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General User Information

• Specific steps and tasks which must be carried out are indicated with bullet marks (large dots), as shown here.

Note

Notes are highlighted in the text in order to draw the reader's attention to specific information. Paying close attention to notes will help you to understand the plant and the way it functions more effectively.

Warnings

Warning Notices draw to the readers attention information which must be closely observed while operating or working on the plant.

Danger Warning



This operating instruction is accompanied by a warning sign. It applies to all areas where your safety is at risk. Danger warnings are separated from the rest of the text and are highlighted in bold.

1 Transport and Storage of the Plant

The Ultromat[®] plant may be moved only when it is empty and using the correct lifting gear. During transportation of the tank there should be nothing which might place pressure on the tank walls. Heavy jolts and bumps should be avoided at all costs. When using fork lifts, use long forks which extend to the full width of the tank.

If transportation is carried out by crane, even when lifting lugs are attached to the plant, fix the slings in such a way as to avoid sheering forces at all costs. Sheering forces which act while the tank is under transportation lead to damage of the tank walls and the welded seams.

Ultromat[®] models 4000 and/or 8000, if fitted with lifting lugs, can be lifted with a tie-bar only. The tie bar must be at least 10 cm - 20 cm longer than the tank being transported.

For the transportation and storage of the plant, the surrounding air temperature should be between -5° to $+50^{\circ}$ C. The plant should be stored in an area which is dust-free as far as possible, and protected from rain, damp (no condensing water) and direct sunlight.

Direct sunlight leads to colour changes and distortion and/or tears forming in the coating material.

Note The Ultromat[®] should not be transported in temperatures below -5°C due to the fact that cold causes brittleness in the plastic coating, which can lead to damage to the welded seams, tank walls and strengthening framework.

2 Plant Information

2.1 Applications

The Ultromat® is a fully automatic polyelectrolyte preparation plant. It can be used wherever liquid polyelectrolyte solutions need to be prepared automatically. Its central function, which is to dissolve solids, makes the plant ideally suited to a variety of technical processing applications, e.g. in the water treatment industry, waste water treatment and paper manufacture.

2.2 Capacity

2.2.1 Ultromat[®] AF/96:

The plant is designed for the fully automatic production of polyelectrolyte stock solution. It may be used for nearly all commercial electrolytes in liquid form.

Controlled by the Ultromat[®] program, concentrations may be preprogrammed within a range of 0.05 to 1.0 %. The viscosity of the polymer solution which is produced must not, however, exceed the value of 3500 mPas. The instructions concerning viscosity of differing polymer solutions can be found in the user's data documents from the individual polymer suppliers.

To fully exploit the batching range, it may be occasionally necessary to adjust the flow rate of the water in-flow. Concentrations above 0.5 % can lead to a decrease in the effectiveness of the batch capacity.

The maturation period of a stock solution is dependant upon the extraction rate and the capacity (volume) of the Ultromat[®] and lasts approx. 60 minutes for a maximum extraction rate. The plant capacities range from a maximum 400 I of prepared solution per hour for the AF 400, to 8000 I for the AF 8000. The in-flow water rate of the plant should be 1.5 times the extraction rate.

Example AF 400/96:

To guarantee a maturing period of approx. 60 minutes for a maximum extraction capacity of 400 l/h of polymer solution the water inflow should be set at 600 l/h.

Using an additional re-diluting station the dosing capacity of each plant can be further increased.

The Ultromat[®] AF/96 is also fitted with a dosing tube for the injection of liquid concentrates. This tube can be fitted optionally with a back pressure valve and thermal dosing monitor (only with eccentric screw pumps).

Liquid concentrate dosing pumps could be supplied with a choice of the following control options:

	Control option	Description
1	Frequency controller	Internal speed controller varies concentrate pump voltages up to maximum 0.37 kW. Fitting an external fan at pump motor will increase the pump setting range. The external fan can be connected at the control cabinet. It is not possible to monitor temperature of motor coil.
2	4-20 mA	Control of gamma, Vario and Sigma pumps via 4-20mA signal

2.3 U	2.3 Ultromat [®] AF/96 dimensions								
Туре	dime (n	ensions nm)	Water inlet:	empty/ operational weights	overflow/ connector dimension	power supply	agitator rotation speed	piping for liquid polymer	
400	L= B= H= H1=	1280 950 1450 716	R 1"	160/590 kg	DN 40 / DN 25	1,5 kW	0,18 kW 750 rpm IP 55	DN 15	
1000	L= B= H= H1=	2448 1015 1605 866	R 1"	360/ 1360 kg	DN 50 / DN 25	2,6 kW	0,75 kW 750 rpm IP 55	DN 15	
2000	L= B= H= H1=	3170 1195 1764 1018	R 1"	410/ 2410 kg	DN 50 / DN 32	3,2 kW	1,1 kW 750 rpm IP 55	DN 15	
4000	L= B= H= H1=	3180 1520 2050 1516	R 1 1/2"	560/ 4760 kg	DN 65 / DN 40	5,5 kW	2,2 kW 750 rpm IP 55	DN 20	

N.B. Ultromat[®] power supply is used for device incorporating two agitators.



3 Descriptions of Functions

3.1 Plant Construction

All plant parts are assembled together to form a compact unit. The Ultromat[®] plant consists of the closed two compartment tank (a), the water pipework (b), the injection point for liquid polymer (c), the agitators (d) and the control cabinet (e). The tank is made from PP. There is a choice of PVC or PP available for the water pipework, fitted with brass mechanisms.



Diagram 2: Ultromat[®] AF/96

The seals are made of EPDM. For the treatment of non-alkaline polyelectrolytes, unsaturated hydrocarbons, which attack these seals, the plant can be fitted with Viton seals. The agitator shafts and agitator blades are made entirely from corrosion resistant stainless steel.

3.2 Description of Individual Units

3.2.1 Two-compartment Tank

The closed PP tank unit with agitator tie bars, brackets for the control cabinet, along with overflow, emptying and extracting connectors, is divided into two separate chambers. Preparation and storage compartments guarantee a sufficient time lapse and maturing period for the stock solution. The division of the tank furthermore prevents mature solution mixing with freshly batched solution and allows continual extraction.

