### Operating Instruction Manual Dry Feeder Equipment Ultromat<sup>®</sup> TD 18.20/30.20/38.20

With Three Phase Drive



**ProMinent**<sup>®</sup>



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#### **1** Application Area

The Dry Dosing Unit Ultromat<sup>®</sup> TD is a helix-dosing mechanism for the continual dosage of dry-flowing polyelectrolytes and is one of the components in the ProMinent Ultromat<sup>®</sup> plants: models AT, ATF, ATD and ATP. Using its extremely sensitive control system with speed controller, the device can be set to deliver dosages proportional to quantity.

#### 2 Description



Diagram 1: Ultromat® TD Dry Dosing Unit

### 2.1 Construction - Method of Operation

The basic Dry Dosing Unit consists of the following parts:

	Part	Material
а	base plate	PP
b	Feed trough	PP
С	dry materials hopper	PP
d	drive unit	
е	conveyor unit	stainless steel
f	conveyor helix	stainless steel
g	breaker wheel	stainless steel
h	Feeder screw pipe	stainless steel
lj	cover	PP
k	protective grid	
I	back-flow stop	
m	Feeder screw pipe heater	
n	level sensor	
0	fixing screws	

Feed trough and drive mechanism are fixed firmly together by flanges and spacer bolts. The three phase motor used operates the conveyor helix (f) via a step-down gear system which rotates at the base of the trough. This in turn drives an breaker wheel (g) located inside the hopper. This prevents build-up of the dosing powder in the hopper. The material is then conveyed through the feeder screw pipe (h). A protective grid (k) in the hopper prevents the rotating conveyor helix from coming into direct contact with dosing materials. The cap (i) serves as a cover for the hopper. The back-flow stop (l) prevents dosing powders from re-entering the mechanism when the helix stops rotating. If moisture manages to enter the feeder screw pipe, despite the magnetic sealing flap, then build-up of the dosing powder is likely to occur. The feeder screw pipe heater (m) is attached to the feeder screw pipe and provides heat to the dosing powders within the pipe. This will remove any traces of moisture. The level sensor (n) signals advance warning of low dosing powder levels, and indicates that it is necessary to refill the hopper. The sensor is attached to the side of the hopper.

#### 2.2 Dimensions - Choosing the Right Conveyor Unit

The basic units are all the same size, while the conveyor units come in three different sizes. These may be easily interchanged. The sizes available are 18, 30 and 38 (inner diameter of feeder screw pipe). Each conveyor unit includes appropriate conveyor helix and feeder screw pipe, and to complete the package, the corresponding agitating helix.

#### Capacity data:

Note

Ultromat	AT/ATF 400	AT/ATF 1000	AT/ATF 2000	AT/ATF 4000	AT/ATF 8000
Dry Feeder	TD 18.20	TD 18.20	TD 30.20	TD 30.20	TD 38.20
Dosing range	0.8-18.3 kg/h	0.8-18.3 kg/h	0.8-18.3 kg/h	3.6-82.8 kg/h	7.1-167.2 kg/h

The dosing capacities given here can be varied in relation to the data provided with the actual dosing powders used.

The corresponding performance curves are given in the performance diagrams in sections 8.2, diagrams 4-6.

The performance data is based on readings and standard values for polyelectrolyte powder in test-conditions which may vary, particularly in humidity and ambient temperature conditions. For this reason it is necessary that users calibrate equipment on site (see section 5.2). A powder density of 0.62 kg/l is used to calculate the dosing capacity of kg/l in l/h (m=0.62 x V).

The choice of conveyor unit depends primarily on the required dosing capacity, but also depends on the nature of the materials which are to be used.

#### **3** Accessories

The following additional components are also available for the Dry Feeder:

#### 3.1 Hopper Adapter 50 I, 75 I or 100 I

The hopper adapter increases the container size of the hopper (Capacity of Dry Feeder Unit: approx. 20 I) Three hopper adapters are available with additional container capacities of 50, 75 and 100 litres. The 100 litre adapter is equipped with a hopper aid. The dimensions are given in section 8, diagram 10.

# 3.2 50 I Hopper Adapter with Adapter Cover for a Small conveyor unit

To operate a small conveyor unit (e.g. KFG 205.12) a 50 l hopper adapter fitted with adapter cover is available (see section 8.8: illustration 12). The small conveyor unit can be screwed onto the adapter cover with the aid of an attachment set (3 tensioning clips with screws).

#### 3.3 Cap for Dry Feeder with Circumference Seal

To improve damp-resistance a cap with a circumference seal is available for the Dry Dosing Unit.

