Valmet Kappa Analyzer – Valmet Kappa QC

Owner's manual

K03303 V2.51 EN

Valmet
FORWARD

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Warnings & safety information

Always check input voltage & frequency before making any connections. Incorrect connections will damage the equipment! Always follow the applicable electric safety regulations in all installation work!

Before replacing any parts, make sure that the water and air supply lines have been shut off and analyzer's operating power is off.

During installation, maintenance and service operations, remember that the sample line may contain hot sample or water – be careful!

Only trained, authorized service personnel may service the analyzer.

Analyzer's measurement loop is pressurized during measurement (pressure > 2 bar / 29 psi)!

Sulphur water or sodium bisulphate are used as neutralization chemical. These chemicals are corrosive! Handle with care, and follow the safety instructions provided by the chemicals supplier.

Before starting the analyzer, make sure that the pump contains water - running dry will damage the pump!

First aid after exposure to toxic substances:
Take the patient to a hospital immediately if
- the patient has difficulty breathing,
- the patient has convulsions, or
- the patient is unconscious.

If no immediate symptoms are observed, give first aid on the spot as instructed below:
- After ingestion: Do NOT induce vomiting! Find out if vomiting is necessary, recommended, or harmful; this is dependent on the chemical in question! In most cases taking medicinal carbon is the primary cure, however NOT if some corrosive chemical has been ingested.
- After contact with skin: Immediately rinse the contaminated area thoroughly with plenty of lukewarm running water. Then wash with soap, rinse with water.
- Contact with the eyes: Immediately rinse the eye thoroughly with plenty of water, e.g. by pouring water from a glass into the eye. Continue rinsing for about 10 minutes. Do not use a strong hard shower that may damage the eye. If the substance is corrosive, rinse for at least 10-30 minutes and seek medical attention.
- After inhalation: Allow the patient to rest in fresh air.

After first aid measures seek medical advice!

Recycling and disposal

When sorted by material, nearly all parts of the device can be recycled. A materials list is delivered with the device. Upon request, the manufacturer will provide more detailed instructions for recycling and disposal.

Used devices may also be returned to the manufacturer for recycling and disposal against a separate fee.

1. Introduction

1.1. Analyzer's basic functions

Valmet Kappa Analyzer (Valmet Kappa QC) is a modular analyzer, with measurements selectable according to customer needs.

It measures various pulp properties from different parts of the pulping process, using the installed measurement modules (kappa number, brightness, shive/fiber properties). The analyzer uses the sweep measurement principle; the advantages of this method include speed and high repeatability. When a measurement is going on, the measuring loop is pressurized (2 - 4 bar) to dissolve any air bubbles that might otherwise disturb the measurement.

Sampling devices provide samples from the process pipeline. Up to 16 sample lines can be connected to one analyzer. The analyzer is also able to measure manual samples; the user pours these directly into the chamber. The device also contains a sample collector which which parallel samples can be collected for subsequent laboratory analysis.

1.2. Main parts of analyzer

The analyzer always contains the following parts:

– **Measurement unit** contains the sample preparation equipment ("wet part"). This unit contains the measurement and valve control electronics, the laboratory sample collector, and the selected measurement modules. One or two measurement units (cabinets) may be included.
– **Analyzer electronics box & connection box,** located in one end of the device. These boxes contain the main switch, fuses, main power supply, inverter, electronic boards, and electric connections. The connections and the number of installed boards are dependent on the number of modules.

Water and instrument air supply lines are brought into the device via the lead-through bushings on analyzer's left side. All cables are connected to the connection box.

1.3. Analyzer's modules

The measurement properties of the device are dependent on the modules installed to it. See Fig. 1.

One Cabinet model contains one measurement unit (A), the analyzer electronics box (B) and connection box (C). The measurement unit may contain a Kappa module, a Brightness module, or both.

Single Chamber measurement unit (Fig. 2) has only one chamber (washing chamber) where sample preparation and measurement take place. Dual Chamber measurement unit (Fig. 2) also contains a separate Sweep module, where the prepared sample is transferred for measurement. This enables faster operation, as the analyzer is able to prepare the next sample while the previous sample is still being measured.

The device may also be provided with a second measurement unit (D, option), either Single Chamber or Dual Chamber model. This Two Cabinet analyzer then contains two measurement loops.

The Fiber-Shive module (E, option) can be attached to both One Cabinet and Two Cabinet analyzers.

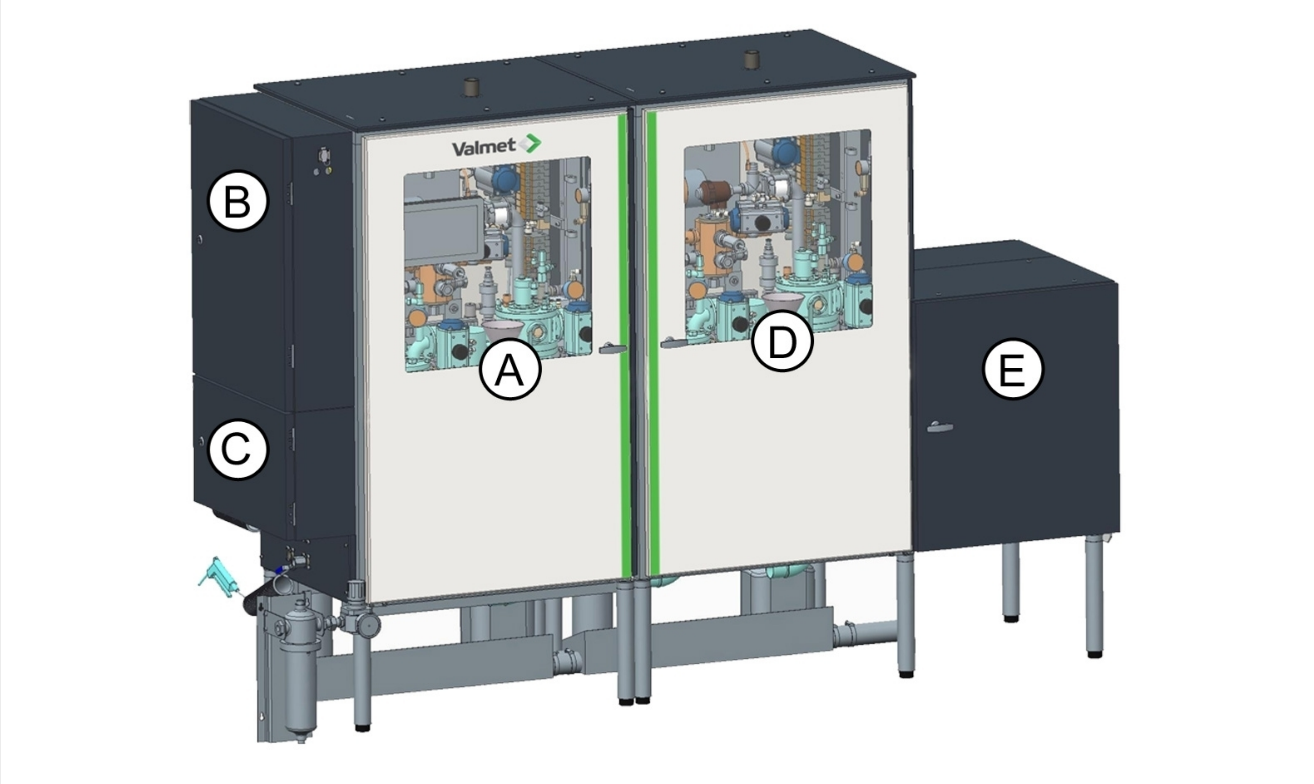


Fig. 1. Valmet Kappa QC: A - measurement unit 1, B - analyzer electronics box, C - connection box, D - measurement unit 2 (option), E - Fiber-Shive module (option).

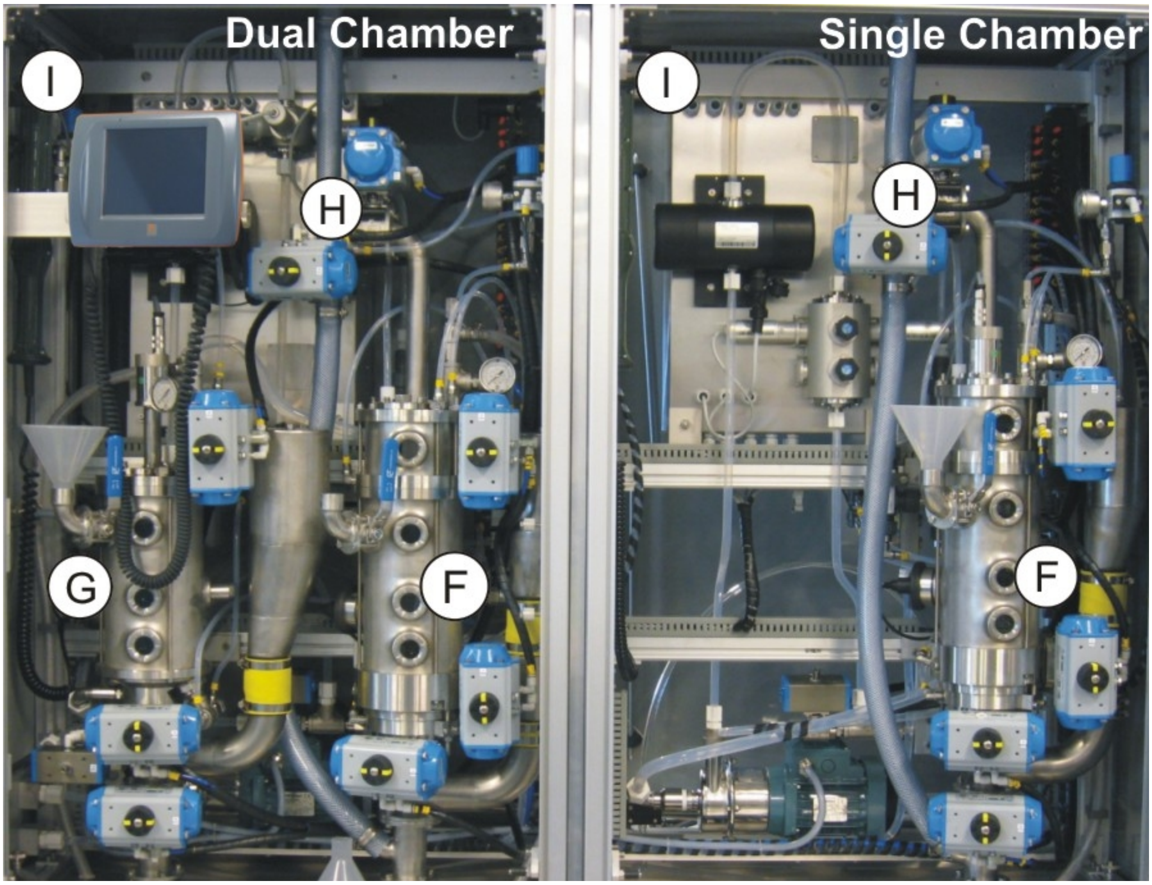


Fig. 2. Valmet Kappa QC: F - washing chamber, G - Sweep module, H - shive screen, I - connector for Flexi-U operating terminal.

1.4. Kappa and Brightness measurement

The analyzer measures pulp kappa number and brightness using an optical measurement principle (Fig. 3). The sample flows through a measuring cell that is illuminated with a Xenon lamp. Detectors (1) measure the scattering and absorption of light in the sample at different wavelengths.

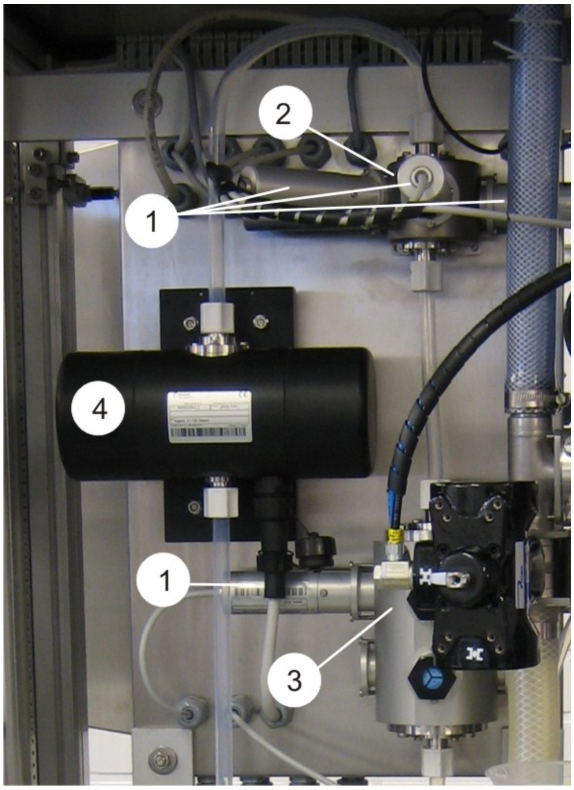


Fig. 3. Kappa and Brightness measuring cells, seen from the front side. 1 - detectors, 2 - Kappa measurement 3 - Brightness measurement, 4 - LC100 consistency transmitter.

The kappa measurement cell (2) is used to determine pulp kappa number. The analyzer also monitors the cleanliness of the cell. Pulp brightness is measured in the Brightness cell (3). The measuring cells and light source are installed in the module electronics box, located in the measurement unit (Fig. 4).

The module electronics box contains sensitive optical components. Always keep the box closed and avoid opening it unless absolutely necessary - air impurities will contaminate the optics and measurement accuracy deteriorates.

After a consistency sweep, the values measured by the detectors are applied to calculate kappa number and brightness results.

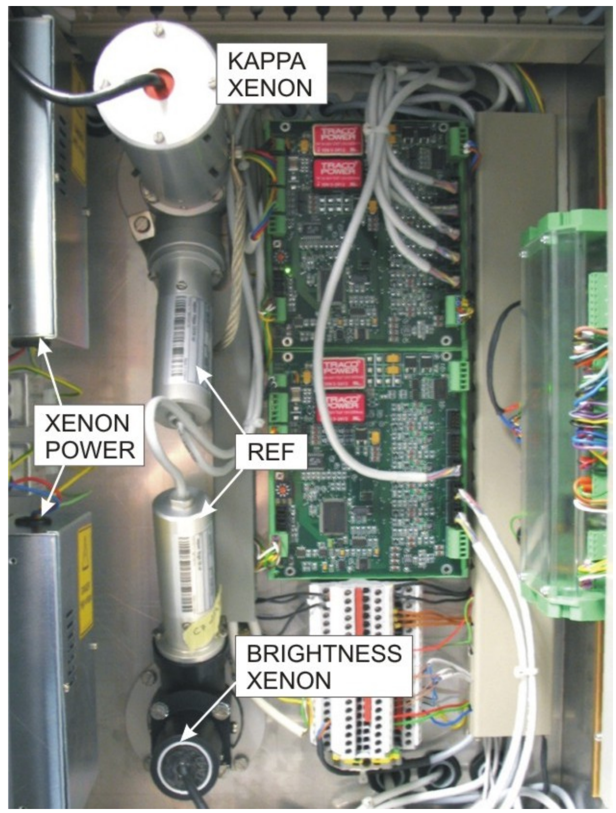


Fig. 4. Module electronics box, opened: Xenon Power = Xenon power supply, Xenon = Xenon lamp, REF = reference detector.

Notes

2. Operating terminal

2.1. Flexi-U

Flexi-U (upgrade, Fig. 1) is a Linux-based, 10.1" operating terminal used with several Valmet analyzers (Fractionator, Kappa QC, MAP, WEM). It is operated with the touch screen, using Analyzer Client as the software interface. Enclosure class: IP65.

Flexi-U has two connectors on the bottom side (Fig. 2): PoE (Power over Ethernet) and USB port. Only USB devices (keyboard, mouse, hub, mass memory) may be connected to the USB port; connecting may require a USB extension cable.

NOTE: During normal use the USB port is closed with a plug. Enclosure class IP65 only applies when the plug is in position!

The terminal has no on/off switch. If the device does not respond to touch, unplug the PoE cable and reconnect it to restart the device.

A bracket on the back side of the terminal (indicated with an arrow in Fig. 2) allows it to be placed in the mounting support inside the analyzer housing.

Fig. 1. Flexi-U operating terminal.

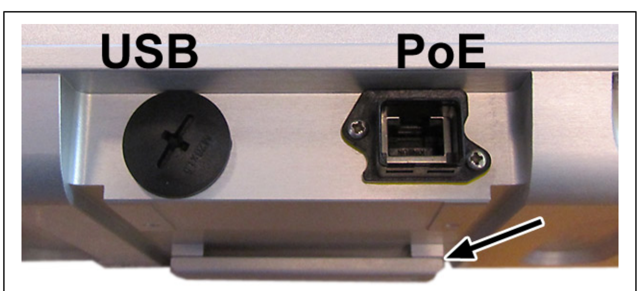


Fig. 2. Connections of Flexi-U.

2.2. Operating with Flexi-U

The display images in this manual are views from the analyzer software. To view the displays, first select the device from the menu on the left and then use operating buttons on the display. If necessary, select "communicator" from the menu (Fig. 3).

If the virtual keyboard in Linux is needed, go to *Start > Universal access > Onboard* (Fig. 4).

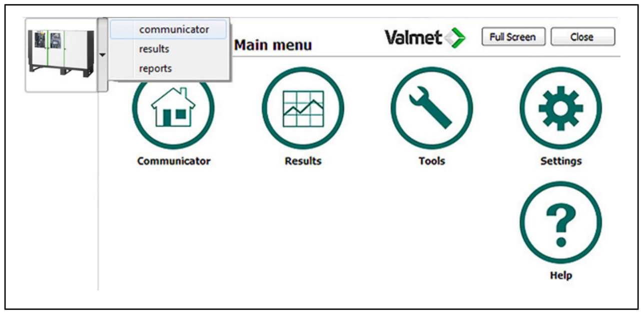


Fig. 3. Opening the operating displays.

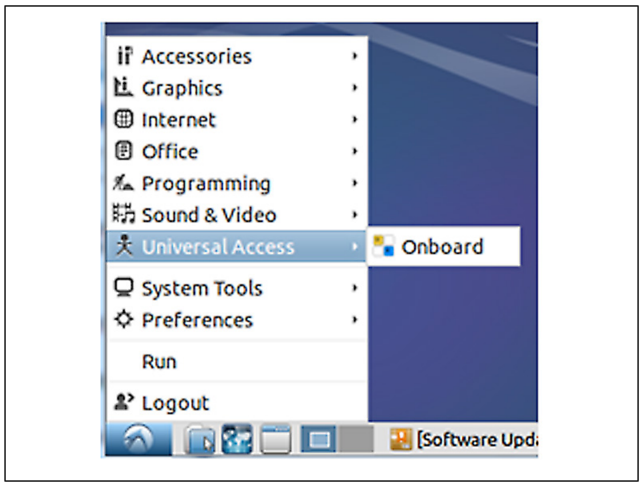


Fig. 4. Accessing virtual keyboard in Linux.

2.3. IP address

When using the Flexi-U for the first time, make sure that the date & time and IP address settings are correct. See Fig. 5 & 6.

1. Close Analyzer client and go to *Start* > *Preferences* > *Network connections*.
2. Choose "Ethernet connection 1" and press **Edit**. If there are no active Ethernet connections in the list, use the button **+Add**.
3. The selected Ethernet connection can now be edited.

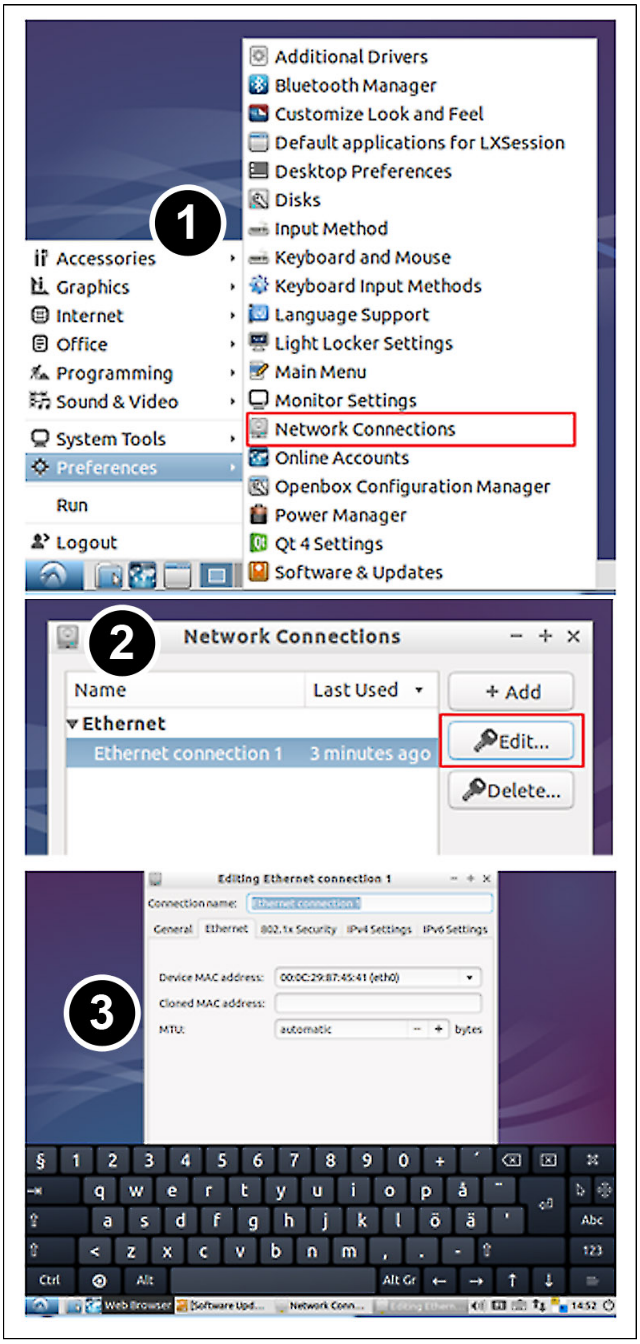


Fig. 5. Setting IP address, steps 1...3.

4. Give a descriptive name for the connection in field "Connection name:", for example Analyzer.net. Enter the IP address on the tab "IPv4 Settings". Set Method = Manual, and then press button **+Add** to give a fixed IP address for the network connection.
5. Using a fixed IP address requires the correct settings in fields Address, Netmask and Gateway. If the terminal is also used for operation over the Internet, also enter the DNS server address in the corresponding field (usually this is not needed when the terminal is used at a mill).
NOTE: Make sure that the exactly same Netmask is set to both Flexi-U and the analyzer; if not, the connection will not work!
6. Press **Save**. The network connection should be operational after this step.

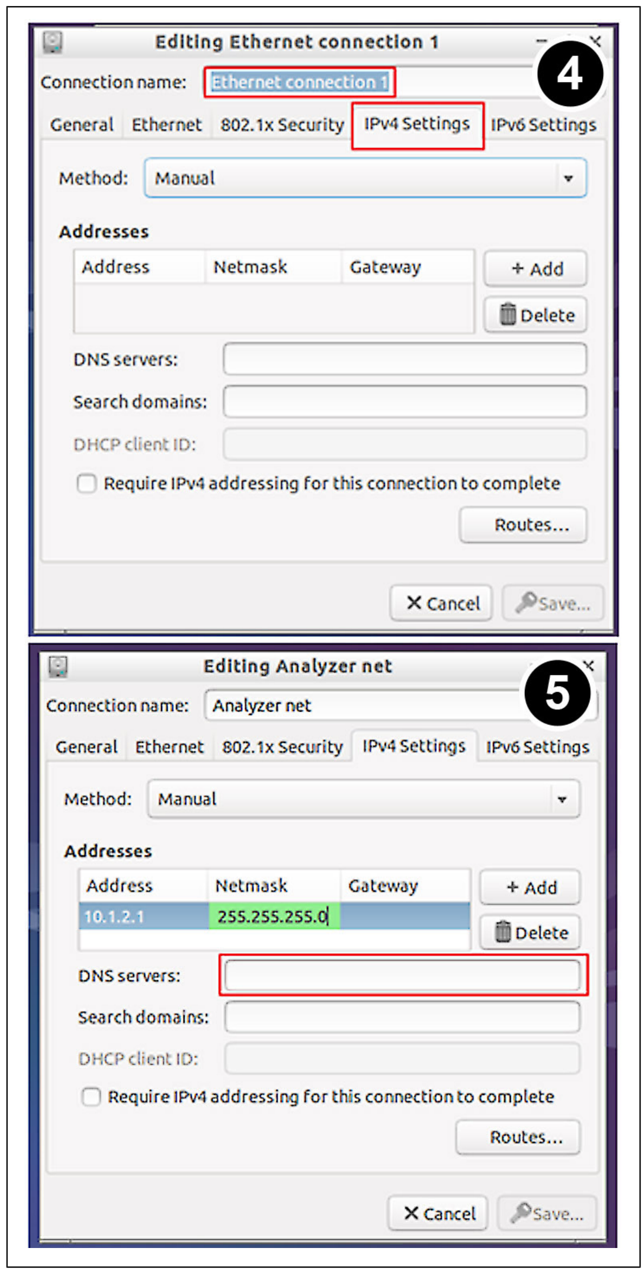


Fig. 6. Setting IP address, steps 4...5.

2.4. Setting the time to Flexi-U

1. Go to *System Tools* > *Time and Date*.
2. Select **Unlock**.
3. Enter the password *u31213121*.
4. Select *Configuration*: **Manual**. Enter the correct time and date and then press **Synchronize now** to start using the set time immediately.
5. Press **Close** to close the window.

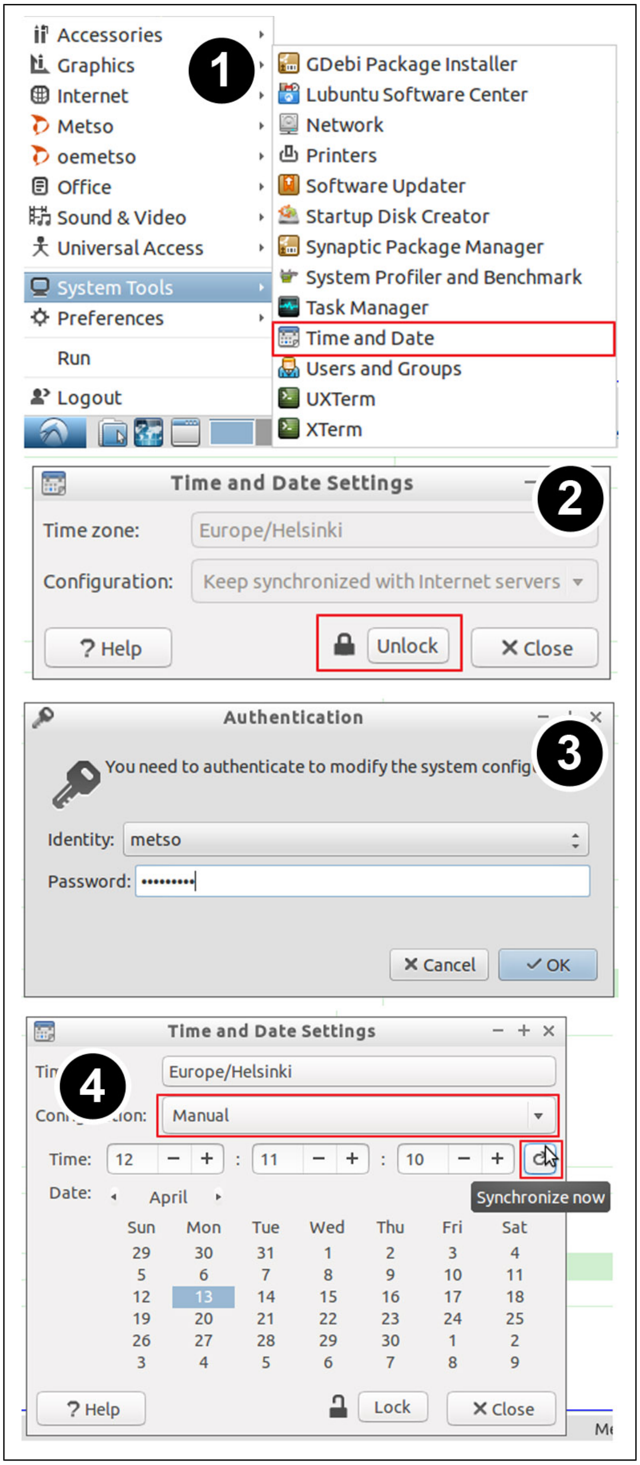


Fig. 7. Setting the time.

2.5. Display sleep time setting

The Flexi-U display will automatically go to sleep mode (= dark) when the computer is inactive for some time, and light up again when touched. This time is set as follows (Fig. 8):

1. Start *Power Manager* and start the background service.
2. Repeat the same procedure and the Power Manager window opens.
3. Select **On AC** and then select the tab **Monitor**.
4. Use the upper slide in the window to set when the display should go to sleep mode.

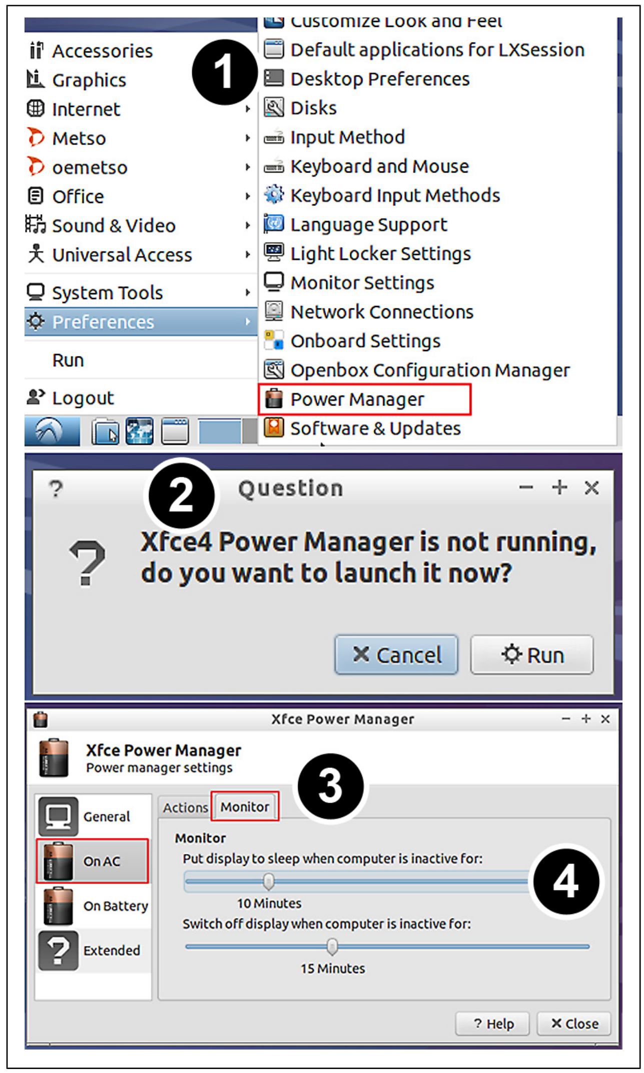


Fig. 8. Display sleep mode.

2.6. Display settings

When data needs to be typed in, a virtual keyboard appears on the screen. To make sure that this works correctly, go to *Settings* > *User interface settings*, and make the following settings (Fig. 9).

– Display type: Touch screen
– Display outlook: Main window without frame

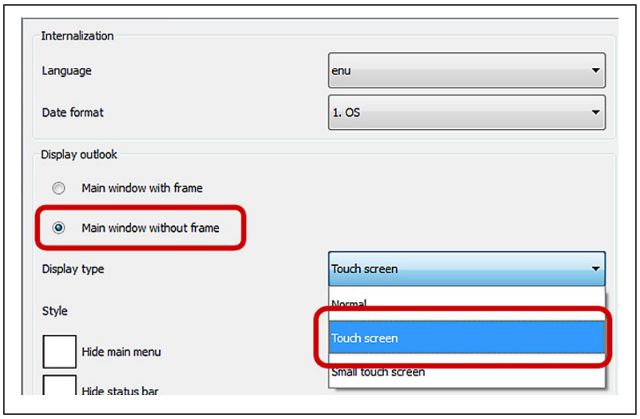


Fig. 9. User interface settings.

3. Operating & user interfaces

3.1. Starting and stopping the analyzer

Switch on the analyzer by its main switch, located in the connection box. Wait until the software has started up; this may take a few minutes.

When shutting down the analyzer, go to "Diagn" -› "Device control" -› "Reboot" -› "Shutdown". This ensures that all open files are closed and saved correctly. After the software has stopped, switch power off by the main switch.

NOTE: Never switch off the device when a sequence is going on!

NOTE: Always use the main switch to switch the analyzer on and off. Do NOT use the Reset switch (S4) on Master-CPU board!

3.2. User interfaces & communication

Three alternative interfaces can be used for configuration and measurement monitoring:

- Analyzer's operating terminal.
- **Valmet Analyzer Interface,** Windows software.
- **Connection to mill DCS,** using the Modbus protocol.

NOTE: Connections for the different communication alternatives are illustrated in the Installation manual.

3.3. Analyzer's operating diagram

The display pictures used in this manual are taken from the Communicator menu of the Valmet Flexi terminal. When the Communicator view is selected, the main display (Fig. 1) will appear. Sample line status can be controlled on the main display.

The default display language is English (alternative: Finnish). Changing display language: "Config" -› "Device settings".

The operating diagram in Fig. 2 follows the menus in the Communicator view.

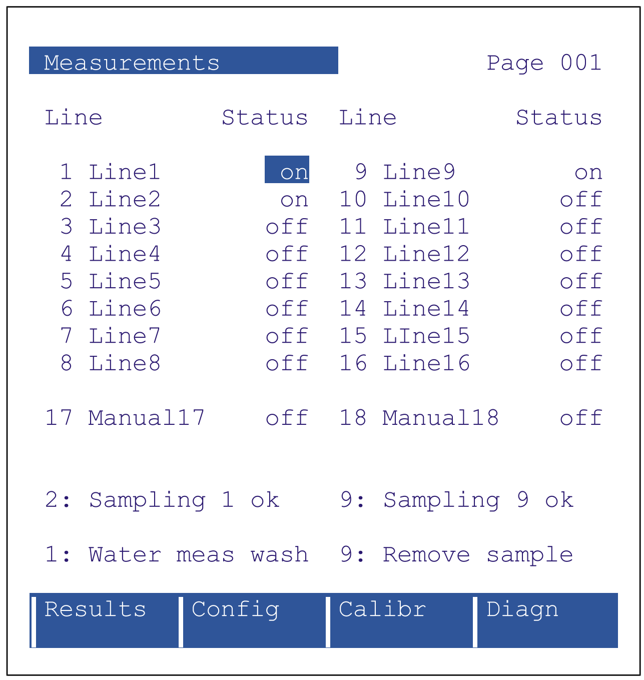


Fig. 1. Flexi-U terminal, main display.

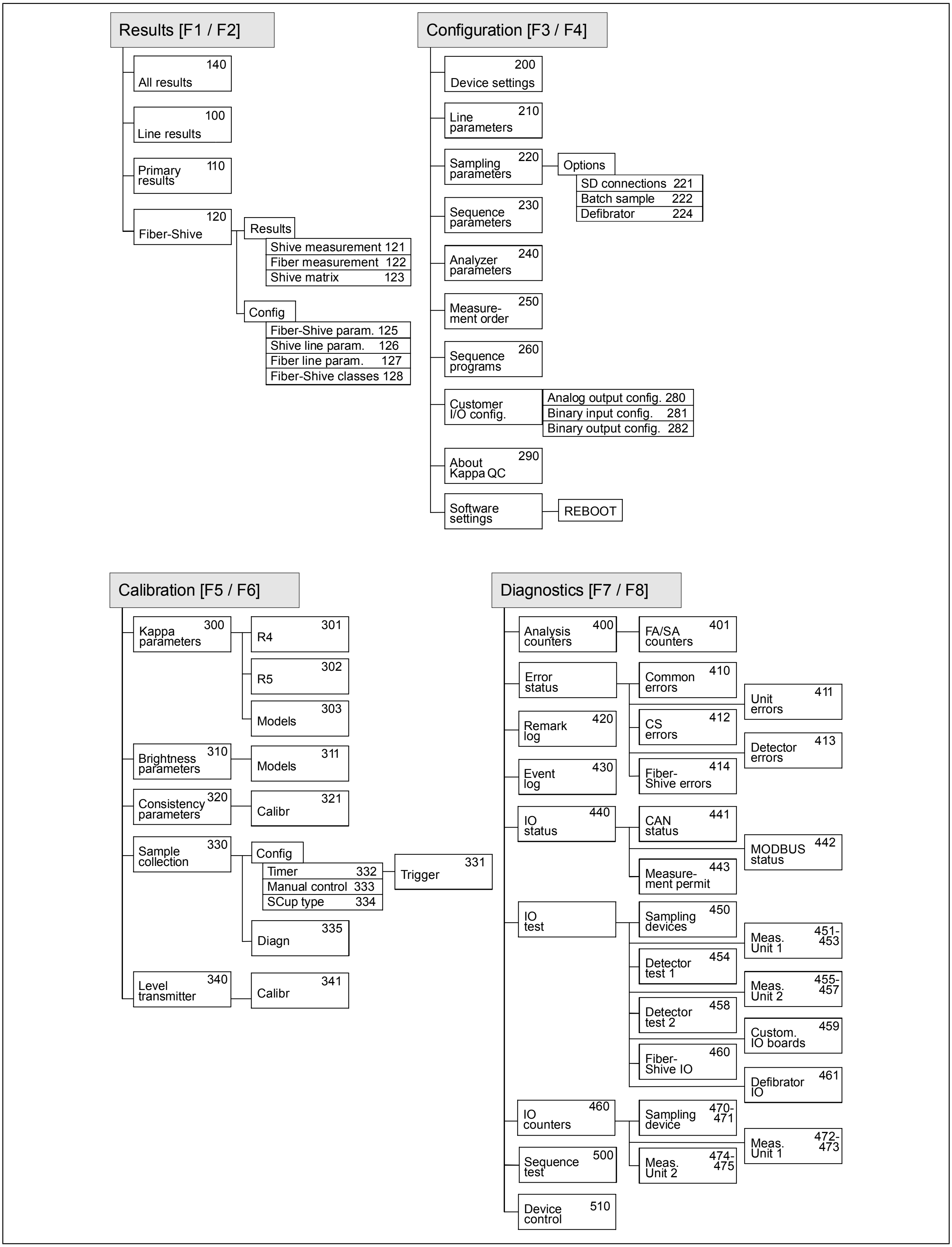


Fig. 2. Analyzer's operating diagram.