The liquid level in the storage compartment is monitored by a liquid level sensor. In addition to the 'maximum' and 'minimum' contacts which start and/or finish the automatic batching process, the unit is also fitted with an 'empty' contact,

which protects the system from running when empty, and a further sensor to protect against over-fill (over-fill safety cutout optional). All inspection openings in the tank are protected by covers which are firmly screwed in position.

3.2.2 Inlet water system

The water pipework supplies the plant with the water required to dissolve the liquid polymer. The pre-set pressure control valve, which incorporates a strainer, limits and maintains the correct operating pressure. A solenoid valve automatically opens and closes the water inlet. The turbine revolution counter (ProMinent turboDOS) continuously relays the flow volume at any one time to the controller. A manually operated stop-cock also allows the water supply to be cut off to allow maintenance work to be carried out.



3.2.3 Agitators

The Ultromat® AT is fitted with two electric agitators. The agitators ensure adequate circulation of the solution in the storage compartment.

Danger Warning



The agitators will continue to run for the pre-set time span even if the mains power is disconnected, or the plant has been turned on/off using the start/stop key. Even if a malfunction has occurred, with exception of malfunctions of the agitators themselves the first two agitators will continue to run for the duration of the running-down period. The third agitator (optional) runs independently and will continue to operate intermittently until the end of its preset period.

3.2.4 Control Cabinet

All the electrical control and command equipment required to operate the plant, in particular the controller for the Ultromat[®] are located inside the control cabinet, next to the mains supply circuit and the safety fuses.

3.2.5 Concentrate Pipework

The Ultromat[®] AF is fitted with the following pipework for delivery of liquid concentrates to the batching compartment:

Туре	Large tubes	Hose nozzle	Options
AF 400	DN15	DN15	flow monitorback pressure valve
AF 1000	DN15	DN15	flow monitorback pressure valve
AF 2000	DN15	DN15	flow monitorback pressure valve
AF 4000	DN20	DN20	flow monitorback pressure valve
AF 8000	DN20	DN20	flow monitorback pressure valve

3.3 Plant Function

The in-flow of the water is automatically turned on or off according to the operating state, by a solenoid valve. A turbine revolution counter continuously tracks and monitors the flow of water through the plant. The pump feeds the liquid polyelectrolyte in proportion to the flow of water. Once there, an agitator completes the dissolving process to produce a solution. From the preparation chamber the solution flows past a weir into the storage compartment. After it has spent sufficient time maturing, the solution in the chamber is ready to use and can then be extracted. The division of the tank prevents, to a great extent, the matured solution from mixing with the freshly batched solution.

3.4 Operating Methods

3.4.1 Preparation Operation

Once the minimum liquid-level in the storage compartment is reached, the Ultromat[®] starts the batching process. The solenoid valve opens, and the pump commences of dosing liquid polymer. When the maximum liquid-level is reached, the controller switches off the pump.

The Ultromat[®] switches to 'batching' mode.

3.4.2 Settings Configuration Option

All the necessary configurations required to commission the machine are entered when the machine is in setting mode. In this mode, the controller deactivates any functions which might interfere with settings. When calibrating the pump, the water supply solenoid valve remains closed. Feed can be activated and stopped independently of water flow. The pump remains switched off while water flow rate is configured.

3.4.3 Remote Control Option

The plant can be activated or stopped from a remote centre by selecting the "remote control" option. The batching process is still carried out fully automatically, when plant is activated via remote control. The configuration and display of the operating parameters are carried out on site.

3.5 Ultromat[®] Options

There is a range of options available for the Ultromat[®] to improve plant efficiency.

3.5.1 Remote Control

Operating or stop states can be controlled via remote control. Ultromat® can be activated or stopped using an external switch.

Operating signals are transmitted via a volt-free contact. The signals are as follows: contact closed:

- Plant was activated using external switch
- No malfunctions
- Operating state activated via the start/stop key on the Ultromat[®] controller.

contact open:

- Plant was stopped using remote control (no operation activated)
- Malfunction
- Ultromat[®] was stopped using the start/stop key.

3.5.2 Overflow Safety Cut-out

The overflow safety cut-out signals an overflow in the Ultromat[®] storage compartment and triggers an alarm.

3.5.3 Analysis of Re-Dilution Unit

The re-dilution unit is used to further dilute the batched polymer solutions. The polymer solution is pumped out of the Ultromat[®] storage compartment into the re-dilution unit. A solenoid valve introduces dilution water into the unit. A flow meter, connected downstream, with a low-flow contact, monitors the dilution water.

The "dilution unit values" option checks the rotameter minimum-liquid-levels contact. If the min. contact indicates lack of water, Ultromat[®] operation is interrupted, and the booster pump (polymer solution) is paused. The Ultromat[®] is fitted with a volt-free contact for control of the booster pump (booster pump release). This contact is closed when liquid-levels in the storage compartment reach 'minimum liquid-level '. It opens when liquid-levels fall below the 'minimum liquid level' once more. The booster pump is normally controlled via an external switch (motor starter combination). As the booster pump may be switched on and off externally, there is an additional input on the Ultromat[®] controller to detect signals from the starter motor (volt-free auxiliary contact). The min. contact on the rotameter is only detected when the booster pump is running, closing the volt-free auxiliary contact on the starter motor. If the booster pump is not running, the volt-free contact is not closed and there is no detection of min. contact on the flow meter.

3.5.4 Empty Signal for Concentrate Supply Drum

The "concentrate drum empty signal-option contains a floating sensor which may be introduced into the drum from above.

3.5.5 Liquid Concentrate Dosing Monitoring

A pump injects the concentrate into the Ultromat[®] batching compartment. Dosing monitoring can be carried out with eccentric screw pumps only.

The dosing monitor consists of a flow adapter and a thermal flow sensor. To set flow monitor configurations select "set dosing monitor" settings menu.

3.6 Ultromat[®] Accessories

The following accessories are available for the Ultromat[®] AF/96

3.6.1 Re-Diluting Station

As the Ultromat® plants can operate with highly-concentrated solutions, in many cases it is appropriate to treat highly concentrated stock solutions by a dilution process. Polyelectrolyte solutions with a higher concentration last longer, and so a dilution station connected downstream increases the dosing and extraction capacity of the plant. Care must be taken, however, that the viscosity of the stock solution does not exceed a value of 3500 mPas. The dilution stations, which are supplied as complete units, have been designed specifically to fit the dimensions of the equipment, and for a dilution-to-volume ratio of 1: 5. A choice of models is available.

