Installation and operation instructions

telab Pump BF 414

(220 Volt / 50 Hz)

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1. Safety instructions

- When working with chemicals, local safty rules and regulations must be observed (e.g. wear protective clothes).
- Before starting work on the dosing pump and system, disconnect the electricity supply to the pump, ensuring that it cannot be accidentally switched on. Before reconnecting the electricity supply, make sure that the dosing hose is positioned in such a way that any chemical left the dosing head is not ejected, thereby exposing persons to danger.
- When changing a chemical, make sure that the materials of the dosing pump and system are resistant to the new chemical. If there is any risk of chemical reaction between the two types of chemicals, clean the pump and system

2. Operating instructions

The dosing pump has four main menu controls:

1. Work menu
2. Menu “External Control“ (see “External connection facilities“)
3. Calibration menu (see “Calibration instruction“)
4. Menu “heating regulation” (see “heating system for the pump chamber”)

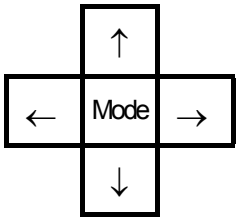
After starting the dosing pump the display will show:

1. Line – Pump type
2. Line – max. stroke frequency
3. Line – max. flow
4. Line – Serial Number

After a few seconds the display changes automatically to the work menu.

2.1 Work menu

Five keys are provided for operator control of the device. Depending on the current operating mode, the arrow keys are used to move the cursor or to change an input value.



Two different operating modes exist and are distinguished by different respective forms of the cursor:

Flashing block cursor : Input mode

Underscore cursor : Cursor mode

Press the "Mode" key (centre key) to toggle between the two operating modes.

2.2 Cursor mode

Use the arrow keys to move the cursor.

The keys ↑ and ↓ move the cursor between the different input fields.

The keys ← and → have no function.

2.3 Input mode

The input value can be changed with the arrow keys.

Select the cursor position with the keys ← and → .

On pressing the keys ↑ or. ↓ , the input value is incremented or decremented respectively at the current cursor position by one counting unit per keypress.

The entered values take effect already during the input procedure !

3. Operating modes

The pump can be operated in various modes. After switching it on, the pump is in status "OFF".

After changing to input mode, the pump can be switched to continuous operation (On), timer mode (Time: hh:mm:ss) or Off status:

Key ↑ ON

Key ↓ Off

Key ↓ TIMER (Run and Wait)

3.1 Continuous operation

The 1st stroke starts as soon as the pump is switched to continuous operation. The current values for stroke volume, stroke frequency or flow rate are shown in the display and can be changed during operation.

3.2 Timer mode

The currently set and indicated values for stroke frequency and stroke volume are taken over in timer mode. The pump runs for a preset time (max. 24 hours) with the values taken over.

The time is displayed with format hours:minutes:seconds.

To change the time Move from field to field with the keys ← and → . Change the time setting with the keys ↑ and ↓ . To discontinue timer mode without starting, move the cursor to the left with the key ←

Timer start Move the cursor to the right when it is in the seconds field.The timer counts down to 0 .

Timer abort Press the "Mode" key (centre key) and Switch-off the pump with the ↑ key

Timer Change After the course-time in the Run-Timer has been set, it is possible through a switch into the Wait-Timer to change the starting time of the Run-Timer and consequently the starting time of the pump can be set. For this purpose, by pressing the Mode key a switch over is necessary into the Cursor mode, and then with the „Down“ arrow key into the Wait-Timer. By once again pressing the Mode key to get back into the Input mode, the time till the start of the Run-Timer can be set.

The stroke volume and the stroke frequency can be changed while the timer (run or wait) is running. For this purpose switch over to cursor mode and select the corresponding line with the arrow key ↑ . Then press the mode key to switch back to input mode and set the desired value with the keys ↑ and. ↓ .

3.3 "Off" status

The pump is in the switched-off state, but the operating parameters can be changed and will be taken over on switching-over to continuous operation, timer mode or single stroke mode.

4. External connection facilities

In the standard version these dosing pumps can be operated only with their own microprocessor control system.

