PCD Table Top Controller
User Guide

Version 2.6
June 22, 2018
Part No. 2200-0297M

for use with pump models: **PCD3 and PCD4**

prepared by GPD Global® Documentation Department

GPD Global®
Precision Dispensing Systems

Contents

Warranty

General Warranty. Subject to the remedy limitation and procedures set forth in the Section "Warranty Procedures and Remedy Limitations," GPD Global warrants that the system will conform to the written description and specifications furnished to Buyer in GPD Global's proposal and specified in the Buyer's purchase order, and that it will be free from defects in materials and workmanship for a period of one (1) year. GPD Global will repair, or, at its option, replace any part which proves defective in the sole judgment of GPD Global within one (1) year of date of shipment/invoice. Separate manufacturers' warranties may apply to components or subassemblies purchased from others and incorporated into the system. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES,EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Limitations. GPD Global reserves the right to refuse warranty replacement, where, in the sole opinion of GPD Global the defect is due to the use of incompatible materials or other damages from the result of improper use or neglect.

This warranty does not apply if the GPD Global product has been damaged by accident, abuse, or has been modified without the written permission of GPD Global.

Items considered replaceable or rendered unusable under normal wear and tear are not covered under the terms of this warranty. Such items include fuses, lights, filters, belts, etc.

Warranty Procedures and Remedy Limitations. The sole and exclusive remedy of the buyer in the event that the system or any components of the system do not conform to the express warranties stated in the Section "Warranties" shall be the replacement of the component or part. If on-site labor of GPD Global personnel is required to replace the non-warranted defective component, GPD Global reserves the right to invoice the Buyer for component cost, personnel compensation, travel expenses and all subsistence costs. GPD Global's liability for a software error will be limited to the cost of correcting the software error and the replacement of any system components damaged as a result of the software error. In no event and under no circumstances shall GPD Global be liable for any incidental or consequential damages; its liability is limited to the cost of the defective part or parts, regardless of the legal theory of any such claim. As to any part claimed to be defective within one (1) year of date of shipment/invoice, Buyer will order a replacement part which will be invoiced in ordinary fashion. If the replaced part is returned to GPD Global by Buyer and found by GPD Global in its sole judgment to be defective, GPD Global will issue to Buyer a credit in the amount of the price of the replacement part. GPD Global's acceptance of any parts so shipped to it shall not be deemed an admission that such parts are defective.

Specifications, descriptions, and all information contained in this manual are subject to change and/or correction without notice.

Although reasonable care has been exercised in the preparation of this manual to make it complete and accurate, this manual does not purport to cover all conceivable problems or applications pertaining to this machine.

Introduction

The PCD Table Top Controller, designed for precision table top control or as an interface to another control system (another machine, for example), has a wide variety of setting options for dispensing quantity and time. For interfacing with external systems, the controller can be set to remain on as long as a signal is high. This scenario works best when a variety of dispense patterns or volumes are to be dispensed.

All the values related to production can be saved and changed at any time. Operation is done via an intuitive operator guidance system using a graphic user interface. It is possible to operate two dispensers at the same time.

Features

Table 1: Functions by Feature

Feature	Refer to
3 dispensing programs: Quantity, Start/ Stop, and Time Program	Dispense Programs (pg 8)
Teach in: the simplest way to determine and save the required dispensing quantity	Dispense Amount (pg 16)
24 different dispensing programs (operation with chip card)	Creating Dispense Programs (pg 10)
Editing a dispense program with a PC (in preparation)	Changing Dispense Program (pg 12)
Prevent dripping by sucking back the medium.	Sucking Back (pg 18)
Setting flow quantity per minute.	Flow Rate (pg 18)
Calibration of controller / dispense pump for exact work.	Calibrating (pg 14)
Connection for foot switch and/or external signal.	Connections (pg 4)
Integrated pressure regulating pump.	Displays & Controls (pg 3)
Pressure monitoring at the medium supply with primary pressure.	Tolerance Value Primary Pressure Monitoring (pg 20)
Level monitoring for supply tank/cartridge/tank	System & Error Messages (pg 23)
Overcurrent monitoring of the connected dispense pump to protect against damage (due, for example, from sticking medium).	

Scope of Supply

- PCD Table Top Controller
- Power adapter
- SD chip card
- Operating and Maintenance Instructions.

Safety Notices

⚠ Preventing damage to dispense pump motor

Only remove and insert the dispense pump power plug [plug 16, Connections (pg 4)] **when the power has been turned off**; otherwise, the electronics of the drive motor could be damaged.

⚠ Preventing damage to controller

Never use more than a single A input speed control at a time, or irreparable damage to the controller may occur. Refer to Analog Inputs at Terminals (pg 28)].

Informal safety measures

Always keep the operation and maintenance instructions with the control system.

This is to be supplemented by the generally and locally applicable rules and regulations to prevent accidents and for protection of the environment.

Appropriate use, warranty

The control system is intended to be used to control dispensers in non-explosion-proof environments.

Any of the following that are done without the explicit and written approval of the manufacturer:

• conversions or additions,
• the use of non-original spare parts,
• repairs carried out by companies or persons that have not been authorized by the manufacturer

can lead to the warranty being rendered null and void.

The manufacturer shall have no liability whatsoever for damage resulting from failure to follow the User Interface (pg 3) and Troubleshooting (pg 33) instructions.

Qualifications of the operating and maintenance personnel

The owner bears the responsibility for ensuring that operating and maintenance personnel have the required qualifications. The operation and maintenance instructions must be read and understood. Comply with the relevant applicable technical and safety regulations.

Organizational measures

The owner is to provide any personal protective equipment that is required. All the safety devices are to be checked regularly. Wear protective glasses and a protective suit for operation and cleaning to protect against any chemicals that may be sprayed out.

Users must be in compliance with all safety information in the relevant instructions for dispensers connected to the control system.

Preparation before starting up - visual check

Make a daily visual check of the control system, before starting work, and before each shift change. If there is any doubt that the unit is not perfectly ready for operation, it must be shut down at once and inspected by a suitably qualified person before it is used again.

User Interface

- [Displays & Controls](#)
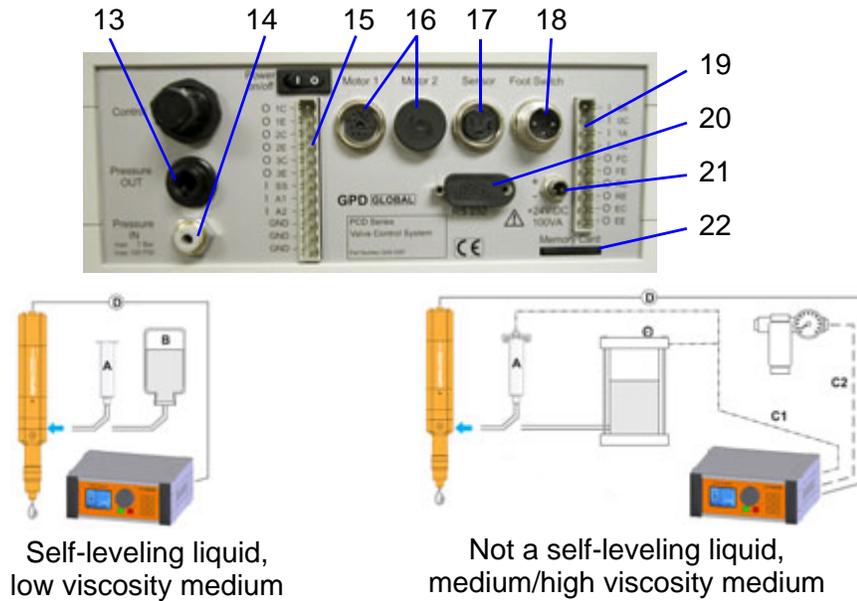- [Connections](#)
- [Screen Symbols](#)

Displays & Controls
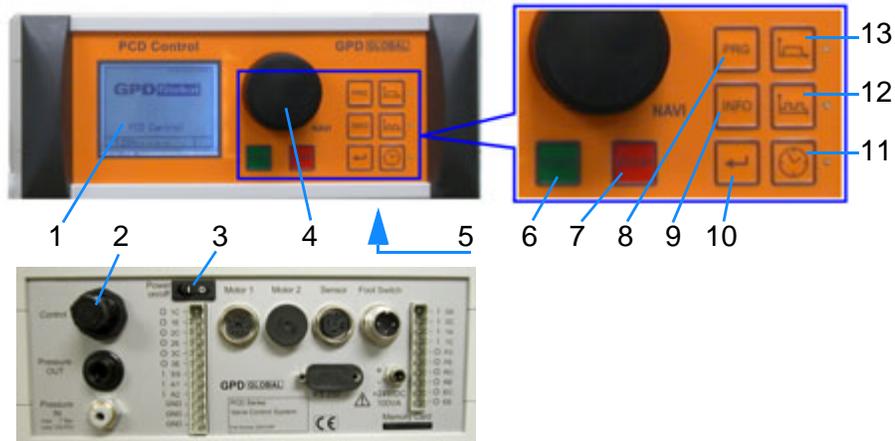
	Designation	Function/Description
1	*Graphic display*	
2	Pressure regulating pump	To regulate the primary pressure (air pressure) that is to be applied to the medium.
3	Power switch	
4	*NAVI wheel*	Select and set variable values and input dialog confirmations.
5	Key (not shown, bottom)	For service, software update.
6	Key *START*	Starts the dispense / function
7	Key *STOP*	Stops the dispense / function; emergency stop
8	Key *PRG / Esc*	Selection of programming, quitting an input dialog.
9	*Key INFO*	Brings further information onto the display, used to quit page 2 in the dispense programs.
10	*Return*	Confirmation of a selection / value input.

