SMART Digital XL - DDE

From 60 to 200 l/h

Installation and operating instructions

Further languages

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English (GB) Installation and operating instructions

Original installation and operating instructions

CONTENTS

Read this document before installing the product. Installation and operation must comply with local regulations and accepted codes of good practice.

1. General information

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 startup, and must be available at the installation location at all times.

1.1 Symbols used in this document

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The text accompanying the hazard symbols is structured in the following way:

SIGNAL WORD

Description of hazard

Consequence of ignoring the warning.

- Action to avoid the hazard.

A blue or grey circle with a white graphical symbol indicates that an action must be taken.

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

Tips and advice that make the work easier.

1.2 Qualification and training

The persons 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 persons must be precisely defined by the operator. If necessary, the persons must be trained appropriately.

Risks of not observing the safety instructions

Non-observance of the safety instructions may have dangerous consequences for persons, 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 humans, animals and the environment 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 humans, animals and the environment.

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

WARNING

Electric shock

Death or serious personal injury

- Keep liquids away from the power supply and electrical components.

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

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

Only original accessories and original spare parts should be used.

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.

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

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.

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

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

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

1.6 Diaphragm leakage

If the diaphragm leaks or is broken, dosing liquid escapes from the drain opening on the dosing head. See fig. 3, pos. 14. Observe section *8.4 Diaphragm leakage*.

WARNING

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

Death or serious personal injury

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

- In case of diaphragm leakage, 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 *8.4.1 Dismantling the dosing head, diaphragm and valves in case of diaphragm leakage*.

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

- Perform regular maintenance. See section *8.1 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 *8.4.1 Dismantling the dosing head, diaphragm and valves in case of diaphragm leakage*.
- 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. Storage and handling

2.1 Storage

- Observe the permissible ambient conditions. See section *4. Technical data / Dimensions*.
- The storage location must be protected from rain, humidity, condensation, direct sunlight and dust.
- The product must be drained completely.
- The product must be cleaned.

2.2 Unpacking

- Mount as soon as possible after unpacking.
- Observe the permissible ambient conditions. See section *4. Technical data / Dimensions*.

2.3 Transport

- The product must only be transported by trained persons.
- Wear personal protective equipment.
- Observe the permissible ambient conditions. See section *4. Technical data / Dimensions*.
- The product must be drained completely.
- The product must be cleaned.
- Use the original packaging or equivalent to protect the product during transport.
- Use appropriate lifting and transporting devices.
- Secure the product during transport to prevent it from tilting and moving.
- Avoid strong impact loads.
- If the pump is installed in a system during transport, make sure it is secured on the mounting plate with the 6 vertical safety screws. See section *5.1.3 Installing the pump on the mounting plate*.

3. Product introduction

The DDE dosing pump is a self-priming diaphragm pump. It consists of a housing with PMS (Permanent Magnet Synchronous) motor and electronics, a dosing head with double PTFE diaphragm and valves and the control cube.

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.

3.1 Applications

The pump is suitable for liquid, non-abrasive, non-flammable and non-combustible media. Observe the technical data of the product. See section *4.1 Technical data*.

Observe the freezing and boiling points of the dosing medium.

Make sure that parts in contact with the dosing medium are resistant to the dosing medium under operating conditions. See data booklet:

- http://net.grundfos.com/qr/i/99021865.

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

A sunscreen is required for outdoor installation.

Areas of application

- Drinking water treatment
- Wastewater treatment
- Boiler water treatment
- Cooling water treatment
- Process water treatment
- CIP (Clean-In-Place). Observe section *4.2 Technical data for CIP (Clean-In-Place) applications*.
- Swimming pool water treatment
- Chemical industry
- Ultrafiltration process and reverse osmosis
- Food and beverage industry
- Paper and pulp industry
- Irrigation.

3.2 Improper operating methods

The operational safety of the pump is only guaranteed if it is used in accordance with section *3.1 Applications*.

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.

The pump is NOT approved for operation in potentially explosive areas, automotive applications or marine applications.

Only use the deaeration valve for deaerating the pump. Make sure the deaeration valve is closed during normal operation.

3.3 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 power supply!
	The device complies with electrical safety class I.

3.4 Nameplate

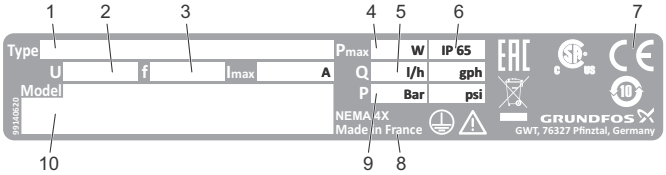

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Fig. 1 Nameplate

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

3.5 Type key

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

Example: **DDE 60-10 AR-PVC/V/C-F-31U3U3FG**

Type	
DDE 60-10 AR-PVC/V/C-F-31U3U3FG	

Max. flow [l/h]	
DDE **60**-10 AR-PVC/V/C-F-31U3U3FG	

Max. pressure [bar]	
DDE 60-**10** AR-PVC/V/C-F-31U3U3FG	

Control variant	
DDE 60-10 **AR**-PVC/V/C-F-31U3U3FG	
B	Basic
AR	B with pulse mode, analog mode and alarm relay

Dosing head variant	
DDE 60-10 AR-**PVC**/V/C-F-31U3U3FG	
PVC	Polyvinyl chloride
PV	PVDF
SS	Stainless steel 1.4401

Gasket material	
DDE 60-10 AR-PVC/**V**/C-F-31U3U3FG	
E	EPDM
V	FKM
T	PTFE

Valve ball material	
DDE 60-10 AR-PVC/V/**C**-F-31U3U3FG	
C	Ceramics
SS	Stainless steel 1.4401

Control cube	
DDE 60-10 AR-PVC/V/C-**F**-31U3U3FG	
F	Front mounted (change to left or right is possible)

Supply voltage	
DDE 60-10 AR-PVC/V/C-F-**3**1U3U3FG	
3	100-240 V 50/60 Hz single phase

Valve type	
DDE 60-10 AR-PVC/V/C-F-3**1**U3U3FG	
1	Standard
2	Spring-loaded

Connection, inlet / outlet	
DDE 60-10 AR-PVC/V/C-F-31**U3U3**FG	
U3U3	2x Union nut G5/4
	2x Hose connector 19/20 mm
	2x Hose clamp
	2x Pipe connector 25 mm
A7A7	2x Union nut G5/4
	2x Inlay external thread 3/4 NPT
A1A1	2x Union nut G5/4 (SS)
	2x Inlay internal thread Rp 3/4 (SS)
A3A3	2x Union nut G5/4 (SS)
	2x Inlay internal thread 3/4 NPT (SS)

