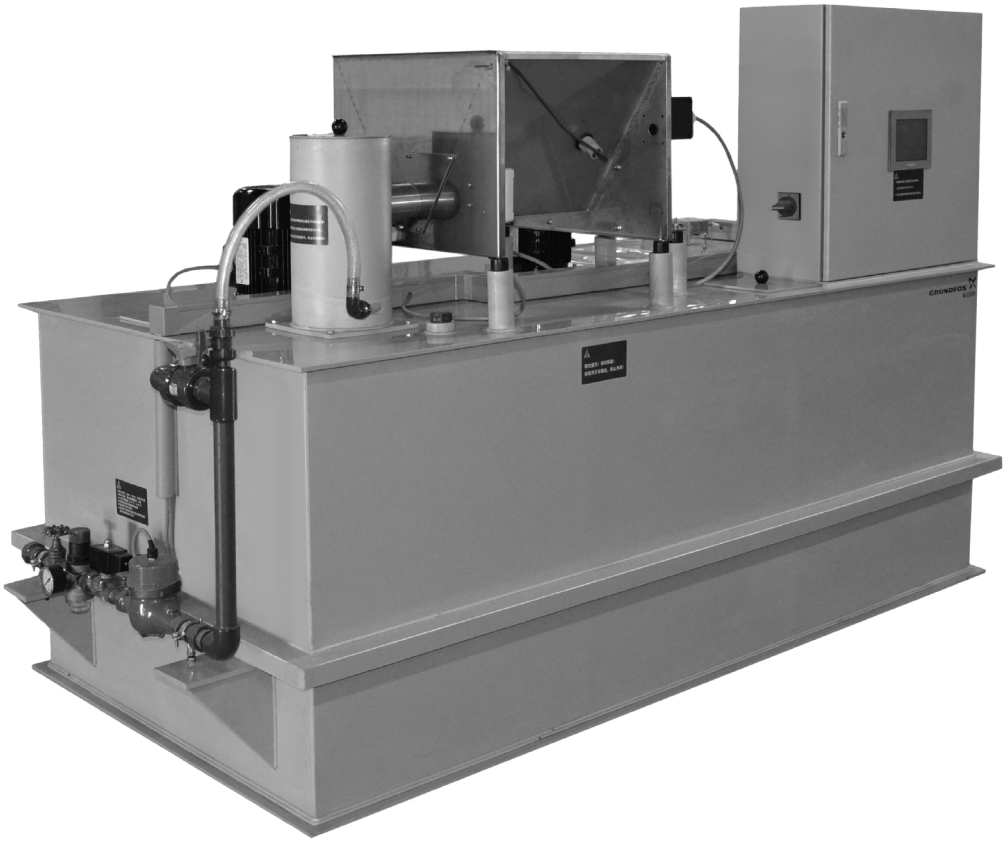
Polydos 412A

Polymer preparation system

Installation and operating instructions



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Original installation and operating instructions.

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Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. Safety instructions

1.1 Purpose of this manual

These installation and operating instructions contain general instructions that must be observed during installation, operation and maintenance of the system. It must therefore be read by the installation engineer and the relevant qualified operator prior to installation and start-up, and must be available at the installation location at all times.

If you require further information or if any problems arise which are not reflected in detail in this manual, please contact Grundfos.

1.2 Symbols used in this document

Warning

If these safety instructions are not observed, it may result in personal injury.

Caution ***If these safety instructions are not observed, it may result in malfunction or damage to the equipment.***

Note ***Notes or instructions that make the job easier and ensure safe operation.***

1.3 Obligations of the operating authority

The operating authority of the system is responsible for

- instructing the operation personnel
- arranging regular maintenance.

1.4 Qualification and training of personnel

The personnel responsible for the installation, operation and service must be appropriately qualified for these tasks. Areas of responsibility, levels of authority and the supervision of the personnel must be precisely defined by the operator. If necessary, the personnel must be trained appropriately.

1.5 Averting dangers

Warning

Danger of injuries from rotating parts!

Do not reach into the chambers when stirrers are running!

Do not reach into the hopper when the dry-material feeder is running!

Open the inspection holes only when necessary!

Warning

Switch off the mains switch and interlock it before doing any maintenance work!

Installation, maintenance and repair must be carried out by authorised and qualified personnel.

Warning

When working with chemicals, the accident prevention regulations applicable at the installation site should be applied (e.g. wearing protective clothing).

Observe the chemical manufacturer's safety data sheets and safety instructions when handling chemicals!

Caution ***Only authorised and trained personnel is allowed to operate the system!***

Slipping hazard!

Caution ***Remove leaked polymer solution and spilled dry material immediately to avoid slipping!***

Caution ***Rebuildings and changes on the system without authority is not allowed and excludes the liability of manufacturer for possibility damages.***

Follow the accident prevention regulations and other general accepted safety regulations.

2. Product description

2.1 Applications

Polydos 412A are fully automatic systems for the continuous preparation of dry polymer in a concentration set at the control panel. Solutions for further dilution as well as ready-to-use solutions can be prepared.

The system is suitable for many applications like:

- Drinking water treatment
- Waste water treatment
- Sludge treatment
- Process and circulation water treatment
- Pulp and paper
- Power plants.

Warning

Other applications or the operation in ambient and operating conditions, which are not approved, are considered improper and are not permitted!

Grundfos accepts no liability for any damages resulting from incorrect use!

2.2 Identification

2.2.1 Type key

Example: PD412A 1000 PP ARML

Example	**PD**	**412A**	**1000**	**PP**	**A**	**R**	**M**	**L**

Product type

PD	Polydos

Model

412A	

Tank size

500	500 l/h
1000	1000 l/h
2000	2000 l/h
4000	4000 l/h
6000	6000 l/h
10000	10000 l/h

Tank material

SS	Stainless steel 304 (ANSI)
PP	PPH

Power supply

A	380 VAC, 50 Hz
C	460 VAC, 60 Hz

Position of control panel

R	Right side
L	Left side

Fieldbus support

M	Modbus RTU
I	Profibus-DP
E	Modbus TCP/IP

Type of powder loading

L	With feeder lid and prepared for vacuum loader
G	Prepared for star-wheeled feeder

3. Technical data

3.1 Plant data

3.1.1 General data

Inlet pressure range of operating water	[bar]	3-10
Concentration range of prepared solution	[%]	0.05 to 0.5
Maximum permissible viscosity	[mPas]	2500

3.1.2 Type specific data

Polydos	Maturing time [min]	Maximum preparation capacity [l/h]	Weight [kg]		Power consumption [kW]		Service water required [m³/h]	Approx. dosing capacity of dry material [kg/h]
			PP	SS	400 V	460 V		50 Hz
412A-500	45	600	220	320	1.6	1.9	1-2	12
	60	500						
412A-1000	45	1300	250	400	2.2	2.5	2-3	24
	60	1040						
412A-2000	45	2200	330	510	2.2	2.5	4-6	40
	60	1800						
412A-4000	45	4500	520	750	3.1	3.6	8-12	65
	60	3700						
412A-6000	45	7000	610	890	5.0	5.8	12-18	128
	60	5800						
412A-10000	45	10000	820	1250	5.7	6.6	20-30	178
	60	7500						

** The power consumption excludes the peripheral devices, such as vacuum loader.

Caution ***The dosing capacity of dry material varies from different types and manufacturers. Here the data is for reference only. The calibration should be done on each device to get precise datum.***

3.1.3 Materials

Materials of components in contact with media:

Component	Material
Tank	PPH or stainless steel 304 (AISI)
Withdrawing/empty/overflow lines and connections	uPVC
Dry-material feeder	Stainless steel 304 (AISI)
Stirrer shafts	Stainless steel 304 (AISI)

3.1.4 Ambient conditions

Ambient temperature for transport and storage	[°C]	-5 to +50
Ambient temperature for operation	[°C]	+0 to +40
Max. relative humidity (non-condensing)	[%]	< 70
Max. altitude above sea level	[m]	2000

3.2 Dimensions

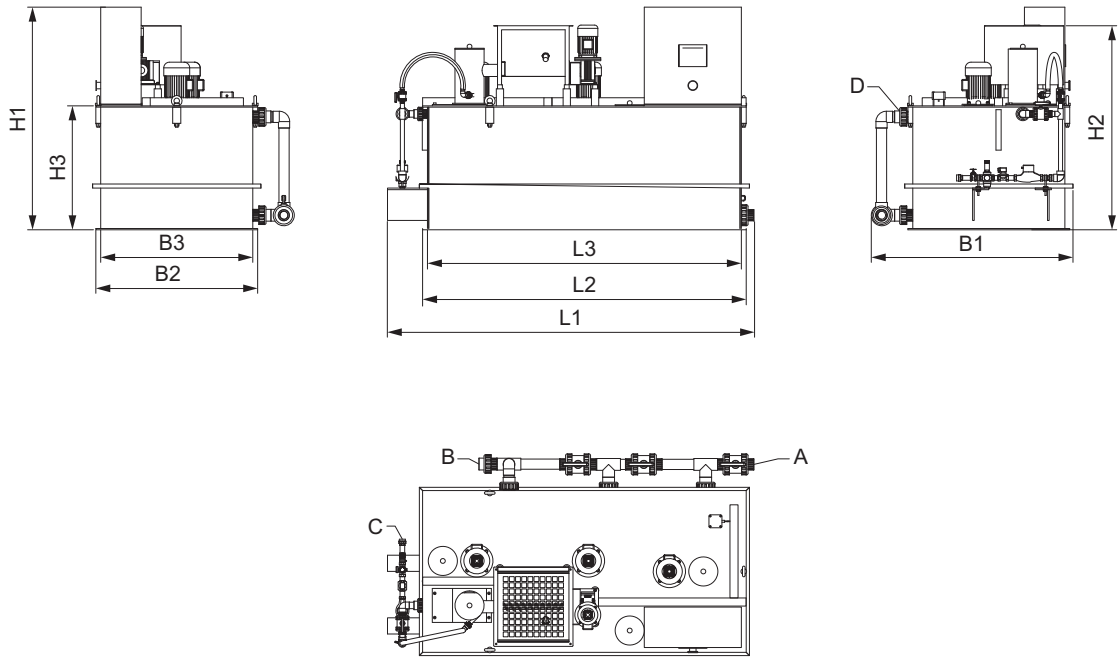

Fig. 1 Example: Polydos 412A-1000

Polydos 412A	Measurements in mm								
	B1	**B2**	**B3**	**H1**	**H2**	**H3**	**L1**	**L2**	**L3**
412A-500	~915	750	690	~1376	~1356	766	~1747	1500	1450
412A-1000	~1247	1000	940	~1376	~1296	766	~2264	2000	1940
412A-2000	~1247	1000	940	~1776	~1696	1166	~2264	2000	1940
412A-4000	~1308	1000	940	~2130	~2050	1520	~3265	3000	2940
412A-6000	~1823	1500	1440	~2130	~2050	1520	~3265	3000	2940
412A-10000	~2182	1800	1740	~2130	~2050	1520	~4266	4000	3940

Connections

Polydos		**412A-500**	**412A-1000**	**412A-2000**	**412A-4000**	**412A-6000**	**412A-10000**
A	Withdrawal connection	DN 32	DN 50	DN 50	DN 65	DN 65	DN 80
B	Drain connection	DN 32	DN 50	DN 50	DN 65	DN 65	DN 80
C	Service water connection	DN 20	DN 20	DN 25	DN 40	DN 40	DN 50
D	Overflow connection	DN 32	DN 50	DN 50	DN 65	DN 65	DN 80

3.3 Components

For locating the components see fig. 2.

3.3.1 Water inlet (12)

- Material of water inlet: uPVC and brass
- Pressure reducing valve (14): 1.5 up to 6 bar
- Solenoid valve (15): 24 VDC, 10 W
- Measuring range of flowmeter (16):
  – Minimum: 100 l/h
  – Maximum: 30000 l/h.