An interface available under the order number "01071" can be fitted in the pump casing for external control of a dosing device. A pump which has been fitted with such an interface is designated by a letter "S" appended to the pump type designation (e.g. BF414/250S). The following drive variants, which are recognised automatically, are possible with a pump bearing this designation:

- Single stroke control
- External switch (potential-free)
- External drive (4 -20 mA or 2 -10 V)
- PC-interface RS232

4.1 Single stroke drive

A single stroke is executed in response to a pulse of 3...24 V DC amplitude and minimum duration 1 ms applied to the control input. The stroke volume can be set manually or under external control (2 - 10 V or 4 - 20 mA).

4.2 External Swith

of at least 1ms at the Input control. By a constant contact, the dosing pump will run withthe max. stroke frequency. The stroke volume can be set manual as well as external (2-10 V or 4-20 mA).

4.3 External control

By applying a voltage or a current to the socket “Ext. Strg.”, a control-voltage area is produced for the Stroke frequency of 2 – 10 V or 4 –20 mA. The stroke volume can also be controlled with a second Control current (2 – 10 V or 4 – 20 mA).

4.4 RS232

The operating values for stroke volume and stroke frequency are communicated to the pump via the RS232 serial data communication interface. Manually set values (stroke volume and stroke frequency) can be interrogated at any time.

The PC serial port (COM1 or COM2) must be configured with the following parameter: *9600 Baud, No Parity, 8 bit, 1 Stopbit*

Vnnn.n	sets the stroke volume
Fnnn.n	sets the stroke frequency Leading zero by small values ! Ex. Frequency input of 25 strokes/min – Input: 025.0
?	reads out current value for volume and frequency (when heated dosing pump for topical-Temperature in Pump chamber TA and for PTFE-Pipe TB, leading zeros will be transmitted as blank characters. Format: **Vnnn.n Fnnn.n TAnnn.n TBnnn.n**
G	starts the dosing procedure
S	stops the dosing procedure
T	starts the dosing pump for one stroke
Hnnn.n	sets the should be temperature of the pump chamber and of the PTFE-pipe. Leading zero by small values !

Leading zeros in nnn.n are transmitted as blank characters.

The RS232 interface takes priority over all other control drive variants.

4.5 Menu „External Control“

The controls of the stroke volume and the stroke frequency can be combined at will and must be pretend in the Menu „External Control“.

To change the settings the dosing pump must be turned-off at the main switch. Before turning ON the pump, the Mode-key has to be held pressed until the request for the security code appears in the display. Through the use of the „Up“ and „Right“ arrow-keys you enter the following numbers 111000 and confirm them by pressing the Mode-key.

In the first line you now choose through the use of the „Up“-key the Frequency control. In the second line you use the same procedure to choose the Volume control (Manual,External I, External U, or External serial).

Over the trigger function, the trigger of the stroke can be chosen. This occurs through the function **Frequency** (processor), **External U** (single stroke) and **External Switch** (potential-free contact) in the third line „Trigger“. Although, this is only possible when **Frequency** (1. Line) is set to the manual position.

In the last line (ON/OFF), the choice will be made through which kind of signal the dosing pump will be started, either internal over the keyboard, serial or external through the start-up of the frequency or the stroke volume.

After all settings have been made you exit by pressing simultaneously the „Left“ and

„Right“-keys. The choose control settings will be automatically saved.

The activation of the external controls for the volume and frequency will shown in the work-menu in the 4. Line and in the LED’s.

You can check the settings in the Menu „External Controls“ by pressing imultaneously the „Left“ and „Right“-keys anytime. By once again pressing simultaneously the „Left“ and „Right“-keys you change back into the work-menu.

4.6 Setting possibilities:

FREQ**:**	Manual	The frequency can be set over the keyboard.
	External Serial	The frequency will be set over the serial interface.
	External I	The frequency settings over a current of 4 –20 mA
	External U	The frequency settings over a voltage of 2- 10 V.
HVOL**:**	Manual	The volume can be set over the keyboard.
	External Serial	The volume will be set over the serial interface.
	External I	The volume settings over a current of 4 –20 mA.
	External U	The volume settings over a voltage of 2 –10 V.
TRIGGER**:**	Ext. Switch	The execution of one stroke (stroke signal) will be controlled externally over a potential-free switch or over the serial interface (T).
	External U	The execution of one stroke (stroke signal) will be controlled externally over a voltage of 3-24 V.
	Frequency	The execution of one stroke (stroke signal) will be controlled internally over the frequency settings.

External Switch and External U can only be activated when „FREQ“ is set to manual. (ON/OFF must be set to internal when Trigger should be set to external.)