Shortcut keys for dispense programs

11	*Time program*	There is a status LED on the right next to the key
12	*Start / stop program*	
13	*Quantity program*	

Connections

Self-leveling liquid,
low viscosity medium

Not a self-leveling liquid,
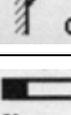medium/high viscosity medium

	Designation	Function/Description
13	Pressure OUT (bayonet type)	Output compressed air, connection to supply tank / cartridge / medium tank
14	Pressure IN (5/32 air line)	Input compressed air, hose connection, 4 mm (Quick start)
15	System plugs	See Analog Inputs at Terminals (pg 28) and Digital Opto-Coupled OUTPUTS at Terminals (pg 30).
16	Motor 1 / 2	For dispensers 1 and 2. See Pin Outs (pg 34).
17	Sensor	Input level monitoring medium. See Plug Connectors for Sensor and Foot Switch (pg 31).
18	Foot switch	Foot switch for hands-free operation. See Plug Connectors for Sensor and Foot Switch (pg 31).
19	System plugs	See Digital Opto-Coupled INPUTS at Terminals (pg 29) and Digital Opto-Coupled OUTPUTS at Terminals (pg 30).
20	RS 232	Data transfer with PC preparation. See Program Selection Module (pg 36). NOTE: This option requires the Program Selection Module - refer to Accessories (pg 33).
21	+24 V/DC 100 VA	Power plug, connection for power supply
22	Chip card reader (SD memory card)	Program storage
A	Cartridge/Syringe	
B	Bottle	
C1	Compressed air, 0-6 bar, regulated	
C2	Compressed air, 7 bar, dry, cleaned, oil-free	
D	Pump control	

For additional details, refer to Interface Description (pg 28).

Screen Symbols

	Designation / Function	Description
	Dispense program quantity	See [Dispense Programs](#) (pg 8) for the quantity program
	Dispense program start / stop	See [Dispense Programs](#) (pg 8) for Start / stop program
	Dispense program time	See [Dispense Programs](#) (pg 8) for time program
	Flow rate	Dispense quantity per minute in **ml / g**
	sucking back	Relieves pressure in the dispense nozzle. The amount of medium that is "sucked back" into the dispense pump in connection with the dispense process.
	Calibrating	Calibrate the dispense pump to an exact volume. Compensates for density variations.
	Teach in	Empirical determination of the dispense quantity
	Saving	Used to save the last values that had been amended. Only applies if a chip card has been inserted.
	Start / Stop	Shows the current controlling of the dispense pump (high/low). The switch is set to I during dispensing.
	Relative quantity, capacity	Dynamic display for the remainder of a program.
	Error	Plain text messages in the status line give information on the relevant error message. Details can be called up with the Info key.

Basic Operations

Start Up

⚠️ **CAUTION:** Only remove and insert the dispense pump power plug [plug 16, Connections (pg 4)] **when the power has been turned off**; otherwise, the electronics of the drive motor could be damaged.

IMPORTANT: Prior to start up, read Safety Notices (pg 2) - this information must be read and understood!

1. Ensure the power switch has been turned off.

2. Connect the dispense pump plug(s).

3. Connect the power supply to the control system.

4. Connect the power adapter plug to an electrical power outlet.

5. Turns on the power switch.

NOTE: The PCD Table Top Controller is only ready for operation if the dispense pump has been connected.

HINT: You can optimize controller response speed during reset with Turn Off Beep (pg 24).

Shut Down

⚠️ **CAUTION:** Only remove and insert the dispense pump power plug [plug 16, Connections (pg 4)] **when the power has been turned off**; otherwise, the electronics of the drive motor could be damaged.

Shutting down is done in the reverse order of Start Up.

Using Screens & Dialogs

The control system has an intuitive input dialog. The selection or the change of a value is offered on the screen to suit the relevant program section. The corresponding area (A) on the screen is then shown as inverse.

The status bar (B) provides plain text messages in accordance with the input dialogs.
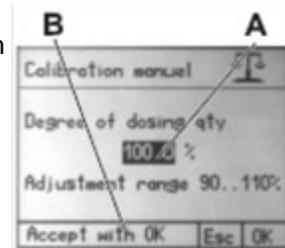
Exit a Dialog

Use the *PRG/Esc* key to quit an input dialog. In some cases it also assumes other functions. If that is the case, this is shown in plain text in the status line.

Changing Settings

The *NAVI wheel* [see [Displays & Controls](pg 3)] is used for the quick selection, input and confirmation of various functions.

The *rotation* of the *NAVI wheel switches* to the next or previous selection, depending on the direction of rotation, or changes a value.

A *press* of the *NAVI wheel confirms* a selection or a change in value that had just been made. (Alternatively, the *Return* key can also be used for confirmation)

To change a setting value:

1. Select the value to be changed by *rotating the NAVI wheel*, the value is shown in inverse.

2. *Press the NAVI wheel*, numbered items* can be selected individually.

3. Select a numbered item by *rotating the NAVI wheel*, the numbered item flashes.

4. *Press the NAVI wheel*, the numbered item is shown in inverse.

5. Change the value by *rotating* the *NAVI wheel* and press the *NAVI wheel* for confirmation, the numbered item flashes again. Another numbered item can be selected.

6. If further numbered items are to be changed, start again from 3., and if not, continue.

7. Press the *PRG* key to confirm the change, the value that has just been set is shown in inverse, if other values can be changed in the input dialog, these can now be reached by *rotating* the *NAVI wheel*.

* Alternatively, fixed defined values are offered (e.g. switching from *ml* to *g*). In this case select the desired value by *pressing* the *NAVI wheel*. This activates the relevant change. If applicable, next follow the dialog in the status line.

Bleed Dispense Pump

Bleed the dispense pump after filling it for the first time or after refilling and after cleaning it.

⚠️ **CAUTION:** Only remove and insert the dispense pump power plug [plug 16, [Connections](pg 4)] **when the power has been turned off**; otherwise, the electronics of the drive motor could be damaged.

The dispense pump must be bled when it is used for the first time and each time after refilling or cleaning. Do this in accordance with the notes given in the operating instructions of the dispense pump.

It is best to use the *Start/Stop program* with a medium flow rate to control the dispense pump.

Using Programs

Dispense Programs & Their Areas of Application

In order to achieve the most accurate results, all the main factors for a reproducible dispense operation can be set.

For the most accurate volumetric dispensing, the system should be re-calibrated when the medium is changed from one to another. See [Calibrating](#) (pg 14).

All the parameters of a dispensing program can be saved. When using a chip card, there are 24 program slots available for permanent storage. If you do not have a data card, the data is stored temporarily in program slot 00. It is kept until the dispense system is switched off.

The following values can be defined, depending on the dispense program used:

Dispense program	Volume	Flow rate	Dispense time	Sucked back quantity	Suck back speed	Pause before sucking back	Material density
Quantity program	x	x		x	x	x	x
Start / Stop program		x		x	x	x	
Time program		x	x	x	x	x	

Dispense Programs

Quantity Program

The *quantity program* is used to give out a fixed and defined quantity of medium. Depending on the dispense pump and the medium used, it is possible to set very small amounts down to 0.001 ml with the PCD3. The dispense time is determined by the (Volume) / (Flow Rate). The dispense operation can be stopped at any time before the programmed volume has been dispensed (*STOP* key).

Maximum dispense volume that can be set: 11 ml for the PCD4.

Start / Stop Program

The *start / stop program* is used when the start/stop of the dispense will be controlled by the operator through the front button controls or a foot switch, or when connected to a robot or other external control. The flow rate dispensed is defined as ml/min. (PCD4) or µL/min. (PCD3). The dispense volume is determined by the time the pump remains on and the flow rate.

Time Program

The *time program* is used if dispensing is to be done for a set period. The time is started when triggered by the operator via the front button controls or via foot switch or external signal. The flow rate is defined as ml/min. (PCD4) and µL/min. (PCD3). The dispensing operation can be stopped at any time before the set time has expired (*STOP* key). The maximum dispense time that can be set is 99.99 seconds.

