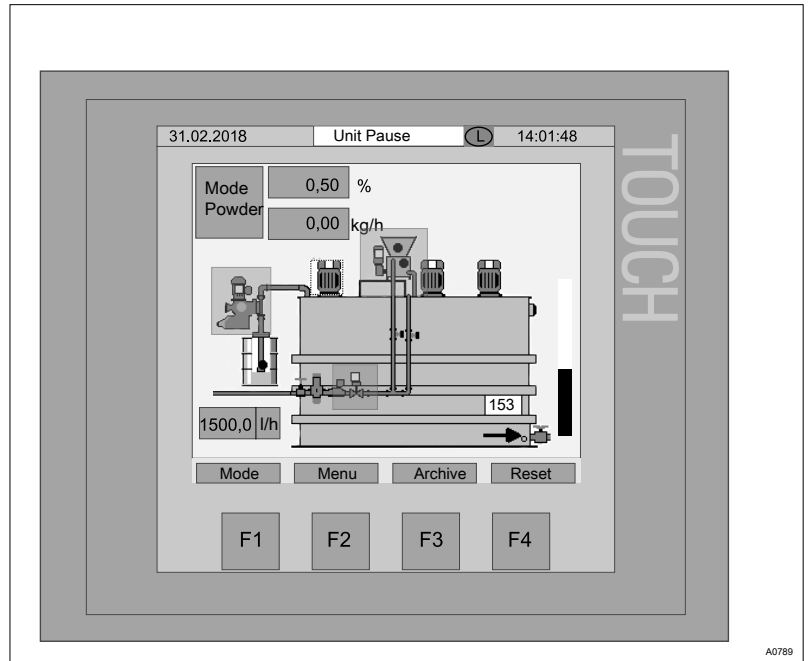


Fig. 17: System in [PAUSE] operating mode

The ULFb system can be set to [PAUSE] operating mode via an external signal or an external switch. Then remove the integral bridge of the terminal strip.

Functionality:

- The contents of chamber 3 can be extracted down to the [Min-Min] level.
- A preparation operation currently under way is ended.
- No new polymer preparation operation is started.
- The [ULFb ready for preparation] signal [DQ A.0] is activated.

7.8 Using [F3] to Select the Archive

The function key [F3] is used to jump to the [Archive]. The last 100 errors are saved in the archive. These faults can then be called up for troubleshooting using the function key [F3].

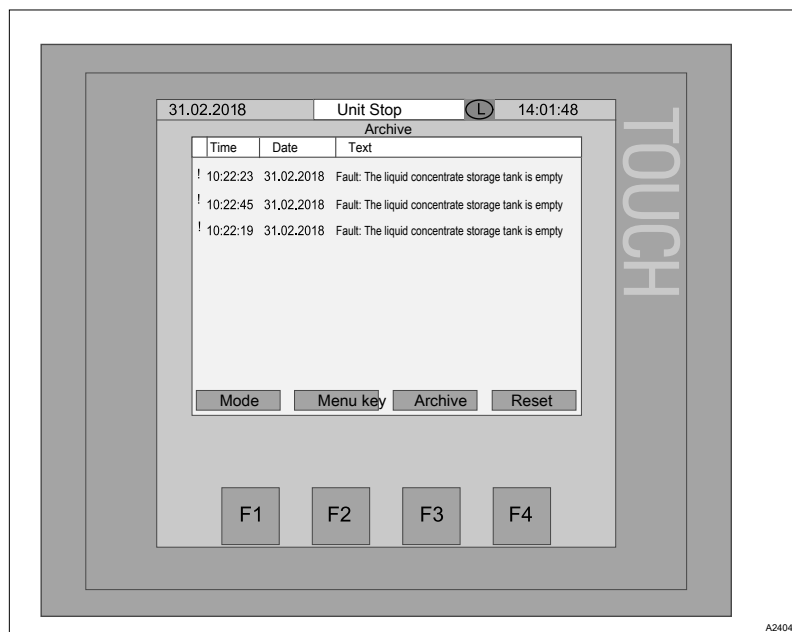


Fig. 18: Archive

7.9 Level Display

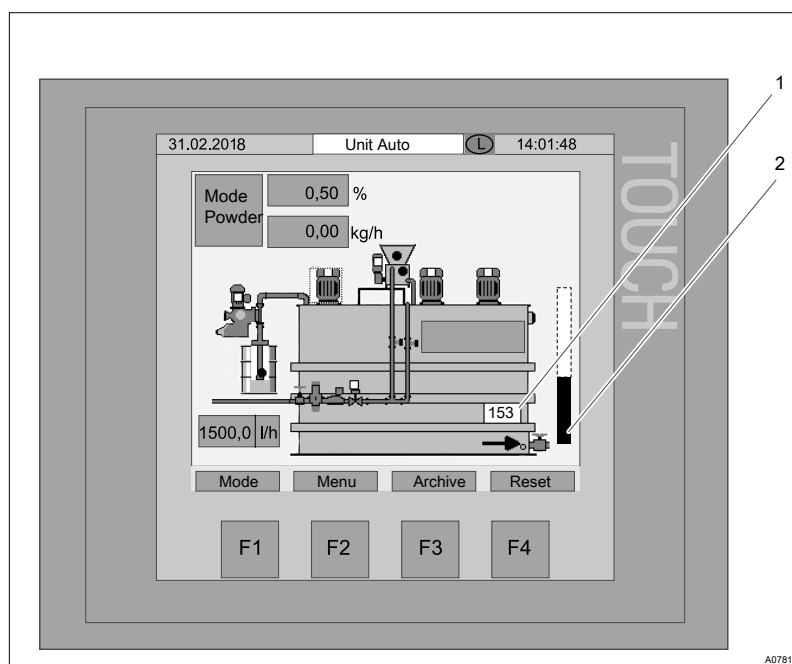


Fig. 19: Level measurement

- 1 Current level in [mm]
- 2 Bar indicator of the current level

**NOTICE!****Incorrect measurement due to contamination of the pressure sensor**

Clean the pressure sensor when maintaining the system to avoid incorrect measurements. Do not damage the diaphragm of the pressure sensor. Do not use hard and/or pointed objects for cleaning. Do not exert any firm pressure on the diaphragm during cleaning.

The filling level is measured using a pressure sensor. *[mBar]* is converted to *[mm]* in the PLC Programmable Logic Controller.

7.10 Water Supply

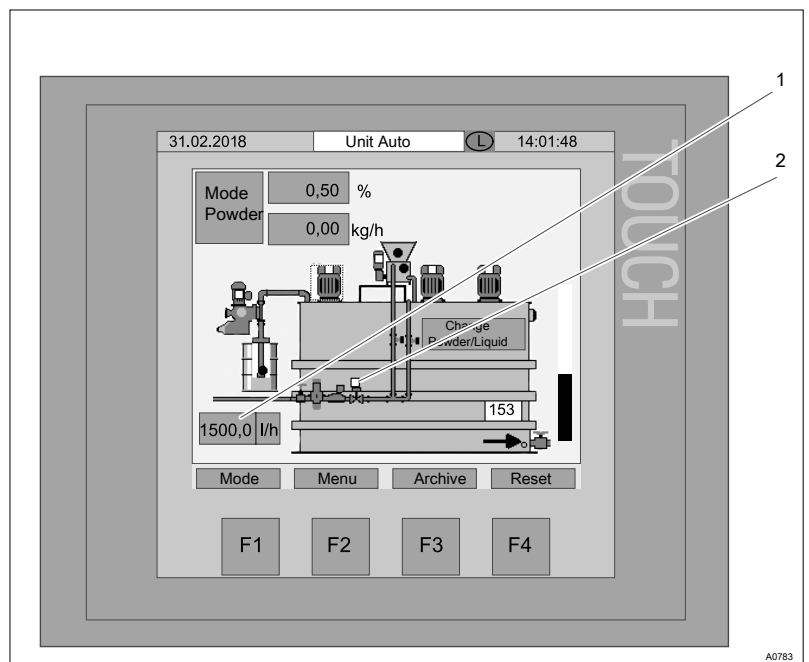


Fig. 20: Water supply

- 1 Process water flow volume in *[l/h]*
- 2 Process water solenoid valve display (white = off // black = on)

The flow volume is measured using a pulse encoder in the water apparatus. The flow volume is monitored. If the limit value (adjustable in the parameter menu) is undershot, a warning is first output. If the flow volume does not increase above this limit value, then the system switches to fault mode and the batching operation is interrupted.



If the flow measurement is not working, the system can be operated with a default value. Find the setting for this in the Service menu.

7.11 Redilution

This function is used by the control to monitor a downstream redilution unit. For this, the running signal of the transfer pump is signalled via a potential-free contact. Additionally, the control has an input, which monitors a limit switch in the water supply line. If the limit switch is not active '5 s' after switching on of the pump, a fault message appears on the touch panel and the fault indicating relay triggers.

7.12 MANUAL Operating Mode



NOTICE!

This operating mode is only for service technicians. To avoid damage to the system, only service technicians may operate the system in *[MANUAL]* operating mode.

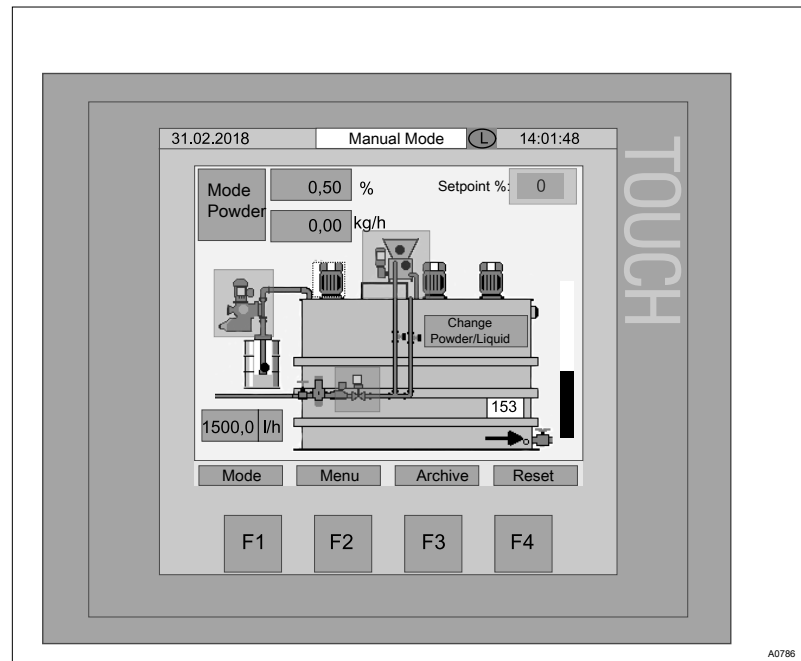


Fig. 21: *[MANUAL]* operating mode

In *[MANUAL]* operating mode, it is possible to switch the individual drives on and off independently. To switch over to *[MANUAL]* operating mode, press the *[MODE]* key in the start screen and then *[MANUAL]*.

You can switch the individual drives on manually. To do so, tap the points corresponding to the drives on the touch panel. If a drive is activated, the point for the drive lights up in black. If a drive is deactivated, the point for the drive lights up in white.

On the screen above, it is possible to activate the following drives in *[MANUAL]* operating mode:

- Switch on/off solenoid valve for water supply.
- Switch the stirrer on/off.
- Switch the liquid concentrate pump on/off.
- Switch the dry feeder on/off.

8 [F2] operating menu

The function key *[F2]* is used to jump to the *[Menu]*. Further settings can be made in the menu.

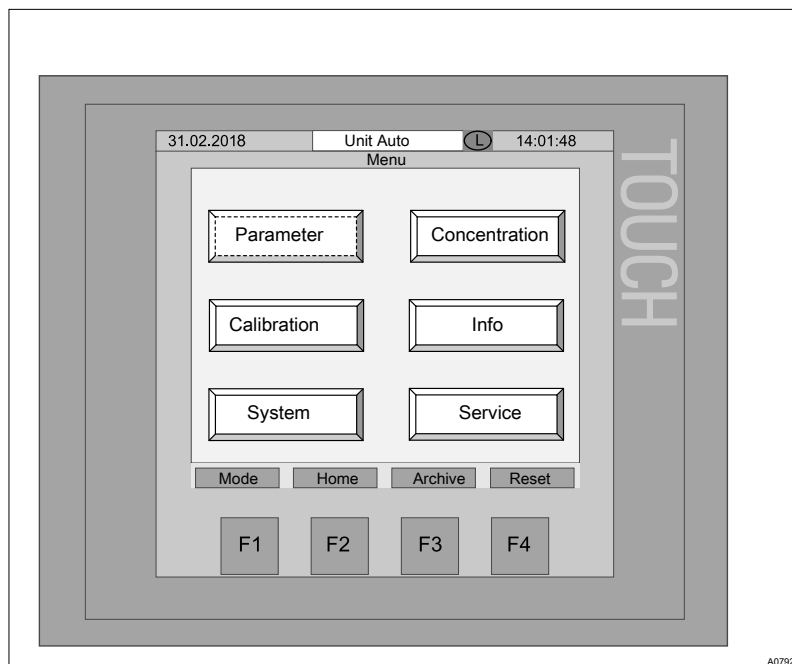


Fig. 22: Jump to the menu

Parameter	see ↗ Chapter 8.1 'Parameter' on page 49
Calibration	see ↗ Chapter 8.2 'Calibration' on page 56
System	see ↗ Chapter 8.3 'System' on page 61
Concentration	see ↗ Chapter 8.4 'Concentration' on page 65
Info	see ↗ Chapter 8.5 'Info' on page 66
Service	see ↗ Chapter 8.6 'Service' on page 68

8.1 Parameter

The parameters for the following areas can be set:

- Water
- Stirrer
- Level (pressure sensor or Dulcolevel)
- Powder
- Liquid

8.1.1 [WATER] parameters

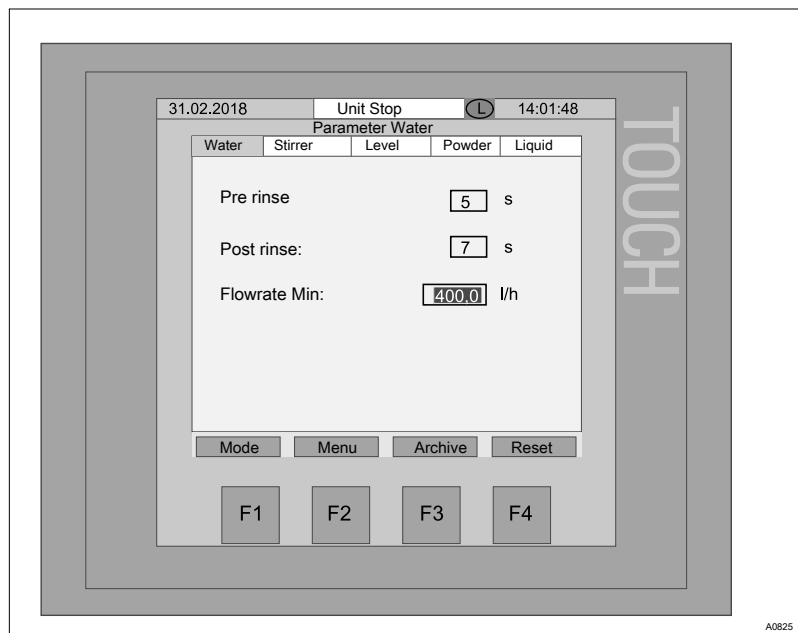


Fig. 23: [WATER] parameters

Parameter	Factory setting	Adjustment range
Pre rinse	7 seconds	0 ... 30 seconds
Post-rinse period	5 seconds	0 ... 30 seconds

ULFb	Required water supply l/h	Min. water supply l/h	Required water supply l/h	Min. water supply l/h
	Maturing time: 60 min.		Maturing time: 45 min.	
500	750	500	937	625
1000	1500	1000	1875	1250
2000	3000	2000	3750	2500
4000	6000	4000	7500	5000
6000	9000	6000	11250	7500
8000	12000	8000	15000	10000
10000	15000	10000	18750	12500

1.5 times the volume of raw water in the water supply is needed to achieve the required extraction volume / preparation output.

