SMART Digital S - DDE

up to 15 l/h

Installation and operating instructions

Further languages

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Original installation and operating instructions

CONTENTS

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

These installation and operating instructions contain general instructions that must be observed during installation, operation and maintenance of the pump. 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.

1.1 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.

1.2 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.

Risks of not observing the safety instructions

Non-observance of the safety instructions may have dangerous consequences for the personnel, the environment and the pump and may result in the loss of any claims for damages.

It may lead to the following hazards:

- Personal injury from exposure to electrical, mechanical and chemical influences.
- Damage to the environment and personal injury from leakage of harmful substances.

1.3 Safety instructions for the operator/user

The safety instructions described in these instructions, existing national regulations on health protection, environmental protection and for accident prevention and any internal working, operating and safety regulations of the operator must be observed.

Information attached to the pump must be observed.

Leakages of dangerous substances must be disposed of in a way that is not harmful to the personnel or the environment.

Damage caused by electrical energy must be prevented, see the regulations of the local electricity supply company.

Caution Before starting work on the pump, the pump must be disconnected from the power supply. The system must be pressureless!

Note The mains plug is the separator separating the pump from the mains.

Only original accessories and original spare parts should be used. Using other parts can result in exemption from liability for any resulting consequences.

1.4 Safety of the system in the event of a failure in the dosing pump

The dosing pump was designed according to the latest technologies and is carefully manufactured and tested.

If it fails regardless of this, the safety of the overall system must be ensured. Use the relevant monitoring and control functions for this.

Caution Make sure that any chemicals that are released from the pump or any damaged lines do not cause damage to system parts and buildings.

The installation of leak monitoring solutions and drip trays is recommended.

1.5 Dosing chemicals

Warning

Before switching the supply voltage back on, the dosing lines must be connected in such a way that any chemicals in the dosing head cannot spray out and put people at risk.

The dosing medium is pressurised and can be harmful to health and the environment.

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 A deaeration hose, which is routed into a container, e.g. a drip tray, must be connected to the deaeration valve.

Caution The dosing medium must be in liquid aggregate state!

Observe the freezing and boiling points of the dosing medium!

The resistance of the parts that come into contact with the dosing medium, such as the dosing head, valve ball, gaskets and lines, depends on the medium, media temperature and operating pressure.

Caution Ensure that parts in contact with the dosing medium are resistant to the dosing medium under operating conditions, see data booklet!

Should you have any questions regarding the material resistance and suitability of the pump for specific dosing media, please contact Grundfos.

1.6 Diaphragm breakage

If the diaphragm leaks or is broken, dosing liquid escapes from the drain opening (fig. 10, pos. 11) on the dosing head. Observe section *7.4 Diaphragm breakage*.

Warning

Danger of explosion, if dosing liquid has entered the pump housing!

Operation with damaged diaphragm can lead to dosing liquid entering the pump housing.

In case of diaphragm breakage, immediately separate the pump from the power supply!

Make sure the pump cannot be put back into operation by accident!

Dismantle the dosing head without connecting the pump to the power supply and make sure no dosing liquid has entered the pump housing. Proceed as described in section *7.4.1 Dismantling in case of diaphragm breakage*.

To avoid any danger resulting from diaphragm breakage, observe the following:

- Perform regular maintenance. See section *7.1 Regular maintenance*.
- Never operate the pump with blocked or soiled drain opening.
  - If the drain opening is blocked or soiled, proceed as described in section *7.4.1 Dismantling in case of diaphragm breakage*.
- Never attach a hose to the drain opening. If a hose is attached to the drain opening, it is impossible to recognise escaping dosing liquid.
- Take suitable precautions to prevent harm to health and damage to property from escaping dosing liquid.
- Never operate the pump with damaged or loose dosing head screws.

2. General information

The DDE dosing pump is a self-priming diaphragm pump. It consists of a housing with stepper motor and electronics and a dosing head with diaphragm and valves.

Excellent dosing features of the pump:

- Optimal intake even with degassing media, as the pump always works at full suction stroke volume.
- Continuous dosing, as the medium is sucked up with a short suction stroke, regardless of the current dosing flow, and dosed with the longest possible dosing stroke.

2.1 Applications

The pump is suitable for liquid, non-abrasive, non-flammable and non-combustible media strictly in accordance with the instructions in these installation and operating instructions.

Areas of application

- Drinking water treatment
- Wastewater treatment
- Swimming pool water treatment
- Boiler water treatment
- CIP (Clean-In-Place)
- Cooling water treatment
- Process water treatment
- Wash plants
- Chemical industry
- Ultrafiltration processes and reverse osmosis
- Irrigation
- Paper and pulp industry
- Food and beverage industries.

2.2 Improper operating methods

The operational safety of the pump is only guaranteed if it is used in accordance with section *2.1 Applications*.

Warning

Other applications or the operation of pumps in ambient and operating conditions, which are not approved, are considered improper and are not permitted. Grundfos cannot be held liable for any damage resulting from incorrect use.

Warning

The pump is NOT approved for operation in potentially explosive areas!

Warning

A sunscreen is required for outdoor installation!