ON/OFF**:**	Frequenz	The pump will be in readiness once the external voltage at the Freq. Input > 2 V or the external current has reached > 4 mA. By not reaching these values the dosing pump will be set to the operation-modus of **OFF**.
	Volume	The pump will be in readiness once the external voltage at the Vol. Input > 2 V or the external current has reached > 4 mA. By not reaching these values the dosing pump will be set to the operation-modus of **OFF**.
	Serial	The pump will be in readiness and started with „G“ (Go) and equivalently stopped with the „S“ (Stop). The option is only possible when „FREQ“ has been set to the External Serial position.
	Internal	Readiness in dependence from the timer or the manual ON/OFF Switch or External U or External Switch.

4.7 Connector pin functions

RS232	Serial Data Communication Interface
1	-
2	RxD
3	TxD
4	-
5	GND
6	-
7	RTS
8	CTS
9	-

Ext. Ctrl.	Analog Interface
1	Stroke frequency U
2	Stroke volume I +
3	Stroke volume U
4	Stroke frequency I+
5	Single stroke
6	GND
7	Stroke volume I -
8	Target temperature I -
9	Stroke frequency I -
10	--
11	--
12	Target temperature I +
13	Target temperature U
14	--
15	External Switch

5. Heating system for the pump chamber

Two heating and control circuits, working independently of one another, heat the PTFE pump chamber as well as the external PTFE tubing. Platinum resistance thermometers - PT100 (input sensor) measure the actual temperature in both heating circuits.

The temperature is regulated by the internal microprocessor.
Temperature regulation and insulation guarantee conditions of constant temperature during the dosing process.

Input of the target temperature as well as the output of the actual temperature take place in the menu "heating regulation". By simultaneously pressing the two keys ↑ → one can jump between the working menu and the menu "heating regulation".

Setting the target temperature in the menu "heating regulation" starts the heating. For this, press the mode key to change to the input mode and set the required temperature with the ↑ key. The green LED "heating" indicates the immediate initiation of the heating cycle.
The actual temperature of the pump chamber and the PTFE tubing are shown in lines 3 and 4. The LEDs "pump chamber" and “PTFE tubing” indicates the operating condition of the two heating circuits.
The heating can be switched off in the menu "heating regulation" by reducing the temperature to below 40 °C - "off" is then indicated in the display.

If the dosing pump has been switched off at the mains, then, after the machine is switched on again, the heating must be reactivated by resetting the target temperature.

Heating power of the pump chamber:	165 W (3 heating cartridges à 55 W)
Heating power of external tubing:	200 W/m
Heating cartridges:	stainless steel outer sheath
	ceramic end caps
insulating material:	magnesium oxide
Adjustable temperature range:	40 - 100 °C
Temperature measurement:	PT-100 sensor

A warning signal is given if there is an interruption of a sensor circuit.

6. Dosing characteristics

6.1 BF414/xx Dosing device feed

- All liquids; for viscous feed media we require comparable information such as 'like water, glycerol, etc.' or preferably a definite viscosity value or, if available, a safety data sheet, because the feed behaviour is different according to type of material.
- All gases with no exception. The gases should be dry and they should have a definite composition at the respective operating temperature (NO_2 <-> N_2O_4 at temp. xx).

6.2 Temperature range -20...100 degrees Celsius

The dosing pumps are also available with adjustable heating devices (up to $100^{O}C$). The pump chamber and the hoselines are heated separately.

The complete control system for the pump and the 2 heating controllers (for the pump chamber and for the connecting hoselines) are mounted in a second casing outside the pump. Temperature control is implemented with a temperature monitoring device (RS) equipped with a Pt100 platinum resistance thermometer as sensor. Operation at temperatures > 100 degrees Celsius is not covered by our warranty.

For cooling the pump chamber and hoselines we can supply a copper spiral for heating / cooling which can be operated with a suitable heating/cooling liquid.

6.3 Technical vacuum for liquid

Vacuum can be applied to the output side of all dosing pumps except for the models BF414/20000 and BF414/40000. A choke device with flow resistance should thereby be placed at the end of the output line. The dosing pump will feed too much liquid if such a choke device, which can consist of a capillary tube, is not present. This is so because the opening output valve releases the pump chamber so that the vapour pressure of the liquid empties the pump chamber in addition to the other bores and hoselines. This can take place more or less unevenly. Therefore special attention must be given to dosing procedures under reduced pressure. Stable dosing can be achieved only and exclusively by fitting a flow resistance device directly at the end of the line, that is in the column, reactor, etc.