Operating Modes

Dispensing Manually

In the three dispense programs, the dispensing is initiated by pressing the *START* key or foot switch. The *quantity program* and the *time program* end the dispensing once the set values have been reached or the *STOP* key is pressed.

In the *start / stop program*, the dispensing is stopped by pressing the *STOP* key.

Dispensing with Foot Switch

The dispense system reacts to the pressing of the foot switch as follows:

Dispense program	Press the foot switch	... and release it again
Quantity program	Quantity program executes to completion	
Start / stop program	Dispense on	Dispense off
Time program	Time program executes to completion	

In the quantity and time programs, the dispense can be stopped by pressing the *STOP* key before the specified values have been reached (EMERGENCY STOP). The suckback delay and suckback are carried out as well.

Dispensing by Means of an External Controller

As in the case of *dispensing with the foot switch*, but the triggering and termination of the dispensing are done by supplying an electrical signal. See Specifications (pg 34).

NOTE: If a chip card is being used, press the foot switch briefly to load the saved and most recently run program and to display it on the screen. Press the foot switch once again to start the dispense. It behaves in exactly the same way with an external signal.

Creating Dispense Programs

Creating a dispense program is only possible when using a chip card. A diskette symbol appears in the display at the lower right. If there is no chip card, then only program 00 (volatile memory) is available.

The creation of a dispense program is done as part of the Save function by inputting a dispense program number.

1. Select the dispense program (e.g. quantity program).
2. Set the values (quantity, flow rate, sucking back).
3. Save and input a dispense program number.

NOTE: Use a memory slot that is still free so that no existing data is overwritten.

All the setting options for this dispense program are now available for editing as described under Changing Dispense Program (pg 12).
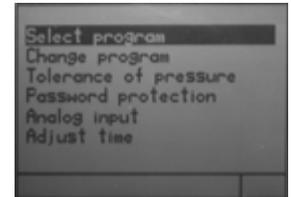
Selecting Dispense Program

Selecting a dispense program is only possible if using a chip card. If there is no chip card, then only program 00 (volatile memory) is available.

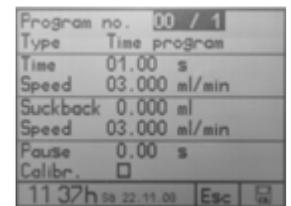1. Press the *PRG* key. *System selection* menu, display 2 appears.
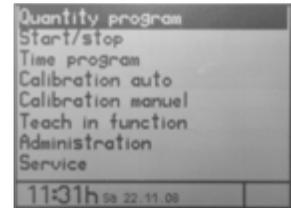
2. Select *Administration*. Display 25 appears.

3. Activate *Select program.* Display 26 appears.

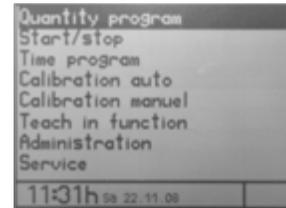   Program 00 (volatile memory) or the last program that was used is shown.

4. Select and confirm the desired program number. The selected program is activated. Dispensing can be done at one. [See also Dispensing (pg 13)].
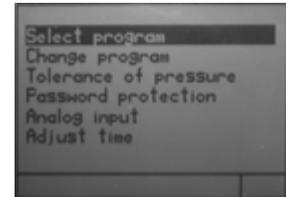
Changing Dispense Program

Changing a dispense program is only possible if using a chip card. If there is no chip card, then only program 00 (volatile memory) is available.

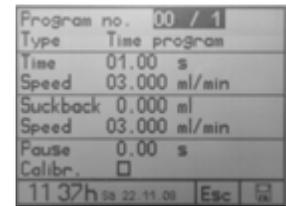1. Press the *PRG* key. *System selection* menu, display 2 appears.

2. Select *Administration*. Display 25 appears.

3. Activate *Select program.* Display 26 appears.
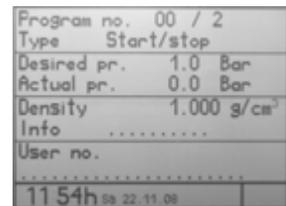
   Program 00 (volatile memory) or the last program that was used is shown.

4. Select and confirm the desired program number. All program parameters (display pages 1 and 2) can be changed.

   NOTE: The value in the *Pause* function defines the amount of time between stopping the dispense and starting the sucking back.
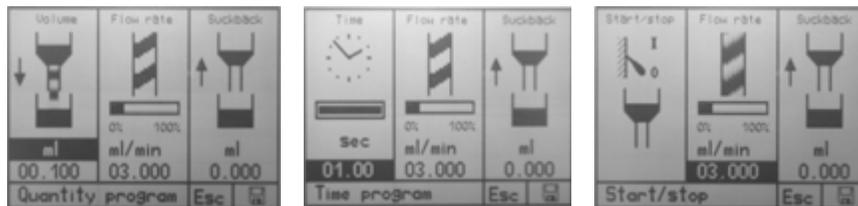
   *NOTE:* The pressure unit *Bar* can be changed over to *psi*.

Dispensing

1. Select the dispense program. This can be done with the shortcut keys for the dispense programs:
   - *Quantity program*
   - *Time program*
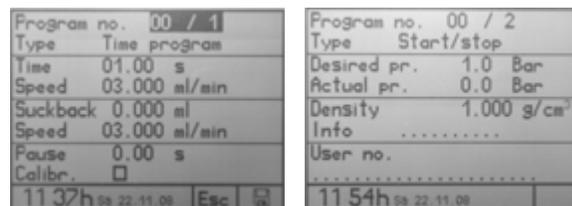   - Using the *Start/Stop program*.

   The associated main display appears for the relevant dispense program.

   After the first dispense operation, the display changes to the associated detail display for the relevant dispense program.
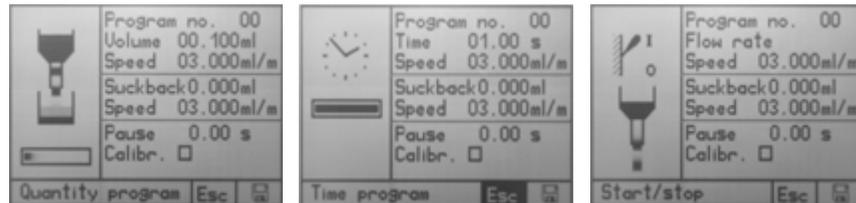
2. Use the *Info* key to display all the dispense program parameters.

Operating Detail

Calibrating

To prepare for calibration:

1. Connect the pump to the controller and prime with the medium to be calibrated.

   ⚠️ *CAUTION:* Only remove and insert the dispense pump power plug [plug 16, Connections (pg 4)] **when the power has been turned off**; otherwise, the electronics of the drive motor could be damaged.

2. Keep a cup at hand to catch and measure the quantity required for calibration.

Automatic Calibration

NOTE: During the calibration operation, the control system cannot be operated by either the foot switch or an external control signal.

1. Press the *PRG* key. System selection menu, display 2 appears.
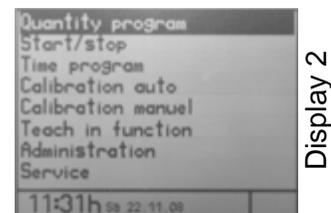
Display 2

2. Select and confirm *Calibration auto*. The menu *Calibration auto*, display 14 appears.

3. Select * and confirm the desired flow rate.

4. Select the OK button and confirm. The next input dialog appears (display 15).
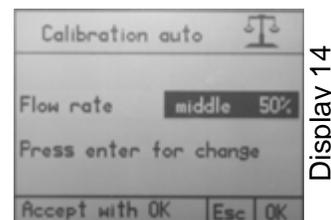
Display 14

   The flow rate (output of the dispense pump) should correspond approximately to the flow speed at which the dispense is to be done. The value 25%, 50%, and 75% are offered for selection. This setting compensates for a reduction in the level of efficiency (depending on the medium) as the speed increases.

5. Select whether the calibration is to be done with quantity unit *ml* or *g** and confirm this, the set quantity can be set as desired.

   * If the saved density value corresponds to the value 1.000 g/cm^3 (default value), the input dialog for the material density appears when you select *g*. See Material Density (pg 19).
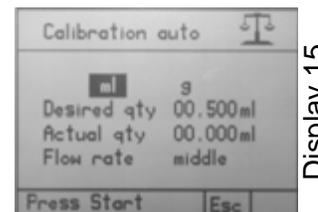
Display 15

6. Set and confirm the calibration quantity. The value of 0.5 ml preset in the control system is to be regarded as the ideal value.

7. Position the cup underneath the dispense nozzle of the dispense pump.

8. Press the *START* key. The pump dispenses the programmed quantity. This process can be repeated as often as desired., e.g., for comparative measurements.

