



Operating Instructions

Precision-Diaphragm-Pump

Ritmo 05/...CAT

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Composed May 20th 2008



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Safety Instructions

1.1 General safety instructions

The mounting and operating instructions include fundamental instructions which must be heeded during setup, operation, and service. They are therefore to be read by qualified personnel/operator and respectively the mechanic before setup and operation of the metering pump. The complete instructions should be available at the operating place of the metering pump.

Apart from these general safety instructions there are further special instructions in other sections to which attention must be given.

The instructions mounted directly on the metering pump must be heeded and always kept in a visible condition.

Besides the general safety instructions the operator must consider the existing national regulations for accident prevention as well as the internal working, company, and safety regulations.

1.2 Personal qualification and training

The personnel for operating, service, inspection, and mounting must have the appropriate qualification for this work. Responsibility, competence and control of personnel underlie the regulations of the organization

1.3 Safety instructions for the user/operator

An existing contact protection for moving parts must not be removed from an operating system.

Dangers caused by electrical energy must be excluded according to the regulations of VDE and the local Energy Supply Company.

1.4 Safety instructions for service, inspection and mounting

The organization is responsible for execution of all service, inspection and mounting work is only done through authorized qualified persons who are instructed with an adequate study of the mounting and operating instructions.

Fundamentally, all work on the metering pump is executed only when the pump is not running. The stopping procedure of the pump must be executed as described in the operating instructions.

Directly after termination of a process all safety and protection fittings must be placed back into place i.e. set in to function.

Before renewed operation all instructions in the section 'Putting into operation' must be executed.

1.5 Independent conversion and spares production

Conversion or alterations on the metering pump are only permitted according to prior agreement of the manufacturer.

1.6 Unauthorized operation practice

The operational safety of the supplied metering pump is only guaranteed by application in accordance with the mounting and operating instructions. The stated limiting values as shown in the technical data must not be exceeded in any case.

The supplier accepts no liability when the deliver fluid or operating conditions are not or only partly specified or during a process changed in an impermissible manner i.e. not maintained.

In individual cases please ask the supplier whether the Metering Pump is suitable for the changed operating conditions.

1.7 Danger caused by non-observance of the safety references

The following safety instructions are used in this manual and can cause danger to persons when not observed. Therefore the reader should give special attention these texts in the safety instructions.

1.8 Explanation of used safety symbols

The following symbols are used in this manual whereby non-observance can cause personal danger. Therefore the safety instructions should be read carefully.



This symbol indicates danger to personal health and life.

Warning

This script indicates a safety precaution which can cause risk to the metering pump or its function.

Note

This script indicates facility tips when using the metering pump

In addition to these specially indicated safety references in the operating instructions, the labelling directly on the metering pump and on the fluid tubes must be observed and maintained in a legible state.



2. Mounting and operational procedure

2.1 Mounting and operational description

Metering pumps in the R 05 series are self-priming precision metering units with positively controlled valve technology.

They consist of a stainless steel casing with drive mechanism and electronics, a pump casing external front side flange mounted PTFE metering head and a control panel on the opposite casing side.

The metering head incl. processing membrane and membrane conical valve is made of virgin pure PTFE warrants a universal chemical resistance. There are no other used material components, seals, O-rings, valve springs, or such which could impair the chemical resistance.

The working membrane is displaced in an oscillating movement by a high resolution stepping motor coupled to a backlash free conical ball screw. The intake and discharge stroke length is thereby always constant. Ritmo-Metering Pumps possess no mechanical or motored stroke adjustment as with all present known marketed metering pumps. The delivery rate is exclusively controlled by the stroke frequency.

Parallel to the membrane movement, the membrane valves are positively controlled by stroke magnets and synchronized such that the pump-head is maintained absolutely leak proof between intake and pressure sides during the metering process. The metering pump is therefore absolute leak proof, has no blow back and requires no additional shut off valves between the pressure and intake sides.

Depending on the functionality the metering pumps are fitted with 2 and/or 3 valves on the pressure side.

The positively controlled valve technology assures a very robust intake and non-sensitive metering behaviours against gas bubbles, gas emission effects, or empty feed pipes. The Ritmo Metering Pumps are absolutely self-priming and require neither de-aerating nor filling or be protected against dry running.

The processor controlling of the metering pump coordinates the exact working processes between stepping motor and valves as well as the stepping motor stroke frequency. Thereby the motor is so controlled that the metering runs consistently and constant as the predetermined rate allows. The intake speed is constant and maintained as short as possible according to the fluid.