3.3.2 Motor types for stirrers (10)

Motor type: 3-phase, 6-pole

Polydos	Motor type		
	Mixing chamber	Maturing chamber	Storage chamber
412A-500	MMG080MA-6	MMG080MA-6	MMG080MA-6
412A-1000	MMG080MB-6	MMG080MB-6	MMG080MB-6
412A-2000	MMG080MB-6	MMG080MB-6	MMG080MB-6
412A-4000	MMG100L-6	MMG080MB-6	MMG080MB-6
412A-6000	MMG100L-6	MMG100L-6	MMG100L-6
412A-10000	MMG112M-6	MMG100L-6	MMG100L-6

Technical data

Motor type	Power [kW]	Voltage/Current [V/A]	Frequency [Hz]	Speed [rpm]	Enclosure class	Standard
MMG080MA-6	0.37	400 / 1.1	50	910	IP55	IEC60034
	0.4255	460 / 1.1	60	1120		
MMG080MB-6	0.55	400 / 1.6	50	900	IP55	IEC60034
	0.6325	460 / 1.5	60	1110		
MMG100L-6	1.5	400 / 3.9	50	940	IP55	IEC60034
	1.73	460 / 3.73	60	1140		
MMG112M-6	2.2	400 / 5.8	50	970	IP55	IEC60034
	2.53	460 / 5.01	60	1170		

3.3.3 Ultrasonic level sensor (9)

Power supply: 24 VDC

Signal output: 0-10 VDC

Measurement range: 60-2000 mm.

3.3.4 Control panel (7)

Box	Steel covered polyester or stainless steel 304 (AISI) 600 x 600 x 250, IP55
Control	Siemens S7 PLC
	7 inch true colour touch screen
	Manual control override, remote on-off
	Multilingual graphic interface
	Emergency stop
	4 dry contact outputs: • system fault • system operating • lack of dry material • enough solution for withdrawing
	1 editable analogue output: • Level of solution in the withdrawing chamber • solution concentration • 0(4)-20 mA • 0(2)-10 VDC
	Fieldbus support: • Modbus RTU (D9 socket) • Profibus-DP (D9 socket) • Modbus TCP/IP (RJ45 socket)

3.3.5 Dry-material feeder (5)

- Dry-material feeder for constant dosing quantities
- Outlet nozzle with heating 115/230 V, 50 Hz, ca. 60 W at 10 °C.
- Motor type: MMG071MA-4, AC, 3-phase, 4-pole, IP55.

Dosing capacity	[kg/h]	5-750 (depending on material)
Accuracy	[%]	± 4
Hopper content	[l]	32
Hopper material		Shaftless steel 304 (AISI)
Weight	[kg]	28

Types

Polydos	Metering screw diameter [mm]	Gear step-down ratio	Metering screw type
412A-500	30	80:1	Hollow
412A-1000	30	40:1	
412A-2000	30	20:1	
412A-4000	40	40:1	
412A-6000	40	20:1	
412A-10000	60	40:1	

Technical data of motor

Voltage [V]	Frequency [Hz]	Current [A]	Power [kW]	Speed [rpm]
400	50	0.7	0.25	1380
460	60	0.67	0.29	1680

4. Construction and function

4.1 Components, connections and valves

All components, connections and valves are mounted on the tank and build one compact unit.

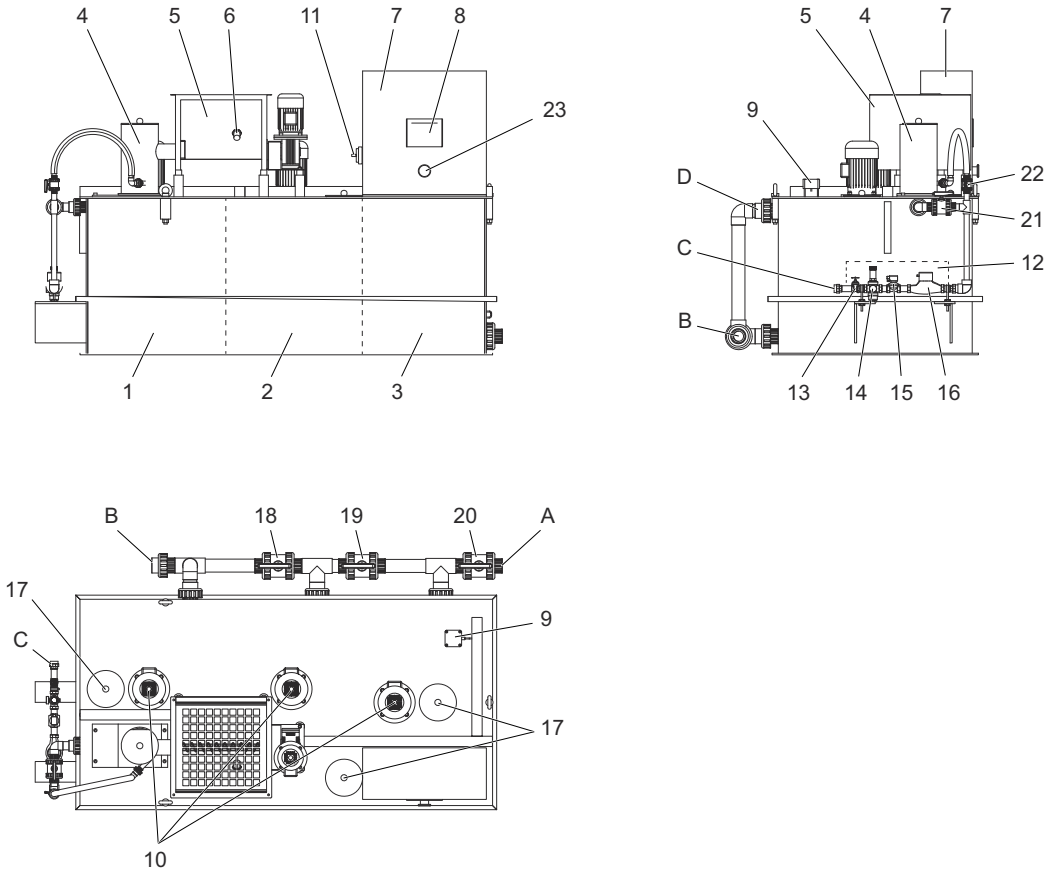

Fig. 2 Components, connections and valves

Pos.	Description	Pos.	Description
1	Mixing chamber	15	Solenoid valve
2	Maturing chamber	16	Flowmeter
3	Storage chamber	17	Inspection holes
4	Jet mixer	18	Ball valve
5	Dry-material feeder	19	Ball valve
6	Vibrator	20	Ball valve
7	Control panel	21	Ball valve
8	Touch screen	22	Ball valve
9	Ultrasonic level sensor	23	Emergency stop
10	Stirrers		
11	Mains switch	A	Withdrawal connection
12	Water inlet	B	Drain connection
13	Shut-off valve	C	Operation water connection
14	Pressure reducing valve	D	Overflow connection

4.1.1 Three-Chamber tank

The tank has three chambers. In the mixing chamber (1), the polymer is mixed with water. In the maturing chamber (2), the polymer solution matures. In the storage chamber (3), the polymer solution is stored before withdrawal. The partition between chambers prevents the amalgamation of the different solution phases, enables a constant withdrawal and guarantees the homogeneity of the solution. In chamber (3), the ultrasonic level sensor (9) is installed to control the start and stop of the preparation process. The overflow (D) is connected to the draining pipe (B). The inspection holes (17) enable the operator to check the level and status in each chamber.

4.1.2 Jet mixer (4)

The jet mixer is specially designed to produce a depression during operation (injector effect). This optimises the suction of the dry polymer, prevents the obstruction of the jet mixer, and guarantees the best wetting of the polymer.

4.1.3 Dry-material feeder (5)

The dry-material feeder can be operated with constant or varying quantities of powders. It is equipped with a 32 l hopper with shaftless screw for constant discharge, and a heating to avoid humidity lumps in the hopper.

4.1.4 Control panel (7)

The Polydos 412A has a control panel with these functions:

- 7-inch true-colour touch screen (8) with Siemens S7 PLC
- Manual control override
- Remote on-off
- Emergency stop button (23)
- Multilingual graphic interface
- Dry contact outputs for:
  – system fault
  – system operating status
  – lack of dry material
  – dry-run
- Communication platform of Modbus RTU, Profibus-DP or Ethernet
- Power supply for vacuum loader
- Operation languages: English and Chinese.

Caution ***Radio shielding for connected consumers must be provided by the customer.***

4.1.5 Ultrasonic level sensor (9)

The contactless and maintenance-free ultrasonic sensor measures the solution level in chamber (3) continuously to set the minimum and maximum thresholds for starting and stopping the automatic preparation process.

The min. and max. limit values start and stop the preparation process automatically.

A limit value for dry run protects the dosing devices from dry operation.

A limit value for overflow prevents overfilling.

4.1.6 Stirrers (10)

There are three stirrers, one in each chamber of the tank. The stirrers mix the prepared solution and enforce the maturing process.

4.1.7 Emergency stop (23)

The unit is supplied with an emergency stop to stop the unit in case of emergency.

4.1.8 Water inlet (12)

The water inlet is equipped with shut-off valve (13), pressure reducing valve (14) with gauge, electric solenoid valve (15) and flowmeter (16) to supply the system with dissolving water. The pressure reducing valve (14) is equipped with manometer and dirt trap. The solenoid valve (15) automatically opens and closes the water inlet.

4.2 Function

The Polydos preparation system works fully automatic. It prepares the polymer solution in a combination of continuous and batch preparation, according to the plug-flow principle.

The following descriptions refer to fig. 2 and fig. 3.

4.2.1 Plug-flow principle

The polymer solution is prepared in a three-chamber tank. The mixing, maturing and withdrawal of the polymer solution runs in a continuous process.

The mixed solution from the bottom of mixing chamber (1) streams through a hydraulic displacement channel to the bottom of maturing chamber (2) and displaces the matured solution into storage chamber (3).

The hydraulic displacement guards against evasion of fresh polymer into storage chamber (3). This is why the plug-flow principle can be utilised in applications were a minimum preparation time must be guaranteed.

4.2.2 Functional principle

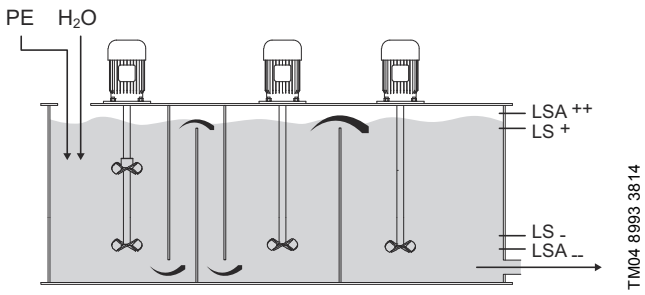

Fig. 3 Functional principle

Pos.	Description
PE	Polymer
H_2O	Service water
LSA++	Overflow alarm level
LS+	Max. filling level
LS-	Min. filling level
LS--	Dry run alarm level

In the storage chamber (3) the ultrasonic level sensor (9) is installed. It controls the start and stop of the preparation process.

- When the min. level (LS-) is reached, the solenoid valve (15) opens and the water streams into the mixing chamber (1). The flow meter (16) measures the water flow. If the water flow is ok:
  – Stirrers in chamber (1) and chamber (3) start running.
  – Dry-material feeder (5) switches on.
  The dry-material feeder does not work continuously during the preparation procedure, but with a certain cycle time set to 10 seconds. When water starts to flow into the mixing chamber (1), the feeder waits until an amount of water has flown in, which is adequate to a dosing time of 10 seconds. Then it starts dosing until the dosing rate corresponds to the amount of water that has flown in so far, then it stops. This cycle is repeated as long as water is running into chamber (1).
- The dry material is dosed into the jet mixer (4). The streaming water causes a slight vacuum within the jet mixer. The dry material is wetted and then sucked with the main stream of the water into chamber (1).
- The mixed solution from the bottom of chamber (1) is pushed to the bottom of chamber (2) by hydraulic displacement. From there, it will eventually flow into chamber (3).
- When the max. level (LS+) is reached, the dry-material feeder is switched off. The water continues flowing for some seconds to clean the jet mixer, then the solenoid valve (15) is closed. The stirrer in chamber (2) is switched on.
- The vibrator (6) prevents the dry material from building "packing bridges" in the hopper. The heated dosing pipe of the dry-material feeder prevents intrusion of humidity into the dry material.

5. Commissioning

5.1 Transport and storage

For transport and storage of the product, the permitted ambient temperature is -5 °C to +50 °C. The product must be stored in a clean and dry area, sheltered from direct sunlight.

Caution ***Direct sunlight can damage the tank material. Don't expose the product to direct sunlight!***

Caution ***For storage and transport after decommissioning, make sure that no residual water is in the water inlet and lines.***
Freezing water can damage the product.

Caution ***The product must only be transported when it is empty and only with suitable lifting and transportation devices!***
Strong impact loads must be avoided!