3.4. Other menus of Flexi-U terminal

Result menu

Result menu (fig. 3) contains various result databases for viewing.

Line results shows a table containing the basic measurement results for each sample, together with some data from the time of sampling (water temperature, water values, etc.).

Primary results shows in table format the detector raw signals as well as detector values measured during Sweep.

SCup results shows a table with data on the samples collected with the lab sample collector. If required, also the reference results from Kappa and Brightness laboratory measurements can be added to the table.

Water measurement shows the water measurement values in table format.

Fiber and Shive results shows a table with the basic fiber and shive measurement results for each sample, together with some data from the time of sampling (measurement consistency, number of images captured, etc.).

Trend displays (fig. 4) are used to show one or several variables as a trend for easy monitoring. Several different variables can be selected, and the Y-axes can be scaled separately.

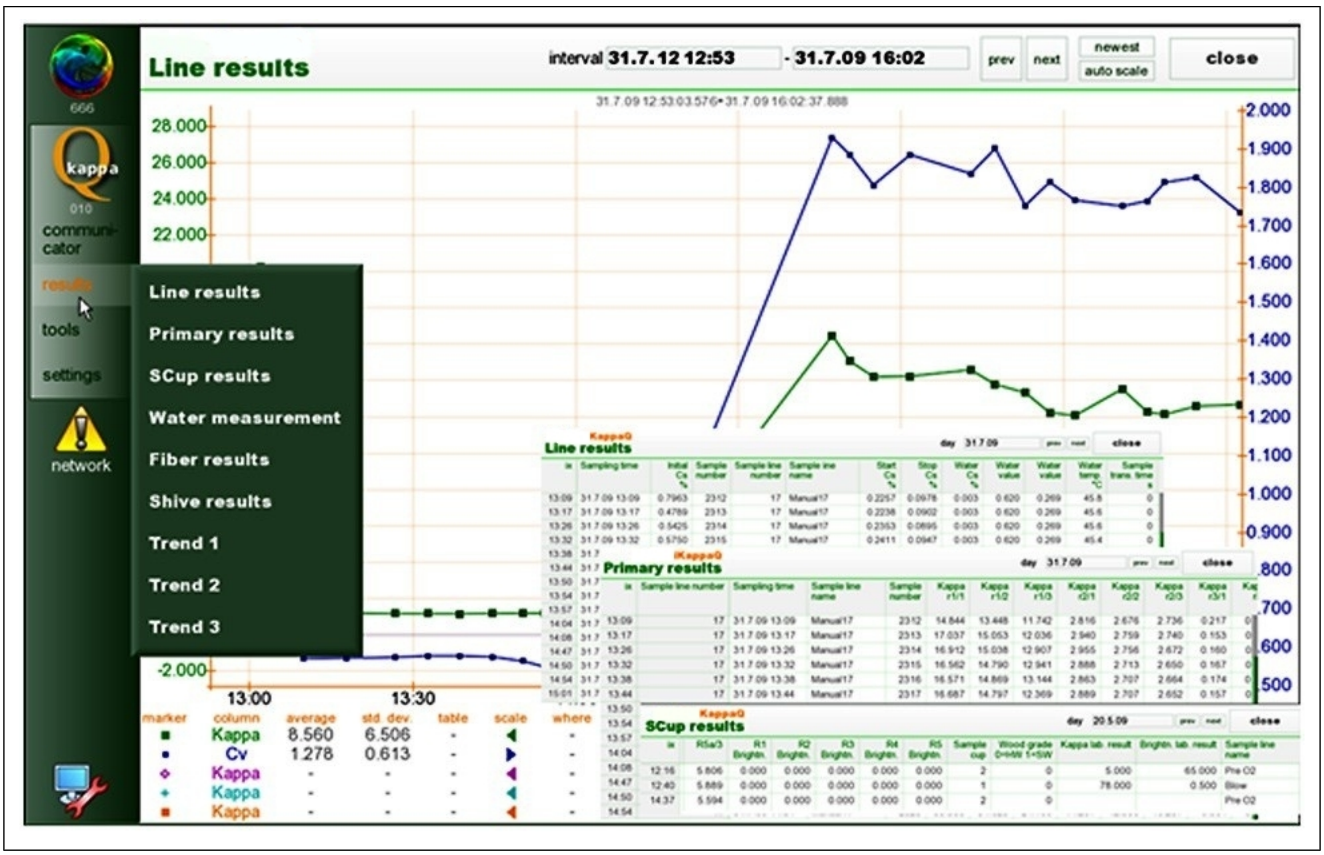


Fig. 3. Results menu.

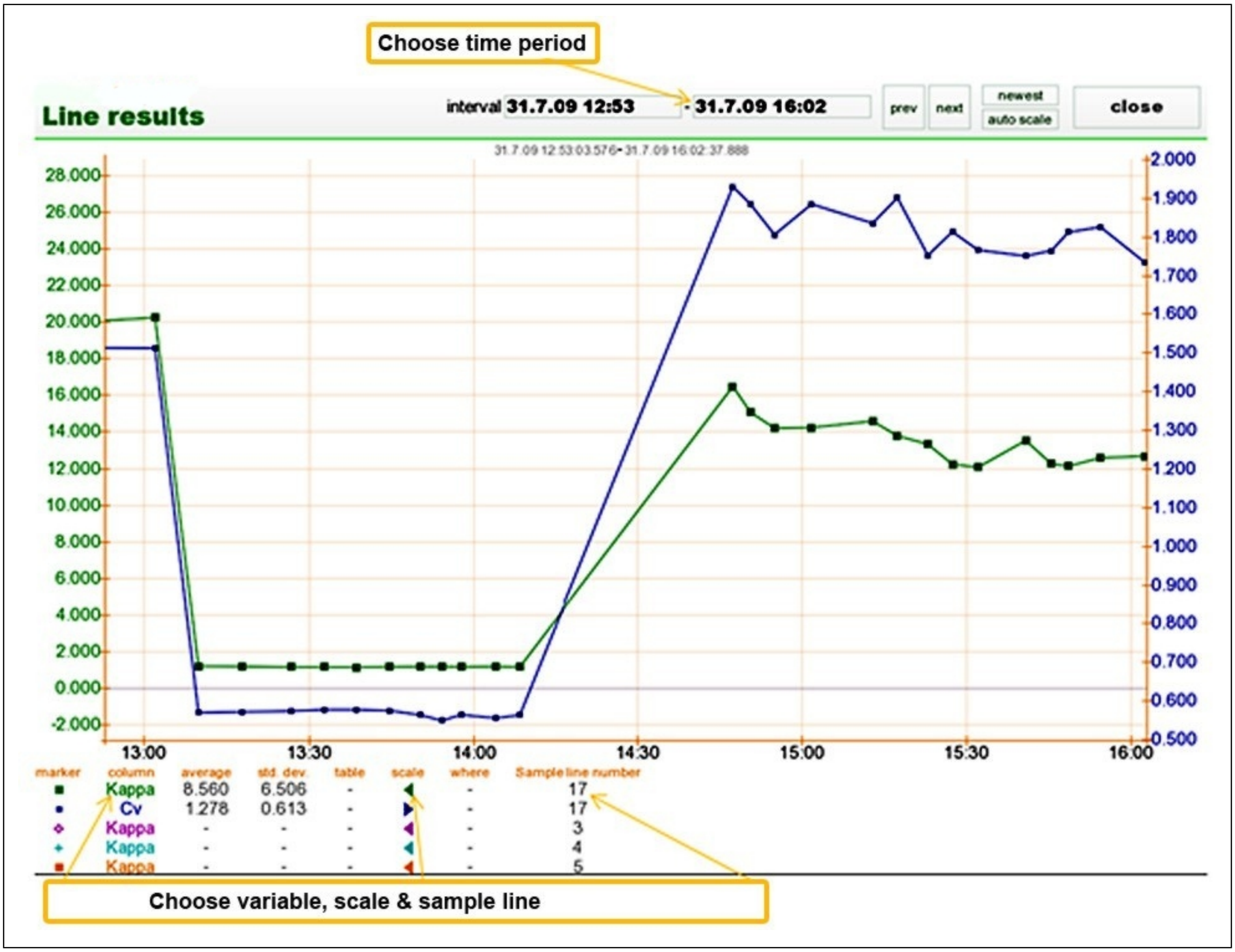


Fig. 4. Trend display.

Tools menu

Tools menu (fig. 5) contains a selection of diagnostics tools for easy and efficient operation monitoring and troubleshooting.

Remark Log shows a list of the saved warning messages and alarms.

Event log 1 (&2) is an action log, in list format. The list shows all the actions performed by the analyzer, and some measurements made during operation, arranged according to the time of occurrence.

Flow diagram shows a real-time flow chart of analyzer operation. Measurement results and valve operation can be monitored in real time, and the valves can also be controlled from the diagram if needed.

Fiber/shive diagram is a real-time flow chart for the fiber and shive module.

Sweep shows the sweep measurement results as a graph.

Browse is a tool designed only for Valmet's Service personnel.

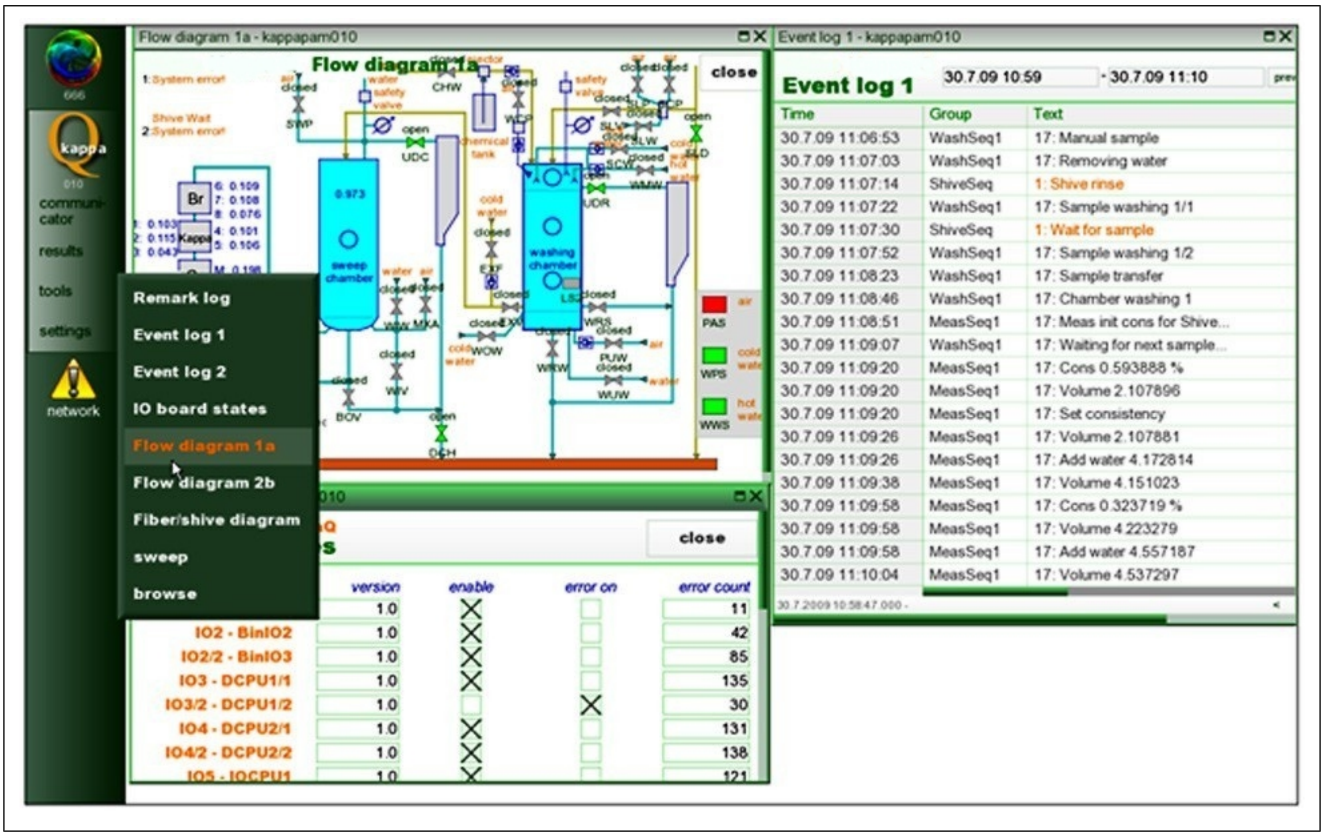


Fig. 5. Tools menu.

Notes

4. Configuration

4.1. Principle of configuration

Configuration involves setting the parameters that control analyzer operations. These settings can be given either with the Flexi-U operating terminal or from the Valmet Analyzer Interface PC software.

When configuring with the Flexi-U, carefully write down all settings. When the Valmet Analyzer Interface software is used, the configuration data can be stored on the PC (disk/memory stick). Thus they are easily available for re-configuration if necessary.

In the main display, press [F3] "Configuration" to begin. Then select the parameter display you wish to edit, and finally choose the sample line [F1]. Make the required edits and then press "Save".

4.2. Device settings

Analyzer's basic settings:

New date/time: Enter the correct date in format [dd-mm-yy] and time in format [hh:mm].

Time zone: Go to "Device settings" and then press [F5] "Timezone". Select first the geographical area and then the more precise location from the list.

NOTE: If you connect a PC with the Valmet Analyzer Interface software to the analyzer, make sure to set the same time zone to both the PC and analyzer!

Date format: Select the required format from the list.

Language: Alternatives: English and Finnish. The selected language is taken into use immediately.

Device IP, Gateway, Subnet mask: Device address settings for communication. These settings cannot be edited here.

Modbus address: Device address for the Modbus protocol; 1 - 254.

Baud rate: Serial communication speed [bit/s]; 9600, 19200, 38400 or 57600.

Parity: Serial communication parity; Odd, Even, or None (no parity).

Stop bits 1 or 2.

Limited Modbus register range: On = only Modbus registers 1-9999 are in use, off = all registers listed in the Modbus document are in use.

```
Device settings                          Page 200

 1 New date                              21.4.10
 2 New time                                12:22

 3 Time zone                    Europe/Helsinki
 4 Date format                             1. OS
 5 Language                                  enu

 6 Device IP                       139.74.56.230
 7 Gateway                         139.74.55.254
 8 Subnet mask                       255.255.0.0

 9 Modbus address                             10
10 Baud rate                               19200
11 Parity                                   none
12 Stop bits                                   1
13 Limited Modbus register range             off

                    Time-
                    zone
```

Fig. 1. Device settings.

4.3. Line parameters

Settings for the sample lines (Fig. 2):

Sample line name: Enter a descriptive name, length max. 16 characters.

Sample line status: Line in use/not in use (on/off). Line status can also be changed in the main display.

Kappa module status: Enable/disable (on/off) kappa measurement for the selected line.

Brightn. module status: Enable/disable (on/off) brightness measurement for the selected line.

Shive/fiber module status: Enable/disable (on/off) shive/fiber measurements for the selected line.

Measurement unit: For a Two Cabinet model, choose the cabinet (1 or 2) where the selected sample line is connected.

NOTE: Measurements will not operate if they have not been activated in the Measurement order table (see section 4.8). The set measurement order determines which lines are active, and in which order they are measured.

```
Line parameters                     Page 210

Line   1

 1 Sample line name                    Line1
 2 Sample line status                     on
 3 Kappa module status                    on
 4 Brightn. module status                 on
 5 Shive module status                   off
 6 Fiber module status                   off
 7 Measurement unit                        1

Line     |          | Get      | Save
         |          | Defaults |
```

Fig. 2. Sample line parameters.

4.4. Sampling parameters

Settings for the sampling devices (Fig. 3). After configuration, press [F7] to save the changes. If you wish to change the sampler connection parameters, press [F3] "SD Conn".

Sampling device number: 1 - 16.

Sampling device type: Choose from the list, alternatives:
- SD501,
- SD502,
- SD505 (also use for sampler SD506).

Partial sample number HW/SW: When process consistency is < 5 %, the sampling device must extract pulp several times from the pipeline to obtain a sufficient sample volume for analysis. Set here how many times pulp is extracted, note that the setting must be done separately for hardwood and softwood.

Sampling valve open HW/SW: Set the time separately for hardwood and softwood pulps.
- SD501: determines how long the sampling piston is in the process pipeline, extracting a sample.
- SD502 & SD505: determines how long the valve is open. The software limits this time to max. 10 seconds.

When determining the correct sampling time, always begin with a short time (e.g. 0.5 sec) to avoid sample line blockages. You can then increase the time as necessary.

Time between samples: Set this time if several partial samples will be taken.

Sample transfer time: Time (seconds) during which the sample is transported from sampling device into "waiting mode" close to the analyzer.

Line flushing time: How long the sample line is flushed (seconds) after the sample transfer time.

Line draining time: Time after line flushing time (seconds). This parameter opens the sampler's line emptying valve (option) after sampling.

Prescreening water: 0 = no water, 1 = cold water, 2 = hot water. Recommended setting = 0.

Prescreening time: Time at the end of sample transfer, sample flows from waiting mode (= in sample line) into the washing chamber.

Prescreening delay: Delay after the sample level is detected, before screening sequence begins. Parameter value 0 = no delay.

Sample draining time: How long the sample flows through the washing chamber into the drain at the end of sample transfer.

Sampling delay: 0 = sampling begins when the previous sample wash is ready. With any other setting, sampling begins when the set delay is up after the previous sampling. Example: setting 2 = sampling begins again 2 seconds after the previous sampling.

Pre-sample flush: It is possible to add to the sequence a sample line flush also before a sample is taken. Give here the required flushing time in seconds, 0 = no flushing.

```
Sampling parameter                    Page 220

Line    1 Line1

 1 Sampling device number                1
 2 Sampling device type            2. SD502
 3 Partial sample number HW              1
 4 Partial sample number SW              1
 5 Sampling valve open HW             0.25
 6 Sampling valve open SW             0.25
 7 Time between samples               1.00
 8 Sample transfer time                 50
 9 Line flushing time                   15
10 Line draining time                    0
11 Prescreening water                    1
12 Prescreening time                  50.0
13 Prescreening delay                 15.0
14 Sample draining time                  3
15 Sampling delay                        1
16 Pre-sample flush                      0
Line      Options
```

Fig. 3. After configuration, press [F7] to save the changes. If you wish to change the sampler connection parameters, press [F3] "SD Conn".

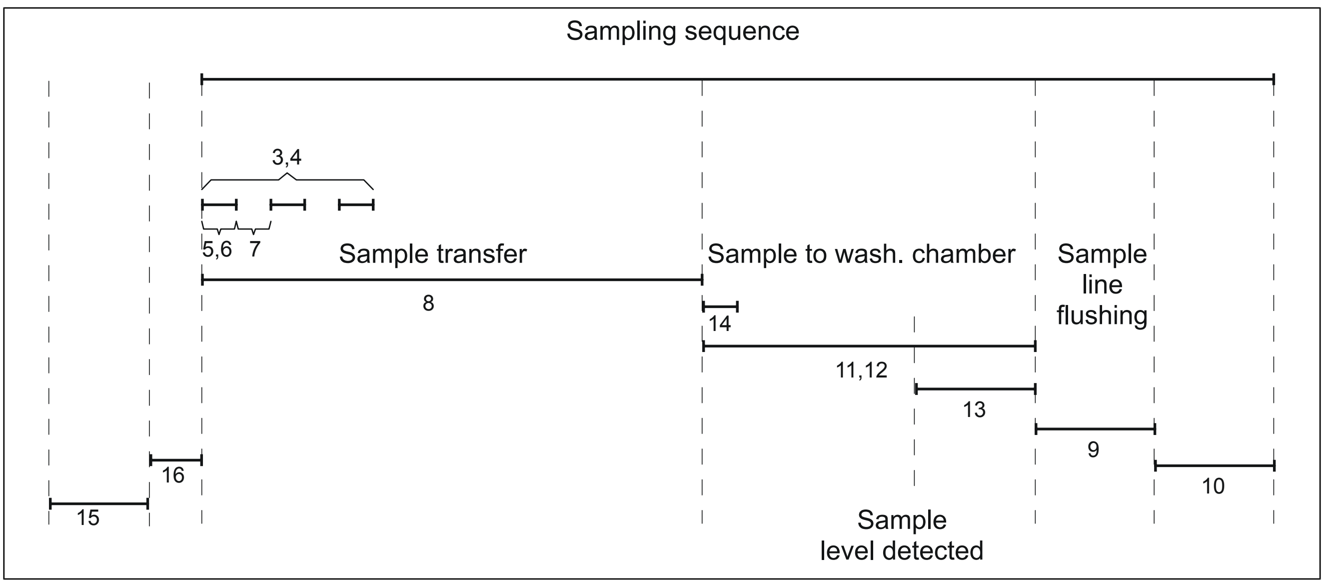


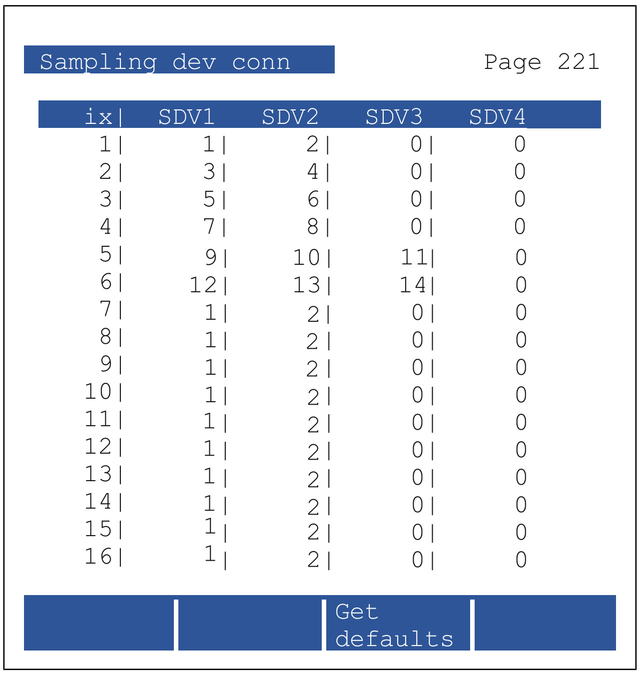
Fig. 4. Sampling sequence.

Options: SD connections

Control signal connections for the sampling devices (Fig. 5). In the list, ix = sampling device number, followed by its control connections (in numerical order). When using sampling devices that require more than two control signals, they should preferably be added to the end of the list so that the whole list need not be rewritten completely.

Fig. 5 shows an example of the control signal connections. Sample lines 1 - 4 use two control signals per sampler. The sampler of sample line 5 uses three control signals (9 - 11), the sampler of line 6 also uses three signals (12 - 14).

At the connection strip, for example the sampler on line 1 is connected to terminals 141 and 142, the sampler on line 2 to terminals 143 and 144, etc. Table 1 lists sampler connections to the terminals.


Sampling dev conn Page 221

ix	SDV1	SDV2	SDV3	SDV4
1	1	2	0	0
2	3	4	0	0
3	5	6	0	0
4	7	8	0	0
5	9	10	11	0
6	12	13	14	0
7	1	2	0	0
8	1	2	0	0
9	1	2	0	0
10	1	2	0	0
11	1	2	0	0
12	1	2	0	0
13	1	2	0	0
14	1	2	0	0
15	1	2	0	0
16	1	2	0	0

Get defaults

Fig. 5. Sampler control connections, example.

Table 1. Connection of sampler cables to connection strips.

Ctrl no	Conn no
1	141
2	142
3	143
4	144
5	145
.	.
.	.
.	.
31	175
32	176

Options: Batch sample

One or more sampler may take samples from a batch cooking process. Set in this display (Fig. 6) how many samples each line should take from each batch.

Batch sample number: set here the required number of samples. With settings 0 and 1 the device takes only one sample.

Batch sample interval: set the required time, in seconds.

Options: Defibrator

Select here the line where a Defibrator is connected, and set the operating parameters.

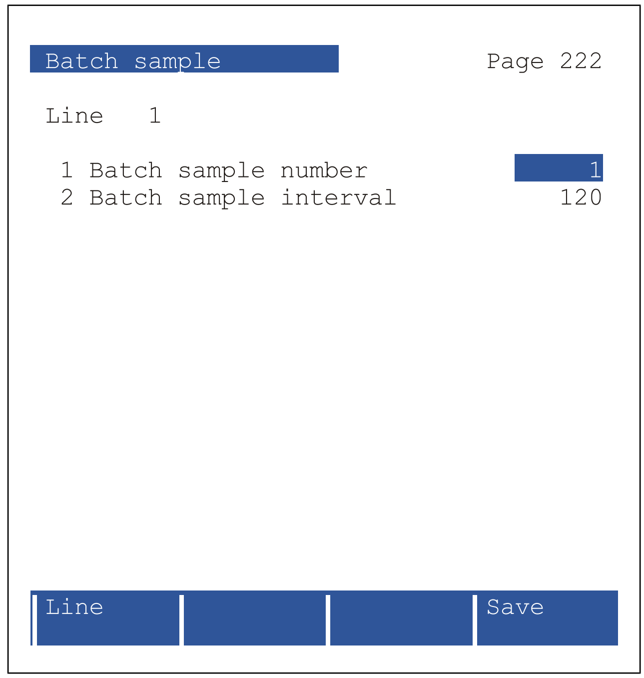


Fig. 6. Batch sample settings.

4.5. Sequence parameters

Settings for sample processing and analysis for the selected line (Fig. 7).

Sample screening mode: Depends on the selected measurements (kappa, brightness, or both):

- 1 = sample is screened according to the set sequence: "Sequence program" -› "Screening (D)", page 260. This mode is usually used for kappa measurement.
- 2 = sample is screened until the configured time is up (Water removing time). Usually used in kappa or brightness measurement, also when both are measured. Recommendation: use value 2.

Water removing time HW/SW: Set the time separately for hardwood and softwood, in seconds. This parameter is used when the "Sample screening mode = 2".

Sample screening: This parameter is used when the "Sample screening mode = 1". This parameter determines how many times the selected screening sequence is repeated.

Sample washing 1: Number of hot water washes with washing sequence 1; set separately for each line. For kappa measurement use at least two washes (max. 9). Brightness samples can be washed if necessary.

Sample washing 2: Number of cold water washes with washing sequence 2; set separately for each line.

Wash. chamber / Sweep module washing: Number of washes, set separately for each line.

Sample mixing water: How long water is added to the sample at the beginning of mixing. Target volume is 1.5 - 2.2 L. This is only used with the Single chamber model (= analyzer with only washing chamber). For the Dual chamber model (= separate washing chamber and sweep chamber) the amount of mixing water is set with the Sequence programs (display 263, Sample transfer D).

Sample mixing time: How long the sample is mixed before measurement. This is only used with the Single chamber model (= analyzer with only washing chamber).

Neutralization liquid: How long the neutralization liquid is added to sample (before mixing). Neutralization is only used for brightness samples containing dioxide residual. Set the time in seconds, for example 2 seconds, and then change as necessary. 0 = neutralization not in use.

Neutralization flush: How long the neutralization tube is flushed during sampling. Set the time in seconds, for example 10 seconds, and then change as necessary. 0 = not in use.

Sweep start / stop Cs: The consistency levels at which the sweep measurement starts and ends. Set separately for each line (see Fig. 7).

Cs hysteresis: The allowed consistency variation (±) between target and adjusted value, also determines the hysteresis for laboratory samples (see Fig. 8).

Sequence parameters   Page 230

Line   1 Line1

1	Sample screening mode	2
2	Water removing time HW	20
3	Water removing time SW	15
4	Sample screening	1
5	Sample washing 1	2
6	Sample washing 2	1
7	Wash. chamber washing	1
8	Sweep module washing	1
9	Sample mixing water	4
10	Sample mixing time	10
11	Neutralization liquid	0.0
12	Neutralization flush	10
13	Sweep start Cs	0.300
14	Sweep stop Cs	0.110
15	Cs hysteresis	0.025

Line

Fig. 7. Sequence parameters.

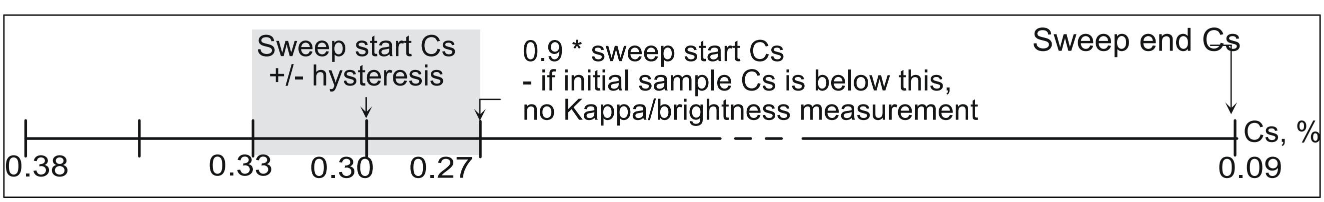


Fig. 8. Example of sweep measurement: pulp kappa range 1 - 50, no brightness measurement. Sweep start Cs 0.30 %, sweep stop Cs 0.09 %, hysteresis 0.02 %.

4.6. Analyzer parameters

Parameters controlling analyzer operation (Fig. 9):

Water measurement cycle: How frequently the analyzer performs a water wash (= after every X analyses).

Chemical washing cycle: How frequently the analyzer performs a chemical wash (= after every X analyses).

Chemical + water: Duration for cleaning chemical injection during a chemical wash.

Chemical washes: The number of air blasts (1 sec + 20 sec) during a chemical wash.

Water washes after chem. wash: How many times the analyzer runs a water wash after each chemical wash.

NOTE: The chemical washing ejector only operates with the hot water control signals. If no hot water is used for sample preparation, cold/deionized water can also be connected to the hot water inlet coupling.

```
Analyzer parameters                          Page 240

Unit 1:

 1 Water measurement cycle                       30
 2 Chemical washing cycle                       100
 3 Chemical + water                               8
 4 Chemical washes                                5
 5 Water washes after chem wash                   1

 6 Volume max.                                  4.5
 7 Volume min.                                  1.1
 8 Volume init.                                 2.2

 9 Water temp. min.                               0
10 Water temp. max.                             100
11 Temperature gain                          35.900
12 Temperature offset                        -0.180

       >
```

Fig. 9. Analyzer parameters, cabinet 1.

Volume max / min: Maximum and minimum volume of the washing chamber. The exact limits must be checked after calibration. These limit values are used in control to make sure that the level transmitter stays within a reliable operating range.

Volume init.: Target sample volume before Sweep measurement begins.

Water temp. min / max: Minimum and maximum limits for water in the washing chamber.

Temperature gain / offset: These settings are used to calibrate the temperature sensor signal to the correct level.

4.7. Measurement order

The measurement order of analyzer's sample lines 1 - 16 is freely selectable. Enter the required measurement order in the table (Fig. 10). The table has 20 slots. If all measurement turns will not be set, give the sample line number as 0.

The measurement order can be set separately for each cabinet. The cabinets will then operate independently, following the order set for each one.

You can also select here the measurements to be carried out each time.

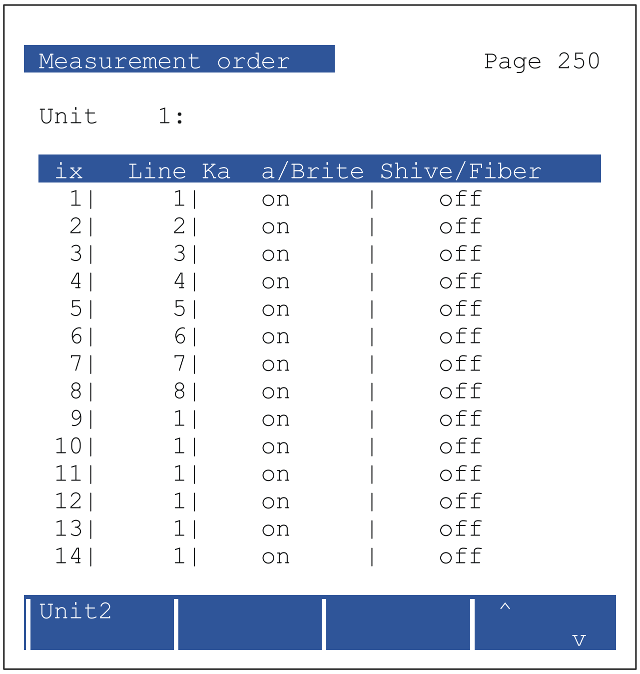


Fig. 10. Setting the measurement order for the cabinets.

4.8. Sequence programs

To start a test, select which cabinet (Two-cabinet model) will be tested: "Test unit 1" [F3] or "Test unit 2" [F5]. The sequences can also be edited in the Valmet Analyzer Interface software. Sequences (D = dual chamber, S = single chamber):

- Screening (D)
- Sample wash 1 (D)
- Sample wash 2 (D)
- Sample transfer (D)
- Wash. chamber wash (D)
- Sweep module wash
- Screening (S)
- Sample wash 1 (S)
- Sample wash 2 (S)
- Wash. chamber wash (S)

The program reads the table from top to bottom and from left to right. Each column stands for a 1-second period.

The indicated valve is open when the control character is [=] and closed when the character is either [+] or [_]. The sequence end character "e" must always be on the first line, and before that there must be one full column of "+" characters to make sure that no valves remain open when the sequence ends.

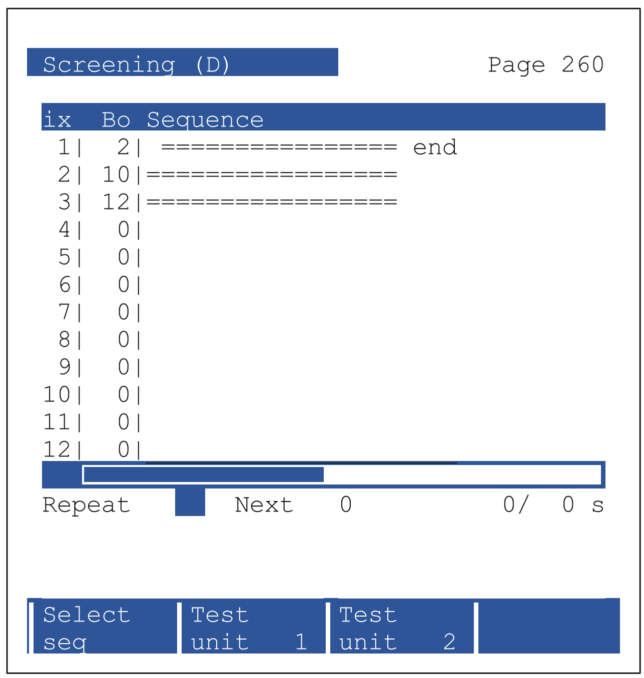


Fig. 11. Example of the Sequence programs display.

Page "Wash. chamber wash" (D & S) contains the function "Chemic. 1 / 2". This command starts chemical washing for the selected cabinet. The modules cleaned during the wash are determined by lines 17 and 18, as follows:

– F7 = chemical wash of Cabinet 1, cleans the modules selected for line 17.
– F8 = chemical wash of Cabinet 2, cleans the modules selected for line 18.

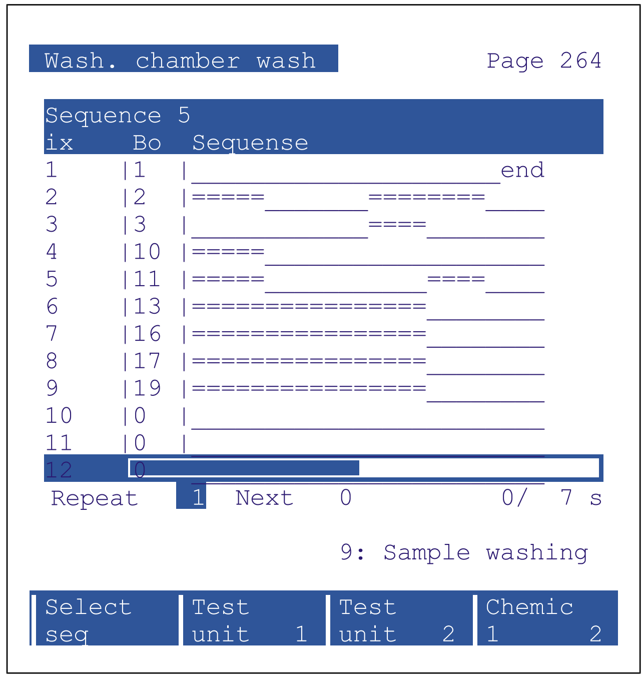


Fig. 12. Example of the Sequence programs display.