The delivery stroke is however, not a short pressure stroke as with usual metering pumps but a longer metering stroke continuing over the total selected longest possible delivery time of the feed rate.

This process can continue for 250 minutes and thus maintains a consistent metering without the typical dosage peaks of traditional membrane metering pumps. Pulsation dampers are not necessarily required.

The exact operating cycle between the membrane and valves, combined with a regulated controllable valve technology and pacified gentle motional and delivery process guarantee the accumulated advantages of a very consistent, repetitious precision dosage.

The high resolution stepping motor enables the Ritmo Metering Pump delivery rate in proportions from 1:1000 with only one pump-head.

2.2 Control Panel

R 05 type Metering Pumps possess a clearly designed keyboard display.

The delivery rate is set by 2 keys for increasing, decreasing or alteration even during operation of the metering pump. The corresponding delivery rate can be displayed at any time.

In addition to the delivery rate further required important metering functions can be simply accessed by pressing a key without activating a menu.



3. Operational criterion

3.1 Defined operation

R 05 Type metering pumps are designed for high precision metering of small and smallest fluid quantities as well as the exclusive PTFE-application for the handling (metering, delivery) of aggressive chemicals and gasses. In case of doubt, reference to a chemical resistance list is advisable.

According to the individual layout (Temperature; Pressure; No. of Intakes and Pressure Sockets; Interface Configuration) the pumps can be utilized for metering under vacuum conditions; metering of hot fluids/melts; metering with cooled dosage head; proportional quantity and synchronous metering of multiple fluids; for metering and mixing of gases; production of calibrating gases as well as filling, sampling or distribution pumps.

The application domains concentrate on the metering/filling of chemicals in laboratories and technical schools for the chemical industry, the Pharmaceutical and biotechnology, research establishments and High Schools as well as in drinking water, sewage, and water treatment.

3.2 Warranty Conditions

The Ritmo 05 Metering Pumps are manufactured according to the latest technological knowledge. Direct ex factory devices the Fink Chem+Tec Company accepts the warranty for material defects and workmanship.

The warranty is for a period 1 year from the date of purchase. The warranty covers all defects within this period except transport damage, wear parts and damages due to misuse, or used contrary to the operation manual.

All rights are reserved to make alterations to design or technical data serving the interest of technical development.

3.3 Technical Parameter

Pump type	R 05/...					
	05/3	05/30	05/60	05/120	05/150	05/250
max. metering capacity ml/min	3	30	60	105	150	250
min. metering capacity µl/min	3	30	60	105	150	250
max. stroke frequency strokes/min	ca. 43	ca. 43	ca. 46	ca. 48	ca. 79	ca. 79
max. pressure inlet bar	4	4	3	2	2	2
max. pressure outlet bar	4	4	3	2	2	2
Stroke volume µl	70	700	1300	2500	1900	3400
min. stroke duration sec.	1,4	1,4	1,3	1,2	0,8	0,8
max. stroke duration sec.	1400	1400	1300	1300	800	800
Repeat accuracy %	< 1	< 1	< 1	< 1	< 1	< 1
Vacuum at inlet mbar	20	20	20	20	20	20
Vacuum at outlet mbar	0	0	0	2	0	0
Max. viscosity Pas	200	200	300	300	300	300
Max. medium temperature °C	120°C					
Material, pump head	PTFE					
Material, diaphragm	PTFE					
Material, valves	PTFE					
Input voltage	100-240 V, 25 W (125 – 800 W heated)					
Safety class	IP 30					
Ambient temperature °C	50°C					
Max. dimensions L x W x H	270x130x205 (340x130x205 heated)					



3.4 Mechanical construction

Fluid connections: PTFE-Connector RGL 14, retainer and guide ring ID 3

3.5 Valve operation, cleanliness

The Metering Pump operation mode and especially the membrane conical valve ensure a very robust operation with an extreme valve sealing.

Warning

However and especially with small metering flows, in order to assure an exact metering process and prevent clogging of the intersection boring in the pump-head maintain cleanliness and homogeneity
Mount a filter on the intake side when necessary.

3.6 Temperature range

The Metering Pumps can be utilized with hot fluids in conformation with the limitation of the application and the chemical resistance of PTFE. A fluid temperature of max.120° serves as the basic guide.