    The ACUTAL amount that goes into the cup is determined in the previously set measuring unit. See also [Dispense Amount](pg 16) (pg 16).

9. Input and confirm the ACTUAL quantity that has been dispensed.

10. Select the OK button and confirm. The next dialog to save the calibration value appears (display 17.1).

11. Accept or discard the suggested program slot. Confirm this and the system has been calibrated.
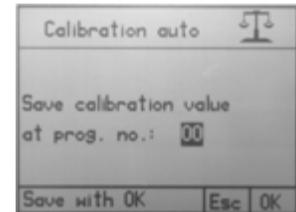
    NOTE: The calibration values are specific to a program.

Display 17.1

Manual Calibration

The *Calibration manual* function provides a simplified option to re-calibrate the system without having to run through the entire process in the *Calibration auto* menu. This can be helpful, for example, after changing the stator, in the event of batch-related product variations, etc., whereby the set dispense value is not to be changed (QA documents, etc.).

⚠️ *CAUTION:* Setting the flow rate in the *Calibration manual* menu also changes the dispense results of all the dispense programs by a linear factor.

1. Press the *PRG* key. *System selection* menu, display 2 appears
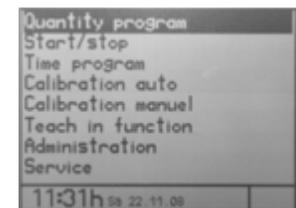
Display 2

2. Select and confirm *Calibration manual*. The *Calibration manual* menu, display 40 appears.

3. Confirm the flow rate and set the desired value with the *NAVI wheel*.

4. Press the *OK* button. *System selection menu*, display 2 appears.
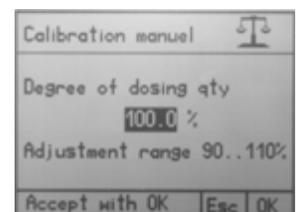
Display 40

Settings

- [Dispense Amount](#) (pg 16)
- [Dispense Time](#) (pg 18)
- [Flow Rate](#) (pg 18)
- [Sucking Back](#) (pg 18)
- [Material Density](#) (pg 19)
- [Tolerance Value Primary Pressure Monitoring](#) (pg 20)
- [Password Protection](#) (pg 21)
- [Time & Date](#) (pg 22)
- [System & Error Messages](#) (pg 23)
- [Dual Pumps](#) (pg 23)

Dispense Amount

General on determining the dispensing amount.

NOTE: If a value that differs from 100% is set in the *Calibration manual* menu [see [Manual Calibration](#) (pg 15)], this affects the results of the dispense.

There are two options from which to choose:

Option A - Determination Via Calculation

It is easiest to determine the smallest dispense quantities by weight.

1. We recommend that you first set the material density.

2. Dispense the required amount with the *start/stop program* and weight it out.

3. Now input in the *quantity program* the quantity in **g**.

Option B - Teach In, Empirical Determination

Use the *Teach in* function if you wish to determine the required amount by means of doing (for example, filling a void). The control system saves the required amount.

Setting Dispense Quantity as a Value

1. Press the *Quantity program* shortcut key. Display 3 appears.

2. Ensure the required quantity unit* has been selected in the *Quantity* display area.

3. Set and confirm the dispense amount.
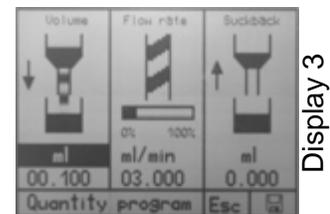
*If the saved density value corresponds to the value 1.000 g/cm^3 (default value), the input dialog for the material density appears when you select **g**. See [Material Density](#) (pg 19).

Display 3

Setting Dispense Quantity with Teach In Function

1. Press the *PRG* key. *System selection* menu, display 2 appears.

Display 2

2. Select and confirm the *Teach in function*. Display 18 appears.

Display 18

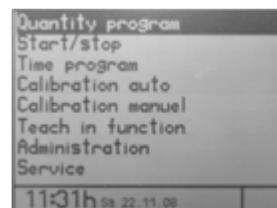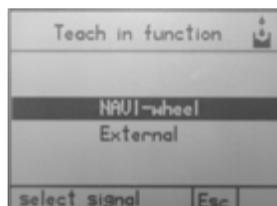3. Confirm the *NAVI wheel* selection. The first input dialog to determine the quantity appears (display 19).

   (The procedure with the selection *External* is described Step 7 onwards.)
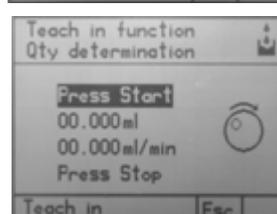
Display 19

4. Press the *START* key. The second input dialog to determine the quantity appears (display 20). In addition, the conveying capacity is shown.

   The *NAVI wheel* controls the dispense pump in a linear fashion.

Display 20

Conveying capacity	when rotating (to the right)
approx. 1.5 ml/min.	1/4
approx. 3.0 ml/min.	1/2
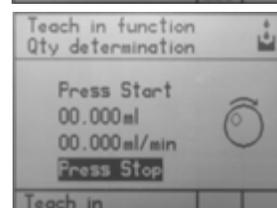
5. Rotate the *NAVI wheel* until the desired dispense quantity is reached. The amount given out is shown directly.

6. If you are controlling by means of an external signal, continue with Step 7; otherwise skip to Step 10.

7. Select *External* and confirm. The input dialog to determine the quantity appears, display 39.
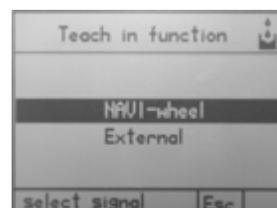
Display 18

8. Create an external signal (e.g., press the foot switch). The dispense pump starts up.

9. When the dispense quantity is reached, switch off the *external signal*. The dispense quantity is displayed; accept it with *OK*.
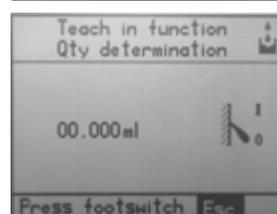
Display 39

10. Press the *STOP* key. *OK* is offered to save the dispense quantity.

11. Confirm with *OK*. The dispense quantity is saved and dis-
play 3, *Quantity program*, appears with the saved quantity.

NOTE: Since the flow rate in the *Teach in* function can differ
from the flow rate in the program that is used subsequently, we
recommend you next check this and make any necessary
corrections if there are especially tight requirements concerning
the dispense quantity.

Display 3

Dispense Time

1. Press the Time program shortcut key. Display 10 appears.

2. Set, confirm, and save the dispense time.
The set value remains active until the next change or until the
control system is switched off. Alternatively, a value of its own for
the flow rate can be assigned to each dispense program (see
Changing Dispense Program (pg 12).
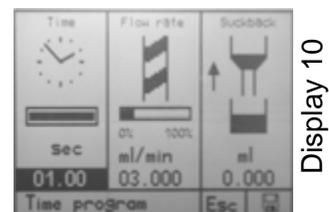
Display 10

Flow Rate

The flow rate in ml/min. can be set in each dispense program.

The *maximum flow rate* that can be set for the PCD4 is 6 ml/minute and for
the PCD3 is 3 ml/min.
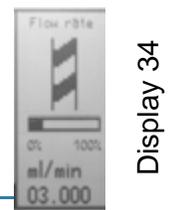
Display 34

Selecting, Changing, & Saving Displayed Value

• The bar chart shows the range (%) in which the flow rate exists.
• The set value remains active until the next change or until the control system is switched
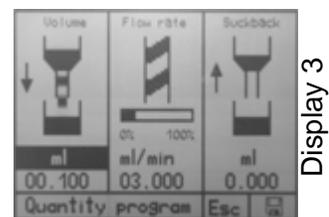off. Alternatively, a value of its own for the flow rate can be assigned to each dispense pro-
gram [see Changing Dispense Program (pg 12)].

Sucking Back

In order to effectively prevent any dripping of the medium due to pressure in the nozzle, a
value for sucking back can be set in ml. The maximum amount for sucking back that can be
set is 0.5 ml.

Selecting, Changing, & Saving Displayed Value

• The sucking back is done after each dispense operation.
• The set value remains active until the next change or until the control system is switched
off. Alternatively, a value of its own for the suck back can be assigned to each dispense
program [see Changing Dispense Program (pg 12)].