Mains plug	
DDE 60-10 AR-PVC/V/C-F-31U3U3**F**G	
F	EU (Schuko)
B	USA, Canada
G	UK
I	Australia, New Zealand, Taiwan
E	Switzerland
J	Japan
L	Argentina

Design	
DDE 60-10 AR-PVC/V/C-F-31U3U3F**G**	
G	Grundfos red
A	Grundfos green
B	Grundfos black
X	Neutral / black

Special variant	
DDE 60-10 AR-PVC/V/C-F-31U3U3FG**C3**	
	Standard
C3	Inspection certificate 3.1 (EN 10204)

3.6 Product overview

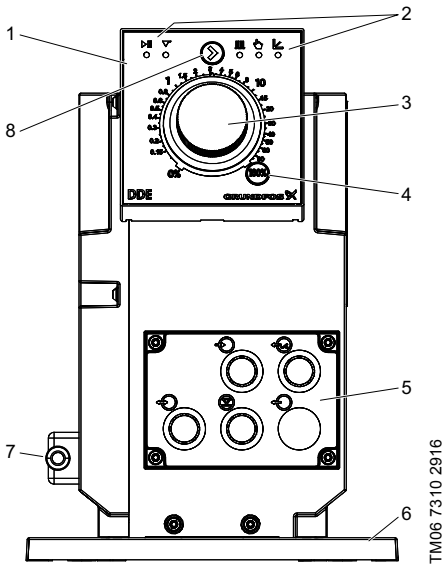

Fig. 2 Front view of the pump

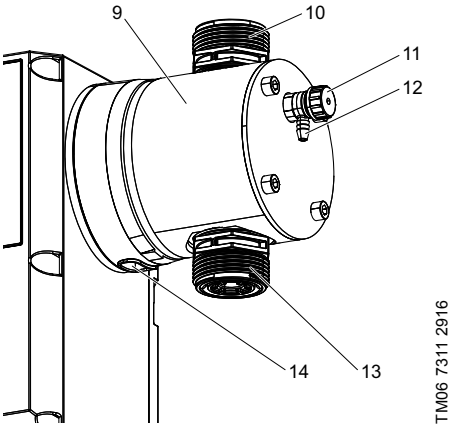

Fig. 3 Dosing head

Pos.	Description	See section
1	Control cube	
2	LEDs for status and operation mode	*7.1*
3	Capacity adjusting knob	*7.1*
4	[100%] key	*7.1*
5	Signal inputs/outputs	*5.3*
6	Mounting plate	
7	Mains connection	
8	[Operation mode] key	*7.1*
9	Dosing head	
10	Valve, outlet side	
11	Deaeration valve	
12	Connection, deaeration hose	
13	Valve, inlet side	
14	Drain opening in case of diaphragm leakage	

4. Technical data / Dimensions

4.1 Technical data

Data			60-10	120-7	200-4
Mechanical data	Turn-down ratio (setting range)	[1:X]	800	800	800
	Max. dosing capacity	[l/h]	60	120	200
		[gph]	15.8	32	52.8
	Min. dosing capacity	[l/h]	0.075	0.15	0.25
		[gph]	0.0197	0.04	0.066
	Max. operating pressure	[bar]	10	7	4
		[psi]	145	101	58
	Max. stroke frequency	[strokes/min]	196	188	188
	Stroke volume	[ml]	5.56	11.58	19.3
	Accuracy of repeatability[4)]	[%]	5 SP + 0.1 FS		
	Max. suction lift during operation[1)]	[m]	3		
	Max. suction lift when priming with wet valves[1)]	[m]	1.5		
	Min. pressure difference between inlet and outlet side	[bar]	1		
		[psi]	14.5		
	Max. inlet pressure, inlet side	[bar]	2		
		[psi]	29		
	Max. viscosity with spring-loaded valves[2)]	[mPas] (= cP)	1000	1000	500
	Max. viscosity without spring-loaded valves[2)]	[mPas] (= cP)	100		
	Min. internal hose/pipe diameter inlet/outlet side[1), 3)]	[mm]	19		
	Min. internal hose/pipe diameter inlet/outlet side (high viscosity)[3)]	[mm]	19		
	Min. / Max. liquid temperature (PVDF, SS)	[°C]	0 / 50		
	Min. / Max. liquid temperature (PVC)	[°C]	0 / 40		
	Min. / Max. ambient temperature	[°C]	0 / 45		
	Min. / Max. storage temperature (PVDF, SS)	[°C]	-20 / 70		
	Min. / Max. storage temperature (PVC)	[°C]	-20 / 45		
	Max. relative humidity (non-condensing)	[%]	90		
	Max. altitude above sea level	[m]	2000		
Electrical data	Voltage	[V]	100-240 V ± 10 %, 50/60 Hz		
	Length of mains cable	[m]	1.5		
	Max. inrush current for 2 ms (100 V)	[A]	35		
	Max. inrush current for 2 ms (240 V)	[A]	70		
	Max. power consumption P_1	[W]	62		
	Enclosure class		IP65, Nema 4X		
	Electrical safety class		I		
	Pollution degree		2		

Data			60-10	120-7	200-4
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. loop resistance in external circuit	[Ω]	150		
	Impedance at 4-20 mA analog input	[Ω]	15		
	Accuracy of analog input (full-scale value)	[%]	± 0.5		
	Min. resolution of analog input	[mA]	0.02		
Signal output	Max. resistive load on relay output	[A]	0.5		
	Max. voltage on relay output	[V]	30 VDC / 30 VAC		
Weight/size	Weight (PVC, PVDF)	[kg]	6.7	7.9	8.9
	Weight (stainless steel)	[kg]	7.2	8.3	9.1
	Diaphragm diameter	[mm]	74	97	117
Sound pressure	Max. sound pressure level	[dB(A)]	80		
Approvals			CE, 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 inlet line: 1.5 m, length of outlet line: 10 m (at max. viscosity)

4) FS = Full-scale, SP = Setpoint

4.2 Technical data for CIP (Clean-In-Place) applications

Short-term temperature limits for max. 40 minutes at max. 2 bar operating pressure:

Max. liquid temperature for dosing head material PVDF	[°C]	85
Max. liquid temperature for dosing head material stainless steel	[°C]	120

The dosing head material Polyvinyl chloride (PVC) must not be used in CIP applications.