Similar conditions apply for underpressure on the input side. Without suitable countermeasures, the amount dosed here would be too small because the liquid degasses promptly. To counteract this, a container is placed higher than the dosing pump. Example => HCN (in industry, alternatively under certain circumstances additional cooling).

Gases may be fed-in and fed-out only without underpressure or overpressure.

7. Pulsation

7.1 Smoothing for liquid dosing

When there is an air bubble in the hoseline (transparent, zero feed rate), it is seen to undergo an oscillatory motion (mutually cancelling alternate forward and backward movement) caused by the valve control cycle. If this pulsation cannot be tolerated, appropriate smoothing must be provided. If elastic hoselines (Viton) cannot be used, we can provide a pulsation smoothing device consisting of a coil of warm plat-pressed Teflon hoseline terminating in a flow resistance device. The coil (5 m) does not change any "gradient" of the liquid with respect to chemical concentration, therefore no tailing is produced. The achievable smoothing effect is greatest for the smallest dosing pumps. Another possible way to elegantly eliminate pulsation which a volumetrically accurate dosing device necessarily produces, is to provide double-occupied output lines, so-called loops. Here a liquid, into which the feed liquid is dosed, must be kept circulating in the output loop. If a flow resistance restriction is used additionally, it must be checked from time to time.

7.2 Smoothing for gas dosing

HOMS such as H1/xxxx, H2/100 or the bypass M1000 are used for gas dosing. This way of avoiding inhomogeneities of gas concentration is absolutely essential for gas-mixing dosing devices.

8. Calibrations

All dosing pumps can be calibrated on request.

Normally the dosing pumps are delivered uncalibrated. The feed rate shown in the display may differ from the actual feed rate by up to two percent. The pump must be calibrated (specify "01270" with your order) if accurate display of the actual feed rate is required.

A calibrated pump is designated by the suffix letter "K" appended to the type specification code (e.g. BF414/250K).

We calibrate with gas (air) using a semi-automated apparatus for gas dosing devices. Liquid pumps are calibrated with a water-isopropanol mixture (98% water and 2% isopropanol) using a weighing balance (1mg/digit).

Calibration is made with 11 tiepoints. An integrated calibration program calculates intermediate values. The calibration is the same in BF414 dosing pumps for gases and liquids because both media are measured by exactly the same stroke change (congruent volume change). A 1.6% difference between liquid and gas calibration is produced by the heated yoke plate.

Alternatively you can calibrate the dosing pump yourself. For this purpose follow the calibrating instructions set forth below. This is necessary when intending to dose from underpressure. In this case exact display values are obtained only when calibration has been carried out under the actual operating conditions.

You can save four different Calibration curves with identification information and reload the needed calibration later.

By simultaneously pressing the „Left“ and „Up“-keys, it is possible during operations to get the current calibration chart with identification. After again pressing simultaneously the „Left“ and „Up“-keys the change back into the work-menu is possible.

8.1 Calibrating instructions for the BF414 devices

The dosing pump BF414/xx can be calibrated using the integrated control system. 11 tiepoints are defined for this purpose: At stroke volume 1%; 10%, 20%; 30%; 40%; 50%; 60%; 70%; 80%; 90% and 100%.

The flow rate is shown in the display.

The pumps are pre-calibrated in the factory with a mixture of water and isopropanol (98% water and 2% isopropanol).

The pump should be calibrated in a corresponding laboratory test with the medium which is to be pumped, when very accurate dosing is required.

Liquid pumps can be calibrated in a very simple manner using, for example, a digital weighing machine (1mg/digit) with a range of 320 grams. For this purpose fix the end of the output hoseline with a clampstand above a beaker standing on the weighing machine.

After switching-on the pump, set the stroke frequency as already described to the maximum possible stroke rate (30 or 60 strokes per minute) and set the stroke volume to the first tie point value (1% stroke volume). Then bring the cursor into the bottom line and press the mode key to select input mode.

Switch to the timer mode (hh:mm:ss) with the down arrow key. Set a value of 10 minutes (00:10:00) and then move the cursor to the right. The pump now runs for 10 minutes with these settings.

At the end of this time wipe the end of the hoseline on the beaker and then note the reading of the weighing maschine. Npw change to the cursor mode, set the stroke volume to 10% and then proceed again as just described.