Caution ***Do not transport the product if the ambient temperature is lower than -5 °C. The material of the tank and the weld seams can be damaged.***

Caution ***When using the lifting eyes, all lifting eyes must be used! Fix the ropes in a way that no product parts are damaged!***

Position of lifting eyes:

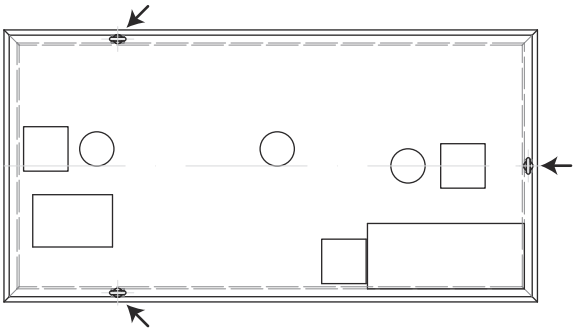

Fig. 4 Lifting eyes (top view)

5.2 Mounting

The unit is completely mounted and checked in the factory.
Erect the system on a horizontal foundation.
Maximum slope: 1:200.

Caution ***Observe the maximum floor load! The foundation must lead to good bearing soil!***

Type of unit	Dimensions of foundation [mm]	Min. weight to afford [kg]
412-500	800 x 1550	1050
412-1000	1100 x 2100	1600
412-2000	1100 x 2100	2700
412-4000	1100 x 3100	4950
412-6000	1600 x 3100	7100
412-10000	2000 x 4200	11500

Install the product in a way, that it is freely accessible for operating, maintenance and loading of dry material at any time.
Observe all specifications in section *3. Technical data* like ambient conditions, connection dimensions etc.

5.3 Hydraulic connection

This section refers to fig. 2.

Caution ***For trouble-free operation the operation water should be drinking water quality. It must be free from contamination and particulate materials.***
The operating water pressure must be in the range of 3 to 10 bar.

Caution ***Observe local rules for the draining of the used polymer when connecting the drain connection (B)!***

- Connect the operation water line to the operation water connection (C) at the water inlet.
- Connect the withdrawal dosing pump to the withdrawal line connection (A).
- Connect the drain line to the drain connection (B) and lead it to an appropriate drain.
- The overflow connection (D) is connected to the drain line as default from factory.

5.4 Electrical connection

Warning
In case of working with electrical parts switch off the mains switch (11) and interlock it.
Electrical connection must only be carried out by authorised qualified personnel!
Observe local safety regulations!
Establish electrical connections according to the enclosed connection chart.

Lead the mains line to the control panel and connect it according to the enclosed connection chart.

- Cable cross-section: 1.5 - 2.5 mm^2

Caution ***Observe sense of rotation! Check it before commissioning in the "HAND" operation mode!***

- Provide a back-up fuse with corresponding capacity.

5.5 Startup

Caution

Before starting commissioning all components have to be ready for operation.

Confirm the installation before the system startup!

5.5.1 Execute startup

Follow this general steps to startup the system:

1. Switch on the mains power.
2. Switch on all the breakers inside the control panel one by one and shut off the door of the panel.

The system executes a self test and the software is started up. After a few seconds the operation screen is displayed on the touch screen:

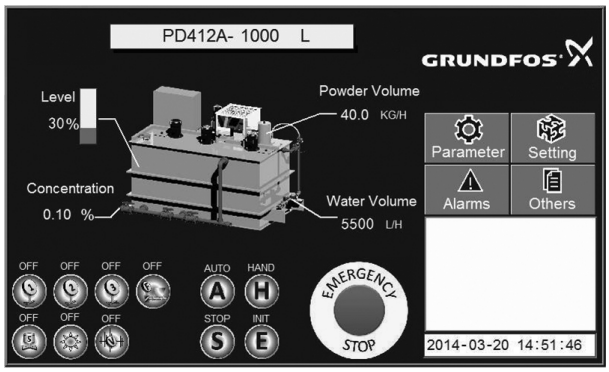

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Fig. 5 Operation screen

3. Change the operation language if necessary. See section *6.5.7 Submenu "Setting > Polydos type"*.
4. Log on to the system with authorised user. See section *6.3.1 Login to the system*.
5. If symbol is displayed, deactivate the emergency stop (fig. 2, pos. 23).
6. Push key to activate the "HAND" operation mode.
7. To verify the running direction of the motors, turn on the following components very shortly by pressing the respective component keys (see section *6.4.7 Component keys*):
   – Stirrer in mixing chamber:
   – Stirrer in maturing chamber:
   – Stirrer in storage chamber:
   – Dry material feeder:
   – If present, star-wheeled valve.
8. Eliminate the "Powder pre-empty" alarm by filling the hopper with powder.
9. Calibrate the powder. See section *6.5.2 Submenu "Parameter > Powder calibration"*.
10. Input the concentration desired. See section *6.5.5 Submenu "Parameter > Water inlet unit"*.
11. Check all the rest parameters and adjust them, if necessary. See section *6.5 Menu structure*.
12. Push key to start the system from empty tank. The system switches to "AUTO" operation mode after the initial startup is finished.
13. Adjust the water flow to be stable between the minimum and maximum flow rate. See section *6.5.5 Submenu "Parameter > Water inlet unit"*.

5.6 Decommissioning of the unit

The tank and the dry-material feeder have to be empty before decommissioning of the unit. Additionally clean the tank with water. The mains switch has to be switched off and must be interlocked.

6. Operation

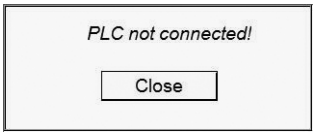
6.1 PLC

The PLC, a SIMATIC S7-200, is mounted in the control panel. It has two operation modes. After delivery it is in the RUN mode, which requires no intervention for commissioning.

6.1.1 Operation mode STOP

- The program will not be executed.
- The values of times, flags and counters relevant when STOP was selected will be kept.
- The outputs of the compact control and those of the output module are locked (signal state 0).
- When changing from STOP to RUN, the times and the non-remanent flags and counters will be set to their default values.
- The touch panel is not active.
- The operation of the unit is not possible. All functions are interlocked.

If the power supply for PLC is switched off or the operation mode is STOP, or the communication between PLC and display is disconnected, the following message is displayed:



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The operation of the unit is not possible.

6.1.2 Operation mode RUN

- The program will be executed cyclically.
- Actions are executed at the programmed times.
- The signal states of the inputs and of the input module will be read.
- The outputs of the compact control and of the output module will be addressed.
- In this state, the operator terminal has all functions described below.

6.1.3 Changing the operation mode

Changing the operation mode is possible:

- by using the operation mode switch.
- by failures switching the compact control to STOP. These are failures of the control itself, no process-caused faults like e.g. a fault message.

The program is stored in the internal program memory (Flash-ROM). It stays resident even in case of power failure until the battery inside PLC is run out.

For loading the program (e.g. in case of changes or improvement) a programming device or a memory module has to be connected.

Note

Changes of the software may only be executed by qualified personnel authorised by Grundfos! In case of unauthorised changes of hardware or software, the warranty will no longer be valid. The software stays property of Grundfos, copies are not allowed.

6.2 Operation modes

The system can be set to different operation modes using the operation mode keys (fig. 8, pos. 6).

Operation mode	Description
"AUTO"	**Automatic operation** The preparation process runs fully automatic.
"HAND"	**Manual operation** In this mode it is possible to switch on/off every component of the system manually. **Warning: There is no protection from faulty operation in this mode!**
"STOP"	The system is stopped.
"INIT"	This operation mode is only for start-up with empty tank e.g. at initial start-up. The system switches to "AUTO" mode automatically after start-up is completed.

See also section *6.4.6 Operation mode keys*.

6.3 Touch screen - general functions

6.3.1 Login to the system

To operate the system, a validated user must log on to the system first. If the user is not authorized to operate a certain function, the desired action will not take place and there pops up a message:

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See section *6.5.14 Submenu "Others > User"*.

6.3.2 Operation language

The operation language can be changed in submenu "Setting > Polydos type" by pushing the respective flag of the desired language. The user can choose following languages:

- GB (English)
- CN (Chinese)

See also section *6.5.7 Submenu "Setting > Polydos type"*.

6.3.3 Display lighting

If the screen is not touched for 20 minutes, the lighting of the screen is switched off automatically.

To relight the screen, touch the display.

6.3.4 Numeric keyboard

The input of numeric parameters is done via a numeric keyboard.

All fields with numeric values and black background are input parameters which can be changed by the operator. Fields with grey background are not supposed to be changed by the operator.

Touch an input field to open the numeric keyboard. The keyboard shows up on the display and the input field is marked.

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Fig. 6 Numeric keyboard

The numeric keyboard has following functions:

Key	Description
"DEL"	Delete the last inserted number behind the cursor.
"BAC"	Delete the last inserted number in front of the cursor.
"< >"	Move the cursor.
"ESC"	Cancel input of parameter without saving and exit the numeric keyboard.
"C"	Clear the input field.
"ENTER"	Confirm and save the input value and exit the numeric keyboard.

6.3.5 Online help

In some menus a question mark key (1) is shown. Pushing this key opens the respective online help topic.

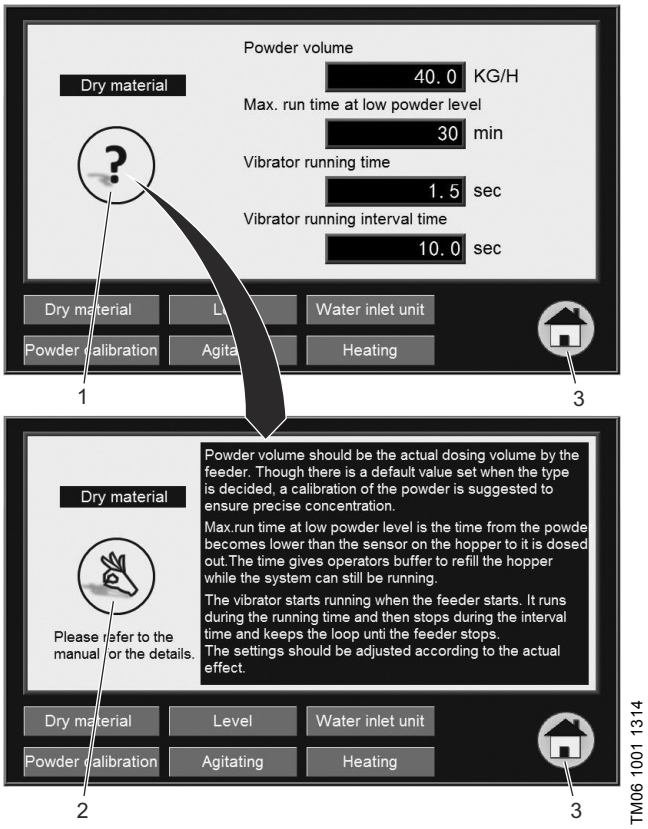

Fig. 7 Online help

Pos.	Description
1	Key to open the online help topic
2	Key to close the online help topic
3	Key to return to the operation screen directly

6.4 Touch screen - operation functions

The system is operated via the touch screen. The operation screen shows all information for operation like error messages, warnings, measuring values and the operation menu. All parameters are set via the touch screen.