The corresponding water supply volumes can be derived depending on the maturing time of 60 or 45 min.

If the current water supply is lower than the set minimum water supply, the following warning is generated:
[Warning: Water supply too low].

If the current water supply remains lower than the set minimum water supply, then after 20 seconds the system generates a fault message: *[Fault: Water supply too low. ULFb to Stop]*. The ULFb interrupts the preparation operation.

8.1.2 [Stirrer] parameters

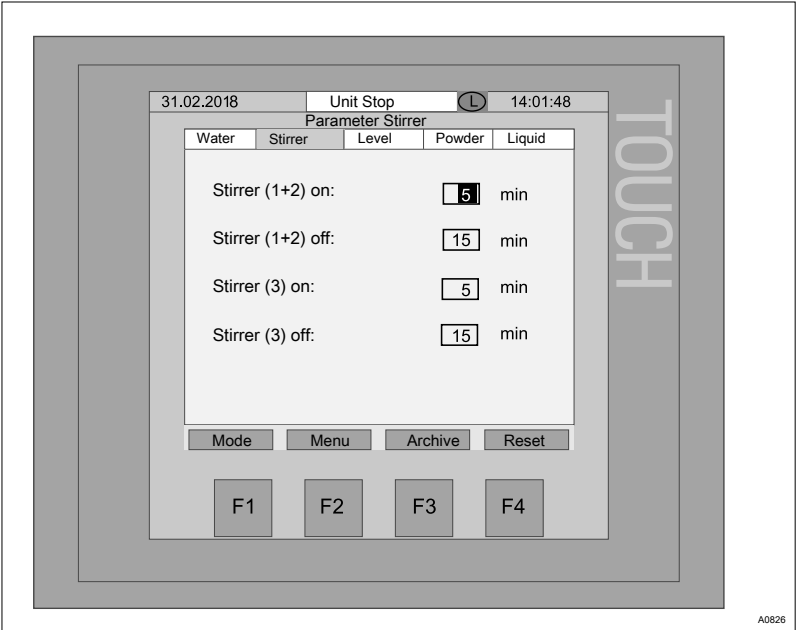


Fig. 24: [Stirrer] parameters

After the preparation operation, the stirrers can continue running in *[Pulse/Pause mode]*. Set the parameters for the switching on and off times as follows:

Parameter	Factory setting	Adjustment range
Stirrer 1+2 on	5 minutes	5 ... 60 minutes
Stirrer 1+2 off*	15 minutes	0 ... 60 minutes
Stirrer 3 on	5 minutes	5 ... 60 minutes
Stirrer 3 off*	15 minutes	0 ... 60 minutes
* Continuous operation: stirrer off = 1 minute		

8.1.3 Parameter [Powder]

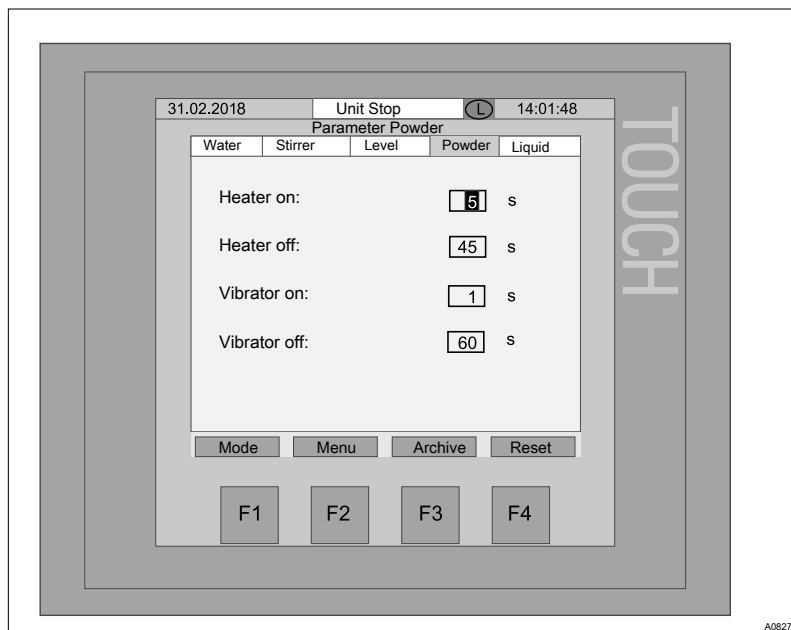


Fig. 25: Parameter [Powder]

A metering pipe heating system removes any moisture that has penetrated the unit and thus prevents any caking of the powder.

The vibrator prevents the forming of bridges in the dry feeder.

Parameter	Factory setting	Setting range
Heater on	5 seconds	1 ... 10 seconds
Heater off	45 seconds	30 ... 100 seconds
Vibrator on	1 seconds	0 ... 30 seconds
Vibrator off	60 seconds	0 ... 999 seconds

8.1.4 [Liquid] parameters

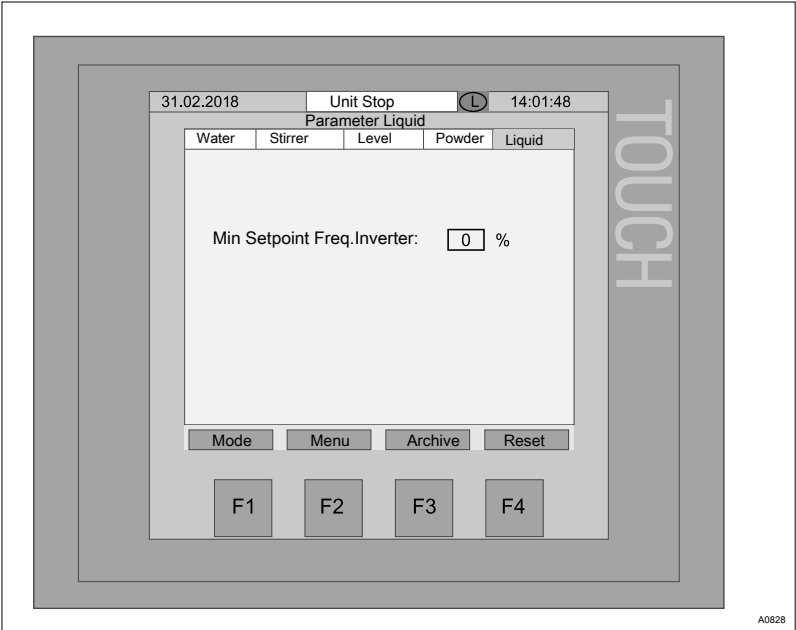


Fig. 26: [Liquid] parameters

Parameter	Factory setting	Adjustment range
Min. frequency converter setpoint	20%	0 ... 50%



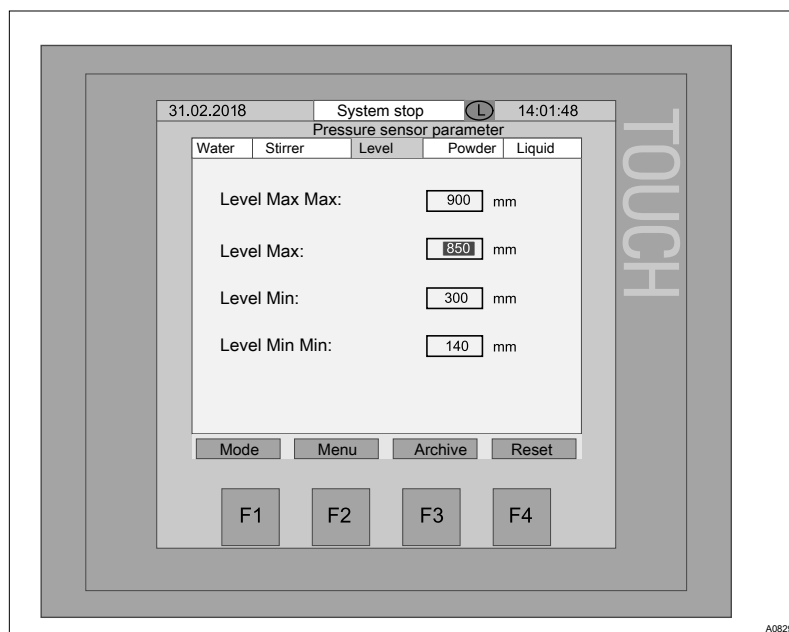
Minimum frequency of the concentrate pump

The liquid concentrate pump should be equipped with an external fan so that the pump can be operated without limitations within the range of 0 ... 86 Hz.

If a liquid concentrate pump is used without an external fan, the winding of the pump motor must be protected against overheating at low speeds. Set the minimum frequency to a value of 10 ... 20%, for example. If the actual frequency of the liquid concentrate pump is lower than the set minimum frequency of the concentrate pump for a period of >5 seconds, then the system generates a fault message:

[Warning: Liquid concentrate pump - min. dosing capacity reached] and the liquid concentrate pump continues running at the set minimum frequency.

Countermeasure: increase the water flow rate or the required concentration.

8.1.5 *[Level]* parametersFig. 27: *[Level]* parameters

Parameter	Remark
Level Max Max	The <i>[Level Max Max]</i> is used to monitor overfilling. If overfilling occurs, an <i>[Overfilling]</i> alarm is signalled.
Level Max	If the <i>[Level Max]</i> is exceeded, the ULFb stops preparation
Level Min	If the <i>[Level Min]</i> is undershot, the ULFb starts preparation
Level Min Min	If the <i>[Level Min Min]</i> is undershot, an alarm message appears and the enable extraction signal is no longer issued.

Tab. 5: Switching levels of the continuous flow system:

ULFb	500	1000	2000	4000	6000	8000
Max-Max	550	780	1040	1320	1320	1310
Max	490	740	995	1105	1105	1105
Min	156	200	263	490	490	490
Min-Min	80	80	90	190	190	190
All values in millimetres						

8.1.6 Stirrer 1+2, Gentle Operation with the First Filling of the Storage Tank

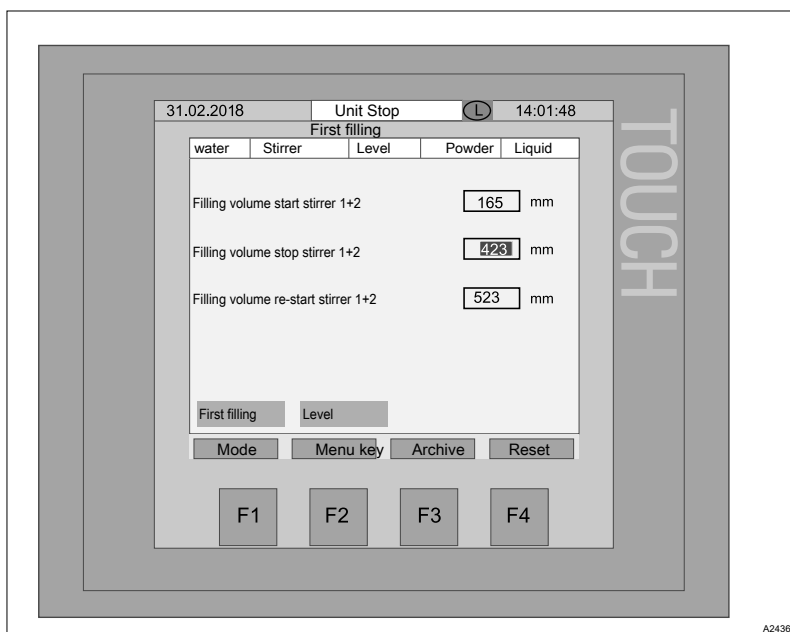


Fig. 28: First filling parameters

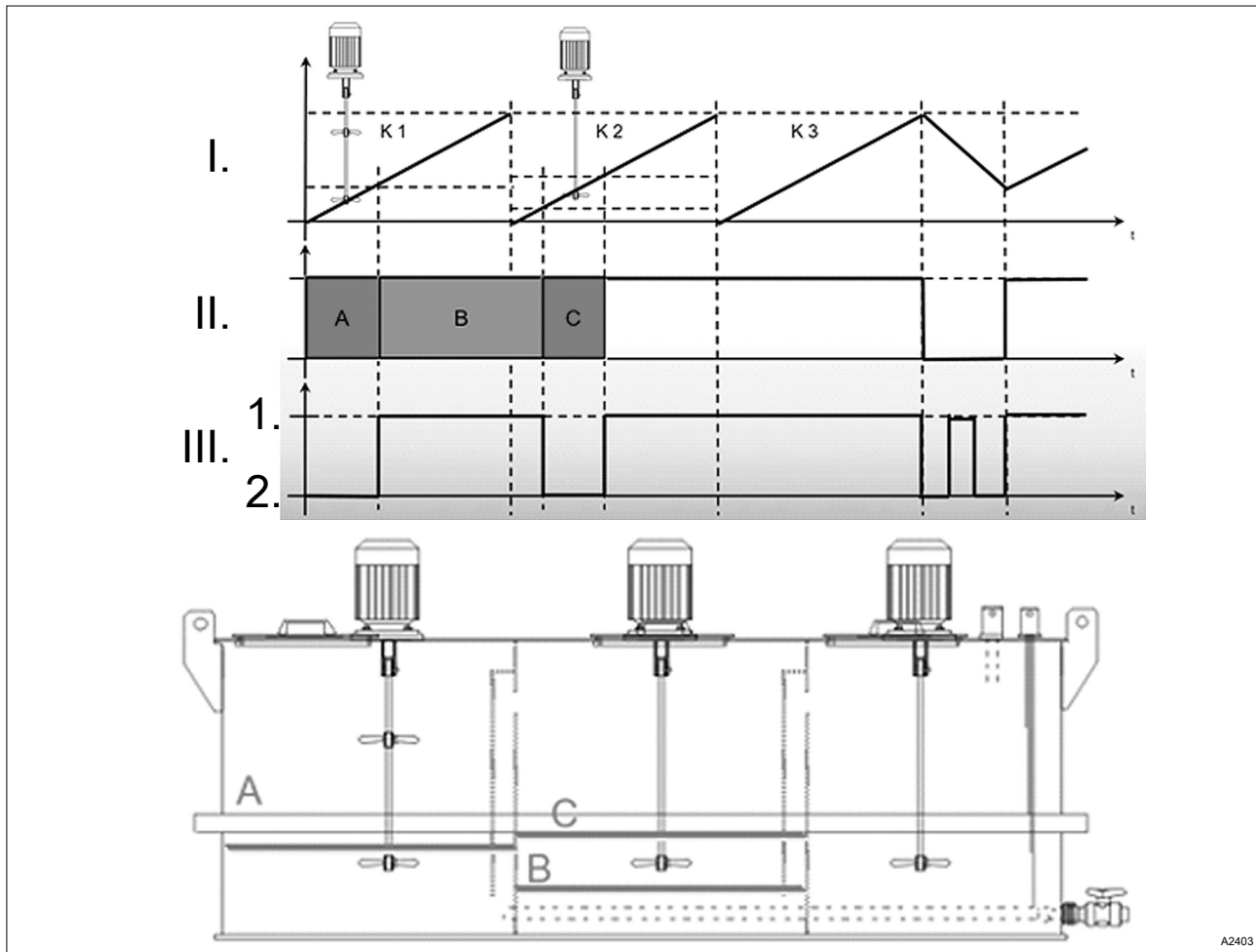
We have introduced the function “Gentle operation with first filling of the tank” to avoid what is known as “stirrer pass-through”, i.e. running stirrer propellers meeting a rising filling volume in the tank.

The stirrers are only switched on when chambers 1+2 have a sufficiently high liquid level. Please note that the two stirrers 1+2 have to be controlled in parallel.

The necessary parameters are set to guarantee the gentle operation of the stirrers when the system is tested in the manufacturer’s plant.

You can make customised adjustments to the start, switch off and switch on volumes, if required. You can select the adjustment function via the customer code.