### 4 Assembly/Installation

#### 4.1 Guidelines for Installation

The device is located on the working side of the Ultromat plants and is surrounded by a protective screen. The installation of Ultromat plants with integrated Dry Feeder must take place in dry conditions. The ambient air temperature must not exceed 40  $^{\circ}$ C.

### 4.2 Connecting to Power

The Dry Feeder is supplied wired and ready to connect to all Ultromat® plants.

#### 5 Commissioning

#### Danger Warning



When device is running, never remove the hopper and reach into the base of the feed trough - there is a danger that fingers can become trapped in the conveyor helix mechanism!

Once the installation of the Ultromat plant is complete, all Dry Feeder functions must be tested before using the unit with dosing powder.

#### 5.1 Test Run

## Warning Some grinding of the conveyor helix in the feeder screw pipe, and other related grinding noise is unavoidable. It does not, however, affect the running of the device.

When the test run is being carried out, particular attention must be paid to the following points:

- ¥ Check that the motor is rotating in the correct direction (if necessary, inspect terminal connections)
- ¥ Check that the back-flow flap is functioning correctly (when motor is not running, flap should be closed)
- ¥ The switch function on the level sensor is working correctly (to test this, it is in fact necessary to fill the feeder funnel with dosing powder, see 5.3)

#### 5.2 Calibration of Dry Feeder Unit

For each conveyor unit, individual calibration is required. In addition, each time the dosing powder is changed, the calibration must be repeated. To carry out calibration an appropriate collecting vessel is required for the dosing powder, and precise scales (with tare function if possible). The following procedure is recommended:

- ¥ Disconnect wetting unit.
- ¥ Place scales with collecting vessel underneath the feeder screw pipe.
- ¥ Weigh the vessel and/or compensate for the weight using tare-function.
- ¥ If this has not already been done, fill the hopper with pre-prepared dosing powder.
- ¥ Call up the calibration menu on the control unit and use the T key to start calibration operation. The Dry Dosing Unit will now be running at 100% capacity.
- ¥ After approximately 3 minutes activate the T key on the control unit again to stop the Dry Feeder. The time period is shown in the control unit display.
- ¥ The net weight of the dry goods released in this period is calculated and the value fed into the control unit. The control unit calculates the dosing capacity in grams per minute.
- ¥ The calibration of the Dry Feeder is now complete. Before returning to the main menu, the solution concentration should be set.
- ¥ Reconnect wetting unit.



Dosing powder which has spilled onto the floor, when combined with moisture, can lead to slippery surfaces (e.g. when using polyelectrolytes). The whole of the surrounding floor area should therefore be cleaned.

### 5.3 Setting Up Level Sensor

The operating threshold sensitivity of the level sensor in relation to different dosing agents must be determined: At the start of this process the device should have been run until empty.

- ¥ Empty Dry Feeder completely.
- ¥ Firstly turn the adjusting screw for the level sensor operating threshold sensitivity to the left (lowers the operating threshold sensitivity) until the LED goes out. Then turn carefully to the right (increases operating threshold sensitivity) until the LED lights up again. The level sensor is now set for the dosing agent. The adjusting screw should be turned a further 180° to the right, to compensate for tolerances.
- ¥ After threshold sensitivity setting, switch functions must be inspected while the device is running. If a fault occurs during operation, the operating threshold sensitivity adjustment must be repeated.

The level sensor is now correctly adjusted and ready to operate.

#### 6 Working on Dry Feeder - Servicing

**Danger warning** 



While servicing tasks are being carried out device must be disconnected from mains power and unable to be activated by unauthorised personnel.

#### 6.1 Dismantling the Dosing Assembly

- ¥ Before dismantling the dosing helix the device should have been run until empty.
- ¥ The cover must be completely removed.
- ¥ The back-flow stop should be removed by unscrewing both screws (3) from the feeder screw pipe flange. Make sure the cable is not damaged while removing the back-flow stop.
- ¥ Unscrew the four flange screws (2) and draw the feeder screw pipe horizontally forwards. The heater must not be detached at this time, and the cable must once again be handled carefully.
- ¥ For devices with built-in breaker wheel it is not necessary to remove the hopper as well. Firstly the eight fixing screws on the hopper must be loosened. Then the hopper is lifted upwards, along with the breaker wheel, off the conveyor feed trough.
- ¥ The dosing helix is now freely accessible and, after taking out the cotter-pin (1), can be removed by drawing it forwards, out of the drive shaft and feed trough.



Diagram 2: Dismantling Dosing Assembly

#### 6.2 Assembling the Dosing Assembly

To assemble the dosing device, follow the previous procedure in precisely the reverse order. Make sure that there is no powder left in the base of the feed trough, as it will be forced back when the dosing helix is inserted, and can block up the drive shaft bearing. In addition, take particular care when assembling, that the O ring (4) is actually sitting on the dosing helix drive shaft.

