Operating instructions

Peristaltic metering pump
DULCO flex Control DFYa

EN

Target group: at least "instructed personnel" unless otherwise required.

Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

Supplementary information

Fig. 1: Please read!

Read the following supplementary information in its entirety! You will benefit more from the operating instructions should you already know this information.

The following are highlighted separately in the document:

- Enumerated lists

→ Instructions

⇨ Outcome of the instructions

↳ *'State the identity code and serial number' on page 2*: Links to points in this chapter

- refer to ... : References to points in this document or another document

[Keys]

'Menu level 1 ➔ *Menu level 2* ➔ *Menu level ...*': Menu paths

'Software interface texts'

Information

This provides important information relating to the correct operation of the unit or is intended to make your work easier.

Safety information

Safety information is identified by pictograms - see "Safety Chapter".

State the identity code and serial number

Please state the identity code and serial number, which you can find on the nameplate or in the menu under *'Setting / Menu* ➔ *Information'* when you contact us or order spare parts. This enables us to clearly identify the unit type and material version.

General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. It is aimed equally at both men and women. We kindly ask female readers for their understanding in this simplification of the text.

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1 About this pump

Fig. 2: Features of the pump.

Pumps in the DULCO flex Control - DFYa product range are microprocessor-controlled peristaltic metering pumps with the following features:

- Adjustment of the dosing rate directly l/h or gph
- Reverse flow is possible
- by software-supported hose change
- Sole contact with media in the hose
- Direct input of the final concentration in concentration mode with volume-proportional metering tasks
- External control via potential-free contacts with pulse step-up and step-down
- External control via 0/4-20 mA standard signal, scalable
- Integrated 1-week/1-month timer
- Connection to process control systems via a BUS interface, such as PROFIBUS® or CAN bus
- DULCOnneX-compatible

2 Identity code

Product identification

This identity code serves to identify the product.

Use the identity code from the Product Catalogue for orders.

Product range DULCO flex Control - DFYa								
DFYa								
	Pump type							
	08410	8 bar, 410 l/h						
	06410	6 bar, 410 l/h						
	04410	4 bar, 410 l/h						
		Hose material						
		0	NR					
		B	NBR					
		E	EPDM					
		G	NBR-A (with FDA + 1935/2004 certificate)					
		C	NBR-A (food-safe)					
		H	HYPALON®					
		N	Norprene®					
			Dosing head orientation					
			R	right (standard)				
			L	left				
				Hydraulic connector				
				A	VA, BSP 3/4"			
				B	VA, NPT 3/4"			
				C	PP, BSP 3/4"			
				D	PVDF, BSP 3/4"			
				E	PVDF, NPT 3/4"			
				F	PVC, NPT 3/4"			
				G	TRI-CLAMP, VA, 1"			
				H	DIN 11851, VA, NW20			
					Hose rupture indicator			
					0	without hose rupture indicator		
					1	with hose rupture indicator		
						Design		
						P	ProMinent design	
						M	modified	
							Special version	
							0	Standard

Product range DULCO flex Control - DFYa		
H	Chemically high-resistance version (Halar-coated)	
Logo		
0	with logo	
1	without logo	
M	modified	
Design of power unit		
U	universal 100 ... 230 V ± 10 %, 50/60 Hz	
Cable and plug		
A	2 m, Europe	
B	2 m, Switzerland	
C	2 m, Australia	
D	2 m, USA / 115 V	
E	2 m, Great Britain	
Relay function		
0	no relay	-
1	Changeover contact 230 V AC – 8 A	Fault indicating relay
3	N/O 24 V DC – 1 A N/O 24 V DC – 100 mA	Fault indicating relay + pacing relay
8	0/4-20 mA output 1 x N/O 24 VDC – 100 mA	As 3 + 0/4-20 mA output
Accessories		
0	no accessories	
Control version		
0	Manual + external contact with pulse control	
1	Manual + external contact with pulse control + analogue 0/4-20mA	
6	PROFIBUS® M12 plug	
7	CANopen	
Operating panel		
0	HMI with Clickwheel 0.5 m	
4	HMI with Clickwheel 2 m	
5	HMI with Clickwheel 5 m	
6	HMI with Clickwheel 10 m	
Access code		
0	no access code	
1	with access code	
Communication		
0	none	
Language		
EN	German	

Product range DULCO flex Control - DFYa																	
																EN	English
																ES	Spanish
																FR	French
																...	...

3 Safety chapter

Identification of safety notes

The following signal words are used in these operating instructions to denote different severities of danger:

Signal word	Meaning
WARNING	Denotes a possibly dangerous situation. If this is disregarded, you are in a life-threatening situation and this can result in serious injuries.
CAUTION	Denotes a possibly dangerous situation. If this is disregarded, it could result in slight or minor injuries or material damage.

Warning signs denoting different types of danger

The following warning signs are used in these operating instructions to denote different types of danger:

Warning signs	Type of danger
	Warning – automatic start-up.
	Warning – hand injuries.
	Warning – high-voltage.
	Warning – danger zone.

3.1 Intended use

NOTICE!

Wear caused by "Pump ON/OFF" using the mains connection

Frequent switching of the pump on and off (>2 times each day) using the supply voltage leads to increased wear in the pump. The pump is not technically designed for this.

If necessary, use the "Pause" function to switch the pump to standby mode. Do not switch the pump on and off using the supply voltage to spare a pause input.

- Only use the pump to meter liquid feed chemicals.
- The pump is only intended for industrial use.
- Only use the pump once it has been correctly installed and started up in accordance with the technical data and specifications contained in the operating instructions.
- Observe the general limitations with regard to viscosity limits, chemical resistance and density - see also the ProMinent Resistance List in the Product Catalogue or at www.prominent.com. Use the "Resistance List for DULCO flex Control DFXa and DFYa" available at www.prominent.com for the pump hose.

- All other uses or modifications are prohibited.
- The pump is neither a gas pump nor a solids pump. In spite of this, gas bubbles in the feed chemical as well as particles with a diameter of up to 1/3 of the inner diameter of the hose can be pumped.
- The pump is not designed to meter flammable media.
- The pump is not designed to meter explosive media.
- The pump is not designed for use outdoors, without appropriate protective measures.
- Only allow the pump to be operated by trained and authorised personnel, see the following "Qualifications" table.
- You have a duty to observe the information contained in the operating instructions during the different phases of the unit's service life.

3.2 Safety information

WARNING!

Warning about personal and material damage

The pump can start to pump, as soon as it is connected to the mains voltage.

– Install an emergency cut-off switch in the pump power supply line or integrate the pump in the emergency cut-off management of the system.

WARNING!

Warning of personal injury and material damage

The pump can start pumping as soon as it has cooled down after the error *'temperature'*.

– Take this into account with the pump and your installation.

CAUTION!

Running on after stop

The pump continues to run on a little.

In the worst case, this could last for around 30 s at low speed.

– Pay attention to this running on time – an hourglass symbol appears in the display.
– If you wish, you can temporarily ramp up the speed – to shorten this time.

Reversing the dosing direction: serious damage to the pump or environment is possible

- Valves, lines etc. can be slightly or irreparably damaged and feed chemical can escape. Pressure of up to +10 bar (now pressure side) can now be applied to components instead of negative pressure (suction side).
- Before changing the dosing direction, it needs to be clear that this will not slightly or irreparably damage parts of the downstream system.

WARNING!

Danger of electric shock

Supply voltage may be present inside the pump housing.

– Safely and quickly disconnect the pump from the mains/power supply if the pump housing has been damaged.
  Only return the pump to operation after an authorised repair.

WARNING!

Warning of hazardous feed chemical

Should a dangerous feed chemical be used: it may escape from the hydraulic components when working on the pump, material failure or incorrect handling of the pump.

– Take appropriate protective measures before working on the pump (e.g. safety glasses, safety gloves, ...). Adhere to the material safety data sheet for the feed chemical.
– Drain and flush the liquid end before working on the pump.

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

CAUTION!

Warning of feed chemical spraying around

Feed chemical may spray out of the hydraulic components if they are tampered with or opened due to pressure in the liquid end and adjacent parts of the system.

– Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
– Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.

Warning of body parts being drawn in

- The rotor running in the liquid end can draw in and trap body parts.
- Do not reach into the running rotor.
- Only remove the front cover when prompted to do so by the operating instructions or operating software.
- Only change the hose as directed in the operating software.

Warning about the feed chemical.

- An unsuitable feed chemical may cause premature wear of the pump hose.
- Pay attention to the resistance of the pump tube and the "Resistance List for DULCO flex Control DFXa and DFYa" available at www.prominent.com when selecting the feed chemical.

CAUTION!

Danger from incorrectly operated or inadequately maintained pumps

Danger can arise from a poorly accessible pump due to incorrect operation and poor maintenance.

– Ensure that the pump is accessible at all times.
– Adhere to the maintenance intervals.

3.3 Isolating protective equipment

- Cover of the slot for relays and optional modules - see the chapter entitled “Overview of equipment and control elements”
- Front cover of the liquid end - see “Overview of equipment and control elements” chapter

The front cover only prevents people accessing the rotor; it is not liquid-tight.

Customers should only remove the cover of the slot for relays and optional modules and/or a relay or optional module in line with the supplementary instructions for the relays and optional modules.

Customers should only remove the front cover of the liquid end in accordance with the “Repair” chapter.

Only ProMinent Service is authorised to open the housing in the pump foot and the HMI (houses the control elements).

3.4 Other protective equipment

Labels.

- A warning sign indicating "Warning of injury to hands" is affixed to the pump and warns of rotating parts and the risk of being dragged into the liquid end.
- Ensure that the label is always fitted and legible.

Star-shaped handle with locking nut.

- The bearing cover of the liquid end is fixed in place with 4 star-shaped screws. 1 star-shaped screw is additionally secured with a locking nut to prevent unintentional opening.

  Make sure that this locking nut is always fitted during operation.

3.5 Information in the event of an emergency

In an emergency, either disconnect the mains plug, press *[Start/Stop]* or the Emergency Stop switch installed on the customer's side, or disconnect the pump from the mains/power supply in line with the Emergency Stop management guidelines for your system.

If feed chemical escapes, ensure that the hydraulic environment around the pump is at atmospheric pressure as well. Pay attention to the material safety data sheet for the feed chemical.

3.6 Qualification of personnel

Qualification of personnel

Task	Qualification
Storage, transport, unpacking	Instructed person
Assembly	Technical personnel, service
Planning the hydraulic installation	Technical personnel who have a thorough knowledge of peristaltic pumps
Hydraulic installation	Technical personnel, service
Electrical installation	Electrical technician
Initial commissioning	Technical personnel, service
Operation	Instructed person
Maintenance, repair	Technical personnel, service
Decommissioning, disposal	Technical personnel, service
Troubleshooting	Technical personnel, electrical technician, instructed person, service

Explanation of the table:

Technical personnel

Technical personnel are deemed to be people who are able to assess the tasks assigned to them and recognise possible dangers based on their technical training, knowledge and experience, as well as knowledge of pertinent regulations.

Note:

A qualification of equal validity to a technical qualification can also be gained by several years of employment in the relevant field of work.

Electrical technician

An electrical technician is able to complete work on electrical systems and recognise and avoid possible dangers independently based on his or her technical training and experience as well as knowledge of pertinent standards and regulations.

The electrical technician must be specifically trained for the working environment in which he or she is employed and be conversant with the relevant standards and regulations.

The electrical technician must comply with the provisions of the applicable statutory directives on accident prevention.

Instructed person

An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.

Service

The service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the device / system.

3.7 Sound pressure level

Sound pressure level LpA < 70 dB in accordance with EN ISO 20361, at maximum dosing rate, maximum back pressure and using water as the feed chemical.

4 Storage, transport and unpacking

User qualification: Instructed person - see *'Qualification of personnel' on page 14*

Safety information

WARNING!

Only return metering pumps for repair in a cleaned state and with a flushed liquid end - refer to "Decommissioning!

Only return metering pumps with a completed Decontamination Declaration form. The Decontamination Declaration constitutes an integral part of an inspection / repair order. A unit can only be inspected or repaired when a Declaration of Decontamination Form is submitted that has been completed correctly and in full by an authorised and qualified person on behalf of the pump operator.

The "Decontamination Declaration Form" can be found on our homepage.

CAUTION!

Danger of material damage

The device can be damaged by incorrect or improper storage or transportation!

- The unit should only be stored or transported in a well packaged state - preferably in its original packaging.
- The packaged unit should also only be stored or transported in accordance with the stipulated storage conditions.
- The packaged unit should be protected from moisture and the ingress of chemicals.

CAUTION!

Before shipping

Remove the pump hose from the pump before shipping.

Ambient conditions

Ambient conditions - see "Technical data" chapter.

Storage period, max.

Storage period of pump hose non-condensing, max.: 2 years

Scope of delivery

Compare the delivery note with the scope of delivery:

- Metering pump with mains cable
- Pump hose
- 2nd roller for the rotor
- Spacer plates
- Connector kit for hose/pipe connection (option)
- Product-specific operating instructions with EU Declaration of Conformity

5 Overview of equipment and control elements

5.1 Overview of equipment

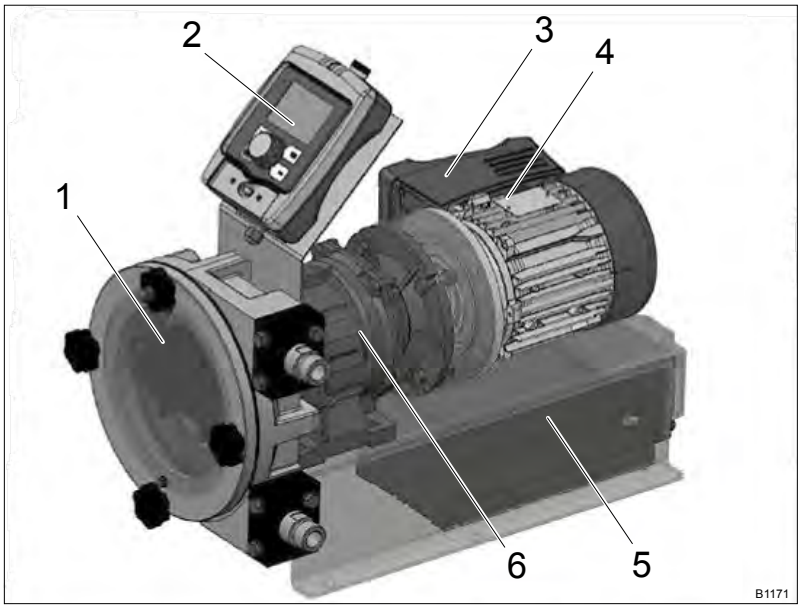


Fig. 3: Overview of equipment DFYa, complete

1 Liquid end
2 HMI
3 Frequency converter
4 Motor
5 Control unit (in the pump foot)
6 Gear

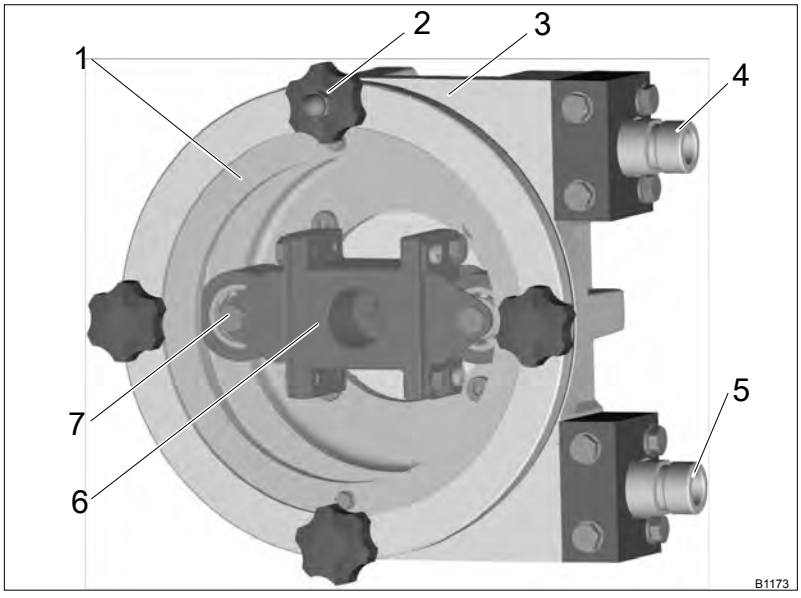


Fig. 4: Liquid end of DFYa

1 Front cover (transparent)
2 Star-shaped screw
3 Dosing head
4 Pressure connector (depending on the identity code)
5 Suction connector (depending on the identity code)
6 Rotor
7 Roller
not shown Hose rupture sensor

5.2 Control elements

5.2.1 Control elements, overview

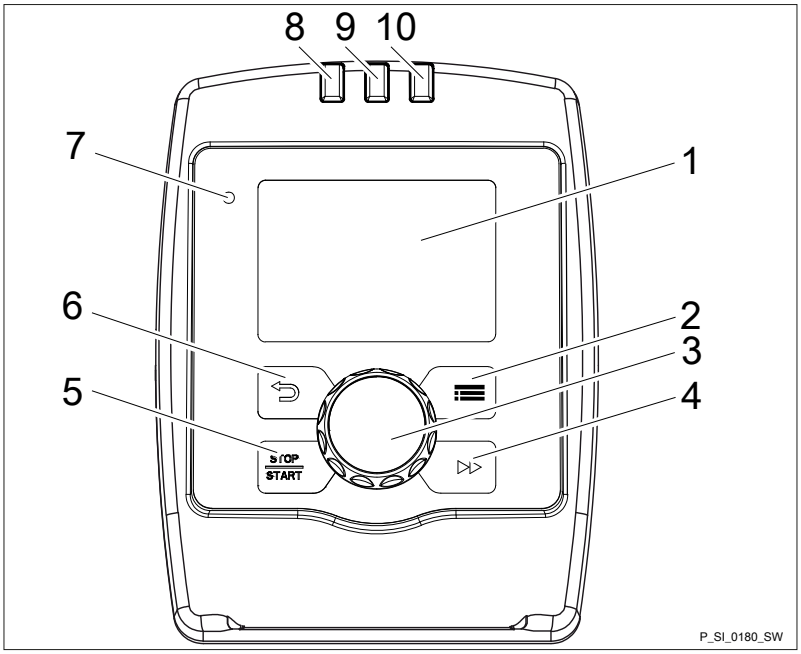


Fig. 5: HMI control elements DULCO flex Control - DFYa DFYa

1 LCD screen
2 *[Menu]* key
3 Clickwheel
4 *[Priming]* key
5 *[STOP/START]* key
6 *[Back]* key
7 "Bluetooth active" display (blue)
8 Fault indicator (red)
9 Warning indicator (yellow)
10 Operating indicator (green)

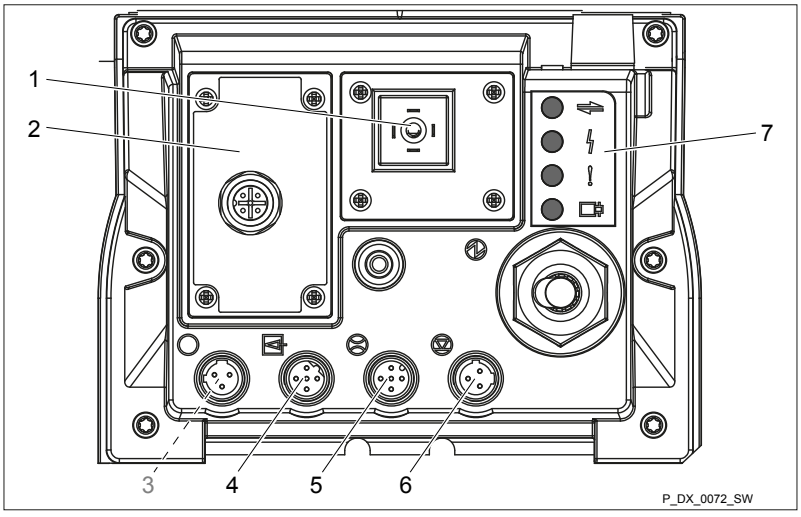


Fig. 6: Control unit control elements

1 Relay and mA-output (optional)
2 Slot for optional modules (PROFIBUS®, ...)
3 No function
4 "External control" terminal
5 "Hose rupture" terminal (DFM input)
6 "Level switch" terminal
7 LEDs (such as) and CAN bus status LED (external)

5.2.2 Control elements, Description

Identifier and fault displays on the LCD screen

Use this overview to familiarise yourself with the keys and other control elements of the pump!

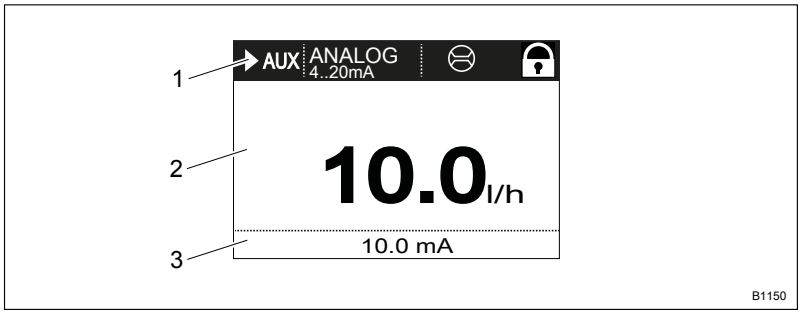


Fig. 7: Construction of the continuous display

1 Status bar
2 Continuous display, central area
3 Secondary display

Refer to the chapter entitled "Main displays and secondary displays" in the Appendix for the different main displays and secondary displays.

The LCD screen supports the operation and adjustment of the pump using different information and identifiers:

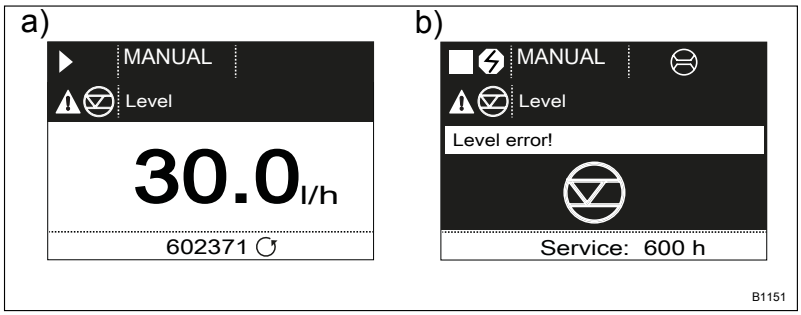


Fig. 8: a) Continuous display with warning message; b) Continuous display with fault message. Explanation of the symbols in the following tables.