4.3 Dimensions

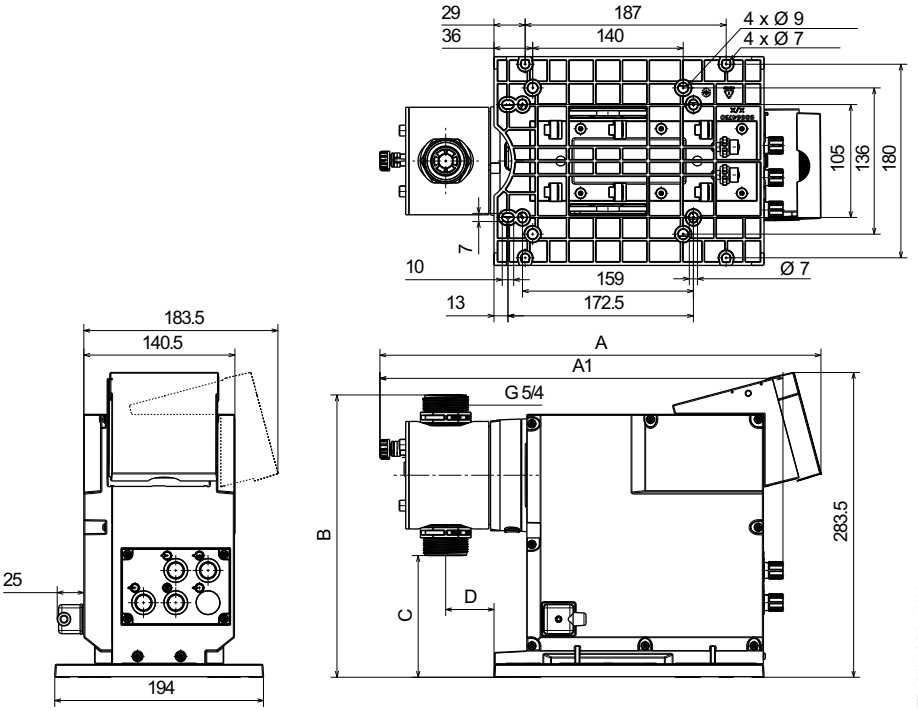

Fig. 4 Dimensional sketch

Pump type	Dosing head material	A [mm]	A1 [mm]	B [mm]	C [mm]	D [mm]
DDE 60-10	PVC/PV	410	374	263	112	45
DDE 60-10	SS	405	364	263	112	45
DDE 120-7	PVC/PV	410	374	276.5	97	45
DDE 120-7	SS	405	364	276.5	97	45
DDE 200-4	PVC/PV	410	374	287.5	88	45
DDE 200-4	SS	405	364	287.5	88	45

5. Assembly and installation

5.1 Pump assembly

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 power supply quickly in case of emergency.

5.1.1 Requirements

- The installation location must be protected from rain, humidity, condensation, direct sunlight and dust.
- The installation location must have sufficient lighting to ensure safe operation.
- Observe the permissible ambient conditions. See section *4.1 Technical data*.
- The mounting surface must be stable.
- The mounting plate must be mounted horizontally e.g. on a tank.
- Dosing must flow upwards vertically.

5.1.2 Aligning and installing the mounting plate

The mounting plate can be used as a drill template, please see fig. 4 for drill hole distances.

1. Indicate drill holes.
2. Drill holes.
3. Secure mounting plate using four screws on a bracket or a tank.

5.1.3 Installing the pump on the mounting plate

1. Remove the locking screws from their transport position on the mounting plate.
2. Place the pump on the mounting plate support clamps and slide it in as far as possible.
   – The mounting plate moves into the final position when you tighten the locking screws.
3. Carefully screw in and tighten the 2 horizontal locking screws using a torque wrench.
   – Wrench size: TORX PLUS 15 IP
   – Torque [Nm]: 1.7 (+/- 0.2)

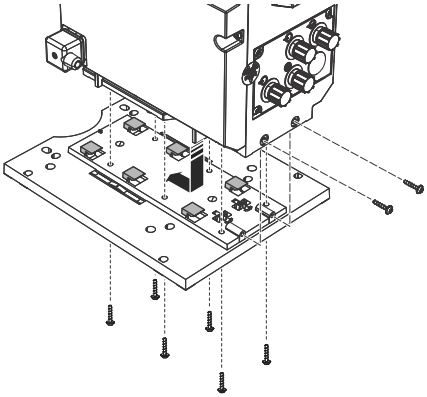

Fig. 5 Installing the pump on the mounting plate

4. For applications where the mounting surface vibrates, or if the pump is installed in a system during transport, secure the pump on the mounting plate with the 6 vertical safety screws using a torque wrench.
   – Wrench size: TORX PLUS 15 IP
   – Torque [Nm]: 1.7 (+/- 0.2)

5.1.4 Adjusting the control cube position

The control cube is fitted to the front of the pump on delivery. It can be turned by 90 ° so that the user can select to operate the pump from the right or left side.

Install the control cube correctly to ensure the enclosure class (IP65 / Nema 4X) and shock protection.

1. Switch off the power supply.
2. Carefully remove both protective caps on the control cube using a thin screwdriver.
3. Remove the screws.
   – Wrench size: TORX PLUS 15 IP
4. Carefully lift off the control cube only so far from the pump housing that no tensile stress is produced on the flat band cable.
   – Make sure no liquid enters the housing.
5. Turn the control cube by 90 ° and re-attach.
   – Make sure the O-ring is placed correctly.
6. Push down the cube and tighten the screws using a torque wrench.
   – Torque [Nm]: 1.7 (± 0.2)
7. Attach the protective caps observing the correct orientation.

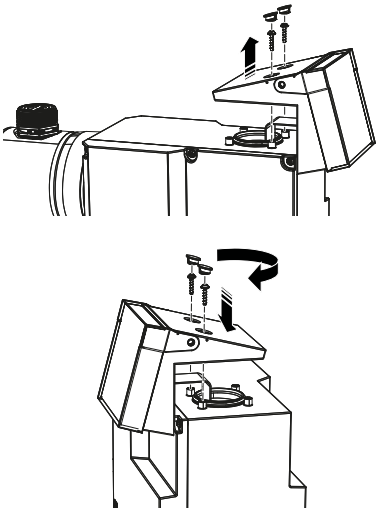

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Fig. 6 Adjusting control cube

5.2 Hydraulic connection

WARNING

Chemical hazard

Death or serious personal injury

- Observe the material safety data sheet of the dosing medium.
- 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. When dosing media which should not come into contact with water, another medium must be dosed beforehand.

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

The lines used must comply with the pressure limits as per section *4.1 Technical data*.

Important information on installation

- Observe suction lift and line diameter. See section *4.1 Technical data*.
- Shorten hoses and pipes at right angles.
- Ensure that there are no loops or kinks in the hoses.
- Keep inlet line as short as possible.
- Route inlet line up towards the inlet valve.
- Installing a strainer in the inlet line protects the entire installation against dirt and reduces the risk of leakage.
- Install a pressure-relief valve in the outlet line to provide protection against impermissibly high pressure.
- We recommend the installation of a pulsation damper downstream the pump:
  – for pipe installations.
  – for hose installations where the pump is operated with ≥ 75 % of its dosing capacity.

Pressure differential between inlet and outlet side must be at least 1 bar / 14.5 psi.