4.9. Customer IO configuration

These configurations are not necessary if Modbus is used for data communication. Slide the bar in the bottom of the screen to see all the settings in the display (low/high scaling limits, board selection).

Analog output configuration

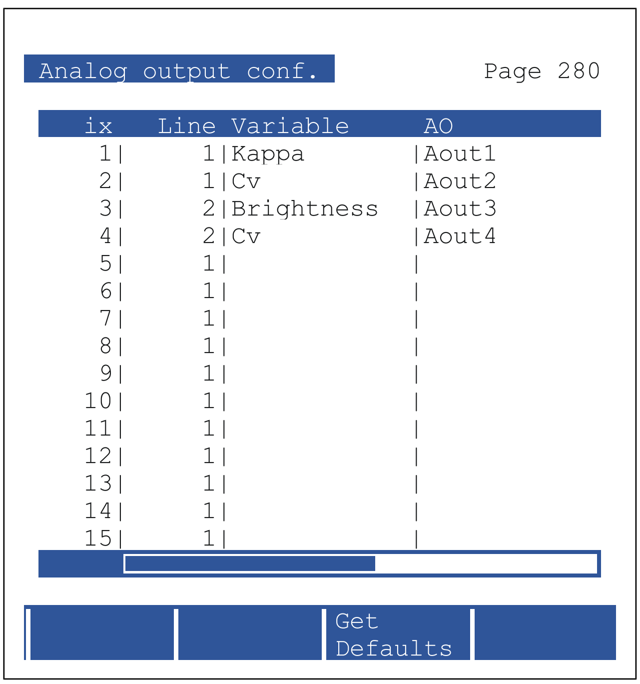
The analyzer may contain up to 16 analog outputs. Measurement results can be freely configured to these outputs. The analog outputs are scaled to range 4 - 20 mA. Select the variable and then the required analog output and board.

Binary input configuration

Binary inputs (max. 16) can be configured for example to transmit pulp grade or process stop information to the analyzer. Select the variable and then the required binary input and board.

Binary output configuration

The analyzer has max. 16 alarm outputs. Any alarms can beconfigured to these outputs. Select the variable and then the required binary output and board.

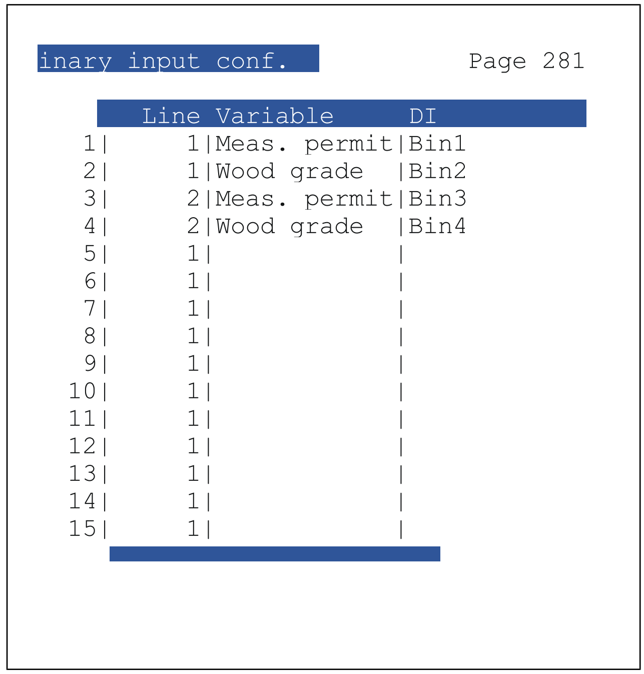


Analog output conf. Page 280

ix	Line	Variable	AO
1	1	Kappa	Aout1
2	1	Cv	Aout2
3	2	Brightness	Aout3
4	2	Cv	Aout4
5	1		
6	1		
7	1		
8	1		
9	1		
10	1		
11	1		
12	1		
13	1		
14	1		
15	1		

Get Defaults

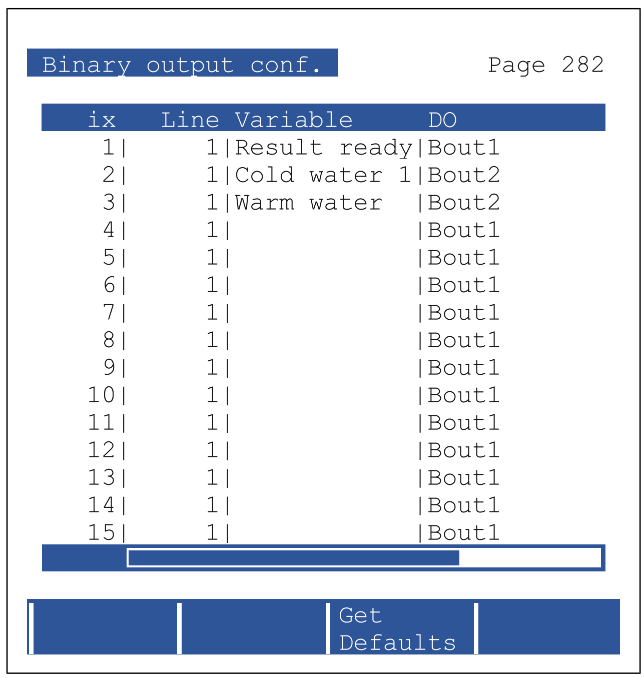
Fig. 13. Analog output configuration.



inary input conf. Page 281

	Line	Variable	DI
1	1	Meas. permit	Bin1
2	1	Wood grade	Bin2
3	2	Meas. permit	Bin3
4	2	Wood grade	Bin4
5	1		
6	1		
7	1		
8	1		
9	1		
10	1		
11	1		
12	1		
13	1		
14	1		
15	1		

Fig. 14. Binary input configuration.



Binary output conf. Page 282

ix	Line	Variable	DO
1	1	Result ready	Bout1
2	1	Cold water 1	Bout2
3	1	Warm water	Bout2
4	1		Bout1
5	1		Bout1
6	1		Bout1
7	1		Bout1
8	1		Bout1
9	1		Bout1
10	1		Bout1
11	1		Bout1
12	1		Bout1
13	1		Bout1
14	1		Bout1
15	1		Bout1

Get Defaults

Fig. 15. Binary output configuration.

Notes

5. Calibration

5.1. Principle of calibration

In calibration, analyzer's raw measurement results are scaled in such a way that the obtained reading corresponds to laboratory results for the same sample. The analyzer is first calibrated during start-up, separately for SW and HW pulps. It can be re-calibrated later on, if necessary.

The analyzer is calibrated by using the Valmet Analyzer Interface software. Calibration data can then be stored in the analyzer and on the PC (diskette/memory stick).

During a calibration measurement, the analyzer saves the sampling time and measurement results in a calibration table. Using the sample collector, it then gives a parallel sample for kappa and/or brightness analysis in the mill laboratory. These parallel samples can also be used to ensure the reliability of the sweep measurement dilution ratio, and the laboratory value for the first data point.

When the analyzer has measured the calibration sample, and the reference samples have been analyzed in the laboratory, the obtained lab. values must be entered to the PC for calculation. This calculation gives the coefficients with which the raw signals can be converted into values comparable with laboratory results.

Even if the analyzer normally measures both kappa/brightness and fiber/shives, it will only measure kappa/brightness for laboratory samples!

For kappa number analysis, up to 5 calibrations (= calculation models) can be entered to the analyzer. The model that gives the most reliable result is then selected for each line and pulp grade. The calculation models are:

- R1, calculation uses raw measurement results from detector D1. Recommended for HW and when pulp kappa # is in the range 1 - 10. Coefficients are set on display page 303.
- R2, calculation uses raw measurement results from detector D2. Recommended when pulp kappa # is > 10. Coefficients are set on display page 303.
- R3, user selects which detectors will be used. Coefficients are set on display page 303.
- R4, user selects which detectors will be used. This model is used when the others do not give sufficiently good correlations. Parameters are set on display page 301.
- R5, calculation uses raw measurement results from detector D5. Use when pulp kappa # is > 40. Coefficients are set on display page 302.

Fig. 1 illustrates the principle of calibration: kappa levels 1 and 2, three samples analyzed. Regression analysis is applied to calculate the line y = ax + b, where a = gain and b = offset.

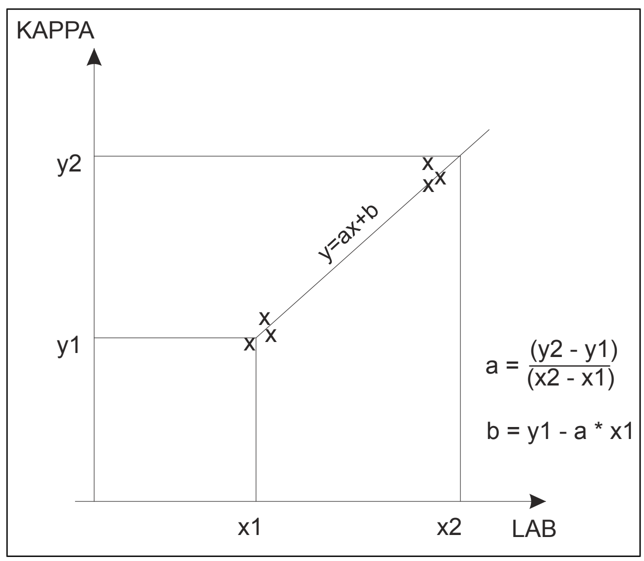


Fig. 1. Calibration principle.

5.2. Calibration procedure

Calibration procedure

1. Consistency calibration (LC100)
2. Checking and setting the sweep start & stop limits for each line
3. Checking and setting the consistency pairs and points for each line
4. Consistency compensation (only required for Brightness measurement >85)
5. Calculation of Kappa and/or Brightness models
6. Taking follow-up samples

When starting model calculation, use the recommended detectors, Cs pairs and sweep ranges (see the Tables).

Start model calculation by combining data collected from both sides of the (O) stage: blowline, pre-O2, post-O2 (and pre-D0). Fine-tuning can be done for each line, but the gains of each model should be real and logical.

Changes coming in from the blowline should show up in the subsequent sampling points, so that when the lignin content of the pulp drops the Kappa number variation should also be reduced.

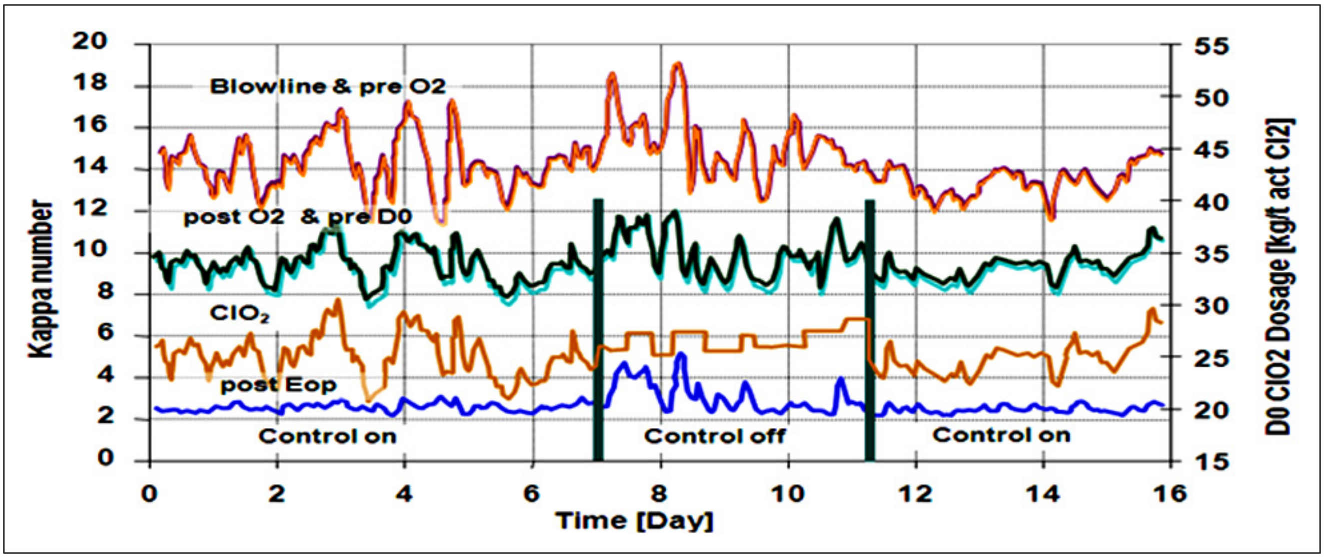


Fig. 2. Kappa number is reduced stage by stage towards the target value.

Table 1. Consistency table, when analyzer only measures kappa and/or brightness.

	Default 1	Default 2	Default 3	Default 4	Default 5
Brightness, ISO	> 95	75–95	40–85	<40	-
Kappa			1–10	5–50	50–120
Sweep measurement range [%]	0.75–0.40	0.65–0.30	0.40–0.15	0.26–0.09	0.20–0.07
Brightness (r1), Consistency [%]	0.7	0.6	0.35	0.24	-
Brightness (r2), Consistency [%]	0.65	0.55	0.3	0.21	-
Brightness (r3), Consistency [%]	0.6	0.5	0.25	0.18	-
Brightness (r4), Consistency [%]	0.55	0.45	0.2	0.15	-
Brightness (r5), Consistency [%]	0.5	0.4	0.15	0.12	-
Kappa measurement, Consistency default value 1 [%]	-	-	0.36; 0.18	0.24; 0.12	0.18 0.09
Kappa measurement, Consistency default value 2 [%]			0.35; 0.25	0.20; 0.10	0.14; 0.08
Kappa measurement, Consistency default value 3 [%]			0.3; 0.2	0.18; 0.09	0.12; 0.07
Consistency compensation limit [%]	0.75–0.40	0.65–0.30	-	-	-
Consistency compensation	yes	yes	no	no	no
Consistency hysteresis [%]	0.02	0.02	0.02	0.02	0.02
Sample wash 1, number of washes	-	-	2	3	5
Calculation formula Brightness HW/SW	1 / 1	1 / 1	1 / 1	-	-
Calculation formula Kappa HW/SW	-	-	Micro or 1 / 1	1 / 2	5 / 5

Table 2. Consistency table, when analyzer measures kappa/brightness and fibers/shives.

	Default 1	Default 2	Default 3	Default 4	Default 5
Brightness, ISO	> 95	75–95	40–85	<40	-
Kappa	-	-	1–10	5–50	50–120
Sweep measurement range [%]	0.75–0.30	0.65–0.30	0.55–0.30	0.30–0.10	0.30–0.08
Brightness (r1), Consistency [%]	0.7	0.6	0.5	0.28	-
Brightness (r2), Consistency [%]	0.65	0.55	0.45	0.25	-
Brightness (r3), Consistency [%]	0.6	0.5	0.4	0.22	-
Brightness (r4), Consistency [%]	0.55	0.45	0.35	0.19	
Brightness (r5), Consistency [%]	0.5	0.4	0.3	0.16	
Kappa measurement, Cs set value 1 [%]	-	-	0.45; 0.35	0.22; 0.12	0.16; 0.09
Kappa measurement, Cs set value 2 [%]	-	-	0.40; 0.33	0.20; 0.10	0.14; 0.08
Kappa measurement, Cs set value 3 [%]	-	-	0.35; 0.32	0.18; 0.09	0.12; 0.07
Cs compensation limit [%]	0.80 - 0.30	0.70 - 0.30	-	-	-
Cs compensation	yes	yes	no	no	no
Cs hysteresis [%]	0.02	0.02	0.02	0.02	0.02
Sample wash 1, number of washes	-	-	1	2	2
Calculation formula Brightness HW/SW	1 / 1	1 / 1	1 / 1	-	-
Calculation formula Kappa HW/SW	-	-	Micro or 1 / 1	1 / 2	5 / 5

5.3. Consistency calibration

When the analyzer contains the Fiber-Shive module (option), consistency calibration should be made separately for each line and grade. In other cases it is enough to calibrate one line and then save the obtained values for use in all lines.

1. Before consistency calibration, detach the tube connected to the laboratory sample connector and drain it empty.
2. Reconnect the tube and place a sample vessel in the sample collector. Make sure to put it under the correct slot (see section 7). Make sure that the collector has an empty vessel in the right place! During calibration the collector slider does not move; a sample is collected in whichever vessel is under the slider at the moment.
3. Select "Calibr" -› "Consistency parameters" (Fig. 3).
4. Choose "Calibr" [F3] and then choose the correct line.
5. Press Start [F3]. When calibrating a manual line (17 or 18), pour the sample into the washing chamber. With the automatic lines, the analyzer will use the sampler of the line to take a process sample.
6. The device then performs sample measurement and water measurement, and runs a sample into the lab. sample collector.
7. Enter the laboratory's consistency result in field "7 Laboratory cons." and then press [F5] to calculate gain and offset. The measurement results will remain stored even if you view other displays or perform other actions.
8. Finally press [F7] to store the obtained coefficients for the required lines and grades.

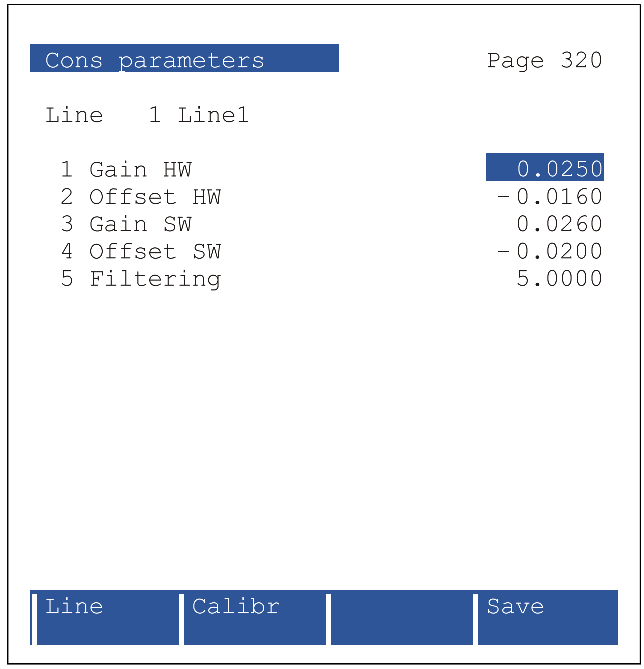


Fig. 3. Consistency parameters display.

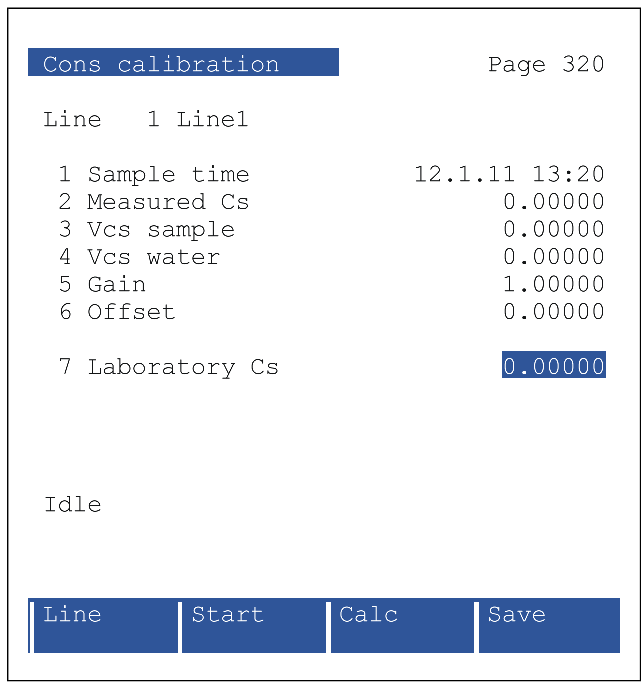


Fig. 4. Consistency calibration display.

5.4. Consistency compensation

Consistency compensation is only necessary when the analyzer is used for brightness measurement in the brightness range 75 - 95. Consistency compensation is not needed for brightness range 30 - 85.

Perform consistency compensation before calibration, separately for each channel and grade. The first consistency used in compensation is higher than the normal analysis consistency; make sure that the analyzer gets enough sample.

Start compensation from the "Brightness parameters" display. Function keys can be used to tell the device that consistency compensation coefficients should be calculated when that line is measured next.

The calculation yields coefficients that calibrate the result from detector 7 so that it corresponds to the consistency result. The calculated coefficients will show up on the "Brightness calibration parameters" display. Calculate the coefficients separately for each grade (SW/HW).

Also see section "Brightness parameters".

5.5. Kappa calibration

Calibrate the analyzer separately for each sample line and pulp grade, using samples from several kappa levels. Let the device operate normally during calibration.

1. Make sure that the sample collector contains all the necessary vessels. In the main display, select "Calibr" -› "Kappa parameters", then choose the line.
2. Configure the sample collector (see section 6).
3. Return to the main display and start the analyzer. Let the sample vessel remain in the sample collector until the analysis is completed: more laboratory sample is added several times during the analysis.
4. When the consistency sweep is over and samples have been collected, the results are shown in the "Sample collection" display.
5. Analyze the collected samples in laboratory. Make sure that the min - max difference of the samples is about 5 kappa points.
6. Enter the laboratory results in the Valmet Analyzer Interface. The software will calculate the calculation model and calibration parameters that best suit the selected line.

5.6. Brightness calibration

Calibrate the analyzer separately for each sample line and pulp grade, using samples from several brightness levels. Let the device operate normally during calibration.

Before calibration, check the quality of the deionized water (see instructions in section "Maintenance").

Follow the procedure described above for Kappa calibration, with the following exceptions:

- Select "Calibr" -› "Brightness parameters".
- Make sure to use the correct sample vessel for brightness samples (see section 6).

5.7. Kappa parameters

In the main display, select "Calibr" -› "Kappa parameters" to begin. Set the parameters separately for each line and grade (HW/SW). Display page 300 is the main calibration page (Fig. 5). Select here which calculation formula will be used.

HW/SW model no: When one of the calculation formulae R1 - R3 is used, choose here the required calibration model. The coefficients for each model are set on display page 303. Five different calibrations can be stored in the analyzer.

R3 Dn1/Dn2: When R3 calculation is used, select here the detectors from which raw measurements will be used in the calculation.

Cs pair: Set measuring consistencies for Cs pairs 1 - 3.

Cv variation limit: The analyzer compares the Cv value of a sample to this limit to choose which calculation model (HW or SW) will be used.

Cv variation hysteresis: Allowed variation around the Cv limit (for HW/SW determination).

Grade determination: Choose here how the analyzer should detect the grade. 1 = from CV value, 2 = grade signal from binary input, 3 = grade signal from Modbus.

HW/SW coefficient (gain, offset): Used when converting the obtained Cv result into a wood grade percentage.

Coefficients for R1 – R3 calculations:
Coefficients for up to five models per grade can be entered on page 303. To view the page press "Models" (F8) on the Kappa calibration parameters page. Return to page 300 by pressing F5.

Cs pair: Select the consistency pair Cs 1 - 3 for each model.

r- calc.: Select the Kappa R1 - R5 calculation for each model.

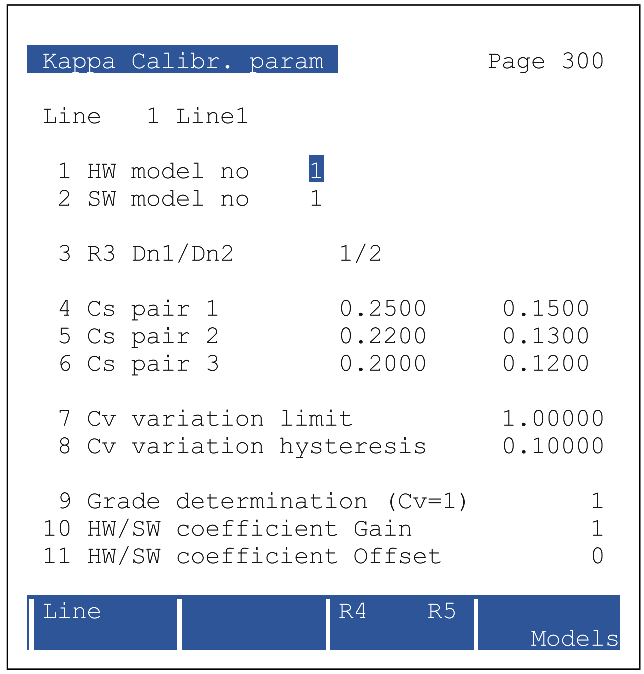


Fig. 5. Kappa calibration parameters.

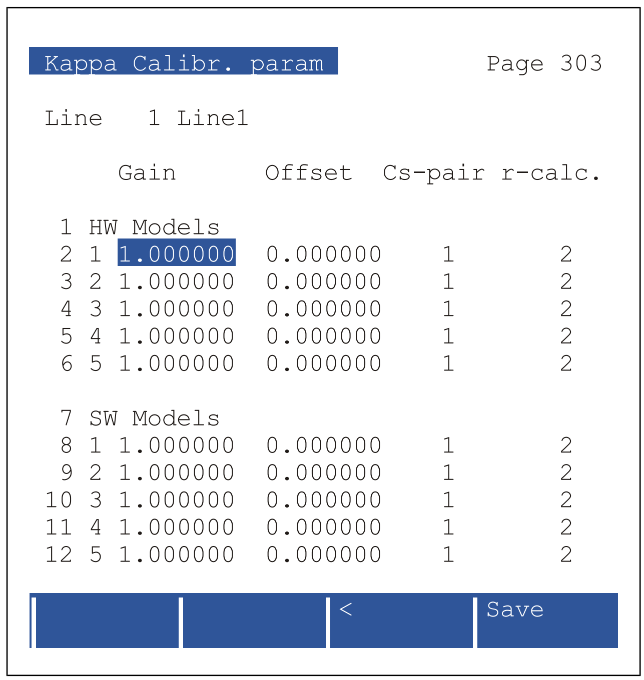


Fig. 6. Calibration coefficients for calculation models R1 - R3.

Coefficients for calculation formula R4 (page 301): To see this display, choose "R4" (F5) on the Kappa calibration page. Back to display 300: press F5.
R4 formula = R1*a1 + b1 + R2*a2 + b2 + R3*a3 + b3 + Cv*a4 + b4 + constant, where

- a1 = display parameter 10
- b1 = display parameter 11
- a2 = display parameter 12, etc.

R4/Rx gain, offset: Parameters for calculation formula R4.

Cv high limit/Cv low limit: Cv value limits for the calculation formula: if the calculated Cv > high limit, the analyzer uses the set maximum value as the Cv value. Similarly, if the calculated Cv < low limit, the minimum value will be used for the parameter.

Cv max. / min. value: Set the maximum and minimum values to be used for Cv in calculation model R4.

Coefficients for calculation formula R5 (page 302): To see this display, choose "R5" (F6) on the Kappa calibration page. Back to display 300: press F5.

Formula R5 uses raw measurement results from detector D5. Set the required coefficients in the fields.

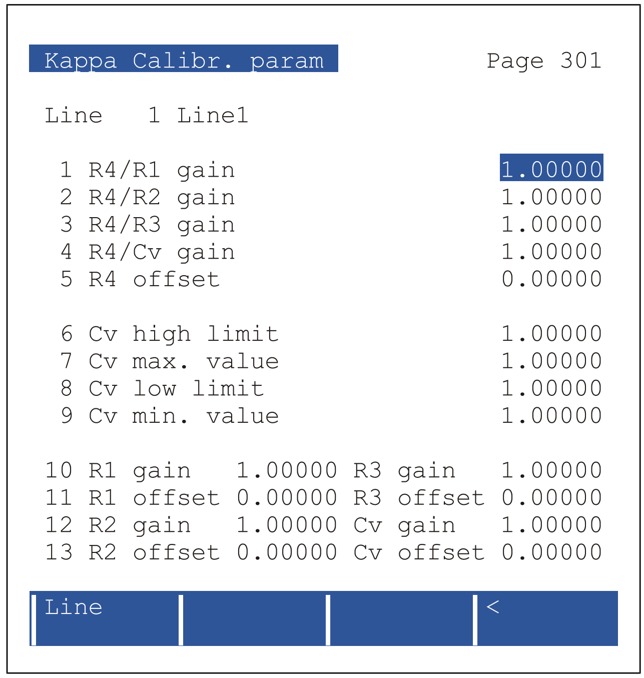


Fig. 7. Calibration coefficients for formula R4.

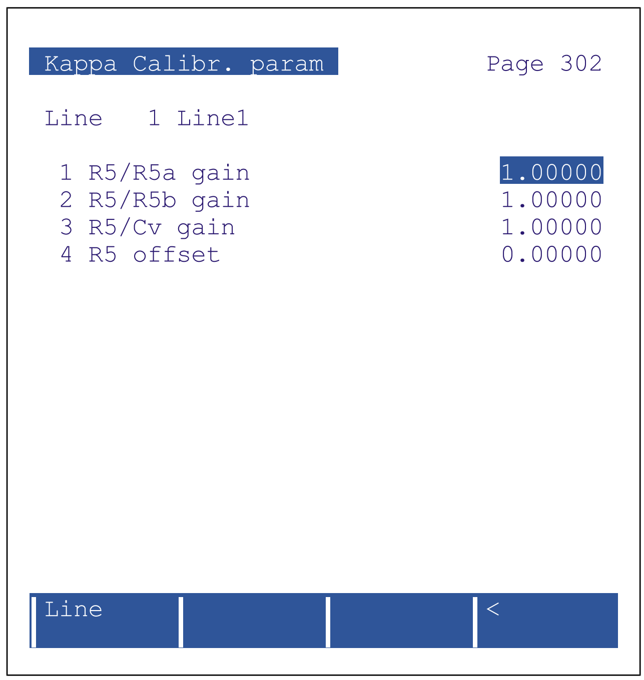


Fig. 8. Calibration coefficients for formula R5.

5.8. Brightness parameters

Select "Calibr" -› "Brightness parameters" (Fig. 9). The following parameters are set here:

Brightn. Cs 1 - 3: Consistencies at which the brightness results will be calculated.

Brightn. HW Calibr. no.: Calibration model to be used when calculating the brightness for hardwood pulps.

Brightn. SW Calibr. no.: Calibration model to be used when calculating the brightness for softwood pulps.

Brightn. Cs compensation: Choose if consistency compensation will be used in brightness measurement or not (on/off).

Det7 HW gain: Calculated gain for hardwood in consistency compensation measurement (the software calculates this value automatically).

Det7 HW offset: Calculated offset for hardwood in consistency compensation measurement.

Det7 SW gain: Calculated gain for softwood in consistency compensation measurement.

Det7 SW offset: Calculated offset for softwood in consistency compensation measurement.

Next meas. Cs compensation: Setting 1 means that the next measurement will be compensation. After the measurement the software will calculate compensation coefficients to lines 8 & 9 or 10 & 11, depending on the grade.

In the "Brightn. calibr. par." display, press "Models" [F8] for the next page. On this page (Fig. 10) you can set the gain and offfset values for HW and SW models 1 - 5 in each line.

Cs: Select the Brightness calculation consistency Cs 1 - 5 for each model.

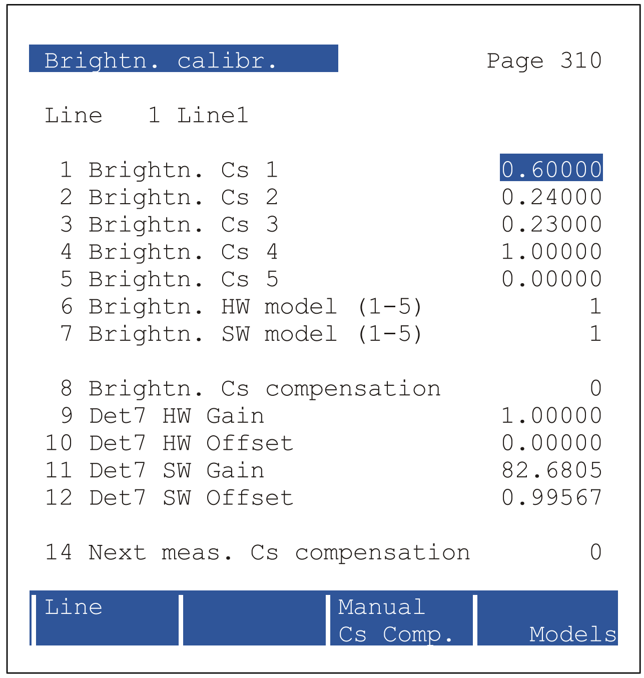


Fig. 9. Brightness parameters, first display.

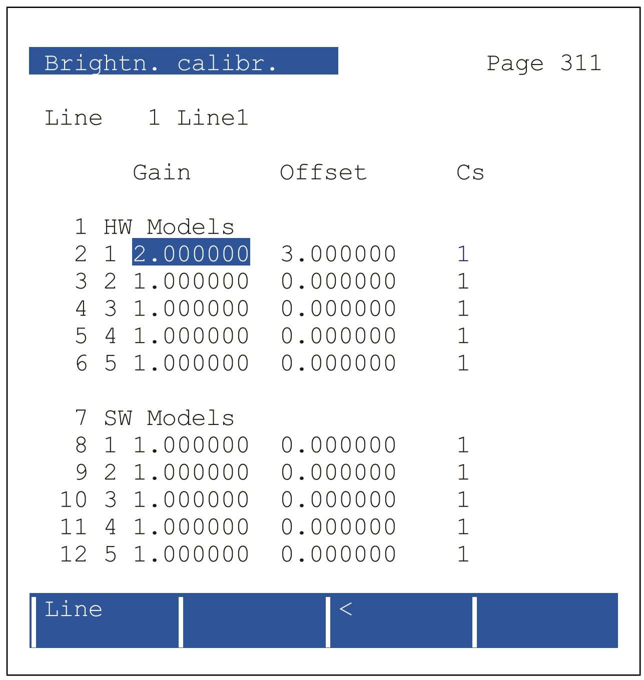


Fig. 10. Brightness parameters, second display.

5.9. Follow-up samples

Take follow-up samples by using the buttons located on the top left corner of analyzer's front panel (Fig. 11):

1. Empty all sample cups and press the MODE button. The Valmet Flexi's display will read "All cups empty".
2. Select line by pressing the LINE button. Each time when the button is pressed, the counter value increases by one.
3. Then press both buttons down for a few seconds. The Valmet Flexi display reads: "Collecting, line X". A specific sample cup is reserved for each line.
4. The analyzer measures the sample and then runs a follow-up sample into sample cup for laboratory measurement. When a new result is ready, the Valmet Flexi's display will show a page with the latest results for the cups.
5. When the sample cup has been emptied, press the MODE button. The Valmet Flexi display will read "All cups empty".

Fig. 11. Sampling buttons.

5.10. Level transmitter calibration

The level transmitter has been calibrated by manufacturer. Usually re-calibration is only needed after the transmitter has been replaced or changes have been made to the measurement loop tubing.

Checking the calibration:

1. Look at the empty/full readings written on the label attached to the chamber.
2. Select "Calibr" -› "Level transmitter" -› "Calibr" -› "Meas" -› "Meas volumes".
3. Display page 341 will appear. The values "Measured max/min volume" should be the same as those on the label.
4. If there is a big difference between them, the transmitter must be re-calibrated.

Calibration:

NOTE: Make sure to drain all water from the measurement loop and pump before calibration!

1. Set the valves OFF.
2. Select "Calibr" [F5] -› "Level transmitter".
3. Write down the "Level gain" and "Level offset" values from the display (Fig. 12), and keep them in case you need to make corrections or cancel the operation. Here you can also enter the gain and offset values (if these are known).
4. Select "Calibr" [F3].
5. Press [F1] to select which transmitter you wish to calibrate (Fig. 13).
6. Pour an accurately weighed water volume (e.g. 2 kg) into the chamber, and enter the added water volume in field "Volume 1".
7. Select "Meas" [F3] -› "Meas level 1".
8. Pour an accurately weighed water volume (e.g. 2 kg) into the chamber, and enter the total water volume in field "Volume 2" (e.g. 2 kg + 1.5 kg = 3.5 kg = "Volume 2").
9. Select "Meas" [F3] -› "Meas level 2".
10. Select "Calc" [F5], and the software will calculate the gain and offset. Select "Save" [F7] to start using the calculated values.
11. Select "Meas" [F3] -› "Meas volumes".
12. Go to menu "Config" [F3] -› "Analyzer parameters". To make sure that the level transmitter remains within its operating range, change the obtained values slightly: deduct 5% from the obtained "Measured max volume" and enter the result in field 6 "Volume max". In the same way, add 5% to the obtained "Measured min volume" and enter the result in field 7 "Volume min".
13. Press Save [F7] to save the changes.