The Fig. 8, Part a) shows that:

- the pump is in operation
- is in *'Manual'* operating mode
- a *'Level'* warning message is pending
- the capacity of 30.0 l/h has been set
- the pump has performed 602371 revolutions to date

Tab. 1: Identifiers and error displays:

Identifier	Meaning
	The pump is working or waiting for a starting signal.
	Direction of rotation of the rotor (here: clockwise)
	The pump was manually stopped using the [STOP/START] key.
	The pump was remotely stopped (Pause) - via the "External" terminal.

Identifier	Meaning
	The pump was stopped by an error.
	Only with cyclical batch metering: the pump is waiting for the next cycle.
	Only with *'Access protection'*: the pump software is locked.
'AUX'	The pump is currently pumping at auxiliary capacity.
'memory'	Only in *'CONTACT'* and *'BATCH'* operating modes: the auxiliary function "Memory" has been set.
	The pump is in *'ANALOG'* operating mode. The *'Curve ➔ linear'* type of processing is set.
	The pump is in *'ANALOG'* operating mode. The *'Curve ➔ Upper side band'* type of processing is set.
	A hose rupture indicator is connected.
	The pump is in the *'Menu'* (Set up).

Further explanations can be found in the "Troubleshooting" chapter.

INFORMATION!: The pump only shows the metering volume and the capacity in the calibrated state in l or l/h or in gal or gal/h (US gallons).

5.2.3 Key functions

Key	Application	In the continuous displays	In the menu
[Back]	press	-	Go back to the previous menu item (or a continuous display) - without saving
[STOP/START]	press	Stop pump,	Stop pump,
		Start pump	Start pump
[Menu]	press	Go to the menu	Go back to a continuous display
[Priming]	press	Priming *	Priming *
[Clickwheel]	press	Start batch (only in *'Batch'* operating mode), Acknowledge error	Go to next menu item (or a continuous display) Confirm entry and save
[Clickwheel]	turn	Switch between the continuous displays	Change figure or change selection

CAUTION!

Rotor is running on

The rotor will continue to run on up to 180° once the pump has been stopped by the *[STOP/START]* key.

– Take this into account before working on the pump or pipework.

* When priming the pump does not run at maximum number of revolutions.

If *[Priming]* is pressed in *'Stop'* status, then *[Priming]* has top priority as long as the button is pressed.

Refer to the "Set-up basics" chapter for information on how to adjust figures

6 Functional description

6.1 Device

An electric motor drives a rotor. Rollers are fitted to the ends of the rotors, which press the pump hose against the inner curvature of the dosing head. The peristaltic pump operates by the rollers driving the feed chemical through the pump hose. The feed chemical is primed by the pump hose automatically returning to its initial position.

The rotor always stops at angle values, which are safe for operation, which is why the rotor can “run on” for up to 1/2 revolution.

6.2 Dos. capacity

The capacity that has been set regulates the pump itself.

The minimum volume that can be metered corresponds to 1 revolution of the rotor.

In *‘Batch’ ‘operating mode’*, the minimum volume that can be metered corresponds to 6 revolutions of the rotor.

6.3 Operating modes

Operating modes are selected via the "Operating modes" menu.

Refer to the "Hierarchy of Operating Modes, Functions and Fault Statuses" for the order of the various operating modes, functions and fault statuses.

"Manual" operating mode

‘Manual’ operating mode permits you to operate the pump manually.

"Contact" operating mode

This operating mode provides the option of controlling the pump externally by means of potential-free contacts (e.g. by means of a contact water meter). “Pulse Control” can be used to preselect the metering volume in the *‘Settings’* menu.

"Batch" operating mode

This operating mode provides the option of working with large metering volumes. Metering can be triggered either by pressing the *[Clickwheel]* or by a pulse received via the "External control" terminal via a contact or a semiconductor switching element. It is possible to pre-select a metering volume (batch) and a metering time using the *[Clickwheel]* in the *‘Settings’* menu.

"Analog" operating mode

The capacity is controlled using an analogue current signal via the "External control" terminal. Processing of the current signal can be preselected using the control unit.

6.4 Functions

Refer to the "Hierarchy of Operating Modes, Functions and Fault Statuses" for the order of the various operating modes, functions and fault statuses.

The following functions can be selected using the *'Settings'* menu:

"Calibrate" function

Calibrate the pump if you wish good precision when metering high-viscosity feed chemicals.

"Auxiliary capacity" function

This facilitates the switch-over to a fixed adjustable capacity in the *'menu'* via the "External control" socket.

"Timer" function

This permits a simple timer program to be set up without the need for an additional timer module.

The following functions are available as standard:

"Level switch" function

Information about the liquid level in the dosing tank is reported to the pump. A two-stage level switch has to be fitted for this purpose, which is connected to the "Level switch" socket. A suction lance with continuous level measurement can also be connected to the pumps.

"Pause" function

The pump can be remotely stopped via the "External control" socket.

"Stop" function

The pump can be stopped without disconnecting it from the mains/power supply by pressing *[STOP/START]*.

"Priming" function

Priming can be triggered by pressing *[Priming]*.

6.5 Relay (options)

The pump has several connecting options available:

"Fault indicating relay" option

The relay can close a connected power circuit (e.g. for an alarm horn) in the event of warnings or fault messages (e.g. *'Warning level'*).

The relay can be retrofitted through the slot in the front of the pump – refer to the installation instructions for "Retrofitting relays".

"Fault indicating and pacing relay" option

This combined relay can generate a contact for an adjustable volume via its pacing relay in addition to functioning as a fault indicating relay.

The relay can be retrofitted through the slot in the front of the pump.

"mA-Output" option

The current output signal I indicates the pump's actual calculated metering volume. The relay can be retrofitted through the slot in the front of the pump.

The option also always includes a fault indicating relay or a pacing relay.

6.6 LED displays

LED display	Colour	lit	lights up	flashes
Fault indicator	red	A fault message is pending	-	undefined operating status
Warning indicator	yellow	A warning message is pending	-	-
Operating display	Green	The pump is ready for operation	-	-
			During every revolution: Capacity greater than 10 l / h	-
			During every 1/2 revolution: Capacity less than 10 l / h	-
			During every 1/8 revolution: Capacity less than 1 l / h	-
			every 4 s: Capacity less than 500 ml / h	-

CAN bus status LED (external)

This LED on the power end is the top one in the row of 4 LEDs.

Colour	Flash code	Cause	Consequence	Remedy
Green	Lit	Bus status OPERATIONAL	Normal bus mode	-
Green	flashing	Bus status PRE-OPERATIONAL	currently no measured value transmission	wait briefly. Disconnect HMI then reconnect
red	any	Bus error	no measured value transmission	Check whether the CAN connection is faulty. Notify Service

6.7 Hierarchy of operating modes, functions and fault statuses

The different functions, fault modes and operating modes have a different impact on whether and how the pump reacts.

The following list shows the order:

1. - Priming
2. - Error
3. - Stop
4. - Pause
5. - Warning
6. - Auxiliary frequency
7. - Manual, Analogue, Contact, Batch

Comments:

“Priming" can take place in any pump mode (providing it is working).

An "error” stops everything.

...

7 Assembly

User qualification: Technical personnel and service - see *'Qualification of personnel' on page 14*

Compare the dimensions on the dimensional drawing in the appendix and on the pump.

Space requirement

CAUTION!

Danger from incorrectly operated or inadequately maintained pumps

Danger can arise from a poorly accessible pump due to incorrect operation and poor maintenance.

– Ensure that the pump is accessible at all times.
– Adhere to the maintenance intervals.

CAUTION!

– Take measures to ensure that no uninformed personnel can access the pump.

Position the pump so that control elements and the liquid end are easily accessible.

If the HMI is mounted remotely from the pump: a clearly marked Stop mechanism must be installed in the direct vicinity of the pump for emergencies!

7.1 Design of the suction side

Position the pump as close as possible to the storage tanks for the feed chemical so that the suction line is kept as short and straight as possible.

Make sure that the suction line is absolutely air-tight and made of a suitable material, so that it does not collapse under negative pressure.

The diameter of the hose connector on the pump must correspond to the nominal diameter of the pump hose. A larger diameter is recommended with viscose feed chemicals.

The pump is self-priming and does not require a suction valve.

Do not allow the priming pressure to exceed 3 bar.

The pump can pump in both directions – therefore the hose connection on the pump can either be the pressure connector or the suction connector.

With fixed pipework, we recommend using a flexible transition between two fixed pipes and the hose connector of the pump to avoid the transmission of vibrations.

7.2 Alignment of the discharge side

The discharge line is to be kept as straight and short as possible, in order to avoid performance reduction.

The diameter must correspond to the rated diameter of the pump hose. Bei viskosen Flüssigkeiten wird ein größerer Durchmesser empfohlen.

It is recommended to use a flexible transition between two fixed pipes and the hydraulic connection of the pump, in order to avoid the transmission of vibrations.

7.3 Setting the roller pressure

Introduction

When delivered, a roll is supplied unfitted (for an improved hose storage period). Probably this roll can be simply installed – with the same number of spacer plates as the roll already installed. Read on to assess this.

"Roller pressure / spacer plates" background

The roller pressure can be used to optimise the degree of compression and, in turn, the service life of the hose in operation. It is worthwhile if the back pressure is clearly lower than the maximum back pressure of the pump.

The optimum roller pressure depends, for instance, on the back pressure of the feed chemical and the hose material.

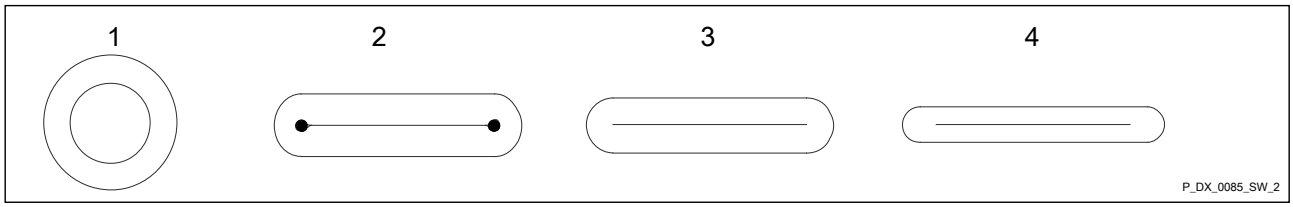


Fig. 9: For optimum degree of compression of the hose and/or roller pressure

1 Uncompressed hose
2 Insufficient roller pressure / degree of compression: increased wear (backflowing medium destroys the hose in the two hollows)
3 Optimum roller pressure / degree of compression: minimal wear
4 Too high roller pressure / degree of compression: increased wear (hose too heavily compressed)

→ Optimum roller pressure can be achieved by fitting the stated number of spacer plates between the rotor and rollers – see *Tab. 2 'Number of spacer plates required *, depending on the back pressure – for all hose materials' on page 26*.

*Tab. 2: Number of spacer plates required *, depending on the back pressure – for all hose materials*

Back pressure bar	NR, NBR, EPDM, NBR-A, HYPALON® **
0.5	1
2.0	1
4.0	1
6.0	2
8.0	3

* Delivery state depending on the pump type / identity code

** The number of spacer plates for Norprene® is always 9 – you need to do nothing more.

Note that you will change the identity code of the pump by changing the number of spacer plates.

Changing the number of spacer plates – using the *'Hose change'* menu

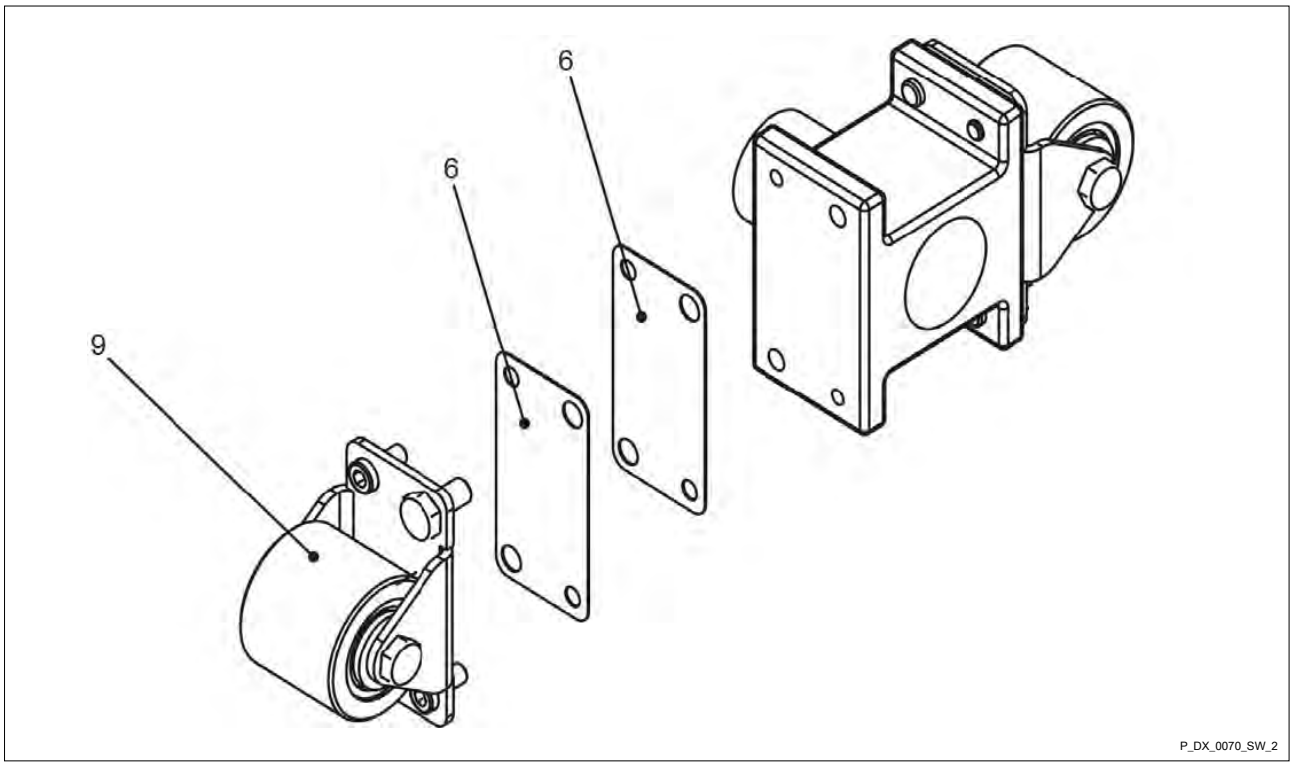


Fig. 10: Rotor of DFYa

6 Spacer plates
9 Roller

To adjust the number of spacer plates:

Requirements

- Ensure that the system is at atmospheric pressure.
- Adhere to the material safety data sheet for the feed chemical.
- Prevent the escape of feed chemical.
- If necessary take protective measures.

1. If necessary, press *[STOP/START]* to bring the pump to a *'Stop (Manual)'*.
2. Drain the liquid end – flush out with a suitable medium; flush the liquid end thoroughly when using hazardous feed chemicals!
3. Go to the ➔ *'Hose change'* menu.
   ⇨ *'Go to change position?'* appears.

WARNING!
The rotating rotor may catch, trap and wind body parts or clothing.

- Only remove the front cover when the pump prompts you to do so.
- Only refit the front cover when the pump prompts you to do so.

4. Confirm the prompt with *'Yes'*.
   ⇨ The rotor turns slowly and the following appears:

   'Please wait...'.

   The rotor stops and *'Hose change - Step 1'* - *'Please remove cover and take out the roller'* appears. (the corresponding roller flashes in the animation).

   If the position is not ideal (the rotor should be relatively horizontal), move the rotor into the right position by turning the *[Clickwheel]*.
5. Loosen the 4 star screws (2) on the dosing head (5) and remove with the front cover (1).
6. Unscrew the roller (3) flashing on the LCD screen with its roller bracket from the rotor (2 hex screws) and remove from the dosing head (5).
7. Unscrew the spacer plates (6) (2 hex screws).
8. Adjust the number of spacer plates (6) to your requirements and screw tightly in place (2 hex screws).
9. Replace the roller (3) you have removed with its roller bracket onto the rotor (2 hex screws) and screw tightly into place.
10. Fit the front cover (1) and attach the 2 star-shaped screws (2) to the dosing head (5).
11. Press the Clickwheel.
    ⇨ The rotor turns slowly around 180° and the following appears:

    'Please wait...'.

    The rotor stops and *'Hose change - Step 2'* - *'Please change the hose'* appears.

    If the position is not ideal (the second roller should be quite far from the hose), move the rotor into the right position by turning the *[Clickwheel]*.
12. Loosen the 4 star screws (2) on the dosing head (5) and remove with the front cover (1).
13. Unscrew the second roller (3) with its roller bracket from the rotor (2 hex screws) and remove from the dosing head (5).
14. Unscrew the spacer plates (6) (2 hex screws).
15. Adjust the number of spacer plates (6) to your requirements and screw tightly in place (2 hex screws).
16. Replace the roller (3) you have removed with its roller bracket onto the rotor (2 hex screws) and screw tightly into place.
17. Fit the front cover (1) and attach the 2 star-shaped screws (2) to the dosing head (5).
18. Press the Clickwheel
    ⇨ The rotor turns slowly and the following appears:

    'Please wait!'.

    The rotor stops and *'Hose change - Step 3'* - *'Insert roller and cover again'* appears.

19. Fit the front cover (1) and attach the 4 star-shaped screws (2) to the dosing head (5). Screw the domed nut onto the 4th star screw again and tighten it to provide a locking function.

20. Press the Clickwheel.

    ⇨ The *'Hose change interval'* menu appears.

21. Press the *[Clickwheel]* to reset the warning time.

    ⇨ *'Reset interval now!'* appears.

22. Press the *[Clickwheel]* again to complete the *'hose change'* menu.

    ⇨ *'Complete!'* and a hand symbol appear. This is a reminder that the pump still needs to be stopped manually. If necessary, now restart the pump using the *[STOP/START]* key.

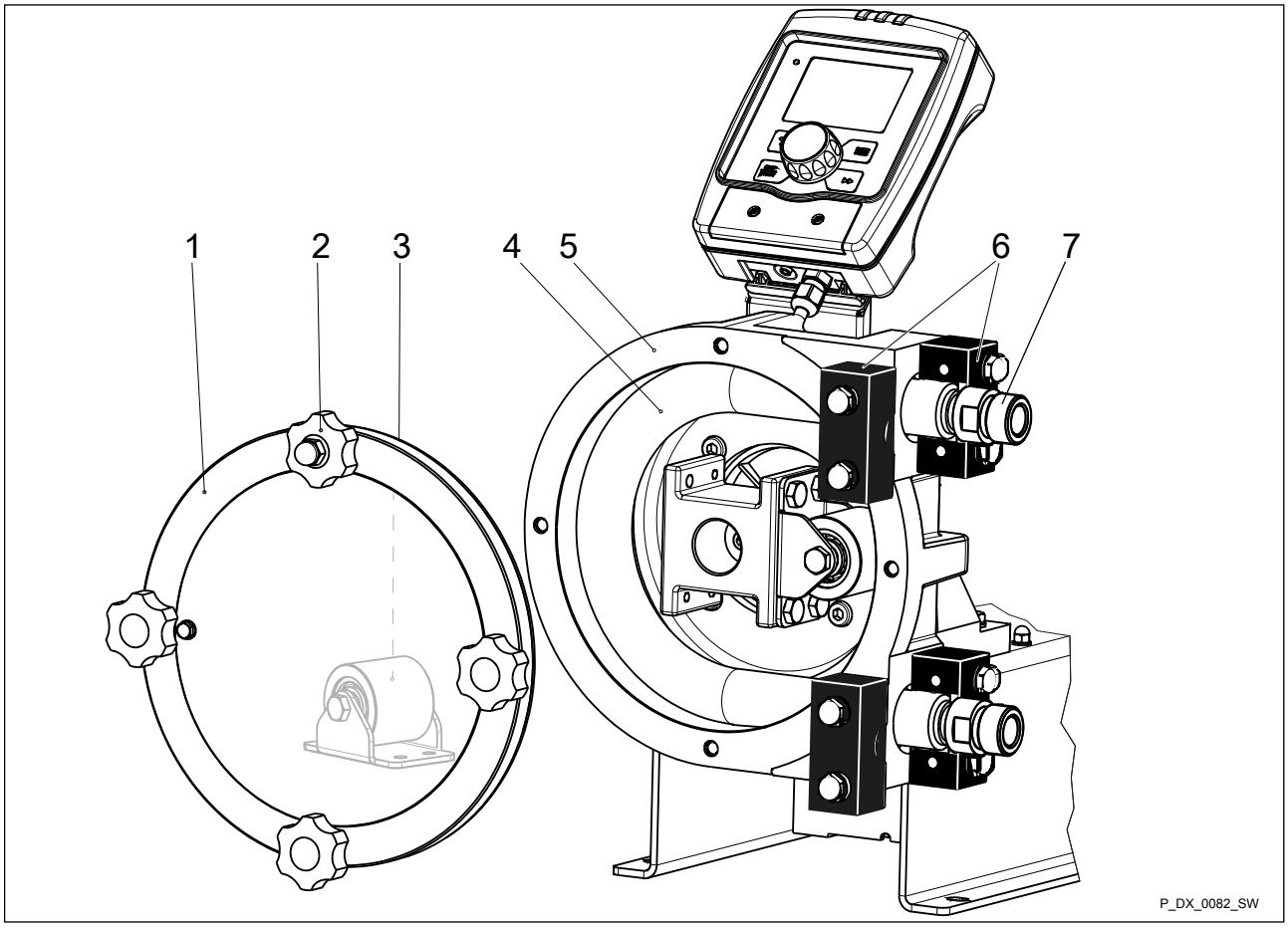


Fig. 11: DULCO flex Control - DFYa DFYa with roller dismantled and in hose change position

1 Front cover
2 Star-shaped screw, shown here with domed nut in a locking function
3 Roller with roller bracket, dismantled
4 Pump hose
5 Dosing head
6 Bracket for hydraulic connector, 2-part, partially dismantled
7 Hydraulic connector, top

7.4 Mounting the HMI user control

If ordered with the wall mounting, the HMI can be mounted directly on a wall.