After assembly, the sealing flap on the feeder screw pipe should be set up. Take care here, that the largest possible aperture is set, but that the two guide plates on the sealing flap are still resting on the feeder screw pipe (approx. 2 mm).

When the aperture set is too small the feeder screw pipe becomes blocked by build up of powder, which affects the precision of the dosing, or else the dosing helix will become damaged.

#### 6.3 Servicing

The drive mechanism for the Dry Feeder is maintenance-free as a general rule, as the gearing is supplied with lubrication which will last its lifetime. Precise tasks and guidelines for possible servicing of the motor may be found in the accompanying manufacturer's instructions. If correctly operated, the only perishable parts which require attention are the packing rings on the drive shaft seals.



- ¥ First take apart dosing helix and hollow drive shaft by removing cotter-pin (1).
- ¥ Now remove tensioning nut (2), to release packing rings from tension.
- ¥ By removing the four (flange) screws (3), remove the entire drive unit and, along with drive shaft, draw horizontally backwards out of the felt packing.

Note

The area of the drive shaft (4) which makes contact with the felt rings as it slides in, should be inspected for deposits. The shaft must be clean and smooth in this area.

- ¥ Now remove the tensioning nut (2) and the thrust collar (5).
- ¥ Next, the feeder funnel must be unscrewed and lifted off, along with the breaker wheel.
- ¥ The sealing flap on the back-flow flap should be unscrewed and removed. (do not, however, detach mounting and magnet!).
- ¥ The detached dosing helix can now be pushed forward into the feed trough base and feeder screw pipe until the packing rings are freely accessible.
- ¥ The old packing rings (6) can now be removed and replaced with new ones.

6.3.2 Installation of new packing rings

Once packing rings are in place, assembly can take place following the procedure described in **section 6.3.1** in reverse order. However, the hopper with breaker wheel must be replaced last. This makes it easier to connect the dosing helix and the drive shaft, as it is possible to rotate the dosing helix at the last possible moment, to locate it correctly. To insert the packing rings, the tensioning nuts should only be tightened slightly. If packing rings are too tight this can occasionally lead to problems during operation due to the heat produced by the increased friction. This can cause the Polyelectrolyte-powder to melt, or excessive wear on the packing rings. After the device has been in operation for one week the pressure on the packing rings should be inspected and if necessary, reduced slightly.

#### 7 Problem-Solving Measures



When carrying out problem-solving measures which require modifications to the feeder assembly, the unit should be disconnected from the mains at all times.

### 7.1 Build-up or Clogging in Hopper

- ¥ Inspect dosing agent for moisture and dry out if necessary.
- ¥ Fit an extra eccentric motor.

#### 7.2 Level Sensor Does Not Trigger

- ¥ Due to build-up of powder over the sensor. Remedy: Screw the sensor further out of the hopper interior. If necessary carry out measures to counteract build-up.
- ¥ Due to a fault in the sensor itself. Remedy: Inspect sensor connections, then, if necessary, reset operating threshold sensitivity.

#### 7.3 Caking on Dosing Helix and in Feed Screw Pipe

- ¥ Check that heater is operating correctly.
- ¥ Check setting parameters for heater (heater-on and heater-off times).
- ¥ Prevent moisture from entering unit by selecting a dry location (see Guidelines for Installation section 4).
- ¥ In damp rooms subject to condensation fit protective screen with ventilation slits.

#### 7.4 Heater Not Functioning Correctly

- ¥ Check electrical connections.
- ¥ Check settings parameters for heater. The temperature on the heater covering should not exceed 35°.

#### Danger Warning

To avoid burns from the feeder screw pipe heater, make sure that the heater covering is kept hand-hot, (approx. 35  $^\circ$ C).



#### 7.5 Nothing Appears From Feeder screw Pipe When Motor is Running

- ¥ Check that the dosing powder levels are not too low and refill if necessary.
- ¥ Is material to be conveyed prevented from dropping down into the conveyor system due to build-up in hopper? Carry out measures to avoid build-up.
- ¥ Check direction of rotation of conveyor helix and motor.

#### 7.6 Drive Becomes Clogged Up During Heavy load

- ¥ Dismount breaker wheel to remove stress on conveyor helix/drive.
- ¥ Check packing rings and pressure of tensioning nuts.

#### 7.7 Uneven Delivery of Dosing Powder

- ¥ Is there occasional build-up occurring? Carry out measures to avoid build-up.
- ¥ If the dosing powder is becoming clogged up between the dosing helix and the feeder screw pipe, the existing helix should be combined with the next size up of pipe. (More play, **see section 2.2).** Beforehand, however, be sure to contact ProMinent customer service.