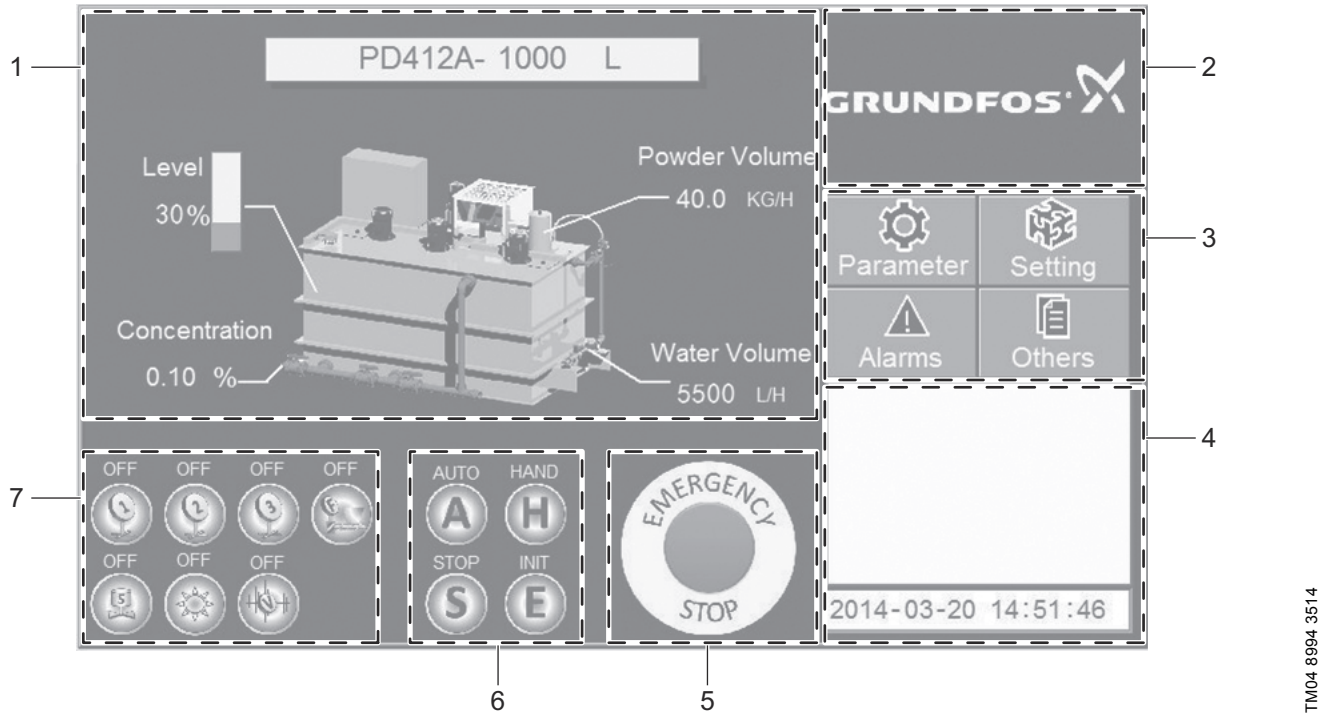

Fig. 8 Touch screen with operation screen

Pos.	Description	See section
1	Process data	*6.4.1 Process data*
2	Manufacturer introduction	*6.4.2 Manufacturer introduction*
3	Menu	*6.4.3 Menu*
4	Events	*6.4.4 Events*
5	Emergency stop indication	*6.4.5 Emergency stop indication*
6	Operation mode keys	*6.4.6 Operation mode keys*
7	Component keys	*6.4.7 Component keys*

6.4.1 Process data

The process data show the system type and size and following further data:

Display text	Description
"Level"	Filling level of storage chamber in %
"Powder volume"	Powder (polymer) dosing volume in kg/h
"Water volume"	Flow rate at water inlet in l/h
"Concentration"	Concentration of prepared solution in %

The relative submenu window can be accessed by touching the fields to check and modify the details.

6.4.2 Manufacturer introduction

This area shows some information about Grundfos.

6.4.3 Menu

The menu area consists of 4 menu keys:

- "Parameter"
- "Setting"
- "Alarms"
- "Others"

6.4.4 Events

This area lists the device's operating actions with the latest on the top.

6.4.5 Emergency stop indication

The emergency stop indication shows up and flashes when the emergency stop (fig. 2, pos. 23) is activated.

6.4.6 Operation mode keys

The operation mode keys are used to switch between the operation modes. See also section *6.2 Operation modes*.

Note

Before the system can be switched from "AUTO" or "INIT" to "HAND" operation mode or vice versa, the "STOP" operation mode must be activated.

The "AUTO" and "INIT" operation mode can only be switched on when all alarms are eliminated.

The respective key to the currently activated operation mode is displayed in green, the rest is displayed in red.

Key	Operation mode	Function
A	"AUTO"	Sets the system to operation mode "AUTO" (automatic operation).
H	"HAND"	Sets the system to operation mode "HAND" (manual operation).
S	"STOP"	Sets the system to operation mode "STOP" (system stopped).
E	"INIT"	Sets the system to operation mode "INIT". This key is only used for the first start-up of the system or first start-up after maintenance when the tank is totally empty in all the three chambers. When the tank is full and the first maturing time is over, the system switches to operation mode "AUTO" automatically.

Warning

Don't start the "AUTO" mode when the mixing and maturing chamber is empty, as this may cause damage to the stirrers and the tank!

6.4.7 Component keys

The component keys indicate the status of the components. In "HAND" operation mode they can be used to start/stop the respective component.

Key colours

The keys can have different colours indicating the status of the component. In addition to the colour a status text is displayed on top of each key.

Key colour	Status text	Description
Red	"OFF"	Component is stopped.
Green	"ON"	Component is running.
Yellow*	"FAIL"	Component is stopped due to an error.

* Not valid for heater key and vibrator key

Overview of component keys

The position numbers of the components in this table refer to fig. 2.

Key	Component
1	Stirrer in mixing chamber (1)
2	Stirrer in maturing chamber (2)
3	Stirrer in storage chamber (3)
F	Dry-material feeder (5)
S	Solenoid valve (15)
	Heater
V	Vibrator (6)
	Star-wheeled valve (optional component)

6.5 Menu structure

The menu (fig. 8, pos. 3) consists of following menus and submenus:

Menu	Submenu	Description	See section
"Parameter"		In this menu the process parameters of the system can be changed.	
	"Dry-material"	Dry-material feeder control.	*6.5.1 Submenu "Parameter > Dry-material"*
	"Powder calibration"	Dry-material feeder calibration.	*6.5.2 Submenu "Parameter > Powder calibration"*
	"Level"	Tank level control.	*6.5.3 Submenu "Parameter > Level"*
	"Agitating"	Stirrers control.	*6.5.4 Submenu "Parameter > Agitating"*
	"Water inlet unit"	Water inlet control.	*6.5.5 Submenu "Parameter > Water inlet unit"*
	"Heating"	Heating control.	*6.5.6 Submenu "Parameter > Heating"*
"Setting"		In this menu the factory-set configuration of the system can be changed. Usually the configuration of the system is factory-set and no changes from the operator are required.	
	"Polydos type"	Setting type and variant of the system.	*6.5.7 Submenu "Setting > Polydos type"*
	"Analogue Output"	Setting the analogue output for the liquid level in the tank.	*6.5.8 Submenu "Setting > Analogue Output"*
	"Level align"	Setting the liquid level detection.	*6.5.9 Submenu "Setting > Level align"*
	"Relay output"	Setting the contact type of the output contacts.	*6.5.10 Submenu "Setting > Relay output"*
	"Remote control"	Setting the connections with upper machine.	*6.5.11 Submenu "Setting > Remote control"*
	"Star-wh. valve"	Setting the star-wheeled valve.	*6.5.12 Submenu "Setting > Star-wh. valve"*
"Alarms"		In this menu the alarms are listed with detailed information.	*6.5.13 Menu "Alarms"*
"Others"		In this menu miscellaneous information and settings can be found.	
	"Users"	User management.	*6.5.14 Submenu "Others > User"*
	"Maintaining"	Maintenance information.	*6.5.16 Submenu "Others > Maintaining"*
	"Statistics"	Working statistics such as water consumption, motor runtime etc.	*6.5.17 Submenu "Others > Statistics"*
	"Commissioning"	Commissioning information.	*6.5.18 Submenu "Others > Commissioning"*
	"Spare parts"	Ordering numbers for spare parts of the system.	*6.5.19 Submenu "Others > Spare parts"*

6.5.1 Submenu "Parameter > Dry-material"

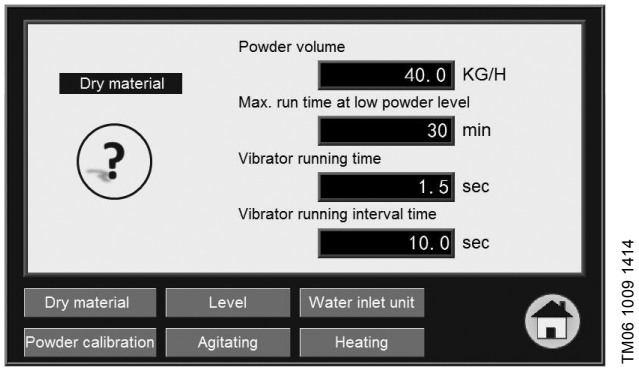

Fig. 9 Submenu "Parameter > Dry-material"

"Powder volume"

This datum defines how much powder the dry-material feeder doses in one hour continuously. The datum is reset to the default value when the type of Polydos is changed (see section *6.5.7 Submenu "Setting > Polydos type"*).

Caution

Danger of wrong concentration of prepared solution!

The default value is for reference only. It is based on the manufacturer's general experience and should only enable the user to start-up the system in case the powder calibration was not executed before startup.

Execute the powder calibration as soon as possible to ensure the right concentration of the final prepared solution. See section 6.5.2 Submenu "Parameter > Powder calibration".

The datum can be changed by touching the input field or via the "Parameter > Powder calibration" submenu.

"Max. run time at low powder level"

When the powder level in the dry-material feeder (fig. 2, pos. 5) reaches the "low powder" level, a timer starts counting the time for dosing of the rest powder. When the timer reaches the time set in the input field, the "powder used out" alarm is triggered and the system stops the filling the powder and water into the tank while the stirrers are kept running, until the feeder is refilled.

The set time gives the user the chance to refill the hopper before the system stops working due to lack of powder. A default value of 30 minutes is factory-set. The value must be adjusted according to on-site experience as soon as possible to avoid stops of the system.

"Vibrator running time" and "Vibrator running interval time"

The vibrator on the feeder runs intermittently while the feeder is running.

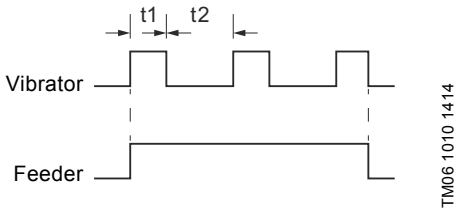

Fig. 10 Vibrator runtime chart

t1	Vibrator running time
t2	Vibrator running interval time (vibrator stopped)

The factory-set value is 1.5 seconds and 10 seconds. The value must be adjusted according to the actual facts on-site.

Caution

Too much vibrating causes imprecise powder dosing and too little vibrating can cause building of powder bridges.

6.5.2 Submenu "Parameter > Powder calibration"

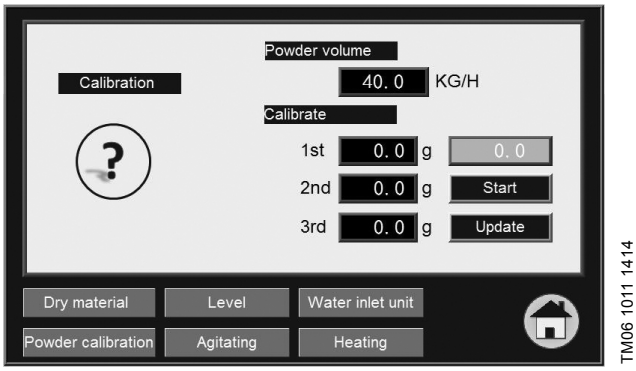

Fig. 11 Submenu "Parameter > Powder calibration"

"Powder volume"

See section *"Powder volume"* in section *6.5.1 Submenu "Parameter > Dry-material"*.

"Calibrate"

The calibration is necessary to get precise concentration of the final prepared solution every time a new type of powder is used.

For calibration a container and a kitchen scales are needed. To calibrate the powder volume execute the following steps:

1. Switch the system to "STOP" operation mode.
2. Remove the upper part of the jet-mixer.
3. Weigh the empty container and record the weight.
4. Put the container under the outlet of the feeder.
5. Switch the system to "HAND" operation mode and start the dry-material feeder.
6. Stop the system when a stable continuous stream of powder comes out from the feeder.
7. Enter the "Parameter > Powder calibration" submenu.
8. Empty the container and put it back under the outlet of the feeder.
9. Push the "Start" button in the menu. The system will run the feeder for 60 seconds. A countdown shows up on top of the "Start" button.
10. After the feeder stops, weigh the powder in the container.
11. Feed in "1st" field in the window with the result of the weighing (minus the container's weight).
12. Execute steps 8 to 10 again to feed in "2nd" and "3rd" field.
13. Push the "Update" button. The new calibration result is updated in the "Powder volume" field.
14. Reassemble the upper part of the jet-mixer.

6.5.3 Submenu "Parameter > Level"

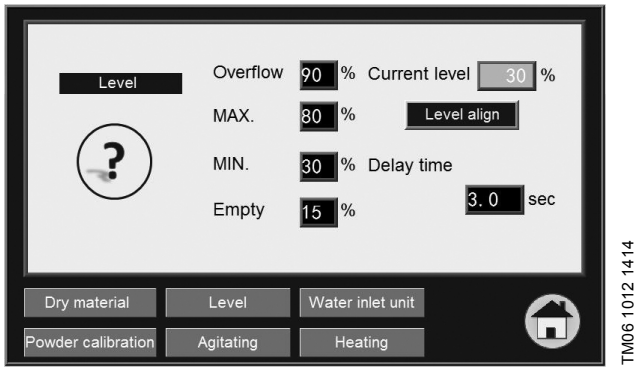

Fig. 12 Submenu "Parameter > Level"

"Overflow", "MAX.", "MIN.", "Empty"

This are the 4 thresholds of the liquid level in the storage chamber (fig. 2, pos. 3) of the tank to control the system.