4 General Safety Guidelines

Danger Warning



The plant delivered is constructed to generally recognised technical standards and is safe to operate as long as specified safety guidelines are observed. When working with Ultromat[®] plant, however, there are certain safety aspects which you must be aware of. These are given below.

- Throughout all installation and maintenance work, the plant must be disconnected from the power supply. Measures must be taken to ensure that no unauthorised personnel can interfere with the plant during this time. This applies especially for work on electrical circuitry. The control cabinet must be kept locked at all times. Danger of Death!
- All work on the Ultromat[®] plant must be carried out by trained specialists only.
- For safety reasons the operation of the-plant may only be assigned to persons who are familiar with its function and who have been instructed correspondingly.
- The tank cover, which is screwed on and which covers the inspection openings, may only be removed for maintenance purposes. On no account remove the cover and reach inside the tank chambers while the plant is switched on. The agitators may start to run unexpectedly. Danger of Injury.
- Each time plant is connected to mains power, or when power is restored after a mains power failure the agitators
 will automatically restart.
- Spilt polyelectrolyte or, occasionally polyelectrolyte solution spillages, are to be removed immediately from the surrounding area increased danger from slippery surfaces!
- The warning notices attached to the plant must be observed.

Danger Warning

Individual re-fitting and alterations to the plant are not permitted and the manufacturers will not be held responsible for any damage resulting from such actions. Equally, the effective running of the plant when using non-original parts and accessories cannot be guaranteed. The relevant accident prevention regulations and other generally recognised technical safety regulations must be observed.

5 Assembly and Installation

The plant is completely assembled by the manufacturer and undergoes function-testing prior to delivery. The cabling between the control cabinet and the electrical units is connected and ready for operation.

5.1 Installation of the Plant

For the plant installation a fixed (concrete) flat floor area must be available, which will accommodate the dimensions and the operating weight of the plant. Furthermore, care must be taken to ensure that the plant is easily accessible at all times for operating and maintenance. The plant is designed for installation in a damp alternating atmosphere (corresponding to FW DIN 50016). The permissible surrounding temperature ranges from 5°C to 40°C. The plant must not be placed in direct sunlight. When connecting with water supply, overflow and drainagepipes make sure dimensions are correct. Overflow and drainage pipes should be fitted with gradients and must be able to operate without back-pressure.

The water must be of potable quality. It must be free from mechanical impurities and suspended particles. The incoming water pressure must not be less than 3.5 bar, and not more than 6 bar.

5.2 Electrical Installation

The electrical installation must be carried out by a qualified electrician.

Danger Warning

The plant must be disconnected from power throughout all installation and maintenance work. Measures must be taken to ensure that no unauthorised personnel can switch on the plant during this time.



5.2.1 Connecting Mains Supply Cable

Connecting the mains supply cable must be carried out exactly in accordance with the circuit diagram (in the appendix or in the control cabinet pocket). The mains cable is passed through a corresponding opening in the control cabinet and connected correctly to the terminal strip provided.

When connecting the electrical unit always pay attention that terminals are correctly arranged and that the direction of rotation of the motors (agitators) is correct.

5.2.2 Opening the Controller (see diagram 4)

Danger Warning

Before opening the controller, ensure that the plant is not connected to the power supply.



- To open the plastic housing, first of all remove the four countersunk screws in the corners of the cover. The upper section is attached to the lower section by additional snap hooks.
- The snap hooks can be released by exerting pressure downwards onto the upper edge of the cover using the index fingers, and simultaneously pulling forwards a little. Then the whole upper section can be drawn forwards.
- Warning! Upper and lower sections must be separated carefully as they are connected to each other by a short ribbon cable!
- Now the upper section can be placed in the 80 mm high insert using the two guide-rails. In this 'parked state' all connector terminals and safety fuses are freely accessible.

5.3 Fitting Options

Some options require reconfiguration of the controller and can therefore only be fitted by our service personnel. Refitting procedures must be done correctly and should be carried out by our experts, in order to ensure that effective plant operation is maintained.

6 Controller

6.1 Design and Function

The Ultromat[®] controller is housed in a robust self-contained plastic housing (for installation into electrical control panel, protection system IP 54). It combines the relevant microprocessor controller and its terminal board with the necessary connector terminals, the mains connector and the safety fuses along with all the insertion cards for inputs and outputs.

All information necessary for operating the plant, such as error messages, warnings and values, along with the entire menu system, is displayed according to precedence on a two row LED display. Malfunctions due to power failures and electrical overload are prevented by a number of safety measures. All stored parameter and configuration data is protected from breaks in the power supply.

6.1.1 Display and Operation Module

<u>ک</u>				L9 L10	
		Conc. = 0; feed = 12	at AF	L2	
	calibration C	HANGE- key DOWN- BAC key ke	K- Key K- key key key		
					3 7 1

Diagram 4: Control Panel, Ultromat[®] Controller

6.1	6.1.2 Display Supplement (Displays State)						
•	L1 green LED displayed plant in operating state plant in stopped state						
•	L2	red LED displayed	malfunction (flashing light) warning (continuous light)				
•	L3	-	-				
•	L4	green LED displayed	controlling dosing concentrate pump				
•	L5	green LED displayed red LED displayed	controlling water in-flow flow below set minimum flow				
•	L6	green LED displayed	controlling transfer pump (stock solution)				
•	L7	green LED displayed	controlling agitators, chambers				
•	L8	green LED displayed	controlling agitator, chamber 2				
•	L9	-	-				
•	L10	-	-				
•	L11	green LED displayed	functioning only in calibration mode				
٠	LCD	LCD display, 2 rows	max. 32 symbols				

6.1.3 Operating Elements

start/stop key	switch Ultromat [®] into operating or stopped states
confirm key	confirms an alarm warning
test key	Start/stop button for calibrating liquid concentrate pump, water feed setting and monitoring facility.
enter key	Saves a value, jumps to next menu point
change key	change in the menu
down key	alters numerical value
back key	goes back in menu
up key	alters numerical value
siren key	Separate key in door of control cabinet to cancel alarm (does not confirm alarm!)