2.3 Symbols on the pump

Symbol	Description
	Indication of universally dangerous spot.
	In case of emergency and prior to all maintenance work and repairs, take the mains plug out of the mains supply!
	The device complies with electrical safety class II.
	Connection for deaeration hose at dosing head. If the deaeration hose is not correctly connected, danger will arise due to possible leakage of dosing liquid!

2.4 Nameplate

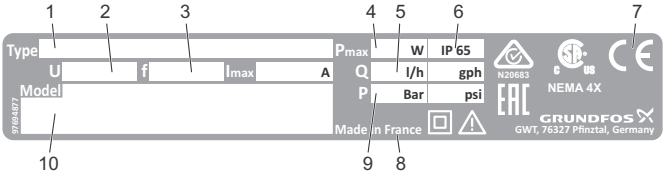

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Fig. 1 Nameplate

Pos.	Description	Pos.	Description
1	Type designation	6	Enclosure class
2	Voltage	7	Mark of approval, CE mark, etc.
3	Frequency	8	Country of origin
4	Power consumption	9	Max. operating pressure
5	Max. dosing flow	10	Model

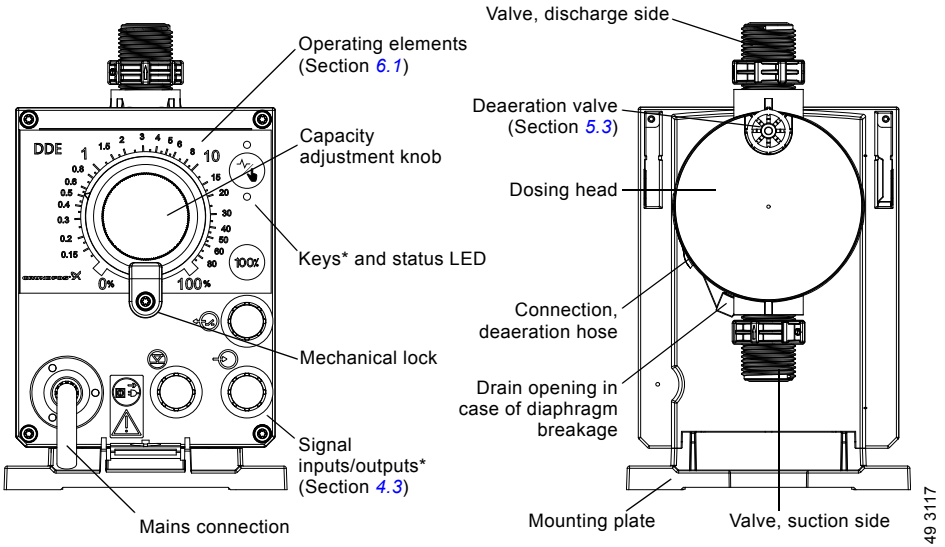
2.5 Type key

The type key is used to identify the precise pump and is not used for configuration purposes.

Code	Example	DDE	6-	10	P-	PP/	V/	C-	X-	3	1	U2U2	F	G
	Pump type													
	Max. flow [l/h]													
	Max. pressure [bar]													
	Control variant													
B	Basic													
P	B with pulse mode													
PR	P with relay output													
	Dosing head material													
PP	Polypropylene													
PVC	PVC (polyvinyl chloride, only up to 10 bar)													
PV	PVDF (polyvinylidene fluoride)													
SS	Stainless steel DIN 1.4401													
	Gasket material													
E	EPDM													
V	FKM													
T	PTFE													
	Valve ball material													
C	Ceramic													
SS	Stainless steel DIN 1.4401													
	Control cube position													
X	No control cube													
	Voltage													
3	1 x 100-240 V, 50/60 Hz													
	Valve type													
1	Standard													
2	Spring-loaded (HV version)													
	Suction/discharge side connection													
U2U2	Hose, 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm													
U7U7	Hose 0.17" x 1/4"; 1/4" x 3/8"; 3/8" x 1/2"													
AA	Threaded Rp 1/4", female (stainless steel)													
VV	Threaded 1/4" NPT, female (stainless steel)													
XX	No connection													
	Installation set*													
I001	Hose, 4/6 mm (up to 7.5 l/h, 13 bar)													
I002	Hose, 9/12 mm (up to 60 l/h, 9 bar)													
I003	Hose, 0.17" x 1/4" (up to 7.5 l/h, 13 bar)													
I004	Hose, 3/8" x 1/2" (up to 60 l/h, 10 bar)													
	Mains plug													
F	EU													
B	USA, Canada													
G	UK													
I	Australia, New Zealand, Taiwan													
E	Switzerland													
J	Japan													
L	Argentina													
	Design													
G	Grundfos													

* Including: 2 pump connections, foot valve, injection unit, 6 m PE discharge hose, 2 m PVC suction hose, 2 m PVC deaeration hose (4/6 mm).