In the "AUTO" operation mode, the system starts feeding new water and powder when the liquid level reaches the "MIN." level and stops when the "MAX." level is reached.

When the "Empty" level is reached, the stirrer in the storage chamber stops and the relay of solution level switches off, to stop downstream pumps. An alarm of lack of solution is given out.

When the "Overflow" level is reached, an alarm of overflow is given out and inlet of service water is stopped. The system keeps running.

"Current level"

The datum shows the current liquid level in the storage chamber detected by ultrasonic sensor (fig. 2, pos. 9). If the datum is found not correct the level needs to be aligned (see section *6.5.9 Submenu "Setting > Level align"*).

"Delay time"

The level detection has a delay time defined in field "Delay time". The delay time prevents wrong alarms due to level fluctuation caused by stirring.

6.5.4 Submenu "Parameter > Agitating"

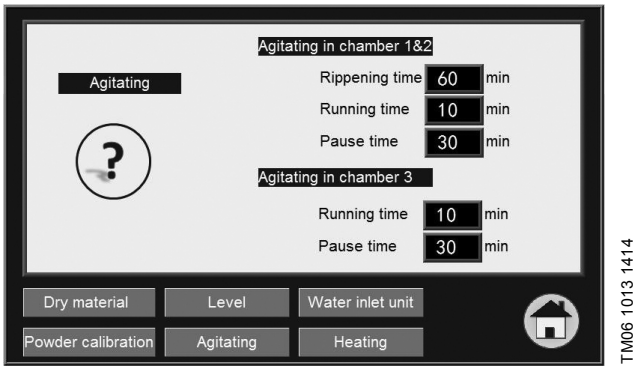

Fig. 13 Submenu "Parameter > Agitating"

In this submenu the running and pause times for the stirrers are defined according to this chart:

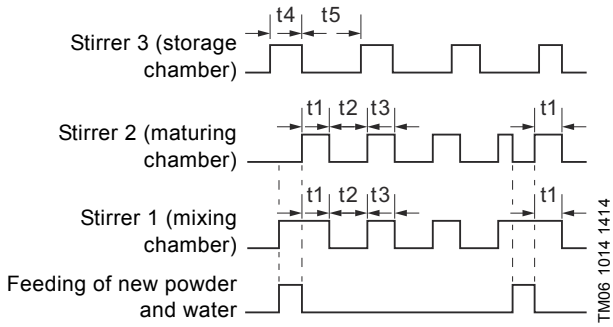

Fig. 14 Stirrers operation chart

t1	"Maturing time" (based on powder properties)
t2	"Pause time" for stirrers 1 and 2. If this value is "0" the stirrers keep running.
t3	"Running time" for stirrers 1 and 2.
t4	"Running time" for stirrer 3.
t5	"Pause time" for stirrer 3.

6.5.5 Submenu "Parameter > Water inlet unit"

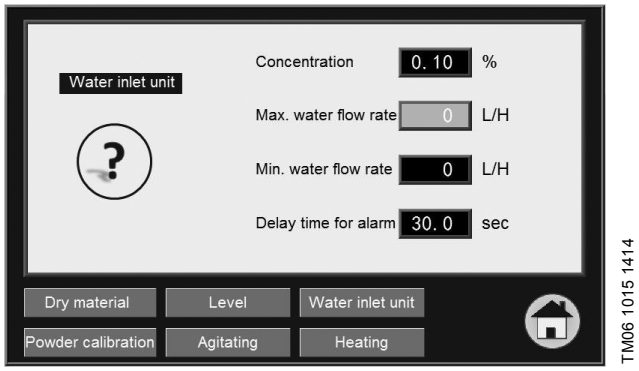

Fig. 15 Submenu "Parameter > Water inlet unit"

"Concentration"

This field defines the desired concentration of the final prepared solution. The possible concentration range is 0.05 to 0.5 %.

"Max. water flow rate"

This datum is calculated by the PLC based on the "Concentration" and the "Powder volume" (fig. 9). If the inlet water flow rate measured by the flow meter (fig. 2, pos. 16) exceeds this value, the system will stop and the alarm "too much inlet water" will be given out, because the desired concentration cannot be achieved.

"Min. water flow rate"

This datum is defined to give out alarm of "not enough water". When the actual inlet water volume is smaller than this flow rate, the alarm is triggered while the system keeps running. In this situation, the designed capacity of Polydos is not able to reach.

The datum, as the default value, should be twice of the designed capacity. Examples:

- Polydos PD412A-2000 = 4000 l
- Polydos PD412A-4000 = 8000 l

But it can be adjusted according to actual application.

"Delay time of alarm"

To prevent alarms from normal fluctuation, the alarms are only triggered if the actual water flow rate exceeds the max. or min. water flow rate for the time defined in this field. The time is at least 10 seconds because the water volume is refreshed every 10 seconds.

Adjusting the inlet water

To adjust the inlet water in a certain range, follow these steps:

1. Loosen the screw at the top of the pressure reducing valve
2. Turn the green knob towards "+" to increase the volume or towards "-" to decrease it.
   – Watch the scale on it, which indicates the pressure at the end of the pressure reducing valve.
3. Wait for 10+ seconds to check the volume on the operation panel and adjust again if necessary.
4. Tighten the screw at the top of the pressure reducing valve back.

6.5.6 Submenu "Parameter > Heating"

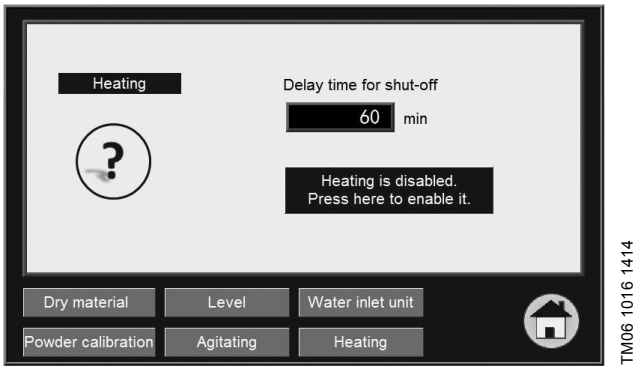

Fig. 16 Submenu "Parameter > Heating"

"Delay time for shut-off"

If the heating is enabled, it will be switched on, when the solenoid valve (fig. 2, pos. 15) in the water inlet (fig. 2, pos. 12) opens. The heating is switched off, when the solenoid valve closes, delayed by the time defined in this field.

The factory-set default value is 10 minutes. An appropriate time must be put in after observation on-site in order to prevent over-heating or moistening of the powder.

The heating function can be disabled in an arid environment. To disable or enable the function press the respective field in the menu.

6.5.7 Submenu "Setting > Polydos type"

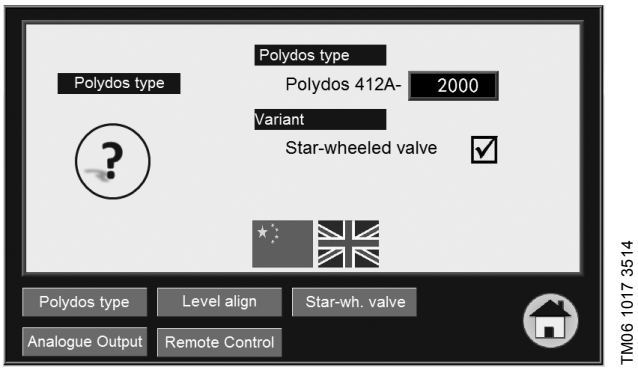

Fig. 17 Submenu "Setting > Polydos type"

"Polydos type"

The field must match the actual system, otherwise the system cannot work correctly. This value is a factory setting and must only be changed by Grundfos service personnel on site!

"Variant"

Tick the variants according to the actual on-site equipment to enable the functions.

- "Star-wheeled valve" is applied.

Language

Push a flag to select the operation language of the system.

6.5.8 Submenu "Setting > Analogue Output"

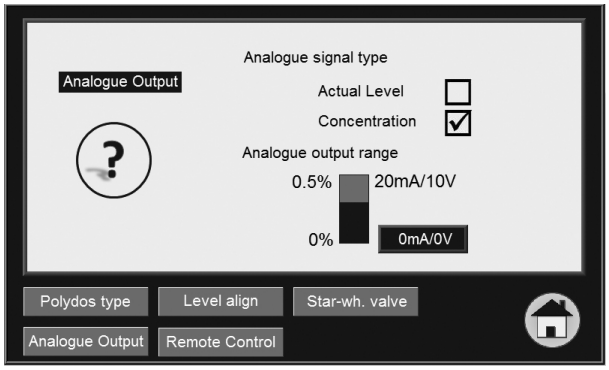

Fig. 18 Submenu "Setting > Analogue Output"

The system provides an analogue output which stands for either "liquid level" in the storage tank or "concentration" of the solution.

The upper limit of the signal (20mA/10V) stands for 100 % liquid level or 0.5 % concentration. The bottom limit of the signal stands for 0 % liquid level or 0 % concentration.

The bottom signal can be configured as 0mA/0V or 4mA/2V by pressing the key at the foot of the column.

6.5.9 Submenu "Setting > Level align"

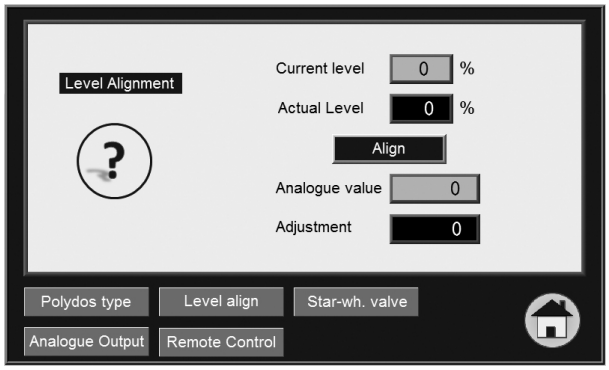

Fig. 19 Submenu "Setting > Level align"

If the liquid level measured by the ultrasonic level sensor (fig. 2, pos. 9) deviates from the actual value it can be adjusted. The initial adjustment is done from the manufacturer.

"Current level"

This datum is the detected level calculated by the PLC. The "Adjustment" value is taken into account.

"Actual level"

This datum can be put in as the actual level measured and calculated by the user. After this datum is put in, the "Align" key must be pushed to initiate the calculation of the "Adjustment" value.

"Analogue value"

This datum shows the actual figure the PLC gets from the ultrasonic sensor.

Distance from sensor to liquid surface [mm]	Approximate "Analogue value"
≤ 60	0
2000	32000

"Adjustment"

The "Adjustment" value can be fed in here directly or it can be calculated by the PLC by pushing the "Align" button (refer to above section *"Actual level"*).

Positive values decrease and negative values increase the "Current level".

Note ***If the system fails to adjust the detected level to the actual level, please contact the Grundfos service for help.***

6.5.10 Submenu "Setting > Relay output"

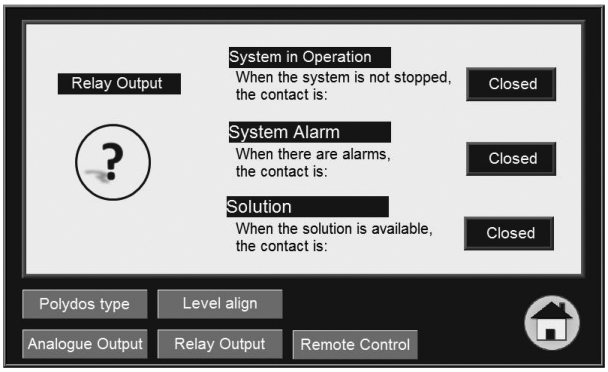

Fig. 20 Submenu "Setting > Relay output"

By pushing the Buttons the contacts outputs can be switched from "closed" to "opened" and vise versa.

6.5.11 Submenu "Setting > Remote control"

Fig. 21 Submenu "Setting > Remote control"

The system may provide 4 types of connection with the upper machine for remote controlling.

Dry contact	Default
Modbus RTU slave	Default
ProfiBus DP	Optional
EtherNet (Modbus TCP/IP)	Optional

The function must be tickled to enable. As to the optional connections, please ensure the hardware applies.

The functions cab be disabled by tickling off.

If the Modbus RTU or EtherNet is enabled, press the key beside for the detail settings.