3.7 Pulsation behaviour

Oscillating displacement pumps fundamentally present functionally significant pulsation behaviour. R 05 type Metering Pumps can reduce this pulsation behaviour considerably by means of the time controlled discharge action. In individual cases the discharge action can take up to 25 min. so that a quasi continuous metering action.

Note

By larger volume flows an additional application of pulsation dampers is advisable in situations where a rest pulsation disturbs the process. In individual cases and in dependence of the required pressure build-up it is in addition possible to configure a selective optional pump-head. In individual cases please contact us so we can assess and solve your metering requirements.

4. Electrical connection and interface

4.1 Electrical connections on the metering pump

Mains connection	230 V, 50 Hz
Fuse	1.0 A
Power consumption	25 W
Internal resistance	270 Ohm
Control voltage	24 V AC (1.50 m Connection cable incl. plug for connection to the debinding furnace.
	Configuration: Pin 1 & Pin 4 – Start/Stop Pin 2 & Pin 3 – Return function

4.2. Signal lamps

The Metering Pump has a green and red control lamp for operation display.

LED in the text line	Lights 'red' when the pump is switched on with the mains switch Mains switch = 5V – control voltage
RUN- LED in the Start/Stop field	Lights 'green' = Metering process running



Stop-LED in the **Start/Stop** field

Lights 'red' = Metering Pump in Standby mode

Lights 'green' = Metering Pump delivers after manual start

LED's in the respective operation functions:

Return, Clean, Max. and Cal.

Lights 'green' when activated.

5. Transport and Setup

5.1 Transport and storage

When the product is delivered please check the package for external transport damages and report them at the respective transport forwarding company. Apply for an inventory and open the consignment where damages on the packaging are detected.

5.2. Setup location and starting operation

Check if the Metering Pump is complete and in perfect condition, has function safety and pressure tightness.

The Metering Pump is designed so that any internal chemical emission is collected in a base tub.

Warning

However, assure that no damage to plant components can occur by an eventual chemical emission on compression couplings and tubes outside of the pump. We recommend the application of leakage control and drip pans.

The pump-head may contain fluid remains of water or water/isopropanol compositions from the factory testing.

Warning

For metering of a media which should not have contact with water, the Metering Pump must be flushed with an appropriate fluid.

The intake and pressure side tubes are identified on the pump-head.

Connect the intake side first whereby absolute cleanliness is very important! Ensure correct order of retainer and guide-ring of the PTFE- connection on retainer-ring-connectors (guide-ring faces with the conus in the PTFE-nozzle, retainer faces with the conus in the threaded cap).

Warning

A wrong order of retainer and guide-ring can squash the PTFE parts and cause leakages on fluid connectors (gas bubbles in the tube). In extreme cases the metered substance can escape!

When in spite of all the cleanest operation methods a fluid contamination can not be prevented contrary to all present experiences we recommend attach a filter on the intake side.

Be sure the retainer and guide-ring on retainer-ring-connectors of PTFE-connectors on the pressure side are also mounted in the correct order.

Warning

Exchange can cause leakages on connectors especially when the Metering Pump must establish a counter-pressure.

The installation of a pressure resistance valve is not required owing to the R05 positively controlled valve technology. Through flows from the suction to the pressure side by hydrostatic conditioned pressure differences (higher placed supply vessel) or by vacuum presented to the pressure side is therefore not possible.

After connection of the fluid side connectors and connection the electrical supply the Metering Pump can be started immediately. Switch on the Metering Pump with the power switch on the front panel of the Metering Pump and start the metering process by activating the RUN/STOP button.

It is not necessary to ventilate or pre-fill the pump head. The Metering Pump R 05 ventilates fundamentally when started.



5.3. Service and cleaning

R 05 Metering Pumps are designed for a long durability, manufactured under highest quality standards and guarantee a service free operation.

However, the Metering Pumps contain wear parts in the fluid section, membranes, valves and pump chamber. To ensure a long life of the Metering Pumps and prevent risk of operation failure, we advise regular visual inspection and careful clean handling of the Metering Pump.

For cleaning purposes we recommend the use of the high chemical resistant PTFE materials and run the pump with aggressive reagents, e.g. in order to dissolve sediments. The Return and/or Clean Function can assist cleaning, whereby the delivery direction is reversed with free pulsing of the valves and pipelines. A subsequent Delivery/Flushing with water, followed with acetone and afterwards continued pumping with air cleans and dries the pump-head.