Material Density

Initial Material Density Input

1. Press the *Quantity program* shortcut key. Menu *Quantity program* display 3 appears.
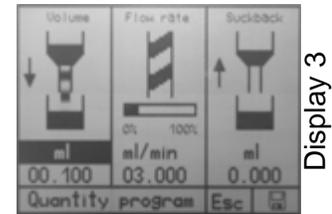
Display 3

2. Confirm selection *ml*. Display 4, input dialog for material density appears.

   If the quantity can be switched from *ml* to *g*, a material density has already been set and saved. See the description under [Changing Set Material Density](#) (pg 19).
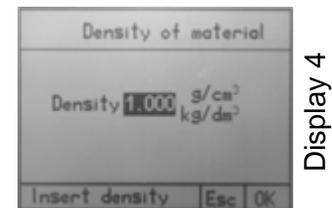
Display 4

3. Set, confirm, and save the material density. After leaving the input dialog, the *Quantity program* menu, display 3, appears again.

Changing Set Material Density

1. Press the *PRG* key. *System selection* menu, display 2 appears.
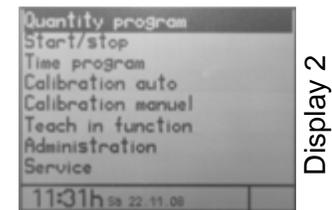
Display 2

2. Select and confirm the *Administration*menu. Display 25 appears.
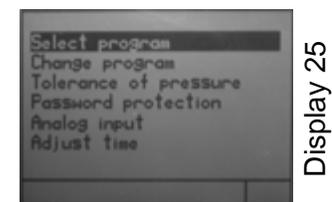
Display 25

3. Select the *Change program.* The input dialog for Change a program appears, display 26.
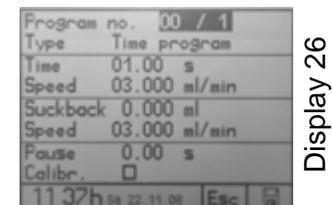
Display 26

4. Rotate the *NAVI wheel* to navigate to the program* to be changed. Display 27 appears.
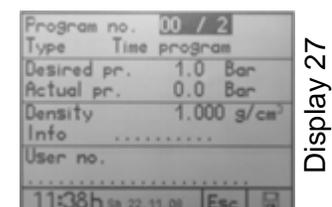
Display 27

5. Change and confirm the material density value (*Density).*

After leaving the input dialog, the *Administration* menu, display 25, appears again.

* If you are using a chip card and the material density value is to be changed in a particular program. If there is no chip card in the control system, the change is made in program 00 (volatile memory).

Tolerance Value Primary Pressure Monitoring

If the air pressure at the pressure regulating pump is changed (primary pressure for the medium), an alarm is given and no further dispensing is possible. A tolerance value can be set. The alarm can be switched on or off. See System & Error Messages (pg 23).

1. Press the *PRG* key. *System selection* menu, display 2 appears.
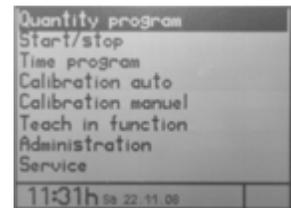
2. Select the *Select Administration* function and then select *Tolerance of pressure.* Display 29 appears.
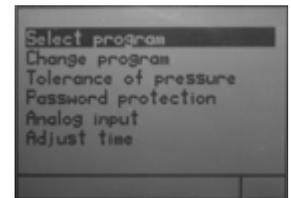
3. Input the *Pressure tolerance* in the input dialog and confirm with *OK.* Display 25 appears.
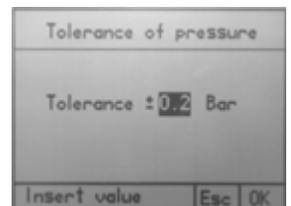
Password Protection

The password protection blocks access to the settings of the Controller and all function keys. Dispensing is possible via a foot switch (optional) and an external signal (system plug). The most recently selected dispense program is always run and shown on the display.

- Setting range for password: 0000 to 9999
- Time of automatic blocking after the last input: 30 seconds.

Turning On Password Protection

1. Press the *PRG* key. *System selection* menu, display 2 appears.
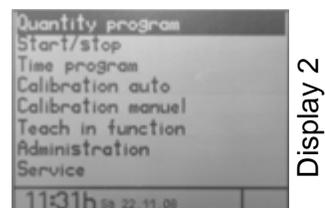
2. Select and confirm *Administration*. The *Administration* menu, Display 25, appears.

3. Select *Password Protection*.

4. Press the *NAVI wheel*. Display *On* changes to *Off*. *Protection active* appears in the status bar.

5. Select and confirm the password (code).

6. Set the password by turning* the *NAVI wheel*.

7. Press the *OK* button and confirm. Password protection has been activated.
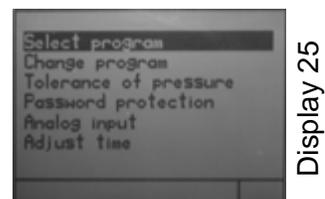
* Dynamic behavior - the faster it is turned, the quicker the range of numbers changes.

NOTE: If no further buttons are pressed, the password protection blocks the Controller after 30 seconds.

Releasing Controller

(if password protection activated)

1. The start screen is shown when it is in the blocked state.

2. Select the correct password by turning the *NAVI wheel* and confirm it by pressing, then the start screen appears.

NOTE: If no further buttons are pressed, the password protection blocks the Controller after 30 seconds.

Turning Off Password Protection

1. Release the controller as described above.

2. Press the *PRG* key. *System selection* menu, display 2 appears.

3. Select and confirm *Administration*. The *Administration* menu, Display 25, appears.

4. Select *Password Protection*. Display 41 appears.

5. Press the *NAVI wheel*. Display *Off* changes to *On. Protection inactive* appears in the status bar.

6. Press the *OK* button and confirm. Password protection has been deactivated.
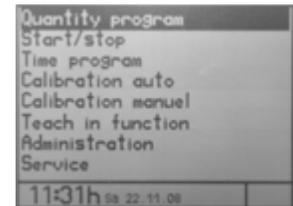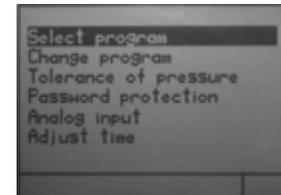
Time & Date

1. Press the *PRG* key. *System selection* menu, display 2 appears.

2. Select *Administration*. The *Administration* menu, Display 25, appears.

3. Select *Set time*. The time and date can be set field-by-field in the status bar with the aid of the *NAVI wheel*.
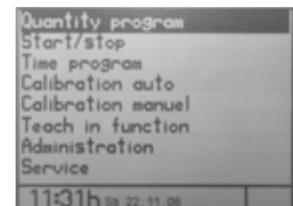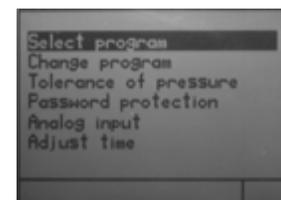
System & Error Messages

Switching Error Messages On/Off

1. Press the *PRG* key. The *START* screen, display 1 appears.

2. Press and hold down the *START* key.

Display 1

3. Press the *Quantity program* key. *Config Error* messages are displayed in Display 33.

4. Select the desired error message and switch it on or off with the *Enter* key.

5. Press the *Esc* key to quit the menu.
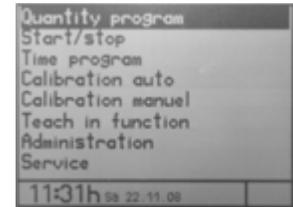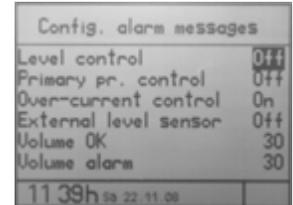
Display 33

Guidelines:

- **All values set here are saved permanently** in the control system.
- The overcurrent monitoring is set permanently to ON.
- If the *Level monitoring* function has been activated with *ON*, the *Ext. level sensor* switch can be used to switch between the signal input at the plug sensor (17) = *OFF* and system plug (19) = *ON*.
- The volume is set with the *NAVI wheel* and confirmed with the *Enter* key.
- The primary pressure and level monitoring functions protect the dispense pump. This effectively prevents any damage due to running dry if there is too little medium. (Connection for the level signal, see Connections (pg 4).

Error Message SD Chip Card

If the chip card is defective or has not been inserted, a corresponding message (display 37) appears for 3 seconds when the control system is switched on.
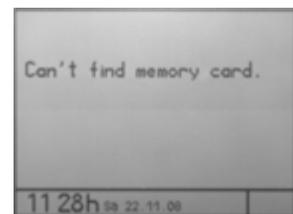
Display 37

Dual Pumps

Two identical pumps can be operated in tandem after the control system is enabled for dual pumps. The pumps are then controlled together, not individually.

For details, refer to *Dual Pump Set Up Procedure* (PN 22200602).

Optimize Operations

Turning off the end-of-cycle beep increases the response speed of the controller to additional *start* signals.

Turn Off Beep

Decrease the reset time the controller needs before the next *start* signal by turning off the end-of-cycle beep.