See section *9. Fieldbus communication unit*.

6.5.12 Submenu "Setting > Star-wh. valve"

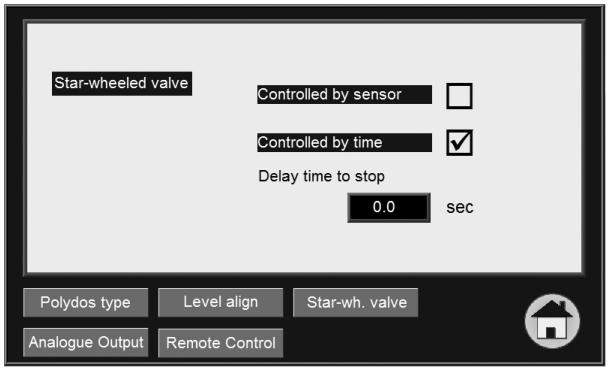

Fig. 22 Submenu "Setting > Star-wh. valve"

There are 2 methods to control the star-wheeled valve to start and stop automatically.

"Controlled by sensor"

If an extension hopper with a "high powder" level sensor (which must be normally closed) is applied, the star-wheeled valve can be controlled using this sensor and the low level sensor (standard component) in the feeder's hopper.

In this case the valve starts when the "Powder pre-empty" level in the feeder's hopper is reached (a respective alarm is triggered), and stops when the "high powder" level in the extension hopper is reached.

"Controlled by time"

If there is no high powder level sensor, the valve can be controlled by a delay time.

In this case the valve starts when the "Powder pre-empty" level in the feeder's hopper is reached (a respective alarm is triggered), and stops after a certain period of time defined in field "Delay time to stop". The timer starts as soon as the "Powder pre-empty" alarm is switched off.

Caution

Danger of damage to property!

If the "Delay time to stop" is too long, the system can be damaged!

The time must be accurately defined according to the observation on-site.

6.5.13 Menu "Alarms"

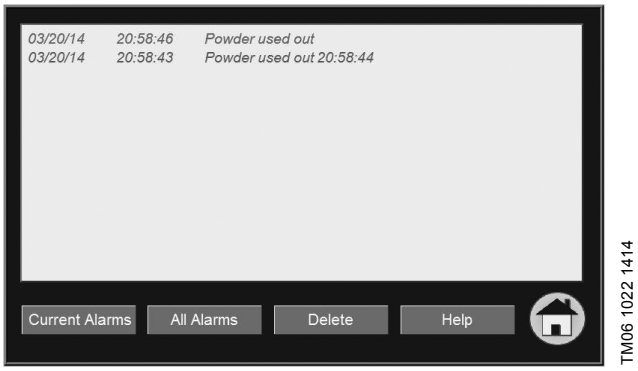

Fig. 23 Menu "Alarms"

This menu lists the alarms of the system. The active alarms are shown in red, the historic alarms are shown in green. Each alarm line starts with date and time of occurrence followed by the alarm message. Removed alarms are followed by the removal time

"Current Alarms"

Pushing this button lists only the active alarms.

"All Alarms"

Pushing this button lists all active and historic alarms.

"Delete"

To delete an historic alarm, the respective line must be selected by touching it. To delete the selected alarm, push the "Delete" key.

Note

It is not possible to delete active alarms from the menu. Active alarms are changed to historic alarms as soon as the cause of the alarm is fixed.

"Help"

Push this button to read the introduction of the alarms and get relevant solving measures suggested.

6.5.14 Submenu "Others > User"

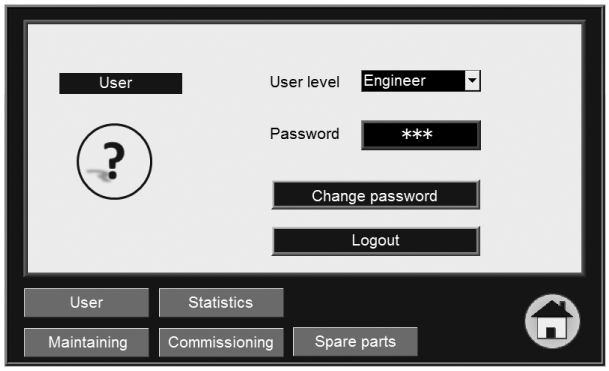

Fig. 24 Submenu "Others > User"

To operate the system, an authorised user must log on. Otherwise the operator can only read the information.

User levels and passwords

There are 3 levels of authorised users:

User level	User rights
"Operator"	• change the operation mode • change parameters: – "Concentration" (section *6.5.5 Submenu "Parameter > Water inlet unit"*) – "Min. water flow rate" (section *6.5.5 Submenu "Parameter > Water inlet unit"*) – etc. **The initial password is "400".**
"Engineer"	• all rights of "Operator" • change all parameters and some on-site configurations **The initial password is "200".**
"Manufacturer"	• full control of all parameters and settings of the system **This user level is for Grundfos service personnel only.**

The rights are given as soon as the password is entered correctly.

"Change password"

Push this key to change passwords. See section *6.5.15 Submenu "Others > User > Change password"*.

"Logout"

Push this key to logout from the system.

Warning

Danger from unauthorised operation!

Unauthorised changes of parameters and settings can cause personal injuries and damage to property!

Always logout from the system before leaving the installation site.

6.5.15 Submenu "Others > User > Change password"

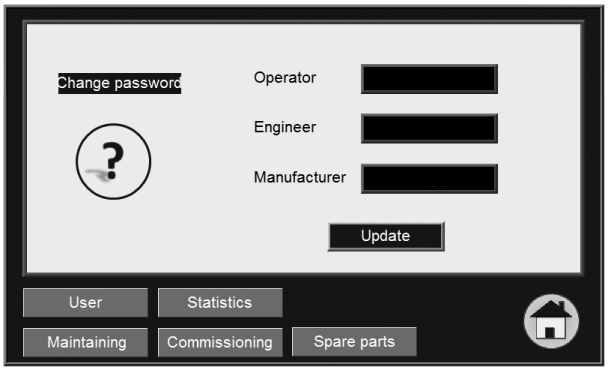

Fig. 25 Submenu "Others > User > Change password"

The passwords for "Operator" and "Engineer" can be changed by the user. For details on password levels see section *6.5.14 Submenu "Others > User"*.

Caution

Changed passwords must be remembered by the user! It is not possible for the manufacturer to read out any passwords from the software.

If a changed password is forgotten, the Grundfos service must be asked visit the site and reset the passwords, for which service fee will be charged.

A user with "Operator" level can only change the "Operator" password.

Users with "Engineer" level can change the "Operator" password as well as the "Engineer" password.

To confirm the new passwords, the [Update] key must be pushed.

6.5.16 Submenu "Others > Maintaining"

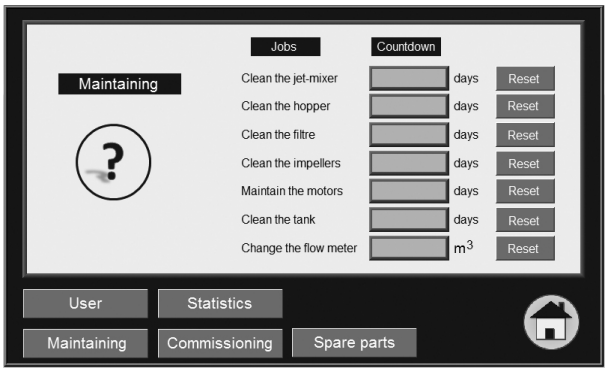

Fig. 26 Submenu "Others > Maintaining"

The maintaining jobs must be done regularly. The countdowns are based on the manufacturer's experience and for reference only. The frequency of maintenance must be set according to actual application and conditions.

When the countdown reaches the "0" value, an alarm is triggered. After the maintenance job is done, the alarm can be reset by pressing the respective "Reset" key. The countdown is reset to its initial value and starts again. For details on execution of maintenance jobs see section *7. Maintenance*.

6.5.17 Submenu "Others > Statistics"

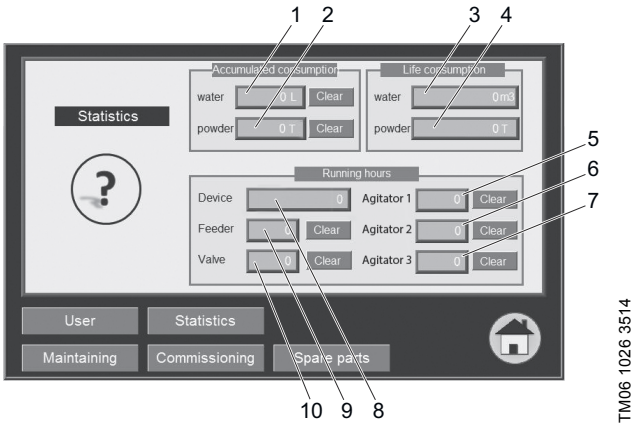

Fig. 27 Submenu "Others > Statistics"

Pos.	Description
1	Accumulated water consumption
2	Accumulated powder consumption
3	Total water consumption in lifetime of system*
4	Total powder consumption in lifetime of system*
5	Running hours of stirrer in mixing chamber
6	Running hours of stirrer in maturing chamber
7	Running hours of stirrer in storage chamber
8	Running hours of system*
9	Running hours of dry-material feeder
10	Open hours of solenoid valve

* This counter cannot be reset by the user

Resettable counters can be reset by pressing the respective [Clear] key.

Note ***Grundfos recommends to reset counters only in case of components replacement.***

6.5.18 Submenu "Others > Commissioning"

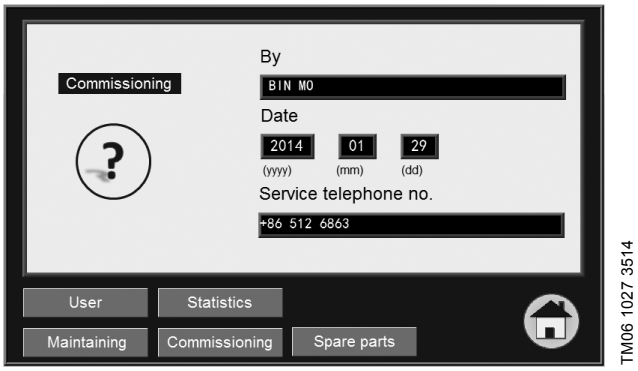

Fig. 28 Submenu "Others > Commissioning"

The data in this menu are put in by the commissioning personnel from Grundfos only. The user can find the contact information in this window.

6.5.19 Submenu "Others > Spare parts"

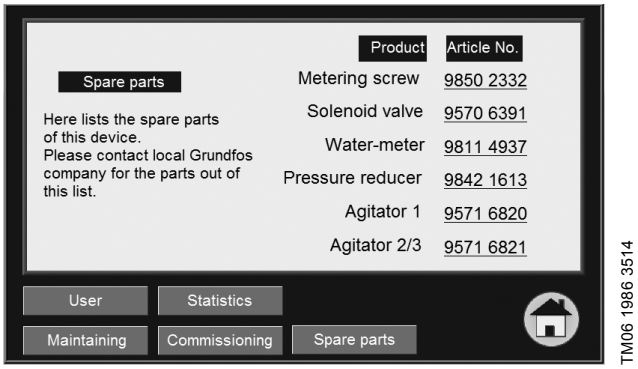

Fig. 29 Submenu "Others > Spare parts"

This menu shows the standard spare parts of the device. When some of them are necessary to re-new, the parts can be ordered by ordering the article numbers listed here to Grundfos.

7. Maintenance

Warning

Work on the control panel and on electrical devices may only be executed by authorised qualified personnel.

Before doing work on the control panel and on electrical devices, switch of the power supply! Before doing work on mechanical parts, switch off mains switch at the control panel!

Components	Cleaning and maintenance rates*
Jet-mixer	Monthly, clean it if necessary
Hopper	Monthly, clean it if necessary
Filter	Weekly, clean it if necessary
Impellers	Half-yearly, clean it if necessary
Motors	Yearly
Tank	Yearly
Flow meter	Weekly, clean it if necessary. Replacement recommended after 250KT water inlet

* Additional cleaning an maintenance in case of faults

7.1 Cleaning the injection funnel

During the control of the jet mixer is to check, that the jet mixer is filling with water. The wall of the jet mixer is clean.

1. Switch off the system.
2. Close the shut-off valve.
3. Loosen the union nut at the water connection and dismount the water connection.
4. Clean the inner tube and the outer tube.
5. Check the water connection, eliminate dirt accumulations, if necessary.
6. Remount the injection funnel and tighten it by means of the wing screws.
   – Observe correct fitting of the gasket!
7. Tighten the union nut of the water connection.
8. Switch on the system.