- Parameter ➔ Level
 - Select the *[First filling]* view, see Fig. 28 and make the adjustments.



A2403

Fig. 29: Process diagram of the stirrers in gentle mode

- | | |
|---------------------|--|
| 1. On | III. Stirrer 1+2 |
| 2. Off | A Start volume of stirrers |
| I. Liquid level | B Stirrers run until switch-off volume |
| II. Water + polymer | C Switch-on volume of stirrers |

8.2 Calibration

The Calibration menu is for calibration of the following areas:

- Calibration of powder
- Calibration of liquid
- Calibration of flow monitor
- Calibration of water

Calibrate the dry material feeder and the liquid concentrate pump before first switching on the system in Automatic mode. Switch off the system during calibration. System *[Stop]*. If you have not yet calibrated the system and you switch the system to *[AUTO]* mode, then the following message appears on the display:

[Fault: dry material feeder not calibrated] or *Fault: [liquid concentrate pump not calibrated]* and the system switches to *[FAULT]* mode.

8.2.1 Calibration of powder

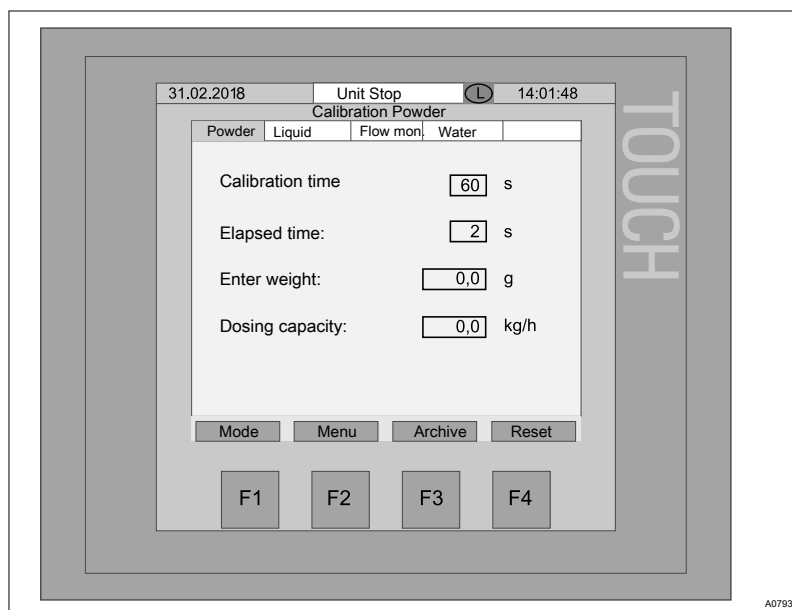


Fig. 30: Calibration of powder

Parameter	Factory setting	Adjustment range
Enter calibration time	60 seconds	0 ... 999 seconds
Enter weight	-	99999.9

Performing calibration



Interrupting calibration

End calibration at any time by pressing [STOP].

Materials required:

- Weighing scales
- PE bag (min. volume 500 g)

1. ➤ Loosen the screw fastenings to dismantle the wetting cone
2. ➤ Hold a PE bag (min. volume 500 g) underneath the feeder screw pipe
3. ➤ Start calibration by pressing [START]
4. ➤ Wait until the calibration time has elapsed
5. ➤ Weigh the feed chemical collected in the PE bag
6. ➤ Enter the weight measured as the [ENTER WEIGHT] parameter in the control
 - ⇒ The dosing rate is recalculated and displayed as the [DOSING CAPACITY] parameter in [kg/h]
7. ➤ Refit the wetting cone once the dry material feeder has been calibrated

8.2.2 Calibration of Liquid Concentrate

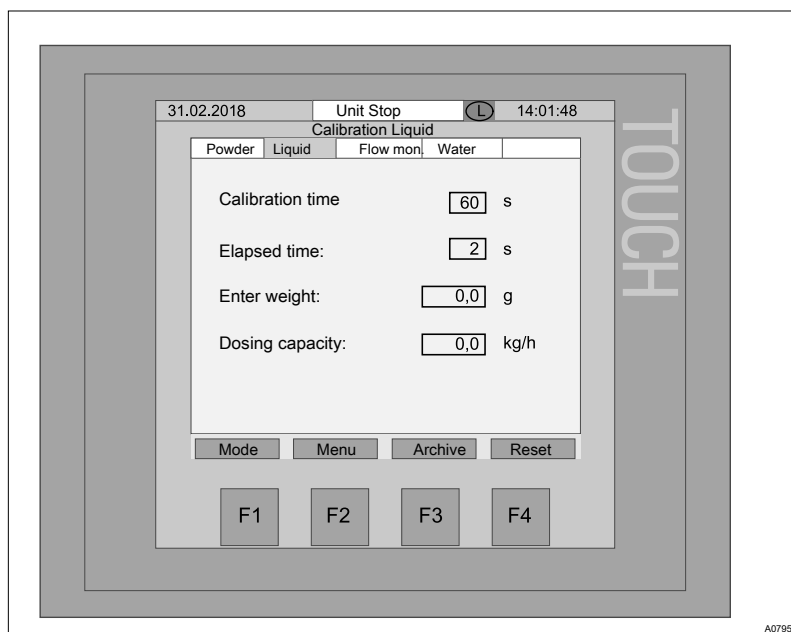


Fig. 31: Calibration of liquid concentrate

Parameter	Factory setting	Setting range
Enter calibration time	60 seconds	0 - 999 seconds
Enter weight	-	99999.9

Performing calibration



Interrupting calibration

End calibration at any time by pressing [STOP].

Materials required:

- Weighing scales
 - Collecting vessel (minimum fill volume 1 litre).
1. Determine the net weight of the collecting vessel.
 2. Open the metering line at a suitable point.
 3. Hold the collecting vessel beneath the opening in the metering line.
 4. Start calibration by pressing [START].
 5. Wait until the calibration time has elapsed.
 6. Weigh the collected amount of liquid concentrate.
 7. Enter the weight ascertained as the [ENTER WEIGHT] parameter in the control.
 - ⇒ The capacity is recalculated and displayed as the parameter [CAPACITY] in [kg/h].
 8. Close the metering line so that it is once again leak-tight.

8.2.3 Calibration Flow Monitor ("Spectra" only)



Calibrate the liquid concentrate pump and then the flow monitor before first switching on the system in Automatic mode.

Switch off the system during calibration. Unit [Stop].

If you operate the system for longer than 20 seconds below the switching point for the minimum metering quantity, then the following message appears on the display

[Fault: Check liquid concentrate flow sensor] and the system switches to [FAULT] mode.

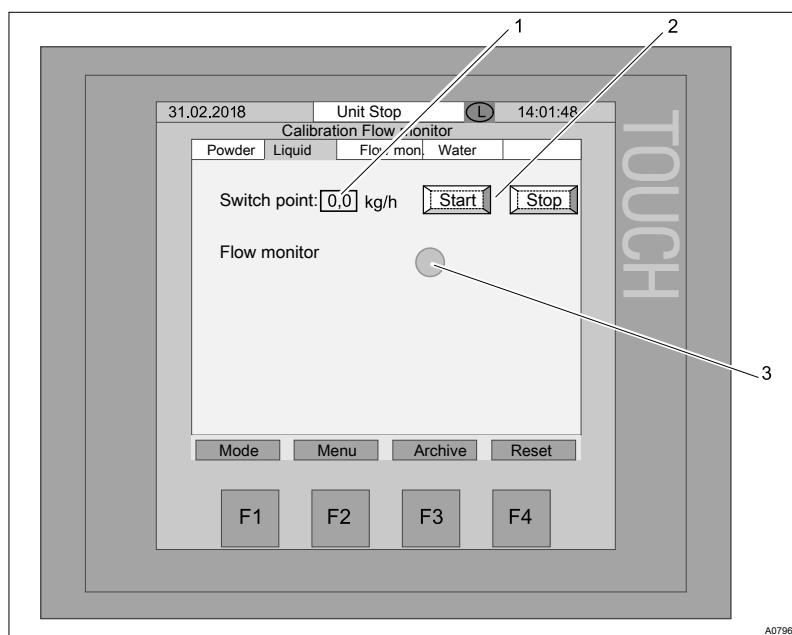


Fig. 32: Calibration of the flow sensor

- 1 Enter the metering volume in [kg/h].
- 2 [START/STOP] the liquid concentrate pump with the metering volume entered.
- 3 Display of the [flow sensor] signal; white=switch point under-shot // grey=switch point exceeded.

Parameter	Factory setting	Setting range
Switching point	-	0 to maximum capacity of the liquid concentrate pump

Performing calibration



Interrupting calibration

End calibration at any time by pressing [STOP].

1. Enter the metering volume which corresponds to the minimum metering quantity during standard operation in Text field (1).
2. Start the liquid concentrate pump using [START] (2).

3. ➤ When the liquid concentrate pump is running at the set frequency, you can set the switching point of the flow sensor using the potentiometer on the flow sensor.
 - ⇒ The flow sensor is set correctly, if the switching point is just below the minimum dosing quantity in standard operation. The *[Flow sensor]* signal display (3) changes from grey to white.
4. ➤ Stop the liquid concentrate pump using *[STOP]* (2).

8.2.4 Calibration of water



Adjust the water supply to the ULFb system during commissioning. ULFb systems with a wetting cone have two water supply lines. Distribute these water supply lines using needle valves so that the wetting cone is not over- or underfilled (1 cm below the lower overflow edge).



NOTICE!

Take the values of the minimum water supply to be set in l/h from the *Chapter 8.1.1 [WATER] parameters'* on page 50.

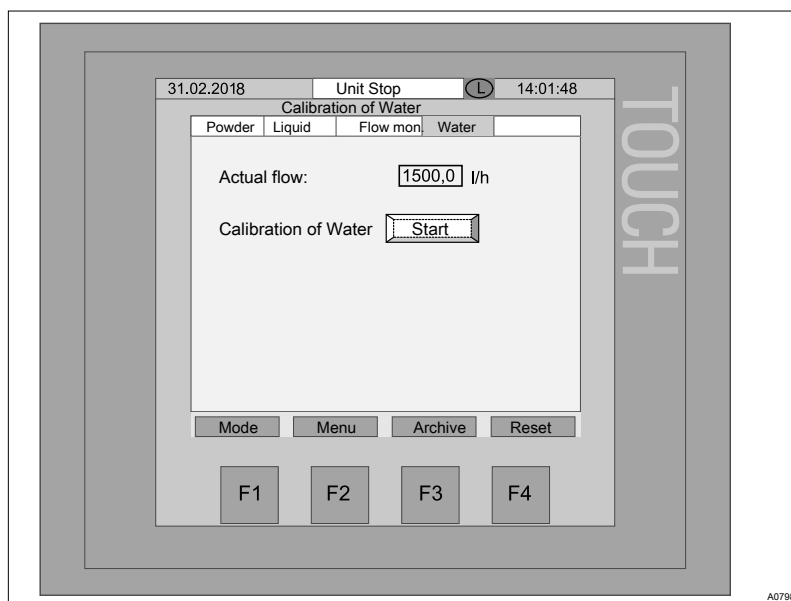


Fig. 33: Calibration of water

Performing calibration



Interrupting calibration

*You can interrupt calibration at any time by pressing *[STOP]*.*

1. ➤ Start calibration by tapping *[START]*.
 - ⇒ The water solenoid valve opens.
2. ➤ Adjust the water supply so that the water supply value appears in *[l/h]* in the display.

3. ➤ Stop calibration using *[STOP]*.
⇒ The water solenoid valve is closed.

8.3 System

The "System" menu enables the following fields to be set:

- Language
- Date and time
- Touch panel
- Control

8.3.1 Changing the Language

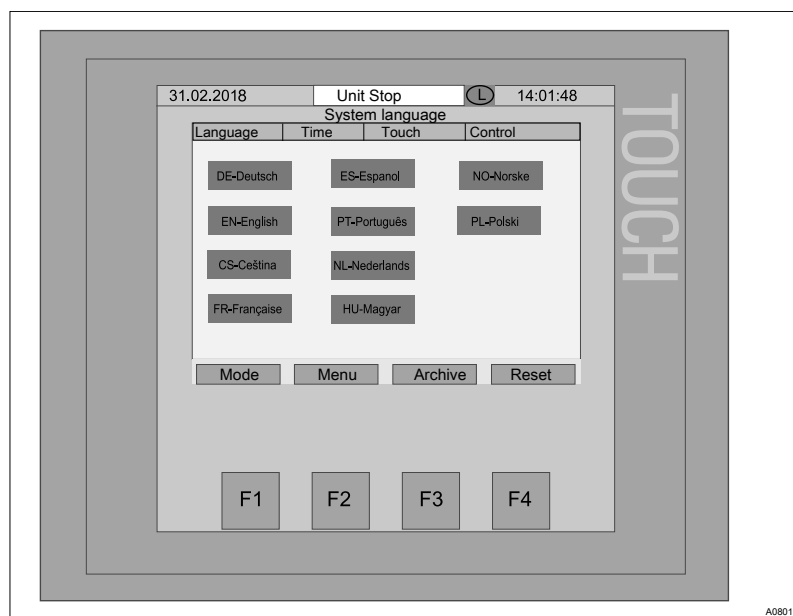


Fig. 34: Changing the language

Proceed as follows to change the language displayed:

1. ➤ Select the desired language.
2. ➤ Tap *[Confirm language]*.
⇒ The message *[shutting down]* is displayed.
3. ➤ Tap *[Start]*.
⇒ The selected language is active.

Direct access to the Language menu

- Tap on the *[L]* symbol in the status bar of the touch panel.
⇒ The sub-menu *[Change language]* appears in the display.

A total of 10 different languages are available. Please contact the manufacturer's Service department should you not find the language you require. Another language package can then be retro-fitted with ease.

8.3.2 Setting Date and Time

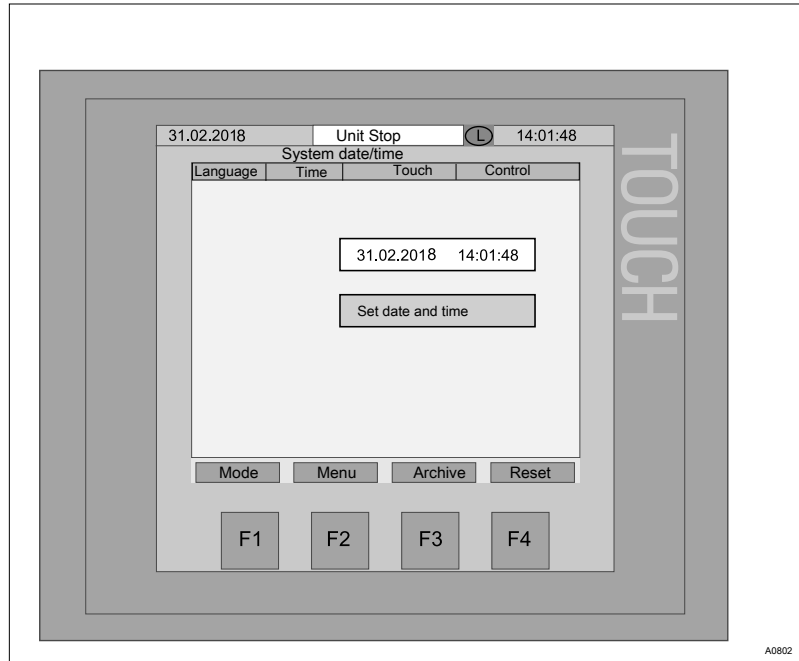


Fig. 35: Setting date and time

The date and time are set as follows:

1. Tap the button on which the time is displayed.
⇒ The display changes to the value input view.
2. Press *[BSP]* to delete the displayed date.
3. Use the keys *[0 ... 9]* to enter the actual date in the format *[dd.mm.yyyy]*. Example: 31.02.2018.



Decimal point = Key above the [0].

4. To input empty spaces, tap the key to the right of *[0]*.
5. Enter the time in the format *[hh:mm:ss]*. Example: 14:01:48.