To turn off the end-of-cycle beep:

1. Press and hold *START* while simultaneously pressing *Quantity Program*. The following screen displays.

2. Change the value for Volume OK from 30 to 0.
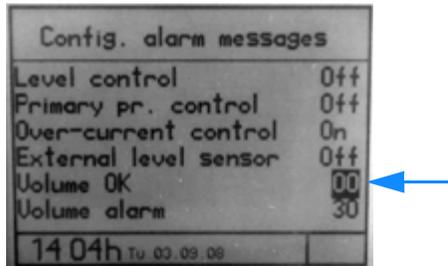
Clearing Error Messages

If there is an error message, it is shown flashing in the status line (display 36) and an acoustic signal is given (if it has not been switched off. See System & Error Messages (pg 23).

1. Press the *Info* key. The acoustic signal is switched off, and the corresponding error message appears.
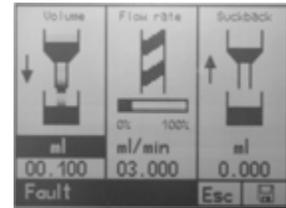
Display 36
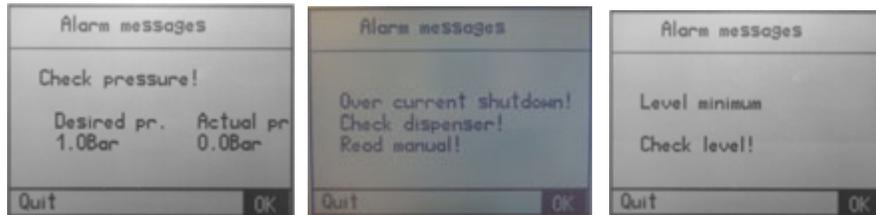
2. Correct the error and clear the error message with *OK*.

⚠️ ***CAUTION:*** If the error message *Overcurrent switching* appears, the dispense pump must be cleaned prior to any further use.

Service Functions

-
-
-

Operating Information

1. Press the *PRG* key. *System selection* menu, display 2 appears.

2. Select and confirm *Service function.* Display 38 appears.

   All the main system and operating times are displayed. The language for the displays can be set.
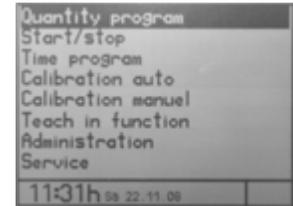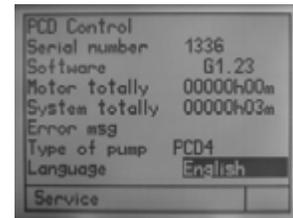
Formatting Chip Card

1. Using the chip card, press the PRG key. The start screen and display 1 appear. Press and hold down the *START* key.

2. Press the *PRG* key.

3. Release both keys again. The chip card is reformatted and any data on it is deleted. A confirmation message appears on the display: *Chipcard initialized and ok.*

Configuring Speed

Because different materials often require different speeds or different amounts of suckback, a separate program can be set up for each different material being dispensed using one of several select plug inputs located on the rear panel interface.

Using an A input provides the greatest flexibility for timing and speed control. **Quantity** mode and **Time** mode dispense parameters are defined by the currently selected program and are also controlled by the A input.

Alternatively, you can use the SS input to act like a foot switch and activate the currently selected program using the saved speed information. The suckback occurs automatically as soon as the SS signal drops or the STOP button on the front control panel is pressed

For all programs and connection set ups, the suckback is set by volume only and is only saved on the controller with a single speed.

Plug Input Choices

SS Input

The SS input allows an external PLC or PC to toggle the pump on and off. This is usually the desired choice as it lets an external PLC or PC synchronize possible gantry motion‡ with the pump motion.

A1 Input

The A1 input (for speed control) allows "on-the-fly" speed adjustments by an external PLC or PC. This choice is often desired if the gantry motion‡ has a deceleration and the pump needs to slow down to maintain consistent line width. This action is typically required when rounding corners or dispensing an arc.

‡ assuming the pump is mounted to a gantry system

For further details about SS and A1 inputs, refer to <u>Analog Inputs at Terminals</u> (pg 28).

How to Configure Controller Speed

To configure the controller to use an A input:

1. From the main menu, press the **PRG** key.

2. Navigate to **Administration**, press the Navi wheel to select.

3. Navigate to **Analog Input**, press the Navi wheel to select.

4. Select the method of speed control you want to use, press the Navi wheel to select the input.

> ⚠️ *CAUTION:* Never use more than a single **A input speed control** at a time, or irreparable damage to the controller may occur. Do not use both A1 and A2 at the same time.

5. Navigate to **OK**, press the Navi wheel to save the change.

Interface Description

System Plugs Overview

Analog Inputs at Terminals

Analog inputs and potential GND terminals.
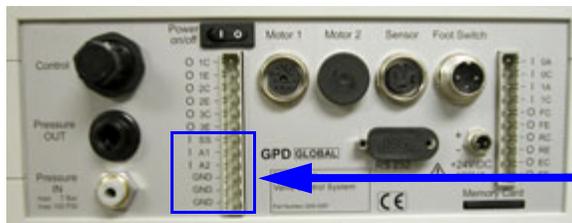
⚠ *CAUTION:* Never use more than a single **A input speed control** at a time, or irreparable damage to the controller may occur.

Input / Output	Label	Description
I	SS	Enable signal only. (Speed is controlled by A1 or A2.) 0/24 V digital input start/stop. (High = start process)
I	A1	Speed control; **voltage** based. When the controller is turned on via input SS, the pump rotates relative to this **voltage**. 0V = 0% pump speed and 10V = 100% pump speed. Analog 1 input for 0-10 V
I	A2	Speed control; **current** based. When the controller is turned on via input SS, the pump rotates relative to this **current**. 0-4 mA = minimum pump speed and 20 mA = 100% pump speed. Analog 2 input for 4-20 mA
	GND	GND analog
	GND	GND sensor
	GND	GND sensor

Digital Opto-Coupled INPUTS at Terminals

- The internal LEDs of the opto-couplers are produced with anodes and cathodes.
- Maximum current at 24 V approximately.
- 10 mA. Low: 0-1.5V, High 12-24V

Input / Output	Label	Description
I I	0A 0C	Function level sensor (digital input signal)
I I	1A 1C	Unused

Digital Opto-Coupled OUTPUTS at Terminals

- Maximum permissible voltage 30 V, max. current 10 mA.
- The transistor (NPN) of each opto-coupler has a collector and emitter.10 mA.
- Low: 0-1.5V, High 12-24V
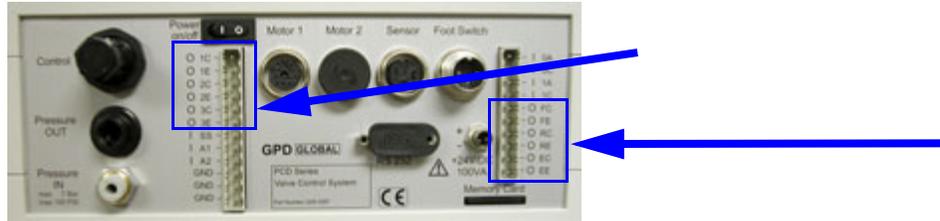
Input / Output	Label	Description
O O	1C 1E	Dispensing (dispensing process running = transistor switched through)
O O	2C 2E	Remote mode. Transistor low resistance = control system in remote mode. Transistor high resistance = control system in local mode or no PCD Remote connected.
O O	3C 3E	Unused

Input / Output	Label	Description
O O	FC FE	Level alarm. (Alarm blocks the transistor.)
O O	RC RE	PCD Table Top Controller ready for operation. (no error = transistor switched through)
O O	EC EE	Error output (pressure + overcurrent blocks the transistor).

Plug Connectors for Sensor and Foot Switch
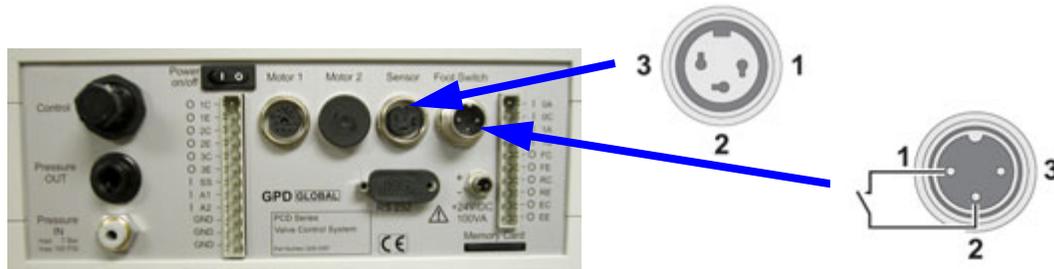
Digital INPUTS

- Direct inputs without opto-couplers. Low: 0..1.5V, High 12..24V
- Both plug connectors 3-pole. Pin1 = internal +24 V, Pin2 = signal, Pin3 = internal GND
- Sensor function: Level monitoring digital
- Foot switch function: Foot switch digital

Digital OUTPUTS

Motor1 and Motor2: Function: Connection of PCD pump model PCD3 or PCD4.