After determining the feed quantities for all tie points, switch-off the pump at the main switch. Now press the mode key and switch the pump on again. Input of a code number is requested. Enter „124000“ with the use of the „Up“ and „Right“ arrow keys and press the mode key to confirm.

In the following display select with the „Up“ arrow key one of the four numbers that are to be occupied by the calibration curve and confirm with the mode key.

The calibration table then appears in the display. Now go to the third line, change into the cursor mode, and enter for the 1. calibration point the measured value in microlitres/minute.

Change back into the cursor mode to get back into the fourth line. To save the entered value, change into the Input mode. The „Up“ key changes into Save „Yes“. The „Down“ key changes into Save „Break“ which aborts the calibration, and keeps the values of the last complete calibration.

After confirming the Save „Yes“ with the mode key the 2. Calibration point (10%) will be asked for. Go back into the third line, change into the cursor mode, enter the measured value for 10%, and proceed again as just described. After the confirmation

of the last calibration point (100%), the calibration will be recognized as complete and in the new display the medium or a identification will be asked for. With the “Up” arrow key you select letters or numbers, and with the “Right” arrow key you switch to the next input field. It is possible to enter 10 characters. Afterwards, confirm with the mode key. The calibration is now completely saveed.

Intermediate values will be determined by an intergrated calculation program. The change back into the work menu will occur automatically.

The saved calibration now has to be selected (it is possible to save four calibration curves) and has to be loaded.

Switch the pump at its main switch off. Before starting the pump, the mode key has to be held pressed until the request for the security code appears in the display. Enter the number combination “112000” by using the “Up” and “Right” arrow keys, and confirm with the mode key.

In the following display select with the “Up” arrow key the number of the desired

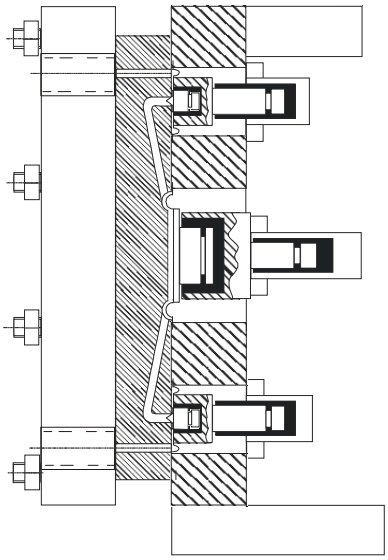
calibration curve. The feed di or the identification will be displayed at the same time. Confirm with the mode key, and you are back in the work menu.

The feed quantity of the selected calibration curve will now be shown in the display. By simultaneously pressing the “Left” and “Up” arrow keys it is anytime possible to select the current calibration table with identification.

The dosing pump can be recalibrated at anytime.

9. Construction and functional principles

9.1 Construction of the dosing devices

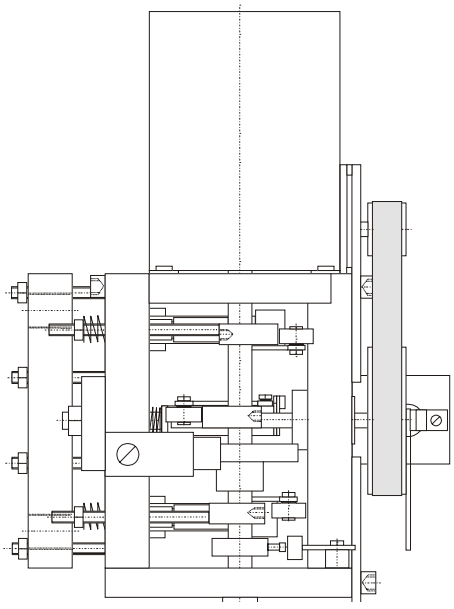


Altogether 3 diaphragms rest on a flat rectangular Teflon block - one membrane and two valve cones. Teflon rests on Teflon without any other foreign gasket material. The Teflon (PTFE) is recompressed. Various bores connect the three chambers whose total volume is extremely small, e.g. 60 microlitres for the BF414/30.
The valves and pump diaphragm connect via adjustment bondings to metal levers which are controlled by ball bearing levers and cams. A special lever takes-up the pressure impacts. A synchronous motor with rugged steel gear system runs at 30 or 60 revolutions per minute. The dosing device makes one controllable single stroke for each revolution.