*Colon = press *[+/-*]* key, then confirm[:].*

*Number pad = Press key *[0-9]*.*

6. Press Enter.
7. Tap *[Set date and time]*.
⇒ The set time is accepted by the system.

8.3.3 Touch panel

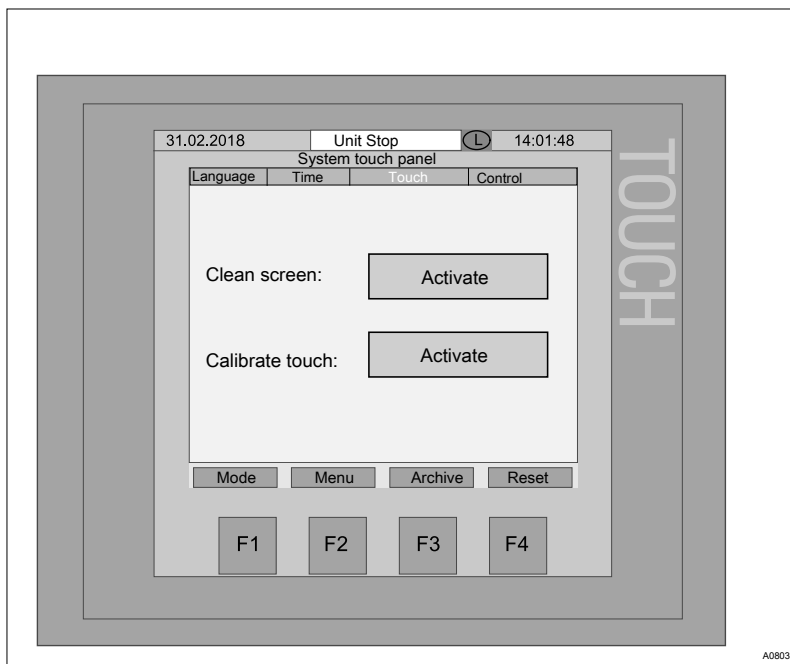


Fig. 36: Display [System]

Clean screen:



The function [Clean screen] is available to enable the touch panel to be cleaned. Using the [Clean screen] function, the touch panel is deactivated for the set time and consequently the touch panel can be cleaned without inadvertently triggering functions.

Use the [Activate] function to call up the [Clean screen] (touch panel).

Calibrate touch:

Use [Activate] to call up the [Calibrate touch] function. This is for renewed calibration of the sensors if the touch function is insufficiently accurate.

1. ➤ Press [Activate].
2. ➤ Tap the cross displayed five times with your finger.
3. ➤ Tap the touch panel once more so that the calibration value is accepted.

8.3.4 Control

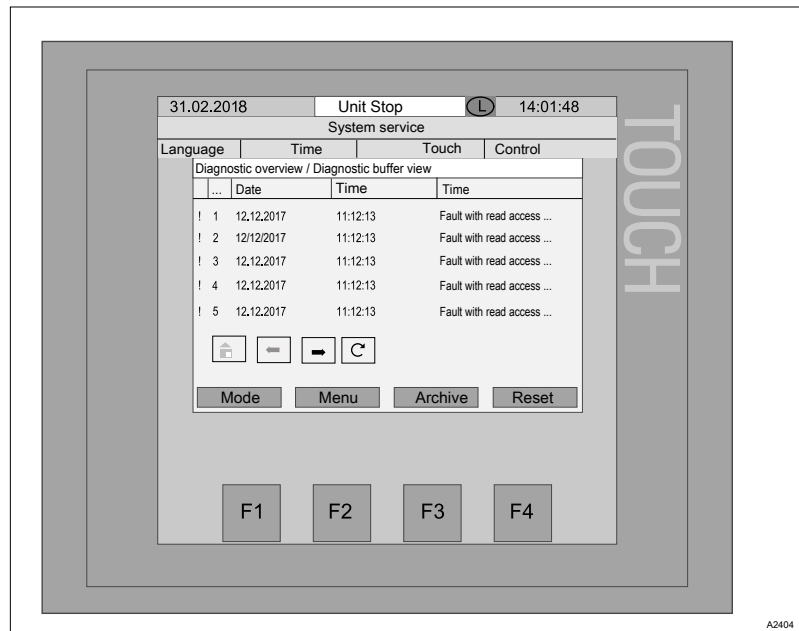


Fig. 37: Control

Detailed view of the last 100 changes to the control e.g.

- Changes of operating mode
- Parametrisation
- Concentration

This enables you to obtain a detailed diagnostic and trace changes to the system in the event of faults.

8.4 Concentration



If the PROFIBUS®, MODBUS® or PROFINET® are included in the scope of delivery, the [Concentration] and the [Internal] / [External] keys appear on the display. In [Internal] mode, the setpoints for the concentration (Powder and Liquid) are specified by the control panel. The (master) process management system can only read data. In [External] mode, the setpoints for the concentration are specified by the process management system. Additionally in [External] mode, the ULFB system can be switched to Pause and a fault acknowledged using the PROFIBUS®. Further information is available in the supplementary instructions for the PROFIBUS® or PROFINET®. Select the [Internal] setting if the PROFIBUS®, MODBUS® or PROFINET® are not connected.

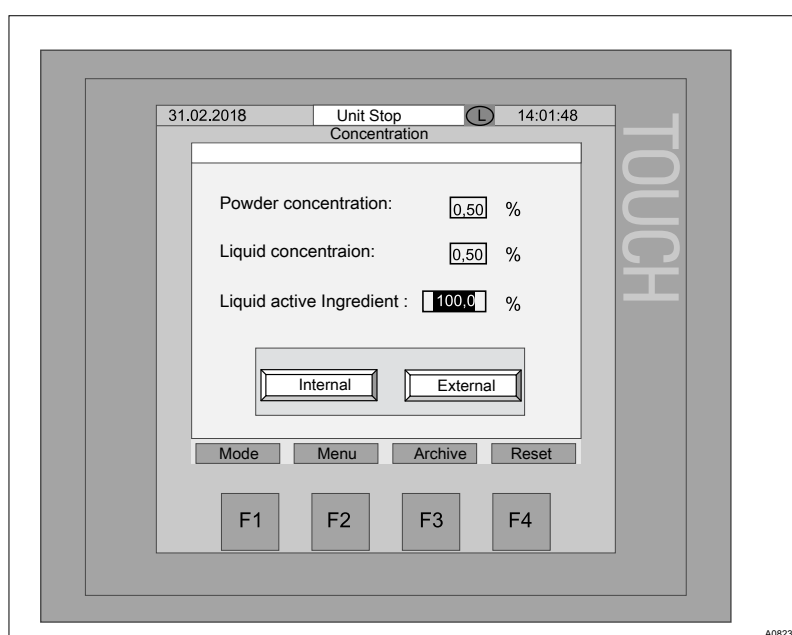


Fig. 38: Concentration powder / liquid

Parameter	Factory setting	Adjustment range
Powder concentration	0.5%	0.05 ... 2.00%
Liquid concentration	0.5%	0.05 ... 2.00%
Liquid active ingredient	50%	10 ... 100%
PROFIBUS®/PROFINET®/MODBUS® (Internal/External)	Internal	Internal or External



The [Powder/liquid concentration] parameters can be used to adjust the concentration of the prepared polymer solution in the ULFb system. The [Active Ingredient liquid] parameter specifies the content of the active ingredient in the liquid polymer.



Liquid active ingredient

The liquid polymers are provided with different active ingredients. While the active ingredient content of powder is 100%, the active ingredient content of a liquid polymer is generally below 50% (typically 40%).

In practice, it is generally desirable to use the same concentration settings with the liquid polymer as with the powder product. That is why the concentration of active ingredient (typically 40%) is entered in the control with the liquid polymer.

8.5 Info

8.5.1 ULFb identity code

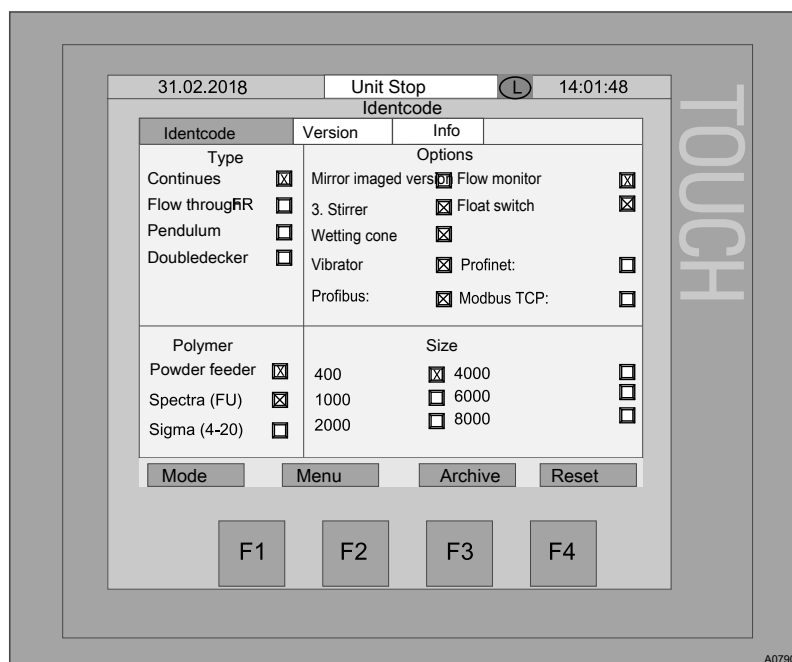


Fig. 39: ULFb identity code

Pressing F2 [MENU] > [INFO] lets you access the [Identcode] screen. You can read about the features with which the ULFb system is equipped here.

Feature	Remark
3rd Stirrer	This option means the ULFb has a stirrer in chamber 3.
Wetting cone	The wetting cone is intended to improve the mixing of polymer and water.

Feature	Remark
Vibrator	Only in the ' <i>dry material feeder</i> ' version. The vibrator is used to improve the sliding property of the polymer.
Flow monitor	Only in the ' <i>Spectra (FC)</i> ' version. Monitors the flow of liquid concentrate in the line.
Capacitive sensor	Only in the ' <i>Liquid</i> ' version. Monitors the liquid level of the liquid concentrate in the tank.
Profibus/Profinet/ Modbus TCP	Interface for data exchange.

8.5.2 Software version

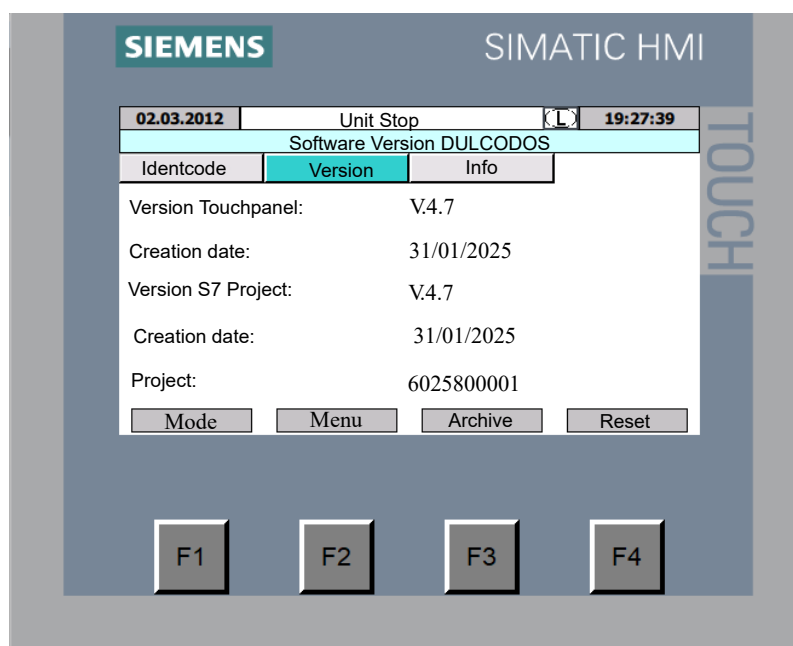


Fig. 40: Software version

You can read off the version of the touch panel and the S7 project, as well as its creation date, in this display. You can also read off the project number of the system.

8.5.3 Operating hour counter of installed motors

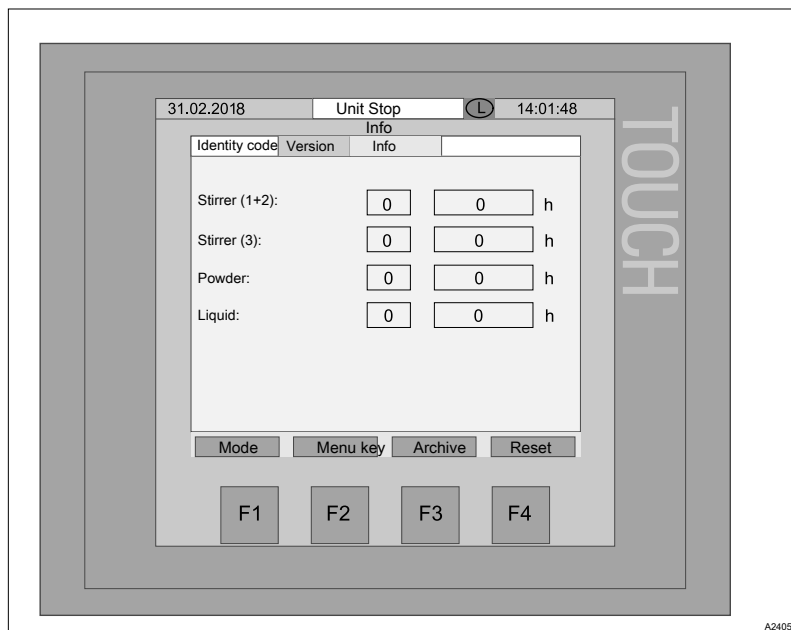


Fig. 41: Operating hour counter

The first column of the display shows the number of motor starts, while the second column shows the operating hours in "h":

- Stirrer 1+2 motors
- Stirrer 3 motor
- Powder feeder unit
- Liquid concentrate pumps

8.6 Service

The function key *[F2]* is used to jump to the *[Menu]*. Further settings can be made in the menu.