Logical Links of Outputs

Ready for operation

The transistor is blocked in the switched-off state. It is switched through after switching on and successful initialization. It has a high ohm value if there is either an under-/overpressure or an overcurrent.

Error output

The transistor is blocked in the switched-off state. It is switched through after switching on and successful initialization. It has a high ohm value if there is either an under-/overpressure or an overcurrent. If one of the two errors applies, it is not possible to initiate a dispensing operation.

Level alarm

The transistor is blocked in the switched-off state. It is switched through after switching on and successful initialization. It has a high ohm value if the level sensor connected to 10A and 10C does not allow any current to flow through the opto-coupler.

Dispensing

The transistor has a high ohm value in the switched-off state and after initialization. It is only switched through during a dispensing operation.

Connections of the level sensor

The device must be informed at which connection the level sensor has been connected. This is necessary because the sensor supplies a high signal if there is no level warning. The selection of the connection is done via system and error messages via the level monitoring function. There it can be set as follows:

Level monitoring	Monitored sensor input
OFF	3-pole socket. Refer to Sensor (Item 17, Connections (pg 4).
ON	Terminals I0A I0C. Refer to System plugs (Item 19, Connections (pg 4).

Troubleshooting

Table 2: Troubleshooting

Error	Possible Cause	Correction
Control system cannot be operated, no display.	No dispense pump connected.	Connect dispense pump (ensure the power plug has been removed beforehand).
	Power switch is turned off.	Turn on the power switch.
	Power adapter has no power or is defective.	Check the power adapter.
Dispense program cannot be saved; only program 00 is offered.	No memory card inserted or memory card is not formatted.	Insert / format memory card.
ERROR MESSAGES		
Over current monitoring	Dispense pump components do not run smoothly due to hardened medium or as a result of dry running.	Dismantle and clean the dispense pump, replacing the stator if necessary.
Level of medium critical.	Not enough medium in the supply tank.	Fill up with the medium. If the error message remains, check the sensor and sensor input, if applicable. Brief "emergency operation" without level monitor.
Check compressed air.	Compressed air too little or switched off.	Check / switch on the compressed air.
	Tolerance range set too small.	Set the tolerance range to be larger. See Tolerance Value Primary Pressure Monitoring (pg 20).

Maintenance

The control system can be regarded as maintenance-free. Keep the ventilation slots of the power adapter and the housing free of dirt. Do not use any aggressive solvents or cleaners for cleaning, only a damp cloth. Unplug the unit from the power before doing any cleaning.

Accessories

Table 3: Table Top Controller Accessories

Item Name	Part No.
Foot switch cpl. for Controller	5100-0135
Plug for foot switch	2100-0664
Plug for sensor empty reporting	2100-0665
Program Selection Module (pg 36) (RS-232 interface)	10/4910
Sensor empty reporting cpl. for Controller	5500-0062

Specifications

Dimensions (HxWxD) . . . .   100 x 240 x 260 mm (3.94" x 9.45" x 10.24")
Weight. . . . .   approx. 1.3 kg (2.9 lbs)

Power supply voltage
       Input . . . .   120/240 V, 50/60 Hz
       Output . . . .   24 V DC
Consumption / rating. . . . . . .   100 VA / 2.7 A
Start . . . .   Key, foot switch
Start / Stop externally . . . . . .   24 V pulse, 10 mA terminal strip;
                                  low 0 to 1.5 V, high 12 to 24 V
On / Off switch . . . .   yes

Communication cables . . . . . .
       Controller to Pump . . . .   up to 3 m (118")
       Robot to Controller . . . .   user-supplied. 18 gauge recommended.
External trigger signal (basic) .   24 V
Interface . . . .   RS 232

Input air pressure . . . .   0 to 6 bar (0 to 87 psi)
Manual pressure regulation . .   0 to incoming air pressure

External memory. . . . .   MM C/SD memory card, min 64 MB,
                                  max. 24 dispense programs can be read with a
                                  Microsoft operating system

Operating conditions . . . .   +10° C to +40° C (non-condensing),
                                  air pressure 1 bar
Medium temperature. . . . .   +10° C to +40° C
Storage conditions . . . .   dry/dust-free, -10° C to +40° C

Pin Outs
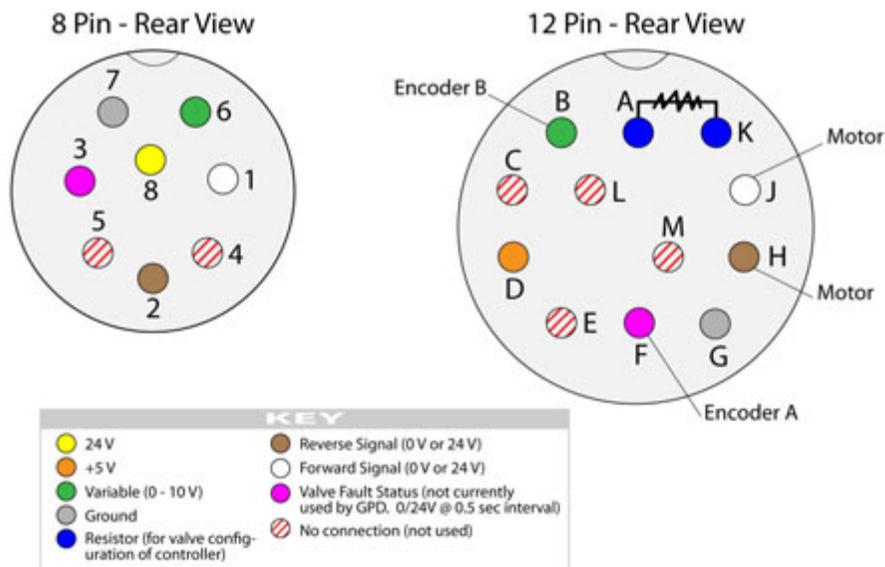
Disposal

The final disposal of the control system is to be done in an environmentally-appropriate manner. All the materials and packaging must be handled in accordance with the recycling stipulations.

Do not dispose of electrical parts in the household garbage. They are to be taken to the appropriate collecting points. 2002/96/EU (WEEE) EU DIRECTIVE concerning used electrical and electronic equipment.

This equipment complies with RoHS stipulations.

Conformity Directives

EU Low Voltage Directive 2006/95/EU
EU Directive Electromagnetic Compatibility 89/336/EEC and 2004/108/EU

The following harmonized European standards were applied:

DIN EN ISO 61000-6-3-2007 Emission standard
DIN EN ISO 61000-6-2-2006 Resistance to interference

Appendices

Program Selection Module

Purpose

The optional Program Selection Module is an RS-232 interface between the PCD Table Top Controller control system and an external controller (e.g., a PLC). It allows the activation of the dispensing programs that are on the memory card of the control system.
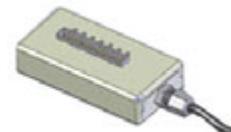
Refer to [Accessories](#) (pg 33) for the part number of this optional equipment.

Operation

When input 5 on the Program Selection Module is energized, the program number (0 to 24) resulting from the signal values at inputs 0 to 4 (on the Program Selection Module) is transmitted to the control system. This program is now activated on the control system. The front keypad is disabled while input 5 remains energized.

Connecting Program Selection Module

Plug the connector (RS232) into the control system which must be switched off. Make the power supply and connections at the terminal block (see [Terminal Block / Signal Values](#) (pg 37).

Switching On PCD Interface

Switch on the control system and supply Program Selection Module with operating voltage. The connection with the control system is established after approximately 15 seconds and the LED lights up.

Table 4: LED Status Signals

Status	Description
lights up	Connection to the control system has been made. Waiting time approximately 15 seconds.
flashes twice quickly	Input 5 (on Program Selection Module) is energized. Data* is being sent to the control system. The front keypad of the control system is disabled.
flashes once quickly	Input 5 (on Program Selection Module) has been deactivated. Data transfer to the control system stops. The front keypad on the control system is enabled again.
flashes continuously	• Connection to the control system is not possible. • No SD memory card plugged into the control system. • Wrong software version of the control system.