6.1.4 Operating State Displays and Plant Operation

- The Ultromat[®] is switched on and off using the main switch located on the side of the control cabinet.
- Once switched on, the plant may be in the operating state (L1 = green LED on) or in stopped state (L1 = red LED on, LCD display: STOP). To stop and start the operating processes use the STOP/START key or the remote control from a central station (only with optional remote operation).
- A volt-free remote contact can be used to switch the Ultromat[®] into the stop state (only for models fitted with "remote control" option). When operating process is stopped by remote control, "Remote control, PAUSE" appears on the LCD display. Using the START/STOP key on the control panel to stop the Ultromat[®] overrides the remote activation signal.
- The text key is used during the calibration procedure, to start or stop an action. Whenever the test key should, or
 may be pressed during calibration, the display will flash. Triggering an action using the text key causes a green LED
 to light up, and it remains on continuously until the action ceases.

- The red "Alarm" indicator (L2) is located next to the "Confirm" key. During normal operation it is off. If a malfunction occurs, however, it flashes until the malfunction is corrected and the error message is confirmed. Acknowledging the error removes the error message and turns off LED. If there is more than one malfunction present, all texts will be displayed in turn, for approximately two seconds each.
- The alarm siren is deactivated using the separate "Siren off" key in the front door of the control cabinet. This deactivates the current alarm.

6.2 Menu System

6.2.1 Menu Layout

The menu is divided into display level and settings level. In the display level, the operating state of the plant alarms is displayed. In the settings level, the parameters for the control of the plant can be altered, and calibration carried out (see also section 12.7 "Programming Menu"). If desired, the controller can automatically change the settings menu back to the display menu after 10 minutes.



6.3 Operating the Controller – Selecting a Menu Option

Enter key



To confirm and/or save a displayed value or setting

Change key



To change displays within a menu level

Back key

Goes back to the previous level, while in the operating menu. The steps appear in the order given in the previous diagram.

Press Enter key to change from the display menu to the configurations menu. Press Enter again, and then enter access code (factory setting 1000). Then use "Change" key to toggle between "Factory settings", "Calibration settings" and "Concentration settings". All the menus which follow may be selected by using the Enter key.

The entry of a value or parameter is carried out using the arrow keys "Reduce Value" and "Increase Value". Generally the last value that was set is displayed. A new value can be entered over this one. By pressing one of the arrow keys continuously, it will change at an ever increasing rate. By continually entering and confirming, you can travel through the menus. With the help of the Back key you can revert any time to the previous menu level.

6.4 Display Mode

6.4.1 Normal Operation

The following messages appear in the controller display during batching operation:

- batching operation, in-flow = xxx l/h
- conc. = x.x %, in-flow = xxx l/h

Once maximum liquid-level in the storage compartment is reached, the following messages appear on the controller display:

- storage tank full, empty storage tank
- conc. = X.X %, empty storage tank

6.4.2 Interrupting Normal Operation

Using the Start/Stop key will stop and/or start normal operation. In the stop state the following message will appear on the display:

• STOP, in-flow = 0 l/h

If the stop signal is a remote-control input, then the following message appears on the display:

remote, PAUSE

6.4.3 Identcode Display

Press the Change key to display the Identcode ULSa xxxxxxxx (as shown in the second row of the controller software version (e.g.:02/2.0.

In case of claims and customer service requirements for operational malfunctions these codes must be given to Prominent Dosiertechnik GmbH.

7 Commissioning

7.1 Assembly, Initial Tasks

During assembly it is absolutely essential that the handling and positioning instructions given in sections 1 and 5 are followed correctly. Make-up water, extraction and overflow pipes must be connected up and checked to ensure they are water tight and in working order.

It is additionally necessary to connect the liquid concentrate supply pipe.

Before starting up for the first time, mechanical and electrical connections must be checked thoroughly to ensure that they are correctly connected up (e.g. motor rotation direction, power supply etc.).

It must be ensured that the voltage, frequency and current going into the control cabinet comply with the instructions given on the nameplate (on the right-hand side of the control cabinet).

Polymer should be available in ready quantities and meet the required quality standards.

After switching on the main switch, the LCD displays the message "**Stop**, **In-Flow 0 I/h**". If a different message appears, use the Start/Stop key until the Stop message appears. When using remote control option you may see "**Remote**. **PAUSE**" on the display. In this case the plant must be released from central switching station control.

7.2 Checking Identcode

Use the change-key in display mode o change to the Identcode display. Press the change key again to return to normal operating display.



7.3 Commissioning Settings

Plant is supplied with the following default settings, which are accessed from the "Factory settings" menu:

Parameter	Default values			
Language	D, E, F, P, C, N			
Minimum water in-flow:				
AF 400 : AF 1000 : AF 2000 : AF 4000 : AF 8000 :	500 l/h 1200 l/h 2400 l/h 5000 l/h 10000 l/h			
Agitator 1 on-time	15 min.			
Agitator 1 off-time	15 min.			
Agitator 2 on-time	5 min.			
Agitator 2 off-time	10 min.			
Concentrate pump minimum frequency	25 Hz			
Alter access code	1000			

Values are adapted to process requirements during commissioning.

7.3.1 Setting Minimum Flow

Select "Min. flow" using Enter key and use up/down keys to raise/lower the value.

7.3.2 Agitator 1

The agitators are automatically re-activated each time a new batching process begins. After the maximum liquid- level has been reached in the third chamber the two agitators continue to run for a pre-set period in pulse/pause mode.

Select menus: "Agitators 1 on-time" and "Agitator 1 off-time". Click on Enter and then use Up/Down keys to alter values. Press Enter again to relay the new settings to the controller.

7.3.3 Agitator 2

The second agitator starts automatically once each batching process has commenced and runs in pulse/pause mode. The choice of appropriate on-off intervals results in effective mixing without damaging the matured macro-molecules.

7.3.4 Concentrate Pump Minimum Frequency

The "Concentrate pump minimum frequency" parameter is only applicable for models including the controller option "frequency controller". Here, the concentrate dosing pump is controlled via the speed controller. During batching, frequency must not fall below the speed controller minimum frequency.

At slow motor speeds the cooling effect of the fan on the motor coil is greatly reduced. This can cause irreparable damage to the motor. Set the minimum permissible motor frequency when pumps are not fan-cooled.

Where fans are fitted, the "Minimum frequency" can be set to approx. 2 - 5 Hz. This greatly increases the pump frequency-range.

7.3.5 Four Figure Access Code

Select the final settings-menu: "Change access code" to alter the four-figure default access code. Keep new code in a safe place.