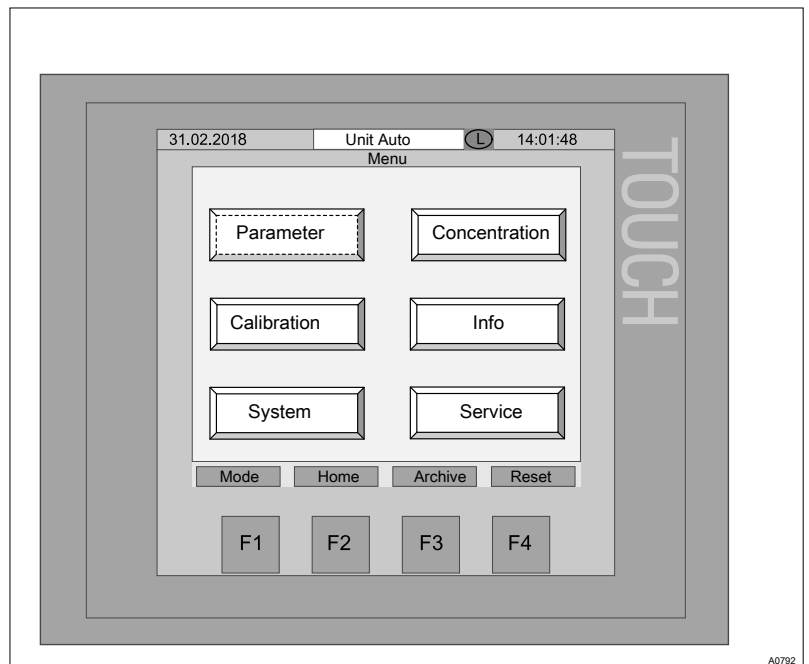


Fig. 42: Jump to the menu

- Parameter see ↗ Chapter 8.1 'Parameter' on page 49
- Calibration see ↗ Chapter 8.2 'Calibration' on page 56
- System see ↗ Chapter 8.3 'System' on page 61
- Concentration see ↗ Chapter 8.4 'Concentration' on page 65
- Info see ↗ Chapter 8.5 'Info' on page 66
- Service see ↗ Chapter 8.6 'Service' on page 68

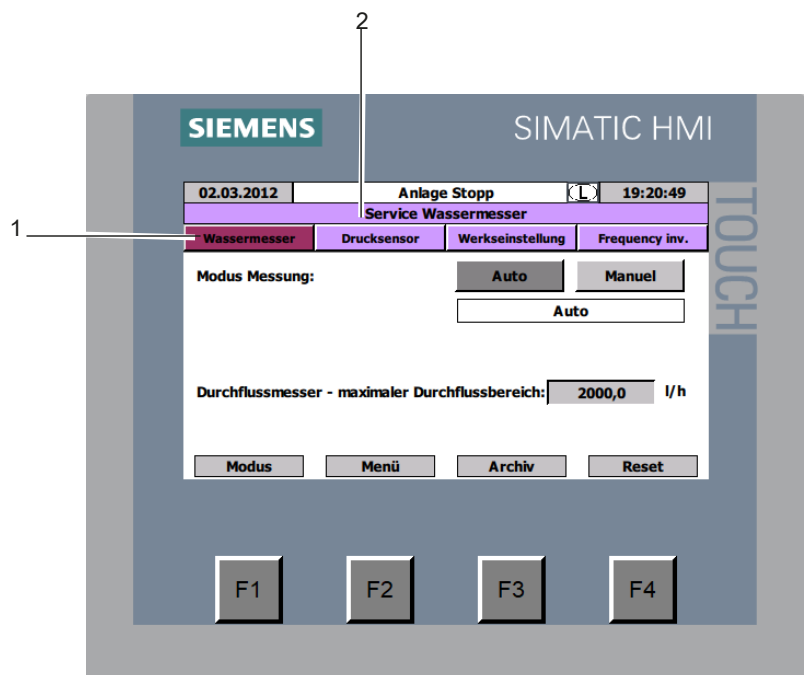


Fig. 43: Service

- 1 Buttons to jump to the different service groups
- 2 Title of the current service group

8.6.1 Service - Water meter

Manual flow entry:

02.2025 Unit Stop L 09:46:02

Service Water meter

Water meter Press. sensor Factory setting Frequency inv.

Mode measurement: Auto Manual

Manual

Manual value: 0,0 l/h

Flow meter - maximum flow range: 0,0 l/h

Mode Menu Archive Reset

Fig. 44: Manual flow entry

In the event of a fault with the automatic water flow measurement, you can switch to manual flow measurement for emergency operation. Manual flow measurement means that automatic measurement is out of operation and proportional metering is restricted.

Manual flow measurement is helpful if the flow meter is faulty, but the system has to remain in operation until the function is restored. The value for manually setting the water flow is entered in l/h [*litres per hour*] and is activated by the [*Manual*] key. An example of this is 1500 l/h for a ULFb 1000.

Flow meter:

The ULFb 500-8000 are equipped with modern flow meters, which determine the flow on the vortex principle and transmit the measured value to the PLC as a 4-20 mA signal. Larger types work with magnetically inductive flow meters.

The maximum flow range must be entered to scale the measuring signal and then corresponds to the max. current of 20 mA. An example of this is 9000 l/h for a ULFb 500-6000.

This default value is specified on delivery of a ULFb.

System type	Max. flow range	Maturing time
ULFb 500-6000	9000 l/h	60 min.
ULFb 8000	12000 l/h	60 min.
ULFb 10000	15000 l/h	60 min.
ULFb 500-6000	11250 l/h	45 min.
ULFb 8000	15000 l/h	45 min.
ULFb 10000	18750 l/h	45 min.

8.6.2 Service – Pressure Sensor

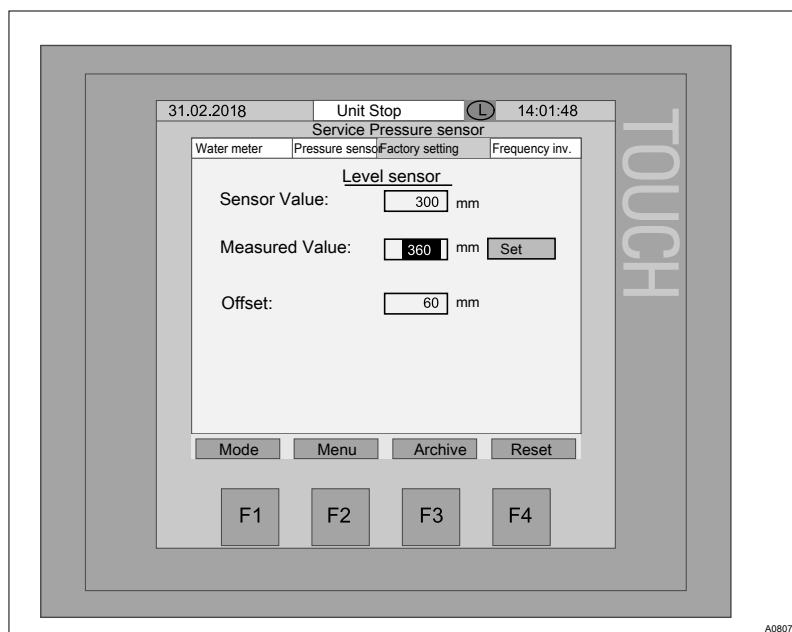


Fig. 45: Service – pressure sensor

Sensor Value:

The *[Sensor Value]* shows the filling height of the storage tank measured. The *[Sensor Value]* does not represent the actual filling height. To enable the correct filling height to be displayed, add the dead zone in the lower part of the storage tank (approx. 60 mm) to the *[Sensor Value]*.

Measured Value:

To determine the dead zone of the storage tank, fill the storage tank to at least 50%. Now you can measure the filling height with a dip stick. You must enter this value in *[mm]* in the text field *[Measured Value]*.

The offset is calculated by the pressing *[Set]*.

Offset:

Display of the current offset (offset = dead zone).

Measured Value = Sensor Value + Offset

8.6.3 Service – Factory setting and changing the identity code

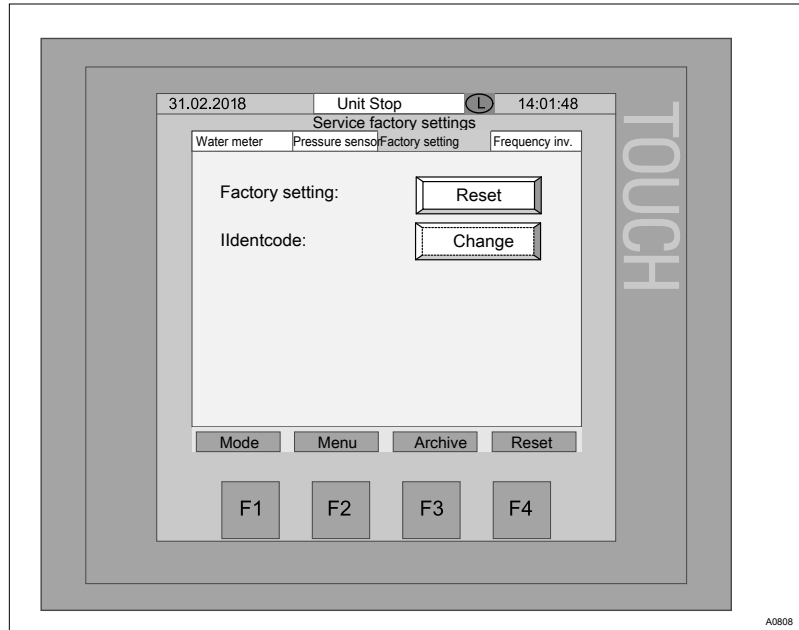


Fig. 46: Service – Factory setting and changing the identity code

Factory setting:

Use the *[Reset]* button to reset the parameters of the ULFb system to its factory setting.

Identcode:



NOTICE!

Incorrect functions can occur if the incorrect identity code is entered.

The function is password-protected.

Use the *[Change]* button to change the identity code of the ULFb systems.

The identity code is programmed according to its factory setting. You can enter technically feasible extensions here to facilitate additional options. The resulting identity code is checked for feasibility and only then can it be changed. For information on the identity code currently set, see [Chapter 8.5 'Info' on page 66](#).

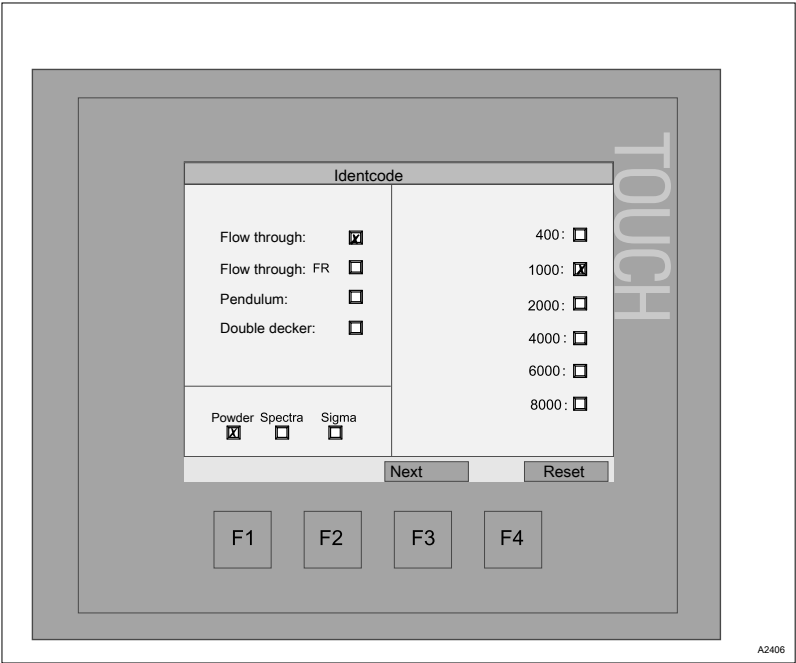


Fig. 47: Selection of ULFb types

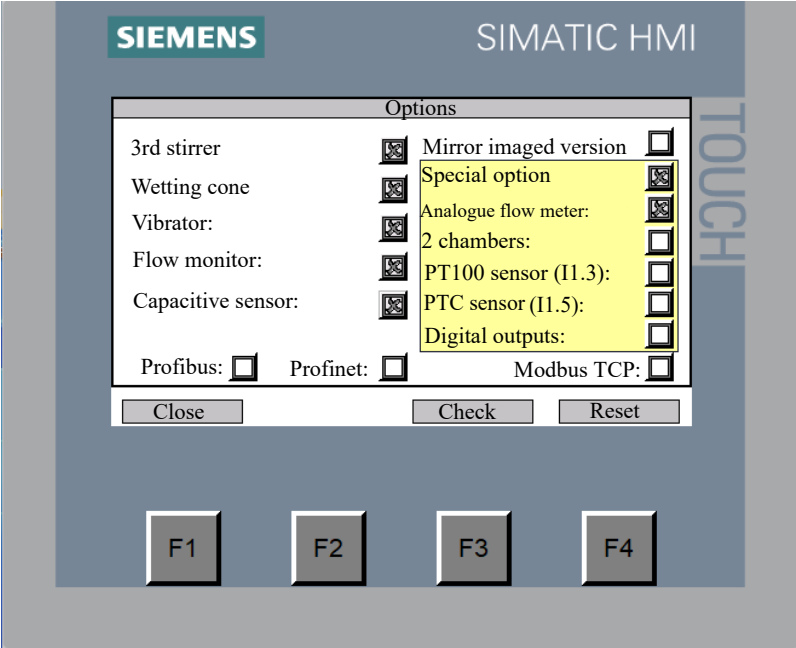


Fig. 48: Selection of options

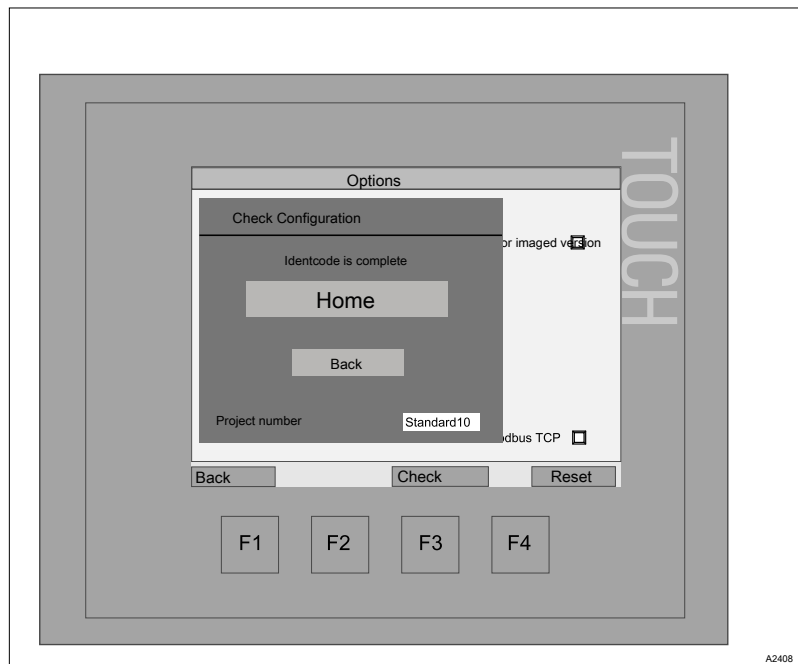


Fig. 49: Checking the configuration

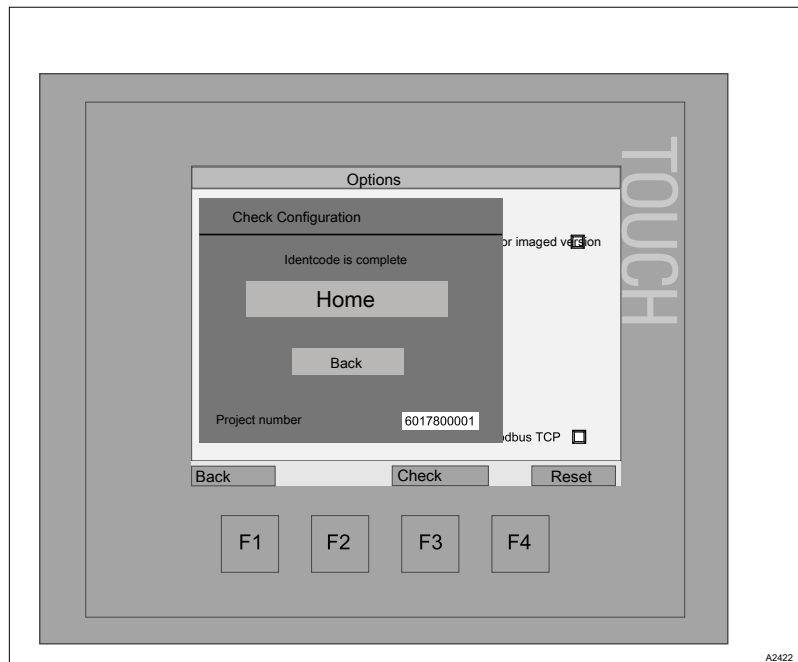


Fig. 50: Naming the project

1. ➤ The system automatically jumps to the Home menu if the check was successful.
2. ➤ In the event of an incorrect or incomplete identity code, go back one level and enter the necessary details.