* Signal values of inputs 0 to 4

Terminal Block / Signal Values

Assignment of inputs 0 to 4

Program number	Input 0	1	2	3	4
0	0	0	0	0	0
1	1	0	0	0	0
2	0	1	0	0	0
3	1	1	0	0	0
4	0	0	1	0	0
5	1	0	1	0	0
6	0	1	1	0	0
7	1	1	1	0	0
8	0	0	0	1	0
9	1	0	0	1	0
10	0	1	0	1	0
11	1	1	0	1	0
12	0	0	1	1	0
13	1	0	1	1	0
14	0	1	1	1	0
15	1	1	1	1	0
16	0	0	0	0	1
17	1	0	0	0	1
18	0	1	0	0	1
19	1	1	0	0	1
20	0	0	1	0	1
21	1	0	1	0	1
22	0	1	1	0	1
23	1	1	1	0	1
24	0	0	0	1	1

Terminal block

Terminal	Signal	
1 ○	+24V	Supply
2 ○	GND	
3 ○	A +24V	Input 0
4 ○	K GND	
5 ○	A +24V	Input 1
6 ○	K GND	
7 ○	A +24V	Input 2
8 ○	K GND	
9 ○	A +24V	Input 3
10 ○	K GND	
11 ○	A +24V	Input 4
12 ○	K GND	
13 ○	A +24V	Input 5
14 ○	K GND	

A = Anode
K = Cathode
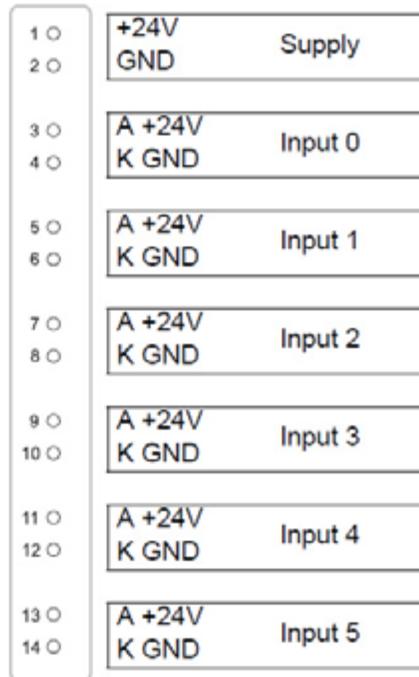
Signal Forms and Levels
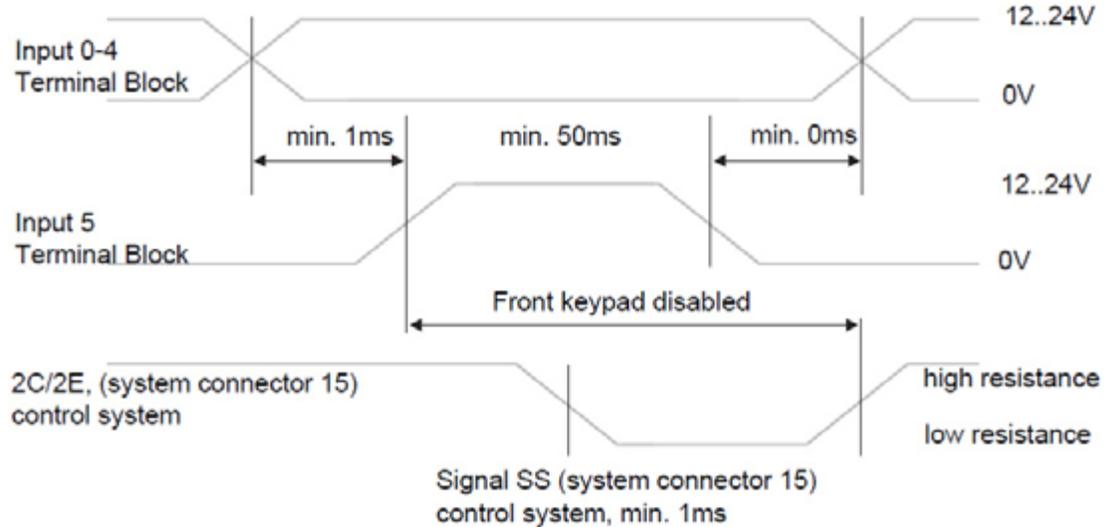
Signal Flow, Logic

1. Energize inputs 0-4 on the terminal block (dispensing program number).

2. Energize input 5 on the terminal block. The dispensing program defined under the prior step is sent to the control system.

3. If 2C/2E is low resistance (system connector 15), the control system is in Remote operating mode and can be activated.

4. Activate the control system. The dispensing program is executed. Then do one of the following:

    Apply Signal SS, ext. Start, 1C/1E (system connector 15)

    OR

    Activate the foot switch (optional, connector 18)

5. When the dispensing program is complete, the 2C/2E switches to high resistance (system connector 15). The control system returns to Local operating mode.

    Another dispensing program can be sent (Step 1 to Step 3) or the selected program can be executed again (Step 4).

Electrical Schematics

Schematic 1

| Dispensing Control | PCD Tabletop Controller | Art.-Nr.: 20120 |

Inputs

Input SS

0 or 24VDC

```
————————————○ SS
————————————○ GND
```

Input A1

0 to 10V

```
————————————○ A1
————————————○ GND
```

Input A2

0 to 20mA

```
————————————○ A2
————————————○ GND
```

Inputs I0, I1

```
+24V ─o╱o─────○ IxA      +24V ────────────○ IxA
       ext. switch
GND ─────────○ IxC       GND ─o╱o─────────○ IxC
                                 ext. switch
```

Outputs

```
+24V ────────────────────○ OxC
GND ──────Rx 4K7──▷|D───○ OxE
      Exteral Load
```

External Load

```
+24V ───────▷|D──Rx 4K7──○ OxC
GND ─────────────────────○ OxE
```

External switch + load are examples!

```
Digital Outputs: max 30VDC / 10mA, NPN-Transistor
Digital Inputs (Opto-coupler): max 10mA at  24VDC, <1,5V = 0; >12...24V = 1
                    integrated Resistor 2K2
Digital Inputs (without Opto-coupler):  <1,5V = 0; >12...24V = 1
Inputs (I0., I1.): C = Cathode; A = Anode
Outputs (O1..3; OF, OR, OE): C = Collector  ; E = Emitter
```

Schematic 2

Dispensing Control   PCD Tabletop Controller   Art.-Nr.: 20120

SS   R 10k0   R 2k2

A1   R 10k0   R 10k0   Inputs, related to ground (Gnd)

A2

GND   R 100R0

GND

GND

IxA   R 2k2

IxC   Opto-coupler Inputs

OxC   Opto-coupler Outputs

OxE

Digital Outputs: max 30VDC / 10mA, NPN-Transistor
Digital Inputs (Opto-coupler): max. 10mA at 24VDC, <1,5V = 0; >12...24V = 1
                     integrated Resistor 2K2
Digital Inputs (without Opto-coupler): <1,5V = 0; >12...24V = 1
Inputs (I0., I1.): C = Cathode; A = Anode
Outputs (O1..3; OF, OR, OE): C = Collector   ; E = Emitter

Schematic 3

| Dispensing Control | PCD Tabletop Controller | Art.-Nr.: 20120 |

Interconnection 1

J1
- Dispensing | O1C 12
- O1E 11
- Remote mode | O2C 10
- O2E 9
- not used | O3C 8
- O3E 7
- ext. Start SS 6
- Analog Input 1 IA1 5
- Analog Input 2 IA2 4
- GND Sensor/analog GND 3
- GND 2
- GND 1

R1 2K2
D
Start
SW1

fill-level SW2

J2
- 1 I0A | Sensor, fill-level
- 2 I0C
- 3 I1A | not used
- 4 I1C
- R3 2K2 5 OFC | Alarm, fill-level
- 6 OFE
- R4 2K2 7 ORC | EC ready for operation
- 8 ORE
- R5 2K2 9 OEC | Error-Output
- 10 OEE

GND +24VDC

Interconnection 2

J1
- Dispensing | O1C 12
- O1E 11
- Remote mode | O2C 10
- O2E 9
- not used | O3C 8
- O3E 7
- ext. Start SS 6
- Analog Input 1 IA1 5
- Analog Input 2 IA2 4
- GND Sensor/analog GND 3
- GND 2
- GND 1

D R1 2K2
2K2
Start
SW1

SW2
fill-level

J2
- 1 I0A | Sensor, fill-level
- 2 I0C
- 3 I1A | not used
- 4 I1C
- R3 2K2 5 OFC | Alarm, fill-level
- D 6 OFE
- R4 2K2 7 ORC | EC ready for operation
- D 8 ORE
- R5 2K2 9 OEC | Error-Output
- D 10 OEE

GND +24VDC

Digital Outputs: max. 30VDC / 10mA, NPN-Transistor
Digital Inputs (Opto-coupler): max. 10mA at 24VDC, <1,5V = 0; >12...24V = 1
                              integrated Resistor 2K2
Digital Inputs (without Opto-coupler): <1,5V = 0; >12...24V = 1
Inputs (I0., I1.): C = Cathode; A = Anode
Outputs (O1..3; OF, OR, OE): C = Collector   ; E = Emitter