Install the HMI in the immediate vicinity of the pump. If not provided for, fit a circuit breaker there - refer to the "Installation, electrical" chapter. Ensure that the system is set up ergonomically.

When doing so, consider the available cable length. Prevent tripping hazards.

Refer to the relevant dimensional drawing for the dimensions of the HMI and the fixing holes.

CAUTION!

Warning of faulty operation

– Do not install the HMI and cable too close to devices and cabling that emit strong electrical interference.

8 Installation, hydraulic

User qualification: Technical personnel and service - see *'Qualification of personnel' on page 14*

Safety information

CAUTION!
Warning of feed chemical spraying around
An unsuitable feed chemical can damage the parts of the pump that come into contact with the chemical.

– Take into account the resistance of the wetted materials and the ProMinent Resistance List when selecting the feed chemical - see the ProMinent Product Catalogue or visit ProMinent.

CAUTION!
Warning of feed chemical spraying around
An unsuitable feed chemical may cause premature wear to the pump hose.

– Pay attention to the resistance of the pump hose and the "Chemical Resistance List DFXa and DFYa" available at www.prominent.com when selecting the feed chemical.

CAUTION!
Warning of feed chemical spraying around
There can be a discharge-side leak if the pump is working against a blockage in the discharge line or a shut-off valve.

– Install a relief valve, among other things, downstream of the pump.

CAUTION!
Warning of feed chemical spraying around
Pumps which are not fully installed hydraulically can pump feed chemical from the pressure nozzle of the liquid end as soon as they are connected to the mains power supply.

– First install the pump hydraulically, then electrically.
– In the event that you have failed to do so, press the *[STOP/START]* button or press the Emergency Stop switch.

CAUTION!
Warning of feed chemical spraying around
Feed chemical may spray out of the hydraulic components if they are tampered with or opened due to pressure in the liquid end and adjacent parts of the system.

– Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
– Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.

CAUTION!

Danger of injury to personnel and material damage

The use of untested third party components can result in injury to personnel and material damage.

– Only fit parts to metering pumps that have been tested and recommended by ProMinent.

CAUTION!

Warning of feed chemical spraying around

The pipes can become loose or rupture if they are not installed correctly.

– Route all hose lines so they are free from mechanical stresses and kinks.
– Only use original hoses with the specified hose dimensions and wall thicknesses.

CAUTION!

Very low hose service life possible

Apart from other factors, too large solid particles in the feed chemical significantly reduce the service life of the hose.

– Do not allow particles of solids with a diameter of more than 4 mm.
  Use an appropriate filter if necessary.

Design the hydraulic installation in such a way that the pump hose can be drained and, if necessary, with hazardous chemicals flushed through before it is changed.

Arrange the lines so that the metering pump and the pump hose can simply be removed if necessary.

Installing hose lines

Installing suction and discharge lines:

1. First test which is the suction connector and which is the pressure connector:

   In *'' 'Manual'* operating mode, briefly press [STOP/START] *[STOP/START]* and observe the rotor:

   The rotor rotates away from the suction connector and towards the pressure connector.

   If this arrangement is inappropriate, you can change it via the *'dosing direction'* - go to *'Settings* ➔ *Dosing direction* ➔ *...'* menu.

2. Screw your suction hose onto the suction connector of the pump and your pressure hose onto the pressure connector.

9 Installation, electrical

User qualification: Electrical technician *'Qualification of personnel' on page 14*

WARNING!

Danger of electric shock

Supply voltage may be present inside the pump housing.

– Safely and quickly disconnect the pump from the mains/power supply if the pump housing has been damaged.
  Only return the pump to operation after an authorised repair.

CAUTION!

Material damage possible due to power surges

Should the pump be connected to the mains power supply in parallel to inductive consumers (such as solenoid valves, motors), inductive power surges can damage the control when it is switched off.

– Provide the pump with its own contacts (Phase) and supply with voltage via a contactor relay or relay.
– Should this not be possible, then switch a varistor (part no. 710912) or an RC gate (0.22 µF/220 Ω, part no. 710802) in parallel.

CAUTION!

Bonding of the contacts of your switching relay

The high starting current can cause the contacts of the on-site switching relay to bond together if the mains voltage switches a solenoid metering pump on and off in a process.

– Use the switching options offered by the external socket to control the pump (functions: Pause, Auxiliary frequency or Operating modes: Contact, Batch, Analogue).
– Use a starting current limiter if it is impossible to avoid switching the pump on and off via a relay.

1. No moisture must reach the pins of the PROFIBUS® terminal.
   - Screw a suitable PROFIBUS® plug or protective cap onto the PROFIBUS® terminal.
2. Incompletely installed electrical options can allow moisture into the inside of the housing.
   - Fit appropriate modules into the slot on the front of the pump or use the original blank cover to seal it in a moisture-tight manner.
3. Mains voltage may be present inside the device.
   - Disconnect the unit's mains cable from the mains/power supply before starting work.
4. Ensure that the pump is only connected to a socket with a correctly connected protective contact to reduce the risk of electric shock.
5. In the event of an electrical accident, quickly disconnect the pump from the mains/power supply.
   - Install an emergency cut-off switch in the pump power supply line or
   - Integrate the pump into the emergency cut-off guidelines for the system and inform personnel of electrical isolating options.

6. Install the pump in line with best working practice and in accordance with the operating instructions and applicable regulations.

9.1 Control unit, HMI

CAUTION!

Danger of malfunctions

Incorrect operation via the CAN bus will lead to malfunctions.

– Do not connect any other control (e.g. DXCa) to the CAN terminal when operating with the HMI connected.

1. Connect the HMI to the CAN terminal above the LEDs of the pump base if the pump is operated with HMI.
2. Among other things, a short circuit may occur in the pump if liquid penetrates into the CAN terminal. If the pump is operated without the HMI, then plug the sealing cap supplied into the CAN terminal above the LEDs of the pump base.

9.2 Supply voltage connector - mains voltage

WARNING!

Unexpected start-up is possible

The pump can start pumping and consequently feed chemical may escape as soon as the pump is connected to the mains/power supply.

– Avoid the escape of feed chemical.
– If you have not done so, immediately press *[STOP/START]* or disconnect the pump from the mains voltage e.g. using an Emergency Stop switch.
– Refer to the material safety data sheet for your feed chemical.

CAUTION!

If the pump is integrated into a system: Design the system so that potential hazardous situations are avoided by pumps starting up automatically subsequent to unintended power interruptions.

Simply disconnect the pump from the mains/power supply for repair or maintenance work, among other things.

– *With cables with plug: Provide adequate room around the socket provided.*
– *With cables without plug: Provide an appropriate, easily accessible On/Off switching option in your building installation.*

Highlight the disconnection option as such and inform staff about the electrical isolation option.

Connect the pump to the mains voltage using the mains cable.

9.3 Description of the terminals

9.3.1 "External control" terminal

The "external control" socket is a 5-pin panel terminal. It is compatible with 2- and 4-pin cables.

Only use a 5-pin cable with the "Auxiliary capacity" and "mA input" functions.

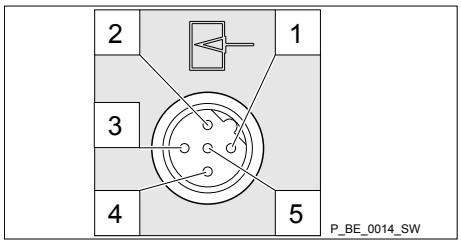


Fig. 12: Assignment on the pump

Electrical interface for pin 1 "Pause" - pin 2 "External contact" - pin 5 "Auxiliary capacity"

Data	Value	Unit
Voltage with open contacts	5	V
Input resistance	10	kΩ
Max. pulse frequency	25	pulse/s
Min. pulse duration	20	ms

Control via:

- potential-free contact (load: 0.5 mA at 5 V) or
- semiconductor switch (residual voltage < 0.7 V)

Electrical interface for pin 3 "mA input" (with identity code characteristic "Control version": 2 and 3)[1]

Data	Value	Unit
Input load, approx.	120	Ω

[1] The metering pump starts running at approx. 0.4 mA (4.4 mA) and reaches maximum capacity at approx. 19.6 mA.

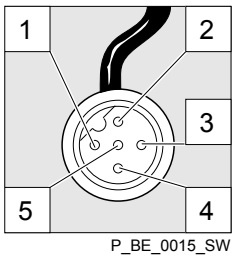


Fig. 13: Assignment on the cable

Pin	Function	5-wire cable	2-wire cable
1	Pause	brown	bridged at pin 4
2	External contact	white	brown
3	mA input*	blue	-
4	Earth GND	black	white
5	Auxiliary capacity	grey	-

*with identity code characteristic "Control version": 3

Refer to the functional description for the sequence of functions and operating modes.

"Pause" function

The pump works if:

- pin 1 and pin 4 are connected to each other and the cable is connected.
- no cable is connected.

The pump does not work if:

- pin 1 and pin 4 are open and the cable is connected.

Acknowledging faults with 'Pause'

Certain errors requiring acknowledgement can also be acknowledged using 'Pause' instead of using the Click-wheel.

"External contact" operating mode

The pump performs one or more revolutions if:

- Pin 2 and pin 4 are connected to each other for at least 20 ms. At the same time, pin 1 and pin 4 must also be connected to each other.

"Analog" operating mode

The pump capacity and/or number of revolutions can be controlled by a current signal. The current signal is connected between pin 3 and pin 4.

Pin 1 and pin 4 must also be connected.

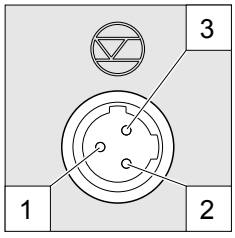
"Auxiliary capacity" operating mode

The pump works at a pre-set capacity if:

- Pin 5 and pin 4 are connected to each other. At the same time, pin 1 and pin 4 must also be connected to each other. The auxiliary capacity is factory-preset to maximum capacity.

9.3.2 "Level switch" terminal

There is a connecting option for a 2-stage level switch with pre-warning and limit stop.



P_BE_0016_SW

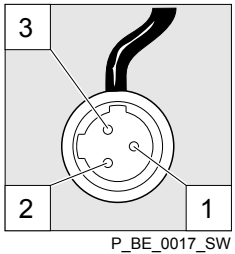
Fig. 14: Assignment on the pump

Electrical interface

Data	Value	Unit
Voltage with open contacts	5	V
Input resistance	10	kΩ

Control via:

- potential-free contact (load: 0.5 mA at 5 V) or
- semiconductor switch (residual voltage < 0.7 V)



P_BE_0017_SW

Fig. 15: Assignment on the cable

Pin	Function	3-wire cable
1	Earth GND	black
2	Minimum pre-warning	blue
3	Minimum limit stop	brown

9.3.3 "Hose rupture indicator" socket (DFM input)

There is an option to connect a hose rupture indicator.

Insert the cable which runs in the metallic pump foot from the hose rupture indicator on the side with the sockets into the "Hose rupture indicator" socket.

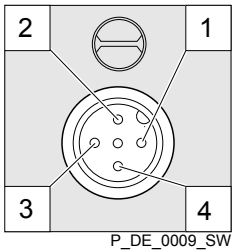


Fig. 16: Assignment on the pump

Electrical interface

Data	Value	Unit
Voltage with open contacts	5	V
Input resistance	10	kΩ

Control via:

- potential-free contact (load: 0.5 mA at 5 V) or

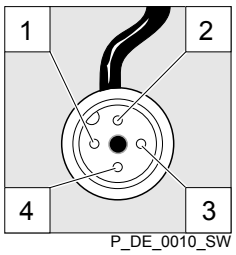


Fig. 17: Assignment on the cable

Pin	Function	4-wire cable
1	Power supply (5 V)	brown
2	Coding	white
3	Feedback	blue
4	Earth GND	black

9.3.4 Relay

9.3.4.1 Relay functions

Tab. 3: DULCO flex Control - DFYa DFYa

Identity code	Designation	Maximum voltage	Maximum current
0	no relay	-	-
1	Fault indicating relay	230 V AC	8 A
3	Fault indicating relay + Pacing relay	24 V DC 24 V DC	100 mA 100 mA
8	0/4-20 mA output + fault indicating / pacing relay	24 V DC	100 mA

Tab. 4: Relay type switches in the event of...

Relay type*	Level warning	Level low	Processor fault
Fault indicating relay:	X	X	X
Warning relay:	X	-	-

* Can be reprogrammed in the *'Relay'* menu.

9.3.4.2 "Fault indicating relay" output (identity code “1”)

A fault indicating relay can be ordered as an option - refer to ordering information in the appendix. It is used to emit a signal when there is a fault with the pump and for the "Liquid level low, 1st stage" warning message and "Liquid level low 2nd stage" fault message.

The fault indicating relay can be retrofitted and is operational once attached to the relay board - refer to "Retrofitting relays" supplementary operating instructions.

The behaviour is factory-programmed. If another switching function is wished, the pump can be reprogrammed in the *'Relay'* menu.

The relay can be retrofitted and is operational once it has been plugged into the relay board.

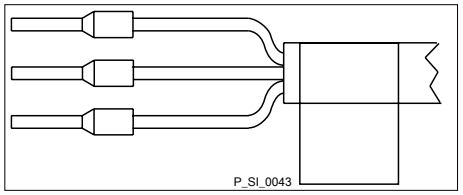


Fig. 18: Assignment on the cable

Electrical interface

Data	Value	Unit
Maximum contact load at 230 V and 50/60 Hz:	8	A
Minimum mechanical service life:	200,000	switching operations

Identity code “1”

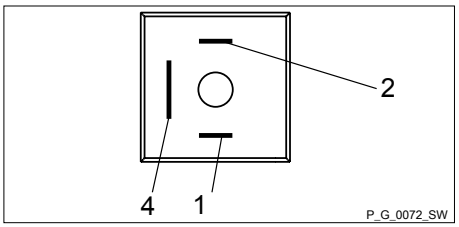


Fig. 19: Assignment on the pump

To pin	VDE cable	Contact	CSA cable
1	white	N/O (normally open)	white
2	Green	N/C (normally closed)	red
4	brown	C (common)	black

9.3.4.3 Output for other relays (identity code “3”)

A fault indicating and a pacing relay can be ordered as options - refer to ordering information in the appendix. The pacing output is electrically isolated by means of an optocoupler with a semiconductor switch. The second switch is a relay (also electrically isolated).

The behaviour is factory-programmed. If another switching function is wished, the pump can be reprogrammed in the *‘Relay’* menu.

The fault indicating/pacing relay can be retrofitted and is operational once attached to the relay board - refer to the "Retrofitting relays" supplementary instructions.

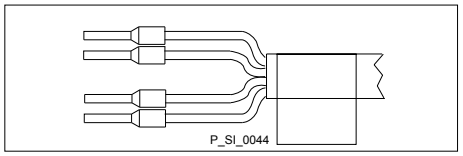


Fig. 20: Assignment on the cable

Electrical interface

for semiconductor fault indicating / pacing relay:

Data	Value	Unit
Max. residual voltage at $I_{off\ max}$ = 1 µA	0.4	V
Maximum current	100	mA
Maximum voltage	24	VDC
Pacing pulse duration, approx.	100	ms

Identity code “3”

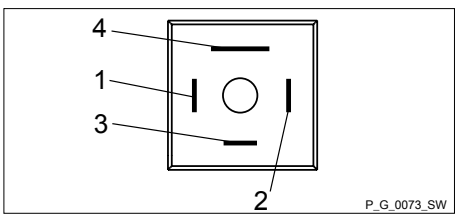


Fig. 21: Assignment on the pump

To pin	VDE cable	Contact	Relay
1	yellow	N/O (normally open)	Fault indicating relay
4	Green	C (common)	Fault indicating relay
3	white	N/O (normally open)	Pacing relay
2	brown	C (common)	Pacing relay

9.3.4.4 "Current output plus relay" output (identity code “8”)

A relay combined with a current output can be ordered as an option. The relay either switches as a fault indicating relay in the event of a fault on the pump and with "Liquid level low 1st stage" warning message and "Liquid level low 2nd stage" fault messages or is used as a pacing relay.

The behaviour is factory-programmed. If another switching function is wished, the pump can be reprogrammed in the *‘Relay’* menu.

The variable to be signalled for the current output can be selected in the *‘ANALOG OUTPUT’* menu.

The current output plus relay can be retrofitted and operates once it is plugged into the board.

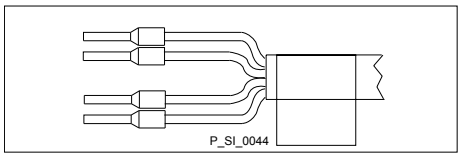


Fig. 22: Assignment on the cable

Electrical interface

for current output

Data	Value	Unit
Open circuit voltage:	8	V
Current range:	4 ... 20	mA
Ripple, max.:	80	µA ss
Load, max.:	250	Ω

for semiconductor switch ("relay"):

Data	Value	Unit
Max. residual voltage at $I_{off\ max}$ = 1 µA	0.4	V
Maximum current	100	mA
Maximum voltage	24	VDC
Pacing pulse duration, approx.	100	ms

Identity code “8”

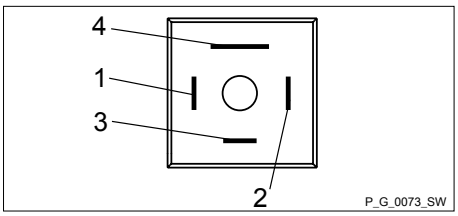


Fig. 23: Assignment on the pump

To pin	VDE cable	Contact	Relay
1	yellow	"+"	Current output
4	Green	“-"	Current output
3	white	N/C (normally closed) or N/O (normally open)	Relay
2	brown	C (common)	Relay

10 Initial commissioning

User qualification: Technical personnel and service - see *'Qualification of personnel' on page 14*

10.1 Testing prior to commissioning the pump

The following checks are to be carried out:

- Ensure that the pump has not been damaged during transportation or storage. Immediately report any damage to the supplier
- Ensure that the hose is suitable for the fluid to be conveyed and that it is not damaged
- Make sure that the temperature of the liquid does not exceed 60 °C
- Only switch on the pump if the front cover has been properly attached
- Check whether the right number of spacer plates have been fitted -
- Check that the rollers are correctly fitted and fastened
- Check that the hose and rollers are sufficiently lubricated
- Check whether the direction of rotation is correctly adjusted
- Install a manometer in the discharge line if the back pressure value is unknown
- Install a pressure relief valve in the discharge line to protect the pump in the event that a valve is unintentionally closed or the line is blocked in another way.
- “Norprene” pump hose only: Check that the back pressure cannot exceed 2 bar.

11 Basic set-up principles

– *Please also refer to all the overviews covering "Operating/set-up overview" and "Operating menu for DULCO flex Control - DFYa, complete" in the appendix and the "Overview of equipment and control elements" and "Control elements" chapters.*
– *The pump exits the menu and returns to a continuous display if [Menu] is pressed or no key is pressed for 60 seconds.*

11.1 Basic principles for setting up the control

Fig. 24: Please read

Fig. 25 shows using the "Language" example how to set up something - in turn:

- Sequence of displays
- The path derived from this
- The path as presented in the operating instructions

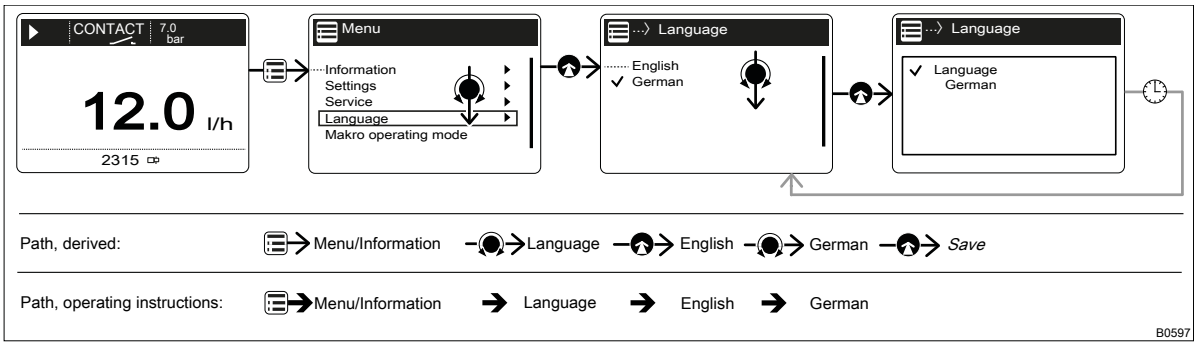


Fig. 25: "Setting up the language": As an example of set-up and path displays

Tab. 5: Legend:

Symbol	Explanation
	Press *[Menu]*
	Turn the *[Clickwheel]*
	Press the *[Clickwheel]*

"Setting up the language" in detail

1. To access the *'Menu'*: press the *[Menu]* key.
   ⇨ The cursor immediately points to *'Information'*.
2. To switch from *'Information'* to *'Language'*: turn the *[Clickwheel]*.
3. To return to the *'Language'* menu: press the *[Clickwheel]*.
   ⇨ The cursor points to a language.
4. To switch to *'Deutsch'*: turn the *[Clickwheel]*.
5. To save: press the *[Clickwheel]*.
   ⇨ The software shows a display by way of confirmation.
   After 2 seconds, it returns to the higher-level *'Menu'*.
6. To complete the setting: press *[]* Menu.
   Alternatively: wait 60 seconds or exit the *'Menu'* via the *[Menu]* key or using *'End'*.

Confirming an entry

→ Briefly press the *[Clickwheel]*.

⇨ The software switches to the next menu point or back to the menu and saves the entry.

Exiting a menu option without confirming it

→ Press *[Back]*.

⇨ The software switches to the next menu point or back to the menu without saving anything.

Returning to a continuous display

→ Press *[Menu]*.

⇨ The software cancels the entry and switches to a continuous display without saving anything.