Hose connection, type U3U3

For details on connection types, see section *3.5 Type key*.

1. Make sure the system is pressureless.
2. Push union nut (2) and hose clamp (3) across hose (4).
3. Push hose (4) completely onto hose connector (1) and tighten hose clamp (3).
4. Install hose connector (1) with union nut (2) at inlet and outlet valve.
   - Make sure the gasket at the valve is placed correctly.
   - Tighten union nuts manually. Do not use tools.
   - If using PTFE gaskets, retighten union nuts after 2-5 operating hours.
5. Attach a deaeration hose to the corresponding connection (see fig. 3, pos. 12) and run it into a suitable container or collecting tray.

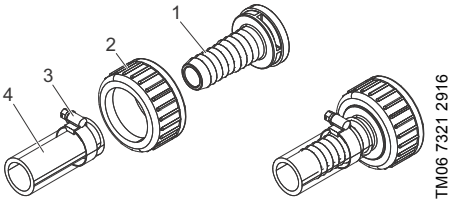

Fig. 7 Hydraulic connection

Pipe connection, type U3U3

For details on connection types, see section *3.5 Type key*.

1. Make sure the system is pressureless.
2. Push union nut (2) across pipe (3).
3. For PVC pipe:
   Glue inlay (1) to end of pipe (3) according to pipe manufacturer's specification.
4. For PVDF pipe:
   Weld inlay (1) to end of pipe (3) according to pipe manufacturers specification.
5. Install pipe with union nut (2) at inlet and outlet valve.
   - Make sure the gasket at the valve is placed correctly.
   - Tighten union nuts manually. Do not use tools.
   - If using PTFE gaskets, retighten union nuts after 2-5 operating hours.
6. Attach a deaeration hose to the corresponding connection (see fig. 3, pos. 12) and run it into a suitable container or collecting tray.

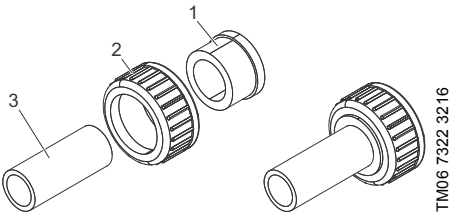

Fig. 8 Hydraulic connection

Pipe connection, types A1A1, A3A3, A7A7

For details on connection types, see section *3.5 Type key*.

1. Make sure the system is pressureless.
2. Push union nut (2) across pipe (3).
3. Apply appropriate sealing material to thread of inlay (1).
4. Screw inlay (1) to end of pipe (3).
5. Install pipe with union nut (2) at inlet and outlet valve.
   – Make sure the gasket at the valve is placed correctly.
   – Tighten union nuts manually. Do not use tools.
   – If using PTFE gaskets, retighten union nuts after 2-5 operating hours.
6. Attach a deaeration hose to the corresponding connection (see fig. 3, pos. 12) and run it into a suitable container or collecting tray.

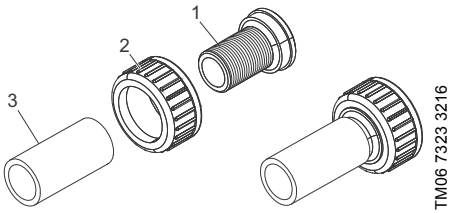

Fig. 9 Hydraulic connection, type A7A7

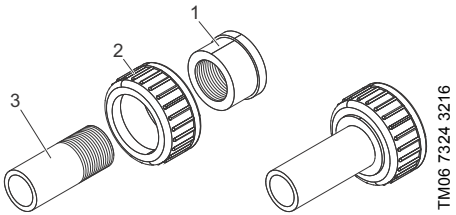

Fig. 10 Hydraulic connection, type A1A1, A3A3

5.3 Electrical connection

Mains connection

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

All electrical connections must be carried out by a qualified electrician in accordance with local regulations.

The pump can start automatically when the power supply is switched on.

CAUTION

Automatic startup

Minor or moderate personal injury

- Make sure the pump has been correctly installed and is ready to be started before you switch on the power supply.

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

Do not manipulate mains plug or cable.

The rated voltage of the pump must conform to local conditions. See section *3.4 Nameplate*.

The pump is supplied with assembled mains cable and plug.

1. Set capacity adjusting knob to 0 % (see *7.1 Operating elements*).
2. Connect the mains plug with the mains socket.

Signal connections

WARNING

Electric shock

Death or serious personal injury

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

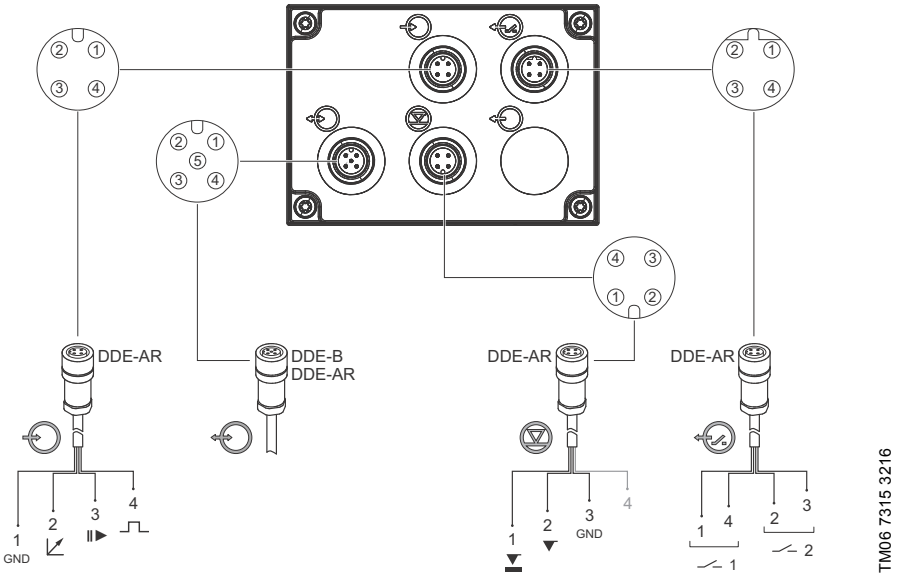

Fig. 11 Wiring diagram of the electrical connections

Symbol	Function	Pin assignment			
		1/brown	2/white	3/blue	4/black
	Analog	GND/(-) mA	(+) mA		
	External stop	GND		X	
	Pulse	GND			X
		1	2	3	4
	Low-level signal	X		GND	
	Empty signal		X	GND	
	Service connection (only for Grundfos service)				
		1/brown	2/white	3/blue	4/black
	Relay 1	X			X
	Relay 2		X	X	

6. Startup

6.1 Preparing the pump for startup

CAUTION

Chemical hazard

Minor or moderate personal injury

- Observe the material safety data sheet of the dosing medium.
- Wear protective clothing (gloves and goggles) when working on the dosing head, connections or lines.
- Collect and dispose of all chemicals in a way that is not harmful to humans, animals and the environment.