8.6.4 Frequency converter for dry material feeder - Status display

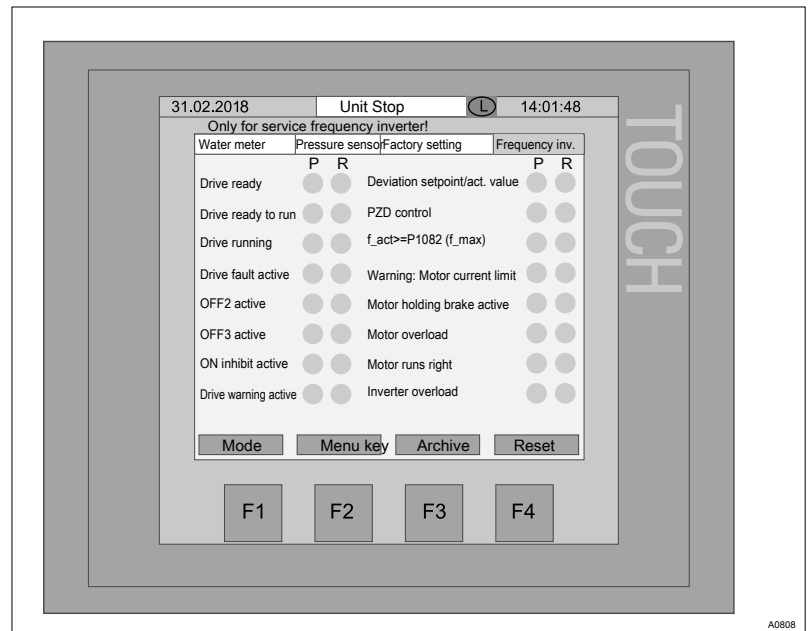


Fig. 51: Status display

Detailed display of the operating status of the frequency converter using green or red light points. You can diagnose errors more precisely and simply here.

9 Operation of the Siemens Sinamics V20 frequency converter

The parameters of the frequency converter are factory-set to the dry material feeders and liquid concentrate pumps used in the ULFb system.

If a liquid concentrate pump is subsequently connected in place of a dry material feeder (not included in the scope of delivery), check the parameters on site and adjust them to the liquid concentrate pump.

9.1 Function and operation

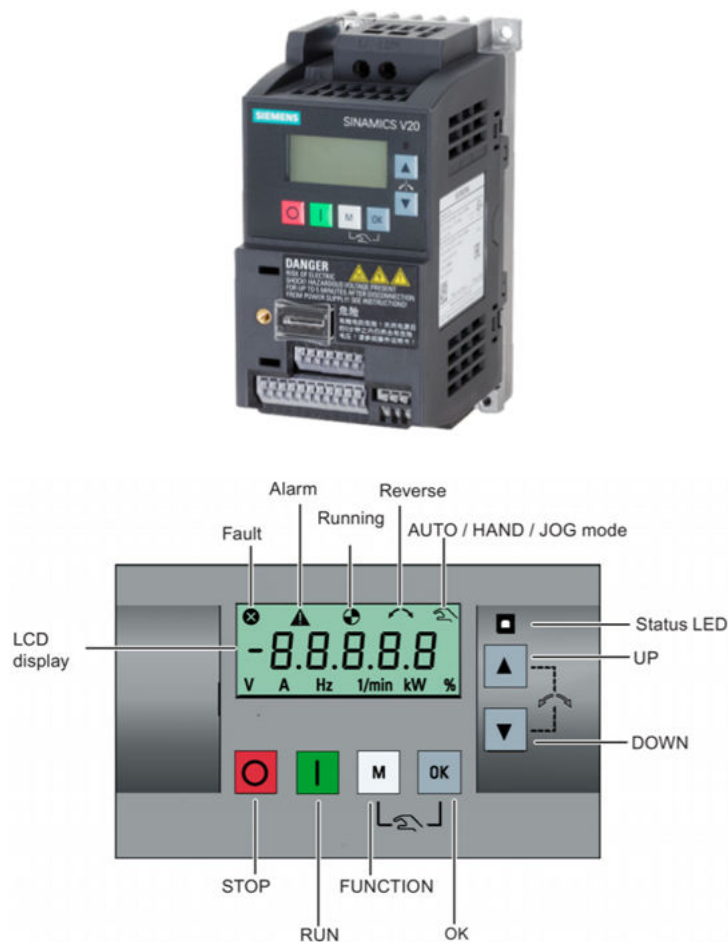


Fig. 52: Sinamics V20 frequency converter

	Function
	Stops the motor
	Starts the motor
	Selects functions
	Confirmation and parameter selection

	Function
	Increase value
	Decrease value

9.2 Set-up of the frequency converter

Tab. 6: Dry material feeder settings:

V20 parameters	Dry material feeder values
0003	3
0305	1.22 A
0307	0.18 kW
0311	1360 rpm
0700	5
1000	5
1082	100 Hz
1120	0.1 s
1121	0.1 s
1210	4
2000	100 Hz
2010	9
2011	1
2012	2
2013	4
2014	6000

Tab. 7: Spectra liquid concentrate pump settings:

V20 parameters	Spectra values
0003	3
0305	1.9 A
0307	0.37 kW
0311	1380 rpm
0700	5
0731	4
1000	5
1082	83 Hz
1120	0.1 s
1121	0.1 s
1210	4
2000	83 Hz
2010	9
2011	2
2012	2
2013	4
2014	6000

10 Setting the additional components

10.1 Capacitive sensor settings

The capacitive sensors we use are pre-set and factory-checked for their correct working order.

The sensor used on the side of the dry material feeder signals a shortage of powder and leads to metering being switched off.

With the wetting cone, which can optionally be fitted, it senses that the hopper is overfilled and leads to the system being stopped.

The small yellow LED attached at the side signals the switching status and lights up in an active status.

The switching interval can be increased or decreased using the potentiometer on the side.

10.2 Metering pumps for liquid concentrate metering

Metering pumps DFXa/Sigma/Spectra fitted are pre-set and factory-checked for their correct working order so that no settings need to or should be entered.



Refer to the operating instructions for the relevant products for more information.

11 Operation of the system

User qualification, system operation: trained user, see [Chapter 2.3 'Users' qualifications' on page 11](#)



WARNING!

Danger of slipping

Danger due to the escaping of water or polymer.

Mixtures of polymer and water are slippery

- Ensure that you have a secure foothold when filling the dry product hopper
- Immediately remove any spilled powdered polymer or leaked polymer solution
- Always observe the safety data sheet for the polymer used.



WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

11.1 Normal mode

11.1.1 Prerequisites for correct and proper operation



WARNING!

Danger due to system operation

The system may only be operated by instructed personnel

- The system can in principle be stopped and restarted in every operating phase
- The cause of a fault should be eliminated before the corresponding fault message is acknowledged. However, you can silence the horn by pressing the key 'Horn off'.

Requirements:

- A reasonable operating parameter set-up
- An accurate calibration
- No unauthorised parameter changes to the frequency converter

11.1.2 Refilling the feed hopper with powdered polymer

If the feed hopper is not automatically filled by a small feed unit, the supply of powdered polymer must be continuously checked and refilled in good time.

This can be done while the system is operational. To do so, remove the cover of the feed hopper and carefully shake in powdered polymer.

11.1.3 Refilling the concentrate storage tank with liquid polymer

If the concentrate storage tank is not automatically refilled, the reservoir of liquid polymer must be continuously checked and refilled in good time.

11.2 Behaviour When Switching on Mains Power and in the Event of Mains Power Failure



WARNING!

Automatic start-up

Each time mains power is switched on, the stirrers start up without regard to the system status measured

Each time mains power is switched on, preparation mode can commence.

Therefore keep all covers or inspection openings closed.

If it is necessary to work on the system, disconnect the system from the mains and secure it to prevent switching back on.

Switching on mains power

Each time mains power is switched on, the stirrers start up without regard to the system status measured

By contrast, the system only starts in preparation mode if the Min. Switch point has been reached in reservoir 3. If there is a loss of mains power during preparation mode, even if only for a short period, once mains power is reconnected, preparation mode is not continued.

Behaviour in the event of loss of mains power

Following a mains power failure, or in the event of a longer loss of mains power, which results in the controller being restarted, the controller will unrestrictedly continue with the operation of the system based on the statuses measured. If the level of the storage tank is within the normal range, no preparation operation will be started even if a preparation process was running prior to the interruption.

11.3 Decommissioning



WARNING!

System transportation

Danger due to the high weight of the system.

If the system is to be moved, observe chapter without fail

For a short period

➔ Press and hold key *[F1]*, and select *[Stop]* mode.

For a longer period

1. ➔ Switch the main switch to 'Off'
2. ➔ Lock the main switch to prevent the system from being switched on accidentally

For more than 2 days



CAUTION!

The liquid end and the lines can become blocked

When bringing back into service, the liquid polymer must not come into contact with rinsing water

Clear any rinsing water from the liquid end and lines

- Rinse the liquid end, the concentrate pump, the suction line and the discharge line
- Dismantle and dry the liquid end of the concentrate pump
- Clean the suction line and discharge line with suitable cleaning devices

1. ➔ Switch the main switch to 'Off'
2. ➔ Lock the main switch to prevent unauthorised switching back on of the system
3. ➔ Pull out the mains plug
4. ➔ Completely empty the powder feeder
5. ➔ Empty the three chamber storage tank through the provided individual chamber connectors.
6. ➔ Carefully rinse the three chamber tank with water
7. ➔ Also rinse the rinsing apparatus (hopper and mixing device) once more with water
8. ➔ Carefully flush the line between the shut-off valve of chamber 3 and the feed pump. (Should an flushing connector have been installed, this will simplify flushing.)

11.4 Disposal of Used Parts

- **User qualification:** instructed user, see  *Chapter 2.3 'Users' qualifications' on page 11*



NOTICE!

Regulations governing the disposal of used parts

- Note the national regulations and legal standards that currently apply in your country

The manufacturer will take back decontaminated used units providing they are covered by adequate postage.

Decontaminate the unit before returning it for repair. To do so, remove all traces of hazardous substances. Refer to the Material Safety Data Sheet for your feed chemical.

A current Declaration of Decontamination is available to download on the ProMinent website.

12 Incorrect operation of the system

- The incorrect position of the drainage valves will result in malfunctions
- The incorrect position of the shut-off valve in the feed water line will result in malfunction
- Unauthorised persons must be prevented from entering or changing operating parameters. Make use of the access codes
- Do not change the pre-set parameter values for the frequency converter. They are factory-set on the powder feeder unit or the liquid concentrate pump
- When setting the concentration, do not exceed the maximum viscosity limit of 1500 mPas
- The system will stop if you fail to top up the polymer supply.
- The system can malfunction if you do not clear the cause of a system-side fault and press the Enter key
- Further and more serious faults can occur should you operate the system without the original faults having been rectified

13 Commissioning

Proceed as follows during commissioning:

Step	Task
1	Assembly and installation, see  Chapter 6 'Assembly and installation' on page 33
2	Set the capacitive sensors, see  Chapter 10.1 'Capacitive sensor settings' on page 79
3	Check the parameters, see  Chapter 8.1 'Parameter' on page 49
4	Check the date and time, see  Chapter 8.3 'System' on page 61 in the "Set date and time" sub-section
5	Perform calibration, see  Chapter 8.2 'Calibration' on page 56
6	Adjust the concentration, see  Chapter 8.4 'Concentration' on page 65
7	Switch the system to operating mode [AUTO], see  Chapter 7.3 'Changing the operating mode' on page 39



CAUTION!

Water damage is possible

Larger volumes of water or polymer solution can escape from the system. Monitor the operation of the system in this start-up phase.

- Prior to starting the preparation process, make sure that the drainage valves on all three chambers are closed.
- Monitor in particular the correct switching operation of the liquid level sensor when it first reaches the respective switching points.



Fault message "ULFb tank is empty"

The fault message [ULFb tank is empty] is unavoidable, as all chambers are now empty. Acknowledge this fault.

Requirements:

- You have checked the correct and proper assembly and installation of the system
 - The drainage valves for the three chambers are closed
 - The feed hopper has been filled with the intended powdered polymer
 - The concentrate tank has been filled with the intended liquid polymer
1. ➤ All the operating parameters have been set
 2. ➤ All the necessary units have been calibrated
 3. ➤ Start the system by switching to AUTO operating mode, see  Chapter 7.3 'Changing the operating mode' on page 39
 - ⇒ The system starts up and begins the automatic preparation process.

14 Maintenance

14.1 Inspect the powder feeder and wetting apparatus

Powder feeder

1. ➤ Inspect the powder feeder regularly during operation to ensure that it is working correctly

2. ➤ Check that the powdered polymer is being dosed correctly

Wetting equipment

3. ➤ Check whether the conical wetting area of the wetting cone is completely rinsed over with water and that no powder deposits form

14.2 Cleaning the filter insert in the pressure reducer



You must clean the filter insert no later than when 2/3 of the throughput surface of the screen insert is dirty.

1. ➤ To remove the filter insert, you must place the system in *[Stop]* mode by pressing the *[F1]* key.

2. ➤ Manually close the shut-off valve upstream of the pressure reducer

3. ➤ Details of the subsequent procedure, can be found in the manufacturer's instructions for the pressure reducer.

14.3 Checking and cleaning the solenoid valve



WARNING!

Danger of electric shock!

Possible consequence: Fatal or very serious injuries

The control cabinet must always be closed during operation

The main switch must be set to '0' and secured against restart before any installation or maintenance work can begin.



CAUTION!

Possibility of incorrect system operation

- When handling the solenoid valve always be aware of the cable
- When assembling, take note of the correct position and layout of the parts

**NOTICE!****More information**

You can find more information and the corresponding drawing contained in the solenoid valve operating instructions in the appendix to this documentation.

1. ➤ Fully close the upstream shut-off valve
2. ➤ Undo the four socket cap screws on the housing and remove the valve cap together with the rinsing attachment
⇒ Look out for the cable.
3. ➤ Remove the inserts
4. ➤ Check the diaphragm for damage
5. ➤ Clean the housing inner, especially the throttling port and the small pre-spill port in the valve outlet

14.4 Remove and check the flow meter

**CAUTION!****Possibility of incorrect system operation**

- Always be aware of the cable when handling the flow meter
- When refitting the flow meter, note the flow arrow on the housing

1. ➤ Stop the system with the *[F1]* key *[Stop]* mode
2. ➤ Close the shut-off valve in the feed water line:
3. ➤ Note the pressure display / manometer:

**CAUTION!**

Only continue working at atmospheric pressure

4. ➤ To remove the flow meter, loosen the corresponding threaded connectors in the water pipework
5. ➤ Check the sensor element inside the flow meter for deposits
⇒ and clean as necessary.
6. ➤ Fit the flow meter pointing in the right direction in the feed water line (flow arrow)

14.5 Removing the cover of an inspection opening



CAUTION!

Propellers are rotating in the storage tanks!

Slight or minor injuries.

Switch off the system and only then remove the screwed cover of an inspection opening.

As a matter of principle, the system must only be operated with the covers of the inspection openings tightly screwed in place. The covers may only be removed temporarily:

- To check the liquid level
- To check the liquid level sensors for correct switching operation
 - After the inspection work, replace all covers and secure

14.6 Cleaning the surface of the storage tank

From time to time clean the surface of the storage tank, as with time, a slippery film can form on it. Always observe the instructions on the safety data sheet for the polymer used.

15 Fault messages

15.1 Troubleshooting

User qualification, troubleshooting: trained user, see ↗ *Chapter 2.3 'Users' qualifications' on page 11*

User qualification, troubleshooting (unspecified faults): Service, see ↗ *Chapter 2.3 'Users' qualifications' on page 11*



WARNING!

Automatic start-up

Each time mains power is switched on, the stirrers start up without regard to the system statuses measured.

Preparation mode can start every time mains power is switched on.

Therefore keep all covers of the inspection openings closed.

If it is necessary to work on the system, disconnect the system from the power supply and secure it to prevent it from switching back on.



Refer also to the operating instructions for the purchased parts when troubleshooting.

Collective alarm

A system fault (collective alarm) is acoustically reported by a warning tone and visually by the red warning light on the control cabinet. The control also displays an error message. The warning tone can be switched off by pressing *[Reset F4]*.

Activation of the downstream feed pump (polymer solution) remains unaffected by the collective alarm.