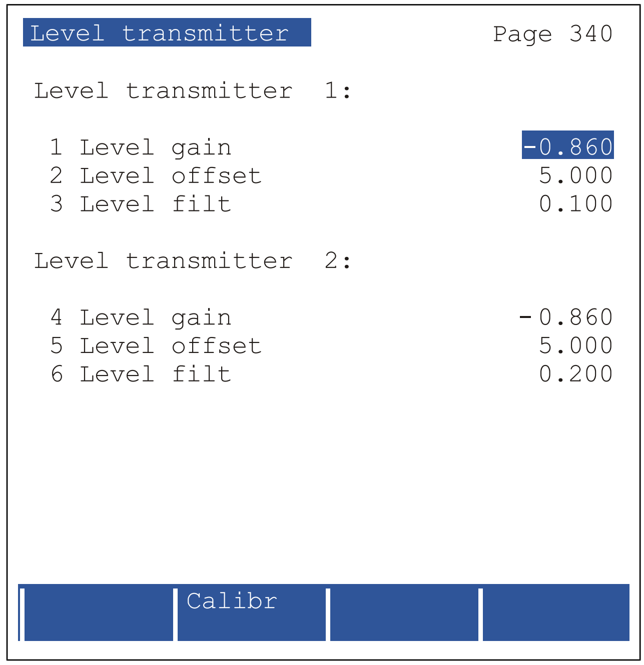


Fig. 12. Level transmitter calibration, display 1.

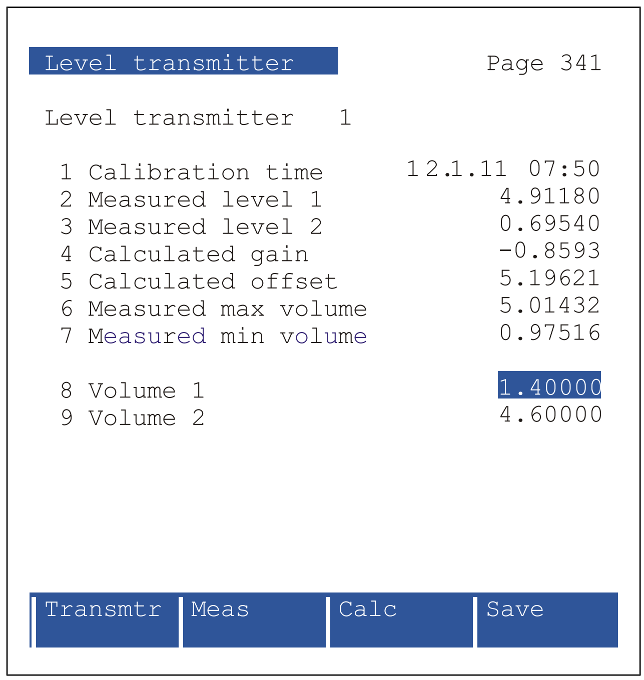


Fig. 13. Level transmitter calibration, display 2.

6. Laboratory sampling

6.1. Operation of sample collector

The laboratory sample collector is located inside the analyzer cabinet, on its rear side. The collector has room for up to five sample vessels. When looking at the device from behind, the vessels are numbered from right to left, 1 - 5.

Brightness samples are collected in plastic bottles. Wash the bottles carefully after every use.

Kappa samples are collected in a special filtering vessel. Extra water is filtered out through holes in the bottom of the vessel and collected in the vat below the analyzer. The construction of a kappa sample vessel is shown in Fig. 1. Fig. 2 illustrates how the sample is extracted from the vessel.

When the kappa sample is in the vessel, proceed as shown in Fig. 2:

- Detach sample vessel from collector.
- Unscrew the filter part (B).
- Carefully pull the filter part out; sample remains in the vessel (C).
- Pour the sample into a laboratory vessel; shake the collector can or apply water to get all of the sample out.
- Wash both the filter and the vessel carefully.
- Insert the filter into the vessel and screw it tight.
- Place the sample vessel back in the collector.

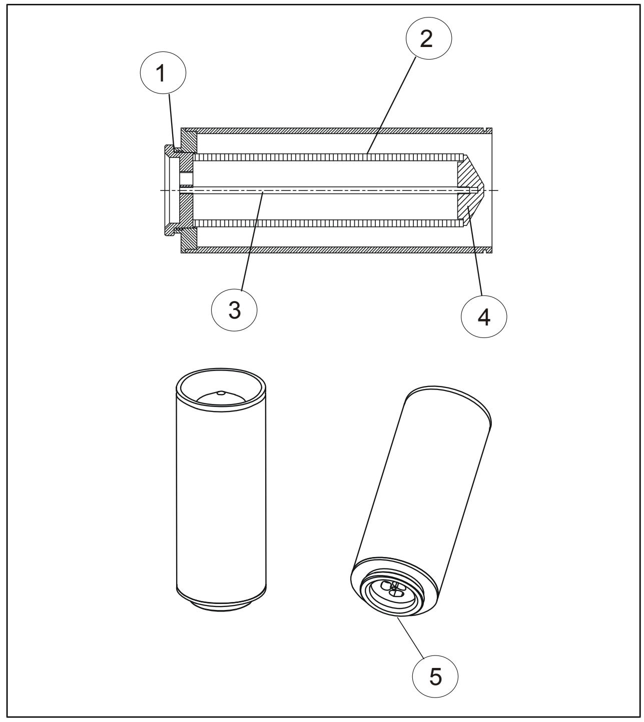


Fig. 1. Construction of kappa sample vessel: 1 - filter core, 2 - filter (body + fabric), 3 - screw rod, 4 - filter cap, 5 - filter core.

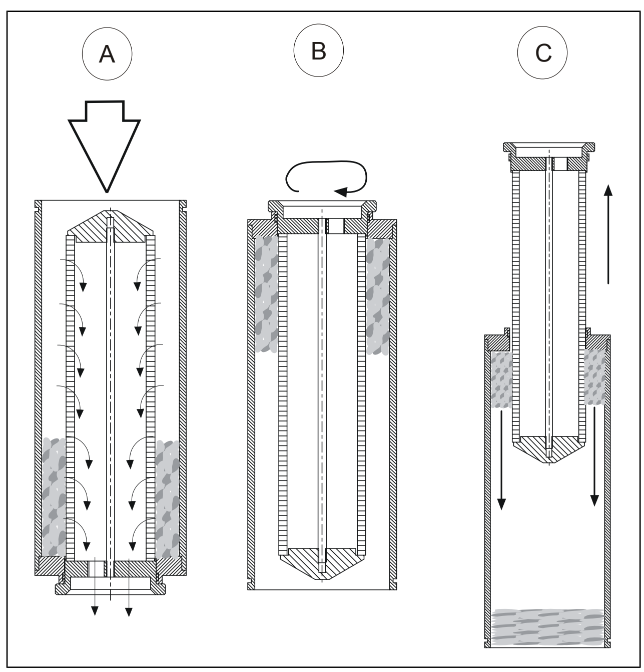


Fig. 2. Principle of kappa sampling (A), and extracting a kappa sample (B & C).

6.2. Sample collector settings

The sample collector is located inside the analyzer cabinet, on its rear side. It is used to automatically collect samples for the mill laboratory. This is done by giving the correct parameters in "Calibr" -› "Sample collection" (Fig. 3).

To view the meausurement results for each collected sample, press F2 "Results".

Sample cup no. Number of sample vessel.

Status (full=on): Indicates whether the selected sample cup is full or empty.

Line No: Number of sample line.

Sample number: Running number.

Sampling time: When the sample was taken from process.

Kappa / Brightness / Cv: Analyzer's measurement results for the sample.

R1 - R5 Kappa / Brightn: Kappa and brightness results measured for the sample with calculation models 1 - 5.

Kappa/Brightn. lab. result: Enter here Kappa and brightness laboratory values.

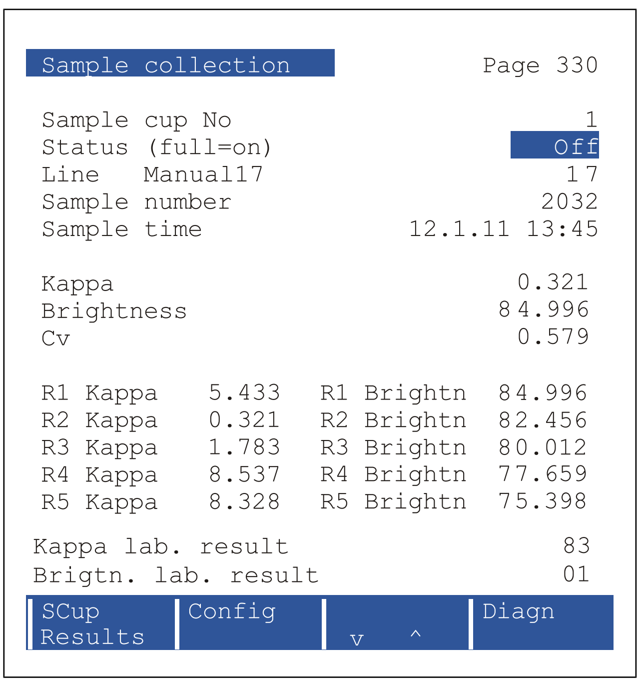


Fig. 3. Sample collection.

6.3. Sample collection with timer

Parameters for automatically timed sampling are set in the display "Sample collection" -› "Config" -› "Timer" (Fig. 4). Choose the line and the number of sample cup. After this the sample collection can also be started manually [F3].

Collection timer: Timing activated/not activated. This field must be set ON when the timer is used. The actual timer settings are given with the following fields.

Repeated collect (0=off): Set the required time, in minutes. This means that the device will collect a new sample at the set intervals.

Every day mode / Weekly mode: To activate, set the required field ON. Choose one of the alternatives.

Collection time: Set here the required sampling times. The analyzer will then repeat sampling at the set times, either once a day or once a week, as selected. When setting the time, you can use period (.) instead of colon (:).

Fig. 4. Timed sample collection, parameters.

Setting "Trigger" [F7] means that sample collection is activated if the measurement result for the sample is outside the limits set in the display. When triggering is activated, the device holds the sample inside until the results have been calculated. If the obtained kappa or brightness results is outside the set limits, a lab. sample is collected.

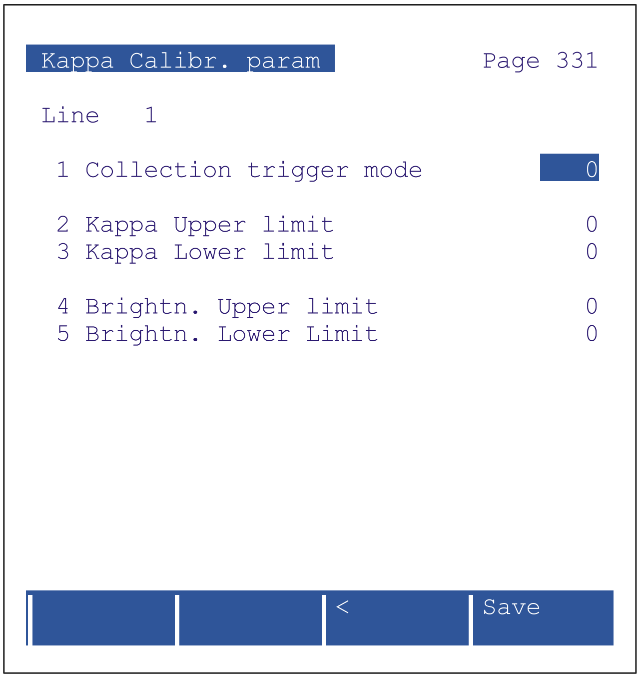


Fig. 5. Sample collection, trigger.

6.4. Sample collection control

Set the sample collection parameters on the page "Calibr" -› "Sample collection" -› "Config" -› "Manual control" (Fig. 6).

Collection: Set sample collection on/off for the selected line.

SC: Number of sample cup.

Status: Status of sample cup, full (on) or empty (off).

To clear the results in the popup menu page select [F1] "Clear Popup"

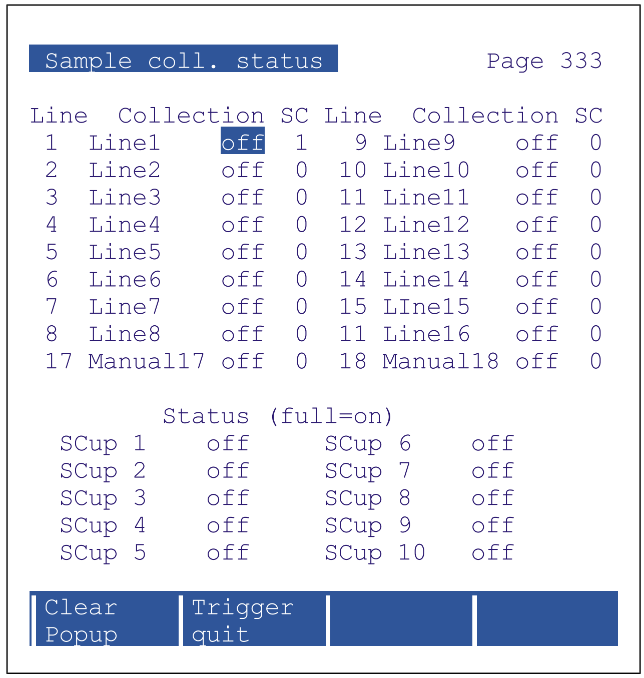


Fig. 6. Sample collection control.

6.5. SCup type

On the page "Calibr" -› "Sample collection" -› "Config" -› "SCup type" you can set the type of sample cup to be used for each line (Fig. 7).

Choose the type according to what samples are collected. Kappa = on, brightness = off.

Brite sample vol: Set the required sample volume, as liters (1 L = 0.26 US gal). The volume of a brightness sample cup is 5 L (1.3 US gal).

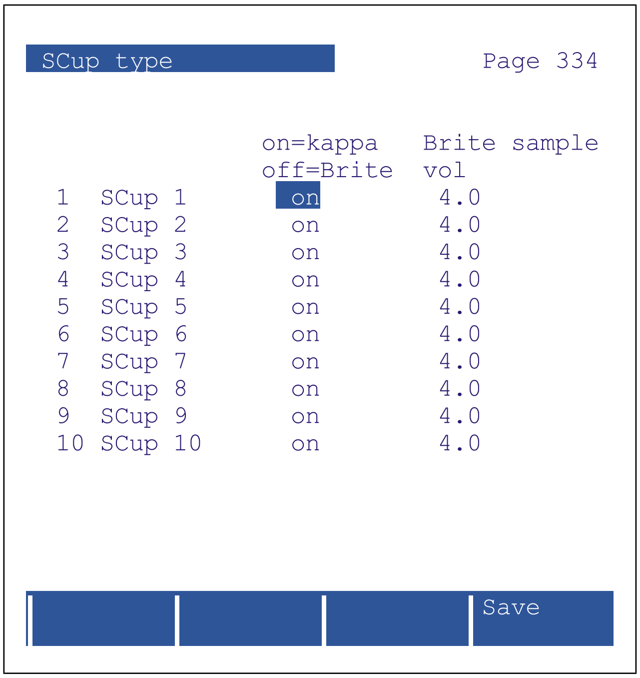


Fig. 7. Sample collection, SCup type.

6.6. Sample collection diagnostics

Sample collector operation can be tested in this display ("Calibr" -› "Sample collection" -› "Diagn", Fig. 7). Choose the sample cup number and press "Sel cup" [F1]. The collector slider should move to the selected cup.

Pay attention to sample cup numbering: cups 1 - 5 = cabinet 1, cups 6 - 10 = cabinet 2 (option).

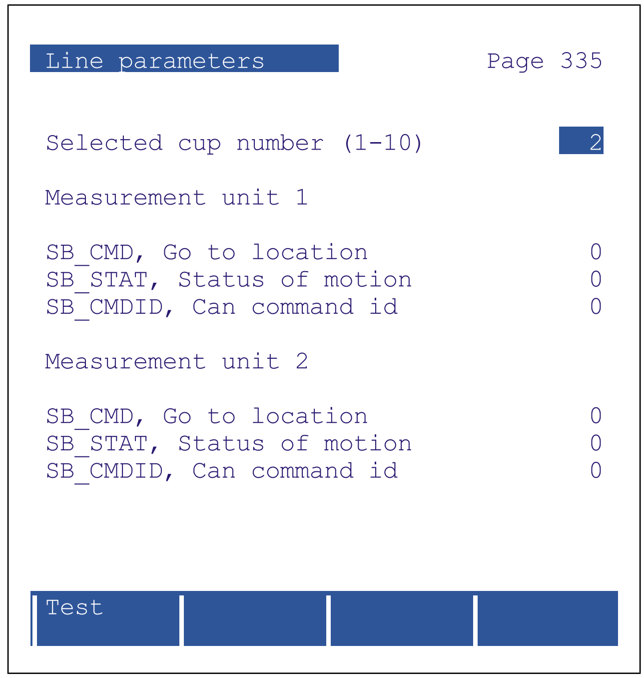


Fig. 8. Sample collection, diagnostics.

7. Results

The main display always shows the latest measurement result, grade, and sampler status. To see the results in more detail, press "Results" [F1] and then select which results you want to view:

- All results
- Line results
- Primary results
- Shive module (see section Fiber-Shive module, option).

All results Page 140

Line		Kappa	Brightness	Cv
1	Line1	33.45	168.3	0.000
2	Line2	5.330	63.08	0.000
3	Line3	0	0.000	0.000
4	Line4	0	0.000	0.000
5	Line5	0	0.000	0.000
6	Line6	5.000	0.000	0.000
7	Line7	0	0.000	1.000
8	Line8	0	0.000	1.000
9	Line9	5.330	82.68	0.000
10	Line10	0	0.000	1.000
11	Line11	0	0.000	0.000
12	Line12	0	0.000	0.000
13	Line13	0	0.000	0.000
14	Line14	0	0.000	1.000
15	LIne15	0	0.000	1.000
16	Line16	0	0.000	1.000
17	Manual17	0	0.000	1.000
18	Manual18	0	0.000	0.000

Fig. 1. All results.

7.1. All results

This display (Fig. 1) shows the latest result from each of the analyzer's lines: date, time, and the results of the measurements selected for the line in question.

7.2. Line results / Kappa

Kappa: Kappa measurement result, calculated from the selected "raw kappa" data with the selected calibration coefficients.

Water value: The result of the latest water measurement.

Cv: Coefficient of variation.

HW/SW: HW/SW-ratio of the sample [%]. If scaling coefficients have not been configured, this value = CV.

Start Cs: Start point of consistency sweep.

Stop Cs: End point of consistency sweep.

Initial Cs: Sample consistency before consistency adjustment.

Water Cs: Consistency measurement result for water.

Water temp: Temperature of hot water.

Kappa r1-r5, r5a: "Raw" kappa results with calculation models 1 - 5, and scaled kappa result R5.

CsPair1 - 3: Raw kappa results calculated by applying the different Cs point pairs, if these have been set during calibration.

Line results Page 100

Line 1 Line1
9.1.11 12:33

Sample number 165268

Kappa	0.000	Start Cs	0.000	%
Wood grade	0	Stop Cs	0.000	%
Water value	0.000	Initial Cs	0.300	%
Cv	0.000	Water Cs	0.000	%
HW/SW	12.000 %	Water temp.	-0.2	°C

	CsPair1	CsPair2	CsPair3
Kappa r1	0.000	0.000	0.000
Kappa r2	0.000	0.000	0.000
Kappa r3	0.000	0.000	0.000
Kappa r4	0.000	0.000	0.000
Kappa r5	0.000	0.000	0.000
Kappa r5a	0.000	0.000	0.000

Line | Kappa | Brightn. | v ^

Fig. 2. Kappa measurement results.

7.3. Line results / Brightness

Brightness: Brightness measurement result, calculated from the selected "raw brightness" data with the selected calibration coefficients.

Water value: Result of water measurement.

Cv: Coefficient of variation.

HW/SW: HW/SW-ratio of the sample [%]. If scaling coefficients have not been configured, this value = CV.

Start Cs: Start point of consistency sweep.

Stop Cs: End point of consistency sweep.

Initial Cs: Sample consistency before consistency adjustment.

Water Cs: Consistency measurement result for water.

Water temp: Temperature of hot water.

R1 - R3 Brightn.: "Raw" brightness results with calculation models 1 - 3.

Ax2+Bx+C correl: Correlation between measurement results and calculation model.

7.4. Primary results

These displays (Fig. 3) shows the momentary voltages of detectors D1 & D2 during the consistency sweep.

Show 1/2: Show/hide the results of the selected detector (1 = D1, 2 = D2).

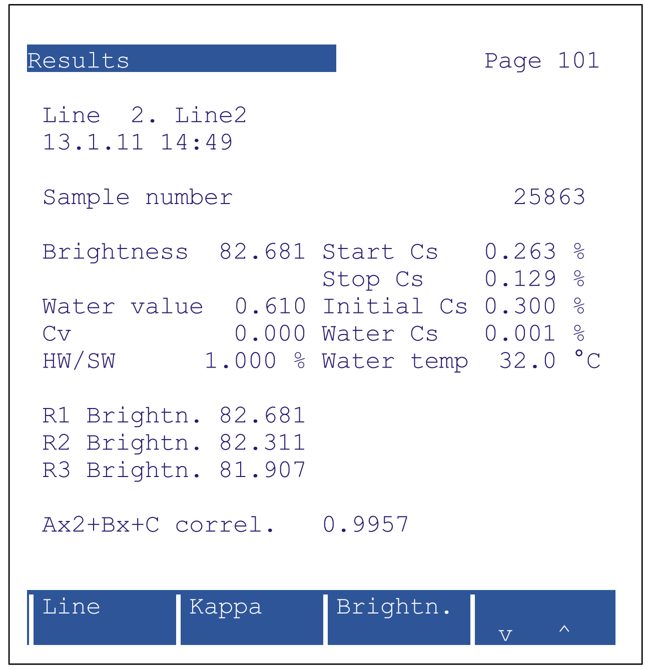


Fig. 3. Primary results.

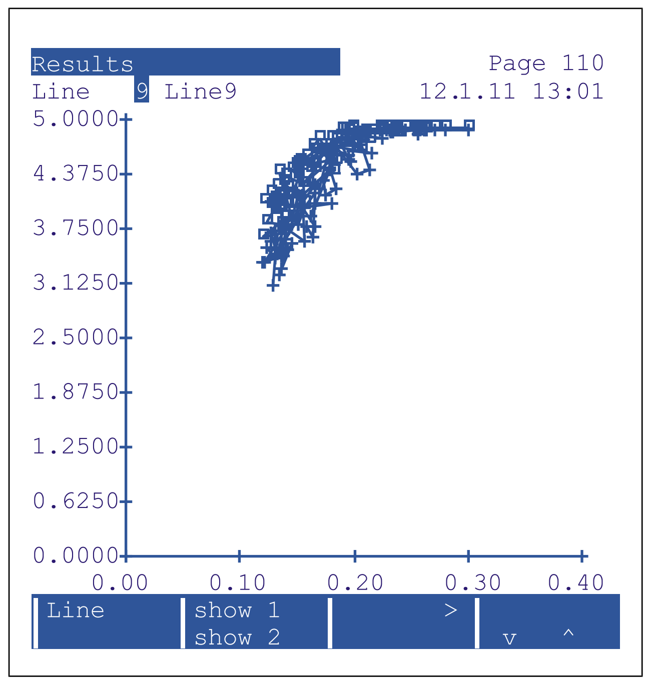


Fig. 4. Brightness results.

8. Fiber-Shive module, option

8.1. Main parts and operation

The Fiber-Shive module measures the dimensions of shives and fibers, and it also analyzes the relative number of shives in the sample.

The module can be attached to both One Cabinet and Two Cabiner analyzers. The main parts of the module are the measurement and computer unit, and the valve assembly & discharge unit (Fig. 1 & 2).

NOTE: Water circulating in the sample loop also cools the module. When the water supply to the analyzer is closed, and also when the module is set to Service mode, also the cooling flow stops. Switch off the Fiber-Shive module PC or open the module's doors to prevent PC overheating!

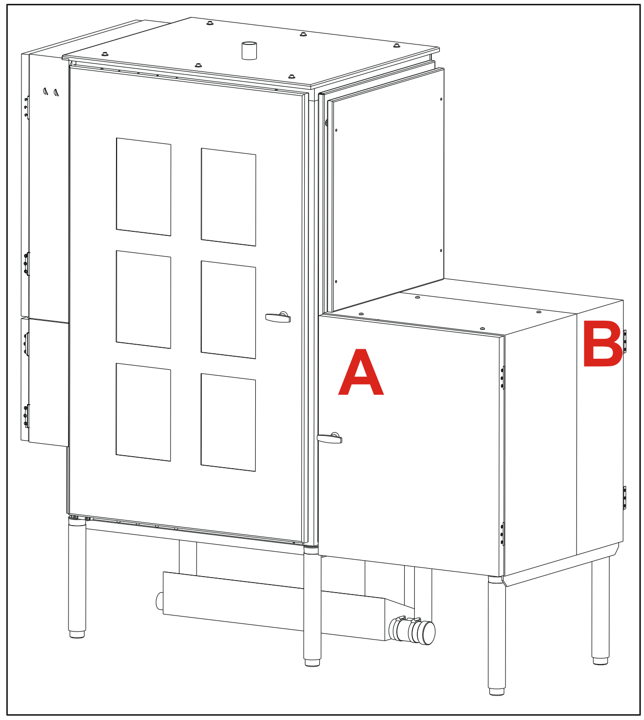


Fig. 1. One cabinet model + Fiber-Shive module. A. Sample processing side, B. Valves and discharge.

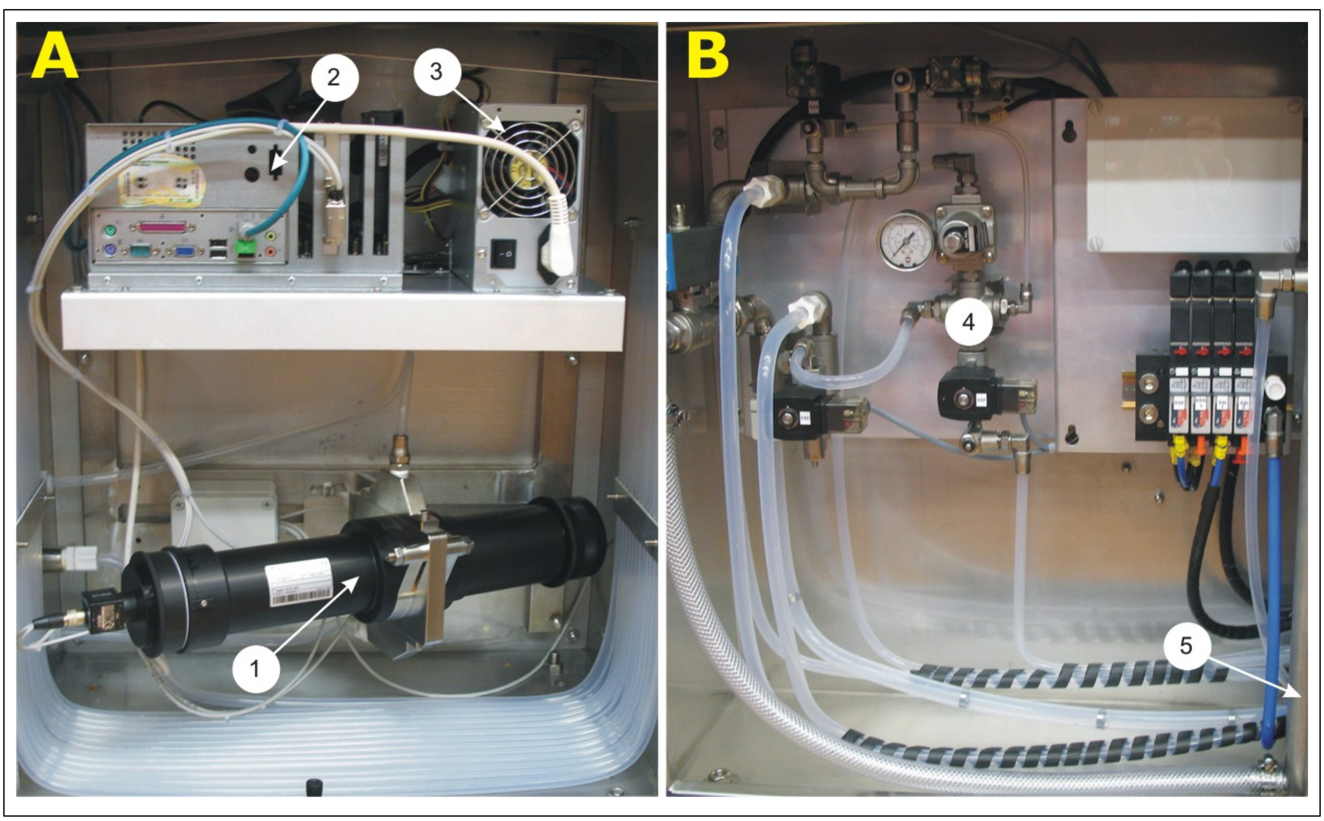


Fig. 2. Fiber-Shive module: A: 1. measurement loop, 2. computer unit, 3. module's power supply. B: 4. valve assemblies, 5. discharge.

8.2. Sequences, Fiber-Shive

The Fiber-Shive module is able to perform three different analyses: fiber-shive, shive, or fiber analysis. The Fiber-Shive sequence is divided into sub-sequences that are executed one by one, depending on the status. Its main parts are:

Background image

All valves are closed. The module checks the parameter "Background image interval" to see if it is time to take a new background image. If a new image is taken, dilution valve opens for 10 seconds before the image is captured, and closes after it.

Rinse

An analysis is always followed by flushing. The actual measuring loop flushing takes place when the next sample flows in and displaces the previous one.

Wait sample

This sequence waits for the start command; the maximum waiting time is set with parameter "Maximum sample wait". If there is no sample, the sequence adds water into the measurement loop for the first 150 seconds of the set "Maximum sample wait" time.

If a command is received within this time, the module continues with the sampling sequence. If it receives a chemical wash command, the entire sequence begins again from step Background image. If there is no command, the module waits until the "Maximum sample wait" time is up, and then starts again from step Background image.

Sample taking

The module takes 2.4 L of sample from the analyzer.

Fiber analysis

This sub-sequence is run if a fiber analysis has been selected. The fiber sample is first diluted. The module waits until the set "Fiber anal. start delay" time is up, and then starts measurement.

Shive analysis

The module performs a shive analysis, then starts again from step Background image.

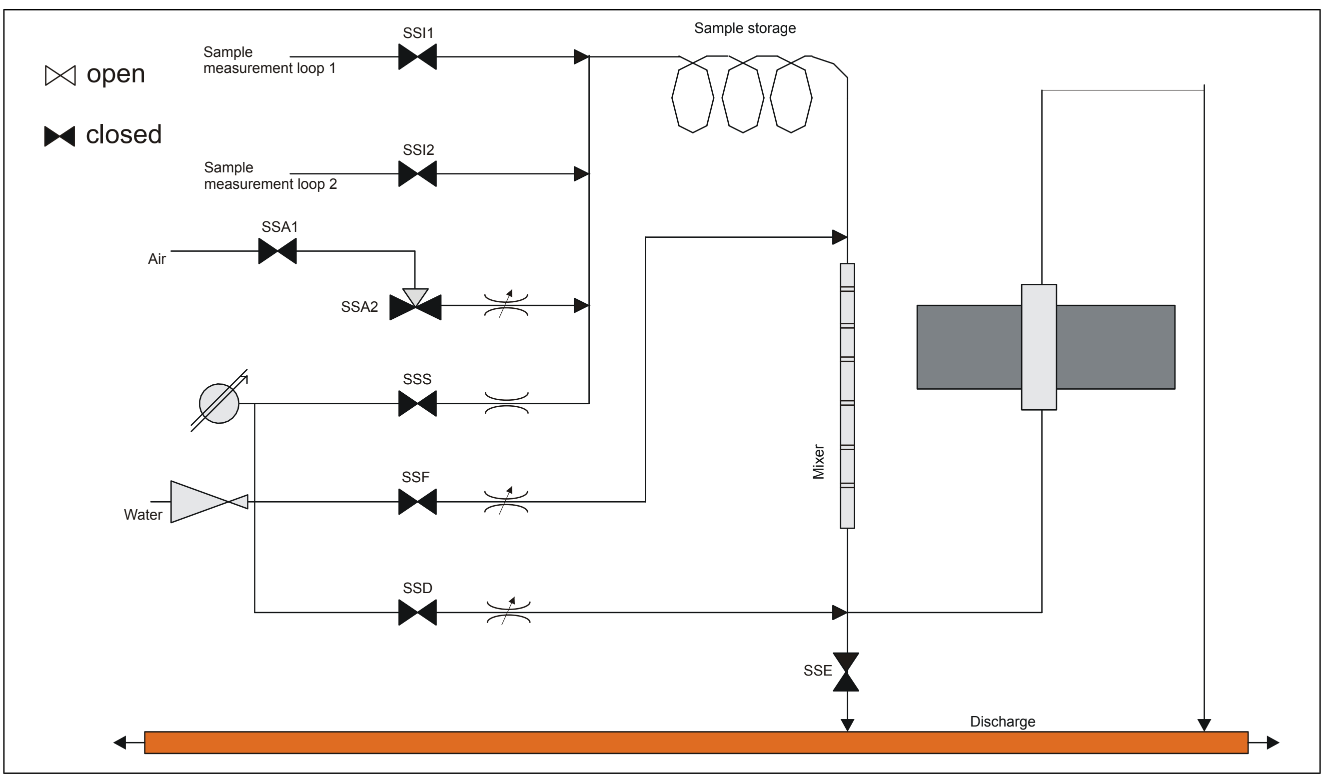


Fig. 3. Flow diagram, Fiber-Shive module.

8.3. Basic settings of valves, Fiber-Shive

Adjust the Fiber-Shive module water valves.

1. Default settings
   - SSD -› fully open.
   - SSS -› fully open.
   - SSF -› first shut the valve fully and then open it by 6 turns.
   - SSA -› first shut the valve fully and then open it by 3 turns.
2. Choose "Diagn" -› "IO-test" -› "Fiber/Shive IO". Open valves SSD and SSS. Close valve SSE. Adjust the module water regulator to 2 Bar. Turn all valves to their normal positions.
3. Start sampling, and make sure there is enough sample for the Fiber and Shive measurement (sample Cs 0.3 %, volume 3.7 Liters).
4. If necessary, adjust the Fiber-Shive consistency:
   - fiber consistency 0.0015 %,
   - shive consistency 0.017 %.

Adjusting the fiber & shive measurement consistency

– SSD closed = less water = higher consistency.
– SSD is normally fully open.

Adjusting fiber measurement consistency

– SSF open = more water = lower consistency.
– SSF closed = less water = higher consistency.
– SSF is normally turned open 6 turns.

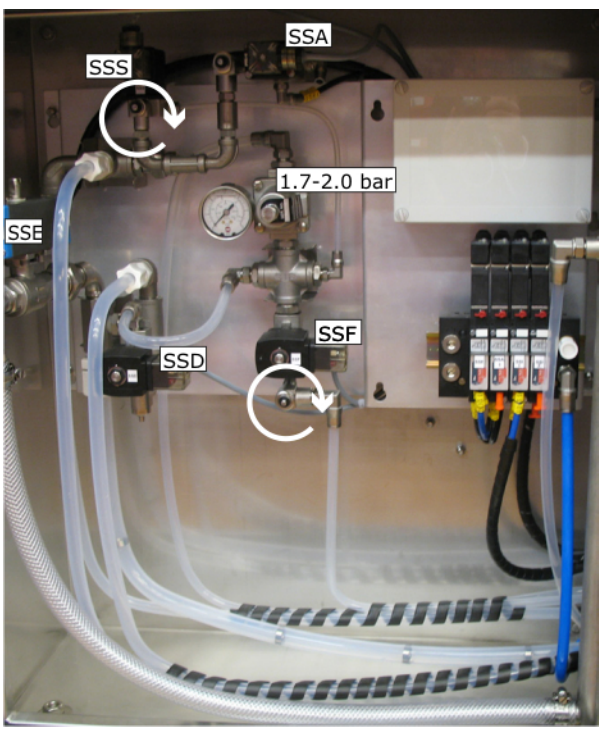


Fig. 4. Valves of the Fiber-Shive module.

8.4. Main page

On the main display, select "Results" -> "Fiber-Shive" (Fig. 5). This display page shows the measured shive percentages for each sample line. You can also enable/disable the Fiber and/or Shive measurements for each line (on/off).

Line: Name and number of sample line.

Shive %: The amount of shives in the sample, as percentage.

Lc(l) [mm]: Length-weighted fiber length.

Sh: Shive measurement on/off.

Fi: Fiber measurement on/off.

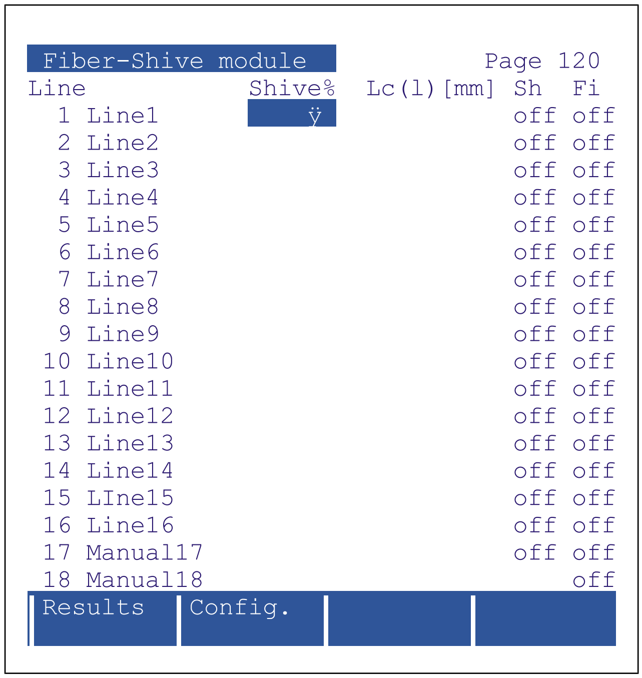


Fig. 5. Fiber-Shive, main page.