7.2 Cleaning or replacing the metering worm

Dosing worm is to control in the fix intervals. If the dosing worm is clotted with dry material, clean it direct in the jet mixer. If the degree of the pollution is very high, the dosing worm has to demount and to clean.

7.2.1 Disassemble the metering worm

1. Switch off the system.
2. Close the shut-off valve.
3. Unscrew the protective plate between gears and hopper.
4. Knock out the spiral pin between metering worm and gear shaft.
5. Pull out the metering worm at the outlet side.

If a metering screw with a different diameter is to be installed, the following additional steps have to be taken:

- Release the setscrew at the protective pipe.
- Pull off the protective pipe.
- Uncoil the strip heater.
- Unscrew the hexagonal screws at the outlet nozzle.
- Remove the outlet nozzle.

6. Clean the metering worm, replace it if necessary

7.2.2 Assembling the metering worm

1. Choose the corresponding outlet nozzle and protective pipe suitable for the diameter of the metering worm required.
2. Install the outlet nozzle by means of the hexagonal screws on the hopper of the dry material feeder
3. Insert the metering worm into the feeder.
4. Arrest the metering worm in the gear shaft by means of the spiral pin.
5. Install the strip heater.
6. Put on the protective pipe.
7. Fix the protective pipe with the setscrew.
8. Switch on the system.

7.3 Cleaning the drip trap

The degree of pollution of the drip trap in the pressure reduction valve can give the necessity for cleaning of this. If the drip trap is polluted to 2/3, than is it the time for the clean process.

1. Switch off the system.
2. Close the shut-off valve.
3. Unscrew the cap at the lower side of the pressure reducing valve.
4. Take out the dirt trap and clean it.
5. Remount dirt trap and cap.
6. Switch on the system.

7.4 Cleaning the tank

Spillage dry material has to remove immediately, because it will be slippery by contact with the humidity.

For avoid of the accidents the covering of the tank should be cleaned time to time.

8. Fault finding

If any faults arise during the operation of the system, they are being evaluated by the PLC and displayed on the operator terminal.

When the system is at manual mode, some operations are interlocked with relevant faults.

When the system is at auto mode, its reactions depend on the level of the faults which are grouped by 3 levels.

Faults level	System actions
1	Switch off to stop mode immediately.
2	Stop feeding new water and powder. Keep the stirrers running. Return to normal auto mode running when the faults disappear.
3	No actions

Any faults have to be removed, before the automatic operation will be started again.

Pos.	Fault	Level	Cause	Remedy
1	Agitator 1 motor failure	1	The motor protection breaker is off	Switch on the breaker
			The mains voltage is too high or not stable	Stable the mains voltage and keep it within the required ranged Switch on the breaker
			The setting of the protection currency is too small	Enlarge the protection currency. Switch on the breaker
			Motor is worn out.	Replace with a new agitator
2	Agitator 2 motor failure	1	Same as "Agitator 1 motor failure"	
3	Agitator 3 motor failure	3	Same as "Agitator 1 motor failure"	
4	Control circuit failure	1	The MCB is off	Switch on the MCB
			The mains voltage is too high or not stable	Stable the mains voltage and keep it within the required ranged Switch on the MCB
			There are shortcuts in the control circuit.	Check the cabling and 1AC components and remove the shortcuts.
5	Feeder motor failure	2	Same as "Agitator 1 motor failure"	
6	Powder used out	2	The powder in the hopper of the feeder is used out	Refill the hopper of the feeder immediately
			"Max. run time at low powder level" is too short	Set the time longer enough
7	Pre-empty alarm of powder	3	The powder in the hopper of the feeder gets lower than the level sensor	Refill the hopper of the feeder soon
			The dry material sensor is worn out	Replace with a new sensor
8	Solenoid failure	3	The solenoid can not be closed completely	Clean the solenoid valve and the filters as well. Replace with a new valve if necessary.
9	Solution overflow	2	The distance between "high level" and "overflow level" is too little	Enlarge the distance of the settings
			The liquid comes back to the tank via the withdrawing or overflow connections	Check the flow directions in the outgoing pipes.
			Wrong with the ultrasonic sensor	Check the 24VDC supply of the sensor Recalibrate the sensor if necessary
10	Solution used out	3	The withdrawing volume is more than the service water volume	Decrease the withdrawing volume and/or increase the service water volume to proper range
			Some Level 2 faults cause this fault at last	Remove the level 2 faults
			The "Empty level" is set to high	Lower the setting to proper level
			Wrong with the ultrasonic sensor	Check the 24VDC supply of the sensor Recalibrate the sensor if necessary
11	Star-wheeled valve motor failure	3	Same as "Agitator 1 motor failure"	
12	Too little service water inlet	3	The incoming water is not enough	Increase the service water Adjust the pressure reducing valve to increase the inlet water pressure
			Too much dirty at the filters	Clean the filters
			Block in the pipe	Check and remove the blocks
				Check the shut-off valve and turn it to totally open position
			"Min. water flow rate" is set too high	Lower the setting to proper level
			The flow meter is worn out	Replace a new flow meter
13	Too much service water inlet*	1	The incoming water is too much	Decrease the service water Adjust the pressure reducing valve to decrease the inlet water pressure
			Wrong setting of the powder volume	Input the right powder volume (by calibration)

* The faults can be removed only by pressing on the flash alarming symbol on the operation window.

Warning

If any other faults occur, please contact Grundfos service people in the first time.

Don't try to fix the device by self without Grundfos's approvals in written. Otherwise it excludes the liability of manufacturer for the possible damages and injuries.

9. Fieldbus communication unit

The Polydos unit can install with a communication group for the data transfer with upper machine. See section *6.5.11 Submenu "Setting > Remote control"*.

Possible Communication Interface:

- Profibus-DP
- Modbus RTU slave
- Modbus TCP/IP

The operation of the unit via communication group is possible only in distance work from control room.

9.1 Profibus-DP

A Siemens EM277 module is applied for Profibus-DP communication.

The configuration is:

- Slave address is looking on the module EM277
- I/O Offset in V-Memory: 0 (VB0)
- Configuration Module (GSD): 64 Bytes Input, 64 Bytes Output

See section *9.3 Communication addresses*.

See the relevant documents provided by Siemens for more details about EM277.

If you use the communication with non Siemens-Master, use please the GSD-file "siem089d" for the EM277. You find it under: http://www4.ad.siemens.de

9.2 Modbus

Set the communication parameters for Modbus communication and then enable it.

See section *6.5.11 Submenu "Setting > Remote control"*.

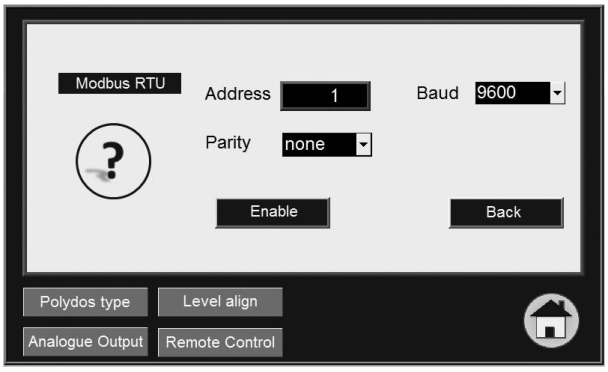

Fig. 30 Submenu Modbus settings

Address

Input the right slave address of this device for Modbus communication.

Bound

Must be the same as the setting of the upper machine

Parity

Must be the same as the setting of the upper machine

Caution ***Prior to change the settings of Modbus, it must be disabled and after the changes, it must be enabled to validate the new settings.***

See section *9.3 Communication addresses*.

9.3 Communication addresses

Local PLC address (Profibus DP)	Modbus Address Word	Modbus Address Bit	Description [unit]	Value
Upper machine -> local PLC				
VW0	40001		New concentration [x 0.01 %]	5-50
VW2	40002		New powder volume [x 0.1 kg/h]	1~9999
VW4	40003		New low filling level [%]	1~99
VW6	40004		New high filling level [%]	1~99
VW8	40005		New min. water volume [l/h]	0~32767
VW10	40006		New maturing time [minute]	0~32767
VW12	40007		New running time of stirrer I/II [minute]	0~32767
VW14	40008		New pause time of stirrer I/II [minute]	0~32767
VW16	40009		New running time of stirrer III [minute]	0~32767
VW18	40010		New pause time of stirrer III [minute]	0~32767
VW20	40011		New running time at low level [minute]	0~32767
VW22	40012		New heating time [minute]	0~32767
VW24	40013		New star-wh. valve running time [minute]	0~32767
VW26, 28, 30	40014~16		Not used	
V32.7	40017	15	Enable star-wh. valve	1
V32.6		14	Disable star-wh. valve	1
V32.5		13	Enable heating	1
V32.4		12	Disable heating	1
V32.3		11	Apply new concentration	1
V32.2		10	Apply new powder volume	1
V32.1		9	Apply new low filling level	1
V32.0		8	Apply new high filling level	1
V33.7		7	Apply new min. water volume	1
V33.6		6	Apply new stirring times	1
V33.5		5	Apply new running time at low level	1
V33.4		4	Apply new heating time	1
V33.3		3	Apply new star-wh. valve running time	1
V33.2		2	Start AUTO mode	1
V33.1		1	Stop AUTO mode	1
V33.0		0	Reset faults	1

Local PLC address (Profibus DP)	Modbus Address Word	Modbus Address Bit	Description [unit]	Value
Local PLC -> upper machine				
VW64	40033		Concentration [x 0.01 %]	5-50
VW66	40034		Powder volume [x 0.1 kg/h]	1~9999
VW68	40035		Low filling level [%]	1~99
VW70	40036		High filling level [%]	1~99
VW72	40037		Current filling level [%]	0~100
VW74	40038		Min. water volume [l/h]	0~32767
VW76	40039		Max. water volume [l/h]	0~32767
VW80	40040		Current water volume [l/h]	0~32767
VW82	40041		Maturing time [minute]	0~32767
VW84	40042		Running time of stirrer I/II [minute]	0~32767
VW86	40043		Pause time of stirrer I/II [minute]	0~32767
VW88	40044		Running time of stirrer III [minute]	0~32767
VW90	40045		Pause time of stirrer III [minute]	0~32767
VW92	40046		Running time at low level [minute]	0~32767
VW94	40047		Heating time [minute]	0~32767
VW96	40048		Star-wh. valve running time [minute]	0~32767
VW98	40049		Not used	
V101.7	40050	15	Stirrer I running	0/1
V101.6		14	Stirrer II running	0/1
V101.5		13	Stirrer III running	0/1
V101.4		12	Feeder running	0/1
V101.3		11	Solenoid valve open	0/1
V101.2		10	Heating on	0/1
V101.1		9	Star-wh. valve running	0/1
V101.0		8	Emergency stop actuated	0/1
V100.7		7	In AUTO mode	0/1
V100.6		6	In HAND mode	0/1
V100.5		5	In INIT mode	0/1
V100.4		4	In STOP mode	0/1
V100.3		3	Faults existing	0/1
V100.2		2	Heating enabled	0/1
V100.1		1	Star-wh. valve enabled	0/1
V100.0		0	Not used	
V103.7	40051	15	Stirrer I motor failure	0/1
V103.6		14	Stirrer II motor failure	0/1
V103.5		13	Stirrer III motor failure	0/1
V103.4		12	Feeder motor failure	0/1
V103.3		11	Solenoid valve failure	0/1
V103.2		10	Control circuit failure	0/1
V103.1		9	Star-wh. valve motor failure	0/1
V103.0		8	Pre-empty alarm of powder	0/1
V102.7		7	Powder used out	0/1
V102.6		6	Too much service water inlet	0/1
V102.5		5	Too little service water inlet	0/1
V102.4		4	Solution used out	0/1
V102.3		3	Overflow alarm	0/1
V102.2		2	Not used	
V102.1		1	Not used	
V102.0		0	Not used	

10. Disposal

This product or parts of it must be disposed of in an environmentally sound way. Use appropriate waste collection services. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

Argentina
Bombas GRUNDFOS de Argentina S.A.
Ruta Panamericana km. 37.500 Centro Industrial Garin
1619 - Garin Pcia. de B.A.
Phone: +54-3327 414 444
Telefax: +54-3327 411 111

Australia
GRUNDFOS Pumps Pty. Ltd.
P.O. Box 2040
Regency Park
South Australia 5942
Phone: +61-8-8461-4611
Telefax: +61-8-8340 0155