2.6 Product overview



* only control variant DDE-PR/P

Fig. 2 Overview

3. Technical data / Dimensions

3.1 Technical data

Data			6-10	15-4
Mechanical data	Turn-down ratio (setting range)	[1:X]	1000	1000
	Max. dosing capacity	[l/h]	6.0	15.0
		[gph]	1.5	4.0
	Min. dosing capacity	[l/h]	0.006	0.015
		[gph]	0.0015	0.0040
	Max. operating pressure	[bar]	10	4
		[psi]	150	60
	Max. stroke frequency	[strokes/min]	140	180
	Stroke volume	[ml]	0.81	1.58
	Accuracy of repeatability	[%]	± 5	
	Max. suction lift during operation[1)]	[m]	6	
	Max. suction lift when priming with wet valves[1)]	[m]	2	3
	Min. pressure difference between suction and discharge side	[bar]	1	

Data			6-10	15-4
Mechanical data	Max. inlet pressure, suction side	[bar]	2	
	Max. viscosity with spring-loaded valves[2)]	[mPas] (= cP)	600	500
	Max. viscosity without spring-loaded valves[2)]	[mPas] (= cP)	50	
	Min. internal hose/pipe diameter suction/discharge side[1), 3)]	[mm]	4	6
	Min. internal hose/pipe diameter suction/discharge side (high viscosity)[3)]	[mm]	9	
	Min./Max. liquid temperature	[°C]	-10/45	
	Min./Max. ambient temperature	[°C]	0/45	
	Min./Max. storage temperature	[°C]	-20/70	
	Max. relative humidity (non-condensing)	[%]	96	
	Max. altitude above sea level	[m]	2000	
Electrical data	Voltage	[V]	100-240 V, - 10 %/+ 10 %, 50/60 Hz	
	Length of mains cable	[m]	1.5	
	Max. inrush current for 2 ms (100 V)	[A]	8	
	Max. inrush current for 2 ms (230 V)	[A]	25	
	Max. power consumption P_1	[W]	19	
	Enclosure class		IP65, Nema 4X	
	Electrical safety class		II	
	Pollution degree		2	
Signal input	Max. load for level input		12 V, 5 mA	
	Max. load for pulse input		12 V, 5 mA	
	Max. load for external stop input		12 V, 5 mA	
	Min. pulse length	[ms]	5	
	Max. pulse frequency	[Hz]	100	
	Max. resistance in level/pulse circuit	[Ω]	1000	
Signal output	Max. ohmic load on relay output	[A]	0.5	
	Max. voltage on relay output	[V]	30 VDC/30 VAC	
Weight/size	Weight (PVC, PP, PVDF)	[kg]	2.4	
	Weight (stainless steel)	[kg]	3.2	
	Diaphragm diameter	[mm]	44	50
Sound pressure	Max. sound pressure level	[dB(A)]	60	
Approvals		CE, CB, CSA-US, NSF61, EAC, ACS, RCM		

1) Data is based on measurements with water

2) Maximum suction lift: 1 m, dosing capacity reduced (approx. 30 %)

3) Length of suction line: 1.5 m, length of discharge line: 10 m (at max. viscosity)

3.2 Dimensions

The indicated dimensions are the same for all control variants of the DDE range.
The following drawing shows the DDE-PR control variant.

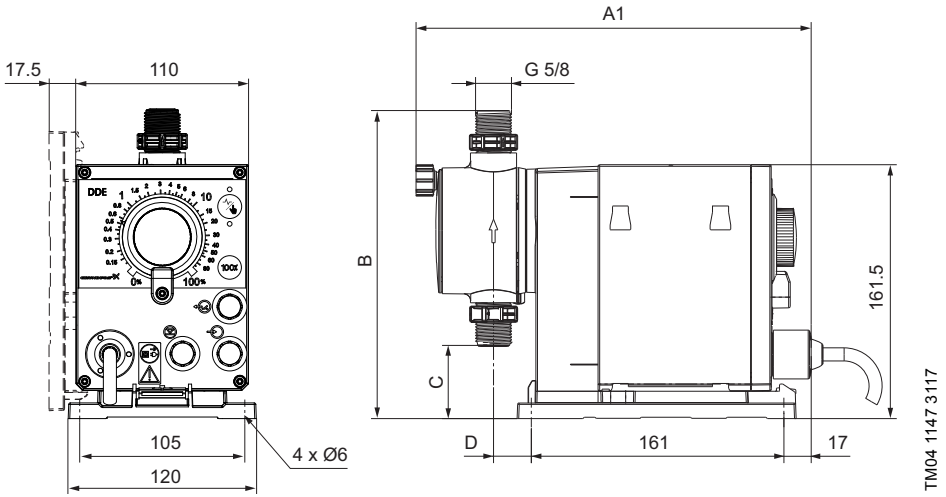


Fig. 3 Dimensional sketch

Pump type	A1 [mm]	B [mm]	C [mm]	D [mm]
DDE 6-10	251	196	46.5	24
DDE 15-4	251	200.5	39.5	24

4. Assembly and installation

For use in Australia:

Note

Installation of this product must comply with AS/NZS3500!

Certificate of suitability number: CS9431

RCM number: N20683

4.1 Pump assembly

Warning

Install the pump in such a way that the plug can easily be reached by the operator during operation! This will enable the operator to separate the pump from the mains quickly in case of emergency!

The pump is delivered with a mounting plate. The mounting plate can be mounted vertically, e.g. on a wall, or horizontally, e.g. on a tank. It takes just a few quick steps to firmly secure the pump to the mounting plate by means of a slot mechanism.

The pump can easily be released from the mounting plate for maintenance.