Diagram 8: Control sequence

7.4 Concentration Settings

The Ultromat[®] can operate with liquid concentrates of 0.05% to 1.0%, as long as polymer solution viscosity does not exceed 3500 mPas.

To set concentrations of less than 0.1% and greater than 0.5% the required concentration must be achieved by correctly configuring the batching water flow. If plant operates at concentrations of less than 0.1% and greater than 0.5%, plant capacity is reduced.

Select sub-menu "Set concentration" using Enter key. "Concentration" appears on the display. Select the required concentration using the up/down keys.

7.5 Calibration Settings

Calibration settings

- Set batching water in-flow
- Calibrate concentrate pump
- Set dosing monitor

7.5.1 Water In-Flow Settings

The flow of batching water should be one-and-a-half times the maximum amount of polymer solution to be extracted.

- In "Set water in-flow" menu, select "Water in-flow" using enter key. LED next to the Test key on the control panel flashes.
- Remove caps on the regulating valve.
- Click on test key in the appropriate menu option. Solenoid valve opens and the current flow is displayed.
- Use a large screwdriver (min. 10 mm) to adjust water-flow setting. The current flow can be read off the controller display.
- Press the T key once more to end settings procedure.
- 7.5.2 Calibration of Dosing Pump for Liquid Concentrate
 - Determine unladen weight of the collector tank (PE bag).
 - Open hose connection on pressured side.
 - In the "Calibrate liquid conc. pump" menu, select "Liquid conc. pump" using Enter key. LED next to test key flashes.
 - Press the Test key to start the concentrate pump. The concentrate enters the collector tank.
 - Press the Test key again to stop the pump. Weigh polymer quantity collected and program the controller with the weight in grams using the Up/Down keys.
 - Pressing the Enter key instructs the controller to calculate the dosing capacity in grams/minute and saves the value.
- 7.5.3 Configuring Dosing Monitor for Liquid Concentrate

.

Dosing monitoring is only applicable for models including "change voltage" option, or with starter motor combination controlling eccentric screw pump. It is not applicable for "Vario with 4-20 mA" models.

Control option	Pump	Dosing monitoring
Frequency controller	Eccentric screw pumps	yes
4-20 mA	Gamma 4/5VarioSigma	no

- in "Configure dosing monitor" menu, select "Dosing monitor" using Enter key. LED next to test key flashes.
- Use arrow keys to select minimum flow value. Press Test key to start concentrate booster pump.
- Use screw driver to adjust switch threshold on flow monitor so that the indicator just passes over from green to red.
- Stop pump using test key.
- Press Enter to end configuration process.

Note:

Minimum flow limit-values are set depending upon "Minimum frequency" parameters. To set low flow-limit values, the minimum frequency in the "Concentrate pump minimum frequency" menu must also have been re-set to a correspondingly low value. Once flow monitor has been configured, the concentrate pump minimum frequency is readjusted to its previous value.

For models including "Starter motor combination" the flow-value displayed cannot be altered using arrow keys, as the pump may only be turned on and off by the starter motor combination. Flow-limit values must be set at the pump.

7.6 Speed Controller Settings

7.6.1 Ultromat[®] AF Configuration

The speed controller is supplied with the following factory settings:

Parameter	Value	Unit	Range	Description
rdy	rdy			Controller ready
FrH	actual	Hz		Current frequency
SLP	on		on, off	Automatic slip compensation
brA	on		on, off	Auto-adjust slope
Uft	n		n, L ,P	Selection of V/Hz curve
tFr	100	Hz	40 - 200	Max. frequency at controller output
Frs	50.0	Hz	40 -200	Nominal motor frequency
UnS	230	V	208 - 460	Motor voltage
ItH	1,1	А	0.9 – 2.2	Thermal motor protection
FLG	nFl		00 - 99, nFL	Frequency enhancement
Ufr	25		00 - 99	U/f curve
HSP	100	Hz	40 - 200	Higher speed at 20 mA
LSP	0.0	Hz	0 - HSP	Lower speed at 4 mA
dEc	0.1	S	0.1 - 600	Deceleration time
Acc	0.1	S	0.1 - 600	Acceleration time
Uln	actual	V		Mains voltage display
Lcr	actual	А		Motor current display

The values should be checked prior to commissioning using control panel on speed controller. The "Data" key is used to toggle between parameters or applicable value. Use arrow keys to display next value, or to alter applicable value. When values have been altered, LED flashes "PROG". Press "PROG" key for speed controller to store new value.

7.6.2 Configuration of Ultromat AF ("Speed controller" control option)

"Thermal motor protection=ItH" parameter must be adjusted to correspond to liquid concentrate pump. The "HSP= higher speed at 20 mA" parameter must not be changed in liquid mode, as the speed controller is controlled by 4-12 mA current signal. Maximum frequency is 50 Hz.

Guideline: The concentrate pump minimum frequency must be re-set to 25 Hz, after configuration of dosing monitoring. Lower values will cause irreparable damage to pump motor.

7.7 Level Sensor Settings

The max. min. and dry running liquid levels in the storage compartment are analysed by a level sensor. The operating threshold sensitivity of the level sensor can be adjusted between 0.5 kQ to 25 kQ (corresponds to 1-10 on the scale) using an adjusting wheel on the front of the sensor. A scale value of 5 is generally applicable. The operating threshold sensitivity is adjusted to correspond to the conductivity of the batching in-flow water. 10 = greatest sensitivity. Scale value should be raised when conductivity is low.

7.8 Commissioning

Assuming set-up and installation have been correctly carried out, the three inspection openings are closed firmly. After setting all operational parameters and completing calibration the plant can be started up.

Press the Start/Stop key to set the plant running. The plant commences operating and the automatic batching process will begin. During this first phase the plant must be monitored carefully. Check particularly that the level sensors are functioning correctly the first time a controlling position is reached.

The error message "Storage tank empty" is unavoidable at this stage, as all compartments are empty. This error message must therefore be confirmed.

Warning

Before starting the batching process the operating personnel must ensure that the emptying valves for the preparation and maturing chambers are closed.