The pump can start automatically when the power supply is switched on.

CAUTION

Automatic startup

Minor or moderate personal injury

- Make sure the pump has been correctly installed and is ready to be started before you switch on the power supply.

Tighten the dosing head screws with a torque wrench before startup and every time the dosing head has been opened. After 48 operating hours, retighten the dosing head screws using a torque wrench. Torque [Nm]: 6 (+ 1).

- Make sure the pump has been connected electrically by a qualified person.
- Make sure the power supply specified on the nameplate matches the local conditions.
- Check that all pipe or hose connections have been tightened properly and tighten them, if necessary. See section *5.2 Hydraulic connection*.

6.2 Starting up and deaerating the pump

1. Read section *6.1 Preparing the pump for startup*.
2. Set the capacity adjusting knob to 0 %.
3. Switch on the power supply.
4. Open the deaeration valve by approximately half a turn.

WARNING

Pressurised dosing medium

Death or serious personal injury

- Do not open the deaeration valve by more than one full turn.

5. DDE-AR control variant:
   Press the [100%] key and hold it down until liquid flows out of the deaeration hose continuously and without any bubbles.
6. DDE-B control variant:
   Turn the capacity adjusting knob to 100 % and wait, until liquid flows out of the deaeration hose continuously and without any bubbles. Then set the capacity adjusting knob back to 0 %.
7. Close the deaeration valve.

The pump is deaerated.

7. Operation

7.1 Operating elements

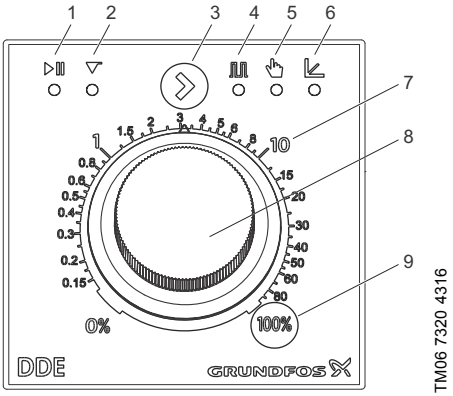

Fig. 12 Operating elements

Pos.	Description	Control variant	
		B	AR
	Status LEDs:		
1	An alarm is active. See section *9. Faults*. (red)	●	●
	External stop (red)		●
2	Tank level (yellow)		●
3	[Operation mode] key		●
	Operation mode LEDs (green):		
4	Pulse		●
5	Manual	●	●
6	Analog		●
7	Logarithmic scale	●	●
8	Capacity adjusting knob	●	●
9	[100%] key		●

7.1.1 Capacity adjusting knob

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

7.1.2 LEDs (DDE-B)

The LEDs indicate the following operating statuses and faults:

LED status		Pump status	Description
▷Ⅱ	☜		
	●	Running	
	❍	Stop	Capacity adjusted to 0 %
❍		Standby*	An alarm is active. See section *9. Faults*.

● = LED on

❍ = LED flashing

empty table cell = LED off

* For some alarms the pump tries to restart periodically. Observe section *9. Faults*.

7.1.3 Keys and LEDs (DDE-AR)

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 the operation mode. See section *7.2.4 Changing the operation mode*.

The operation mode LEDs indicate the active operation mode. Only one operation mode can be active at a time. Together with the status LEDs, the operation mode LEDs indicate the following statuses and faults:

LED status					Pump status	Description
▷II	▽	||| hand	⌞		
			●		Running	
			❍		Stop	Capacity adjusted to 0 %
		●			Running	
		❍			Standby	No incoming pulses
				●	Running	
				❍	Standby	Analog signal < 4.1 mA
	❍	●			Running	Low-level in tank
	●	❍			Standby	Tank empty
●		❍			Standby	External stop activated
❍					Standby*	An alarm is active. See section *9. Faults*.

● = LED on

❍ = LED flashing

empty table cell = LED off

* For some alarms the pump tries to restart periodically. Observe section *9. Faults*.

7.2 Operation modes

Following operation modes are available:

- **Manual**, see section *7.2.1 Manual*
- **Pulse (DDE-AR)**, see section *7.2.2 Pulse*
- **Analog (DDE-AR)**, see section *7.2.3 Analog*

7.2.1 Manual

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

The setting range depends on the pump type:

Type	Setting range	
	[l/h]	[gph]
DDE 60-10	0.075 - 60	0.0197 - 15.8
DDE 120-7	0.15 - 120	0.04 - 32
DDE 200-4	0.25 - 200	0.066 - 52.8

7.2.2 Pulse

Applies to DDE-AR 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 0.125 % and 100 % of the stroke volume using the adjusting knob.

The setting range depends on the pump type:

Type	Setting range [ml/pulse]
DDE 60-10	0.0070 - 5.56
DDE 120-7	0.0145 - 11.58
DDE 200-4	0.0242 - 19.3

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.

7.2.3 Analog

Applies to DDE-AR control variant.

In this operation mode, the pump doses according to the external analog signal. The dosing volume is proportional to the signal input value in mA. The input signal must be 4-20 mA.

The maximum dosing volume can be changed via the capacity adjusting knob.

Example:

Set capacity [%]	Input signal [mA]	Dosing flow [%]
100	≤ 4.1	0
	≥ 19.8	100
50	≤ 4.1	0
	≥ 19.8	50
1	≤ 4.1	0
	≥ 19.8	1

7.2.4 Changing the operation mode

Applies to DDE-AR control variant.

1. Set adjusting knob to 0 %.
2. Connect power supply. See section *5.3 Electrical connection*.
3. Hold down the [Operation mode] key until the next operation mode is activated.
   – The operation mode LED indicates the active operation mode.
   – Repeat until the desired operation mode is active.

7.3 Inputs/outputs

Applies to DDE-AR control variant.

7.3.1 External stop

The pump can be stopped via an external contact, e.g. from a control room.

Frequent disengagement from the mains voltage, e.g. via a relay, can result in damage to the pump electronics and reduces the dosing accuracy.

We strongly recommend only to use the external stop signal to start and stop the pump.

When activating the external stop signal, the pump switches to operating state "Standby". The active operation mode LED flashes green and the red external stop LED is on.

The contact type can be changed. See section *7.3.4 Change settings*.

7.3.2 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 flashes • Pump continues running
Empty	• LED on • Pump stops dosing

The contact type can be changed. See section *7.3.4 Change settings*.

CAUTION

Automatic startup

Minor or moderate personal injury

- When the tank is filled up again, the pump restarts automatically.

7.3.3 Relay outputs

Applies to DDE-AR control variant.