5.4. Demounting and return transport

If the Metering Pump must be demounted and returned to the supplier for repair, before dispatch remove all fluid remains from the pump-head and subsequently cleaned and flushed and where necessary neutralized or decontaminated (see item 5.5). It must be assured that the Metering Pump contains no such adverse health effective or poisonous substances.

A safety data sheet of the last delivered fluid must be enclosed with the delivery note and reference to eventual dangers by the dismantling, especially when efficient remedies for an adequate cleaning of the Metering Pump were not possible.

All external connections must be tightly closed. The sender is liable for damages due to leaking fluid remains on the Metering Pump or other commodities.

5.5. Disposal

Insofar as the Metering Pump or parts of it and especially the fluid transferring components, are chemically contaminated they must be disposed environmentally compatible.

If the Metering Pumps are returned to the supplier for repair, possible contamination must be indicated. (Section 5.6.)

In case of contamination (e.g. diffusion of chemicals in the PTFE substances) or by defects on the Metering Pump that after return delivery for repair a sufficient cleaning from the manufacturer is not possible these parts or the complete pump will be sent back to the customer or as agreed by the customer disposed of at his charge.



6. Operation

6.1. Switching On/Off

The Metering Pump is switched on or off with the POWER switch on the pump front panel (red LED is on in the script and in the **Start/Stop** pad). After switching on the Metering Pump is in Standby Mode and individual operating functions can be manually set or activated over the configuration interface.

Switching the pump off with the POWER switch or through abrupt mains power failure stops the running procedure immediately i.e. the interruption of a started intake or discharge process. Both valves are closed instantly.

A new power-on of the Metering Pump the processor controlling initiates a calibration of the existing pump status. Thereupon the membrane moves to the front centre point.

Note

It must be noted that by this synchronisation the Metering Pump initially implements a residual charge stroke in the intake line before going into the standby status.

6.2. Keyboard

The R 05 Metering Pump has a clearly arranged illuminated operating panel for setting, for indication and adjustment of the set metering rate as well as accessing the Service Menu.

6.3. Adjusting the metering rate

The metering rate is adjusted by two keys \uparrow or \downarrow i.e. readjusted. By extended pressing of the \uparrow or \downarrow key the adjustment in fast sequence. A subsequent fine-adjustment is attained by repeated pressing of the \uparrow or \downarrow keys.

Note

The displayed metering rate is only exact when the Metering Pump has been calibrated to the current application.

Note

A changed metering rate is only active when the Metering Pump is started.

The discharge rate may be changed during operation. In this case the changed value is effective during a metering process.

Note

The selected metering rate is only active as long as the Metering Pump is in operation. When the Metering Pump is switched off the metering rate will not be retained in the memory automatically.

The set metering rate can be stored with the Enter key and is then available after switching the Metering Pump off and on again.

6.4. Additional operating functions

Apart from the adjustable metering rate, other user important functions are directly accessed by a simple key press without activating a menu.

Therefore in an additional key row there are 4 parallel keys to directly activate important functions of the Metering Pump.

Note

Please note that out of operational safety reasons, these functions can not be used during the running process.

The Metering process must be stopped before activating the desired function.

Return

The Metering Pump transfers in reverse mode to the receiver tank at maximum metering rate in order to drain any aggressive fluids out of the pump-head and pipelines of the system.

A cleaning effect of the valves or free pulsing of a filter/frit is attained in the system.

A single press of the key activates this function. The green LED is on. Repressing the key stops the function.



In the activated mode the display shows a time cycle which can be varied between 1sec. and 120sec.

Press the **Start/Stop** key to start the function. The pump stops automatically when the set time has cycled.

Pressing the **Return** key again deactivates the function.

The process may be interrupted at any time by pressing the **Start/Stop** key and the remaining time is displayed. The time cycle can be changed in this state.

In the 'Stop' mode the 'Return' function can be cancelled by repressing the Return key. The remaining cycle time will not be completed.

Clean

The Metering Pump opens both valves simultaneously to allow a flow through of the pump-head. This enables 'Cleaning' and 'Flushing' procedures of the system from the supply vessel through the pipes and pump-head to the reaction vessel.

Pressing this key activates the function. The green LED is on. Repressing the **Clean** key deactivates the function.

Note

If the key is pressed again on multi-channel pumps the next respective metering channel is activated.