8 Operating the Plant

8.1 Normal Operation

8.1.1 Preconditions for Correct Operation

To ensure malfunction-free operation of the Ultromat plant there are important basic preconditions. The first of these are that the set-up and installation has been carried out according to the instructions given. It is vital that the operating parameters are set within reasonable limits and that calibration has been carried out conscientiously. This is particularly important as far as the level sensors are concerned. These cannot carry out their monitoring functions effectively if not correctly adjusted. It is important to note that there should be no on-site changes to parameters for the speed controller. In addition to these basic preconditions there is a series of points which must be taken into consideration when working with the plant itself. In particular the general safety notes (see section 4) must be observed.

The operation of the plant is only permitted to trained personnel who are familiar with the plant. The work of operating staff is limited chiefly to the rapid correction of malfunctions when operation is interrupted, and maintenance of the Ultromat[®]. In addition, staff are expected to monitor the processes regularly, and make sure all plant components are working correctly. One aspect of this, for example, is the occasional checking of display lights using the Test key. The control of the plant itself takes place automatically, however. Controller settings need not normally be carried out further during operation.

The plant can be completely shut down or re-started using the Start/Stop key during any phase of operation. An exception, however, is the re-starting of the plant after a malfunction occurrence. The general procedure involves the removal of the cause of the malfunction (see section 10 for more details) before confirming the corresponding error message. Each error message can, however, be altered to a warning by pressing the "Confirm Alarm" key, so that the plant, if necessary, can resume provisional operation. In such cases the operating personnel must bear the responsibility for removing the cause of the malfunction as quickly as possible so that a more serious malfunction does not develop. A plant in warning mode must nevertheless be closely monitored in the meantime.

8.2 Switching On Mains Power and Mains Power Failure Procedure

a) Switching on mains power

Each time the mains power is switched on, agitators commence operating regardless of the liquid level of the chambers. The plant only starts, however, when the batching process starts once the minimum switching position is reached in the storage compartment. If there is a power failure, however short, during the batching process, the batching process will not commence when the power is switched back on. When the mains power is switched on, furthermore, the warning light and siren will be activated for around 0.5 seconds.

b) Mains power failure procedure

After a power failure or a long break in the power, which has led to re-activating the controller, the plant recommences operating according to the state in which it was before the power failure. If the storage compartment levels are within the specified range, batching will not begin, even if, prior to the power failure, a batching process had been underway.

Danger Warning After a power failure the agitators will start running automatically.



8.3 Emergency Measures

In an emergency the plant must be disconnected from the mains power using the main control. This will automatically cause the plant and all electrical systems to shut down.

Danger Warning

Using the "Start/Stop" key on its own is not enough in an emergency as the control is based on a toggle system and does not differentiate between two distinct switch states.



8.4 Plant Idle

Usually the plant is shut down using the Start/Stop key. If shut down is followed by a period where it is foreseeable that the plant will be lying idle for some time, the Ultromat[®] should also be disconnected from the mains power using the main switch. The main switch must be used in order to prevent unauthorised reactivation of the plant. During periods when Ultromat[®] is not in use, all tank compartments must also be completely emptied. Emptying takes place using the pipe-connectors which are fitted on each compartment for this purpose. Rinse the tank thoroughly with water.

9 Operational Errors

In order to avoid, as far as is possible, entering operational parameters incorrectly in the set-up period, access to those menus relevant for the correct operation of the plant is limited. Only a small group of personnel have access to the code menus. These must be people who are familiar with the way the plant functions, and who are permitted to enter or change operating parameters. It must be re-stated that the maximum viscosity value for concentration settings must not exceed 3500 mPas.

The pre-set parameter values for the variable frequency converter may not be altered on site. The parameters have been pre-programmed in the factory for use with the appropriate liquid pump. A possible operational error can arise when the cause of an error in the plant is not removed, and the confirm key has been thoughtlessly pressed. The original malfunctions can lead to more severe ones, which will threaten the plant operation simply because the plant has recommenced operating (see section 10). Confirming an error message before removing the physical cause of the malfunction must only be done in exceptional circumstances, not as a general rule. The cause of the malfunction must be removed immediately afterwards and a plant in warning mode must be carefully monitored in the meantime.

In general, the danger from any form of operational error can be minimised as long as the Ultromat[®] is handled sensibly and with due care. Continuing function checks during operation forms as much a part of this as does following the steps given in the relevant sections of this instruction manual. Sources of malfunctions which can be easily solved are very often due to incorrectly set emptying valves and stop-cocks in the water inlet pipes.

Danger Warning

To prevent possible dangers from any remaining risks, follow all safety precautions when working with the Ultromat $^{\!\!8}$ plant.

10 Plant Malfunctions/Error Messages - Breakdown Advice

A plant malfunction is signalled acoustically via the warning siren and visually via the red warning light on the controller display in the control cabinet. In addition, the cause of the malfunction will be displayed in the controller display. The warning siren can be de-activated using the separate "Siren Off" key located in the front door of the control cabinet. The error analysis can take place based on the error message.

In order that the plant can recommence operation after a malfunction occurrence the "Confirm Alarm" key must be pressed to remove the error message once the cause of the malfunction has been removed.

When an alarm is triggered, agitators continue to run in pulse/pause mode. The (polymer solution) booster pump release, connected downstream, is not affected.

Possible malfunctions can arise, due to manufacturer's settings, which may affect the warning or display systems in the plant. If a malfunction should arise which does not appear in this list, or if a malfunction described in the list cannot be solved using the guidance given in the breakdown advice section, then please contact our customer service department.

Danger Warning



If, to remove the cause of a malfunction in the system, it is necessary to carry out work on the Ultromat[®] itself, then ensure that the plant is disconnected from mains power through out and that it cannot be re-activated by unauthorised personnel. Agitators continue to run for the pre-set period in pulse/pause mode even after an error signal or when plant has been stopped using Stop-key.

It is crucial to effective plant operation that the level sensors are working correctly. When on-site settings are carried out, however, it may be found that a proximity sensor or a concentrate flow sensor has been set too sensitively, or suddenly responds to different operating conditions and gives a false warning signal for a non-existent malfunction as a consequence. This possibility should be taken into consideration whenever an error analysis is undertaken. If sensors prove themselves to be too insensitive, it will be necessary to reset those sensors.