4.1.1 Requirements

- The mounting surface must be stable and must not vibrate.
- Dosing must flow upwards vertically.

4.1.2 Align and install mounting plate

- **Vertical installation:** Mounting plate slot mechanism must be above.
- **Horizontal installation:** Mounting plate slot mechanism must be opposite the dosing head.
- The mounting plate can be used as a drill template, please see fig. 3 for drill hole distances.

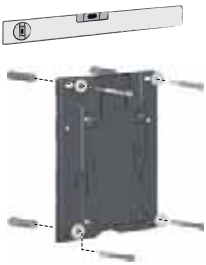


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Fig. 4 Locate mounting plate

Warning

Make sure that you do not damage any cables and lines during installation!

1. Indicate drill holes.
2. Drill holes.
3. Secure mounting plate using four screws, diameter 5 mm, to the wall, on the bracket or the tank.

4.1.3 Engage pump in mounting plate

1. Attach the pump to the mounting plate support clamps and slide under slight pressure until it engages.

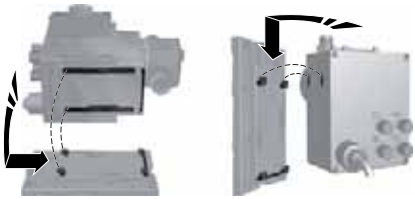

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Fig. 5 Engaging the pump

4.2 Hydraulic connection

Warning

Risk of chemical burns!

Wear protective clothing (gloves and goggles) when working on the dosing head, connections or lines!

The dosing head may contain water from the factory check!

Caution

When dosing media which should not come into contact with water, another medium must be dosed beforehand!

Caution

Faultless function can only be guaranteed in conjunction with lines supplied by Grundfos!

Caution

The lines used must comply with the pressure limits as per section *3.1 Technical data*!

Important information on installation

- Observe suction lift and hose diameter, see section *3.1 Technical data*.
- Shorten hoses at right angles.
- Ensure that there are no loops or kinks in the hoses.
- Keep suction line as short as possible.
- Route suction line up towards the suction valve.
- Installing a filter in the suction line protects the entire installation against dirt and reduces the risk of leakage.

Hose connection procedure

1. Push union nut and tensioning ring across hose.
2. Push cone part fully into the hose, see fig. 6.
3. Attach cone part with hose to the corresponding pump valve.
4. Tighten union nut manually.
   – Do not use tools!
5. Tighten up union nuts after 2-5 operating hours, if using PTFE gaskets!
6. Attach deaeration hose to the corresponding connection (see fig. 2) and run into a container or a collecting tray.

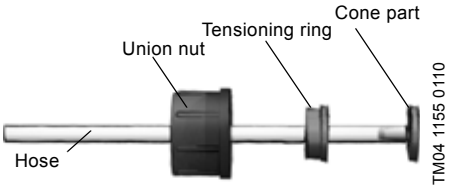

Fig. 6 Hydraulic connection

Note Pressure differential between suction and discharge side must be at least 1 bar/14.5 psi!

Caution Tighten the dosing head screws with a torque wrench once before commissioning and again after 2-5 operating hours at 4 Nm.

Installation example

The pump offers various installation options. In the picture below, the pump is installed in conjunction with a suction line, level switch and multifunction valve on a Grundfos tank.

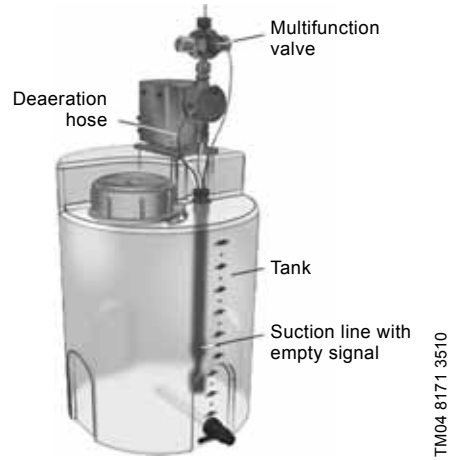

Fig. 7 Installation example

4.3 Electrical connection

Mains connection

Warning

The enclosure class (IP65/Nema 4X) is only guaranteed if plugs or protective caps are correctly installed!

Warning

The pump can start automatically when the mains voltage is switched on!

Do not manipulate mains plug or cable!

The mains plug is the separator separating the pump from the mains.

Note The rated voltage of the pump, see section *2.4 Nameplate*, must conform to local conditions.

The pump is supplied with assembled mains cable and plug.

1. Set capacity adjustment knob to 0 % (see *6.1 Operating elements*).
2. Connect the mains plug with the mains socket.

Signal connections

Applies to DDE-PR/P control variant.

Warning

Electric circuits of external devices connected to the pump inputs must be separated from dangerous voltage by means of double or reinforced insulation!