Changing adjustable variables

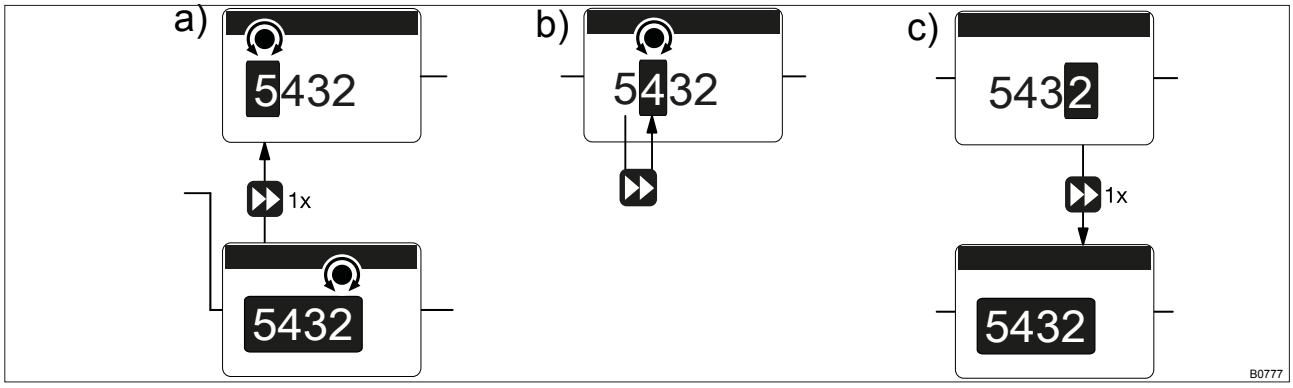


Fig. 26: a) Changing from one figure to its initial figures; b) Changing the figure; c) Returning from the last figure to the (complete) figure (to correct a wrong figure, for example).

Changing a (complete) number

→ Turn the *[Clickwheel]*.

⇨ The value of the figure highlighted is raised or lowered.

Changing figures

1. → To adjust the value of a figure digit-by-digit, press *[Priming]*.

   ⇨ The first figure is highlighted - see Figure above, point a)

2. → To adjust the value of a figure, turn the *[Clickwheel]*.
3. → To move to the next figure, press *[Priming]* - see above Figure, point b).
4. → To run through the figures again, if necessary (possibly because of an incorrect figure), when you get to the last figure press *[Priming]* again - see above Figure, point c).

   ⇨ Now you can start from the beginning again.

Confirming adjustable variables

→ Press the *[Clickwheel]* 1x.

⇨ The software saves the entry.

11.2 Checking adjustable variables

Continuous displays

Before adjusting the pump, you can check the current settings of the adjustable variables:

Simply turn the *[Clickwheel]* if the pump is showing a continuous display.

⇨ Each time the *[Clickwheel]* engages when you turn it, you will see a different continuous display.

The number of continuous displays depends on the identity code, the selected operating mode and the connected additional devices – see overview of "Continuous displays" in the appendix.

Secondary displays

The lowest line of a continuous display shows different information (which cannot be adjusted in the secondary display) - see "Continuous displays and secondary displays" overview in the appendix.

You can access secondary displays via any continuous display as follows:

1. Press the *[Clickwheel]* for 3 seconds.

   ⇨ A frame appears around the secondary display.

2. Providing there is a frame, you will see a different secondary display each time the *[Clickwheel]* engages when turned.

   When you reach the secondary display you wish, leave the *[Clickwheel]* and wait briefly.

11.3 Changing to Setting mode

In a continuous display, if you press *'Menu'*, the pump in Setting mode changes to *'Menu'*. For more information refer to the following chapter entitled "Set up / Menu".

If under *'Access protect.'* only *'Menu'* or *'All'* has been set up (top right lock symbol), then after pressing the *[Clickwheel]*, first enter the *'Password'*.

12 Set up / *'Menu'*

User qualification: Technical personnel and service - see *'Qualification of personnel' on page 14*

- *Refer to the overviews covering "Operating/set up overview" and "Operating menu DULCO flex Control - DFYa, complete" in the appendix and in the "Overview of equipment" - "Control elements" chapters by way of supplementary information.*
- *The pump exits the menu and returns to a continuous display if [Menu] is pressed or if no key is pressed for 60 seconds.*

The *'Menu'* is sub-divided as follows:

1 - *'Information'*

2 - *'Operating mode*'*

3 - *'Settings'*

4 - *'Hose change'**

5 - *'Timer'*

6 - *'Maintenance'*

7 - *'Language'*

* only to be selected

12.1 *'Information'*

[Menu] ➔ *'Menu / Information ➔ ...'*

The *'Information'* menu provides information on your pump and certain parameters and counters. The number and type can depend on the pump settings.

12.2 *'Settings'*

[Menu] ➔ *'Menu / Information ➔ Settings ➔ ...'*

The *'Settings'* menu generally includes these setting menus:

1 - *'Operating mode'*

2 - *'Dosing direction'*

3 - *'Overload monitor'*

4 - *'Calibration'*

5 - *'Inputs/outputs'*

6 - *'System'*

7 - *'Set time'*

8 - *'Date'*

12.2.1 *'Operating mode'*

➔ *'Menu / Information ➔ Operating mode ➔ ...'*

12.2.1.1 *'Manual'*

➔ *'Menu / Information ➔ Operating mode ➔ Manual'*

'Manual' operating mode lets you operate the pump manually.

The capacity can be set in the continuous displays of this operating mode.

The minimum volume that can be metered corresponds to 1 revolution of the rotor.

12.2.1.2 *'Contact'*

➔ *'Menu / Information ➔ Operating mode ➔ Contact ➔ ...'*

The *'Contact'* operating mode allows you to meter pre-set metering volumes.

You can trigger metering via a pulse sent via the "External control" socket.

The purpose of this operating mode is to convert the incoming pulses into a pre-settable metering volume.

CAUTION!
The pump maintains the capacity when changing over from *'Manual'* operating mode to *'Contact'* operating mode.

The maximum capacity can be set in 'Contact' operating mode.

The minimum volume that can be metered corresponds to 1 revolution of the rotor.

Memory - Pulses not yet processed

You can also activate the *'Memory'* function extension ("memory" identifier). When *'Memory'* is activated, the pump adds up the remaining volumes, which could not be processed, up to the maximum capacity of the memory of 99,999 l. If this maximum capacity is exceeded, the pump goes into fault mode.

CAUTION!
– Only with *'Memory'* - *'off'*: If you press *[STOP/START]* or empty the contact memory (*'Menu / Information ➔ Service ➔ Clear counters'*) or the "Pause" function is activated, the *'Memory'* is cleared.

Contact water meter

Using "Pulse control" you can ideally adapt the pump to the relevant process, for example in conjunction with contact water meters.

12.2.1.3 *'Batch'*

➔ *'Menu / Information ➔ Operating mode ➔ Batch ➔ ...'*

The *'Batch'* operating mode enables you to pre-select large metering volumes or metering times.

You can trigger the metering volume using the *[Clickwheel]* if you have already switched to the *'Push'* continuous display. You can also trigger them via a pulse using the "External control" socket.

The minimum volume that can be metered corresponds to 6 revolutions of the rotor.

Memory - remaining volumes not yet processed

You can also activate the *'Memory'* function extension ("memory" identifier). When *'Memory'* is activated, the pump adds up the remaining volume, which could not be processed, up to the maximum capacity of the memory of 99,999 l. If this maximum capacity is exceeded, the pump goes into fault mode.

CAUTION!

- The pump maintains the capacity when changing over from *'Manual'* operating mode to *'Batch'* operating mode.
- When you press [STOP/START] *[STOP/START]* or the "Pause" function is activated, the *'Memory'* is cleared.

In operation, the batch size can be changed more easily by using the "Batch size" continuous display.

12.2.1.4 *'Analog'* (option)

[menu] ➔ *'Menu / Information ➔ Operating mode ➔ Analogue ➔ ...'*

The secondary display "Signal current" indicates the incoming current.

You can select 2 sub-menus:

- *'Standard'*
- *'Extended'*

The minimum volume that can be metered corresponds to 1 revolution of the rotor.

"Standard" sub-menu:

'0 - 20 mA'

At 0 mA the pump is stationary –

At 20 mA the pump works at maximum speed.

'4 - 20 mA'

At 4 mA the pump is stationary –

At 20 mA the pump works at maximum speed.

With current signals of less than 3.8 mA, an error message appears and the pump stops (e.g. if a cable has broken).

"Extended" menu:

You can use *'Curve'* and *'Curve points'* to define current signal speed curves in the same way as:

- *'Linear curve '*
- *'Lower side band'*
- *'Upper side band'*

'Linear curve'

The "Linear curve" symbol appears on the LCD screen. You can enter any speed behaviour proportional to the current signal. For this purpose, enter any two points P1 (I1, F1) and P2 (I2, F2) (F1 is the speed at which the pump is to operate at current I1, F2 is the speed at which the pump is to operate at current I2...); this defines a straight line and thus the behaviour is specified:

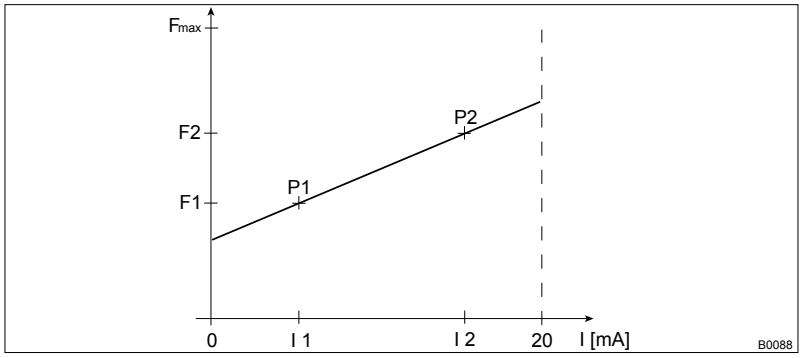


Fig. 27: Speed-current diagram for "Linear curve"

Plot a diagram similar to the one above – with values for (I1, F1) and (I2, F2) – so that you can set the pump as desired!

The smallest processable difference between I1 and I2 is 4 mA (ll I1-I2 ll ≥4 mA).

'Lower side band'

Using this type of processing, you can control a metering pump using the current signal as shown in the diagram below.

However, you can also control two metering pumps for different feed chemicals via a current signal (e.g. one acid pump and one alkali pump using the signal of a pH sensor). To do this, connect the pumps electrically in series.

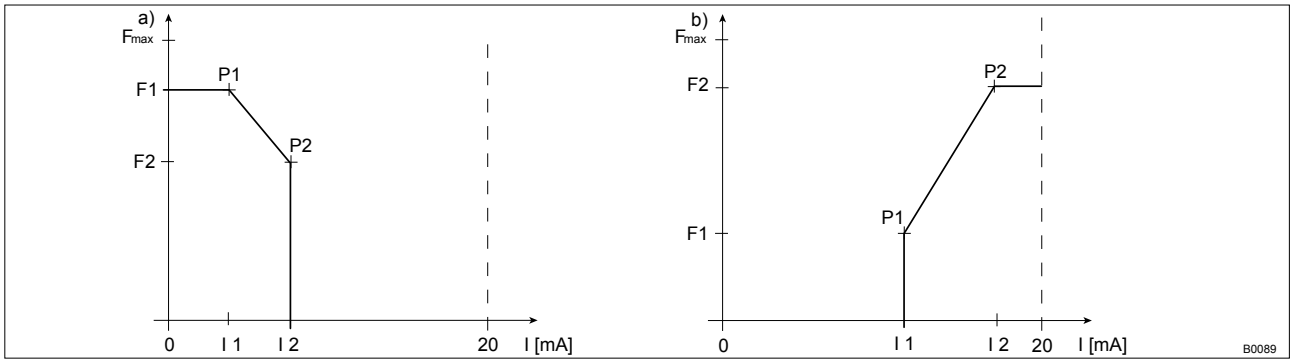


Fig. 28: Speed-current diagram for a) Lower side band, b) Upper side band

'Upper side band'

Using this processing type, you can control a metering pump using the current signal as shown in the diagram above.

Everything functions according to the *'Lower side band'* type of processing.

Error mess. i < 4 mA

You can state the minimum current above which an error is emitted in the *'Error message'* menu item.

12.2.2 Dosing direction

➔ *'Menu / Information ➔ Settings ➔ Dosing direction'*

The *'Dosing direction'* menu lets you select the dosing direction of the pump:

- clockwise
- anti-clockwise

CAUTION!

Serious damage to the pump or environment is possible

Valves, lines etc... can be slightly or irreparably damaged and feed chemical can escape. Pressure of over +10 bar can now be applied instead of -1 bar.

Before changing the dosing direction, it needs to be clear that this does not slightly or irreparably damage parts of the downstream system.

The menu only appears if [STOP/START] has been pressed to stop the unit.

12.2.3 Overload monitor

➔ *'Menu / Information ➔ Settings ➔ Overload monitor ➔ ...'*

You can enter an *'Overload limit value'* above which the pump is to issue a message in the *'Overload monitor'* menu.

The pump displays the current load number, which is simply a number between 0 and 99, in the *'Load'* secondary display. The number depends on factors, such as: back pressure, temperature, feed chemical viscosity, hose material, ...

Normally there is no need to calibrate anything here.

However, if you would like to enter an 'Overload limit value', we would recommend increasing the required 'Overload limit value' by 20%, which will avoid incorrect alarms when the hose is still cold.

You can select under *'Message with overload'* whether the pump issues a *'Warning'* or an *'Error'* (that requires acknowledgement) (p+ overload) or nothing (*'Off'*).

12.2.4 Calibration

☰ ➔ *'Menu / Information ➔ Settings ➔ Calibrate ➔ ...'*

Accuracy of calibration

Normally the pump does not have to be calibrated.

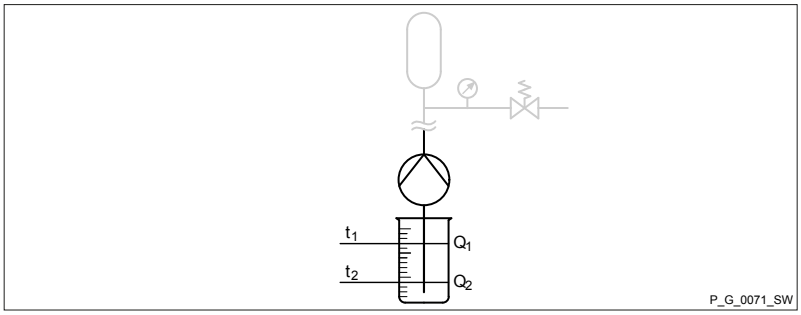
However, the pump can be calibrated if viscous feed chemicals are used or extremely high accuracy is required.

12.2.4.1 Calibrating using a calibration procedure

Run through this calibration procedure for calibration.

WARNING!

If the feed chemical is hazardous, take appropriate safety precautions when performing the following calibration instructions. Observe the material safety data sheet for the feed chemical!



Preparation

1. Use the *[Clickwheel]* to scroll through the continuous displays to check whether litres or gallons have been selected.
2. If the incorrect volume unit has been selected, correct it in the *'Menu / Information ➔ Settings ➔ System ➔ Volume unit'* menu.
3. Check whether the capacity in the continuous display is not too low for calibration.
4. Lead the suction hose into a measuring cylinder containing the feed chemical – make sure that the discharge hose is installed permanently (operating pressure, ...!).
5. Prime the feed chemical (press ⏭) *[Priming]*) if the suction hose is empty.

Calibration procedure

1. Record the level in the measuring cylinder.
2. Select the *'Menu / Information* ➔ *Settings* ➔ *Calibrate'* '' menu and press the *[Clickwheel]*.
   ⇨ The *'Start calibration'* (PUSH) menu item appears.
3. To start calibration, press the *[Clickwheel]*.
   ⇨ The *'Calibrate ...'* menu item appears, the pump starts to pump and indicates the number of revolutions.
4. After a reasonable number of revolutions (a minimum of 200), use the *[Clickwheel]* to stop the pump.
   ⇨ The *'Calibrate ended'* menu item appears. It asks you to enter the calibration volume.
5. Determine the required metering volume (difference between initial volume - remaining volume in the measuring cylinder).
6. Use the *[Clickwheel]* to enter this volume in the *'Calibrate ended'* menu item and close.
   ⇨ The pump switches to the *'Calibration result'* menu item - the pump is calibrated.
7. Press the *[Clickwheel]*.
   ⇨ The pump returns to the *'Menu / Information* ➔ *Settings'* menu.

12.2.4.2 Clear Calib.

Use this menu to reset the calibration data to factory settings.

12.2.5 Inputs/outputs

☰ ➔ *'Menu / Information* ➔ *Settings* ➔ *Inputs/outputs* ➔ *...'*

The *'Inputs/outputs'* menu is generally split into the following sub-menus:

1 - *'Auxiliary capacity'*

2 - *'Relay1'* (optional)

3 - *'Relay2'* (optional)

4 - *'mA-Output'* (optional)

7 - *'Pause input'* (optional)

6 - *'Level monitoring'*

7 - *'Hose rupture error'* (optional)

12.2.5.1 *'Auxiliary capacity'*

☰ ➔ *'Menu / Information* ➔ *Settings* ➔ *Inputs/outputs* ➔ *Auxiliary capacity* ➔ *...'*

The programmable *'Auxiliary capacity'* function enables the pump to be switched over to an additional capacity that can be fixed in the *'Auxiliary capacity'* menu.

It can be activated via the "External control" socket. If *'Auxiliary capacity'* is being used, then the "AUX" identifier appears on the LCD screen.

Refer to the "Hierarchy of Operating Modes, Functions and Fault Statuses" for the order of the various operating modes, functions and fault statuses.

12.2.5.2 *'Relay1 (optional)'*

☰➔ *'Menu / Information ➔ Settings ➔ Inputs/outputs ➔ Relay1 ➔ ...'*

The setting options for the 'Relay' function only exist if a relay is fitted.

DULCO flex Control, DFYa

Tab. 6: Relay, physical and pre-set to ...

Identity code specification	Relay, physical	Pre-set to ...
1	1 x changeover contact 230 V – 8 A	Fault indicating relay, N/C
3	2 x N/O 24 V – 100 mA	Fault indicating relay, N/C, and pacing relay
8	1 x N/O 24 V – 100 mA, + 4...20 mA output	Fault indicating relay, N/C

Relay type

You can reprogram the relays to these types:

Menu setting	Effect
Warning	The relay switches in the event of a warning message (yellow LED*).
Error	The relay switches in the event of a fault message (red LED*).
Warning + error	The relay switches in the event of a warning message (yellow LED*) or a fault message (red LED*).
Warning + error + stop	The relay switches in the event of a warning message (yellow LED*) or a fault message (red LED*) or a stop.
Pump active	The relay switches as soon as the pump is in standby and not in a state like *'Pause'*.
Speed	The relay switches with every revolution.
Pump inactive	The relay changes as soon as the pump is inactive.

* see the "Troubleshooting" chapter

Relay polarity

You can set here how a relay is to switch.

Menu setting	Effect
normally-closed (NC)	The relay is closed in normal mode and opens with a triggering event.
normally-open (NO)	The relay is open in normal mode and opens with a triggering event.

12.2.5.3 *'Relay2 (optional)'*

☰➔ *'Menu / Information ➔ Settings ➔ Inputs/outputs ➔ Relay2 ➔ ...'*

For more information on *'Relay2'* - see *Chapter 12.2.5 'Inputs/outputs' on page 50*.

12.2.5.4 *'mA-Output (optional)'*

☰ ➔ *'Menu / Information ➔ Settings ➔ Inputs/outputs ➔ mA-Output ➔ ...'*

You can set which current range is to be used at the mA output here.

You can then set whether, for example, the current capacity (litres / hour) is to be signalled at the mA output and set the desired value for 20 mA.

You can also set the state which the mA output is to signal at 23 mA:

- Passive
- Error
- Warning
- Warning + error
- Warning + error + stop

12.2.5.5 *'Pause input'* (optional)

☰ ➔ *'Settings ➔ Inputs/outputs ➔ Pause ➔ ...'*

In the *'Pause'* menu, you can select whether the pump switches to *'Pause'* with a *'normally-open'* (NO) or *'normally-closed'* (NC) input contact signal.

12.2.5.6 *'Level monitoring'*

☰ ➔ *'Settings ➔ Inputs/outputs ➔ Level monitoring ➔ ...'*

In the *'Level monitoring'* menu, you can select whether the pump is to run with standard 2-stage level monitoring or a continuous form.

12.2.5.7 *'Hose rupture error'* (optional)

☰ ➔ *'Settings ➔ Inputs/Outputs ➔ Hose rupture error ➔ ...'*

You can select in the *'Hose rupture error'* menu whether the pump issues an *'Error'* or nothing (*'Inactive'*) in the event of a hose rupture.

12.2.6 System

☰ ➔ *'Menu / Information ➔ Settings ➔ System ➔ ...'*

12.2.6.1 Hose type

☰ ➔ *'Menu / Information ➔ Settings ➔ System ➔ Hose type ➔ ...'*

You need to enter the hose type in the *'Hose type'* menu if you have changed the hose type.

The *'Hose type'* consists of a hose material, its maximum permitted back pressure, and its maximum pump capacity:

Tab. 7: Examples of hose type

Hose material	maximum permitted back pressure	maximum pump capacity
TVP_	5BAR_	30 l
TVP_	7BAR_	30 l
PUR_	5BAR_	30 l

12.2.6.2 Volume unit

➔ *'Menu / Information ➔ Settings ➔ System ➔ Volume unit ➔ ...'*

You can select another unit for the volume in the *'Volume unit'* sub-menu.

12.2.7 *'Set time'*

➔ *'Menu / Information ➔ Settings ➔ Set time ➔ ...'*

You can set the time in the *'Set time'* menu.

1. Use the dial to adjust a figure.
2. Use ⏭) *[Priming]* to move to the next figure.

Under *'Auto. Summertime'* you can select whether you wish to change over to *'Summertime'*.

You can also state when the pump is to change to and from *'Summertime'*.

Check under *'Location'* whether the pump is also set to your *'hemisphere'* of the world.

12.2.8 *'Date'*

➔ *'Menu / Information ➔ Settings ➔ Date ➔ ...'*

You can set the date in the *'Date'* menu.

12.3 *'Hose change'*

➔ *'Menu / Information ➔ Service ➔ Hose change ➔ ...'*

This menu only appears once a manual stop has been performed using the STOP/START *[STOP/START]* key.

This lets you replace a hose following the guidance provided. For the detailed description - see *Chapter 14.2 'Replacing the pump hose' on page 74*.

12.4 Timer

➔ *'Menu / Information ➔ Timer ➔ ...'*

– *Please first read this chapter to gain an overview. You will then understand the timer better when working through the chapter.*

The timer DULCO flex Control - DFYa can do the following at predefined times and intervals or event-dependent:

- open / close the relays
- start a delayer
- switch operating mode
- allow the pump to work at a defined capacity
- stop / start the pump
- trigger a batch (*'Batch (time)'*)

12.4.1 Activation / deactivation

☰ ➔ *'Menu / Information ➔ Timer ➔ Activation ➔ ...'*

You can only program the timer when 'Activation' is set to 'inactive'.