Acknowledgement

The fault message must be acknowledged with the Reset key once the cause of the fault has been eliminated so that the system can restart operation following the fault.

Unspecified faults

Should a problem occur which is not included in this list or should a listed fault not be remedied by the suggested troubleshooting measures, please contact ProMinent® Service to remedy the problem.

Sensors

With every fault analysis, it should first be considered that a capacitive proximity sensor or a concentrate flow sensor may possibly be incorrectly signalling a fault (because its sensitivity has been set too high or it is triggering/responding to suddenly changed ambient conditions).

15.2 General notes on fault messages



Acknowledging fault messages

You must acknowledge fault messages.

If the system generates a fault message, optical and acoustic signalling of the fault is triggered. Simultaneously with the generation of the fault message a message about the type and time of the fault is output to the display of the operating panel.



Fig. 53: Fault message on the display

The fault and the number of occurrences of the fault are signalled by the following fault symbol

If you have cleared the fault, the optical and acoustic signalling is reset by pressing the key *[RESET]* (F4) and the fault message on the display is deleted.

If you have not cleared the fault, only the acoustic signalling is reset by pressing the key *[RESET]* (F4). The optical alarm display as does the fault message.

In parallel to the optical signalling of the alarm the fault switches the system output *[COLLECTIVE ALARM]*. If a fault occurs, the output *[COLLECTIVE ALARM]* is activated (switches from 0 to 1).



Fig. 54: Fault

15.3 Faults - Cause - Remedy

Fault message	Cause	Remedy	Preparation Stop	Extraction locked
Dry material feeder is not calibrated	Dry material feeder not yet calibrated	Calibrate the dry material feeder	YES	NO
Check the dry material feeder frequency converter	Frequency converter faulty	Check the frequency converter	YES	NO
	Frequency converter parametrisation is incorrect	Check frequency converter parameters		
Powder feeder unit is empty	Feed hopper is empty	Top up the feed hopper	YES	NO
	Digital input faulty	Check the digital input		
	Powder sensor faulty	Check the powder sensor		

Fault message	Cause	Remedy	Preparation Stop	Extraction locked
Dry material feeder - max. dosing capacity reached	Dry material feeder calibration is faulty	Repeat dry material feeder calibration	NO	NO
	Water supply too high	Reduce the water supply		
	Concentration parameter too high	Reduce concentration parameter		
Liquid concentrate pump is not calibrated	Liquid concentrate pump is not yet calibrated	Calibrate the liquid concentrate pump	YES	NO
Check the Sigma liquid concentrate pump	Pump is faulty	Check the pump		
Check the liquid concentrate pump frequency converter	Frequency converter faulty	Check the frequency converter		
	Frequency converter parametrisation is incorrect	Check frequency converter parameters	YES	NO
Liquid concentrate supply tank is empty	Supply tank is empty	Top up the supply tank		
	Float switch faulty	Check the float switch		
	Digital input faulty	Check the digital input		
Check the liquid concentrate flow sensor	Supply tank is empty	Top up the supply tank	YES	NO
	The flow sensor is not correctly adjusted	Calibrate the flow sensor		
	Digital input faulty	Check the digital input		
Liquid concentrate pump - max. dosing capacity reached	Liquid concentrate pump calibration is faulty	Repeat liquid concentrate pump calibration	NO	NO
	Water supply too high	Reduce the water supply		
	Concentration parameter too high	Reduce concentration parameter		
Liquid concentrate pump - min. dosing capacity reached	Concentration parameter too low	Increase concentration parameter	NO	NO
	Water supply too low	Increase water supply		
	Liquid concentrate pump calibration is faulty	Calibrate the liquid concentrate pump		
Water supply too low	Minimum water supply parameter too high	Check minimum water supply parameter	NO	NO
	Fluctuations in the water supply	Check the water supply		
	Filter bowl blocked	Clean the filter bowl		
	Pressure reducer set incorrectly	Set pressure reducer correctly		
	Water meter faulty	Check the water meter		

Fault messages

Fault message	Cause	Remedy	Preparation Stop	Extraction locked
	Digital input faulty	Check the digital input		
Water supply too low. ULFb Stop	Minimum water supply parameter too high	Check minimum water supply parameter	YES	NO
	Water supply failed	Check the water supply		
	Fluctuations in the water supply	Check the water supply		
	Filter blocked	Clean the filter		
	Pressure reducer set incorrectly	Set pressure reducer correctly		
	Water meter faulty	Check the water meter		
	Digital input faulty	Check the digital input		
Wetting cone too full	Needle valves to the wetting cone are not set correctly	Adjust the needle valves	YES	NO
	Wetting cone blocked	Clean the wetting cone		
	Sensor faulty	Check the sensor		
	Digital input faulty	Check the digital input		
ULFb tank is empty	Extraction from the ULFb is too high	Reduce extraction	NO	YES
	Water supply too low	Increase water supply		
	Pressure sensor faulty	Check the pressure sensor		
ULFb tank too full	Post-rinse period parameter too high	Check post-rinse period parameter	YES	NO
	Solenoid valve faulty	Check the solenoid valve		
	Pressure sensor faulty	Check the pressure sensor		
Check the pressure sensor	Sensor faulty	Check the sensor	YES	YES
	Analogue input faulty	Check the analogue input		
Stirrer motor protection switch triggered	Motor faulty	Check the motor	YES	NO
	Stirrer sluggish	Mechanically check the stirrer		
	Motor protection switch set incorrectly	Check the motor protection switch setting		
	Digital input faulty	Check the digital input		
Water shortage in the post-dilution unit	Water supply to post-dilution unit failed	Check the water supply to the post-dilution unit	NO	NO

Fault message	Cause	Remedy	Preparation Stop	Extraction locked
	Limit switch faulty	Check the limit switch		
	Digital input faulty	Check the digital input		
1F2 fuse triggered	Short circuit	Check for short circuit	YES	NO
	Connected devices faulty	Check devices		
	Digital input faulty	Check the digital input		
1F6 fuse triggered	Short circuit	Check for short circuit	YES	NO
	Connected devices faulty	Check devices		
	Digital input faulty	Check the digital input		
PROFIBUS®	PROFIBUS® faulty	Check the PRO-FIBUS®	YES	NO
	Cable faulty	Check the cable	YES	NO
	Plug faulty	Check the plug	YES	NO
	Address not correct	Check the PRO-FIBUS® parameters	YES	NO
PROFINET®	PROFINET® faulty	Check the PRO-FINET®	YES	NO
	Cable faulty	Check the cable	YES	NO
	Plug faulty	Check the plug	YES	NO
	IP address and PRO-FINET® name not assigned	Check the assignment	YES	NO

16 Systems / Data sheets

16.1 Logical statuses

Tab. 8: Logical statuses of the digital inputs:

Input	Signal designation	Logical status*	Status description
DI A.0		-	
DI A.1	230 V voltage error	1	Voltage OK
		0	Error
DI A.2	24 V voltage error	1	Voltage OK
		0	Error
DI A.3	Stirrer fault	1	Stirrers OK
		0	Fault
DI A.4	Pause	1	Pause disabled
		0	Pause enabled
DI A.5	Post-dilution pump	1	Chemical transfer pump on (water supply available)
		0	Chemical transfer pump off (water supply disconnected)
DI A.6	Post-dilution flow monitor	1	Flow present
		0	Flow not present
DI B.0	Lack of powder in dry material feeder	1	Powder present
		0	Powder not present
DI B.1	Wetting cone overflowing	1	Wetting cone OK
		0	Wetting cone overflow
DI B.2	Liquid concentrate capacitive sensor	1	Liquid concentrate available
		0	Liquid concentrate empty
DI B.3	Liquid concentrate flow monitor	1	Liquid concentrate flow present
		0	Liquid concentrate flow not present
DI B.4	Liquid concentrate pump fault	1	Liquid concentrate pump OK
		0	Liquid concentrate pump fault

*) 1 = 24 V DC; 0 = 0 V DC

Tab. 9: Logical statuses of the digital outputs:

Output	Signal designation	Logical status*	Status description
DQ A.0	Ready for preparation	0	Ultromat not ready for preparation
		1	Ultromat ready for preparation
DQ A.1	Dry running (enable signals)	0	Dry running (chamber 3 is empty)
		1	Chamber 3 is full
DQ A.2	Collective alarm	0	No collective alarm
		1	Collective alarm enabled
DQ A.3	Horn	0	Horn off
		1	Horn on
DQ A.4	Solenoid valve	0	Solenoid valve closed
		1	Solenoid valve open
DQ A.5	Stirrer 1 and 2	0	Stirrer 1+2 off
		1	Stirrer 1+2 on
DQ A.6	Stirrer 3	0	Stirrer 3 off
		1	Stirrer 3 on
DQ A.7	Heating	0	Heater off
		1	Heater on
DQ B.0	Vibrator	0	Vibrator off
		1	Vibrator on
*) 1 = 24 V DC; 0 = 0 V DC			

Analogue inputs:

Input	Signal designation	Terminals	Description
AI.0	Level measurement chamber 3 via pressure sensor or Dulcolevel	X3 4 X3 5+6	4-20 mA
AI.1	Flow measurement	X3 1 X3 2+3	4-20 mA

Analogue outputs:

Output	Signal designation	Terminals	Description
	Emulsion consumption DFXa / Sigma pumps	X3 7+8	4-20 mA

16.2 Operating menu with mode overview

16.2.1 Mode: Parameter

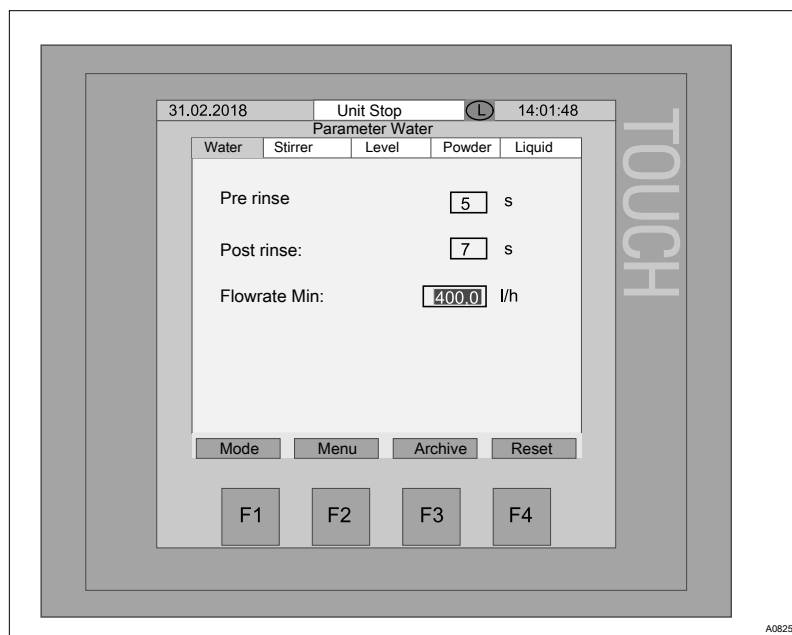


Fig. 55: Example: [WATER] parameters

Water:

Pre rinse:	xx (s)
Post rinse:	xx (s)
Flowrate Min:	xx.xxx (l/h)

Stirrer:

Stirrer 1+2 on:	xx (min)
Stirrer 1 +2 off:	xx (min)
Stirrer 3 on:	xx (min) (*)
Stirrer 3 off:	xx (min) (*)

Level:

Max-Max:	xxxx (mm)
Max:	xxxx (mm)
Min:	xxxx (mm)
Min-Min:	xxxx (mm)

First filling:

Input of 3 levels

Powder: (*)

Heater on:	xx (s)
------------	--------

Heater off:	xxx (s)
Vibrator on:	xx (s) (*)
Vibrator off:	xxx (s) (*)

(*): Many operating menus are not installed depending on the design and setting supplied.

(**): First switch the control to "Stop mode".

x = Input required.

16.2.2 Mode: Calibration (**)

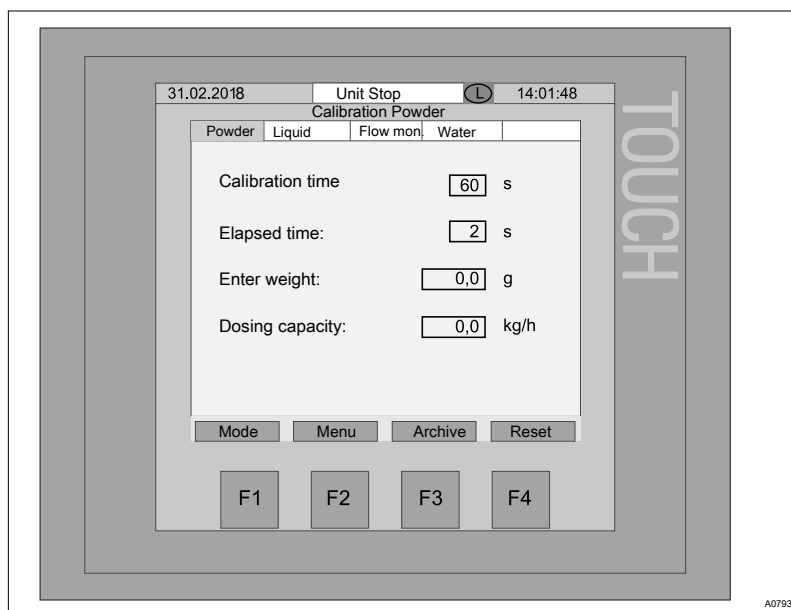


Fig. 56: Calibration Powder

Powder (*)

Calibration time:	xxx (s)
Elapsed time:	ddd (s)
Enter weight:	xxxxx.x (g)
Dosing capacity:	dddd.d //(kg/h)

Liquid: (*)

Calibration time:	xxx (s)
Elapsed time:	ddd (s)
Enter weight:	xxxxx.x (g)
Dosing capacity:	dddd.d //(kg/h)

Flow monitor: (*)

Switch point:	xx.x (kg/h)
Start/Stop (concentrate pump)	

Water:

Actual flow:	dddd.d (l/h)
Calibration of water:	Start/Stop

(*): Many operating menus are not installed depending on the design and setting supplied.

(**): First switch the control to "Stop mode".

x = Input required.

16.2.3 Mode: System

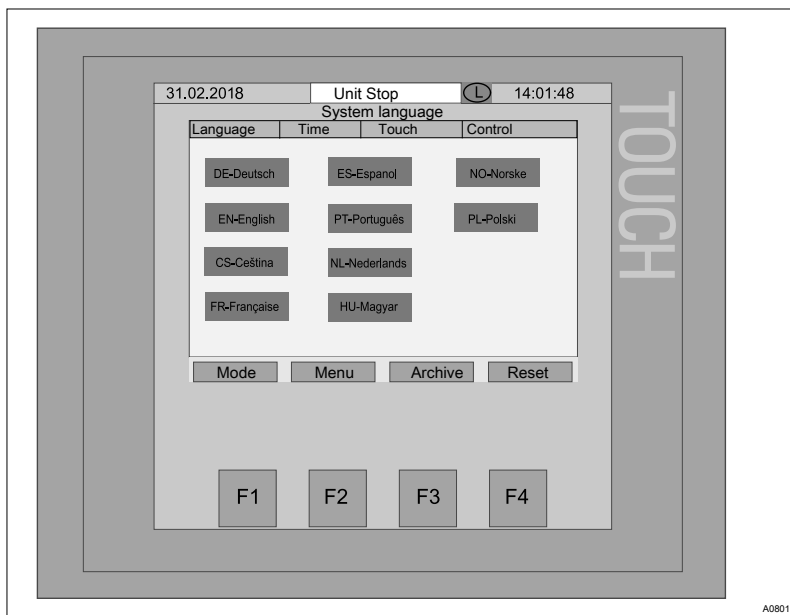


Fig. 57: Changing the language

Language:

DE, EN, FR, ES, PT(*)

Confirm language

Start

Time:

31.02.2018 14:01:48

Set date and time

(dd.mm.yyyy hh:mm:ss)

Touch:

Clean screen: Activate

Calibrate touch: Activate

(*): Many operating menus are not installed depending on the design and setting supplied.