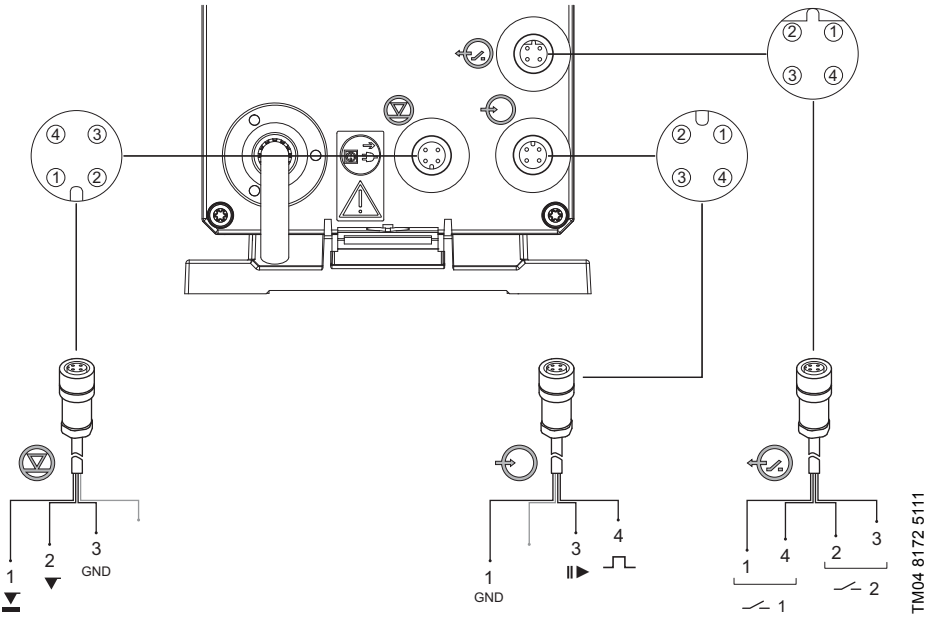

Fig. 8 Wiring diagram of the electrical connections (DDE-PR/P)

External stop and pulse input

Function	Pins			
	1/brown	**2/white**	**3/blue**	**4/black**
External stop	GND		X	
Pulse	GND			X

Level signals: empty and low-level signal

Function	Pins			
	1	**2**	**3**	**4**
Low-level signal	X		GND	
Empty signal		X	GND	

Relay outputs*

Function	Pins			
	1/brown	**2/white**	**3/blue**	**4/black**
Relay 1 (Alarm)	X			X
Relay 2 (selectable)		X	X	

* applies to DDE-PR control variant

5. Startup

5.1 General notes

Warning
Suction and discharge hoses must be connected correctly!
The deaeration hose must be connected correctly and inserted into a suitable tank!

Caution
Tighten the dosing head screws with a torque wrench once before commissioning and again after 2-5 operating hours at 4 Nm.

5.2 Check before commissioning

- Check that the rated voltage indicated on the nameplate complies with the local conditions.
- Check that all connections are assembled correctly. Tighten connections, if necessary.
- Check that the dosing head screws are tightened with the indicated torque (4 Nm). Tighten dosing head screws, if necessary.
- Check that all electrical cables and plugs are connected correctly.

5.3 Start and deaerate the pump

1. Connect mains supply (see *4.3 Electrical connection*).
2. Open the deaeration valve by approximately half a turn.
3. DDE-PR/P control variant: Press the [100%] key and hold it down, until liquid flows out of the deaeration hose continuously and without any bubbles.
4. DDE-B control variant: Turn the capacity adjustment knob to 100 % and wait, until liquid flows out of the deaeration hose continuously and without any bubbles. Then set the capacity adjustment knob back to 0 %.
5. Close the deaeration valve.

The pump is deaerated.

6. Operation

6.1 Operating elements

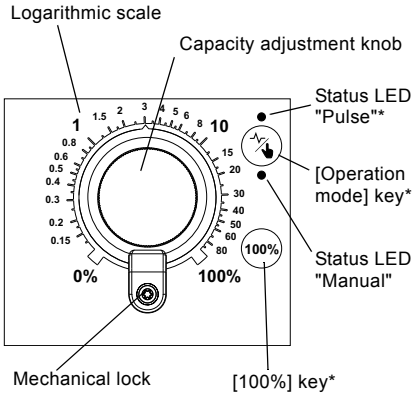

Fig. 9 Operating elements

* Applies to DDE-PR/P control variant.

Capacity adjustment knob

The capacity adjustment knob is used to set the capacity in percent of the maximum dosing flow of the pump. Due to the logarithmical increase of the percent values, even small dosing capacities can be set accurately.

Mechanical lock

The mechanical lock protects the set dosing capacity against unauthorised manipulation. For locking, tighten the screw until the adjustment knob cannot be turned anymore.

Keys and LEDs

Note
The DDE-B control variant is only equipped with a status LED.

When pressing and holding down the [100%] key, the pump doses at 100 % for a certain time.
The [100%] key can be used e.g. for deaeration.

The [Operation mode] key is used to change between the "Manual" and "Pulse" mode (see section *6.2.3 Change operation modes*).
According to the selected operation mode, the respective status LED is active ("Pulse" = LED above key; "Manual" = LED below key).

The status LEDs indicate the following operating statuses and faults:

LED colour	Pump status/fault
Green (flashing)	stop
Green	running
Red-green (flashing)	standby (external stopped)*
Yellow	low-level signal*
Red	empty signal, pump stops*
Red (flashing)	motor blocked, pump stops

* only DDE-PR/P control variant

6.2 Operation modes

Following operation modes are available:

- **Manual**, see section *6.2.1 Manual*
- **Pulse***, see section *6.2.2 Pulse*

* Applies to DDE-PR/P control variant.