The pump can switch two external signals using internal relays. The relay outputs are potential-free. The connection diagram of the relays is shown in section *5.3 Electrical connection*.

Relay 1 is allocated with the alarm signals (see section *9. Faults*) 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.

Continuous operation of the relays on a high frequency reduces the relay lifetime significantly.

7.3.4 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 adjusting knob to 0 %.
2. Connect power supply. See section *5.3 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 operation mode LEDs. The current setting is indicated by the status LEDs.
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**
	LED status			
	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: 	LED status 	NO*	NO*	Low-level signal
		NC	NC	Stroke signal
		-	-	Pulse input

* Default setting.

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

8. 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.

For the full range of service kits and spare parts see the service kit catalogue:

- http://net.grundfos.com/qr/i/96488862_23

or the Grundfos Product Center:

- https://product-selection.grundfos.com

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

Maintenance work must only be carried out by qualified persons.

The pump housing must only be opened by persons authorised by Grundfos. Observe section *8.5 Repairs*.

8.1 Regular maintenance

Interval	Task
Daily	Check, if liquid leaks from the drain opening on the dosing head and if the drain opening is blocked or soiled. See fig. 13-14, pos. 8. If so, follow the instructions given in section *8.4 Diaphragm leakage*.
	Check, if liquid leaks from the dosing head or valves. If necessary, tighten dosing head screws with a torque wrench. Torque [Nm]: 6 (+ 1). If necessary, tighten valves and cap nuts, or perform service (see *8.3 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. Torque [Nm]: 6 (+ 1). Replace damaged screws immediately.
Every 2 years or 8000 operating hours*	Replace diaphragm and valves (see *8.3 Perform service*)

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

8.2 Cleaning

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

8.3 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.

CAUTION

Chemical hazard

Minor or moderate personal injury

- Observe the material safety data sheet of the dosing medium.
- Wear protective clothing (gloves and goggles) when working on the dosing head, connections or lines.
- Collect and dispose of all chemicals in a way that is not harmful to humans, animals and the environment.

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

8.3.1 Service overview

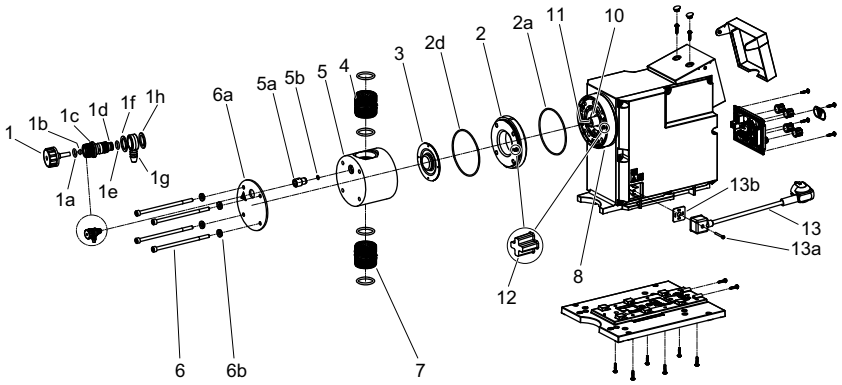

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Fig. 13 DDE 60-10

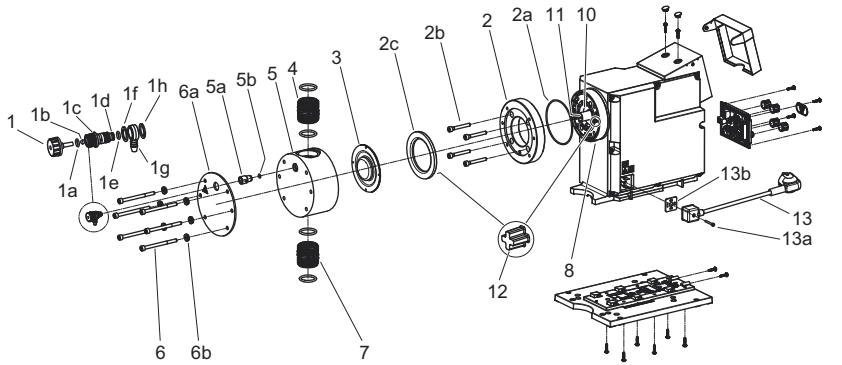

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Fig. 14 DDE 120-7 / DDE 200-4

Pos.	Components
1	Deaeration screw
1a, 1e	O-ring
1b	Valve ball
1c	Valve housing
1d	Groove for O-ring
1f, 1h	Flat gasket
1g	Hose nipple
2	Flange
2a, 2d	O-ring
2b	Screws
2c	Intermediate ring
3	Diaphragm
4	Valve on outlet side
5	Dosing head
5a	Double nipple
5b	O-ring
6	Screws

Pos.	Components
6a	Cover plate (plastic dosing heads only)
6b	Washers (stainless steel dosing heads only)
7	Valve on inlet side
8	Drain opening
10	Safety diaphragm
11	Extension piece
12	Alignment pin
13	Mains cable
13a	Safety screw
13b	Gasket

8.3.2 Dismantling the dosing head, diaphragm and valves

If the diaphragm is possibly damaged, don't connect the pump to the power supply! Proceed as described in section *8.4 Diaphragm leakage*.

This section refers to fig. 13-14.

1. Put on the stipulated personal protective equipment.
2. Set adjusting knob to 0 %.
3. Switch off the power supply.
4. Make system pressureless.
5. Take suitable steps to ensure that the returning liquid is safely collected.
6. Empty dosing head and flush it if necessary.
7. Dismantle inlet, outlet and deaeration lines.
8. Unscrew valves on inlet and outlet side (4, 7).
9. For plastic dosing head:
   – Remove screws (6).
   – Remove dosing head (5) together with cover plate (6a).
10. For stainless steel dosing head:
   – Remove screws (6) together with washers (6b).
   – Remove dosing head (5).
11. Unscrew diaphragm (3) counter-clockwise and remove it.
12. DDE 60-10:
   – Remove flange (2) together with O-rings (2a, 2d).
13. DDE 120-7 / DDE 200-4:
   – Remove intermediate ring (2c).
   – Remove screws (2b) together with flange (2) and O-ring (2a).
14. Make sure the drain opening (8) is not blocked or soiled. Clean if necessary.
15. Check the safety diaphragm (10) for wear and damage. If the safety diaphragm is damaged, send the pump to Grundfos for repair. See section *8.5 Repairs*.

If nothing indicates that dosing liquid has entered the pump housing, go on as described in section *8.3.3 Reassembling the dosing head, diaphragm and valves*. Otherwise proceed as described in section *8.4.2 Dosing liquid in the pump housing*.

8.3.3 Reassembling the dosing head, 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 *8.4.2 Dosing liquid in the pump housing*.

This section refers to fig. 13-14.