(**): First switch the control to "Stop mode".

x = Input required.

16.2.4 Mode: Concentration

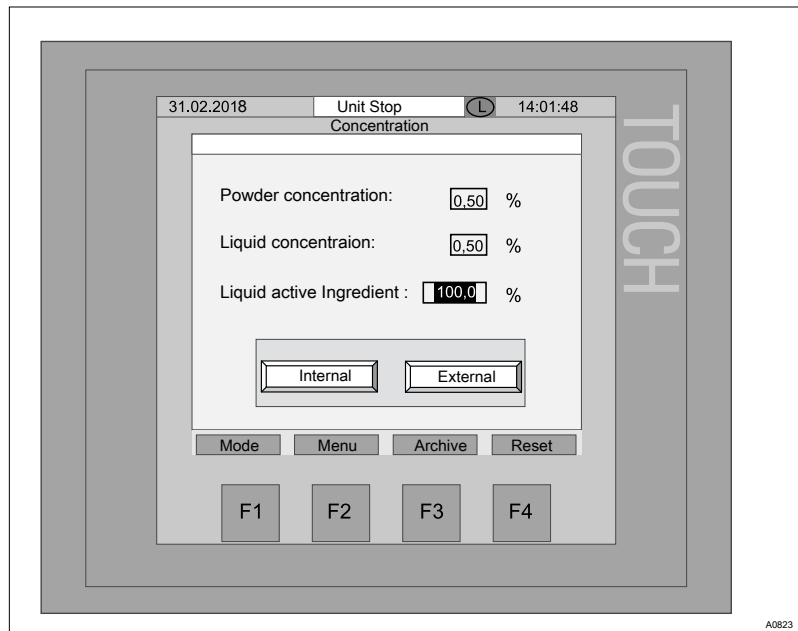


Fig. 58: Concentration powder / liquid

Concentration:

Powder: x.xx (%) (*)

Liquid: x.xx (%) (*)

Liquid active ingredient: xxx.x %(*)

internal/external

(Profibus, Profinet, Modbus) (*)

(*): Many operating menus are not installed depending on the design and setting supplied.

(**): First switch the control to "Stop mode".

x = Input required.

16.2.5 Mode: Info

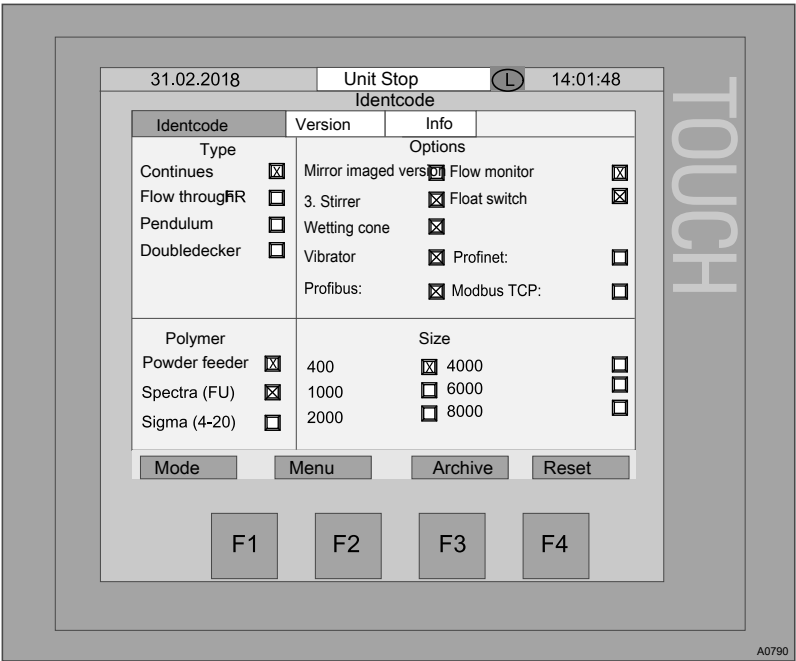


Fig. 59: ULFb identity code

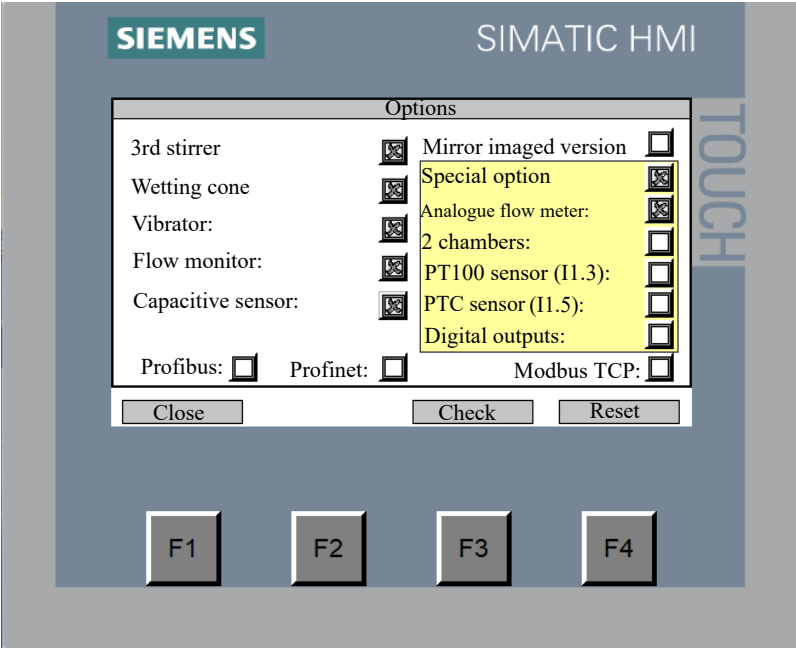


Fig. 60: SIMATIC HMI options

Identcode:
Type: d
Size: d
Polymer: d
Options: d
Version:
Touch panel version: d

Creation date: d

Version of S7 project: d

Creation date: d

Project: d

Info:

Operating times

Stirrer 1+2

Stirrer 3

Powder feeder unit

Concentrate pump

(*): Many operating menus are not installed depending on the design and setting supplied.

(**): First switch the control to "Stop mode".

x = Input required.

16.2.6 Mode: Service

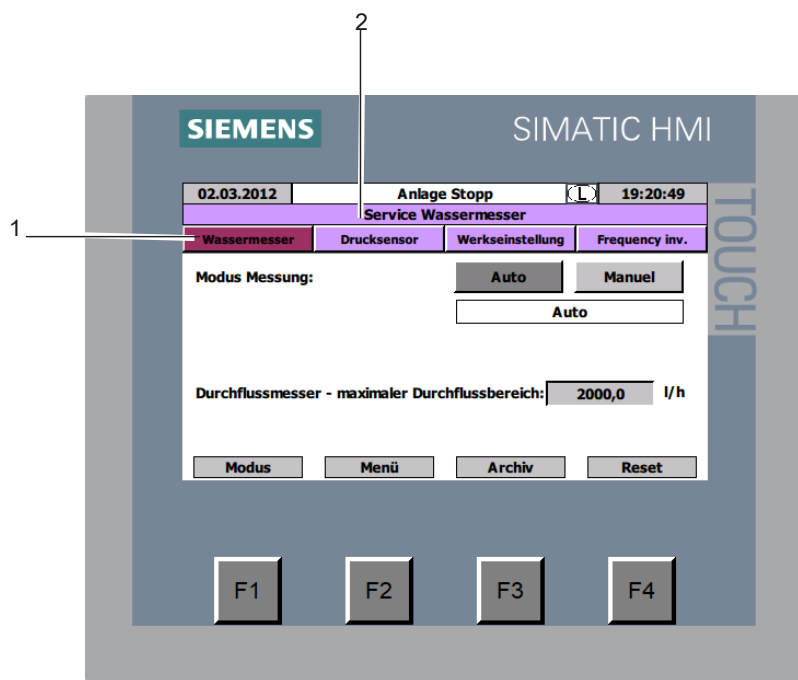


Fig. 61: Service

- 1 Buttons to jump to the different service groups
- 2 Title of the current service group

Water meter:	
Mode measurement:	Auto/Manual
Manual value:	xxxx (l/h)
Flow meter:	xx.x max. flow

Pressure sensor:	
Sensor Value:	ddd (mm)
Measured Value:	xxx (mm)
Offset:	ddd (mm)
Factory setting:	
Factory setting: Reset	
Identcode: Change	
Frequency inv.:	
Information on function	
Status	
Error messages	
(*) : Many operating menus are not installed depending on the design and setting supplied.	
(**) : First switch the control to "Stop mode".	
x = Input required.	

16.3 Comparison of Running Empty and Pause Functions

General functionality

- Identical switching functionality for running empty and pause
- The *[Ultromat ready for batching]* (DQ A.0) output signal on the terminal strip of the switch cabinet is used to signal the status of the system to a higher-level control system.

	Running empty	"Pause" function
Activation of the function	On the touch panel	By an external signal.
How is it activated?	Switchover of operating mode by the operator.	Control Pause signal in the control cabinet.
Duration	Longer-term action.	Short-term action.
Polymer batching	Is interrupted.	Is ended.
No new polymer batching.	Yes	Yes
Extraction to level <i>[Min. Min.]</i> .	Yes	Yes
<i>[Ultromat ready for batching]</i> signal	0	0
■ Logical switch status – "not ready for batching"		

16.4 DULCODOS ULFb inspections

Our polymer preparation stations are assembled with the greatest care and quality in our production facility and all technical details and functions are then inspected.



The resulting inspection protocol is filed in the control cabinet.

Description of the pre-delivery inspections of the DULCODOS ULFb systems

Order data

- Customer order or project number
- Identity code or customised version based on the identity code
- Non-standard versions
- Serial number

Detailed delivery specification of the ULFb system

- Power supply and electrical connection data
- Software version
- Wiring diagram version
- Installed options
- Accessories supplied

Import of the system software onto PLC and HMI

- As per the order data

Parameters Settings

- Water
 - Stirrers
 - Heating
 - Vibrator
 - Dry material feeder settings
 - Liquid concentrate pump settings
 - Frequency converter settings
 - Level settings

Calibration

- Inspection of the calibration process
 - Powder and liquid concentrate (by the customer)

Functional test of the system configuration

- All possible operating modes and preparation functions
- Including all fitted components

Product inspections

- Leak-tightness and pressure test
- Inspection and validation of electrical safety as per EN-60204-1
- **Creation of a complete inspection protocol**

Product documentation

- Operating instructions, wiring diagrams, drawings, reports, data sheets ...

16.5 Lubricating plan

With the exception of the Spectra and peristaltic pump, all Ultramat drives are maintenance-free.

Units	Gear	Interval	Oil	Volume
Stirrers	-	-	-	-
DFXa/Sigma	-	-	-	-
Spectra	SK01-71L/4	10,000 h / 2 years	ISO VG 220	250 ml
Dry material feeder	SK1 SD	Maintenance-free	-	-
Peristaltic pump	Motovario HA 32 U	10,000 h / 2 years	ISO VG 220	250 ml

Units	Hose/rolls	Interval	Grease	Volume	Part number
Peristaltic pump	lubricate well	every 200 h	Silicone	0.5 kg	1037255

16.6 Control sequence

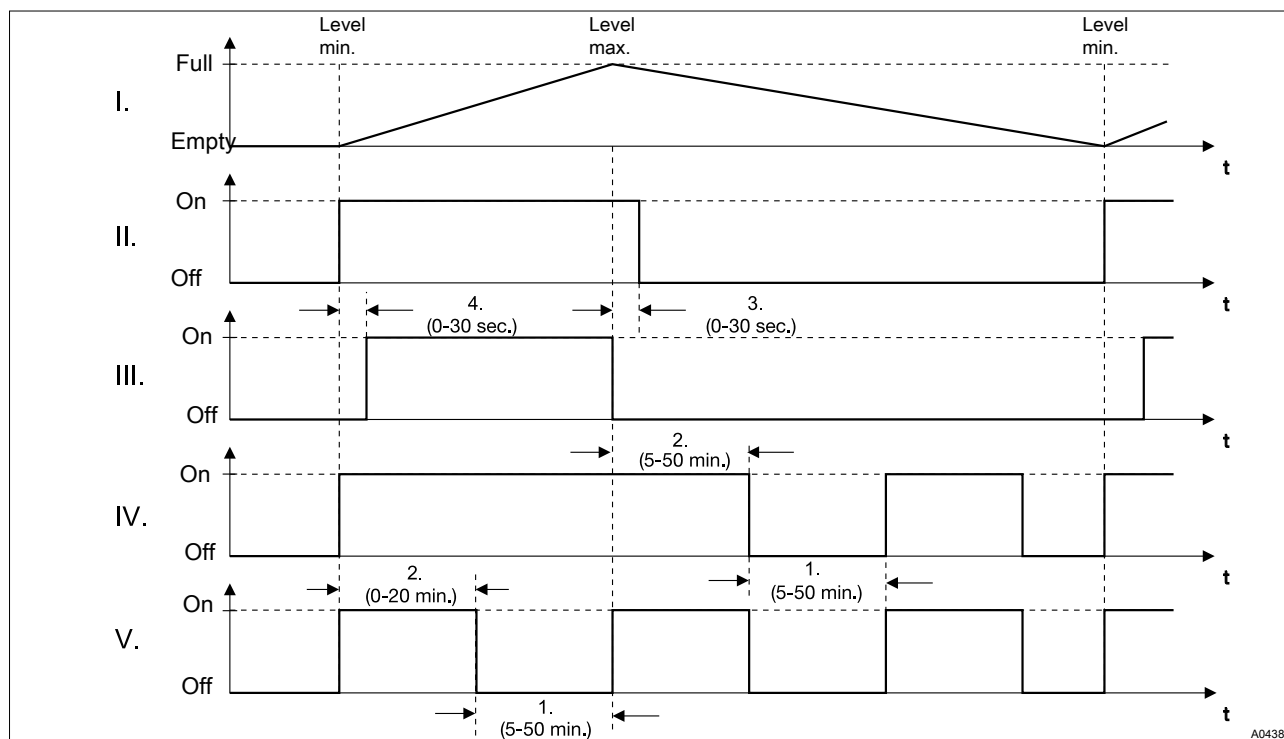


Fig. 62: Control sequence

- I. Liquid level Ultramat®
- II. Solenoid valve water supply
- III. Powder feeder
- IV. Stirrer 1 + 2
- V. Stirrer 3

- 1. Off time
- 2. On time
- 3. Post-rinse
- 4. Pre rinse

17 EC Declaration of Conformity for Machinery

In accordance with the DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Appendix I, ESSENTIAL HEALTH AND SAFETY REQUIREMENTS, section 1.7.4.2. C.

We,

- ProMinent Systems s.r.o.
- Fügnerova ul. 567
- CZ - 33601 Blovice, Czech Republic

hereby declare that the product specified below complies with the relevant basic health and safety requirements of the EC Directive on the basis of its functional concept and design and in the version marketed by us. Any modification to the product that we have not approved will invalidate this declaration.

Tab. 10: Extract from the EC Declaration of Conformity

Designation of the product:	Automatic polyelectrolyte preparation system
Type:	Ultromat
Serial number:	see nameplate on the unit
Relevant EC/EU directives:	EC Machinery Directive (2006/42/EC) EU EMC Directive (2014/30/EU) Compliance with the protection targets of the Low Voltage Directive 2014/35/EU according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC
Harmonised standards applied, in particular:	CSN EN ISO 12100:2011 CSN EN 60204-1 ed.2:2007 CSN EN 60349-1 ed.2:2010 CSN EN 61140 ed.2:2003 CSN EN 61000-2-4 ed.2:2003 CSN EN 61000-6-2 ed.3:2006 CSN EN 60529 + A2:2014
Place, Date:	Blovice, 09.02.2017

The EC Declaration of Conformity is available to download on the manufacturer's homepage.

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