8.5. Parameters

Press "Config" in the Fiber-Shive module main display to set the parameters for fiber and shive measurements (Fig. 6, 7, 8). Press "Get defaults" [F5] to reset the parameters to their default values.

Fiber-Shive, parameters

Fiber sample predilution: This parameter determines how long valve SSF is open before fiber analysis.

Meas. cell flushing: Duration of flushing between samples.

Background picture interval: How many analyses are completed before a new background image is captured.

Fiber anal. start delay: How long the analyzer waits before starting fiber analysis.

Shive analysis time: Maximum duration of shive analysis.

Fiber analysis time: Maximum duration of fiber analysis.

Sample wait time max.: The module stops and waits for a sample. If there is no sample within this time, the module continues with rinsing (to cool the module PC).

Background pic. flushing: How long the measurement cell is flushed before a background image is captured.

Shive sample tube volume: How much sample is taken for Fiber-Shive analysis. If there available volume of ready sample is lower than this limit, analysis will not be performed and the display will read "Low sample volume".

Sample pipe time to fill: Maximum wait time for sampling and sample volume monitoring. The target volume must be reached within this time.

ShiveIP: IP-address of the module's PC.

Fiber-Shive enabled. Enable/disable (on/off) shive/fiber measurements for the selected line.

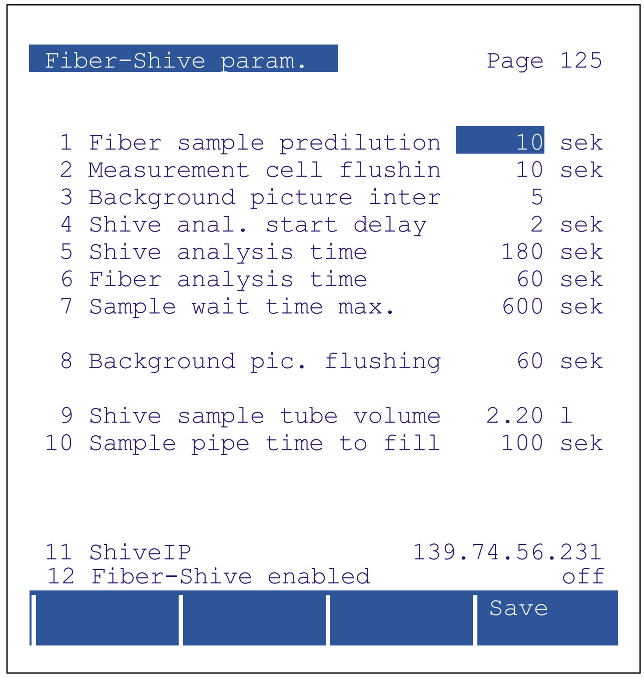


Fig. 6. Fiber-Shive parameters.

Shive line parameters

Sample line name: User-defined name.

Consistency stop limit: Limit for reduction in consistency. Example: Setting 0.5 means that measurement stops if sample consistency drops by 50% or more from the initial value.

Accuracy target: Target accuracy of shive measurement, percentage. Measurement stops when the uncertainty of the result is below the set limit. Example: setting 7 % = measurement result is correct with 93% certainty.

Min. shive width: Minimum width limit.Objects larger than this will be considered shives.

Shive length limit: Minimum length of shives. Objects longer than this will be considered shives.

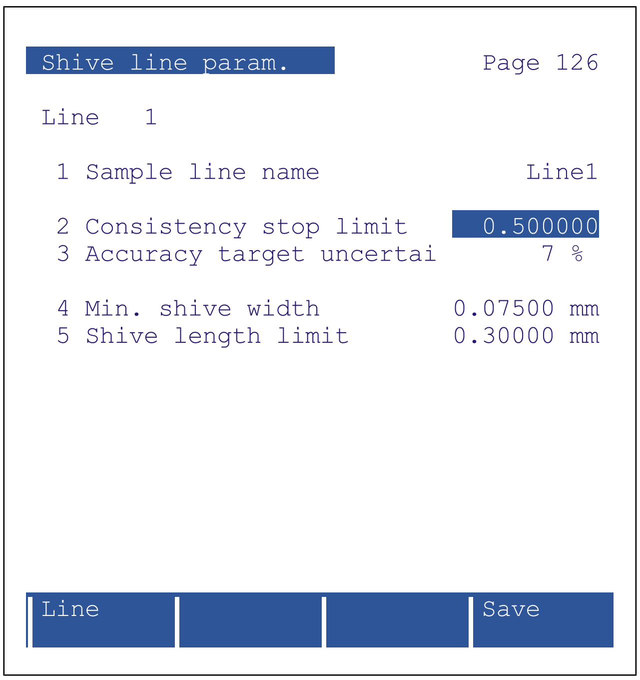


Fig. 7. Shive line parameters.

Fiber line parameters

Sample line name: User-defined name.

Min. object width: Minimum width of objects regarded as shives.

Min. object area: Size of the smallest object to be detected.

Remove short: What proportion (percentage) of zero-length particles will be omitted from the results. This parameter can be used when the measurement results must be comparable with results from other devices using a different measurement principle.

Remove short, limit: Fiber length limit, fibers longer than this limit will be included in the results (= fines removal percentage = 0).

Consistency stop limit: This setting determines the consistency level where fiber measurement will stop if consistency increases. Default value is 1.3. When this setting is lower the Cs stop limit is also lower, and vice versa.

Consistency set value: Sample is diluted to this consistency before it is delivered to the Fiber-Shive module. This value can now be edited.

Consistency hysteresis: Accepted accuracy when checking/adjusting consistency.

Consistency low limit 1: Incoming sample consistency must be above this limit when

– only Fiber+Shive is measured from the sample, or
– Fiber-Shive is measured before Kappa and/or Brightness measurement(s).

If incoming sample consistency is lower than this, the device will proceed to consistency adjustment but only Kappa and/or Brightness measurement will be performed, as there is not enough sample to complete all measurements.

Consistency low limit 2: As parameter 9, but this low limit is applied when Fiber+Shive will be measured after Kappa and/or Brightness measurement(s).

```
Fiber line param.                  Page 127

Line    1

 1 Sample line name                  Line1

 2 Min. object width         0.01000 mm
 3 Min. object area              100 um2

 4 Remove short              0.00000 %
 5 Remove short, limit       0.50000 mm

 6 Consistency stop limit    1.30000
 7 Consistency set value       0.300
 8 Consistency hysteresis      0.010
 9 Consistency low limit 1     0.370
10 Consistency low limit 2     0.280

Line                          Save
```

Fig. 8. Fiber line parameters.

8.6. Fiber-Shive classes

Set in this display (Fig. 9) the limits for the matrix displays.

Shive matrix width: Limits for the width classes of the shive matrix.

Shive matrix length: Limits for the length classes of the shive matrix.

Fiber fractions: Defines the classes into which the measured fibers are classified.

```
Fiber-Shive classes                Page 128

 1  Shive matrix width 0           1.000
 2  Shive matrix width 1           2.000
 3  Shive matrix width 2           3.000
 4  Shive matrix width 3           4.000
 5  Shive matrix width 4           5.000
 6  Shive matrix lenght 0          6.000
 7  Shive matrix lenght 1          7.000
 8  Shive matrix lenght 2          8.000
 9  Shive matrix lenght 3          9.000
10  Shive matrix lenght 4         10.000

11 Fiber fractions 0               0.000
12 Fiber fractions 1               0.200
13 Fiber fractions 2               0.500
14 Fiber fractions 3               1.200
15 Fiber fractions 4               2.000
16 Fiber fractions 5               3.200
17 Fiber fractions 6               7.600

                                Save
```

Fig. 9. Fiber-Shive classes.

8.7. Results

Click "Results" in the Fiber-Shive main display to see the results: Shive measurements, Fiber measurements, or Shive matrix.

Shive measurements

Sample Number: Number of sample.

Shive cons: Average consistency during shive analysis.

Image count: How many images were analyzed.

Analyzed pulp, mg: Estimated dry weight of the analyzed pulp sample.

Shive %: Shives as percentage of the analyzed sample (object length 0.3 - 40.0 mm, width 75 - 2000 µm).

Wide shives (%): Wide shives as percentage of the analyzed sample (object length 0.3 - 40.0 mm, width 150 - 2000 µm).

Shives, n/g: The number of shives per gram of (dry) pulp (object length 0.3 - 40.0 mm, width 75 - 2000 µm).

Wide shives, n/g: The number of large shives per gram of (dry) pulp (object length 0.3 - 40.0 mm, width 150 - 2000 µm).

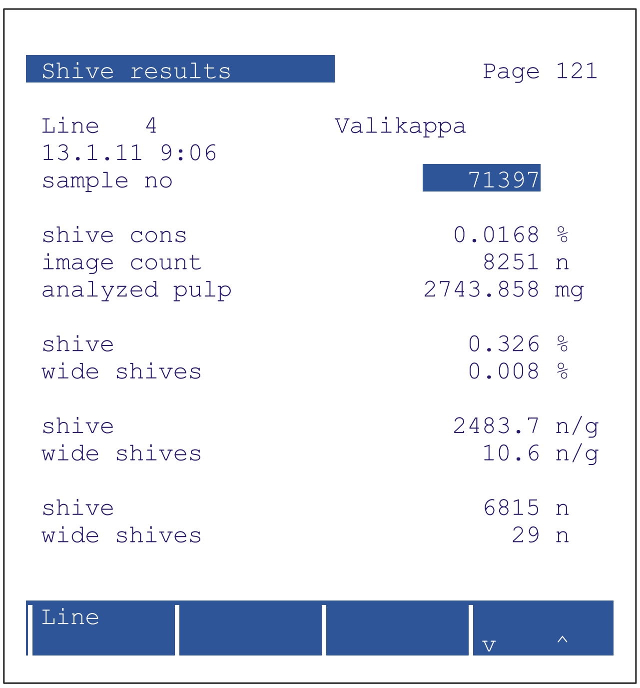


Fig. 10. Shive measurement results.

Shives, n: Number of shives in the analyzed sample.

Wide shives, n: Number of large shives in the analyzed sample.

Fiber measurement results

Sample Number: Number of sample.

Image count: How many images were analyzed.

Fines A: The amount of dust-like fines in the sample (length 0.0 - 0.2 mm).

Fines B: The amount of lamella-shaped fines (length 0.2 - 7.0 mm, width < 10 µm).

Lc (n) ISO: Arithmetic average fiber length (ISO 0.2 - 7.0 mm).

Lc (l) ISO: Length-weighted average fiber length (ISO 0.2 - 7.0 mm).

Lc (w) ISO: Weight-weighted average fiber length (ISO 0.2 - 7.0 mm).

Fiber cons: Average consistency during fiber analysis.

Width: Length-weighted average fiber width (fiber length 0.2 - 7.0 and width > 10 µm).

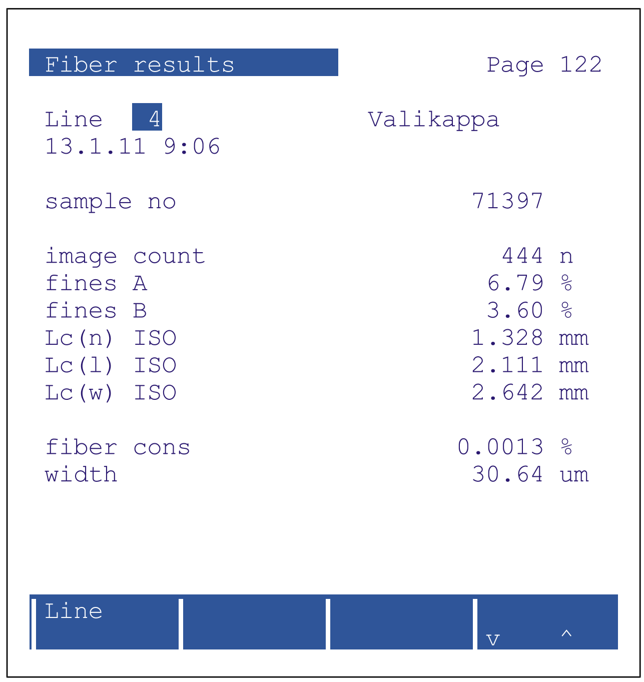


Fig. 11. Fiber measurement results.

Shive results can be viewed as a matrix, either with the number of shives per gram of sample, or as a percentage. Select the required line and matrix format from the menu.

Class limits for the matrix are set on page Fiber-Shive classes (display 128).

Shive matrix

Length [mm]: Minimum and maximum length of shives in each category.

Width [mm]: Minimum and maximum width of shives in each category.

Length & width class field: Number of shives per gram of analyzed solids.

Count/g matrix

Press [F1] "Line" to view the results for the required line. Press [F7] to see the Count/g matrix. The length and width fields show the number shives in each category, as percentages of analyzed solids.

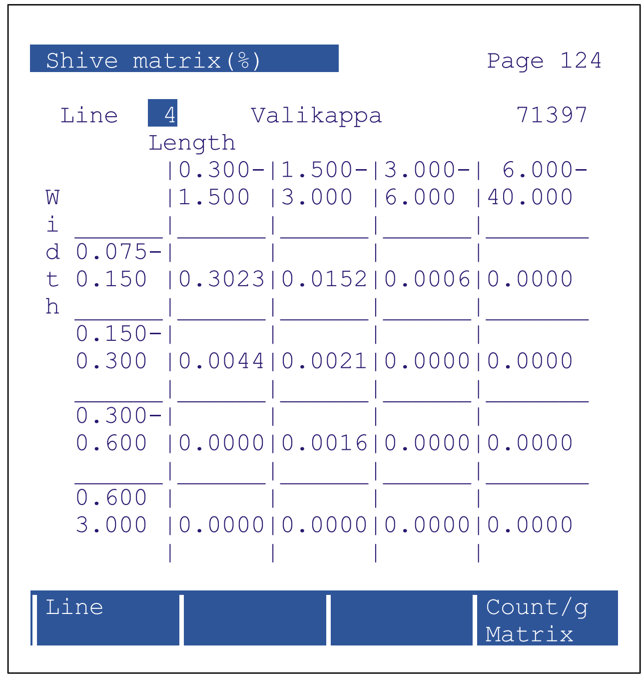


Fig. 12. Shive matrix display.

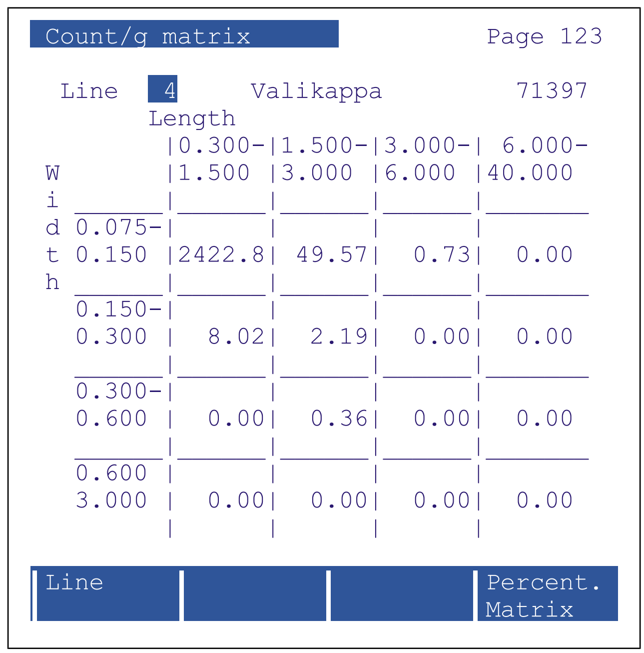


Fig. 13. Count/g matrix (number of shives per gram of pulp).

9. Operating sequences

9.1. Sequences

When the analyzer is switched on, it always begins operation with a wash. Washing starts when the water and air pressures are OK. Kappa measurement uses chemically purified water, Brightness measurement requires deionized water.

The analyzer may contain only a washing chamber (Single Chamber model), or a separate washing chamber and Sweep chamber (Dual Chamber model). In a Single Chamber model, the entire sequence takes place in the washing chamber. A new sample is taken when the previous sample has been discharged. With a Dual Chamber model the measurement frequency is higher: a new sample is already waiting in the washing chamber when the previous one is discharged from the Sweep chamber.

The duration of the sequence is dependent on the selected measurements, the number of sample washes, and the time required to transfer the sample from sampler to analyzer (= length of sample lines).

Sampling, sample transfer, prescreening

A sampler takes a process sample from the pipeline, and transfers it to the analyzer. Water is added to aid the passage of the sample in the sample line.

The added water is first discharged from the sample line into the drain. If necessary, the sample is stopped to wait until the previous sample has been prepared for measurement, and it then flows into the washing chamber. In prescreening, large shives and pieces of wood are removed from the sample with a coarse screen.

Sample transfer ends when the set time is up or when the level sensor is activated.

Filtering

The filtering method is configured separately for each line:

- 1 = use the sequence table
- 2 = drain water through the bottom wire until the set time is up

Sample washing

During sample washes the washing chamber is pressurized.

The samples may be washed using hot and/or cold/deionized water. Washing water is removed by using pressurized air. The washing sequence, and the number of hot water washes, are dependent on the selected measurements. They must be configured individually for each line.

Sample transfer, washing chamber wash

In a Dual Chamber model, the washed sample is transferred to the Sweep chamber and the washing chamber is washed before the next sample is taken in.

Sample mixing

Water is added to the dry sample on the wire screen, and the sample is mixed with pressurized air until all fiber bundles have broken up.

Measuring initial consistency

Adjustment of the Sweep start consistency:

- if the initial consistency of the sample is higher than Sweep start Cs -› rough Cs adjustment
- if the initial consistency of the sample is at least 90% of the Sweep start Cs -› consistency is accepted
- if the initial consistency of the sample is less than 90% of the Sweep start Cs -› no kappa/brightness measurement; analyzer dilutes the sample to the end Cs, performs Cv-measurement and gives an error message.

Sweep measurement

Before measurement the measurement loop is pressurized to dissolve any air bubbles in the sample. The chamber and discharge chamber are also pressurized.

Sweep measurement begins at the set Sweep start Cs. Water is continuously added to the sample during measurement. Overpressure is released through a safety valve.

If the end Cs cannot be reached during measurement, the analyzer gives an error message.

HW/SW measurement

At the end of the consistency sweep, the analyzer measures the HW/SW ratio of the sample (Cv-measurement).

Analyzer washing

After the measurements, the sample is discharged and the analyzer washes the Sweep chamber and the measurement loop. The number of washes can be selected in configuration.

In a Single Chamber model (= sample preparation and measurement in the same chamber), the washing chamber is washed at this stage.

Water value measurement

The analyzer pressurizes the measurement loop again and measures the values for water. These values reflect the cleanliness of the measurement loop and the water used in measurement, and they are used for self-diagnostics.

Analyzer's flow chart is shown in Fig. 2 (Single Chamber) and Fig. 3 (Dual Chamber).

IO-controls of the Sweep chamber and washing chamber, Fig. 2 & 3:

- 01_SCP Screening pressure
- 02_WCP Wash. chamber pressure
- 03_PUW Pressure under wire
- 04_BLR Blockage removal
- 05_SLV Sample line valve
- 06_SLD Sample line draining
- 07_LAB Laboratory sample valve
- 08_DCH Discharge
- 09_SLP Sample line pressure
- 10_UDR Upper draining
- 11_WRS Water removal to side
- 12_WRW Water removal through wire
- 13_SCW Screening water
- 14_EJC Ejector
- 15_CHW Wash. chemical
- 16_WOW Water on the wire
- 17_WUW Water under the wire
- 18_LFL Meas. loop flushing
- 19_WMW Warm water
- 20_SLW Sample line water
- 22_EXV Exchange valve (= sample from wash. chamber to Sweep chamber)
- 23_EXF Exchange line flush
- 24_SVF Safety valve flush
- 25_BOV Bottom valve (Sweep chamber)
- 26_UDC Upper discharge (Sweep chamber)
- 27_MXA Mixing air (Sweep chamber)
- 28_WIW Wire washing (Sweep chamber)
- 29_WIV Wire valve (Sweep chamber)
- 30_MCP Sweep module pressure
- 31_PMP Pump
- 32_PSP Pump speed
- 33_CLG Chamber light
- 34_WLG Work light
- 35_ LAL Lab. collector control, left
- 36_ LAR Lab. collector control, right
- 37_NTR Neutralization valve

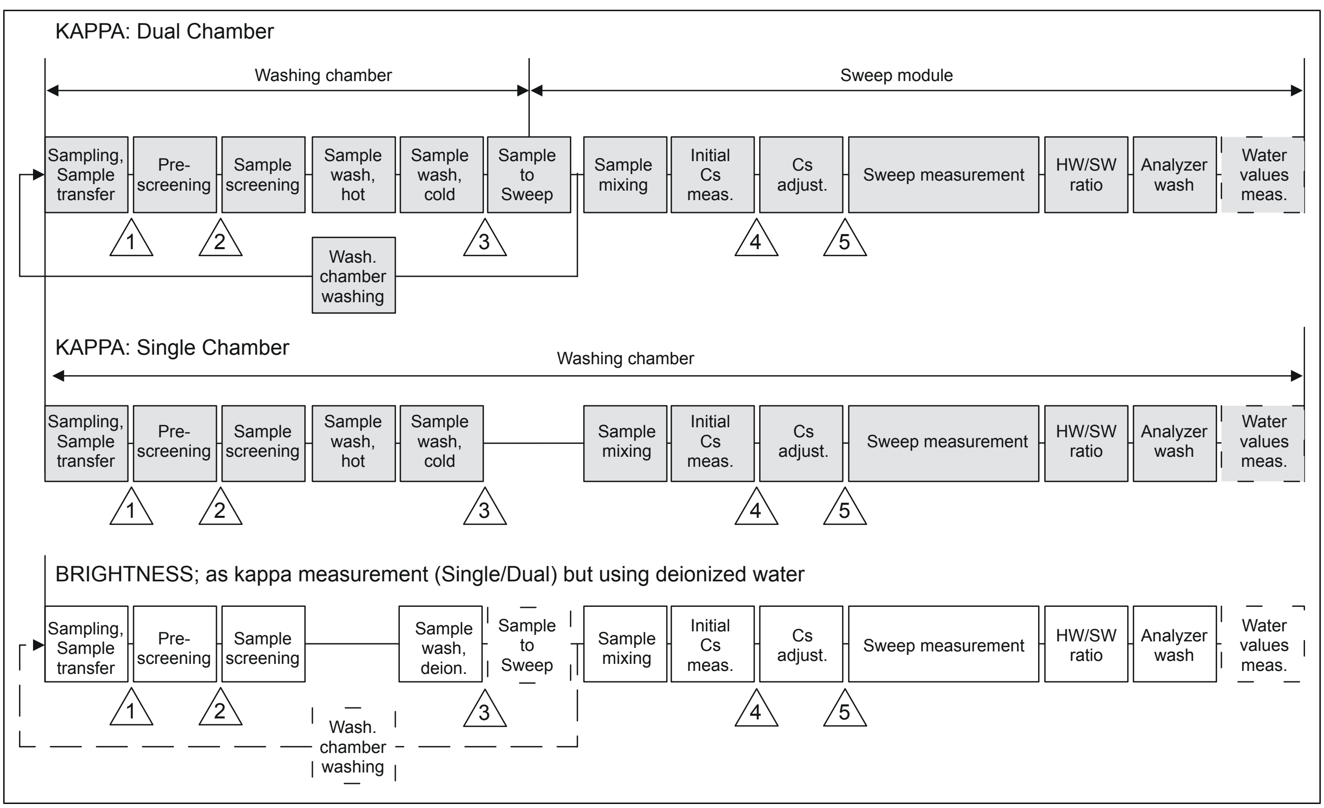


Fig. 1. Operating sequences. The numbers 1 - 5 in the picture indicate sequence breaks set in the Sequence test display.

9.2. Flow diagrams

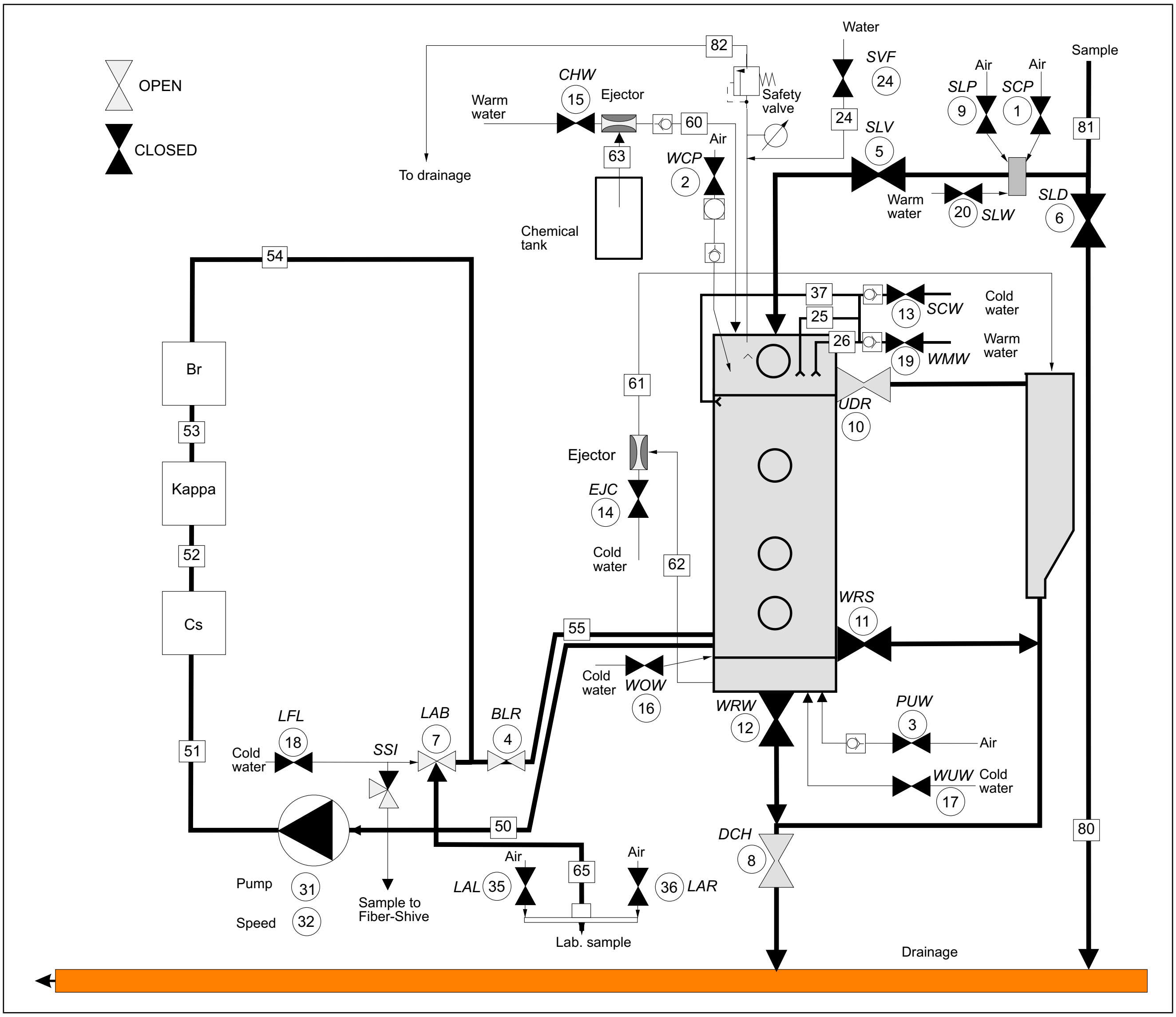


Fig. 2. Flow diagram, Single Chamber model.

Tube	Mater.	Diam.	Color	Length (mm)
24	FEP	8/6	Transparent	
37	FEP	8/6	Transparent	530
25	FEP	8/6	Transparent	420
25A	PA	6/4	Black	1415
25B	PA	6/4	Blue	1400
26	FEP	8/6	Transparent	450
50	FEP	3/4	Transparent	285
51	FEP	1/2	Transparent	810
52	FEP	1/2	Transparent	460
53	FEP	1/2	Transparent	230
54	FEP	1/2	Transparent	550
55	FEP	1/2	Transparent	800
61	FEP	10/8	Transparent	750
62	FEP	8/6	Transparent	600
63	FEP	6/4	Transparent	2000
65	Festo PUN-H	12x2	Transparent	940
80	Tricoclair	25x36	Transparent	820
81	Tricoclair	25x36	Transparent	280
82	Tricoclair	12x18	Transparent	1600

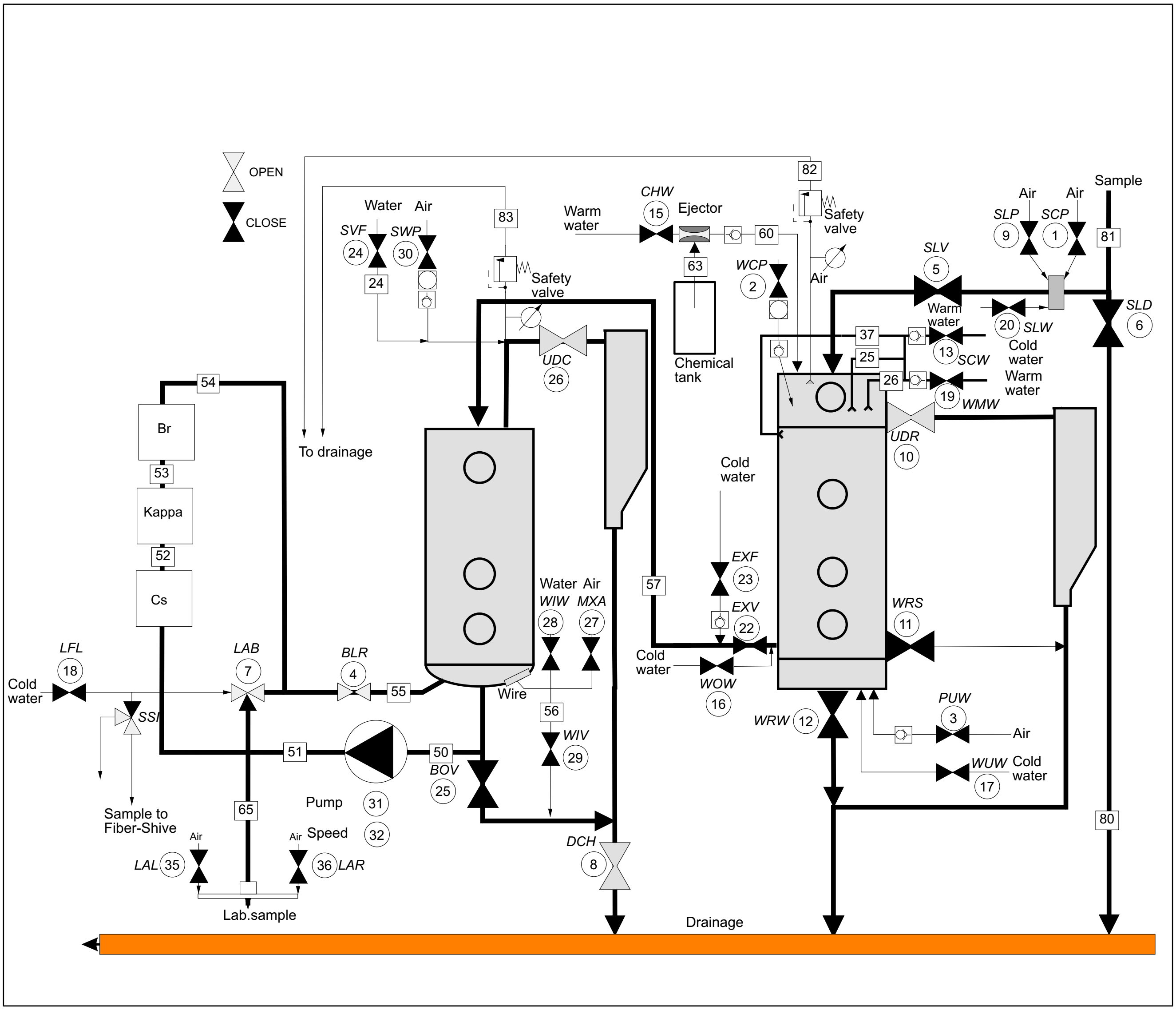


Fig. 3. Flow diagram, Dual Chamber model.

Tube	Mater.	Diam.	Color	Length (mm)
24	FEP	8/6	Transparent	
37	FEP	8/6	Transparent	530
25	FEP	8/6	Transparent	420
25A	PA	6/4	Black	1415
25B	PA	6/4	Blue	1400
26	FEP	8/6	Transparent	450
50	FEP	3/4	Transparent	285
51	FEP	1/2	Transparent	810
52	FEP	1/2	Transparent	460
53	FEP	1/2	Transparent	230
54	FEP	1/2	Transparent	550
55	FEP	1/2	Transparent	800
56	FEP	1/2	Transparent	470
57	FEP	3/4	Transparent	650
63	FEP	6/4	Transparent	2000
65	Festo PUN-H	12x2	Transparent	940
80	Tricoclair	25x36	Transparent	820
81	Tricoclair	25x36	Transparent	280
82	Tricoclair	12x18	Transparent	1600

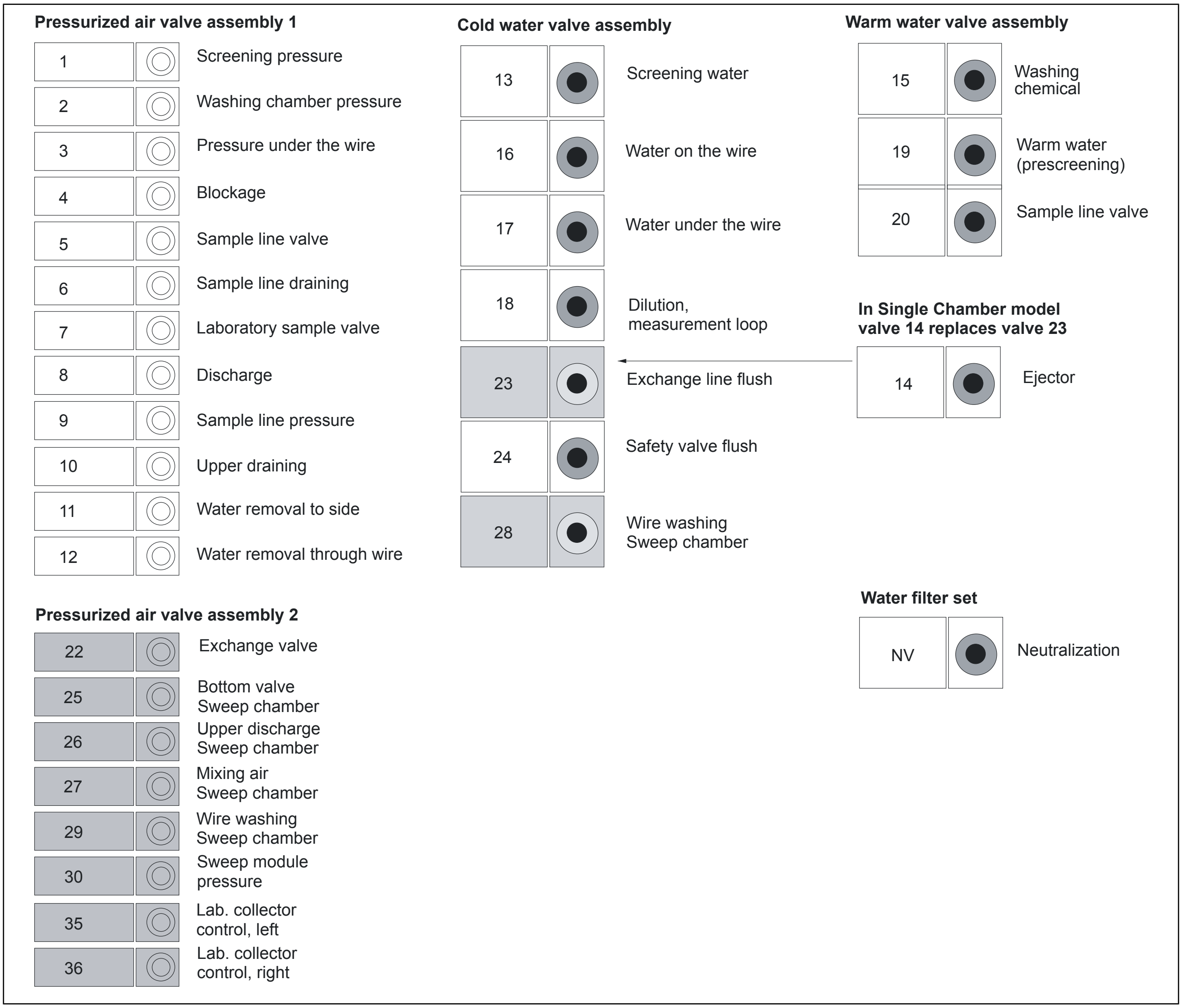


Fig. 4. Valve numbers. Single Chamber = only the valves shown as white; Dual Chamber = all valves (including the ones shown as gray).