To program the timer, set *'Activation'* to *'inactive'*.

⇨ The first line of the timer menu *'Timer status'* then shows *'Inactive'*.

To activate the timer, set *'Activation'* to *'active'*.

⇨ The first line of the timer menu *'Timer status'* then displays *'active'*.

The timer starts working - the timer identifier ◷ is visible in the continuous display.

When 'Activation' is set to 'active', the timer software generates the state of the pump which the pump would have precisely had at this time if it had been set to 'active' without any interruption.

Delayed, linked actions are unaffected by this.

12.4.2 Setting the timer

☰ ➔ *'Menu / Information ➔ Timer ➔ Set timer ➔ ...'*

You can create commands (also known as “program lines”) for a timer program in the *'Set timer'* menu.

You can create up to 32 commands (program lines).

Create the command as follows:

1 - Create a *'new'* command (program line)

2 - Select the *'Triggering event'* (trigger) and the time and/or interval if necessary

3 - Select *'Action'* and a value, if necessary

4 - Check the command

5 - Create the next command – if necessary

The following administration functions are available to manage the commands (program lines):

1 - Reprogram program line (*'New'*)

2 - Check program line (*'Show'*)

3 - Change program line (*'Change'*)

4 - Delete individual program line (*'Clear'*)

(5 - Delete the entire program (*'Clear all'* one level higher))

CAUTION!
The pump does not perform any plausibility check.

Please ensure before using that the timer actually does what you expect of it. Please consider the consequences for your system.

CAUTION!
If you wish to use automatic summer time adjustment (*'Settings'* - *'Time'*) avoid any triggering events between 02:00 a.m. and 03:00 a.m.

Restriction with day numbers
If you wish to start an action of a certain day of each month, note that the timer only permits days 01 - 28.

12.4.2.1 Reprogram program line (*'new'*)

CAUTION!
If the *'Timer status'* is set to *'active'*, the pump can neither be set nor programmed!

To do so, set the *'Timer status'* under *'Activation'* to *'inactive'*.

12.4.2.1.1 Principle design of a program line

In principle, an (imaginary) program line / instruction is set up as follows:

Time event (trigger)		Action	
workdays 1 (Mo-Fr)	Time of day 12:00	Manual	20.00 l/h

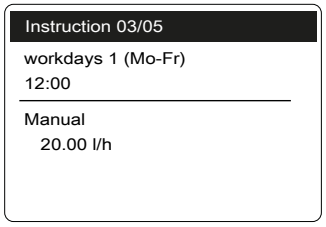
This corresponds to the following instruction:

```
WHEN triggering event, THEN action
```

The **time event (trigger)** defines what action or at what time an action is to take place.

The **action** defines which type of action is to take place.

The finished program line/ instruction looks like this:



B1106

Example

Time event (trigger)		Action	
workdays 1 (Mo-Fr)	Time of day 12:00	Manual	20.00 l/h

The example means:

When it is 12:00 on a workday, then the pump is to work in *'Manual'* operating mode at 20.00 l/h.

Tab. 8: Time events (triggers)

Time events (triggers)	Description	Remark
Time	Switching time reached	For more information - see ↳ *Chapter 12.4.2.1.3 'Selecting time events and switching point' on page 57*
'Init'	Thus declared is started at the beginning of the program process	Defined starting conditions - see ↳ *Chapter 12.4.2.1.2 ' 'Init' Initial conditions' on page 57*

*refer to "Overview of equipment" chapter

You can select an action and also a value:

Tab. 9: Action

Action	Description	Value
'Manual'	Switch over in this operating mode	Litre/h (*'Dos. capacity'*)
'Halt'	Stop pump	--
*'Relay1 **'*	Have the relay switch to status ...	open closed
*'Relay2 **'*	Have the relay switch to status ...	open closed
'Contact'	Switch over in this operating mode	--
'Batch (input)'	Switch over in this operating mode	--
'Analog'	Switch over in this operating mode	--

** Option; needs to be assigned to the *'Timer'* (under *'Settings* ➔ *Inputs/Outputs* ➔ *Relay* ➔ *Relay type'* - refer to this chapter of the operating instructions under *'Settings'*)

Tab. 10: Selected value ranges

Designation	Value range
Line numbers	01 ... 32
Day (date)	01 ... 28
Time of day (hours)	00 ... 23
seconds	0001 ... 9999

12.4.2.1.2 *'Init'* Initial conditions

Using the triggering event *'Init'* initial conditions can be set at the beginning of a program sequence.

Example

triggering event (trigger)		Action	
Init	-	Relay2	closed
Init	-	Contact	-

The example means:

As soon as the programme is started (via *'Timer* ➔ *Activation* ➔ *active'* or mains voltage on), *'Init'* sets *'Relay2'* to *'closed'* and the *'Operating mode'* to *'Contact'*.

12.4.2.1.3 Selecting time events and switching point

The cyclic time events periodically trigger actions. That is why a program line consists of a cycle and a switching point:

The **cycle** specifies after which time the action is to be repeated.

The **switching time** specifies when the action is to take place.

Example

Time events (triggers)		Action
Cycle	Switching time	
workdays 1 (Mo-Fr)	Time of day 12:00	Manual

Tab. 11: Cyclic time events

Cycle	Time
'hourly'	hourly at mm. Minute
'daily'	daily at the time mm.ss, Monday to Sunday
'workdays 1 (Mo-Fr)'	daily at the time mm.ss, Monday to Friday
'workdays 2 (Mo-Sa)'	daily at the time mm.ss, Monday to Saturday
'Weekend (Sa+Su)'	daily at the time mm.ss, Saturday and Sunday
'weekly'	weekly at the time mm.ss on day xxxxxx.
'monthly'	monthly at the time mm.ss on the day dd. Day* of the month

* Value range is restricted to 01 – 28 days

CAUTION!
If you wish to use automatic summer time adjustment (*'Settings'* - *'Time'*) avoid in principle any time events between 02:00 and 03:00.

A time event lets you trigger an action precisely to the minute.

12.4.2.2 1 time event - several actions

You can assign 1 time event to several actions. To do so, always use the same cycle and the same switching time! :

Example

No.	Time event (trigger)		Action	
01	workdays 1 (Mo-Fr)	Time of day 12:00	Stop	-
02	workdays 1 (Mo-Fr)	Time of day 12:00	Batch (input)	500 ml
03	workdays 1 (Mo-Fr)	Time of day 12:00	Relay 1	-closed
04	-	-	...	.

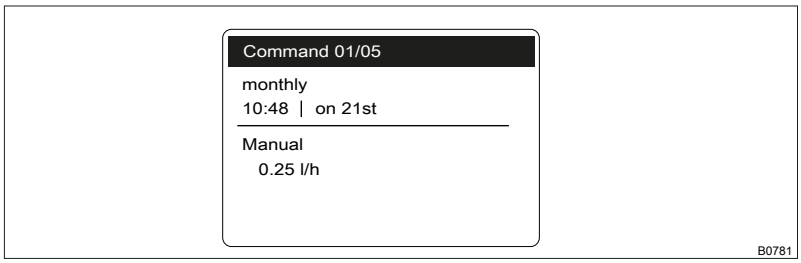
- *For details on the sorting sequence of the program lines see 'Sorting sequence' on page 59.*
- *The timer program can have a maximum of 32 program lines.*

12.4.2.3 Check program lines (*'Show'*)

➔ *'Menu / Information* ➔ *Timer* ➔ *Set timer* ➔ *Show'*

'Show' lets you check individual program lines / instructions.

1. Press the *[Clickwheel]* on a program line / instruction.
   ⇨ This display appears:



Above the line Time event (trigger) and possible value
Below the line Action and value, if required

2. Turn the *[Clickwheel]*.

   ⇨ Scroll from instruction to instruction.

   The number of the program line or instruction (and the number of the last program line or instruction) appears at the top in the dark bar.

3. Pressing the *[Clickwheel]* returns you to *'Set timer'*.

As the timer software automatically sorts the program lines, the numbers of the program lines can change if you change something.

Sorting sequence

The timer software automatically sorts every newly programmed program line / instruction after completing it (press the *[Clickwheel]*) below the other program lines.

The 1st sorting criterion is the type of **time event (trigger)** (for the sequence refer to *Further information on page 56* and *Further information on page 57*).

Time-dependent program lines are ordered below each other initially after the **Switching point** (2nd sorting criterion)

then after the length of the **Cycle** (3rd sorting criterion).

The 4th sorting criterion is the type of **action** (see also the programming examples at the end of these instructions).

A purely time-controlled timer program will also run in this sequence.

12.4.2.4 Change program lines (*'Change'*)

'Menu / Information ➔ Timer ➔ Set timer ➔ Change'

1. Use the *[Clickwheel]* to select the required program line / instruction according to its number and press the *[Clickwheel]*.
2. Click through the instruction and change it.

   ⇨ The timer software sorts a changed program line / instruction after completion with the *[Clickwheel]* possibly differently in between the other program lines (Rules - see *'Sorting sequence' on page 59*).

12.4.2.5 Delete individual program lines (*'Clear'*)

'Menu / Information ➔ Timer ➔ Set timer ➔ Clear'

1. Use the *[Clickwheel]* to select the required program line / instruction according to its number.
2. The program line will be deleted as soon as you press the *[Clickwheel]*.

   ⇨ The timer software re-sorts the remaining programme lines (Rules - see *'Sorting sequence' on page 59*).

Delete all program lines

The option to delete all program lines is to be found one level higher in the menu:

'Menu / Information ➔ Timer ➔ Clear all'

12.4.3 Clear all

☰ ➔ *'Menu / Information ➔ Timer ➔ Clear all ➔ ...'*

Use the *'Clear all'* menu to clear all instructions (the entire program).

12.4.4 Examples

Requirements:

- You have already worked with the pump type
- The time has been set (possibly set under *'Settings ➔ Set time ➔ Time'*. Only possible with *'Timer status'*- *'Inactive'*).

Example of "Weekday metering"

Task:

The pump is to meter 2 litres every half hour every weekday (Mon-Fri) between 8:00 and 11:00.

Solution:

As you define switching times with the timer, you need to first define the switching points at 08:30, 09:30 and 10:30.

To meter 2 litres, the pump needs to work in *'Manual' 'operating mode'* for 10 min at a *'Dos. capacity'* of 12,000 l/h. A *'Dos. capacity'* of 12,000 l/h is thereby added to the switching points.

You also need to define the switching times to stop the pump at 08:40, 09:40 and 10:40 - paired with the *'Halt'* action.

Tab. 12: Program as program lines / instructions

No.	Time event		Action		Comment
		Switching time		Capacity	
01	workdays 1 (Mo-Fr)	08:30	Manual	12,000 l/h	Meter at 12,000 l/h
02	workdays 1 (Mo-Fr)	08:40	Stop	-	Stop
03	workdays 1 (Mo-Fr)	09:30	Manual	12,000 l/h	Meter at 12,000 l/h
04	workdays 1 (Mo-Fr)	09:40	Stop	-	Stop
05	workdays 1 (Mo-Fr)	10:30	Manual	12,000 l/h	Meter at 12,000 l/h
06	workdays 1 (Mo-Fr)	10:40	Stop	-	Stop

How to enter the program lines / instructions:

1. To program the timer, set ☰ ➔ *'Menu / Information ➔ Timer ➔ Activation'* to *'inactive'*.

   ⇨ The first line of the timer menu *'Timer status'* then shows *'Inactive'*.

2. Always enter the program / instructions from the table, above, into the newly created instruction under *'Timer ➔ Set timer ➔ new ➔ ...'* (Do not get irritated: the timer program automatically sorts the instructions).

3. To activate the timer, set *'Activation'* to *'active'*.

   ⇨ The first line of the timer menu *'Timer status'* then displays *'active'*.

   The timer starts working - the timer identifier ◷ is visible in the continuous display.

4. Test your programming!

   The secondary display “Timer” can help here, which shows the next instruction and the remaining time. (To access this secondary display, press the *[Clickwheel]* in a continuous display until a long series of small circles appears below - immediately turn the *[Clickwheel]* to navigate to the last circle and press the *[Clickwheel]*.)

   The continuous display itself shows information on the current status of the pump in the dark bar.

If something has been entered incorrectly:

- *Either press ⮌ in the current program line and enter the correct values*
- *or search for the program line in 'CHANGE' (automatic sorting!). Now press the [Clickwheel], allow the program to run through the program lines again and enter the values correctly*
- *or use 'Clear' to select the program line and delete*
- *or delete everything using 'Clear all' (one level higher).*

12.4.5 Timer information

Status as soon as the programmed pump is connected to the mains voltage:

The timer software now generates the state of the pump which the pump would have precisely had at this time if it had not been disconnected from the mains voltage.

This relates to linked or non-delayed actions.

Effective settings after switching between Timer *'active'* and *'inactive'*:

The timer settings are saved and become effective again when *'inactive'* switches to *'active'*.

The operating mode settings are saved and become effective again when *'active'* is switched to *'inactive'*.

Storage period of your programming:

The pump stores your programming for up to 20 years.

(The calibration and timer data is maintained for up to 20 years).

The time is retained without mains voltage for approx. 2 years.

12.4.6 Typical pitfalls Timer functional faults

Problem	Possible cause of fault	Remedy
The pump starts pumping unexpectedly.	The timer deletes every “Manual” stop when activated - see “Timer behaviour at start”	Enter an *'Init'* instruction with *'Halt'* action.

12.4.7 Brief explanation of selected functions

Time event (trigger)

An event can be triggered either time-dependent or event-controlled.

1 - Time events (really time-dependent) are processed precisely to the minute.

2 - Initialisation (*'Init'*) is executed at the start of the program (*'Timer* ➔ *Activation* ➔ *active'* or when mains voltage is connected) to obtain a defined status of the system.

3 - Delayers can trigger an action as soon as their time has expired.

Actions

These are the *'Actions'* which the timer executes as soon as a *'time event'* has occurred.

Initialisation

When *'Activation'* is set to *'active'*, the timer software generates the state of the pump which the pump would have precisely had at this time if it had been set to *'active'* without any interruption.

Using the initial commands (*'Init'*), a defined switch-on state can be programmed. Initial commands have priority over time commands.

Outputs

Those relays which were connected with the relay option are designated as outputs. Up to 2 relays can be fitted.

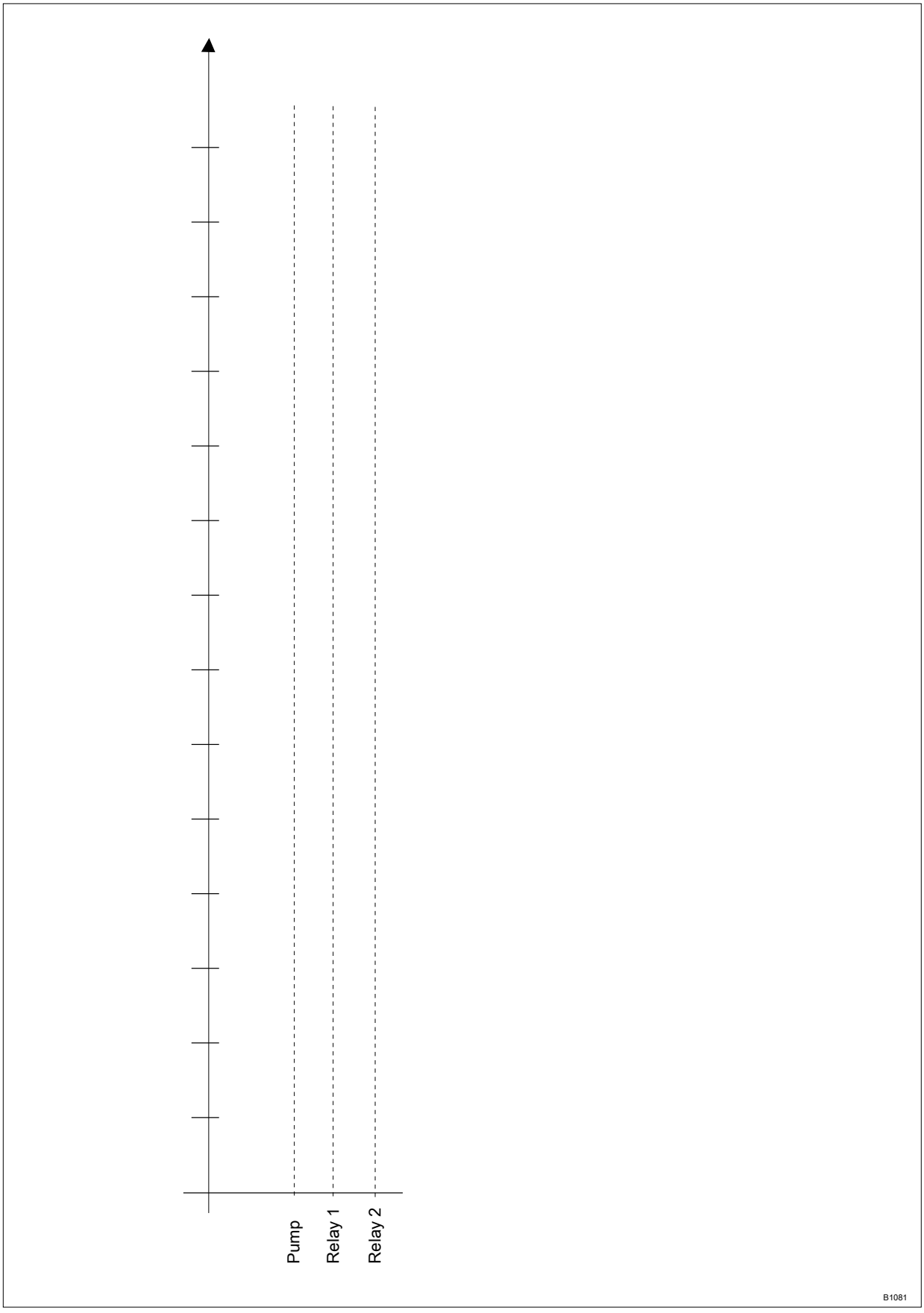


Fig. 29: Bar chart - Template

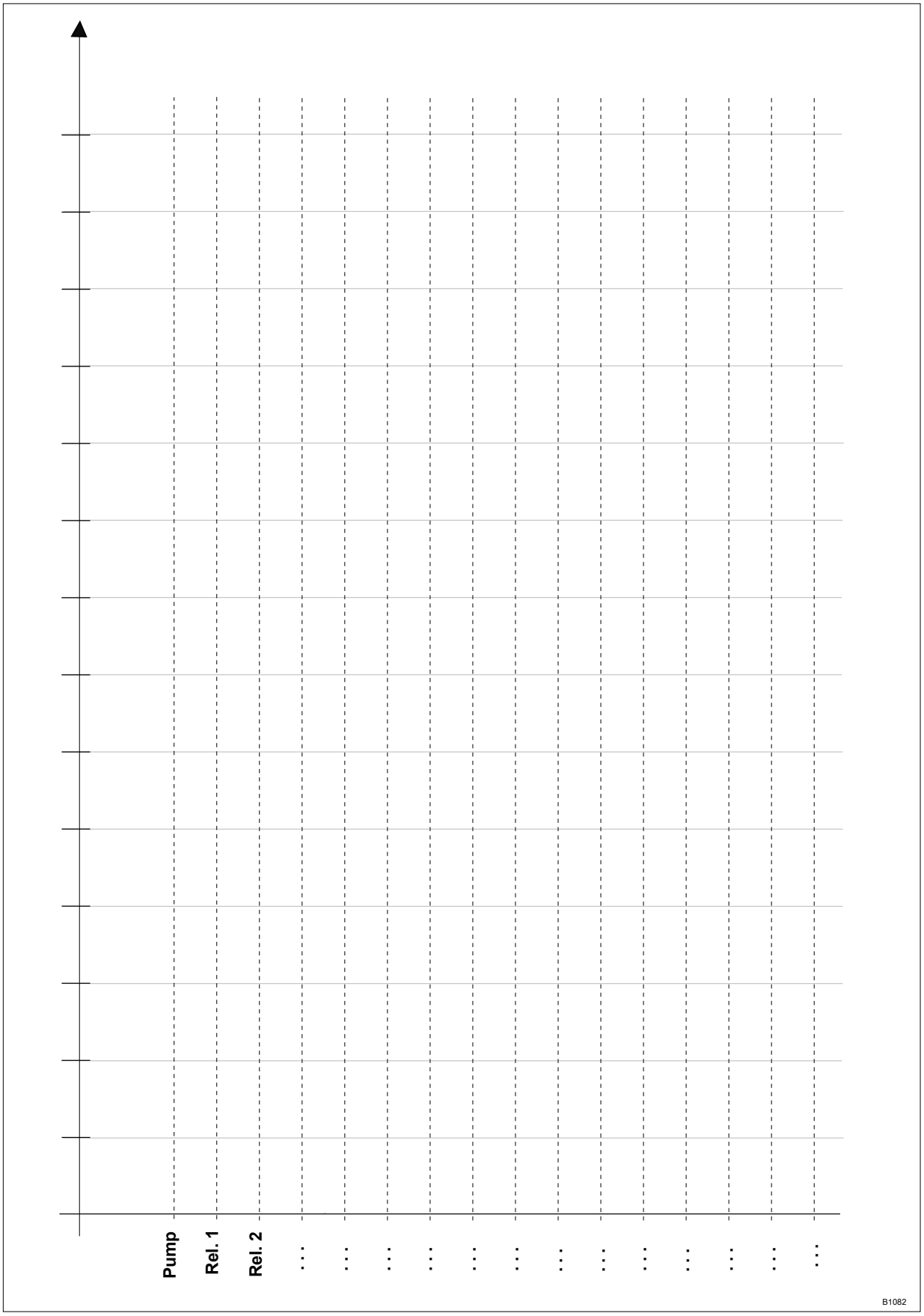


Fig. 30: Switching times - Template

Tab. 13: Discard program lines / instructions about the program (Line 09 = example)

Instruction no.	Time event		Action	
09	workdays (Mo-Fr)	15:23	Contact	50

12.5 *'Service'*

☰ ➔ *'Menu / Information ➔ Service ➔ ...'*

The *'Service'* menu is split into the following sub-menus:

1 - *'Access protection'*

2 - *'Password'*

3 - *'Hose'*

4 - *'Clear counters'*

5 - *'Log book'*

6 - *'Display'*

7 - *'HMI logout'*

12.5.1 *'Access protection'*

➔ *'Menu / Information ➔ Service ➔ Access protection ➔ ...'*

You can lock parts of the setting options here.