6.2.1 Manual

In this operation mode, the pump doses constantly the dosing quantity set by the adjustment knob.

The setting range depends on the pump type:

Type	Setting range [l/h]
DDE 6-10	0.0060 - 6
DDE 15-4	0.0150 - 15

6.2.2 Pulse

Applies to DDE-PR/P control variant.

In this operation mode, the pump doses the set dosing volume for each incoming (potential-free) pulse, e.g. from a water meter. The pump automatically calculates the optimum stroke frequency for dosing the set volume per pulse.

The calculation is based on:

- the frequency of external pulses
- the set stroke volume in percent.

The dosing quantity per pulse is set to a value between 0.1 % and 100 % of the stroke volume using the adjustment knob.

The setting range depends on the pump type:

Type	Setting range [ml/pulse]
DDE 6-10	0.0008 - 0.81
DDE 15-4	0.0016 - 1.58

The frequency of incoming pulses is multiplied by the set dosing volume. If the pump receives more pulses than it can process at the maximum dosing flow, it runs at the maximum stroke frequency in continuous operation. Excess pulses will be ignored.

6.2.3 Change operation modes

Applies to DDE-PR/P control variant.

1. Set adjustment knob to 0 %.
2. Connect mains supply (see section *4.3 Electrical connection*).
3. Hold down the [Operation mode] key for at least 5 seconds.

The new operation mode is saved.

6.3 Inputs/outputs

Applies to DDE-PR/P control variant.

6.3.1 External stop

The pump can be stopped via an external contact, e.g. from a control room. When activating the external stop signal, the pump switches from the operating state "Running" into the operating state "Standby". According to the selected operation mode, the respective LED flashes red-green.

6.3.2 Empty and low-level signals

In order to monitor the filling level in the tank, a dual-level sensor can be connected to the pump. The pump responds to the signals as follows:

Sensor signal	Pump status
Low level	• LED lights up in yellow • Pump continues running
Empty	• LED lights up in red • Pump stops

Caution When the tank is filled up again, the pump restarts automatically!

6.3.3 Relay outputs

Applies to DDE-PR control variant.

The pump can switch two external signals using installed relays. The relays are switched by potential-free pulses. The connection diagram of the relays is shown in section *4.3 Electrical connection*.

Relay 1 is allocated with the alarm signals (tank empty, motor blocked) as standard. Relay 2 can be allocated with the following signals:

Relay 2 signal	Description
Low-level signal*	low level in tank
Stroke signal	each full stroke
Pulse input**	each incoming pulse from pulse input

* Default setting

** The correct transmission of incoming pulses can only be guaranteed up to a pulse frequency of 5 Hz.

6.3.4 Change settings

The signal inputs (level signals, external stop) and the relay outputs are configured at the factory as normally open (NO) contacts. They can be re-configured as normally closed (NC) contacts. Relay 2 can be allocated with different signals.

The activated settings are indicated by the status LEDs when the pump is in the setup mode. For entering the setup mode and changing settings, proceed as follows:

1. Set adjustment knob to 0 %.
2. Connect mains supply (see section *4.3 Electrical connection*).
3. Press [100%] key and [Operation mode] key simultaneously and hold them down for at least 5 seconds.
   – The pump switches into setup mode 1. The active setup mode is indicated by the colour of the upper status LED. The current setting is indicated by the colour of the lower status LED.
4. Make the desired settings according to the following table:

			Switch setup modes with [Operation mode] key		
			Setup mode 1	**Setup mode 2***	**Setup mode 3***
		upper status LED	**Green**	**Yellow**	**Red**
		setup mode description	Contact type of signal inputs (low-level, empty and external stop)	Contact type of relay outputs	Allocated signal of Relay 2
Change setting with [100%] key (100%)	lower status LED	**Green**	NO**	NO**	Low-level signal**
		Yellow	NC	NC	stroke signal
		Red	-	-	pulse input

* Only DDE-PR control variant

** Default setting

5. To exit setup mode, keep [100%] key and [Operation mode] key simultaneously pressed for at least 1 second.

7. Service

In order to ensure a long service life and dosing accuracy, wearing parts such as diaphragms and valves must be regularly checked for signs of wear. Where necessary, replace worn parts with original spare parts made from suitable materials.

Should you have any questions, please contact your service partner.

Warning

Maintenance work must only be carried out by qualified staff.

7.1 Regular maintenance

Interval	Task
Daily	Check, if liquid leaks from the drain opening (fig. 10, pos. 11) and if the drain opening is blocked or soiled. If so, follow the instructions given in section *7.4 Diaphragm breakage*.
	Check, if liquid leaks from the dosing head or valves. If necessary, tighten dosing head screws with a torque wrench at 4 Nm. If necessary, tighten valves and cap nuts, or perform service (see *7.3 Perform service*).
Weekly	Clean all pump surfaces with a dry and clean cloth.
Every 3 months	Check dosing head screws. If necessary, tighten dosing head screws with a torque wrench at 4 Nm. Replace damaged screws immediately.
Every 2 years or 8000 operating hours*	Replace diaphragm and valves (see *7.3 Perform service*)

* For media which result in increased wear, the service interval must be shortened.