1. DDE 60-10:
   – Place new O-rings (2a, 2d) in the grooves at flange (2) and make sure they are seated correctly.
   – Attach flange (2) observing alignment pin (12).
2. DDE 120-7 / DDE 200-4:
   – Install flange (2) and new O-ring (2a) with screws (2b) observing alignment pin (12). Make sure the O-ring is seated correctly.
   – Cross-tighten screws (2b) with a torque wrench. Torque [Nm]: 6 (+ 1).
   – Attach intermediate ring (2c) to flange (2) observing alignment pin (12).
3. Screw on the new diaphragm (3) clockwise.
   – Make sure the diaphragm is screwed on completely and fully resting on extension piece (11).
4. Switch on the power supply.
5. Turn the adjusting knob slowly to bring the diaphragm into its service position "inside" (end of suction phase, diaphragm retracted). Set adjusting knob back to 0 %.
6. Close the cover to avoid unintended manipulation of the adjusting knob.
7. Attach dosing head (5).
   – DDE 60-10: Observe alignment pin (12).
8. For plastic dosing head:
   – Install screws (6) through cover plate (6a).
9. For stainless steel dosing head:
   – Install screws (6) with washers (6b).
10. Cross-tighten screws (6) with a torque wrench.
   – Torque [Nm]: 6 (+ 1).
11. Install new valves (4, 7).
   – Pay attention to the flow direction arrow.
   – Make sure the O-rings are seated correctly.
12. Perform hydraulic connection. See section *5.2 Hydraulic connection*.

Tighten the dosing head screws with a torque wrench before startup and every time the dosing head has been opened. After 48 operating hours, retighten the dosing head screws using a torque wrench. Torque [Nm]: 6 (+ 1).

13. Deaerate dosing pump. See section *6.2 Starting up and deaerating the pump*.
14. Observe the notes on commissioning in section *6. Startup*.

8.3.4 Replacing the deaeration valve

This procedure requires a special tool kit. See service kit catalogue:

- http://net.grundfos.com/qr/i/96488862_23

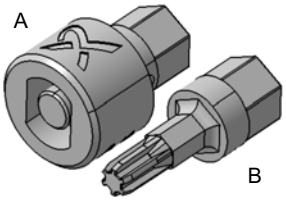


Fig. 15 Special tool kit

Pos.	Description
A	Special tool for valve housing
B	Special tool for double nipple

This section refers to fig. 13-14.

1. Put on the stipulated personal protective equipment.
2. Switch off the power supply.
3. Make system pressureless.
4. Take suitable steps to ensure that the returning liquid is safely collected.
5. Empty dosing head and flush it if necessary.
6. Dismantle deaeration line.
7. Manually unscrew deaeration screw (1).
   – Do not use any tools, otherwise deaeration valve parts can break.
   – O-ring (1a) normally remains on the deaeration screw.
   – Valve ball (1b) normally remains in valve housing (1c).
8. Use special tool (A) to unscrew valve housing (1c) from double nipple (5a).
9. Remove hose nipple (1g) and flat gaskets (1f, 1h).
10. Use special tool (B) to unscrew double nipple (5a).

Reassemble the deaeration valve with new parts as follows:

11. Put in O-ring (5b).
12. Use special tool (B) to screw in the new double nipple (5a) carefully with a torque wrench.
    – Torque [Nm]: 3 (+/- 0.2).
13. Make sure that O-ring (1e) is seated correctly in groove (1d).
14. Put flat gasket (1f) followed by hose nipple (1g) and flat gasket (1h) onto valve housing (1c).
15. Use special tool (A) to screw in valve housing (1c) into double nipple (5a) carefully with a torque wrench.
    – Torque [Nm]: 2 (+/- 0.2).
16. Make sure that O-ring (1a) is placed correctly on deaeration screw (1).
17. Check that valve ball (1b) is correctly pre-assembled in valve housing (1c).
18. Manually screw in deaeration screw (1).
19. Deaerate the dosing pump. See section *6.2 Starting up and deaerating the pump*.
20. Observe the notes on commissioning in section *6. Startup*.

8.3.5 Replacing the mains cable

All electrical connections must be carried out by a qualified electrician in accordance with local regulations.

1. Switch off the power supply.
2. Unscrew safety screw (13a).
3. Replace mains cable (13) and gasket (13b).
4. Carefully screw in safety screw (13a) with a torque wrench.
   – Torque [Nm]: 0.4 (+/- 0.1)

The pump can start automatically when the power supply is switched on.

CAUTION

Automatic startup

Minor or moderate personal injury

- Make sure the pump has been correctly installed and is ready to be started before you switch on the power supply.

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

Do not manipulate mains plug or cable.

8.4 Diaphragm leakage

If the diaphragm leaks or is broken, dosing liquid escapes from the drain opening on the dosing head. See fig. 3, pos. 16.

In case of diaphragm leakage, the safety diaphragm (fig. 13-14, pos. 10) 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. 13-14, pos. 3) and the safety diaphragm. 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 few 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!

Death or serious personal injury

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

- In case of diaphragm leakage, 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 *8.4.1 Dismantling the dosing head, diaphragm and valves in case of diaphragm leakage*.

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

- Perform regular maintenance. See section *8.1 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 *8.4.1 Dismantling the dosing head, diaphragm and valves in case of diaphragm leakage*.
- 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.

8.4.1 Dismantling the dosing head, diaphragm and valves in case of diaphragm leakage

Do not connect the pump to the power supply!

This section refers to fig. 13-14.

1. Put on the stipulated personal protective equipment.
2. Make system pressureless.
3. Take suitable steps to ensure that the returning liquid is safely collected.
4. Empty dosing head and flush it if necessary.
5. Dismantle inlet, outlet and deaeration lines.
6. Unscrew valves on inlet and outlet side (4, 7).
7. For plastic dosing head:
   – Remove screws (6).
   – Remove dosing head (5) together with cover plate (6a).
8. For stainless steel dosing head:
   – Remove screws (6) together with washers (6b).
   – Remove dosing head (5).
9. Unscrew diaphragm (3) counter-clockwise and remove it.
10. DDE 60-10:
    – Remove flange (2) together with O-rings (2a, 2d).
11. DDE 120-7 / DDE 200-4:
    – Remove intermediate ring (2c).
    – Remove screws (2b) together with flange (2) and O-ring (2a).
12. Make sure the drain opening (8) is not blocked or soiled. Clean if necessary.
13. Check the safety diaphragm (10) for wear and damage. If the safety diaphragm is damaged, send the pump to Grundfos for repair. See section *8.5 Repairs*.

If nothing indicates that dosing liquid has entered the pump housing, go on as described in section *8.3.3 Reassembling the dosing head, diaphragm and valves*. Otherwise proceed as described in section *8.4.2 Dosing liquid in the pump housing*.