The following locking options are available:

Selection	Point ①	Point ②
'None'	-	-
'Lock menu'	X	-
'Lock all'	X	X

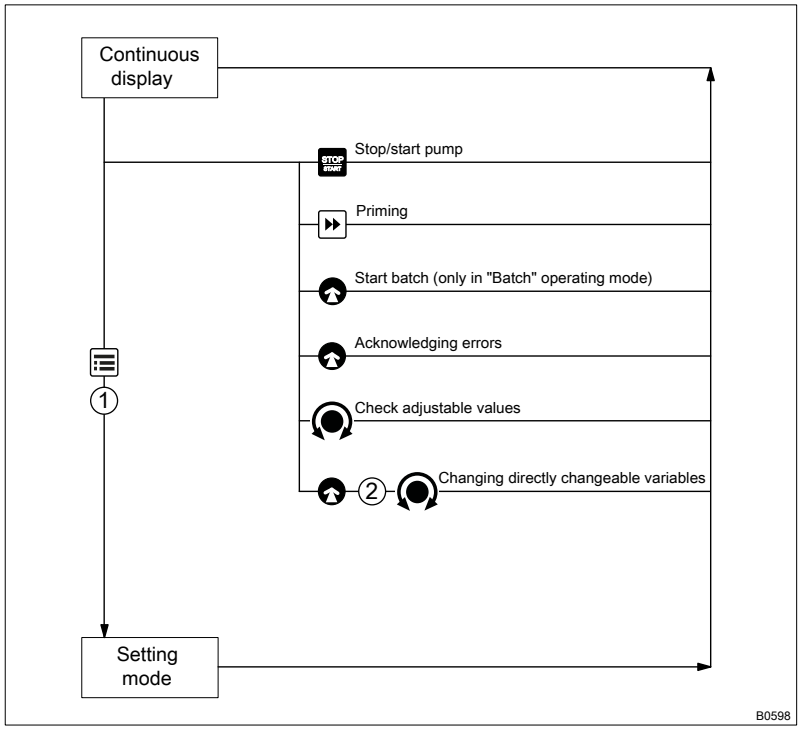


Fig. 31

If you have set a *'Password'* - see below, then the identifier will appear after 1 minute in the top left and the specified areas will be locked, if no key has been pressed in the meantime.

Both locks use the same *'Password'*.

12.5.2 *'Password '*

→ *'Menu / Information → Service → Password → ...'*

You can enter a password of your choice in the *'Change password'* menu.

12.5.3 *'Hose'*

→ *'Menu / Information → Service → Hose → ...'*

For this menu to appear, press [STOP/START] *[STOP/START]* to bring the pump to a stop (manually).

You can read or set various counters for hose operation in the *'Tube'* menu:

- *'Hose interval'*
- *'Hose service in'*
- *'Revolutions since service'*
- *'Interval-counter'*

The values have increased since pump commissioning or since they were last deleted.

Hose interval

Here you can change the interval for the hose replacement - the revolutions are counted in thousands.

As soon as the counter has counted down to "0", the LCD screen displays the *'Hose change'* warning. From this point on, the "Hose service maintenance" secondary display shows the revolutions counted as a negative figure so that the operator is able to better adapt the interval to the circumstances.

Expected service life of the pump hose

Determining the service life of the pump hose

When starting to pump, regularly check the pump hose for wear - do this several times a day if necessary. The service life and thus the replacement interval for the pump hose can be derived from the collected information and experience.

The following have a negative impact on the service life of the pump hose:

- High back pressure
- High speed
- High temperature
- Exposure to chemicals.

Hose service in

Here you can see the number of hours in which the hose is to be replaced. The value displayed depends on the value in *'Hose interval'*.

Revolutions since service

Here you can see how many revolutions the pump has performed since its last maintenance.

Interval-counter

Here you can see the total number of hose replacement intervals the pump has .

12.5.4 *'Clear counters'*

☰ ➔ *'Menu / Information ➔ Service ➔ Clear counters ➔ ...'*

You can reset the counters to "0" in the *'Clear counters'* menu:

- *'All'*
- *'Revolutions counter'*
- *'Volume counter'* (total litres)

To clear: exit the menu by briefly pressing the *[Clickwheel]*.

The values have increased since commissioning the pump, the last calibration or the last deletion.

The "Hose service maintenance" counter can only be reset by scrolling through the 'Hose change' menu.

12.5.5 *'Log book'*

☰ ➔ *'Menu / Information ➔ Service ➔ Error log book ➔ ...'*

You can view the list of *'Error log books'* here.

A *'Filter'* helps with the overview.

12.5.5.1 Log book entry - detailed view

For more information about a log book entry, press the *[Clickwheel]*.

Tab. 14: Information on the detailed view

Line	Information
1	Date, time
2	Type of entry (fault, warning ...)
3	Total operating time, total revolutions
4	Switching-on duration, revolutions since switching on
5	Room temperature, additional information on the error (for developers)

12.5.6 *'Display'*

☰ ➔ *'Menu / Information ➔ Service ➔ Display ➔ ...'*

You can set the *'Contrast'* and the *'Brightness'* of the LCD screen here.

12.5.7 *'HMI logout'*

☰ ➔ *'Menu / Information ➔ Service ➔ HMI logout ➔ ...'*

You can log off the HMI from the internal pump CAN bus here.

12.6 *'Language'*

☰ ➔ *'Menu / Information* ➔ *Language* ➔ *...'*

You can select your required operating language in the *'Language'* menu.

13 Operation

User qualification: Instructed person - see *'Qualification of personnel' on page 14*

This chapter describes all the operating options in a continuous display (several symbols and the pressure display appear at the top in the black bar) for the person trained on the pump.

– *Please also refer to the "Operating/Setting overview" and "Continuous displays and secondary displays" overviews at the end of the operating instructions and also the "Overview of equipment and control elements" chapter.*

13.1 Manual operation

Stop/start pump

1. Stop the pump: Press *[STOP/START]*.
   ⇨ The display shows: "Please wait! Stopping ...".

CAUTION!
Running on after stop
The pump continues to run on a little.
In the worst case, this could last for around 30 s at low speed.
– Pay attention to this running on time – an hourglass symbol appears in the display.
– If you wish, you can temporarily ramp up the speed – to shorten this time.

2. Start the pump: Press *[STOP/START]* again.

The pump can independently initiate pauses
If a very low speed of revolution has been set, it is possible that the pump performs 1 revolution and then pauses.

Priming

Press *[Priming]*.

Turn the *[Clickwheel]* to lengthen or shorten the priming time during priming.

Starting a batch

In *'Batch'* operating mode: Press the *[Clickwheel]* in the *'Push'* continuous display.

Acknowledge errors

Press the *[Clickwheel]* to acknowledge error messages that require acknowledgement.

Check adjustable variables

In a continuous display: Another continuous display appears each time the *[Clickwheel]* engages when turned. (The number depends on the configuration.)

List of adjustable variables:

- Dos. capacity
- Contact volume
- Batch dosing time
- Batch start
- Time

Change directly adjustable variables

Changing a variable in the relevant continuous display:

1. Press the *[Clickwheel]*.
   ⇨ The variable can be changed (highlighted).
2. Turn the *[Clickwheel]*.
   ⇨ The variable is changed.
3. Press the *[Clickwheel]*.
   ⇨ The variable is saved (the highlighting disappears).

If the "lock" - "lock all" has been set - see *'Set-up overview DULCO flex Control - DFYa' on page 71*, first enter the *'Password'* after pressing the *[Clickwheel]*.

Set-up overview DULCO flex Control - DFYa

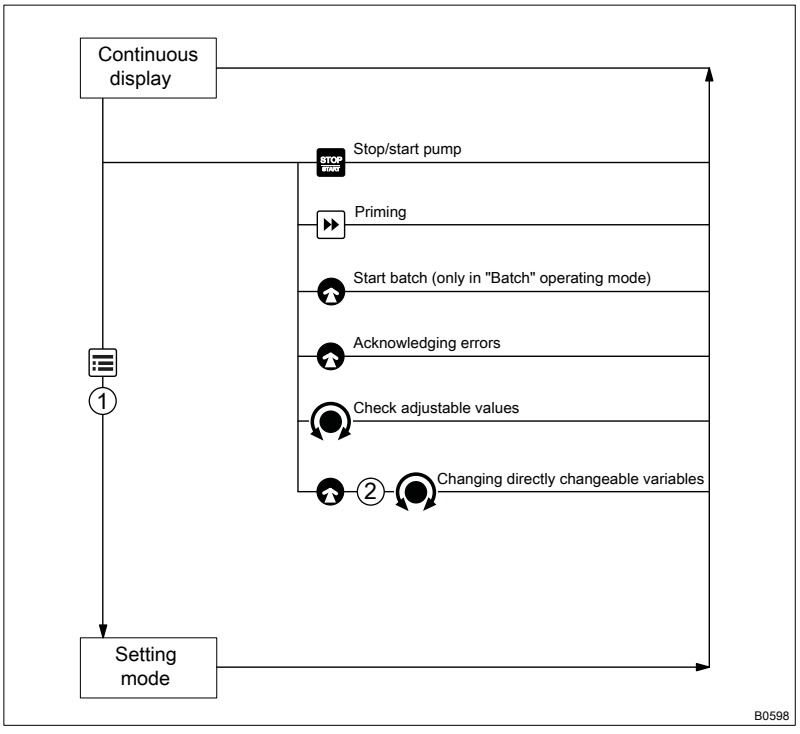


Fig. 32: Control options using keys @ and locking options

Press *[Clickwheel]*
Turn *[Clickwheel]*
① "Lock menu"
② "Lock all"

14 Maintenance

User qualification: technical personnel and service - see *'Qualification of personnel' on page 14*

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

Maintenance information

It is mandatory that you read the safety information and specifications in the "Storage, transport and unpacking" chapter prior to shipping the pump!

Remove the pump hose from the pump before shipping.

Escape of feed chemical

- Feed chemical may spray out of the hydraulic components if they are tampered with or opened due to pressure in the liquid end and adjacent parts of the system.
- Disconnect the pump from the mains/power supply and ensure that it cannot be switched on again by unauthorised persons.
- Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.

Contact with the feed chemical

- Wetted parts are exposed and touched during repair work.
- Protect yourself against the feed chemical if it is hazardous. Read the material safety data sheet for the feed chemical.

Third-party spare parts for the pumps can lead to problems when pumping.

- Preferably only use genuine spare parts.
- Use the correct spare parts kits, see order no. in the *'Service'* menu. If in doubt, refer to the ordering information in the Appendix.

Maintenance intervals

Interval	Maintenance work	Personnel
Quarterly*	■ Check the pump hose for damage** - refer to *Chapter 14.2 'Replacing the pump hose' on page 74*. ■ Clean running surface in the dosing head and rotor rollers. You may need to carefully but fully remove any adhered hose residue with a plastic or wooden scraper. You can also use the green side of a household cleaning sponge (e.g. Scotch sponge). ■ Check that the hydraulic lines are fixed firmly to the liquid end. ■ Check the leak-tightness of the entire liquid end. ■ Remove the hose rupture sensor (option) and test with water. ■ Check that the front cover is fixed in place. ■ Check that the flow is correct: Press ⏩ *[Priming]* to allow the pump to prime briefly. ■ Check that the electrical connectors are intact. ■ Check the reduction gear system for any escaping oil. ■ Check the integrity of the housing.	Technical personnel

* Under normal loading (approx. 30% of continuous operation).

Under heavy-duty loading (e.g. continuous operation): Shorter intervals.

** Check the pump hose more frequently with feed chemicals that put particular pressure on the pump hose, e.g. those containing abrasive additives or oxidation agents.

14.1 Expected service life of the pump hose

Determining the service life of the pump hose

When starting to pump, regularly check the pump hose for wear, several times a day if necessary. The service life and thus the replacement interval for the pump hose can be deduced from the information and experience collected.

You can enter the value for this replacement interval as a *'Hose interval'* in the *'Hose'* menu and will be warned once the interval has expired, *'Hose service in' on page 67*.

The following have a negative impact on the service life of the pump hose:

- High back pressure
- High degree of compression
- High speed
- High temperature
- Exposure to chemicals.

14.2 Replacing the pump hose

User qualification: technical personnel and service, *'Qualification of personnel' on page 14*

The rotating rotor may catch and trap body parts.

- Only replace the pump hose as outlined in the instructions below.
- During a hose change, the rotor turns contrary to the standard direction of rotation.

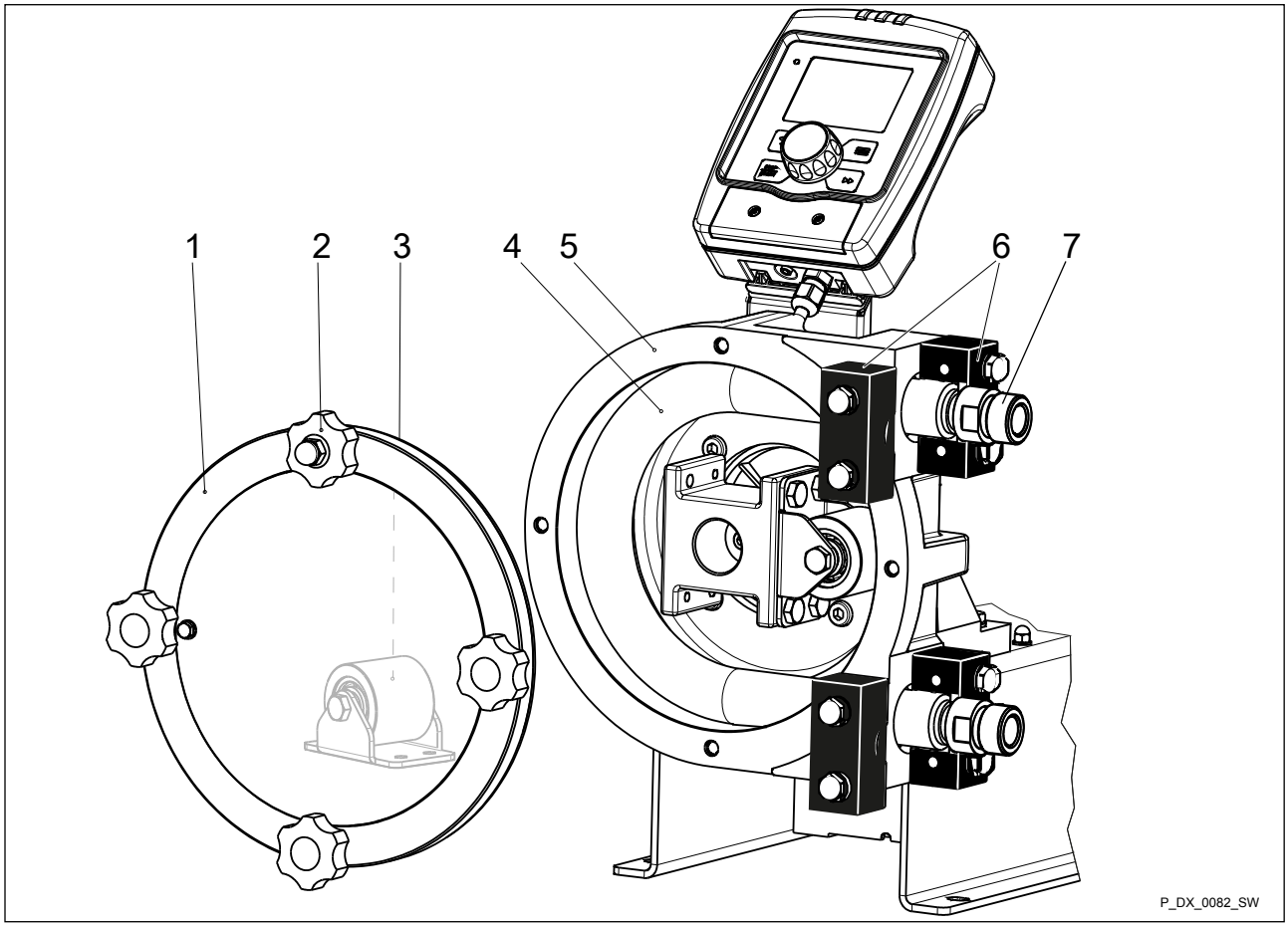


Fig. 33: Pump with roller dismantled and in its hose change position

1 Front cover
2 Star-shaped screw, shown here with a domed nut providing a locking function
3 Roller with roller bracket, dismantled here
4 Pump hose
5 Dosing head
6 Bracket for hydraulic connector, 2-part, partially dismantled
7 Hydraulic connector, top

- Ensure that the system is at atmospheric pressure.
- Adhere to the material safety data sheet for the feed chemical.
- Prevent the escape of feed chemical.
- Put in place protective measures, if necessary.

1. If necessary, press [STOP/START] *[STOP/START]* to bring the pump to a stop (Manual).
2. Empty the liquid end (turn the liquid end upside down and allow the feed chemical to run out; flush out with a suitable medium; flush the liquid end thoroughly when using hazardous feed chemicals!).
3. Go to the ☰ ➔ *'Hose change'* menu.
   ⇨ *'Go to change position?'* appears.
4. The rotating rotor may catch, trap or drag in body parts or clothing.
   - Only remove the front cover (1) when the pump prompts you to do so.
   - Only refit the front cover when the pump prompts you to do so.

Confirm the prompt with *'Yes'*.

⇨ The rotor turns slowly and the following appears:

' Please wait...'.

The rotor stops and *'Hose change - Step 1'* - *'Please remove cover and take out the roller'* appears. (The corresponding roller flashes in the animation).

If the position is not optimum (the rotor should be relatively horizontal), then turn the *[Clickwheel]* to move the rotor into the right position.

5. Loosen the 4 star-shaped screws (2) on the dosing head (5) and remove with the front cover (1).
6. Unscrew both hex screws of the roller (3) flashing on the LCD Display along with its roller bracket from the rotor and remove from the dosing head (5).
7. Fit the front cover (1) and attach the 2 star-shaped screws (2) to the dosing head (5).
8. Press the Clickwheel.

⇨ The rotor turns slowly around 180° and the following appears:

' Please wait...'.

The rotor stops and *'Hose change - Step 2'* - *'Please change the hose'* appears.

If the hose change position is not optimum, e.g. the remaining roller is too close to the hose, then turn the *[Clickwheel]* to move the rotor into the right position.

9. Loosen the 2 star-shaped screws (2) on the dosing head (5) and remove with the front cover (1).
10. Use the 4 hex screws to unscrew the 2 black brackets (6) of the blank hydraulic connectors (7) on the dosing head (5).
11. Remove the pump hose (4) together with its two blank hydraulic connectors from the dosing head.
12. Flush the liquid end if the pump hose (4) was leaking.
13. Check whether the running surface of the liquid end is level and smooth.
14. Pull the two hydraulic connectors (7) from the old pump hose and press into the new one.
15. Insert the new pump hose (4) into the dosing head (5). Fasten the blank hydraulic connectors (7) using the black brackets (6) on the dosing head.
16. Rub a little silicone grease between the contact surface and the pump hose.
17. Fit the front cover (1) and attach the 2 star-shaped screws (2) to the dosing head (5).
18. Press the Clickwheel

⇨ The rotor turns slowly and the following appears:

' Please wait!'.

The rotor stops and *'Hose change - Step 3'* - *'Insert roller and cover again'* appears.

If the position is not optimum, then turn the *[Clickwheel]* to move the rotor into the right position.

19. Replace the roller (3) you have removed with its roller bracket and screw tightly onto the rotor.
20. Fit the front cover (1) and attach the 4 star-shaped screws (2) to the dosing head (5). Screw the domed nut onto the 4th star-shaped screw again and tighten it to provide a locking function.
21. Press the Clickwheel.

⇨ The *'Hose change interval'* menu appears.

22. In the first *'Revolutions'* menu item in the *'Hose change interval'* menu, you have the option of increasing or reducing the warning time for the next hose change by changing the *'Revolutions'* (they are shown in thousands) - also refer to *'Service ➔ Hose'*.

23. Press the *[Clickwheel]* to reset the warning time.

⇨ *'Reset interval now!'* appears.

24. Press the *[Clickwheel]* again to complete the hose change.

⇨ *'Complete!'* and a hand symbol appear. This is a reminder that the pump still needs to be stopped manually. If necessary, now restart the pump using the *[STOP/START]* key.

25. If the pump hose was ruptured, dismantle and clean the hose rupture indicator (optional) now.

14.3 Cleaning the hose rupture indicator (optional)

Unnoticed escape of feed chemical

- Once the hose rupture indicator has been triggered, any residue of feed chemical may affect the function of the hose rupture indicator.
- Clean and test the hose rupture indicator after it has been triggered.

1. Unscrew the hose rupture indicator using an AF 14 open-ended spanner.

2. Use a suitable liquid to clean the hose rupture indicator, if possible using water.

3. Test the connected hose rupture indicator: fully immerse the tapered section at the front in water.

⇨ The continuous display indicates a hose rupture.

4. Thoroughly dry the hose rupture indicator.

⇨ The continuous display no longer indicates a hose rupture.

5. Screw the clean and dry hose rupture indicator into the hole until hand-tight and liquid-tight.

15 Repair

User qualification: Qualified personnel and service - see *'Qualification of personnel' on page 14*

Safety information

WARNING!

Danger of electric shock

Unauthorised repairs inside the pump may result in an electric shock.

For this reason, only allow a ProMinent branch or representative to perform repairs inside the pump, in particular the following:

- Replacement of damaged mains connection lines
- Replacement of fuses
- Replacement of electronic controller

WARNING!

It is mandatory that you read the safety information and specifications in the "Storage, Transport and Unpacking" chapter prior to shipping the pump.

WARNING!

Contact with the feed chemical

Wetted parts could become exposed and touched during repair work.

- Protect yourself against the feed chemical if it is hazardous. Read the material safety data sheet for the feed chemical.

CAUTION!

Warning of feed chemical spraying around

Feed chemical may spray out of the hydraulic components if they are tampered with or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.

16 Troubleshooting

User qualifications: see the following tables and *'Qualification of personnel' on page 14*

measures before starting work

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

1. Refer to the material safety data sheet for your feed chemical.
2. If necessary: depressurise the pump.
3. If necessary: de-energise the pump.
4. If necessary: use a suitable flushing medium to rinse, clean, and decontaminate the pump.