#### 7.8 Motor Does Not Run, Even When Connected to Mains

- ¥ Is the conveyor unit and/or the drive blocked? (see 7.6 and 7.7)
- ¥ Check overload safety cut-out on motor and if necessary, reset safety cut-out button.

#### 8 Technical Data

#### 8.1 Feeder Data

Base plate, conveyor trough and hopper on the feeder are made from polypropylene. The dosing unit and the agitating helix are made entirely from stainless steel. The dimensions are given in **diagrams 9** and 10.

Device Model	TD 18.20	TD 30.20	TD 38.20
helix turning speed with 50/100 Hz drive feed rate at 50 Hz (160 rpm) feed rate at 100Hz (320 rpm) feed rate at 5 Hz (16 rpm) hopper capacity operational noise level	160/320 rpm 9.15 kg/h 18.3 kg/h 0.8 kg/h 20 l <70 dB(A)	160/320 rpm 41.4 kg/h 82.8 kg/h 3.6 kg/h 20 l <70 dB(A)	160/320 rpm 83.6 kg/h 167.2 kg/h1- 7.1 kg/h 20 l <70 dB(A)

The dosing capacities given above can be adjusted in line with the data provided with the dosing powder being used.

### 8.2 Motor Data

Motor model:	4-pole standard three phase electric motor SG63/4B
Capacity:	0.18 kW
Voltage:	230/400 V
Rated Current:	1.04/0.6 A
Protective system:	IP 54
Construction:	B3
Isolation material class	F
Gear ratio:	1 : 9.5
Drive shaft turning speed at 50 Hz:	160 rpm

#### 8.3 Performance Diagrams

Readings were taken using a Polyelectrolyte powder. The performance values given therefore, should be considered as guidelines, dependant as much upon the nature and dry weight of the materials metered, as on the prevailing humidity conditions, ambient temperature etc.





Diagram 5: Performance Diagram for Conveyor Unit Size 30

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Diagram 6: Performance Diagram for Conveyor Unit Size 38

#### 8.4 Replacement Parts

8.4.1 Dry Feeder: Conveyor Unit Replacement Parts

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Conveyor L	Init Pack for	TD 18.20 Part No. 791738, consisting of:	
Pos.	No.	Replacement Part	Part Number
1	1	sealing cap, size 18	791768
2	1	magnet holder 99x66x18.5	791758
3	1	feeder screw pack, size 18	791744
4	1	agitating helix, size 18	791747
5	1	feeder screw pipe with flange, size 18	791741
6	2	bolts M6x12	791795
7	4	screws M4x6	468065
8	1	heater cover-Ultromat TD 18.20	204251
9	1	one-way solenoid	403625
10	1	flat packing 22x25x1	791803

#### Conveyor Unit Pack for TD 30.20 Part No. 791739, consisting of: Replacement Part Part Number Pos. No. sealing cap, size 30 791769 1 1 791758 2 magnet holder 99x66x18.5 1 3 dosing helix pack, size 30 791745 1 4 1 agitating helix, size 30 791748 5 1 feeder screw pipe with flange, size 30 791742 6 2 bolts M6x12 791795 468065 7 4 screws M4x6 heater cover-Ultromat TD 30.20 204252 8 1 403625 9 1 one-way solenoid 10 flat packing 34x34x1 791805 1

onveyor u	THIL FACK IOF	1D 56.20 Part No. 791740, consisting of.	
Pos.	No.	Replacement Part	Part Number
1	1	sealing cap, size 38	791770
2	1	magnet holder 99x66x18.5	791758
3	1	dosing helix pack, size 38	791746
4	1	agitating helix, size 38	791749
5	1	feeder screw pipe with flange, size 38	791743
6	2	bolts M6x12	791795
7	4	screws M4x6	468065
8	1	heater cover-Ultromat TD 38.20	204253
9	1	one-way solenoid	403625
10	1	flat packing 42x47x1	791804





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pos.	number off	replacement part	part number
11	1	O-ring 20 - 2.5	481020
12	1	mounting flange d120x31	791754
13	3	packing ring d47/35x6	791785
14	1	thrust collar d47/37x14	791774
15	1	tensioning nut d68x16	791773
16	1	drive shaft d35x90	791760
17	3	spacing bolts d15x69	791755
18	1	motor flange d120x12	791756
19	1	drive unit 0.18 kW, N2=100 rpm	741213
20	1	electrical screws M6x16	468083
21	4	electrical screws M6x25	468021
22	4	screws M6x 20	791791
23	6	screws M6x10	791790
24	2	set screw M5x8	467468
25	6	screws M6x30	791792
26	6	plain washer 6.4	462219
27	6	screws M6x30	791792
28	6	plain washer 6.4	462219
29	4	screws M6x25	468021
30	1	capacitive proximity switch	710253





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