In the activated mode the display shows a time cycle which can be varied between 1sec. and 120sec.

Press the **Start/Stop** key to start the function. The pump stops automatically when the set time has cycled.

Pressing the **Return** key again deactivates the function.

The process may be interrupted at any time by pressing the **Start/Stop** key and the remaining time is displayed. The time cycle can be changed in this state.

In the 'Stop' mode the 'Return' function can be cancelled again by repressing the **Return** key. The remaining cycle time will not be completed.

Max

The Metering Pump operates with maximum capacity for ca. 35 min. for quick ventilation and filling of the system, e.g. by initial operation setup.

Pressing the key once activates this function. The green LED is on. Pressing the **Max** key again deactivates the function again.

Note

If the key is pressed again on multi-channel pumps the next respective metering channel is activated.

In the activated mode the display shows a timing cycle which can be varied between 1sec. and 120sec.

Press the **Start/Stop** key to start the function. The pump stops automatically when the set time has cycled.

The function is deactivated by pressing the **Return** key.

The process may be interrupted at any time by pressing the **Start/Stop** key and the remaining time is displayed. The time cycle can be changed in this state.

In the Stop mode the Return function can be cancelled again by repressing the **Return** key. The remaining cycle time will not be completed.

Cal

Before operation, the Metering Pump must be calibrated i.e. with the metering fluid and if possible under the system conditions (pressure, temperature) in order to obtain an exact displayed value of the metering rate and enable a selective change of the metering rate.



Pressing the key once activates this function. The green LED is on. Pressing the **Max** key again deactivates the function again.

Note

If the key is pressed again on multi-channel pumps the next respective metering channel is activated.

In the activated mode the display shows a quantity in ml which is based on the factory setting (by initial operation) or from the last calibration.

After pressing the **Start/Stop** key the function is started. The Metering Pump executes 50 strokes with a defined stroke sequence (factory setting: 70% of max. Metering capacity) and stops automatically.

The value determined by a weighing machine must be entered on the display panel i.e. change the actual displayed value. The entered calibration value must be confirmed with the **Enter** key. Under 'Cycles Remaining' the display shows the value null.

The display changes to the operating menu when the **Cal** key is pressed,

Note

As long as the **Cal** LED is on, the entered calibration value can be viewed by pressing the **Start/Stop** key (LED in the **Start/Stop** panel changes from red to green) and return to the previous indication (LED in the **Start/Stop** panel changes from green to red).

The calibration process can be interrupted and continued at any time by repressing the **Start/Stop** key. The remaining rest strokes of the interrupted calibration are then continued.

6.5 Operational modes

The operation mode of the Metering Pump must be set in the Configuration Menu.

Activating the **Configuration Menu** is accessed by switching the pump on with the power switch and pressing **+** and **-** at the same time.

The required setting in the configuration menu is confirmed by pressing the Enter key. There after the menu changes to the next option. When all setting options have been sequenced the configuration is closed automatically.

The required setting is selected with the **+** and **-** keys and then pressing the **Enter** key. The menu changes to the setting option. After running through all the setting options, the Configuration Menu is closed automatically.



6.5.1 Internal/External Settings

Changing from 'Internal' (= manual operation of the Metering Pump) to "External" (= external operation) or reversal is attained with the  or  and then pressing the **Enter** key.

Note The Ritmo-CAT type Metering Pumps (Types for Catamold Debinding processes) are fundamentally configured so that the 'External' mode is activated when switched on.



Attention !! Danger of explosion.

Metering of nitric acid in debinding furnaces is only allowed in the external mode i.e. through pulsation from the debinding furnace !!

Changing to an internal mode must be executed in the calibration mode or other operations in **non-coupled mode** with the debinding furnace.

Internal operation:

In this mode the pump is operated manually. The pump is started with the 'Run/Stop' button (both LED's are green after pressing the button). Pressing the button again stops the metering process. The 'Stop' LED is red.

The 'ON' sign flashes in the display during operation.

It must be noted that when the Metering Pump is halted, the metering process is stopped

Note immediately and both valves are closed immediately. The residual fluid remains in the pump chamber.
On restarting a new suction process is started. The suction side valve is opened and the pump chamber is filled with the rest volume.

External operation:

When the Metering Pump is set to external operation, the process operation is controlled exclusively by the Debinding Furnace. When a 24V AC or DC signal from the Debinding Furnace is placed to the Metering Pump it discharges the manually set metering rate. The **Run-Key** lights green and the **Stop-Key** lights orange.