9.2 Functional principles of the dosing devices

A BF414/xx dosing device has controlled valves. A revolution of the camshaft produces the following successive action steps: The input valve opens, the diaphragm (piston) sucks. Pause for 80 ms, then the input valve closes. The output valve opens, the diaphragm (piston) presses. Pause for 80 ms, then the output valve closes. The next dosing cycle (stroke) starts again with the input valve.

The closed phases of the valves overlap, thus the BF414/xx dosing pumps do not permit blow-through and they are always self-priming on the input suction side. This means that they vent automatically when feeding liquids, even when the maximum permitted opposing pressure is applied.



Force is required to suddenly move a long resting liquid thread in a hoseline (force = mass multiplied by acceleration). The accelerating and braking forces increase greatly when the process cycles are run faster. The 80 ms pauses mentioned above are provided to allow these forces to dissipate.

The feed process does NOT stop if gas breaks in (e.g. by venting, etc.), but an incorrectly dosed amount is then the consequence because the volume of the gas bubble is fed instead of a corresponding amount of liquid.

Every liquid is in solution equilibrium with the gas phase. This produces no significant errors if the liquid degasses reasonably regularly.

In contrast to aqueous liquids, non-aqueous organic fluids usually wet Teflon to a much better extent, contain less dissolved air and can be used for calibrating purposes with automated weighing machines provided that their viscosity is low, their vapour pressure is small and their density is known.

10. Material

10.1 Input/output connectors (I/O)

We manufacture these parts from solid Teflon and employ a conical contact pressing technique. Of course, on request be can alternatively provide Swagelock connectors, GL connectors, Bohlender connectors, etc.

10.2 Pump chamber, diaphragm and valves

Recompressed Teflon is used for making the pump chambers, diaphragms and valves. From the constructional as well as the practical point of view, the valve construction as well as all other seals are effectively "gastight". A final check of our dosing pumps is made with air and the type-specific maximum pressure.

11. Filter

We always recommend filter protection on the input side. Dosing without input filter leads to clogging of the chamber channels. In almost every case this starts gradually and ends with complete blockage of the pump. We recommend exploiting of the chemically inert behaviour of Teflon, to run aggressive reagents through the dosing devices from time to time which are known to be able to dissolve any sediments. Examples are chromic-sulfuric acid, hydrochloric acid, hydrofluoric acid and strongly alkaline solutions.

When a dosing pump is to be used for gases, successively feed water, acetone, ether (grease-free) and then dry with air while the pump is running.

Reactions which produce precipitates must not be allowed to take place in the pump.

Example: Aluminium sulfate solution was dosed and then methanol. This precipitates aluminium sulfate which clogs the pump.

Also avoid reactions which produce large amounts of heat inside the pump, e.g. pumping an alkaline solution or water immediately after dosing concentrated sulfuric acid. In this case briefly interpose at least one intermediate pumping phase with approx. 50% sulfuric acid.

12. Loops for gas-mixing dosing devices

12.1 Input and output loop

In contrast to the standard version, the dosing devices BFX14/xx for this purpose have two inputs and two outputs and are therefore easily recognised by this externally visible feature. The input loop passes through the input valve which is thereby completely purged, replacing any otherwise stagnant gas. This is necessary because slow diffusion exchange with the external atmosphere takes place through PTFE hoselines.

To avoid back-interaction of the gas output with the gas input which would otherwise take place and (slightly) modify the contents of the diaphragm chamber, the output loop does not pass directly through the valve, but passes instead through a H1/xxxx homogeniser (xxxx stands for the pump type, e.g. H1/30 for the BF414/30) which can be followed by a H2/100 or a bypass M1000. The H2/100 homogenises the gas stream up to 100 l/h.

H1 is a T-distributor with approx. 70% HOM effect. H2 is a series element to eliminate residual inhomogeneities. When two dosing devices are cascaded, the first one must have this H2/100 in addition to the H1/xxxx. The H2/100 is not required when the bypass M1000 is fitted in solo versions.

12.2 BYPASS M1000

This is a Teflon bypass which replaces the two outputs at the front on the front panel. The same as for the other HOM elements, it can be fitted in the factory and replaces the H2/100 for all gas flow rates greater than 100 up to 1000 l/h.

12.3 BF414/30+30

BF414/30+30 consist of 2 cascaded dosing pumps. Gas dilutions in the range from less than 1 ppb up to 1000 ppm can be obtained therewith, whereby the ppm part of the first stage and the ppb part of the second stage can be tapped simultaneously. All other BF414/xx dosing pumps can be combined analogously.