7.2 Cleaning

If necessary, clean all pump surfaces with a dry and clean cloth.

7.3 Perform service

Only spare parts and accessories from Grundfos should be used for maintenance. The usage of non-original spare parts and accessories renders any liability for resulting damages null and void.

Further information about carrying out maintenance can be found in the service kit catalogue on our homepage (www.grundfos.com).

Warning

Risk of chemical burns!

When dosing dangerous media, observe the corresponding precautions in the safety data sheets!

Wear protective clothing (gloves and goggles) when working on the dosing head, connections or lines!

Do not allow any chemicals to leak from the pump. Collect and dispose of all chemicals correctly!

Caution

Before any work to the pump, the pump must be disconnected from the power supply. The system must be pressureless!

7.3.1 Dosing head overview

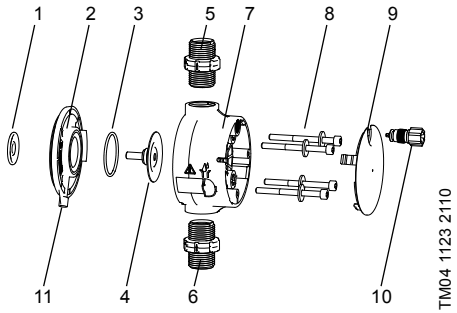

Fig. 10 Dosing head, exploded view

1	Safety diaphragm
2	Flange
3	O-ring
4	Diaphragm
5	Valve on discharge side
6	Valve on suction side
7	Dosing head
8	Screws with discs
9	Cover
10	Deaeration valve
11	Drain opening

7.3.2 Dismantling the diaphragm and valves

Warning

Danger of explosion, if dosing liquid has entered the pump housing!

If the diaphragm is possibly damaged, don't connect the pump to the power supply! Proceed as described in section *7.4 Diaphragm breakage*!

This section refers to fig. 10.

1. Make system pressureless.
2. Empty the dosing head before maintenance and flush it, if necessary.
3. Set adjustment knob to 0 %.
4. Switch off mains supply.
5. Take suitable steps to ensure that the returning liquid is safely collected.
6. Dismantle suction, pressure and deaeration hoses.
7. Dismantle valves on suction and discharge side (5, 6).
8. Remove the cover (9).
9. Loosen screws (8) on the dosing head (7) and remove the screws and discs.
10. Remove the dosing head (7).
11. Unscrew diaphragm (4) counter-clockwise and remove with flange (2).
12. Make sure the drain opening (11) is not blocked or soiled. Clean if necessary.
13. Check the safety diaphragm (1) for wear and damage. Replace if necessary.

If nothing indicates that dosing liquid has entered the pump housing, go on as described in section *7.3.3 Reassembling the diaphragm and valves*. Otherwise proceed as described in section *7.4.2 Dosing liquid in the pump housing*.

7.3.3 Reassembling the diaphragm and valves

The pump must only be reassembled, if nothing indicates that dosing liquid has entered the pump housing. Otherwise proceed as described in section *7.4.2 Dosing liquid in the pump housing*.

This section refers to fig. 10.

1. Attach flange (2) correctly and screw on new diaphragm (4) clockwise.
   – Make sure that the O-ring (3) is seated correctly!
2. Connect/switch on mains supply.
3. Turn the adjustment knob slowly to bring the diaphragm into its service position "inside" (end of suction phase, diaphragm retracted). Set adjustment knob back to 0 %.
4. Switch off mains supply again.
5. Attach the dosing head (7).
6. Install screws with discs (8) and cross-tighten with a torque wrench.
   – Torque: 4 Nm.
7. Attach the cover (9).
8. Install new valves (5, 6).
   – Do not interchange valves and pay attention to direction of arrow.
9. Connect suction, pressure and deaeration hoses (see section *4.2 Hydraulic connection*).

Caution

Tighten the dosing head screws with a torque wrench once before commissioning and again after 2-5 operating hours at 4 Nm.

10. Deaerate dosing pump (see section *5.3 Start and deaerate the pump*).
11. Please observe the notes on commissioning in section *5. Startup*!

7.4 Diaphragm breakage

If the diaphragm leaks or is broken, dosing liquid escapes from the drain opening (fig. 10, pos. 11) on the dosing head.

In case of diaphragm breakage, the safety diaphragm (fig. 10, pos. 1) protects the pump housing against ingress of dosing liquid.

When dosing crystallising liquids the drain opening can be blocked by crystallisation. If the pump is not taken out of operation immediately, a pressure can build up between the diaphragm (fig. 10, pos. 4) and the safety diaphragm in the flange (fig. 10, pos. 2). The pressure can press dosing liquid through the safety diaphragm into the pump housing.

Most dosing liquids don't cause any danger when entering the pump housing. However a view liquids can cause a chemical reaction with inner parts of the pump. In the worst case, this reaction can produce explosive gases in the pump housing.

Warning

Danger of explosion, if dosing liquid has entered the pump housing!

Operation with damaged diaphragm can lead to dosing liquid entering the pump housing.

In case of diaphragm breakage, immediately separate the pump from the power supply!