During operation the 'ON' sign flashes.

When the signal is interrupted by the Debinding Furnace the Metering Pump stops and both valves are closed immediately. The rest fluid remains in the pump chamber.

The external halting of the metering is indicated by the red **Stop**-LED.

The display indicates 'OFF'.

Warning The control voltage is limited to 25V AC. A higher control voltage will damage control PCB of the pump.

Note During the operation control from the Debinding Furnace the metering rate of the Metering Pump can be changed manually.
It must be noted that no unauthorized person is allowed to change the metering rate of Metering Pump.

External Return Operation:

The **Return**-Function in the **Standby** mode can be activated by placing a 8-24V control voltage on PIN 2 and 3.

The return metering is then started by placing a control voltage to PIN 1 and 4.

Note In the normal metering operation the **Return** Function can not be activated.
The Metering Pump must be stopped before placing the control voltage to PIN 2 and 3 to start the **Return** Function.



As long as the control voltage is placed on PIN 2 and 3 the Metering Pump discharges in the **Return** mode. The display indicates a count down from 60 sec. If the control voltage is placed longer than 60 sec. the count down is repeated.

If the Metering Pump is stopped during the **Return** mode the Return discharge is interrupted and be restarted at any time by placing the control voltage on again.

Note

If the **Return** control signal is interrupted during the **Return**-Function the Metering Pump continues the discharge in **Return** mode until the Start/Stop signal is interrupted on PIN 1 - 4. When the control voltage is placed on PIN 1 – 4 again (**Start/Stop**) the Metering Pump starts the normal Metering process with the set metering rate.

Quick setup

- 1 Mount the tubes on the connectors.
The fluid intake is always at the bottom and the fluid output at the top. Both connections are labelled.
Ensure the correct order of the retainer and guide rings inside the PTFE connectors.
- 2 Switch on the supply voltage with the mains switch. The red LED is on in the script panel and the **Run/Stop** red LED is on.
- 3 Start the Metering Pump with **Run/Stop**. LED changes to green.
- 4 The system can be primed and filled quicker with the **Max.** function. Stop the Metering Pump, activate the max function and enter desired filling time (1-60 sec.). **Run** starts the filling time. The green LED is on.
- 5 When the filling procedure is finished and the system the Metering Pump must be calibrated according to system conditions i.e. back pressure or vacuum.

8. Calibration

The Metering Pump it must be calibrated before an application. According to the individual purpose, the Metering Pump should be calibrated with the metering fluid to be used in the process and where possible under the expected pressure conditions. This ensures an exact indication of the discharge rate in the display and enables the selective alteration of metering rates.

- 1 Prior to calibration, connect the Metering Pump on the intake side with a suction tube to a supply vessel (beaker) placed on a precision scale or connect to a graduated burette with a feed to the intake side connection of the Metering Pump.
- 2 Fill the suction tube and metering head with the metering fluid and stop the pump.
- 3 Fill the suction tube and metering head with the metering fluid and make a note of the level. Set the scale to zero when applied.
- 4 Select the **Cal** function and start the Metering Pump with the **Run** key. The Metering Pump conducts 50 strokes and stops automatically. The display shows the factory calibration setting or the setting of the previous calibration.
- 5 Remove the suction tube from the cylinder and make a note of the new level to obtain metered value or make a note of the weighed value on the scale when applied.



- 6 Enter the determined value on the display with the + and – keys i.e. change the existing value. When using a scale, the weighed value must be converted from the specific density of the metering fluid to volumetric value.
- 7 Confirm the entered value with the **Enter** key. The Metering Pump is now calibrated and switches to operating menu.

9. Error messages

<u>Error message</u>	<u>Cause of error</u>	<u>remedy</u>
Err. Data read	Error when reading the memory after switching on the Metering Pump. The error is shown in bottom line.	Call Support The memory can be set back to the initial value with Enter allowing a further provisional operation. Warning Cal. value and metering rate may differ the from entered calibration value.

Warning

Cal-value and Metering rate can vary from the entered values of the last calibration and metering. For safety reasons (over-dosage of Nitric acid to the Debinding Furnace) the metering rate is read in at 500 µl/min and could lead to an under-dosage to the Debinding Furnace.

The metering rate can be reset to required metering value at any time with the key  and 

The manufacturers support should be informed independently in any such case.

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14.09.2008