Austria
GRUNDFOS Pumpen Vertrieb Ges.m.b.H.
Grundfosstraße 2
A-5082 Grödig/Salzburg
Tel.: +43-6246-883-0
Telefax: +43-6246-883-30

Belgium
N.V. GRUNDFOS Bellux S.A.
Boomsesteenweg 81-83
B-2630 Aartselaar
Tél.: +32-3-870 7300
Télécopie: +32-3-870 7301

Belarus
Представительство ГРУНДФОС в Минске
220125, Минск
ул. Шафарнянская, 11, оф. 56
Тел.: +7 (375 17) 286 39 72, 286 39 73
Факс: +7 (375 17) 286 39 71
E-mail: minsk@grundfos.com

Bosnia/Herzegovina
GRUNDFOS Sarajevo
Trg Heroja 16,
BiH-71000 Sarajevo
Phone: +387 33 713 290
Telefax: +387 33 659 079
e-mail: grundfos@bih.net.ba

Brazil
BOMBAS GRUNDFOS DO BRASIL
Av. Humberto de Alencar Castelo Branco, 630
CEP 09850 - 300
São Bernardo do Campo - SP
Phone: +55-11 4393 5533
Telefax: +55-11 4343 5015

Bulgaria
Grundfos Bulgaria EOOD
Slatina District
Iztochna Tangenta street no. 100
BG - 1592 Sofia
Tel. +359 2 49 22 200
Fax. +359 2 49 22 201
email: bulgaria@grundfos.bg

Canada
GRUNDFOS Canada Inc.
2941 Brighton Road
Oakville, Ontario
L6H 6C9
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

China
Grundfos Alldos
Dosing & Disinfection
ALLDOS (Shanghai) Water Technology Co. Ltd.
West Unit, 1 Floor, No. 2 Building (T 4-2)
278 Jinhu Road, Jin Qiao Export Processing Zone
Pudong New Area
Shanghai, 201206
Phone: +86 21 5055 1012
Telefax: +86 21 5032 0596
E-mail: grundfosalldos-CN@grundfos.com

China
GRUNDFOS Pumps (Shanghai) Co. Ltd.
10F The Hub, No. 33 Suhong Road
Minhang District
Shanghai 201106
PRC
Phone: +86-21 6122 5222
Telefax: +86-21 6122 5333

Croatia
GRUNDFOS CROATIA d.o.o.
Cebini 37, Buzin
HR-10010 Zagreb
Phone: +385 1 6595 400
Telefax: +385 1 6595 499
www.hr.grundfos.com

Czech Republic
GRUNDFOS s.r.o.
Čapkovského 21
779 00 Olomouc
Phone: +420-585-716 111
Telefax: +420-585-716 299

Denmark
GRUNDFOS DK A/S
Martin Bachs Vej 3
DK-8850 Bjerringbro
Tlf.: +45-87 50 50 50
Telefax: +45-87 50 51 51
E-mail: info_GDK@grundfos.com
www.grundfos.com/DK

Estonia
GRUNDFOS Pumps Eesti OÜ
Peterburi tee 92G
11415 Tallinn
Tel: + 372 606 1690
Fax: + 372 606 1691

Finland
OY GRUNDFOS Pumput AB
Mestarintie 11
FIN-01730 Vantaa
Phone: +358-(0)207 889 900
Telefax: +358-(0)207 889 550

France
Pompes GRUNDFOS Distribution S.A.
Parc d'Activités de Chesnes
57, rue de Malacombe
F-38290 St. Quentin Fallavier (Lyon)
Tél.: +33-4 74 82 15 15
Télécopie: +33-4 74 94 10 51

Germany
GRUNDFOS Water Treatment GmbH
Reetzstraße 85
D-76327 Pfinztal (Söllingen)
Tel.: +49 7240 61-0
Telefax: +49 7240 61-177
E-mail: gwt@grundfos.com

Germany
GRUNDFOS GMBH
Schlüterstr. 33
40699 Erkrath
Tel.: +49-(0) 211 929 69-0
Telefax: +49-(0) 211 929 69-3799
E-mail: infoservice@grundfos.de
Service in Deutschland:
E-mail: kundendienst@grundfos.de

Greece
GRUNDFOS Hellas A.E.B.E.
20th km. Athinon-Markopoulou Av.
P.O. Box 71
GR-19002 Peania
Phone: +0030-210-66 83 400
Telefax: +0030-210-66 46 273

Hong Kong
GRUNDFOS Pumps (Hong Kong) Ltd.
Unit 1, Ground floor
Siu Wai Industrial Centre
29-33 Wing Hong Street &
68 King Lam Street, Cheung Sha Wan
Kowloon
Phone: +852-27861706 / 27861741
Telefax: +852-27858664

Hungary
GRUNDFOS Hungária Kft.
Park u. 8
H-2045 Törökbálint,
Phone: +36-23 511 110
Telefax: +36-23 511 111

India
GRUNDFOS Pumps India Private Limited
118 Old Mahabalipuram Road
Thoraipakkam
Chennai 600 097
Phone: +91-44 4596 6800

Indonesia
PT GRUNDFOS Pompa
Jl. Rawa Sumur III, Blok III / CC-1
Kawasan Industri, Pulogadung
Jakarta 13930
Phone: +62-21-460 6909
Telefax: +62-21-460 6910 / 460 6901

Ireland
GRUNDFOS (Ireland) Ltd.
Unit A, Merrywell Business Park
Ballymount Road Lower
Dublin 12
Phone: +353-1-4089 800
Telefax: +353-1-4089 830

Italy
GRUNDFOS Pompe Italia S.r.l.
Via Gran Sasso 4
I-20060 Truccazzano (Milano)
Tel.: +39-02-95838112
Telefax: +39-02-95309290 / 95838461

Japan
GRUNDFOS Pumps K.K.
Gotanda Metalion Bldg. 5F,
5-21-15, Higashi-gotanda
Shiagawa-ku, Tokyo,
141-0022 Japan
Phone: +81 35 448 1391
Telefax: +81 35 448 9619

Korea
GRUNDFOS Pumps Korea Ltd.
6th Floor, Aju Building 679-5
Yeoksam-dong, Kangnam-ku, 135-916
Seoul, Korea
Phone: +82-2-5317 600
Telefax: +82-2-5633 725

Latvia
SIA GRUNDFOS Pumps Latvia
Deglava biznesa centrs
Augusta Deglava ielā 60, LV-1035, Rīga,
Tālr.: + 371 714 9640, 7 149 641
Fakss: + 371 914 9646

Lithuania
GRUNDFOS Pumps UAB
Smolensko g. 6
LT-03201 Vilnius
Tel: + 370 52 395 430
Fax: + 370 52 395 431

Malaysia
GRUNDFOS Pumps Sdn. Bhd.
7 Jalan Peguam U1/25
Glenmarie Industrial Park
40150 Shah Alam
Selangor
Phone: +60-3-5569 2922
Telefax: +60-3-5569 2866

Mexico
Bombas GRUNDFOS de México S.A. de C.V.
Boulevard TLC No. 15
Parque Industrial Stiva Aeropuerto
Apodaca, N.L. 66600
Phone: +52-81-8144 4000
Telefax: +52-81-8144 4010

Netherlands
GRUNDFOS Netherlands
Veluwezoom 35
1326 AE Almere
Postbus 22015
1302 CA ALMERE
Tel.: +31-88-478 6336
Telefax: +31-88-478 6332
E-mail: info_gnl@grundfos.com

New Zealand
GRUNDFOS Pumps NZ Ltd.
17 Beatrice Tinsley Crescent
North Harbour Industrial Estate
Albany, Auckland
Phone: +64-9-415 3240
Telefax: +64-9-415 3250

Norway
GRUNDFOS Pumper A/S
Strømsveien 344
Postboks 235, Leirdal
N-1011 Oslo
Tlf.: +47-22 90 47 00
Telefax: +47-22 32 21 50

Poland
GRUNDFOS Pompy Sp. z o.o.
ul. Klonowa 23
Baranowo k. Poznania
PL-62-081 Przeźmierowo
Tel: (+48-61) 650 13 00
Fax: (+48-61) 650 13 50

Portugal
Bombas GRUNDFOS Portugal, S.A.
Rua Calvet de Magalhães, 241
Apartado 1079
P-2770-153 Paço de Arcos
Tel.: +351-21-440 76 00
Telefax: +351-21-440 76 90

Romania
GRUNDFOS Pompe România SRL
Bd. Biruintei, nr 103
Pantelimon county Ilfov
Phone: +40 21 200 4100
Telefax: +40 21 200 4101
E-mail: romania@grundfos.ro

Russia
ООО Грундфос
Россия, 109544 Москва, ул. Школьная 39
Тел. (+7) 495 737 30 00, 564 88 00
Факс (+7) 495 737 75 36, 564 88 11
E-mail grundfos.moscow@grundfos.com

Serbia
GRUNDFOS Predstavništvo Beograd
Dr. Milutina Ivkovića 2a/29
YU-11000 Beograd
Phone: +381 11 26 47 877 / 11 26 47 496
Telefax: +381 11 26 48 340

Singapore
GRUNDFOS (Singapore) Pte. Ltd.
25 Jalan Tukang
Singapore 619264
Phone: +65-6681 9688
Telefax: +65-6681 9689

Slovakia
GRUNDFOS s.r.o.
Prievozská 4D
821 09 BRATISLAVA
Phona: +421 2 5020 1426
sk.grundfos.com

Slovenia
GRUNDFOS d.o.o.
Šlandrova 8b, SI-1231 Ljubljana-Črnuče
Phone: +386 1 568 0610
Telefax: +386 1 568 0619
E-mail: slovenia@grundfos.si

South Africa
Grundfos (PTY) Ltd.
Corner Mountjoy and George Allen Roads
Wilbart Ext. 2
Bedfordview 2008
Phone: (+27) 11 579 4800
Fax: (+27) 11 455 6066
E-mail: lsmart@grundfos.com

Spain
Bombas GRUNDFOS España S.A.
Camino de la Fuentecilla, s/n
E-28110 Algete (Madrid)
Tel.: +34-91-848 8800
Telefax: +34-91-628 0465

Sweden
GRUNDFOS AB
(Box 333) Lunnagårdsgatan 6
431 24 Mölndal
Tel.: +46 31 332 23 000
Telefax: +46 31-331 94 60

Switzerland
GRUNDFOS ALLDOS International AG
Schönmattstraße 4
CH-4153 Reinach
Tel.: +41-61-717 5555
Telefax: +41-61-717 5500
E-mail: grundfosalldos-CH@grundfos.com

Switzerland
GRUNDFOS Pumpen AG
Bruggacherstrasse 10
CH-8117 Fällanden/ZH
Tel.: +41-44-806 8111
Telefax: +41-44-806 8115

Taiwan
GRUNDFOS Pumps (Taiwan) Ltd.
7 Floor, 219 Min-Chuan Road
Taichung, Taiwan, R.O.C.
Phone: +886-4-2305 0868
Telefax: +886-4-2305 0878

Thailand
GRUNDFOS (Thailand) Ltd.
92 Chaloem Phrakiat Rama 9 Road,
Dokmai, Pravej, Bangkok 10250
Phone: +66-2-725 8999
Telefax: +66-2-725 8998

Turkey
GRUNDFOS POMPA San. ve Tic. Ltd. Sti.
Gebze Organize Sanayi Bölgesi
Ihsan dede Caddesi,
2. yol 200. Sokak No. 204
41490 Gebze/ Kocaeli
Phone: +90 - 262-679 7979
Telefax: +90 - 262-679 7905
E-mail: satis@grundfos.com

Ukraine
Бізнес Центр Європа
Столичне шосе, 103
м. Київ, 03131, Україна
Телефон: (+38 044) 237 04 00
Факс.: (+38 044) 237 04 01
E-mail: ukraine@grundfos.com

United Arab Emirates
GRUNDFOS Gulf Distribution
P.O. Box 16768
Jebel Ali Free Zone
Dubai
Phone: +971-4- 8815 166
Telefax: +971-4-8815 136

United Kingdom
GRUNDFOS Pumps Ltd.
Grovebury Road
Leighton Buzzard/Beds. LU7 4TL
Phone: +44-1525-850000
Telefax: +44-1525-850011

U.S.A.
GRUNDFOS Pumps Corporation
17100 West 118th Terrace
Olathe, Kansas 66061
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

Uzbekistan
Grundfos Tashkent, Uzbekistan The Representative Office of Grundfos Kazakhstan in Uzbekistan
38a, Oybek street, Tashkent
Телефон: (+998) 71 150 3290 / 71 150 3291
Факс: (+998) 71 150 3292

Addresses revised 10.03.2015

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