Make sure the pump cannot be put back into operation by accident!

Dismantle the dosing head without connecting the pump to the power supply and make sure no dosing liquid has entered the pump housing. Proceed as described in section *7.4.1 Dismantling in case of diaphragm breakage*.

To avoid any danger resulting from diaphragm breakage, observe the following:

- Perform regular maintenance. See section *7.1 Regular maintenance*.
- Never operate the pump with blocked or soiled drain opening.
  - If the drain opening is blocked or soiled, proceed as described in section *7.4.1 Dismantling in case of diaphragm breakage*.
- Never attach a hose to the drain opening. If a hose is attached to the drain opening, it is impossible to recognise escaping dosing liquid.
- Take suitable precautions to prevent harm to health and damage to property from escaping dosing liquid.
- Never operate the pump with damaged or loose dosing head screws.

7.4.1 Dismantling in case of diaphragm breakage

Warning

Danger of explosion, if dosing liquid has entered the pump housing!

Do not connect the pump to the power supply!

This section refers to fig. 10.

1. Make system pressureless.
2. Empty dosing head before maintenance and flush it if necessary.
3. Take suitable steps to ensure that the returning liquid is safely collected.
4. Dismantle suction, pressure and deaeration hose.
5. Remove the cover (9).
6. Loosen screws (8) on the dosing head (7) and remove with discs.
7. Remove the dosing head (7).
8. Unscrew diaphragm (4) counter-clockwise and remove with flange (2).
9. Make sure the drain opening (11) is not blocked or soiled. Clean if necessary.
10. Check the safety diaphragm (1) for wear and damage. Replace if necessary.

If nothing indicates that dosing liquid has entered the pump housing, go on as described in section *7.3.3 Reassembling the diaphragm and valves*. Otherwise proceed as described in section *7.4.2 Dosing liquid in the pump housing*.

7.4.2 Dosing liquid in the pump housing

Warning

Danger of explosion!

Immediately separate the pump from the power supply!

Make sure the pump cannot be put back into operation by accident!

If dosing liquid has entered the pump housing:

- Send the pump to Grundfos for repair, following the instructions given in section *7.5 Repairs*.
- If a repair isn't economically reasonable, dispose of the pump observing the information in section *9. Disposal*.

7.5 Repairs

Warning

The pump housing must only be opened by personnel authorised by Grundfos!

Repairs must only be carried out by authorised and qualified personnel!

Switch off the pump and disconnect it from the voltage supply before carrying out maintenance work and repairs!

After consulting Grundfos, please send the pump, together with the safety declaration completed by a specialist, to Grundfos. The safety declaration can be found at the end of these instructions. It must be copied, completed and attached to the pump.

The pump must be cleaned prior to dispatch!

Caution If dosing liquid has possibly entered the pump housing, state that explicitly in the safety declaration! Observe section *7.4 Diaphragm breakage*.

If the above requirements are not met, Grundfos may refuse to accept delivery of the pump. The shipping costs will be charged to the sender.

8. Faults

8.1 Indication of faults

Depending on the selected operation mode, the pump indicates the following faults with its LEDs:

LED colour	Fault	Remedy
Yellow	low-level signal	• fill tank • check contact type (see section *6.3.4*).
Red	empty signal	• fill tank • check contact type (see section *6.3.4*).
Red (flashing)	motor blocked	• reduce backpressure • have gear repaired, if necessary.

For further faults, please see *8.2 List of faults*.

8.2 List of faults

Fault	Possible cause	Possible remedy
Dosing flow too high	Inlet pressure greater than backpressure	Install additional spring-loaded valve (approx. 3 bar) on the discharge side.
		Increase pressure differential.
No dosing flow or dosing flow too low	Air in dosing head	Deaerate the pump.
	Faulty diaphragm	Change the diaphragm (see section *7.3 Perform service*).
	Leakage/fracture in lines	Check and repair lines.
	Valves leaking or blocked	Check and clean valves.
	Valves installed incorrectly	Check that the arrow on the valve housing is pointing in the direction of flow. Check whether all O-rings are installed correctly.
	Blocked suction line	Clean suction line/install filter.
	Suction lift too high	Reduce suction lift.
		Install priming aid.
	Viscosity too high	Use hose with larger diameter.
		Install spring-loaded valve on the discharge side.
	Deaeration valve open	Close the deaeration valve.
Irregular dosing	Valves leaking or blocked	Tighten up valves, replace valves if necessary (see section *7.3 Perform service*).
	Backpressure fluctuations	Keep backpressure constant.
Liquid escaping from the drain opening on the flange	Faulty diaphragm	Immediately separate the pump from the power supply! Observe section *7. Service* and especially section *7.4 Diaphragm breakage*.
Liquid escaping	Dosing head screws not tightened	Tighten up screws (see section *4.2 Hydraulic connection*).
	Valves not tightened	Tighten up valves/union nuts (see section *4.2 Hydraulic connection*).
Pump not sucking in	Suction lift too high	Reduce suction lift; if necessary, provide positive inlet pressure.
	Backpressure too high	Open the deaeration valve.
	Soiled valves	Flush system, replace valves if necessary (see section *7.3 Perform service*).

9. 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.

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