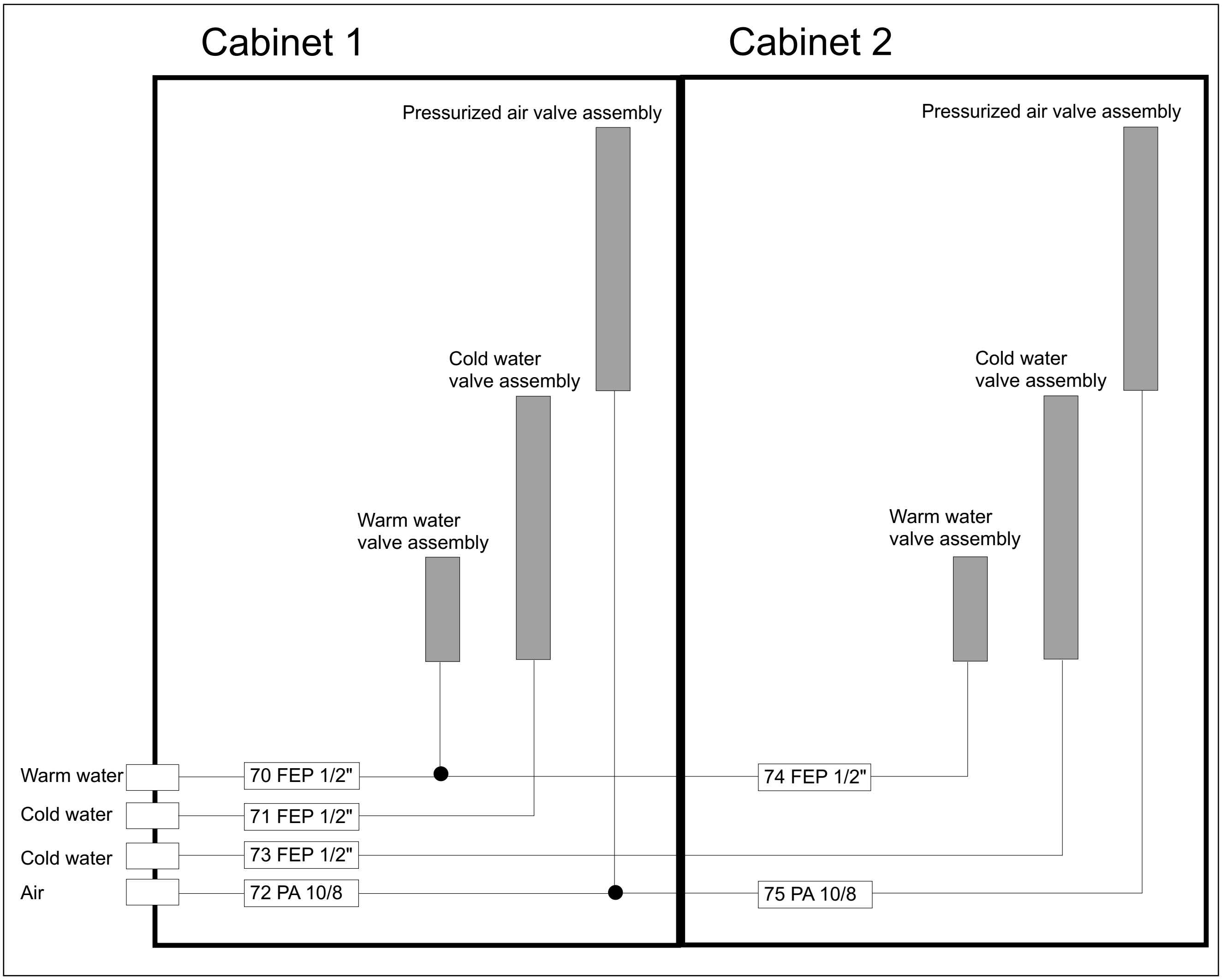


Fig. 5. Tubing scheme, Cabinet 1 & 2.

10. Diagnostics and troubleshooting

The counters, errors, and IO-status of Valmet Kappa QC analyzer can be viewed in the "Diagnostics" displays.

You can also watch the progress of operating sequences and test valve operation.

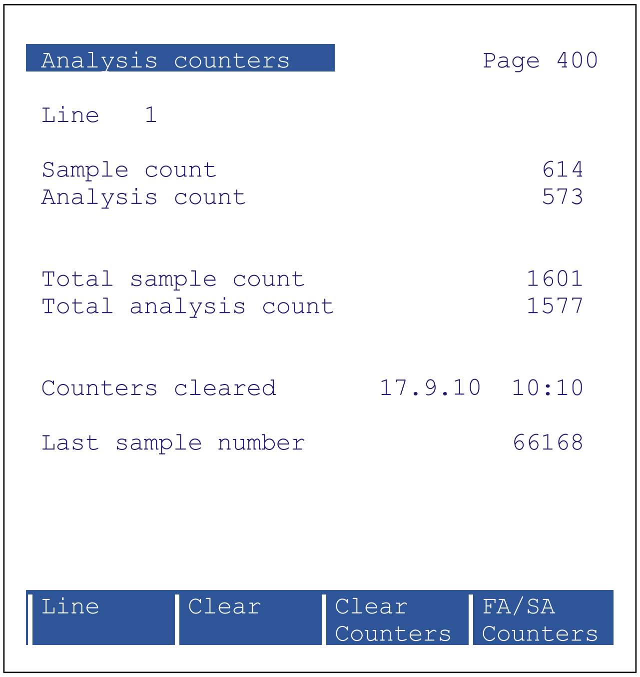


Fig. 1. Analysis counters display.

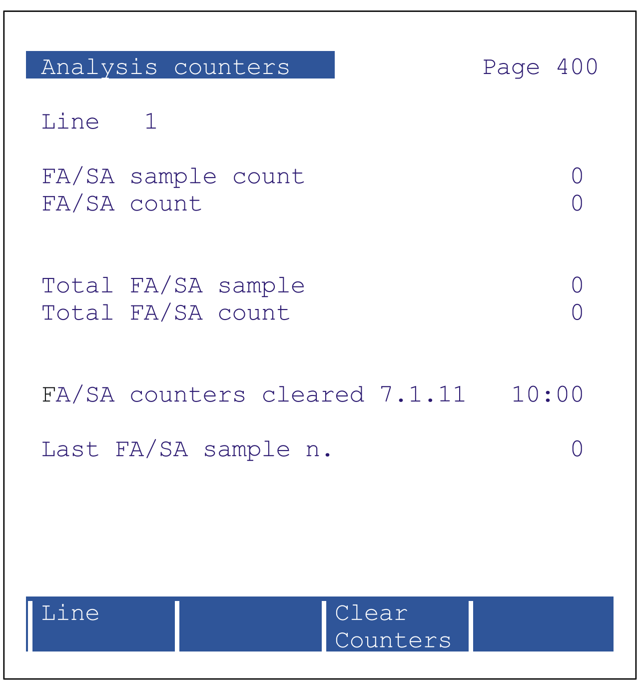


Fig. 2. Analysis counters display, Fiber-Shive.

10.1. Analysis counters

Each analysis counter page (Fig. 1 & 2) shows statistics for one line. Press [F1] to choose the line. Press [F5] to reset the counters.

For Fiber-Shive module counters, press [F7].

Sample count: Number of samples taken from the line.

Analysis count: How many analyses have been made for the line (kappa, brightness, fiber/shive analyses).

Total sample count: Samples taken from all the lines in use.

Total analysis count: Number of completed analyses for all lines in use. This value only includes kappa and brightness analyses.

Counters cleared: Date and time when the counters were last cleared.

Last sample number: Number of samples analyzed with the device. This field cannot be cleared.

Fiber-Shive sample count: Number of fiber/shive samples taken from the line.

Fiber-Shive analysis count: How many fiber/shive analyses have been completed for the line.

Total Fiber-Shive sample: Fiber/shive samples taken from all the lines in use.

Total Fiber-Shive analysis c: Number of completed fiber/shive analyses for all lines in use.

Fiber/Shive counters c: Date and time when the counters were last cleared.

Last fiber-shive sample n: Number of last fiber/shive sample analyzed. This field cannot be cleared.

10.2. Error status

If the incoming air or water pressure is too low, the main display will read "System Error!". Error status can be checked from "Diagn" => "Error status" displays (Fig. 3).

The errors are grouped according to extent: common errors, measurement unit errors, and line errors. The number of the malfunctioning measurement unit (1 or 2) or line will be shown when possible. The displays contain counters for the different errors, and also the status and level of the errors can be checked (also see section 10.10).

To reset the counter memory, press [F5] Clear counters. Pressing [F3] "Quit" clears the error messages from the display and sets the error status on -› off.

Status: Error on or off.

Cnt: Counter, number of errors occurred.

Level: How serious the error is; parameter.

- 0 = error has no effect.
- 1 = error count increases, error data is stored in the log.
- 2 = as in level 1 + alarm is set.
- 3 = as in levels 1 & 2 + analysis is interrupted, analyzer continues with washing.
- 4 = only the alarm output is activated.
- 5 = similar to level 3, but the alarm output is activated after the error has occurred three times.
- 6 = if the same error occurs three times in a row, the alarm output is activated and the channel is disabled.

```
Error status                       Page 410

Error table
Error          Stat Cnt     Level
Press. air    |1   |68     |1
Cold water 1|1     |38     |1
Cold water 2|1     |30     |1
Warm water    |0   |68     |1
Water temp l|0     |0      |1
Water temp h|0     |0      |1
Reset         |0   |38     |1
              |    |       |
              |    |       |
              |    |       |
              |    |       |
              |    |       |
              |    |       |
              |    |       |

Group     Quit      Clear      ^
                    Counters         v
```

Fig. 3. Example of Error status display, Common errors.

Common errors

- Instrument air
- Cold water 1/2, unit (cabinet) 1/2
- Warm water
- Water temp low/high
- Reset

Unit errors, units (cabinets) 1 & 2

- Kappa/brightness water value, Single/Dual chamber
- Short sweep, Single/Dual chamber
- CV measurement error, Single/Dual chamber
- Sample cup error, Single/Dual chamber
- No sample cup, Single/Dual chamber
- Prescreen error, Single/Dual chamber
- Sample trans(fer) error
- Initial vol(ume) error, Single/Dual chamber
- Overdilution error, Single/Dual chamber
- Underdilution error, Single/Dual chamber
- Sample remove error, Single/Dual chamber
- Water remove error, Single/Dual chamber
- Leaking error, Single/Dual chamber
- Washing chamber error, Single/Dual chamber
- Sweep module error
- Meas. loop error
- Sweep corr. error
- Shive sample low

Consistency errors, line-specific

- Low init. Cs
- Cs timeout
- Sweep Cs error

Detector errors, unit/line

- Kappa measurement Det1 level - Det5 level
- Brightness measurement Det6 level - Det10 level
- Det1 offset - Det5 offset
- Det6 offset - Det10 offset

Fiber-Shive errors

- Chemical / Sample volume low
- SA/FA (shive analysis or fiber analysis) start/stop error
- FA/SA (fiber analysis / shive analysis) Cs low/high
- FA / SA result rejected
- SSI/SSE valve error

10.3. Remark and event logs

The remark log (Fig. 4) stores all errors and the time when they occurred.

The event log (Fig. 5) shows an event history for each unit of the analyzer.

After an error, the displays shows the number of the channel (= line) where the error occurred.

```
Remark log                          Page 420

Time           Text
13.1.11 13:4|^^c37^^2: Br water value
13.1.11 13:4|^^c37^^2: Short sweep
13.1.11 13:4|^^c37^^2: Sweep module erro
13.1.11 13:4|^^c37^^2: Sweep module erro
13.1.11 13:4|^^c37^^9: Sweep Cs error
13.1.11 13:4|^^c37^^9: Det1 level
13.1.11 13:4|^^c37^^9: Det2 level
13.1.11 13:4|^^c37^^9: Det3 level
13.1.11 13:4|^^c37^^9: Det4 level
13.1.11 13:4|^^c37^^9: Det5 level
13.1.11 13:4|^^c37^^9: Det6 level
13.1.11 13:4|^^c37^^9: Det7 level
13.1.11 13:4|^^c37^^9: Det8 level
13.1.11 13:4|^^c37^^9: Det9 level
13.3.11 13:4 ^^c37^^9: Det10 level

                      <    >    ^
                                     v
```

Fig. 4. Remark log display.

```
Event log 1                        Page 430


3.1.11 13:4|1: Line started
3.1.11 13:4|1: Sampling 1
3.1.11 13:4|1: Sample pulse 0
3.1.11 13:4|1: Sample pulse 0
3.1.11 13:4|2: Sample washing 1/1
3.1.11 13:4|1: Sample pulse 0
3.1.11 13:4|1: Transfer 1...
3.1.11 13:4|1: Sweep measurement...
3.1.11 13:4|1: Sampling 1 ok
3.1.11 13:4|1: Sweep cons error
3.1.11 13:4|1: CV measurement...
3.1.11 13:4|1: CV measurement ok
3.1.11 13:4|1: Meas chamber wash 1
3.1.11 13:4|1: Line Calc started
3.3.11 13:4 2: Sample washing 2/1
```

Fig. 5. Event log display.

10.4. I/O-status

To see the IO status display press "Diagn" -› "IO status" (Fig. 6). The display lists all electronic boards connected to the analyzer.

– Ver = version number of IO board definition file.
– Enable = board status. ON = connected to CAN-bus, OFF = not installed.
– Error = error status: ON = board OK, OFF = board cannot be found or does not operate correctly.
– Count = error counter.

Check the display regularly for any board error messages (error "on"). If the error count for any board is high (several hundreds), the board is probably malfunctioning.

Press [F1] to see data on CAN-bus operation. The most crucial of these fields are:

– Run frequency, normally 100 Hz. The frequency drops when CAN-errors occur.
– No node n boards = how many IO-boards are connected to the bus.
– Node n errors = total number of errors occurred in the bus.

Kappa IO-cards — Page 440

IO	board	ver	enable	error	count
IO1	BinIO1	1.0	on	off	0
IO2	BinIO2	1.0	on	off	0
IO3	DCPU1	1.0	on	off	3
IO4	DCPU2	1.0	on	off	0
IO2/2	BinIO3	1.0	off	on	20
IO3/2	DCPU1	1.0	on	off	3
IO4/2	DCPU2	1.0	off	on	20
IO5	IOCPU1	1.0	on	off	0
IO6	IOCPU2	1.0	off	on	20
IO7	IOCPU3	1.0	off	on	20
IO8	BinIO4	1.0	off	on	20
IO10	CustIO1	1.0	off	on	20
IO11	CustIO2	1.0	off	on	20
IO12	CustIO3	1.0	off	on	20
IO13	CustIO4	1.0	off	on	20
IO14	CustIO5	1.0	off	on	20

CAN status | MODBUS status | Measperm status

Fig. 6. I/O-status display.

If necessary, Modbus can be connected simultaneously over serial communication and Ethernet. Press [F3] MODBUS status to monitor the operation of Modbus communication and counters.

Note that the Modbus address, baud rate, parity and stop bits for the serial connection Modbus cannot be edited on this page (Fig. 7); go to Config / Device settings if you need to change them. The page also shows the number of messages, responses, errors and timeouts in the communication.

The TCP fields show the Ethernet Modbus port, and the number of connections and messages.

Measurement permit may be transmitted to the analyzer using binary inputs, Modbus, or both. Press [F5] Measperm status to view the current status of measurement permit signals. The field values cannot be edited here. Default is OFF = measurement permitted.

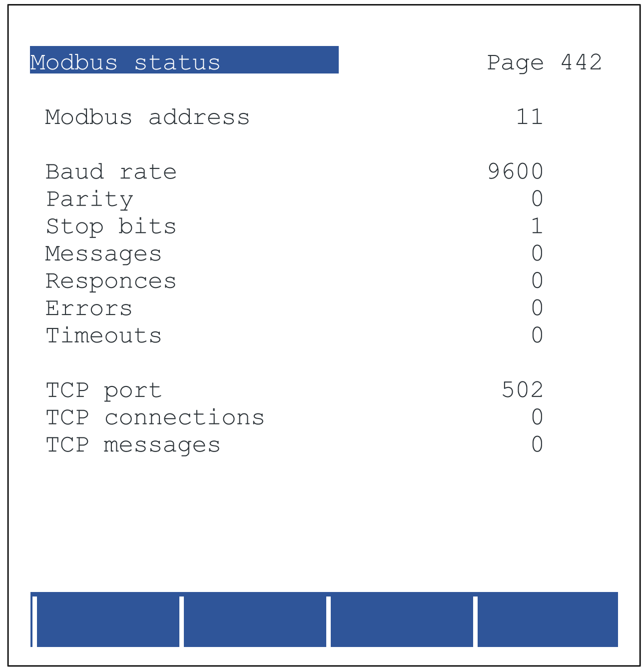


Fig. 7. MODBUS status display.

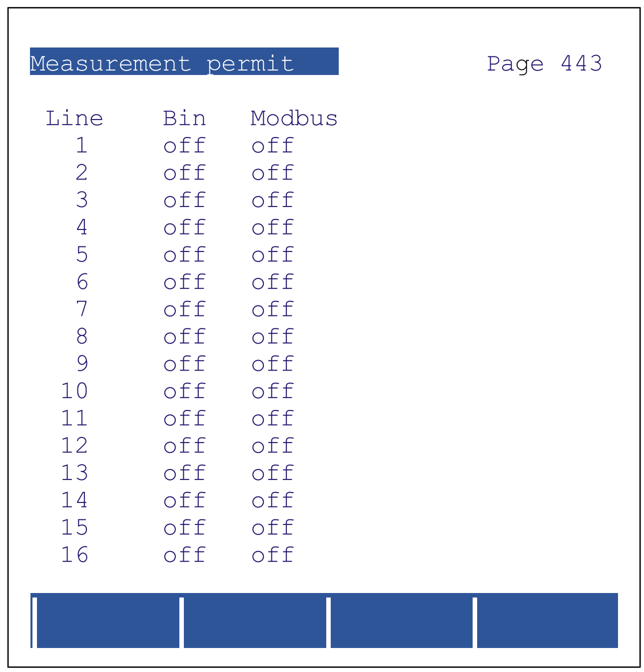


Fig. 8. Measperm status display.

10.5. I/O test

IMPORTANT:

- Do not change valve status during analysis!
- Before you exit from the test, make sure that all controls are set OFF!
- Do not operate the pump dry! Before starting the pump, make sure that the measurement loop is filled with water.

To see the IO test displays (pages 451–453) press "Diagn" -› "IO-test" (Fig. 9). On these pages you can control the status of sample loop valves, and view the status of pressure sensors, level sensors, and sampling buttons.

Valve controls can be switched on/off by pressing the + and - key. Press [F1] to test the samplers and detectors, and to view Customer IO board operation.

On this page you can also switch on and off the chamber lamp (33_CLP) and work lamp (34_WLP) located inside the analyzer. All controls are cabinet-specific. Make sure to choose the right cabinet (unit)!

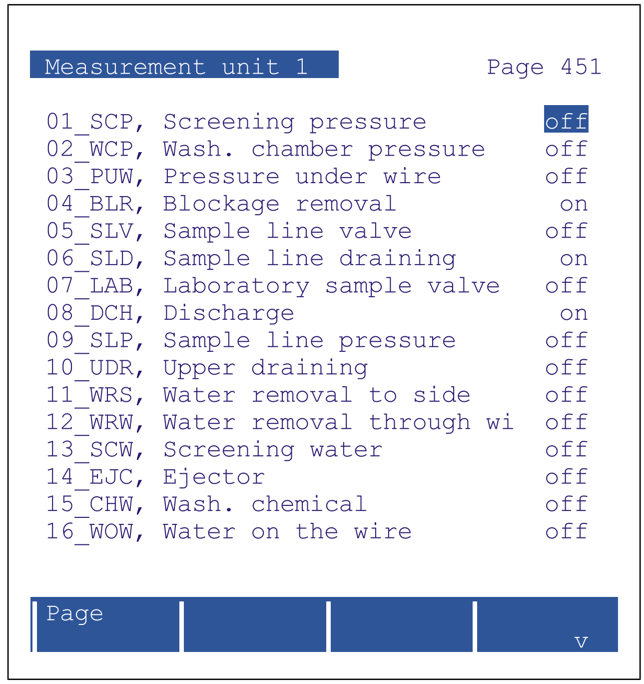


Fig. 9. Example of IO test display, cabinet (unit) 1.

Detector test for the kappa and brightness detectors:

1. Before the test, wash the analyzer twice: "Config" -› "Sequence programs" -› "Wash. chamber wash" (Single Chamber) or "Sweep module wash" (Dual Chamber). If you also run a chemical wash, analyze at least one normal pulp sample before the washes.
2. Choose [F7] "Diagn" -› "IO-test". For Single Chamber/Dual Chamber model, set "08_DCH Discharge" and "04_BLR Blockage removal" = OFF. Set "18_LFL Meas. loop flushing" = ON, and add about 3 L of water into the chamber.
3. Pressurize the measurement loop: Single Chamber: Set 02_WCP Wash. chamber pressure = ON Dual Chamber: set "30_SWP Sweep module pressure" = ON.
4. Go to "Diagn" -› "I/O test" -› "Detector test".
5. Measure the signal levels [F7] "Test ON" and write down the results (signal with no Xenon light).
6. Press [F5] "Xenon ON" and write down the results (signals with Xenon light).
7. Release the pressure.
8. Drain the washing chamber empty.

Table 1 shows approximate values for the detector voltages measured with clean water.

Table 1. Detector voltages, guidelines. The values need not be exactly the same as here!

		Water, no fibers, pressure ON	
	Explanation	**Xenon OFF**	**Xenon ON**
Det 1	Kappa D1 voltage	0.05 - 0.2	0.05 - 0.25
Det 2	Kappa D2 voltage	0.05 - 0.2	0.05 - 0.25
Det 3	D3 water reference	0.05 - 0.2	0.6 - 2.0
Det 4	D4 lamp reference voltage	0.05 - 0.2	0.9 - 2.0
Det 5	Kappa D5 voltage	0.05 - 0.2	0.18 - 1.0
Det6	Brightness detector voltage	0.05 - 0.2	2.0 - 4.8
Det7	Cs comp. detector voltage	0.05 - 0.2	2.0 - 4.8
Det8	Brightness lamp reference voltage	0.05 - 0.2	2.0 - 4.8
Det9	not in use	0	0
Det10	not in use	0	0
CS_M	Consistency, measuring signal (LC100)	0.1 - 0.5	0.1 - 0.5
CS_R	Consistency, reference signal (LC100)	4.5 - 4.8	4.5 - < 5
TEMP	Warm water temperature	Warm water temperature °C	

10.6. I/O counters

To see the IO counters display press "Diagn" -› "IO counters". This display (Fig. 10) shows the number of valve strokes, the limits set for them, and when the counter was last cleared. The counter readings and limits are given in thousands (n * 1000), for example the limit "1000" means (1000 * 1000) = 1 million.

```
Measurement unit 1                 Page 472

IO name          Count   Limit Cleared
01_SCP, Screeni   34220   1000 1.1.11
02_WCP, Wash. c  247629   1000 1.1.11
03_PUW, Pressur  117026   1000 1.1.11
04_BLR, Blockag  303212   1000 1.1.11
05_SLV, Sample    24036   1000 1.1.11
06_SLD, Sample    24066   1000 1.1.11
07_LAB, Laborat      18   1000 1.1.11
08_DCH, Dischar   52016   1000 1.1.11
09_SLP, Sample    48068   1000 1.1.11
10_UDR, Upper d  144744   1000 1.1.11
11_WRS, Water r   91985   1000 1.1.11
12_WRW, Water r   75988   1000 1.1.11
13_SCW, Screeni  108634   1000 1.1.11
14_EJC, Ejector       8   1000 1.1.11
15_CHW, Wash. c    4024   1000 1.1.11
16_WOW, Water o  136742   1000 1.1.11

 Page        v
```

Fig. 10. I/O counters display.

10.7. Troubleshooting procedures

Analyzer problems and malfunctions may be observed as error messages in the diagnostics displays (operating terminal) or as abnormal operation, or they may be found out during routine maintenance.

Always take action to find out what the malfunction is, and check the following:

– process status
– analyzer's measurement results in comparison to laboratory results,
– error messages (if any),
– the required chemicals,
– water and air inlets (pressure, temperature, flow rate), and
– sample flow rate.

10.8. Problems observed during operation

Problems in measurement operation:

Make sure that

- the water is clean,
- the dehumidifier cartridges of the brightness measurement cell are not wet,
- sample flows in the measurement loop when the pump is operating,
- the measurement cell is not dirty or blocked,
- no valves are leaking,
- there is no air in the sample,
- the water/air pressures are in the correct range,
- there are no kinks, flat sections, or holes in the sample lines.

LC100 measurement errors

Make sure that the measurement cell is not broken or blocked.

Consisteny control problems

Make sure that

- the pump is running (not broken or stopped),
- the measurment loop is not blocked.

10.9. Sequence test

In this display (Fig. 11) you can test the operation of the analyzer sequence step by step. The test is done on one line at a time. Make sure to set all other lines OFF and leave only the tested line ON before starting.

NOTE: Before starting a sequence test, set all lines OFF on the main display.

Set one or more breaks ON and save (F7) your settings. Then press F3 to start the test. The sequence begins with sampling and continues until the first activated break. While the sequence is stopped, the display will read "Break on!"

To continue the sequence press F5 Cont. To interrupt the test press F6 Wash, and the device will flush the sample out. The display shows sample line status, the sample transfer time calculated by the sequence, and the measured initial consistency of the sample. This data is updated on the display while the sequence progresses.

Sampling break: The device stops after the set sample transfer time (sample waiting in sample line, close to analyzer).

Sample in break: Prescreened sample is in washing chamber.

Sample wash break: After sample washes.

Init Cs break: After the initial consistency measurement.

Set Cs break: After consistency adjustment, before analysis begins.

The breaks are also indicated with the corresponding numbers in chapter Sequences, Fig. 1.

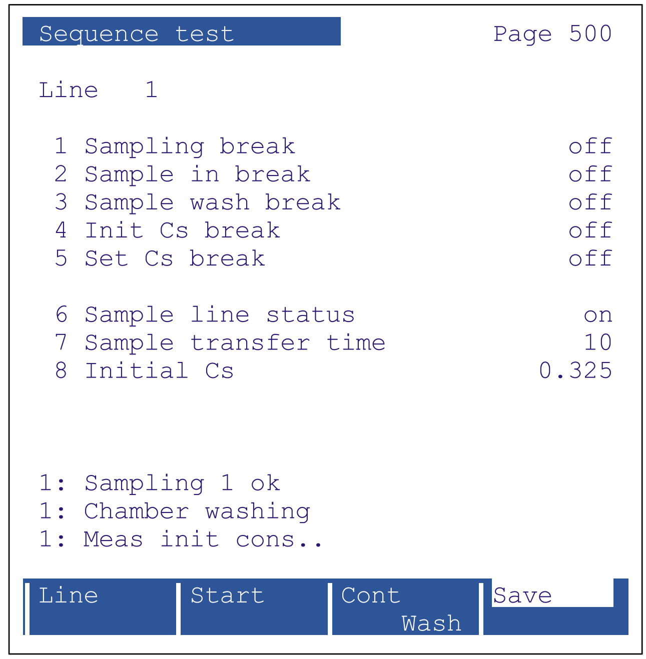


Fig. 11. Sequence tests display.

10.10. Device control

On this page (Fig. 12) the analyzer and Fiber-Shive module (option) can be set separately to service mode.

In service mode the Fiber-Shive module's rinsing/cooling is also stopped. Do not keep the module in service mode for longer periods, its PC may be overheated!

Set the device to Service mode always before maintenance and service operations. Set service mode OFF again as soon as you have completed whatever service work needs to be done at the time!

The analyzer can also be shut down from the Device control page. Shut down as follows:

Reboot

This operation restarts the analyzer in a controlled fashion.

Controlled shutdown

The analyzer will complete any ongoing sequences and then stop, closing all open files in a controlled fashion. Individual valves can be operated on the IO-test page ("Diagn" -› "IO-test"). When you wish to restart the analyzer, choose "Start device". The device will then wash all chambers, measure the water values and rinse all sample lines before taking the first sample.

NOTE: Before these operations all sample lines of the analyzer must be set OFF and the device status must be Idle (= all sequences have stopped).

Quick stop

This will stop the device immediately. Individual valves can be operated on the IO-test page ("Diagn" -› "IO-test"). When you wish to restart the analyzer, choose "Start device". The device will then wash all chambers, measure the water values and rinse all sample lines before taking the first sample.

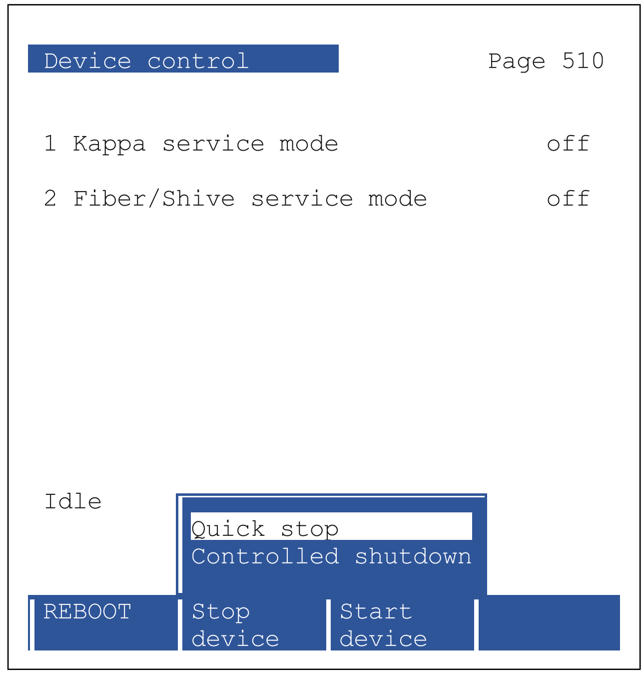


Fig. 12. Service mode display.

10.11. Errors

Underdilution, Single Chamber

- Diluted volume is 0.25 L or more under the target volume.

-› washing chamber level transmitter is incorrectly calibrated
-› LFL 18 (IO2) does not open
-› check washing chamber level transmitter (IO5)
-› check water pressure

Underdilution, Dual Chamber

- Diluted volume is 0.25 L or more under the target volume.

-› Sweep module level transmitter is incorrectly calibrated
-› LFL 18 (IO2) does not open
-› check Sweep module level transmitter (IO5)
-› check water pressure

Low init. Cs

- Too low incoming sample consistency -› no analysis.

-› blockage in measurement loop or sample line
-› LC100 consistency sensor is defective
-› check the sampling parameters
-› check the pressure of sample transport water
-› check the operation of sampler's water pressure switch
-› check the process pressure
-› check the pump

Initial volume error, Single chamber

- Sample level changes during initial consistency measurement. The level must be 1.5 L - 2.5 L.

-› WUW 17, WOW 16 (IO2) does not open, or leaks
-› WMW 19, SCW 13, LFL 18 (IO2) leaks
-› check washing chamber level transmitter (IO5)

CV measurement error, Single chamber/Dual chamber

- Consistency adjustment for CV measurement failed. Sample could not be diluted to target consistency.

-› not enough sample
-› blockage in measurement loop
-› LFL 18 (IO2) does not open
-› check boards IO3 and IO4
-› check LC100 consistency sensor operation

Det1 offset - Det5 offset

- Detector signal offset under 0.025 V or over 0.2 V.

-› check the detectors (IO3)

Det6 offset - Det10 offset

- Detector signal offset under 0.025 V or over 0.2 V.

-› check the detectors (IO4)

No sample cup, Single chamber/Dual chamber

- The collector does not contain an empty vessel (has not been reset after the previous sample).

Prescreen error, Single chamber/Dual chamber

- Not enough sample, or the timing of sampling is incorrect.
- Washing chamber level transmitter is stuck or defective.

-› check washing chamber level transmitter (IO5)
-› check Sweep module level transmitter (IO5)
-› WRS 11 (IO2) leaks
-› SLV 5 (IO2) does not open

Kappa measurement Det1 level - Det5 level

- Detector signal level under 0.025 V or over 4.80 V.

-› check the detectors (IO3)

Kappa/brightness water value, Single chamber

- D3/D4 or D6/D8 water value below the low limit set during start-up. Average value and allowed variation are set with parameters.

-› blockage in measurement loop
-› water is not clean
-› LFL 18, WCP 2 (IO2) does not open
-› BLR 4, DHC 8 (IO2) leaks
-› check water pressure

Kappa/brightness water value, Dual chamber

- D3/D4 or D6/D8 water value below the low limit set during start-up. Average value and allowed variation are set with parameters.

-› blockage in measurement loop
-› water is not clean
-› LFL 18, MCP 30 (IO2) does not open
-› BLR 4, DHC 8 (IO2) leaks
-› check water pressure

Chemical / Sample volume low
- The volume of sample or chemical/water solution is too low before it is transferred to the Fiber-Shive module.

Fiber start/stop error
- Error at the start or end of fiber measurement.

Fibercs low/high
- Average consistency is too low/high for fiber measurement.

Fiber / Shive result rejected
- Too few images used when calculating fiber/shive results.

Cold water 1/2, unit (cabinet) 1/2
- Cold water pressure sensor detects no pressure.
- Pressure to the measurement unit is too low.

Short sweep, Single chamber
- Too few sweep points (minimum 20 points). Sweep measurement does not succeed.

-› measurement loop or safety valve blocked
-› LFL 18 (IO2) does not open
-› WOW 16, WMW 19, SCW 13 (IO2) leaks

Short sweep, Dual chamber
- Too few sweep points (minimum 20 points). Sweep measurement does not succeed.

-› measurement loop or safety valve blocked
-› LFL 18, BLR 4 (IO2) does not open
-› WIW 28 (IO2) leaks
-› check LC100 consistency sensor operation

Meas. loop error
- Consistency is not 0 % at the end of the washing sequence.

-› blockage in measurement loop
-› LFL 18 (IO2) does not open
-› BLR 4 (IO2) leaks
-› LC100 consistency sensor does not work
-› check water pressure

Sample cup error, Single chamber/Dual chamber
- Sample collector did not find the sample cup.

-› collector rail is dirty
-› LAL 35, LAR 36 (IO3)

Sample removal error, Single Chamber
- Extra sample could not be removed, error more than ± 0.2 L.

-› WRS 11 (IO2) does not open, or leaks
-› check washing chamber level transmitter (IO5)

Sample removal error, Dual Chamber
- Extra sample could not be removed, error more than ± 0.2 L.

-› SEV 25 (IO2) does not open, or leaks
-› check Sweep module level transmitter (IO5)

Sample trans(fer) error
- Sample transfer from washing chamber to Sweep module failed in cabinet 1 or 2. Sweep module level must be 1.5 L - 2.5 L.

-› WUW 17, WOW 16, WMW 19, SCW 13 (IO2) leaks
-› WUW 17, EXV 22, WCP 2, WOW 16 (IO2) does not open
-› UDR 10 does not close
-› check Sweep module level transmitter (IO5)
-› check water and air pressures
-› check to make sure there is not too much or too little sample

Instrument air
- Air pressure sensor detects no pressure.
- Too low air pressure.

Washing chamber error, Single Chamber
- Washing chamber is not drained empty during analyzer washing.
- Washing chamber level transmitter is stuck or defective.

-› check washing chamber level transmitter (IO5)
-› valve WRS 11 (IO2) does not open

Washing chamber error, Dual Chamber
- Washing chamber is not drained empty during analyzer washing.
- Washing chamber level sensor is dirty or defective.

-› check washing chamber level transmitter (IO5)
-› valve WRS 11 (IO2) does not open

Sweep Cs error

- The set end consistency could not be reached during the sweep.

-› too large sample volume
-› safety valve is blocked
-› cold water pressure is too low

Reset

- The device has restarted, for example after a power failure.

Cs timeout

- Consistency adjustment does not succeed within the allowed time.

-› blockage in measurement loop
-› LC100 consistency sensor or pump is defective
-› calibrate the level transmitter

SSI/SSE valve error

- Not in use at the moment.

Sweep corr. error

- The calculated correlation obtained in brightness measurement is below the low limit (< 0.5).

Sweep module error

- Sweep module is not empty within 5 seconds after the washing started.

-› SEV 25, WIW 28, MCP 30 (IO2) does not open
-› check Sweep module level transmitter (IO5)

Shive sample low

- Sample volume to Fiber-Shive module is too low.

Shive start/stop error

- Error at the start or end of shive measurement.

Shive cs low/high

- Average consistency is too low/high for shive measurement.

Brightness measurement Det6 level - Det10 level

- Detector signal level under 0.025 V or over 4.80 V.

-› check the detectors (IO4)

Water temp low

- Warm water temperature is below the set limit.

Water temp high

- Warm water temperature is over the set limit.

Water remove error, Single Chamber

- Sample thickening did not succeed. The volume is at least 0.5 L below target.

-› wire screen or ejector is blocked
-› EJC 14 (IO2) does not open
-› check washing chamber level transmitter (IO5)

Water remove error, Dual Chamber

- Sample thickening did not succeed. The volume is at least 0.5 L below target.