8.4.2 Dosing liquid in the pump housing

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 *8.5 Repairs*.
- If a repair isn't economically reasonable, dispose of the pump observing the information in section *10. Disposal*.

8.5 Repairs

The pump housing must only be opened by persons authorised by Grundfos.

Repairs must only be carried out by authorised and qualified persons.

For pump repair contact your local Grundfos supplier. If your local Grundfos supplier asks you to send the pump to Grundfos for repair, fill in the safety declaration in English and attach it to the pump for shipping. The safety declaration can be found at the end of these instructions.

The pump must be cleaned prior to dispatch!

If dosing liquid has possibly entered the pump housing, state that explicitly in the safety declaration! Observe section *8.4 Diaphragm leakage*.

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.

Observe section *2.3 Transport*.

9. Faults

In the event of faults, a warning or an alarm is triggered. Active faults are indicated by the LEDs.

In case of a warning the pump continues running.

In case of an alarm the pump stops dosing.

For some alarms the pump tries to restart periodically. To initiate a restart attempt manually, set the adjusting knob to 0 % for 2 seconds. When the cause of the alarm has been remedied, the pump starts automatically and switches back to normal operation.

CAUTION

Automatic startup

Minor or moderate personal injury

- Before remedying the cause of the fault, make sure the pump is ready to be started.
- Before starting work on the pump, the pump must be disconnected from the power supply. The system must be pressureless.

9.1 Indicated faults for DDE-B

LED status		Pump status	Fault	Possible cause	Possible remedy
▷Ⅱ	☝				
❍		Standby*	Motor blocked (Alarm)	• Backpressure greater than nominal pressure	• Reduce backpressure. Observe section *4.1 Technical data*.
				• Incorrectly installed diaphragm	• Install the diaphragm correctly.
				• Damage to gears • Hall sensor failure • Motor failure	• Contact your Grundfos service partner.
				• Leaky/dirty outlet valve. Dosing medium flows back from the outlet line into the dosing head and moves the motor. • Inlet pressure too high. Dosing medium flows from the inlet line into the dosing head and moves the motor.	• Replace valve if necessary. See section *8.3 Perform service*. • Install screen in inlet line. • Reduce inlet pressure. Observe section *4.1 Technical data*.
			Cavitation (Alarm)	• Blocked / constricted / squeezed inlet line • Blocked/constricted inlet valve • Suction lift too high • Viscosity too high • Cavitation moves the motor	• Reduce suction lift. • Increase inlet line diameter. • Check inlet line and open isolating valve if necessary.
			Motor overheated (Alarm)	• Ambient temperature to high	• Reduce ambient temperature. • Stop pump until motor cools down.

❍ = LED flashing

empty table cell = LED off

* For some alarms the pump tries to restart periodically.

9.2 Indicated faults for DDE-AR

LED status			Pump status	Fault	Possible cause	Possible remedy
	❍	•	Running	Low-level in tank (Warning)	• Dosing medium tank almost empty	• Fill tank. • Check contact setting (NO/NC).
	•	❍	Standby	Tank empty (Alarm)	• Dosing medium tank empty	
•		❍	Standby	External stop activated (Status message)	• External stop signal is activated	• Deactivate external stop signal to start the pump again. • Check contact setting (NO/NC).
❍			Standby*	Motor blocked (Alarm)	• Backpressure greater than nominal pressure	• Reduce backpressure. Observe section *4.1 Technical data*.
					• Incorrectly installed diaphragm	• Install the diaphragm correctly.
					• Damage to gears • Hall sensor failure • Motor failure	• Contact your Grundfos service partner.
					• Leaky/dirty outlet valve. Dosing medium flows back from the outlet line into the dosing head and moves the motor. • Inlet pressure too high. Dosing medium flows from the inlet side into the dosing head and moves the motor.	• Replace valve if necessary. See section *8.3 Perform service*. • Install screen in inlet line. • Reduce inlet pressure. Observe section *4.1 Technical data*.
				Motor overheated (Alarm)	• Ambient temperature to high	• Reduce ambient temperature. • Stop pump until motor cools down.
				Cavitation (Alarm)	• Blocked / constricted / squeezed inlet line • Blocked/constricted inlet valve • Suction lift too high • Viscosity too high • Cavitation moves the motor	• Reduce suction lift. • Increase inlet line diameter. • Check inlet line and open isolating valve if necessary.

• = LED on

❍ = LED flashing

empty table cell = LED off

* For some alarms the pump tries to restart periodically.

9.3 General faults

Fault	Possible cause	Possible remedy
Dosing flow too high	Inlet pressure greater than backpressure	Install additional spring-loaded valve (approx. 2 bar) on the outlet side. Check settings.
		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 *8.3 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 inlet line	Clean inlet line/install strainer.
	Suction lift too high	Reduce suction lift.
		Install priming aid.
	Viscosity too high	Use lines with larger diameter.
		Install spring-loaded inlet and outlet valve.
	Deaeration valve open	Close the deaeration valve.
Irregular dosing	Valves leaking or blocked	Tighten up valves, replace valves if necessary. See section *8.3 Perform service*.
	Backpressure fluctuations	Keep backpressure constant.
Liquid escaping from the drain opening on the dosing head	Faulty diaphragm	Immediately separate the pump from the power supply! Observe section *8. Service* and especially section *8.4 Diaphragm leakage*.
Liquid escaping	Dosing head screws not tightened	Tighten up screws. See section *5.2 Hydraulic connection*.
	Valves not tightened	Tighten up valves/union nuts. See section *5.2 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 *8.3 Perform service*.

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.

See also end-of-life information at www.grundfos.com/product-recycling.

Safety declaration

Please copy, fill in and sign this sheet and attach it to the pump returned for service.

Fill in this document using English or German language.

Product type (nameplate) _____

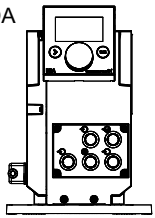
Model number (nameplate) _____

Dosing medium _____

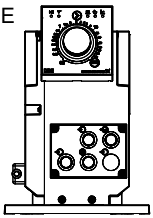
Fault description

Please make a circle around the damaged parts.
In the case of an electrical or functional fault, please mark the cabinet.

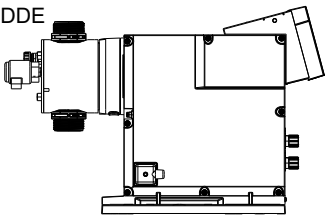
DDA



DDE



DDA / DDE



TM06 7265 3918

Please describe the error/cause of the error in brief.

_____

☐ Dosing liquid has possibly entered the pump housing.
The pump must not be connected to the power supply! Danger of explosion!

_____

We hereby declare that the pump has been cleaned and is completely free from chemical, biological and radioactive substances.

_____
Date and signature

_____
Company stamp

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