16.1 Faults without error message

User qualification: trained qualified personnel

Tab. 15: Faults without error message

Error	Possible cause	Remedy
The temperature of the pump is raised.	The pump hose is ungreased.	Grease the pump hose.
	The temperature of the feed chemical is raised.	Lower the temperature of the feed chemical.
	The suction conditions are inadequate or poor.	Check the suction line for blockages.
	The speed of the pump is too high.	Lower the speed of the pump.
The flow or pressure is reduced.	The valves on the discharge and or suction side are completely or partially closed.	Open the valves.
	The pump hose is insufficiently compressed.	Check the number of spacer plates. Check the roller fastening.
	The pump hose has ruptured. Feed chemical is escaping from the hose into the liquid end.	Replace the pump hose and clean the pump.
	The suction line is partially blocked.	Clean the suction line.
	The supply tank is empty.	Fill or replace the supply tank.
	The diameter on the suction side is insufficient.	Increase the diameter of the suction side, where this is possible.
	The suction line is too long	Shorten the suction line, where this is possible.

Error	Possible cause	Remedy
	The viscosity of the feed chemical is too high.	Reduce the viscosity where this is possible.
	Air is entering through the suction connectors.	Check the connectors and the accessories for leak-tightness.
	Strong vibrations on the suction side.	Tighten the connectors. Fix the accessories in place Install a pulsation damper. Modify the process (speed of rotation, ...)
Vibrations on the pump and pipework	The pipes are not correctly fastened.	Fasten the pipes correctly (e.g. wall brackets).
	The speed of the pump is too high.	Lower the speed of the pump.
	The nominal width of the pipes is insufficient.	Increase the nominal width.
	The base plate of the pump is loose.	Fasten the base plate in place.
	The pulsation damper is insufficient or missing.	Install a pulsation damper on the suction and / or discharge side.
Short service life of the hose	Too severe exposure to chemicals	Check the resistance of the hose to the feed chemical being pumped, the cleaning fluid and the lubricant.
	The speed of the pump is too high.	Lower the speed of the pump.
	The temperature of the feed chemical is too high.	Lower the temperature of the feed chemical.
	The back pressure is too high.	Lower the back pressure.
	Cavitation occurs.	Check the suction conditions.
	Unusually high temperature at the liquid end	Check the fixing of the rotor.
	Unsuitable lubricant was used.	Use the manufacturer’s lubricant.
	Too little lubricant was added.	Re-lubricate.
The pump hose is pulled into the liquid end.	The priming pressure is too high (> 3 bar).	Lower the priming pressure.
	The pump hose is filled with deposits.	Clean or replace the pump hose.
	The bracket has been insufficiently tightened.	Tighten the bracket.
	Too little lubricant was added.	Re-lubricate.
The pump does not stop.	The pump runs on up to 1 revolution after the stop signal – the pump runs on to a defined stop position. The pump does not appear to stop at a very low speed.	none
The pump is not running.	A speed of less than 1 rpm was set in bus mode.	Set a speed of at least 1 rpm in bus mode.

16.2 Fault with error message

16.2.1 Fault messages on the LCD screen

In the event of a fault:

- the red LED display lights up.
- an identifier “Error” , an identifier shown below and a message appear on the LCD screen.
- the pump stops.

Fault description	Cause	Remedy	Personnel
No. 33: The identifier appears with the message *‘Level error!’*.	The fluid level in the supply tank has reached "Liquid level low 2nd stage".	Top up the supply tank.	Technical personnel
No. 34: The identifier appears with the message *‘Memory overflow’*.	The memory is insufficient.	Press the *[Clickwheel]* (think of the consequences for the process!). Match the frequency of the incoming pulses to the metering rate.	Technical personnel
No. 35: The identifier I < 4 mA appears with the message *‘Input signal < 4 mA’*.	The pump is in *‘Analog’* operating mode, a fault behaviour has been programmed in the *‘Analog’* menu and the control current has fallen below 4 mA.	Eliminate the cause of the low control current.	Technical personnel
No. 36: The identifier I > 20 mA appears with the message *‘Input signal > 20 mA’*.	The pump is in *‘Analog’* operating mode, a fault behaviour has been programmed in the *‘Analog’* menu and the control current has risen above 23 mA.	1. Eliminate the cause of the high control current. 2. If the control current is undoubtedly correct: Switch the programming of the fault behaviour to *‘off’* - see chapter “Set up”-”Settings”-”Operating mode”-”Analog”.	Technical personnel
No. 38: The identifier appears with the message *‘Hose rupture’*.	The pump hose has a leak.	Press the *[Clickwheel]*. Replace the pump hose and clean the hose rupture indicator – refer to the "Repair" chapter.	Technical personnel
No. 40: The identifier appears with the message *‘Communication revision’*.	Problems with the communication software.	Call Service.	Technical personnel
No. 41: The identifier appears with the message *‘Update HMI version’*.	The HMI version is not compatible.	Call Service.	Technical personnel
No. 42: The identifier appears with the message *‘CTRL system error’*.	There is a system or EEPROM error.	Call Service.	Technical personnel
No. 42: The identifier appears with the message *‘FC system error’*.	There is a system or an EEPROM error	Call Service.	Technical personnel
No. 42: The identifier appears with the message *‘PFC system error’*.	There is a system or an EEPROM error.	Call Service.	Technical personnel
No. 42: The identifier appears with the message *‘PFC system error’*.	There is a system or an EEPROM error in the PFC.	Call Service.	Technical personnel
No. 43: The *‘Control unit missing’* message appears.	The (HMI) control unit is missing.	Communication between the control unit and the pump is not working although the HMI has been configured. 1. Check the screw connection of the cable from the HMI to the pump. 2. If these measures are unsuccessful: Call Service.	Technical personnel

Fault description	Cause	Remedy	Personnel
No. 44: The identifier appears with the message *'Module communication'*.	Communication between the optional module and pump electronics is not working.	Call Service.	Technical personnel
No. 45: The identifier appears with the message *'Module error'*.	The optional module is missing or no communication is established between the optional module and the pump electronics.	1. Check whether the module is correctly installed. 2. Call Service.	Technical personnel
No. 46: The identifier appears with the message *'FC missed'*.	One of the signals from the FC is missing or there is no communication between the FC and the control.	Call Service.	Technical personnel
No. 46: The identifier appears with the message *'PFC missed'*.	One of the signals from the PFC is missing or there is no communication between the FC and the control.	Call Service.	Technical personnel
No. 46: The identifier appears with the message *'PFC missed'*.	One of the signals from the PFC is missing or there is no communication between the PFC and the control part.	Call Service.	Technical personnel
No. 47: The identifier appears with the message *'FC temperature'*.	The temperature at the FC is too high.	1. Check whether the system pressure is too high. 2. Check whether the ambient temperature is too high. 3. If this measure is unsuccessful: Call Service.	Technical personnel
No. 47: The identifier appears with the message *'PFC temperature'*.	The temperature at the FC is too high.	1. Check whether the system pressure is too high. 2. Check whether the hose is too cold. 3. Check whether the ambient temperature is too high. 4. If this measure is unsuccessful: call Service.	Technical personnel
No. 47: The identifier appears with the message *'Temperature error'*.	The temperature at the PFC is too high.	1. Check whether the system pressure is too high. 2. Check whether the pump hose is too cold. 3. Check whether the ambient temperature is too high. 4. If these measures are unsuccessful: call Service.	Technical personnel
No. 48: The identifier appears with the message *'PFC overload'*.	The pump detects too high a back pressure or the motor oil is too cold.	1. Press the *[Clickwheel]* (think of the consequences for the process!). 2. Check whether the system pressure is too high. 3. Check whether the ambient temperature is too low.	Technical personnel
No. 48: The identifier appears with the message *'overload FC'*.	The pump detects too high a back pressure or the motor oil is too cold.	1. Press the *[Clickwheel]* (think of the consequences for the process!). 2. Check whether the system pressure is too high.	Technical personnel

Fault description	Cause	Remedy	Personnel
No. 48: The identifier p+ appears with the message *'overload FC'*.	The pump detects too high a back pressure or the motor oil is too cold.	3. Check whether the ambient temperature is too low.	Technical personnel
No. 49: The identifier appears with the message *'Drive error'*.	There is an internal error in the FC.	1. Press the *[Clickwheel]* (think of the consequences for the process!). 2. Check whether the system pressure is too high. 3. If this measure is unsuccessful: call Service.	Technical personnel
No. 49: The identifier appears with the message *'Drive error'*.	There is an internal error in the FC.	1. Press the *[Clickwheel]* (think of the consequences for the process!). 2. Check whether the system pressure is too high. 3. If this measure is unsuccessful: call Service.	Technical personnel
No. 51: The identifier appears with the message *'Power supply'*.	The supply voltage is too low or not connected.	Rectify the cause.	Technical personnel
No. 52: The identifier appears with the message *'Fan error'*.	The fan on the PFC is faulty or not connected.	Call Service.	Instructed personnel
No. 53: The identifier appears with the message *'UDC error'*.	There is an internal error in the FC or PFC.	Call Service.	Technical personnel
No. 54: The identifier appears with the message *'DFM overload / 5 V short circuit at the DFM'*.	The 5 V pin at the DFM input has short circuited.	Press the *[Clickwheel]*. 1. Check the connecting cable. 2. Rectify the short circuit.	Technical personnel
No. 55: The identifier appears with the message *'Module not supported!'*.	An incompatible optional module has been inserted.	Insert a compatible optional module.	Technical personnel
No. 56: The identifier appears with the message *'software CTRL incompatible'*.	The CTRL software is incompatible with other elements (PFC, FC).	Call Service.	Instructed personnel
No. 56: The identifier appears with the message *'software FC incompatible'*.	The FC software is incompatible with other elements (PFC, FC).	Call Service.	Instructed personnel
No. 56: The identifier appears with the message *'software PFC incompatible'*.	Problems with the compatibility of the assemblies' firmware.	Call Service.	Instructed personnel
No. 57: The identifier appears with the message *'Pump blocked'*.	The pump is blocked and is not running.	1. Press the *[Clickwheel]* (think of the consequences for the process!). 2. Check whether the system pressure is too high. 3. Check whether the motor oil is too cold. 4. If this measure is unsuccessful: Call Service.	Technical personnel
No. 59: The identifier p+ appears with the message *'overload FC'*. (Slow overpressure shut-down)	The pump has detected too high a back pressure.	1. Press the *[Clickwheel]* (think of the consequences for the process!). 2. Check whether the system pressure is too high. 3. Check whether the pump hose is too cold. 4. Check whether the ambient temperature is too low.	Technical personnel

Fault description	Cause	Remedy	Personnel
No. 60: The identifier appears with the message *'overload FC'*. (Fast overpressure shut-down)	The pump has detected too high a back pressure.	1. Press the *[Clickwheel]* (think of the consequences for the process!). 2. Check whether the system pressure is too high. 3. Check whether the pump hose is too cold. 4. Check whether the ambient temperature is too low.	Technical personnel

Call Service with all other errors.

16.2.2 Warning messages on the LCD display

In the event of a warning:

- the yellow LED display lights up.
- an identifier and a message appear on the LCD screen.

Fault description	Cause	Remedy	Personnel
No. 1: *'Level'* and the identifier appear.	The fluid level in the supply tank has reached "Liquid level low 1st stage".	Top up the supply tank.	Instructed personnel
No. 4: The identifier appears with the message *'Change'*.	The set pump hose service life has elapsed. (Adjust - .).	Replace the pump hose - refer to the "Repair" chapter.	Technical personnel
No. 6: The identifier appears with the message *'overload FC'*.	The FC is overloaded.	Check whether the system pressure is too high.	Technical personnel
No. 7: The "Temperature" identifier appears with the message *'FC temperature'*.	The temperature in the FC is too high.	1. Check whether the system pressure is too high. 2. Check whether the ambient temperature is too high. 3. If no improvement: replace the FC.	Technical personnel
No. 7: The "Temperature" identifier appears with the message *'PFC temperature'*.	The temperature in the PFC is too high.	1. Check whether the system pressure is too high. 2. Check whether the ambient temperature is too high. 3. If no improvement: replace the PFC.	Technical personnel
No. 8: The identifier appears with the message *'CANopen pump!'*.	An HMI was connected to a CANopen pump. Bus mode and HMI are not permitted simultaneously.	Remove the HMI.	Technical personnel

16.2.3 All other errors.

Please contact the responsible ProMinent branch or representative!

16.3 Log book

16.3.1 Fault messages in the log book

For more information on the 'ERROR' messages - refer to the chapter "Fault messages on the LCD screen".

Tab. 16: Errors

Log book no.	Description	Acknowledge?
0	If one of the signals needed from the frequency converter (FC) is missing and/or if no communication is established between the FC and the control.	X
1	-	
2	Different version status of the communication software between CTRL, PFC and FC	X
3	The HMI version is not compatible or communication between the pump and operating unit is not working, although an operating unit has been configured.	
4	-	
5	System, EEPROM error	X
6	The float switch input reports no feed chemical.	
7	The hose is ruptured.	X
...	...	
11	The mA signal is ≤ 3.8 mA when the monitor is switched on.	
12	The mA signal is ≥ 23 mA when the monitor is switched on.	
13	In *'Batch'* or *'Contact'* operating mode, a memory overload has occurred when the memory is switched on.	X
14	The options module is missing or no communication is established with the options module.	
15	There is no ongoing connection to the options module.	
16	-	
17	The 5 V at the DFM input has short circuited.	
18	A module was inserted into the pump, which cannot be used.	

16.3.2 Warning messages in the log book

For more information on the 'WARNING' messages - refer to the chapter "Warning messages on the LCD screen".

Tab. 17: Warnings

Log book no.	Description
0	The temperature in the PFC is too high.
1	The FC is overloaded.
2	The temperature in the FC is too high.

Log book no.	Description
3	-
4	The feed chemical reaches “Warning” level.
5	The hose lifetime reaches “Hose-warning” point.
...	...
9	An HMI was connected to a CANopen pump.

16.3.3 Event messages in the log book

Only with HMIX.

Tab. 18: Events

Log book no.	Description
0	-
...	...
7	The pump was reset to factory settings.
8	The pump was calibrated.
9	*[START/STOP]* was pressed.
...	...
12	The pump hose was replaced.
...	...
21	The dosing direction was changed.

16.3.4 Log book entry - detailed view

For more information about a log book entry, press the *[Clickwheel]*.

Tab. 19: Information on the detailed view

Line	Information
1	Date, time
2	Type of entry (fault, warning ...)
3	Total operating time, total revolutions
4	Switching-on duration, revolutions since switching on
5	Room temperature, additional information on the error (for developers)

17 Decommissioning and disposal

User qualification: Technical personnel and service - see *'Qualification of personnel' on page 14*

Decommissioning

WARNING!

Danger from chemical residue

There is normally chemical residue in the liquid end and on the housing after operation. This chemical residue could be hazardous to people.

- It is mandatory that the safety information in the "Storage, transport and unpacking" chapter is read before shipping or transport.
- Thoroughly clean the liquid end and the housing of chemicals and dirt. Adhere to the material safety data sheet for the feed chemical.

WARNING!

Warning of hazardous feed chemical

Should a dangerous feed chemical be used: it may escape from the hydraulic components when working on the pump, material failure or incorrect handling of the pump.

- Take appropriate protective measures before working on the pump (e.g. safety glasses, safety gloves, ...). Adhere to the material safety data sheet for the feed chemical.
- Drain and flush the liquid end before working on the pump.

CAUTION!

Warning of feed chemical spraying around

Feed chemical may spray out of the hydraulic components if they are tampered with or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Ensure that the system is at atmospheric pressure before commencing any work on hydraulic parts of the system.

Danger of damage to the device

Take into account the information in the "Storage, transport and unpacking" chapter if the system is decommissioned for a temporary period.

1. Disconnect the pump from the mains power supply.
2. Drain the liquid end, for instance through bleed valves installed by the operator.
3. Flush the liquid end with a suitable medium; flush the dosing head thoroughly when using hazardous feed chemicals!

Disposal

CAUTION!

Risk to the environment from the battery

There is a battery in the pump, which can have a toxic effect on the environment.

– Disconnect the battery from the remaining parts.
– Note the pertinent regulations currently applicable in your country!

CAUTION!

Environmental hazard due to gear oil

There is gear oil in the pump, which can have a toxic effect on the environment.

– Remove the gear oil from the gear.
– Note the pertinent regulations currently applicable in your country!

CAUTION!

Environmental hazard due to electronic waste

There are components in the pump, which can have a toxic effect on the environment.

– Note the pertinent regulations currently applicable in your country!

18 Technical data

WARNING!
Risk of personal injuries
Please observe the ”Supplement for modified version“ at the end of the chapter!

It replaces and supplements the technical data!

18.1 Performance data

DULCO flex Control - DFYa, DFYa at 80 rpm

Liquid end type	Minimum dosing rate at maximum back pressure		Speed, max.	Connector size *	Hose diameter (internal)	Suction lift = priming lift	Priming pressure, suction side, max.	Weight
	bar	l/h	rpm	DN	mm	m water column	m water column	kg
08410	8	410	80	3/4 "	16	8	3	30
06410	6	410	80	3/4 "	16	8	3	30
04410	4	410	80	3/4 "	16	8	3	30
02410	2	410	80	3/4 "	16	8	3	30

* for more accurate information - refer to the identity code characteristic “Hydraulic connector”

Data calculated with water at 20 °C.

18.2 Precision

Parameter	Value
Capacity range of the product range	- 10 ... + 10 % *
Metering reproducibility	± 2 % *

* with pump hose retracted (after approx. 500 revolutions)

18.3 Viscosity

The liquid ends are suitable for the following viscosity ranges:

Design	Range	Unit
Standard	0.7 ... 40 000	mPas

18.4 Material specifications

Part	Material
Pump hose *	NR, NBR, EPDM, NBR-A Hypalon® or Norprene® **
Hose connection *	VA, PP, PVDF or PVC-U **
Pump housing	Aluminium EN-AC-44100
Front cover	Steel F-111 / polycarbonate
Rotor	Spheroidal graphite-cast iron EN-GJL-400
Rollers	Steel F-114
Upper part of housing	PPE + 20 % GF
Lower part of housing	PPE + 20 % GF
Pump foot (U-profile)	1.4301
HMI bracket	1.4301
Metal parts (screws, etc.)	A2
Cable threaded connectors	PA6

* wetted

** see identity code

18.5 Electrical data

The electrical data does not relate to the motor, but the pump, which is connected as a whole unit.

Electrical data for DFYa pump

Identity code specification "Electrical power supply" - "U": 100 - 230 V ± 10%, 50/60 Hz

Data	Value	Unit
Capacity	400	W

Electrical data at 100 V

Data	Value	Unit
Effective current	8.3	A
Switch on peak current, (for approx. 100 ms)	4.5	A

Electrical data at 230 V

Data	Value	Unit
Effective current	3.4	A
Switch on peak current, (for approx. 100 ms)	8	A

Tab. 20: Fuses

Fuse	Value	Part no.
Fuse, internal	10 AT - (1.5 kA)	733855

Only use the original fuses from ProMinent! It is not sufficient to use a fuse with the above fuse rating.

18.6 Temperatures

Pump, fully assembled

Data	Value	Unit
Storage and transport temperatures:	-10 ... +50	°C
Ambient temperature during operation:	-10 ... +45	°C
Feed chemical temperature	-10 ... +80	°C
Feed chemical temperature, temporary (5 min) *	+120	°C

* only with VA or PVDF hose connectors together with hose materials NBR, NBR-A and EPDM!

Use special hoses at temperatures below 0 °C or above +60 °C to obtain appropriate service lives.

Contact Boyser for advice (www.boyser.com) or get in touch with ProMinent Service.

18.7 Climate

Data	Value	Unit
Maximum air humidity*:	95	% relative humidity

*non-condensing

Exposure in a humid and changing climate:

DIN EN 60068-2-38 (Environmental assessment procedure humidity heat cyclical 12 + 12 hours)

DIN EN 60068-2-30 (Environmental assessment procedure temperature / humidity cyclical)

18.8 Installation height

Data	Value	Unit
Maximum installation height:	1000	m a.s.l.

18.9 Degree of protection and safety requirements

Degree of protection

Protection against contact and moisture:

IP 55 according to DIN EN 60529

CAUTION!
Always plug a CAN plug or the sealing cap supplied onto the CAN socket for the HMI.

Safety requirements

Degree of protection:

1 - mains connection with protective earth conductor

18.10 Sound pressure level

Sound pressure level

Sound pressure level LpA < 70 dB according to EN ISO 20361

at maximum feed rate and maximum back pressure (water)

18.11 Supplement for modified versions

(With Identcode specification "Version": "M" - "modified")

Technical data

Technical data of pumps in the modified version can deviate from those of the standard pumps. They can be queried by stating the details of the serial number.

motor

The motor data sheets for the modified version are valid. They may deviate from the standard motor data sheets.

Spare parts

With a modified version, it is absolutely necessary to specify the details of the serial number requesting and ordering the spare and replacement parts.