Fault	Message on LCD display	Effect	Interval	LED red	Alarm Relay	Action
Warnings						
In-flow monitor	Flow low	Dosing, stopped in-flow active	3 sec.	On	Off	Increase in-flow
Concentrate pump minimum frequency	Minimum frequency!		5 sec.	On	Off	Increase in-flow
In-flow monitor	Excess in-flow		3 sec.	Off	Off	Adjust in-flow
Malfunction						
Agitator malfunction	Agitator breakdown	Stop state	1 sec.	Flashing	On	Correct fault
Minimum liquid level indicator	Storage tank empty	Stop state	5 sec.	Flashing	On	Check level sensor LSL
Water in-flow below min. volume	Water low	Stop state	20 sec.	Flashing	On	Check water in-flow
Level sensor defect, compartment 2	Error: liquid level	Stop state	5 sec.	Flashing	On	Check level sensor
Concentrate pump malfunction	Pump breakdown	Stop state	2 sec.	Flashing	On	Check liquid dosing pump starter motor
Speed controller malfunction	Speed controller malfunction	Stop state	5 sec.	Flashing	On	Check speed controller
Overflow compartment 2	Storage tank over- full	Stop state	1 sec.	Flashing	On	Check LSH level sensor
Dilution monitor	Dilution	Stop state	3 sec.	Flashing	On	Correct fault
Concentrate drum empty	Concentrate low	Stop state	10 sec.	Flashing	On	Replenish concentrate
Dosing monitor	Dosing monitor	Stop state	20 sec.	Flashing	On	Replenish concentrate
Controller malfunction	Contact defect	Replenish concentrate	1 sec.	Flashing	On	Check contacts
Power supply off		Plant shut down	-	Off	On	Identify cause

10.1 Fault Identification/Malfunctions/Breakdown Advice

Warnings do not require acknowledgement. The alarm light remains on continuously, the alarm is not triggered. When the cause of the fault has been removed, plant will automatically re-commence normal operation.

10.2 Malfunctions in the Water Inlet Pipe

10.2.1 Water In-Flow Malfunctions

If the water in-flow rate falls below the set minimum value for longer than 3 seconds the pump will be de-activated and the message "Flow Low" will appear in the display. After a total of 20 seconds of continuing low water flow a malfunction will be registered. The water inlet valve is closed. The message "water in-flow" remains on the display.

If the water flow reaches the set minimum value again within the next 20 seconds the pump will control back on elapsed.

Possible causes and countermeasures:

- Dirt in the pressure reducing valve. Solution: Clean filter-insert in pressure reducing valve.
- Continuing pressure drop in the water inlet pipe. Solution: Check the relevant pipework and connectors.
- Operating pressure is too low. Solution: First of all check the strainer in the pressure reducing valve visually. If there is no dirt in there, reposition the throttle in the pressure reducing valve (see manufacturer's instructions).
- The stop valve in the water pipe is not fully open. Solution: Turn tap to the left as far as it will go.
- The flow rate has been set too low at the regulator valve. Solution: Reset the flow rate.

10.2.2 Water Meter Malfunctions

If the flow meter does not register flow when a batching process is in operation, the error message "Water low" appears. In these cases check flow meter connections first. In this case the flow meter connections should be checked first. If no fault can be detected at this point then is assumed that the turbine inside the flow meter is not running freely. The water meter should therefore be completely dismantled and cleaned.

10.2.3 Solenoid Malfunctions

During malfunction the solenoid will no longer open and close correctly.

Possible causes and countermeasures:

- Solenoid connections have worked loose. Solution: Check the cable connection and fix if necessary.
- The throttle hole or the pilot hole in the valve outlet is blocked. Solution: Open the solenoid carefully and clean the inside of the housing.
- The membrane inside the valve is defective. Solution: Open the solenoid and check the membrane. If it is defective, replace with new membrane.

10.3 Malfunctions in the Storage Compartment

10.3.1 Storage compartment Runs Dry

If the sensor which detects when the chamber is running dry triggers the 'running on empty protect.', then "Reservoir Empty" will appear in the display. Once the alarm has been confirmed, the transfer pump is paused until the minimum liquid-level in the storage compartment is reached. Water levels falling to minimum liquid-levels also trigger an error message.

Possible causes and countermeasures:

- All chambers are empty. Solution cannot get past the weir into the storage compartment. Solution: Ensure beforehand that all emptying valves are closed. Start plant operating and wait until all chambers have filled up sufficiently, and working solution can be continually extracted.
- The water throughput has fallen below the plant capacity. Solution: Monitor water throughput with the aid of the water flow display. Check pressure reducing valve and clean and/or reposition throttle if necessary. If necessary reset the flow rate.

- Extraction rate exceeds the plant capacity. Solution: In exceptional cases and within narrow boundaries it is possible to raise the extraction capacity at the cost of the resting period of the Polyelectrolyte. Otherwise the dosing capacity can be correspondingly increased by installing a re-diluting station.
- 10.3.2 Overflow in Storage Compartment

If the Ultromat[®] does not control off the batching process once the maximum level has been reached, the overfill sensor (optional) will detect the rising level and interrupt the batching process. The error message "Reservoir Over-full" will appear in the display. The controller will stopped the batching process and close the solenoid. The second agitator in the storage compartment will continue to run periodically until it has finished its cycle.

Danger Warning



On no account remove inspection cover and reach inside the chamber if a malfunction occurs. The second agitator is still in operation and can commence turning unexpectedly.

Possible Causes and Countermeasures:

- The liquid level control that starts and finishes the batching process has not triggered when the maximum level has been reached. Solution: Control off the plant with the main control, in order to stop the agitators. Then dismantle the liquid level sensor and clean. Following replacement, check the control functions.
- 10.3.3 Contradictory Liquid level Messages in the Storage compartment

If the level sensors in the storage compartment send out two contradictory signals the display will read "Reservoir Implausible". Once again the third agitator should be stopped first of all, in order that it does not prevent a possible falsification of the liquid level measurement. Then the actual liquid level should be determined and compared with the messages from the sensors. The level switch should be cleaned if necessary and its controlling relay should be checked.

10.4 Agitator Malfunctions

The monitoring of the agitators is carried out by the motor protection control. When a defect occurs, however, only the error message "Agitator Defect" will appear in the display. The plant itself will not stop running.

In the event of malfunction it should be checked whether the motor protect. control has triggered. The relevant motor should be checked for damage and should be replaced if necessary. The safety button can then be reset.