-› wire screen is blocked
-› WIV 29, MCP 30 (IO2) does not open
-› UDC 26 (IO2) leaks
-› check Sweep module level transmitter (IO5)

Leaking error, Single Chamber

- Sample level drops (by more than 0.5 L) after consistency adjustment.

-› WRW 12, WRS 11 (IO2) leaks
-› check washing chamber level transmitter (IO5)

Leaking error, Dual Chamber

- Sample level drops (by more than 0.5 L) after consistency adjustment.

-› SEV 25, WIV 29, LAB 7 (IO2) leaks
-› check Sweep module level transmitter (IO5)

Overdilution, Single Chamber

- Diluted volume is over the target (by more than 0.25 L).

-› washing chamber level transmitter is incorrectly calibrated
-› LFL 18, WOW 16, WUW 17, SCV 13, WMW 19 (IO2) leaks
-› check washing chamber level transmitter (IO5)

Overdilution, Dual Chamber

- Diluted volume is over the target (by more than 0.25 L).

-› Sweep module level transmitter is incorrectly calibrated
-› LFL 18, WIW 28, EXF 23 (IO2) leaks
-› check Sweep module level transmitter (IO5)

System error

- Water or air pressure to the analyzer has dropped below the set limit. Serious error, analyzer operation stops.

-› check incoming water and air pressures
-› check the pressure switches

11. Electronics

11.1. Location of boards in the analyzer

The location of the electronics and connection boxes, and the placement of boards in the electronics box, are shown in the following pictures (Fig. 1, 2, 3). Table 1 lists the IO-board names.

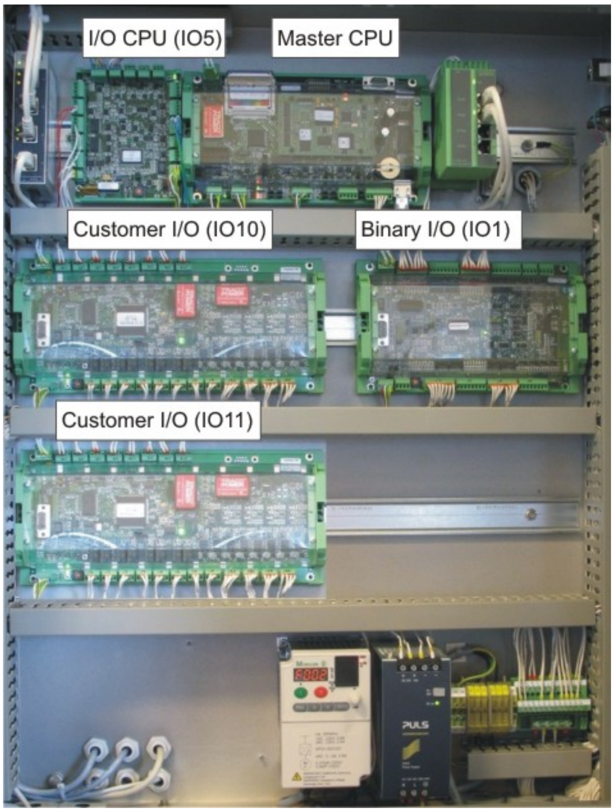


Fig. 1. Analyzer electronics box, analyzer furnished for analog/binary connections. If serial communication is used instead, the box contains no Customer IO boards.

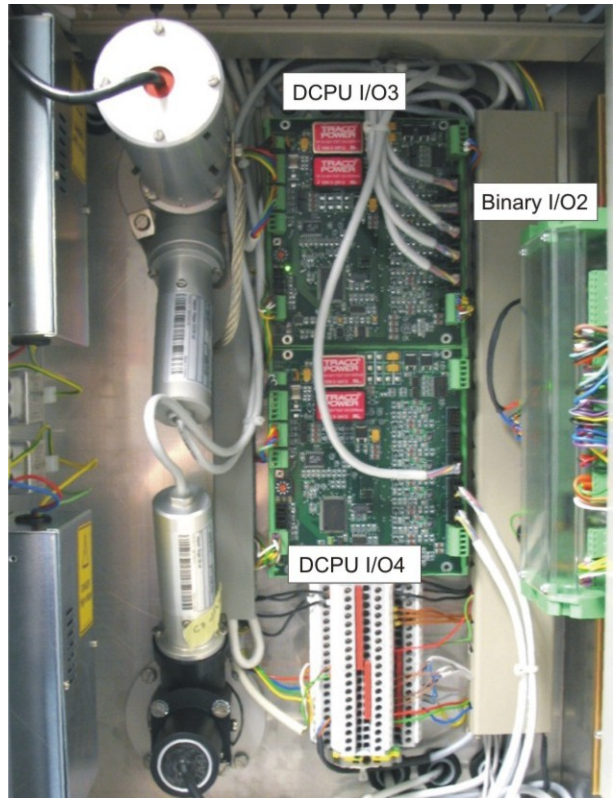


Fig. 2. Module electronics box.

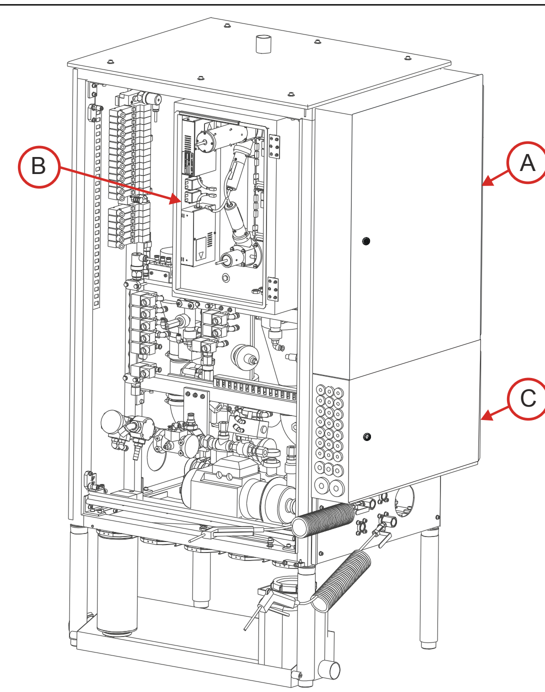


Fig. 3. Measurement cabinet (some doors removed); A - analyzer electronics box, B - module electronics box, C - connection box.

Table 1. IO boards: functions, location, names used in software.

OeClient-name	Board	Usage	Location	CAN address	CAN bus
IO1	Binary IO	Sample controls	Analyzer electronics box	0	1
IO2	Binary IO	Cabinet 1 IO-board	Cabinet 1 module electronics box	1	1
IO2_2	Binary IO	Cabinet 2 IO-board	Cabinet 2 module electronics box	2	1
IO3	DCPU	Cabinet 1 Kappa measurement	Cabinet 1 module electronics box	0	1
IO4	DCPU	Cabinet 1 Brightness measurement	Cabinet 1 module electronics box	1	1
IO3_2	DCPU	Cabinet 2 Kappa measurement	Cabinet 2 module electronics box	2	1
IO4_2	DCPU	Cabinet 2 Brightness measurement	Cabinet 2 module electronics box	3	1
IO5	IOCPU	Pump controls, temperature measurement, calibration buttons, level measurement, neutralization valve	Analyzer electronics box	0	1
IO6	IOCPU	Fiber-Shive module IO	Fiber-Shive module	1	1
IO7	IOCPU	Defibrator	Analyzer electronics box	2	1
IO10	Customer IO	Analog connections 1-8	Analyzer electronics box	0	1
IO11	Customer IO	Analog connections 9-16	Analyzer electronics box	1	1
IO12	Customer IO	Analog conn. 1-8	Customer IO Box	0	2
IO13	Customer IO	Analog conn. 9-16	Customer IO Box	1	2
IO14	Customer IO	Analog conn.17-24	Customer IO Box	2	2
IO15	Customer IO	Analog conn. 25-32	Customer IO Box	3	2
IO16	Customer IO	Analog conn. 32-40	Customer IO Box	4	2

11.2. MasterCPU K00990

MasterCPU is the computer of the analyzer. Its software is stored on a Compact Flash card. To update the software, either copy the new software version to the Flash card (with a Flash reader or from the PC over Ethernet), or replace the Flash card. The board uses +24 V voltages.

Connections:

- J3 = operating voltage +24 V
- J6, J8 = 2 CAN-connections
- J7 = RS port 1, MODBUS-DCS connection (RS485, 2/4-wire)
- J20 = RS485, Communicator-i
- J23 = Ethernet connection
- J24 = RS232, for service use only
- J28 = RS port 2, RS485 connection, not in use
- S4 = board Reset, DO NOT USE!
- B1 = Lithium battery for real-time clock

Test points & jumpers:

- TP2: main voltage + 5 V (TP4, GND)
- TP4: GND
- TP5: +3.3 V (TP4, GND)
- TP7: battery voltage + 3 V (TP4, GND)
- TP8: CAN + 5 V (TP6, GND CAN)
- TP9: RS485 + 5 V (TP10, GND RS)
- TP16: +24 V (TP17, GND 24)
- J2: CAN bus2 termination, here set Yes
- J5: CAN bus1 termination, here set Yes
- J11 & 12: RS port comm, terminators, here set Yes
- J13: RS port comm, 2/4-wire, top position = 4-wire
- J16, 17, 18 & 21: RS port 1, terminators, here set Yes
- J19: RS port 1, 2/4-wire, top position = 4-wire
- J24: RS port, for service use (RS232)
- J25, 22, 27 & 26: RS port 2, terminators, here set Yes
- J29: RS port 2, 2/4-wire, top position = 4-wire

LEDs:

- D5: operating voltage on
- D13: CAN1 active
- D14: CAN2 active
- D15: Ethernet, LAN 100 Mb (LED on)/LAN 10 MB (LED not on)
- D16: LAN connected

Always reset/switch off the analyzer as instructed in chapter 3 of this manual.

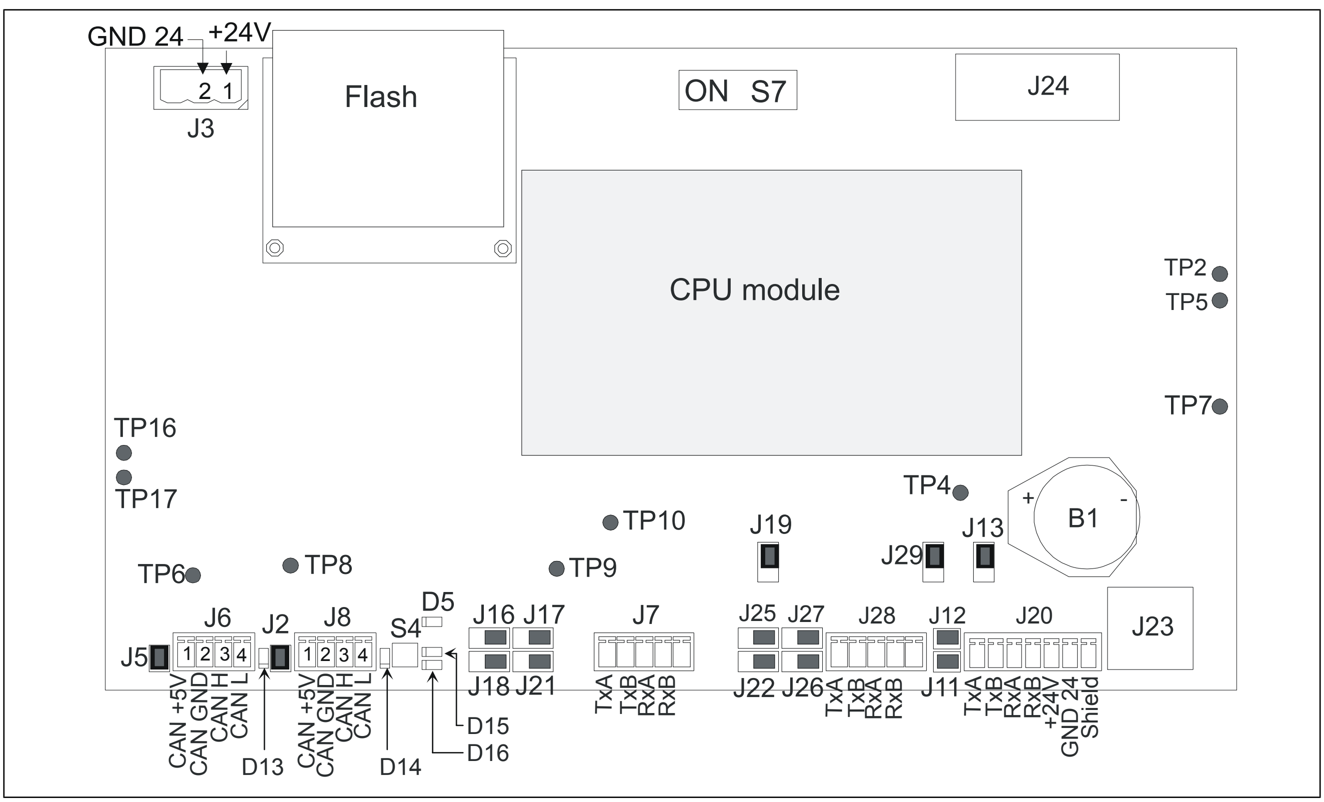


Fig. 4. MasterCPU board.

11.3. Binary IO K02772

The board uses +24V operating voltage. The electronics and all control signals are secured with automatic fuses. The fuses cut the operating voltage when the load gets too high (controls over 5A, other electronics over 300 mA). The operating voltage is connected automatically when there is no more overload.

Connections:
- J6 = RS485 port
- J14 = CAN connection
- J30 = RS232, software loading & testing
- S1 = CAN address selection
- S2 = board Reset

Test points & jumpers:
- TP1: +3.3 V (TP24, TP22, TP26: GND)
- TP4: +5V (TP27: GND 24)
- TP16, TP21: +5 V (TP24, TP22, TP26: GND)
- TP24, TP26, TP22: GND
- TP28: +24 V (TP27: GND 24)
- TP31: CAN operating voltage +5 V (TP30: GND CAN)
- J10, J27: RS485 termination
- J15: CAN bus termination
- J23: RS485 setting, 2-wire/4-wire
- J28, J29: Bootload jumpers

LEDs:
- LD1 - 8 = Bout 1 - 8
- LD9 - 16 = Bout 9 - 16
- LD17 - 24 = Bout 17 - 24
- LD25 - 32 = Bout 25 - 32

Above the RS485 connector
- LD33, red, RESET
- LD34, red, CAN error
- LD35, green. Blinks once per second when CAN-communication is operating, goes off when communication stops.

In the middle of the board
- LD36 & LD37, blink alternately when the board software is running.

IO1 (Binary IO)

CAN-bus address is 1. CAN-bus is not terminated on this board. IO1 (Fig. 5) controls the samplers. Connect sampler's ground wire to the minus terminal between the control terminals. Sampler controls can be configured so that in special cases several consecutive control signals can be reserved for one sampler. The control signals for the next sampler are then connected starting from the next free terminal. Default: two control signals / sampler.

IO2 and IO2_2 (Binary IO)

CAN-bus address is 1 or 2. CAN-bus is not terminated on this board. This board controls analyzer's valves and work lamp, and it also monitors the pressure sensors and level transmitters.

Table 2 lists the sampler controls, table 3 the IO-control signals and inputs of the valves and pressure sensors.

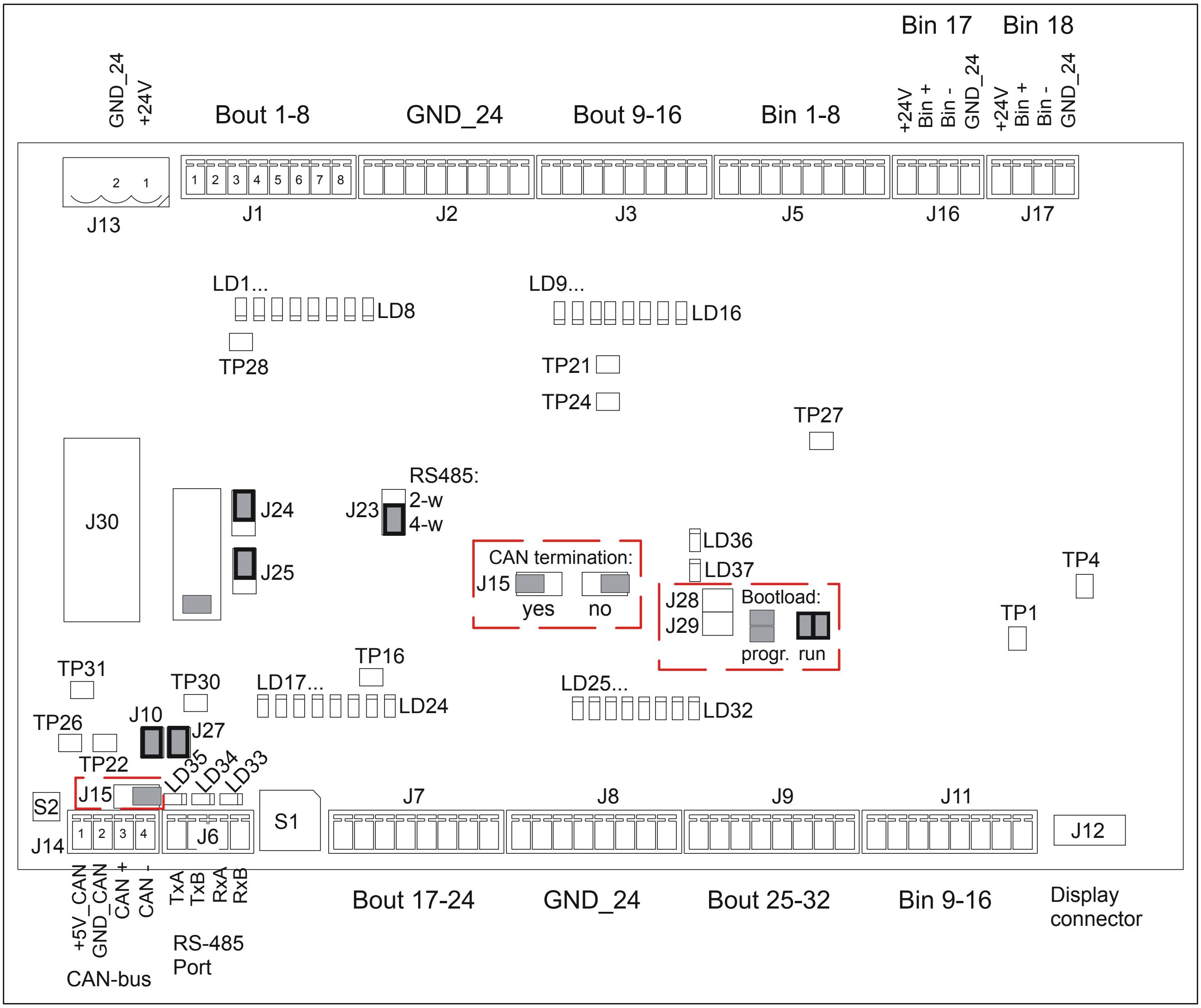


Fig. 5. Binary IO board (IO1).

Table 2. IO1 - sampler connectors.

		terminal	connector
SD1	SDV1	141	J1-1
	SDV2	142	J1-2
SD2	SDV1	143	J1-3
	SDV2	144	J1-4
SD3	SDV1	145	J1-5
	SDV2	146	J1-6
SD4	SDV1	147	J1-7
	SDV2	148	J1-8
SD5	SDV1	149	J3-1
	SDV2	150	J3-2
SD6	SDV1	151	J3-3
	SDV2	152	J3-4
SD7	SDV1	153	J3-5
	SDV2	154	J3-6
SD8	SDV1	155	J3-7
	SDV2	156	J3-8

		terminal	connector
SD9	SDV1	161	J7-1
	SDV2	162	J7-2
SD10	SDV1	163	J7-3
	SDV2	164	J7-4
SD11	SDV1	165	J7-5
	SDV2	166	J7-6
SD12	SDV1	167	J7-7
	SDV2	168	J7-8
SD13	SDV1	169	J9-1
	SDV2	170	J9-2
SD14	SDV1	171	J9-3
	SDV2	172	J9-4
SD15	SDV1	173	J9-5
	SDV2	174	J9-6
SD16	SDV1	175	J9-7
	SDV2	176	J9-8

Special cases:

		terminal	connector
SD1	SDV1	141	J1-1
	SDV2	142	J1-2
	SDV3	143	J1-3
SD2	SDV1	144	J1-4
	SDV2	145	J1-5
	SDV3	146	J1-6

etc.

Table 3. IO2 - IO2_2, IO-control signals and inputs for valves and pressure sensors.

Control	Purpose	IO2 connector
01_SCP	Screening pressure	J1-1
02_WCP	Washing chamber pressure	J1-2
03_PUW	Pressure under wire	J1-3
04_BLR	Blockage removal	J1-4
05_SLV	Sample line valve	J1-5
06_SLD	Sample line draining	J1-6
07_LAB	Laboratory sample valve	J1-7
08_DCH	Discharge	J1-8
09_SLP	Sample line pressure	J3-1
10_UDR	Upper draining	J3-2
11_WRS	Water removal to side	J3-3
12_WRW	Water removal / wire	J3-4
13_SCW	Screening water	J3-5
14_EJC	Ejector	J3-6
15_CHW	Chemical wash	J3-7
16_WOW	Water on the wire	J3-8
17_WUW	Water under the wire	J7-1
18_LFL	Loop flushing (dilution)	J7-2
19_WMW	Warm water	J7-3
20_SLW	Sample line water	J7-4

Control	Purpose	IO2 connector
22_EXV	Exchange line valve	J7-6
23_EXF	Exchange line flush	J7-7
24_SVF	Safety valve flush	J7-8
25_BOV	Bottom valve	J9-1
26_UDC	Upper discharge	J9-2
27_MXA	Mixing air	J9-3
28_WIW	Wire wash	J9-4
29_WIV	Wire valve	J9-5
30_SWP	Sweep chamber pressure	J9-6
33_CLG	Chamber light	J9-7
34_WLG	Working light	J9-8

Control	Purpose	IO2 connector
01_PAS	Air pressure sensor	J5-1
02_WPS	Water pressure sensor	J5-2
03_WWS	Warm water pressure sensor	J5-3
06_LS2	Washing chamber level sensor 2, functions as a level indicator when Sweep module is installed.	J5-6

11.4. Customer IO (IO10-IO16) K00991, old model

This board contains the binary input, binary output, and analog output connections to the mill system.

Connections:

- J2 - 7 = 8 binary outputs, relay contact
- J10 - 17 = 8 binary inputs, opto-isolated
- J25 - 28 = 8 current outputs, 4 - 20 mA
- S1 = Bootload button, only used for board software updates
- S2 = board Reset
- S3 = CAN address selection

Test points & jumpers:

- TP2: +5 V; analog output logic voltage (TP18, GND Aout)
- TP7: +24 V (TP8, GND 24)
- TP13, TP14: main voltage + 5 V (TP9, GND)
- TP17: analog output operating voltage +15 V (TP18, GND Aout)
- J24: RS-232 port; SW loading and testing
- J43: programming/running mode, here set to Run
- J52: CAN bus termination

The board uses 24 V operating voltage, and it connects to the CAN-bus. CAN address is 0 - 4. CAN-bus is terminated on this board only when the board is installed in the Customer IO Box as the last board in the bus.

Board electronics and all control signals are protected by automatic fuses. These disconnect the operating voltage when the load gets too great (controls over 1.35 A, other electronics over 300 mA, when relay outputs control an external load using the operating voltage supplied by the board). The operating voltage is connected automatically when there is no more overload.

LEDs:

- LD1, red, RESET
- LD2, red, CAN error
- LD3, green. Blinks once per second when CAN-communication is operating, goes off when communication stops.
- LD2 & LD3 off = program is not running

LEDs LD4 and LD5 indicate the CAN-bus baud rate:

- 1000 kbit/s = LD4 and LD5 are on
- 500 kbit/s = LD5 is on
- 250 kbit/s = LD4 is on
- 125 kbit/s = both LEDs are off
- 62,5kbit/s = LD4 and LD5 are on

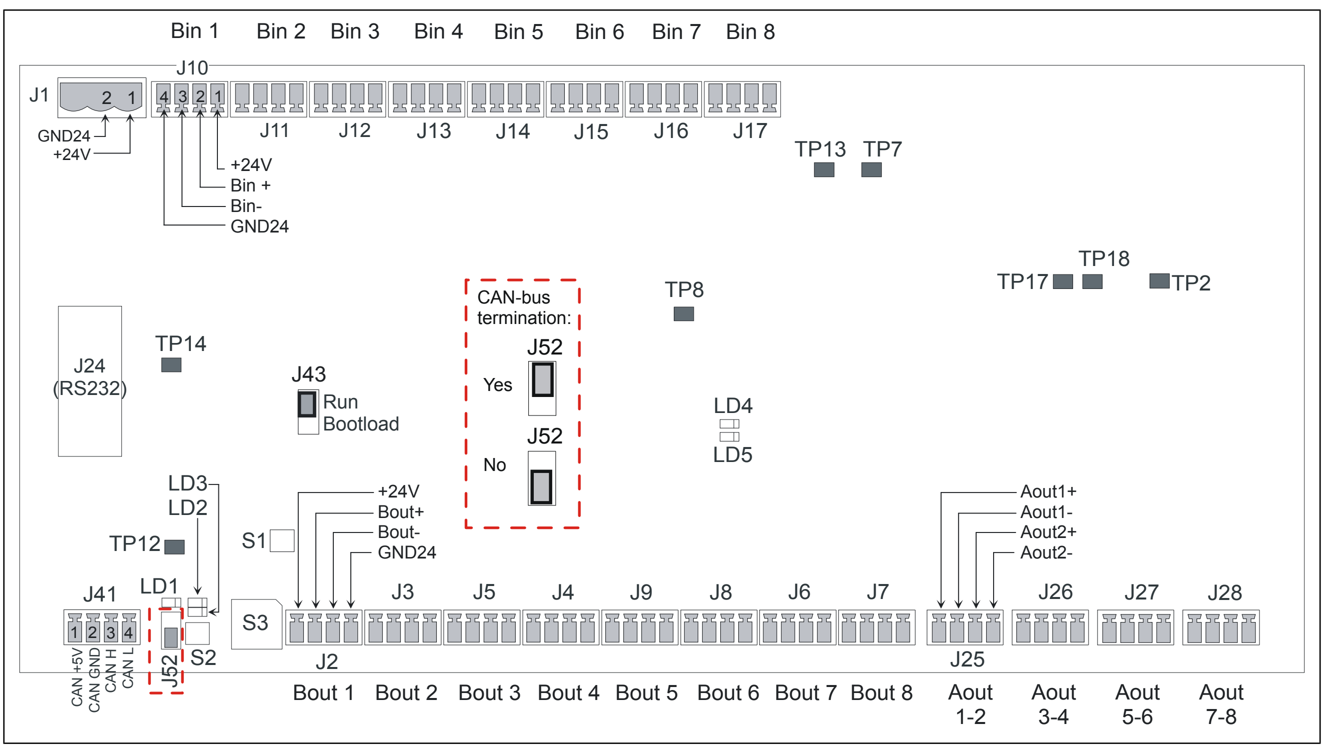


Fig. 6. Customer IO board, A4910040 V1.0.

Table 4. IO10 - IO16, analog outputs, binary outputs, binary inputs (16 pcs).

Binary output

	Terminal strip in connection box		Customer IO pin		
	+	-	Board	Pin, old	Pin, new
Bout 1	1	21	IO10	J2-2, J2-3	J4-1, J4-2
Bout 2	2	22	IO10	J3-2, J3-3	J4-3, J4-4
Bout 3	3	23	IO10	J5-2, J5-3	J4-5, J4-6
Bout 4	4	24	IO10	J4-2, J4-3	J4-7, J4-8
Bout 5	5	25	IO10	J9-2, J9-3	J5-1, J5-2
Bout 6	6	26	IO10	J8-2, J8-3	J5-3, J5-4
Bout 7	7	27	IO10	J6-2, J6-3	J5-5, J5-6
Bout 8	8	28	IO10	J7-2, J7-3	J5-7, J5-8
Bout 9	9	29	IO11	J2-2, J2-3	J4-1, J4-2
Bout 10	10	30	IO11	J3-2, J3-3	J4-3, J4-4
Bout 11	11	31	IO11	J5-2, J5-3	J4-5, J4-6
Bout 12	12	32	IO11	J4-2, J4-3	J4-7, J4-8
Bout 13	13	33	IO11	J9-2, J9-3	J5-1, J5-2
Bout 14	14	34	IO11	J8-2, J8-3	J5-3, J5-4
Bout 15	15	35	IO11	J6-2, J6-3	J5-5, J5-6
Bout 16	16	36	IO11	J7-2, J7-3	J5-7, J5-8

Load 1A 30VDC

Binary input

	Terminal strip in connection box		Customer IO pin		
	+	-	Board	Pin, old	Pin, new
Bin 1	41	61	IO10	J10-2, J10-3	J3-7, J3-8
Bin 2	42	62	IO10	J11-2, J11-3	J3-5, J3-6
Bin 3	43	63	IO10	J12-2, J12-3	J3-3, J3-4
Bin 4	44	64	IO10	J13-2, J13-3	J3-1, J3-2
Bin 5	45	65	IO10	J14-2, J14-3	J2-7, J2-8
Bin 6	46	66	IO10	J15-2, J15-3	J2-5, J2-6
Bin 7	47	67	IO10	J16-2, J16-3	J2-3, J2-4
Bin 8	48	68	IO10	J17-2, J17-3	J2-1, J2-2
Bin 9	49	69	IO11	J10-2, J10-3	J3-7, J3-8
Bin 10	50	70	IO11	J11-2, J11-3	J3-5, J3-6
Bin 11	51	71	IO11	J12-2, J12-3	J3-3, J3-4
Bin 12	52	72	IO11	J13-2, J13-3	J3-1, J3-2
Bin 13	53	73	IO11	J14-2, J14-3	J2-7, J2-8
Bin 14	54	74	IO11	J15-2, J15-3	J2-5, J2-6
Bin 15	55	75	IO11	J16-2, J16-3	J2-3, J2-4
Bin 16	56	76	IO11	J17-2, J17-3	J2-1, J2-2

Input voltage range 24VDC, 50mA

Analog output

	Terminal strip in connection box		Customer IO pin, old and new	
	+	-	Board	Pin
Aout 1	81	101	IO10	J25-1, J25-2
Aout 2	82	102	IO10	J25-3, J25-4
Aout 3	83	103	IO10	J26-1, J26-2
Aout 4	84	104	IO10	J26-3, J26-4
Aout 5	85	105	IO10	J27-1, J27-2
Aout 6	86	106	IO10	J27-3, J27-4
Aout 7	87	107	IO10	J28-1, J28-2
Aout 8	88	108	IO10	J28-3, J28-4
Aout 9	89	109	IO11	J25-1, J25-2
Aout 10	90	110	IO11	J25-3, J25-4
Aout 11	91	111	IO11	J26-1, J26-2
Aout 12	92	112	IO11	J26-3, J26-4
Aout 13	93	113	IO11	J27-1, J27-2
Aout 14	94	114	IO11	J27-3, J27-4
Aout 15	95	115	IO11	J28-1, J28-2
Aout 16	96	116	IO11	J28-3, J28-4

Loop resistance max. 600 ohm

11.5. Customer IO (IO10-IO16) K00991

This board contains the binary input, binary output, and analog output connections to the mill system.

Connections:

- J4 - 5 = 8 binary outputs, relay contact
- J10 - 17 = 8 binary inputs, opto-isolated
- J25 - 28 = 8 current outputs, 4 - 20 mA
- S5 = board Reset
- S4 = CAN address selection

Test points & jumpers:

- TP2: +5 V; analog output logic voltage (TP18, GND Aout)
- TP7: +24 V (TP8, GND 24)
- TP13, TP14: main voltage + 5 V (TP9, TP10, TP11, TP12, GND)
- TP17: analog output operating voltage +15 V (TP18, GND Aout)
- J35: RS-232 port; SW loading and testing
- J6: programming/running mode, here set to Run
- J32: CAN bus termination

The board uses 24 V operating voltage, and it connects to the CAN-bus. CAN address is 0 - 4. CAN-bus is terminated on this board only when the board is installed in the Customer IO Box as the last board in the bus.

Board electronics and all control signals are protected by an automatic fuse. This disconnects the operating voltage when the load gets too great (when sum load of all controls is over 5 A and the other board electronics over 300 mA). The operating voltage is connected automatically when there is no more overload.

LEDs:

- LD6, green. Blinks when board program is running
- LD7, red, CAN error + board RESET
- LD8, green. Blinks once per second when CAN-communication is operating, goes off when communication stops.
- LD6 & LD8 off = program is not running

LEDs LD20 and L21 indicate the CAN-bus baud rate:

- 1000 kbit/s = LD20 and LD21 are on
- 500 kbit/s = LD20 is on
- 250 kbit/s = LD21 is on
- 125 kbit/s = both LEDs are off
- 62,5kbit/s = LD20 and LD21 are on

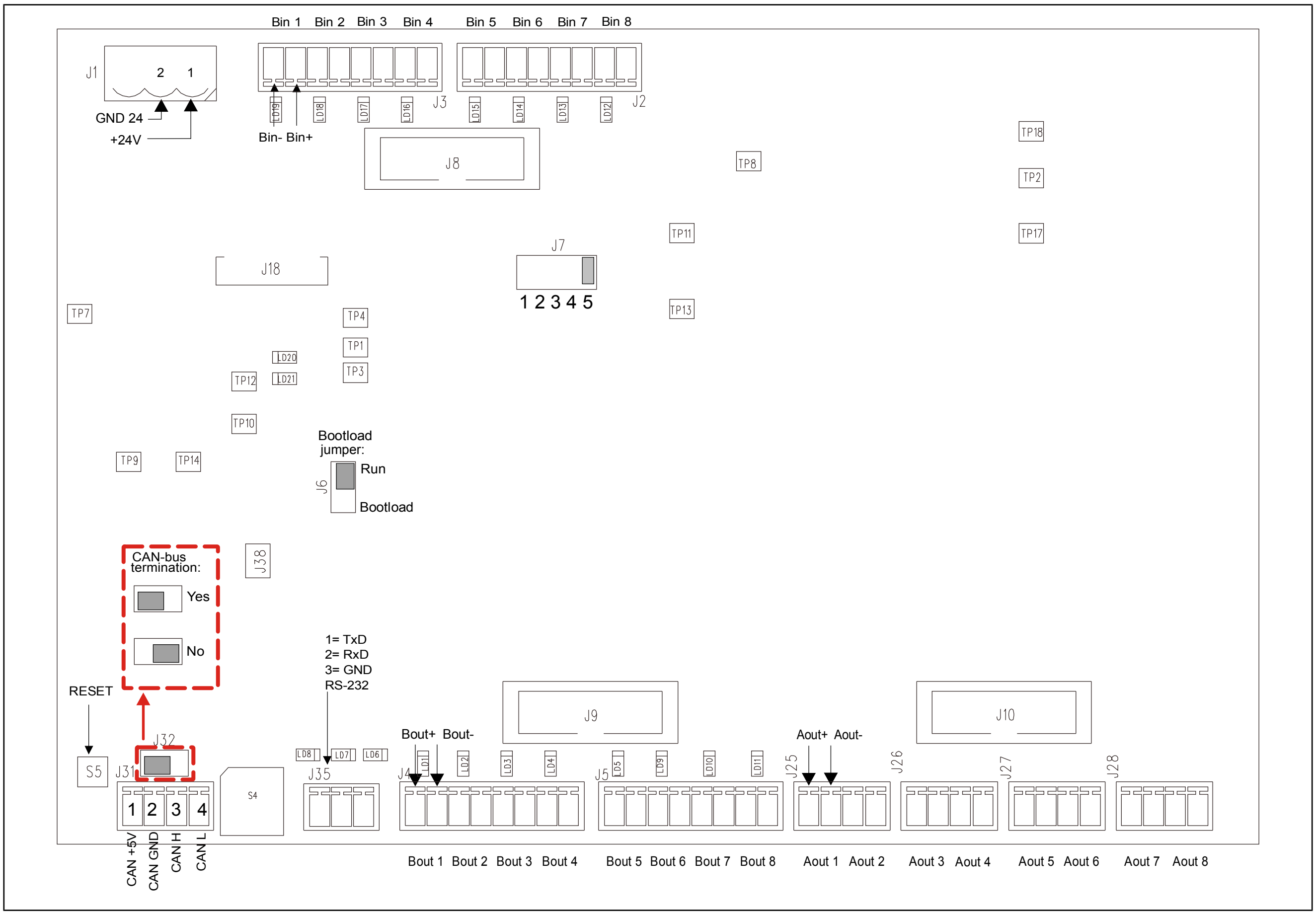


Fig. 7. Customer IO board, A4910040 V2.1.

11.6. DCPU (IO3 & IO4, IO3_2 & IO4_2) K03236

The board uses 24 V operating voltage, and it connects to the CAN-bus. Board electronics and all control signals are secured with an automatic fuse that disconnects the operating voltage when the load is too great (over 650 mA). The operating voltage is connected automatically when there is no more overload. The CAN address of these boards is 0 - 3.

Table 5. IO3 & IO4, DCPU board terminals.