19 Dimensional drawings

- *Compare the dimensions on the dimensional drawing with those of the pump.*
- *All dimensions are in mm.*

HMI and wall bracket

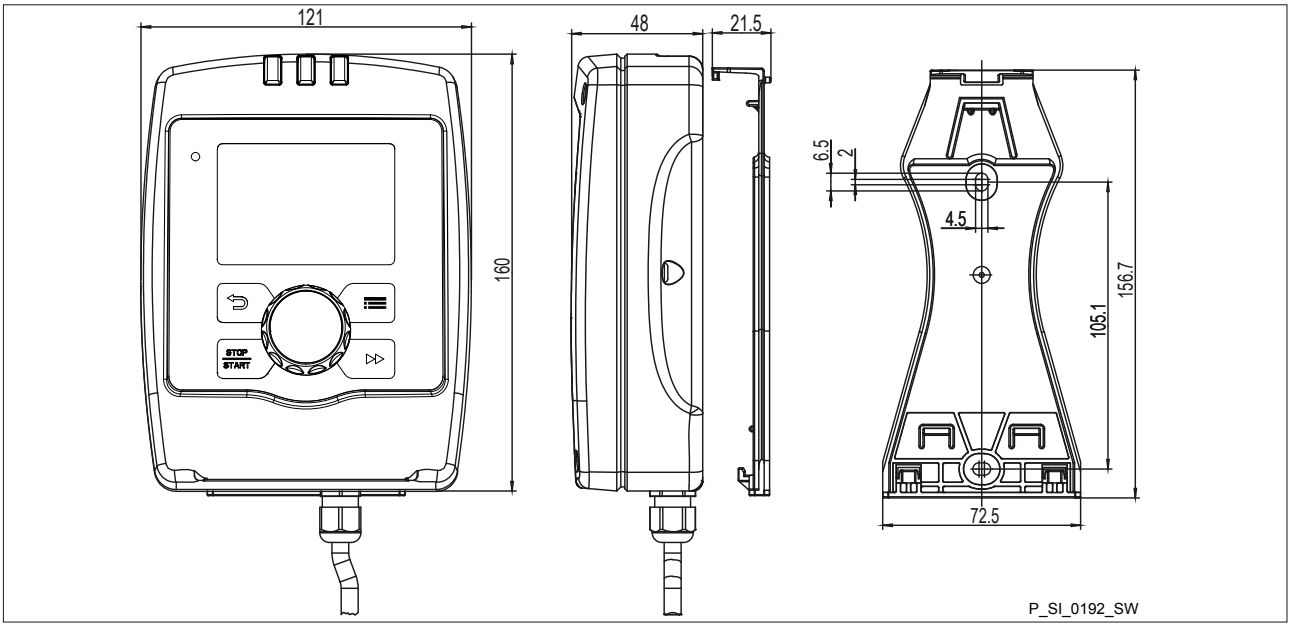


Fig. 34: Dimensions in mm

Dimensional drawing DULCO flex Control - DFYa

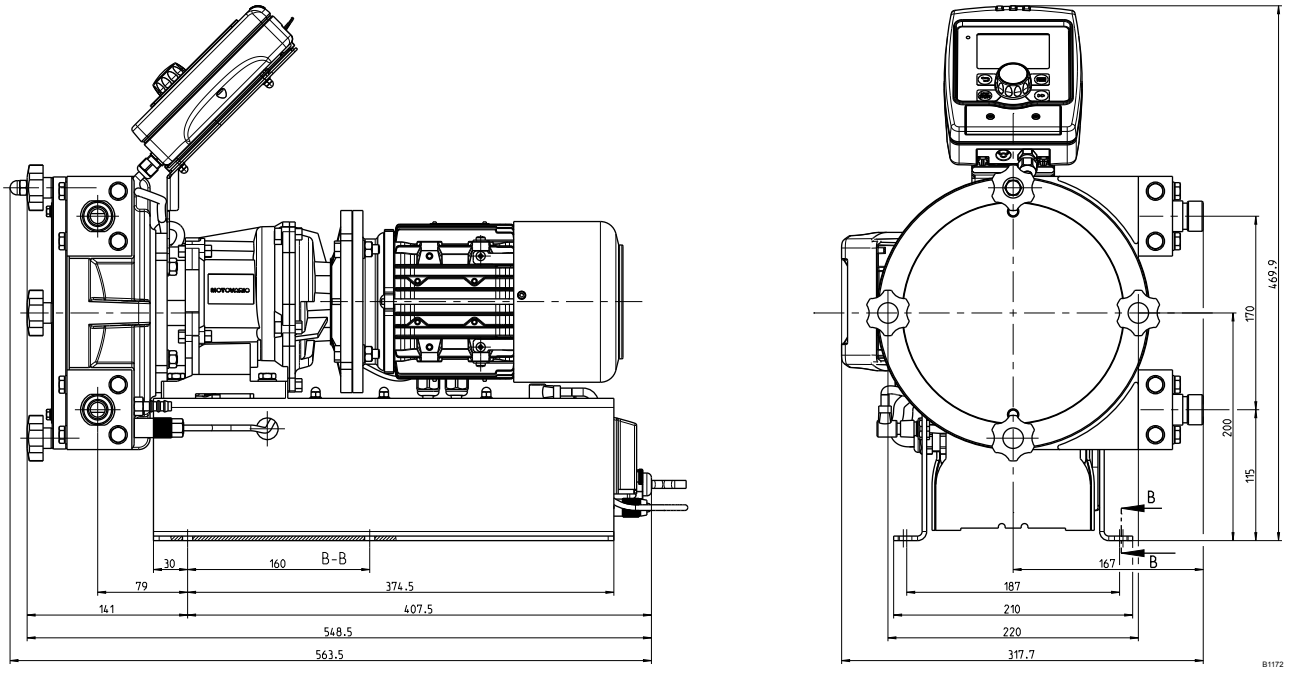


Fig. 35: Diagram is not strictly binding

20 Ordering information

Tab. 21: Pump hose

Designation	Order number
Pump hose NR	1037164
Pump hose NBR	1037165
Pump hose EPDM	1037166
Pump hose NBR-A	1037168
Pump hose HYPALON®	1037171
Pump hose Norprene®	1037169

HYPALON® is a registered trademark of DuPont Performance Elastomers.

Norprene® is a registered trademark of Saint-Gobain Performance Plastics.

Tab. 22: Silicone grease

Pos.	Designation	Order number
1	Silicone grease for DULCO®flex DFBa, 0.5 kg	1037255

Tab. 23: HMI cable, extensions

Designation	Order number
Connecting cable - CAN M12 5-pin. 2 m	1022140
Connecting cable - CAN M12 5-pin. 5 m	1022141
Connecting cable - CAN M12 5-pin. 10 m	1046383

Tab. 24: HMI wall bracket

Designation	Order number
Wall bracket for operating unit	1036683

21 Performance diagrams

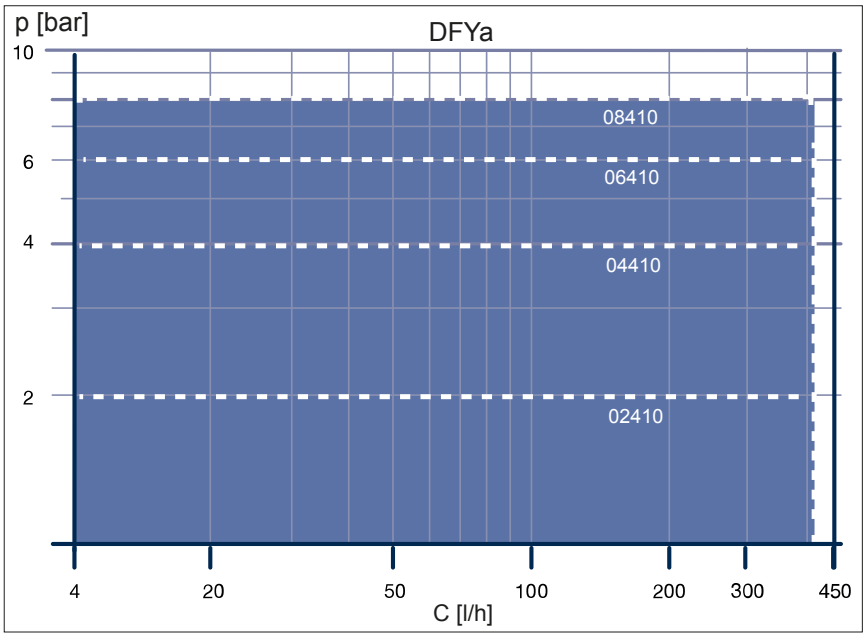


Fig. 36: Back pressure p versus dosing rate C for DFYa

22 Declaration of Conformity for Machinery

In accordance with DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Appendix I, BASIC HEALTH AND SAFETY REQUIREMENTS, section 1.7.4.2. C.

We,

- ProMinent GmbH
- Im Schuhmachergewann 5 - 11
- D - 69123 Heidelberg, Germany,

hereby declare that the product specified below complies with the relevant basic health and safety requirements of the EC Directive on the basis of its functional concept and design and in the version marketed by us.

Any modification to the product not approved by us invalidates this declaration.

Tab. 25: Excerpt from the Declaration of Conformity

Designation of the product:	Peristaltic pump DULCO flex Control
Product type:	DFYa...
Serial number:	see nameplate on the device
Relevant directives:	Machinery Directive (2006/42/EC) The protection targets of the Low Voltage Directive according to Appendix I, No. 1.5.1 of the Machinery Directive (2006/42/EC) have been complied with. EMC Directive (2014/30/EU) RoHS Directive (2011/65/EU)
Harmonised standards applied, in particular:	EN ISO 12100: 2010 EN 809:1998 + A1:2009 + AC:2010 EN 61010-1:2010 EN 61000-6-2:2005 + AC:2005 EN 61000-6-4:2007 + A1:2011 EN 50581:2012
Date:	02.03.2020

You can download the Declaration of Conformity at www.prominent.com.

23 UK Declaration of Conformity

We,

- ProMinent GmbH
- Im Schuhmachergewann 5 - 11
- D - 69123 Heidelberg
- Germany

hereby declare that the product identified below conforms to the basic health and safety requirements of the Regulations, by virtue of its design and construction, and in the configuration placed on the market by us.

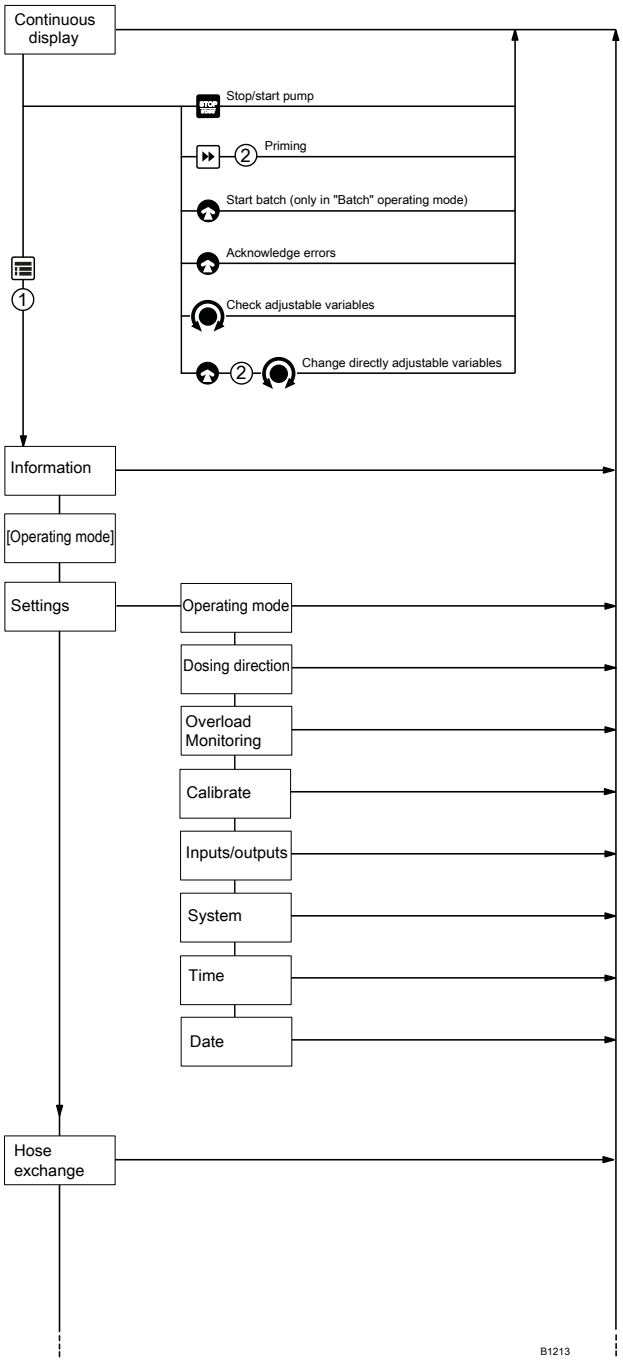
This declaration is no longer applicable if changes are made to the product without our authorisation.

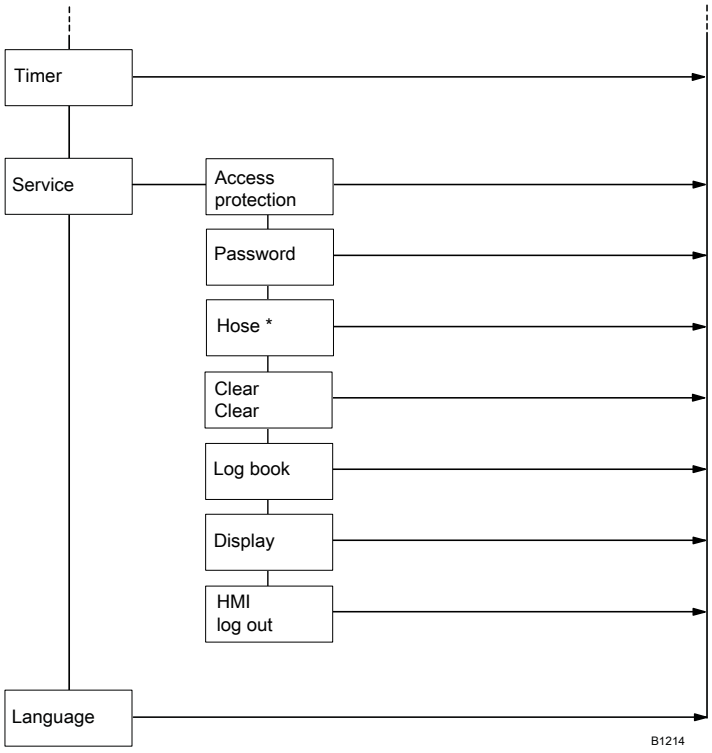
Tab. 26: Extract from the Declaration of Conformity

Product description:	DULCO flex Control, hose pump
Product type:	DFYa ...
Serial no.:	see type plate on the unit
Applicable regulations:	Supply of Machinery (Safety) Regulations 2008 The safety objectives of the Electrical Equipment (Safety) Regulations 2016 were complied with in accordance with Appendix 1, No. 1.5.1 of the Supply of Machinery (Safety) Regulations 2008 Electromagnetic Compatibility Regulations 2016 Restriction of the use of certain hazardous substances in electrical and electronic equipment regulations 2012
Applied standards, especially:	EN ISO 12100: 2010 EN 809:1998 + A1:2009 + AC:2010 EN 61010-1:2010 EN 61000-6-2:2005 + AC:2005 EN 61000-6-3:2007 + A1:2011 EN IEC 63000:2018
Date:	03.03.2021

You will find the UK Declaration of Conformity to download on our homepage.

24 Operating / set-up overview DULCO flex Control - DFYa DFYa





* For this menu to appear, press *[STOP/START]* to bring the pump to a “Stop (manually)”.

25 Operating menu of DULCOflex DFYa, entire unit

1. level	2.	3rd	4.	5th	xth
Information	Versions	Hardware CTRL Software CTRL HMI software HMI data FC hardware FC software Hardware PFC Software PFC			
	Time				
	Date				
	Serial number				
	Identity code				
[Operating mode]	Manual Batch Contact Analog				
Settings	*Operating mode*	Contact	*Memory* On Off		
		Batch	*Memory* On Off		
		Analog	Standard	0...20 mA 4...20 mA	
			Extended	Curve Curve points Error mess. i < 4 mA	...
	Dosing direction	Clockwise Anti-clockwise			
	Overload monitor	Overload limit	0 ... 100		
		Message with overload	Warning Error Off		
	Calibrate	Calibrate	Push	...	
		Calibr. factor			
		Clear Calib.	Yes		
	Inputs/outputs	Auxiliary frequency	xxx l/h		

1. level	2.	3rd	4.	5th	xth
		Relay 1	Relay 1 type	Warning Error Warning + error Warning + error + stop Stop Speed Pump inactive	
			Relay 1 polarity	Energizing (NO) Releasing (NC)	
		Relay 2	Relay type	Warning Error Warning + error Warning + error + stop Stop Speed Pump inactive	
			Polarity	Energizing (NO) Releasing (NC)	
		mA-Output	0...20 mA 4...20 mA	Capacity at 20 mA	...
		Pause input	N/C N/O		
		Level monitoring	2-stage continuous		
	System	Volume unit	Litres Gallons (US)		
	Set time	Time	Set	hh.mm.ss	
		Auto. summer time	Yes No		
		Summer time begin in	February March April		
		Sunday the	1st, 2nd, 3rd, 4th, 5th		
		Summer time end in	August September October November		
		Sunday the	1st, 2nd, 3rd, 4th, 5th		

1. level	2.	3rd	4.	5th	xth
		Location	Northern hemi-sphere Southern hemi-sphere		
	Date	dd.mm.yyyy			
Hose change *	Go to change posi-tion?	No Yes	...		
Timer	Timer status				
	Activation	Active Inactive			
	Setting the timer	New Displays Change Clear	Instruction 01 Anweisung2 …	Hourly Daily (Mon-Sun) Weekdays1 (Mo-Fr) Weekdays2 (Mo-Sa) Weekend (Sa+Su) Weekly Monthly Init Delayer	...
	Clear all	No Yes			
Service	Access protection	*Password?*	None Lock menu Lock all		
	Password	*Password?*	0000		
	Hose *	Hose interval Hose service in xxx h Revolutions since service Interval-counter			
	Clear counters	All Revolutions counter Volume counter Contact memory			
	Log book	Error-Logbook	...		
		Filter	None only warn.+errors only errors only warnings only events		
	Display	Brightness			
		Contrast			

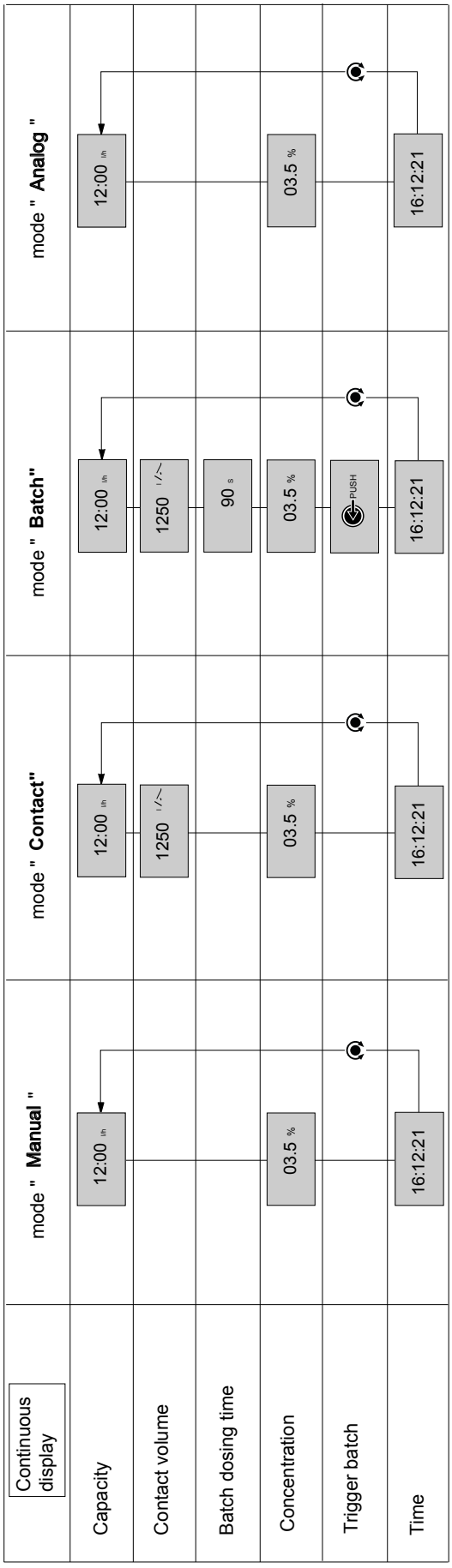
1. level	2.	3rd	4.	5th	xth
	HMI logout				
Language (*Language*)	English Deutsch Français Español Italiano Nederlands Português Polski Ceština Svenska Suomi Dansk				

Menus may be missing or added depending on the design and equipment on the pump.

* For this menu to appear, press *[STOP/START]* to bring the pump to a “Stop (manually)”.

26 Continuous displays and secondary displays

Continuous displays



Auxiliary displays in the continuous display

Secondary display	Operating mode " **Manual** "	Operating mode " **Contact** "	Operating mode " **Batch** "	Operating mode " **Analog** "
Revolution rate	1613 1/h	1613 1/h	1613 1/h	1613 1/h
Dos. capacity	12.00 L/h			12.00 L/h
Remaining litres			000,833↓R [1]	
Total number of revolutions	602371 ↻	602371 ↻	602371 ↻	602371 ↻
Total litres	2949.6 l	2949.6 l	2949.6 l	2949.6 l
Signal current (at the input)				12,7 mA [2]
Time	16:12:21	16:12:21	16:12:21	16:12:21
Date	2015 - 03 - 27	2015 - 03 - 27	2015 - 03 - 27	2015 - 03 - 27
Relay status	Relay1: on | Relay2: off [3]	Relay1: on | Relay2: off [3]	Relay1: on | Relay2: off [3]	Relay1: on | Relay2: off [3]
Load	Load: 27	Load: 27	Load: 27	Load: 27

1 = only with "Memory" function extension
2 = only with current output
3 = only with relay

27 Installation instructions for retrofitting relays

These installation instructions apply to:

Relay retrofit kit	Order no.
Fault indicating relay	1029311
Fault indicating and pacing relay	1029310
0/4-20 mA output + fault indicating and pacing relay	1031273

WARNING!

Danger of electrocution.

Live parts can be accessed if the slot for the relay has been opened.

- Disconnect the pump from the mains/power supply prior to commencing work.
- Only operate the pump with a liquid-tight screwed slot for the relay and connector for the relay cable.

Scope of delivery

1 - Relay board, fully assembled

1 - Relay cable, fully assembled, with connector

1 - Seal

Materials

Torx spanner T 25

A small bright pocket torch can help to find the 4x2 contact in the slot for the relays more easily.

Personnel: ■ Electrician

Requirement:

The pump is electrically disconnected.

1. Remove the cover of the slot.
2. Hold the relay board by the edge of the relay cover.
3. Carefully insert the relay board into the slot for the relay - the opening in the board in the slot will help with this. At the same time make sure that the 3x2 pins on the relay board are sitting correctly and on the left contacts of the 4x2 contact in the slot.
4. Push the relay board with gentle pressure into the slot.
5. Use the screws to screw the relay cover until liquid-tight with the housing.
6. Insert the seal of the connector of the relay cable into the relay cover.
7. Push the connector onto the pins of the relay cover and then tighten the screw into the connector until liquid-tight.

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