10.5 Concentration Errors

If, despite the fact that the dosing is fully programmed in, the pre-determined solution concentration is not produced, the warning "Concentrate Error" will appear. The plant does not, however, switch off automatically in this situation. Occasionally the fault may lie in the fact that the liquid pump has been wrongly calibrated. If it is not possible to correct the problem in any other way it will be necessary to re-calibrate the liquid pump:

Possible causes and countermeasures:

• The preset flow rate is too high. Solution: Reduce the water throughput by a reasonable amount in order to produce the correct flow-proportional feed.

10.6 Error Messages in Initial Start Up

If the extraction compartment is empty when plant commissioning takes place, the message "Tank empty" appears and an alarm is sounded. Once alarm is confirmed, batching recommences and alarm stops. The "Tank empty" message remains until minimum liquid level is reached. Once minimum liquid level is reached, booster pump connected downstream is activated.

10.7 Hardware Fault Analysis

Hardware faults always occur in the cases when a particular Identcode has been assigned to a special function, but the relevant insertion card has not been inserted into the controller, or it is defective. If the controller registers an internal hardware fault, please contact the ProMinent customer service department.

10.8 Dilution Faults

The dilution unit is fitted with a flow meter which detects particles in suspension. This enables the meter to relay information about the dilution water to the display. A limit contact monitors the minimum water flow. If the water flowing through the dilution unit falls below the preset measured variable, the error message "Dilution" will appear. Counter-measures involve identifying the cause of the problem and restoring water flow.

11 Maintenance

Danger Warning



The plant should be disconnected from the mains power throughout all maintenance work, and there must be no possibility that unauthorised personnel can reactivate the plant.

11.1 Cleaning the Filter Insert in the Pressure-Reducing Valve

The amount of dirt in the pressure reducing valve can easily be judged by examining the transparent filter container. At the latest, when 2/3 of the filtration inserts have become clogged with dirt, the filter insert should be cleaned. As the rate at which filtration inserts are becoming clogged increases, the amount of water entering the plant is reduced. This leads to possible faults due to insufficient water in-flow.

To dismantle the filter insert, the plant should be placed into the stopped state. As the pressure reducing valve is located upstream from the solenoid valve, the stop cock should always be manually closed. The exact procedure for dismantling and reassembly of the insert may be found in the appendix of the manufacturer's instruction manual.

11.2 Opening and Cleaning the Solenoid Valve

Before opening the solenoid valve the stop cock, located upstream, should be completely closed to close off the water flow. It is not necessary to dismantle the valve to open it. The four bolts should be unscrewed and the valve cap along with the rinsing insert removed (take care with the cable!). Next remove the inner parts and inspect the membrane for damage. At this point, the housing, in particular the throttle hole and the small pilot hole in the valve outlet, can be cleaned. Take care, when re-assembling, that the parts are put together in the correct order. Further instructions and the relevant diagram can be found in the appendix of the manufacturer's instruction manual.

11.3 Dismantling and Examining the Flow Meter (turboDOS)

For safety reasons, when dismantling the flow meter too, the stop cock should be closed manually. The plant is effectively shut down. To dismantle the turbine rev. counter remove the corresponding screws in the water pipework. Do not, however, use the solenoid as a lever. Then the turbine wheel inside the water meter can be checked to ensure it is running freely, and cleaned if necessary. When handling the flow meter always be careful with the cable.

When re-assembling, check direction of flow has been taken into account.

11.4 Changing the Mains Power Safety Fuse in the Controller

Danger Warning



To change the safety fuse the plant should be disconnected from the mains power-Danger of Death!

The mains power safety fuse is located in a safety-fuse holder in the controller. It is accessed by opening the controller housing and placing the upper section in the 'parked state'. After releasing the bayonet fitting on the safety fuse connector, the defective safety fuse can be removed and replaced with a new one. Refasten the bayonet fitting and close the housing.

11.5 Removing the Inspection Cover on the Two Compartment Tank



When plant is controlled on do not remove the inspection cover. The agitators can start running unexpectedly - Danger of Injury!

Generally the plant should only be operated with the inspection cover fixed firmly in position. Only the cover on the storage compartment may be removed during operation when inspecting the liquid level and to monitor the level sensors (controlling correctly). We recommend that care be taken, however, and on no account should you reach inside the chamber.

You must always remember to check that before the plant is put into operation, all covers are in position and fastened down. They have been designed so that it is impossible to position them incorrectly.

11.6 Rinsing the Ultromat[®] Tank

In order to remove remaining polyelectrolyte solution and to prevent clogging of the dosing system the tank must be thoroughly rinsed with water if it is to be left idle for any length of time. The plant should be stopped and disconnected from mains power for safety reasons. Only then can the inspection covers be removed, so that the inside of the tank can be cleaned. The dosing system can be cleaned via a connection to a water supply. Close the emptying tap in the storage compartment and feed water through the system using the rinsing connector. When arranging rinse water supply, all legislation, regulations and directives must be observed.

Subject to Technical Alterations Addresses and ordering information available from the manufacturer.

ProMinent Dosiertechnik GmbH Im Schuhmachergewann 5-11 D-69123 Heidelberg Postfach 10 17 60 D-69007 Heidelberg Phone: +49 (6221) 842-0 Fax: +49 (6221) 842-419 ProMinent@t-online.d www.prominent.de

12 Appendix

12.1 Declaration of Conformity

	EC Declaration of Conformity
We,	ProMinent Dosiertechnik GmbH Im Schuhmachergewann 5 - 11 D - 69123 Heidelberg
hereby declare that, on the bac circulation by us, the product and health stipulations laid do Any modification to the product	asis of its functional concept and design and in the version brought into specified in the following complies with the relevant, fundamental safety wn by EC regulations. ct not approved by us will invalidate this declaration.
Product description :	Polyelektrolyte preparation system, Ultromat
Product type :	AT / ATF / AF / ATP / ATFP / ATD / ATFD / MT
Serial number :	see type identification plate on device
Relevant EC regulations :	EG - machine regulation (89/392/EEC) subsequently 93/44/EEC EG - low voltage regulation (73/23/EEC) EG - EMC - regulation 89/336/EEC subsequently 92/31/EEC
Harmonised standards used, in particular :	EN 292-1, EN 292-2, EN 563 EN 60204-1 EN 50081-1/2, EN 50082-1/2
National standards and techni specifications used, in particul	ical Iar :
Date/manufacturer's signature	e: 01.04.1999 Ppl. Mulalt
The undersigned :	ڑ Mister Manfred Hüholt, factory manager











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