All investigations of the back-influence from the dosing device output to its input, of the inward diffusion of the external atmosphere in the Teflon hoselines and chambers and the

investigation of gas concentrations in relation to our dosing pumps, have been carried out with nitrogen and carbon dioxide using a special coulometric measuring instrument operating with an absolute measuring process, and the results led to the constructional forms of the HOMs adopted here.

Our warranty covers defective components but not damage caused by environmental influence.

13. Technical data

Dosing pump 30 strockes/min

Typ BF 414	**30**	**250**	**1.000**	**2.500**	**20.000**
Max. capacity [ml/min]	0,01 - 0,9	0,02 – 5	0,3 – 15	0,6 – 40	6 – 300
Stroke Volume [µl]	0,33 – 30	0,66-166	10 – 500	20 - 1.333	200 - 10.000
max. pressure inlet [bar]	10	10	5	3	0,2
max. pressure outlet [bar]	10	3	1	1	0,2
Smallest abs. Pressure inlet [mbar]	20	20	30	50	1.000
Smallest abs. Pressure outlet [mbar]	0	0	0	0	900
length of stroke [mm]	0 – 1	0 – 1	0 – 2	0 – 2	0 – 2
stroke frequency [min^{-1}]	0 – 30	0 – 30	0 –30	0 – 30	0 – 30
motor speed [min^{-1}]	30	30	30	30	30
Material	PTFE	PTFE	PTFE	PTFE	PTFE
regenerative	Yes	Yes	Yes	Yes	Yes
Voltage [V/Hz]	230/50	230/50	230/50	230/50	230/50
max. power consumption [W]	50	50	50	50	50
heating version [W]	270	270	325	325	325
	BF 414/30 - BF 414/2.500 gases or liquids				only gases

Dosing pump 60 strockes/min

Typ BF 414	**32**	**252**	**1.002**	**5.000**	**10.000**	**40.000**
Max. capacity [ml/min]	0,02 – 1,8	0,04 – 10	0,6 – 30	1,2 – 80	2,4 – 160	12 – 600
Stroke Volume [µl]	0,33 – 30	0,66 – 166	10-500	20 - 1.333	20 - 1.333	200 - 10.000
max. pressure inlet [bar]	10	10	5	3	3	0,2
max. pressure outlet [bar]	10	3	1	1	1	0,2
Smallest abs. Pressure inlet [mbar]	20	20	30	50	100	1.000
Smallest abs. Pressure outlet [mbar]	0	0	0	0	0	900
length of stroke [mm]	0 – 1	0 – 1	0 – 2	0 – 2	0 – 2	0 – 2
stroke frequency [min^{-1}]	0 –60	0 –60	0 –60	0 – 60	0 - 2x60	0 – 60
motor speed [min^{-1}]	60	60	60	60	60	60
Material	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
regenerative	Yes	Yes	Yes	Yes	Yes	Yes
Voltage [V/Hz]	230/50	230/50	230/50	230/50	230/50	230/50
max. power consumption [W]	70	70	70	70	70	70
heating version [W]	290	290	345	345	345	345
	BF 414/32 - BF 414/10.000 gases or liquids					only gases

Gas dosing should be done without pressure. The pressures shown in the data sheet are for fluids only. Highly viscouse substances and hypotension couse a decrease in the flow rate given.

Safty declaration

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

We hereby declare that this product:

Product type: _____

Product number: _____

is free from hazardous chemicals, biological and radioactive substances!

_____ _____

Date and signature Company stamp

Declaration of Conformity for the EU

We hereby declare that the machines described below and the models marketed by us fulfil the relevant fundamental safety and health requirements of the EU Guideline for Machinery on account of their design and type of construction. If the machine is altered without our knowledge this Declaration loses it validity.

Name of the machine: Dosing pump

Machine type: BF 414

Model Nos.: 30, 32, 35, 250, 252, 255, 1000, 1002, 1005, 2500, 2550, 5000, 10000, 20000, 40000

EU-Guideline: EU-Guideline for Machinery 89/392/E.E.C. dated 14.06.1989 with Amended Guideline 91/368/E.E.C. dated 20.06.1991.

Manufacturer P. Fink Date Okt. 2001

Letzte Änderung: 20.03.02 13:43