Control	Purpose	IO6 connector
LAL	Lab.collector control, left	J19-1
LAR	Lab.collector control, right	J19-2

Control	Purpose	IO6 connector
Bin1	Lab.collector position 1	J18-2
Bin2	Lab.collector position 2	J18-3
Bin3	Lab.collector position 3	J18-4
Bin4	Lab.collector position 4	J18-5

Connections:

- J1, J3, J5, J6, J11 = 5-channel peak detector for kappa/brightness detectors
- J2 = Connection to LC100 consistency sensor
- J4 = CAN connection
- J7 = Programming/Running mode
- J18 = 4 binary inputs, for sample collector sensors
- J19 = 4 binary outputs, sample collector control signals (2 pcs)
- J26 = RS-232 connection
- J28 = Xenon power connection

Test points:

- TP2 = 5 V
- TP4 = AD-converter reference voltage 5.0 V
- TP8 = +12 V
- TP9 = -12 V
- TP10-11, TP23 = GND
- TP21 = +15 V
- TP22 = -15 V

LEDs:

- LD1, green, blinking when the board software is running
- LD2, red, CAN error
- LD3, green. Blinks once per second when CAN-communication is operating, goes off when communication stops.

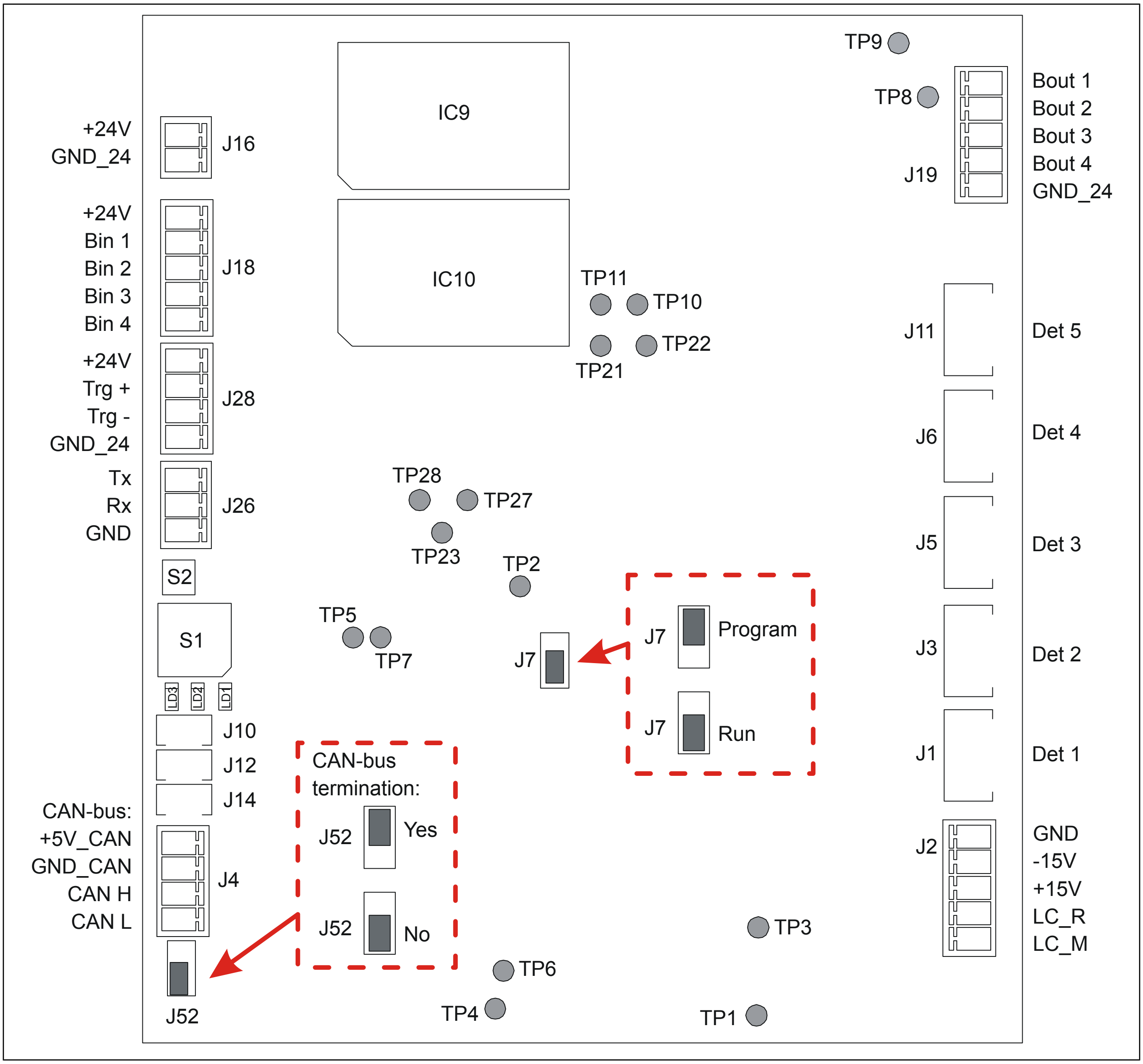


Fig. 8. DCPU board (IO3 & IO4).

11.7. IOCPU K00956

Operating voltage +24 V. The board connects to the CAN-bus, CAN address 0 - 2. Board electronics and all control signals are secured with an automatic fuse that disconnects the operating voltage when the load is too great (over 5 A). The operating voltage is connected automatically when there is no more overload.

Connections:

– J1, J3, J29 = 4 analog inputs, 4 - 20 mA/0 - 5 V/0 - 10 V, configured with jumpers
– J4 = CAN connection
– J5 = PT100 temperature sensor terminal
– J6, J10 = 8 binary outputs, valve control signals
– J11, J12, J14 = 6 binary inputs, sensor inputs
– J16, J17 = GND 24V
– J26 = RS232 connection
– Counter input (not in use)

Test points & jumpers:

– TP3: analog input operating voltage +12 V (TP27, GND 24)
– TP4: analog input logic voltage +5 V (TP27, GND 24)
– TP16, TP21: main voltage +5 V (TP23, GND)
– TP28: +24 V (TP27, GND 24)
– TP31: analog input reference voltage +5 V (TP27, GND 24)
– J7: programming/running mode, here set to Run

IO5

This board is located in the analyzer electronics box. It is connected to:

– pump control and speed setting (inverter),
– hot water temperature sensor,
– level transmitter(s), and
– follow-up sample buttons (on the front side of analyzer) and their light.

IO5 board connections:

- J4 = CAN-bus connection
- J7, J9 = mode selection
- J26 = RS232 connection
- J52 = CAN-bus termination
- S1 = CAN address selection
- S2 = board Reset

LEDs:

- LD1, green, blinking when the board software is running
- LD2, red, CAN error
- LD3, green, blinks once per second when CAN communication is operating; goes off when communication stops.

IO6

This board is located in a plastic box inside the Fiber-Shive module. It controls the Fiber-Shive module operations. CAN-bus is terminated on this board.

IO7

This board is located in the analyzer electronics box, and it controls an external sample processing unit (if any).

Table 6. IO5 - pump controls, neutralization valve control, follow-up buttons, temperature measurement; IO6 - Fiber-Shive module control signals.

Control	Purpose	IO5 connector
PSP 2	Measurement unit 2 pump speed	J6-1
PMP 2	Measurement unit 2 pump on/off	J6-2
PSP 1	Measurement unit 1 pump speed	J6-3
PMP 1	Measurement unit 1 pump on/off	J6-4
NTR1	Neutralization Valve Unit1	J10-3
NTR2	Neutralization Valve Unit2	J10-2
Cal_light	Calibration button light	J10-4
Line_light	Line select switch light	J10-4
Input	**Purpose**	**IO5 connector**
S2	Level transmitter (float), unit 2	J1
S1	Level transmitter (float), unit 1	J3
Temp	Warm water temperature	J5
LINE button	Calibration sample, line selection	J11-2
Cal_button 2	Calibration sample, reset	J11-3
Control	**Purpose**	**IO6 connector**
SSE	Shive Sample Empty	J6-1
SSF	Shive Sample Fiber	J6-2
SSS	Shive Sample Shive	J6-3
SSI1	Shive Sample In 1	J6-4
SSI2	Shive Sample In 2	J10-2
SSA1	Shive Sample Air 1	J10-3
SSA2	Shive Sample Air 2	J10-3
SSD	Shive Sample Dilution	J10-4

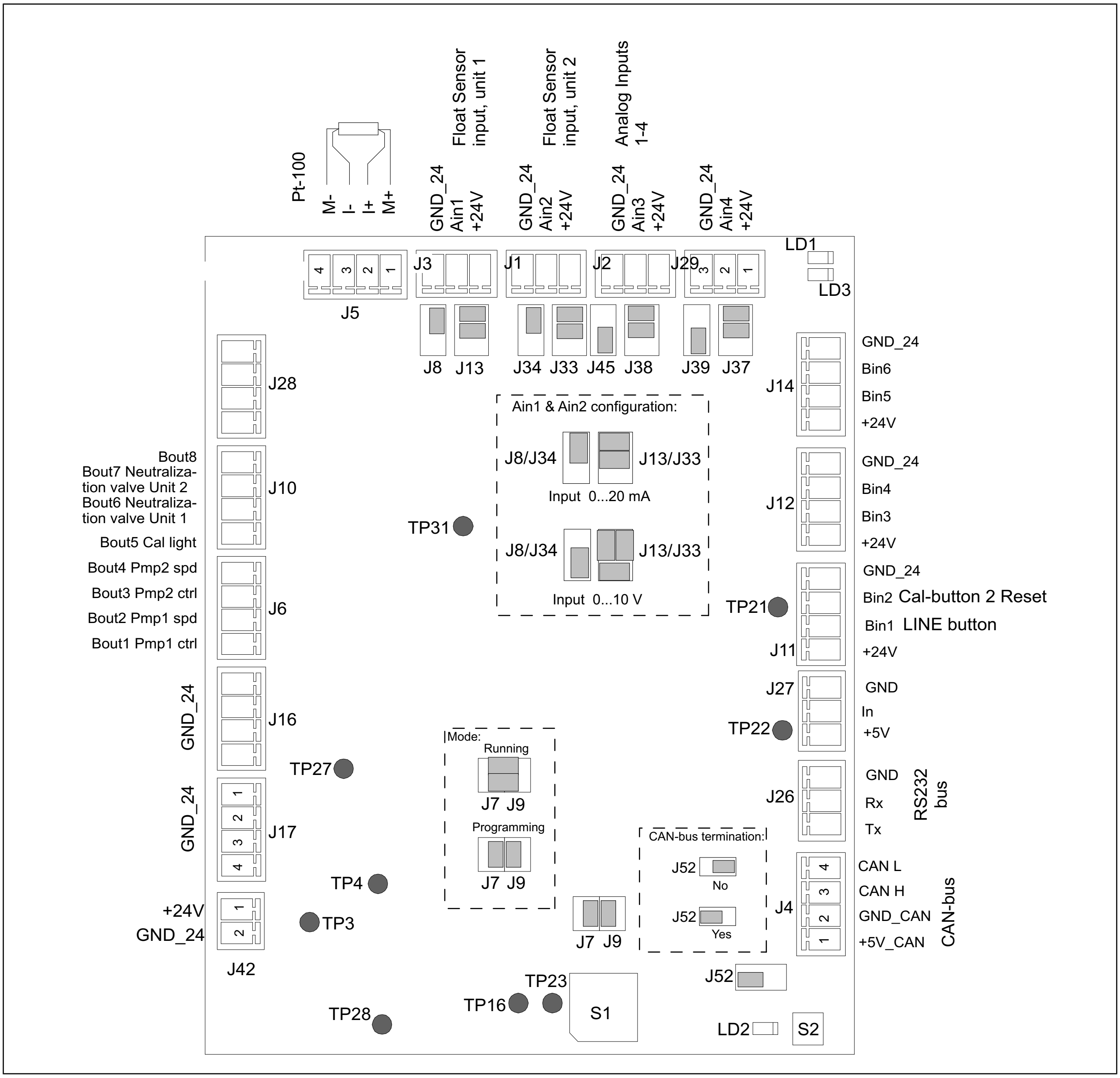


Fig. 9. IOCPU board (IO5).

11.8. Power-over-Ethernet module

The PoE module (Power over Ethernet) for industrial use enables common transmission of power and data in accordance with IEEE 802.3af via Ethernet. The compact module converts two standard Ethernet ports into two PoE ports. The plug & play device generates those +48 VDC from the +24 V module power supply required for Power-over-Ethernet according to IEEE 802.3af.

No configuration is required, and the module automatically detects connected devices. It is able to operate on 10 Mbps and 100 Mbps networks. Diagnostic and status indicators allow the user to monitor device status.

Connection of the supply voltage

Terminal	Meaning
1	Supply voltage +US1 (+24 V DC)
2	GND US1
3	Supply voltage +US2 (+24 V DC)
4	GND US2
5 - 8	Functional earth ground (optional)

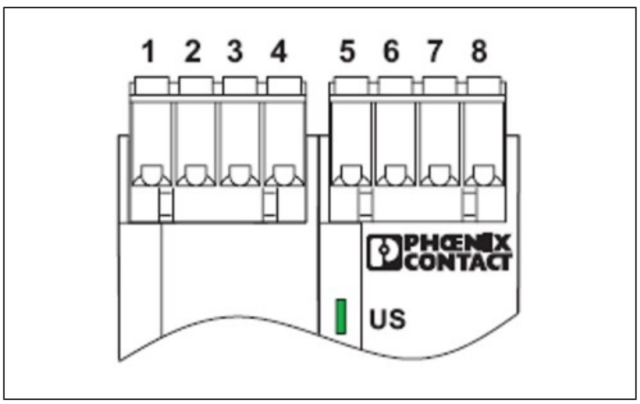


Fig. 10. Power-over-Ethernet terminal.

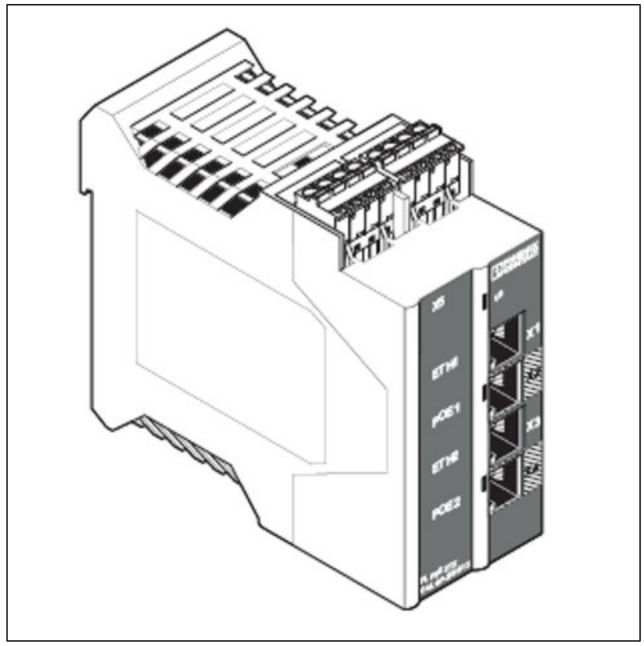


Fig. 11. Power-over-Ethernet module.

Notes

12. Maintenance

12.1. Monthly maintenance

During analysis:

- Check the condition and operation of Valmet Flexi operating terminal. Inspect analyzer's condition visually.
- Inspect the water, sample, and air connections.
- Make sure that the incoming air pressure is 4.5 bar (65 psi). The pressure is at its lowest for example during washes. If the pressure is too low, clean the filter and readjust the pressure if necessary. Check the operation of the pressure switch.
- Make sure that the pressure in the measurement loop is 2.5 bar (~ 36 psi) during measurement. If necessary, readjust the pressure.
- Make sure that all water is drained from the sample during the sample washes, and that a pulp pad forms on the wire screen. Inspect visually the condition of the wire screen.
- Make sure that water flows from the pump's both tubes (suction side & pressure side). If not, clean the pump check valve and make sure it operates correctly.
- Check the analyzer's internal tube connections and valves.
- Check the diagnostics, and if there are any error messages, find out what has caused them. Reset the error counters.
- Fill the cleaning chemical tank (Deconex 26 Plus).
- Check the dehumidifier cartridges of the brightness measurement cell.
- Do the deionized water quality test.
- Check the operation of ejectors.
- Inspect visually the condition of the lab. sample collector. Wash it if necessary. Also make sure that there are no leaks in any valves or tubes.
- Check the line results (Kappa, Brightness) and compare the "Water Cs" and "Water values" with earlier results.

12.2. Maintenance every 6 months

The analyzer must be stopped for these checks:

NOTE: Never switch analyzer's power off when an operating sequence is running! Always do a controlled shutdown as instructed in Chapter 3.

- Check the condition of the pump. If necessary, replace the pump seals.
- Remove the bottom screen and check its condition.
- Clean the analyzer on the outside.
- Clean the instrument air filter and water separator, replace if necessary.
- Check the operation of sampling device pressure switches.

12.3. Maintenance every 12 months

- Make a backup copy of the Flash memory.
- Replace the bottom screen of the washing chamber; see section Replacing parts, Washing chamber wire screen.
- Check the operation of the 2-way valves, replace if necessary.
- Replace the seals of MARS ball valves.
- Measure the leakage from samplers (L/min.).
  Valmet SD501: If the leakage is > 0.5 L/min. (~ 1 pint/minute), check the condition of the sampling piston and cylinder.
  Valmet SD502/SD505: If the leakage is > 50 mL/min. (1 pint/minute), check the condition of the sampling piston and the seal ring closest to the process flow.
- Check if process fluid is leaking out.
  Valmet SD501: Leaking between actuator and sampling device body.
  Valmet SD502/SD505: Open the top cover and make sure that the piston shaft seal does not leak. Also check the piston stroke length. If a leak is observed, the piston shaft seals must be replaced. This requires a process stop, as the sampling device must be removed from process.
- **Valmet SD501:** Check and clean the water nozzle.
- Check the sample piston and piston shaft seals. If necessary, replace the seals, piston, and cylinder.

12.4. Deionized water test

The quality of deionized water should be tested regularly in the laboratory with filter paper. The test should be done routinely every day, and additionally always when the water quality is suspect.

Test the purity of deionized water as follows:

1. Take two pieces of white filter paper (100 - 150 mm) and measure their brightness. Both pieces must have identical brightness.
2. Take 2000 mL (0.5 US gal) of the dionized water in a clean vessel.
3. Hold one piece of filter paper with pincers and dip it in the water. Take it out immediately and place it between two sheets of white blotter paper.
4. Filter the entire water volume through the second filter paper sheet using a Büchner funnel, and place this filter paper between another two sheets of white blotter paper.
5. Dry both filter paper sheets with the method used for the mill's brightness samples. No under-/over-drying!
6. Analyze the brightness of both filter papers. They should be nearly identical: the brightness of the paper used for filtering must not be more than 0.2% lower than the brightness of the sheet that was only dipped in the water.

Example of suitable water: water used in the recovery boiler, prepared through partial/complete demineralization (e.g. in resin exchanger) of chemically purified water.

12.5. Cleaning and checking the water & air module

Check and clean the water filter at least once a month. Replace the filter cartridge when necessary.

Check the air filter once a month and drain out any water that may have collected inside it. If necessary, replace the cartridge.

NOTE: Replace both filter cartridges at least once a year!

Cleaning the water filter:

1. Close the water inlet by its shut-off valve, and release pressure from the filter.
2. If the filter bowl contains water, open the drain valve on the bottom of the bowl and drain the water out.
3. Release the bowl fastening collar by opening the wing nut (Fig. 1, step A).
4. Turn the bowl anti-clockwise and pull it off (step B).
5. Turn the bowl upside down and remove the filter cartridge (step C).
6. Clean the filter or replace it with a new one.
7. Place the filter cartridge back into the bowl. Make sure that seal ring is properly in position.
8. Reassemble in reverse order.

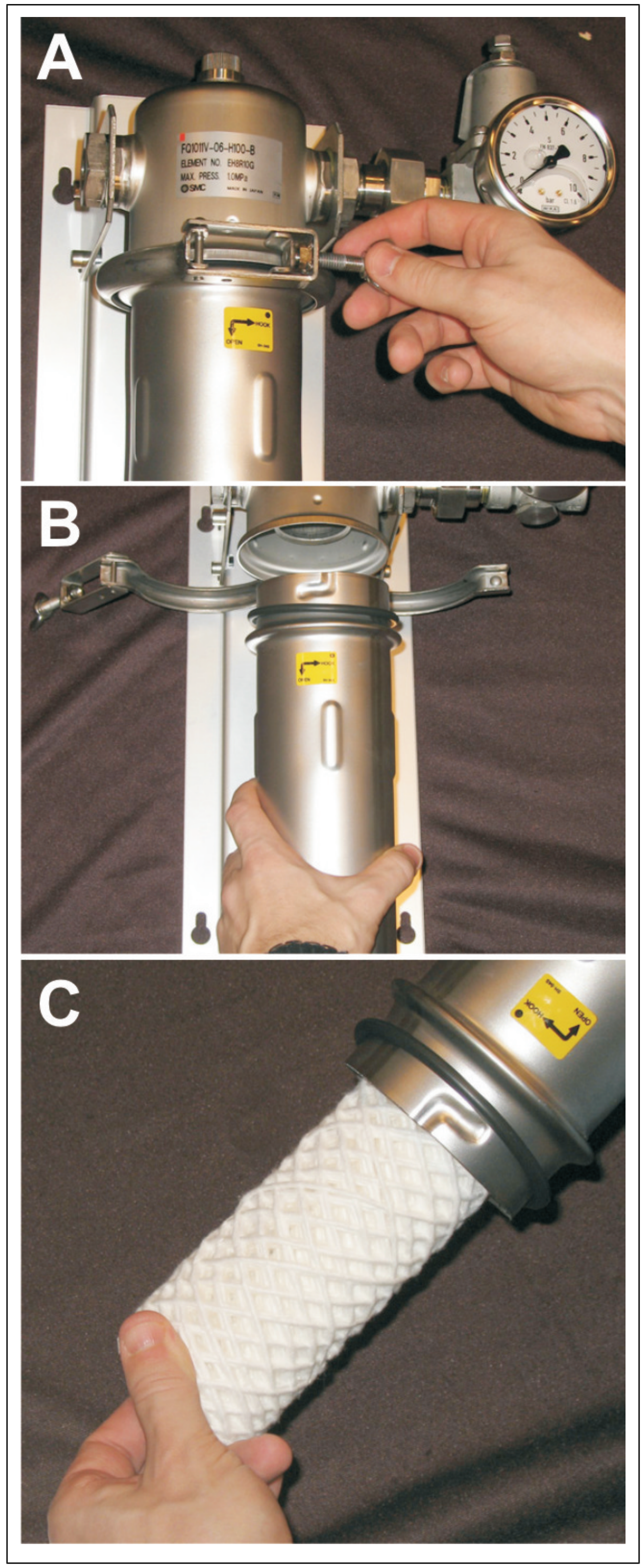


Fig. 1. Cleaning the water filter.

Cleaning the air pressure regulator (K05156):

1. Close the air inlet by its shut-off valve, and release pressure from the filter.
2. Pull the latch down (Fig. 2, step A 1.) and turn the filter bowl (2.) until the two lines marked on the bowl match with the center line of the body (3.).
3. Pull the bowl down so that it comes loose.
4. Open the nut on the lower end of the filter cartridge (step B, part 1) so that the nut and cartridge (part 2) can be pulled out.
5. Clean or replace the cartridge. Reassemble in reverse order.

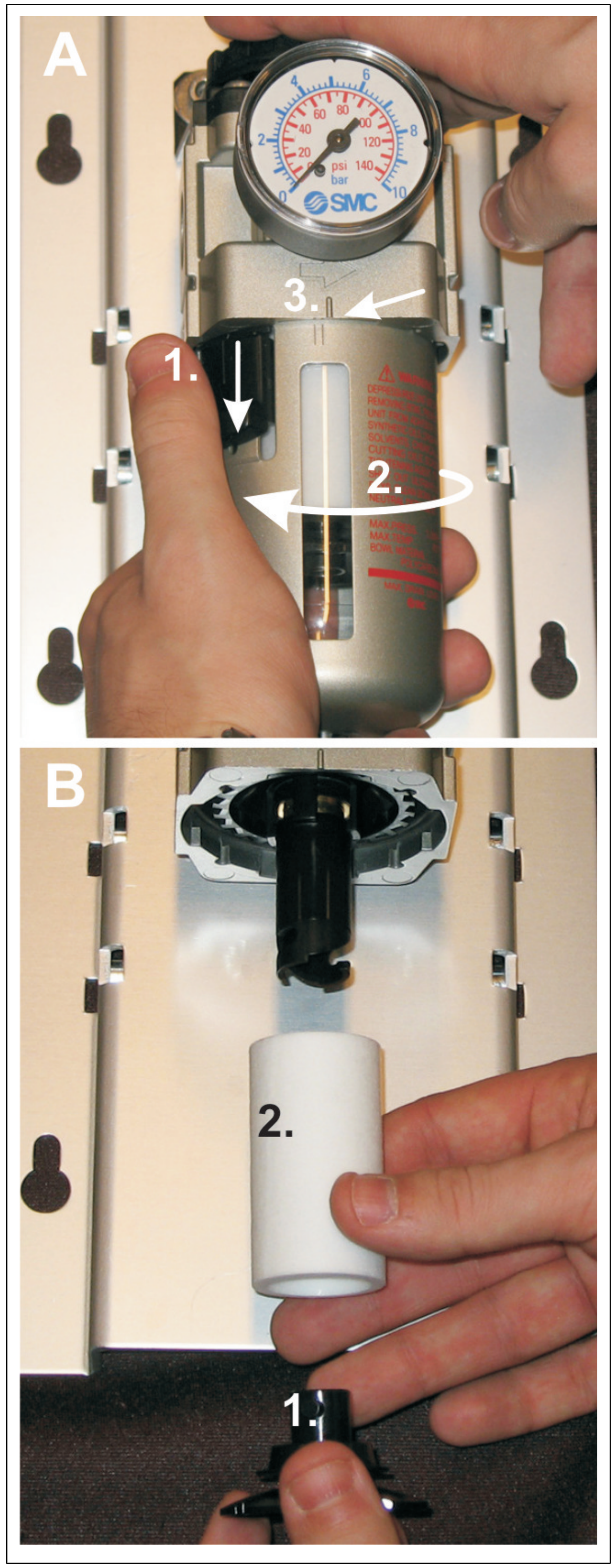


Fig. 2. Cleaning the pressure regulator.

12.6. Cleaning the kappa measurement cell

If the measurement cell is dirty, the analyzer may show higher kappa results than it should. Before cleaning, do the following:

- Make sure that the cleaning chemical tank contains chemical.
- Reduce the washing interval (= number of analyses between washes) by setting a smaller "Chemical washing cycle" value ("Config" -› "Analyzer parameters"). You can also set the chemical valve to stay open longer (parameter "Chemical + water"), to add more cleaning chemical during the washing sequence.

NOTE: If the number of washes and/or chemical dosage is increased, remember that the cleaning chemical tank must be refilled more often!

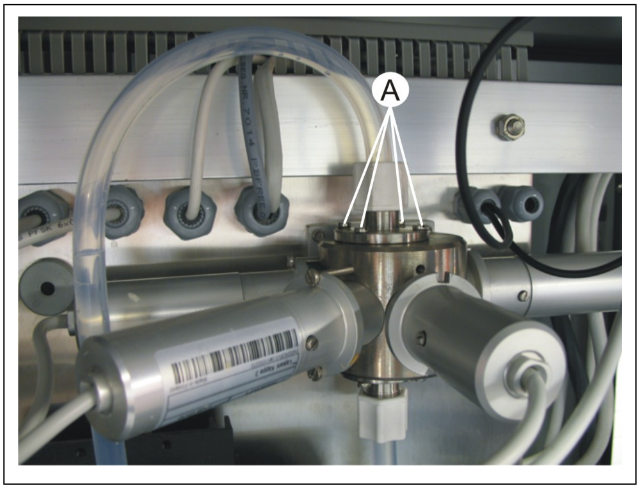


Fig. 3. Cleaning the Kappa measurement cell.

Tools: round bottle brush, diam. 10 - 20 mm (about 1/2"); protective goggles; screwdriver.

NOTE: Always use protective goggles to prevent the chemical from coming into contact with the eyes!

Cleaning the measurement cell:

1. Set the analyzer to service mode: "Diagn" -› "Service mode". Set parameter 1 "Kappa service mode" = ON.
2. Disconnect the tube from measurement cell.
3. Remove the 4 screws from the upper part of the cell (Fig. 3, step A). **Be careful not to drop the screws into the cell!**
4. Wet the brush in the cleaning chemical tank, and clean the walls and lenses of the cell with the brush.
5. Rinse the brush with water and repeat step 4.
6. Close the measurement cell. Make sure that the O-ring is properly in position.
7. Set Service mode OFF again.
8. Return to the main display. Go to "Config" -› "Sequence programs" -› "Sequence" -› "Wash chamber washing", then choose "Test unit 1" [F3] or "Test unit 2" [F5] depending on the analyzer model (One cabinet/Two cabinet). Wash the measurment loop twice.

12.7. Configuration of Moeller inverter

The inverter (Fig. 4 or 5) outputs 3-phase voltage for the pump, and it can also be used to change the pump speed. The inverter is located in the connection box, on the left side of the analyzer. If the analyzer has two measurement units (= Two Cabinet model), there is a separate inverter for the pump in each unit – remember to check the settings of both inverters separately!

NOTE: If Sweep module is installed, pump speed is slower during analysis.

Operation, old model (Fig. 4):

Select the source of frequency data, 02 = Digital input:

1. Press PRG.
2. Press arrow DOWN until the display reads A---
3. Press PRG.
4. The display reads A001.
5. Press PRG.
6. The PRG LED lights up, and address value A001 is shown. Change the value into 02.
7. Press ENTER to accept. The display now reads A001.

Frequency 1, when controls are Pump ON, Pump speed OFF

1. Press arrow UP until address A020 is shown.
2. Press PRG.
3. Change the value to: Sweep = 30, Single = 50.
4. Press ENTER.

Frequency 2, when controls are Pump ON, Pump speed ON

1. Press arrow UP until address A021 is shown.
2. Press PRG.
3. Change the value into 50.
4. Press ENTER.

Changing the deceleration time

1. Press 3 times PRG, until the display reads A---
2. Press arrow DOWN until address F003 is shown.
3. Press PRG.
4. Change the value into 1.0.
5. Press ENTER.

Changing the acceleration time

1. Press arrow DOWN until address F002 is shown.
2. Press PRG.
3. Change the value into 1.0.
4. Press ENTER.

Fig. 4. Inverter, old model.

Operation, new model (Fig. 5):

To edit parameter values, go to the parameter menu as follows:

1. Press BACK/RESET.
2. Press arrow DOWN until the blinking cursor points to text PAR (on the left of display).
3. Press OK.
4. Scroll in the parameter menu using arrows RIGHT > and LEFT <, for example P1.1 > P2.1 > P3.1 etc.
5. Select parameters in a menu with arrows UP and DOWN, for example P2.1 ∧ P2.2 ∨ P2.3, etc.

Select frequency data source, Digital input 1:

1. Go to parameter P3.9 as instructed above.
2. Press OK, and the parameter value blinks in the display.
3. Using arrows UP and DOWN change the value to 1.
4. Press OK.

Second frequency data source, Digital input 3:

1. Go to parameter P3.10 as instructed above.
2. Press OK, and the parameter value blinks in the display.
3. Using arrows UP and DOWN change the value to 3.
4. Press OK.

Changing the acceleration time:

1. Go to parameter P6.5 as instructed above.
2. Press OK, and the parameter value blinks in the display.
3. Using arrows UP and DOWN change the value to 1.0. Choose the digit to edit with arrows RIGHT and LEFT.
4. Press OK.

Changing the deceleration time

1. Go to parameter P6.6 as instructed above.
2. Press OK, and the parameter value blinks in the display.
3. Using arrows UP and DOWN change the value to 1.0. Choose the digit to edit with arrows RIGHT and LEFT.
4. Press OK.

Motor settings:

Check the values from the motor type plate and set the following parameters:

– P7.1 = motor current = 1.65 A
– P7.2 = current limit 1.5 x 1.65 A = 2.48 A
– P7.3 = motor speed = 2780 rpm
– P7.4 = motor power coefficient = 0.82

Frequency 1, when controls are Pump ON, Pump speed OFF:

1. Go to parameter P10.2 as instructed above.
2. Press OK, and the parameter value blinks in the display.
3. Using arrows UP and DOWN change the value as follows:
   - with Sweep module: 30
   - no Sweep module: 50
4. Press OK.

Frequency 2, when controls are Pump ON, Pump speed ON:

1. Go to parameter P10.4 as instructed above.
2. Press OK, and the parameter value blinks in the display.
3. Using arrows UP and DOWN change the value to 50.
4. Press OK.

Fig. 5. Inverter, new model.

After setting the parameters:

1. Press BACK/RESET.
2. Press arrow UP until the blinking cursor points to text MON (on the left of display).
3. Press OK. When the motor is operating, the display will show the motor speed.

If you cannot access all of the parameters:

1. Go to parameter P1.1 and press OK. This setting determines which parameters the user is allowed to access.
2. Change the parameter value to 0 (zero) with arrow DOWN.
3. Press OK.
4. Now you should be able to check and edit the other parameters as instructed above.

12.8. Fiber Image module, consistency adjustment

Always regulate the shive measurement consistency first, and only then the fiber consistency.

SSS valve is not needed for shive and fiber consistency adjustment. Shive measurement consistency is adjusted with the SSD valve. This valve also influences the fiber measurement consistency, but the actual adjustment is done with valve SSF. When the valve screws are turned clockwise the shive and fiber consistencies will be higher; turning the screws anti-clockwise gives a lower consistency.

NOTE: If the Fiber Image module contains both the HD Fiber measurement unit and Fiber-shive measurement unit, fiber measurement consistency must be adjusted according to the needs of the Fiber-shive measurement unit!

Adjusting shive measurement consistency

Basic settings of valves:

– SSS fully open,
– SSD almost fully open.

1. Watch the fiber measurement consistency, either from the shive measurement IO test page "Shive sample consistency" (Fig. 7), or alternatively from the result database of the IMG software. The consistency reading must be in the range 0,015 – 0,030 %, a good average for the different channels is 0,020 - 0,025 %.
2. Adjust the consistency with the SSD valve:
   shive consistency too high => open the SSD valve more
   shive consistency too low => close the SSD valve more
3. Note that samples from the different sample lines may give different consistencies. If the average consistency during the measurement cycle is > 0.035 % or < 0.007 %, and the error level of the "Shive Cs low/high" error is 3 or 4, the sample analysis results will not be accepted.

NOTE: When the HD Fiber measurement unit is included, the error level of errors "Fiber Cs low/high" and "Shive Cs low/high" must be set to level 1. Error levels are set on the "Error status" page for the Fiber Image module (Fig. 9).

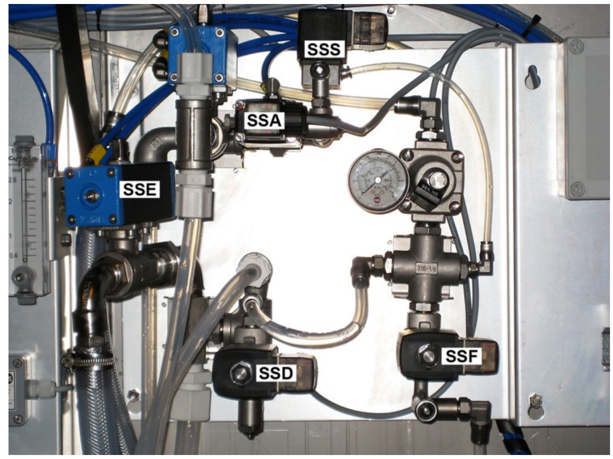


Fig. 6. Valves of Fiber Image module.

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Fiber image module
IO-test                                    Page 478

SSI, Shive Sample Inlet......(1) = Off
SSS, Shive Sample Shive......(2) = Off
SSF, Shive Sample Fiber......(3) = Off
SSE, Shive Sample Empty......(4) = On
SSD, Shive Sample Dilution...(5) = Off
SSA, Shive Sample Air........(6) = Off
SSH,Shive Sample Hires..... (7) = Off


Fiber sample consistency  =  0.000000  %
Shive sample consistency  =  0.000000  %


Waiting for sample   Active line:  1.
```

Fig. 7. IO test page of Shive measurement.

Adjusting fiber consistency for Fiber-shive measurement unit

Basic settings of valves:

– SSS fully open,
– SSD almost fully open,
– SSF about half open.

1. Watch the fiber measurement consistency, either from the shive measurement IO test page "Fiber sample consistency" (Fig. 7), or alternatively from the result database of the IMG software. The consistency reading must be in the range 0.0015–0.0030 %, a good average for the different channels is 0.0020–0.0025 %.
2. Adjust the consistency with the SSF valve:
   fiber consistency too high => open the SSF valve more
   fiber consistency too low => close the SSF valve more
3. Note that samples from the different sample lines may give different consistencies. If the average fiber consistency during the measurement cycle is > 0.0035 % or < 0.0007 %, and the error level of the "Fiber Cs low/high" error is 3 or 4, the sample analysis results will not be accepted.

NOTE: When the HD Fiber measurement unit is included, the error level of errors "Fiber Cs low/high" and "Shive Cs low/high" must be set to level 1. Error levels are set on the "Error status" page for the Fiber Image module (Fig. 9).

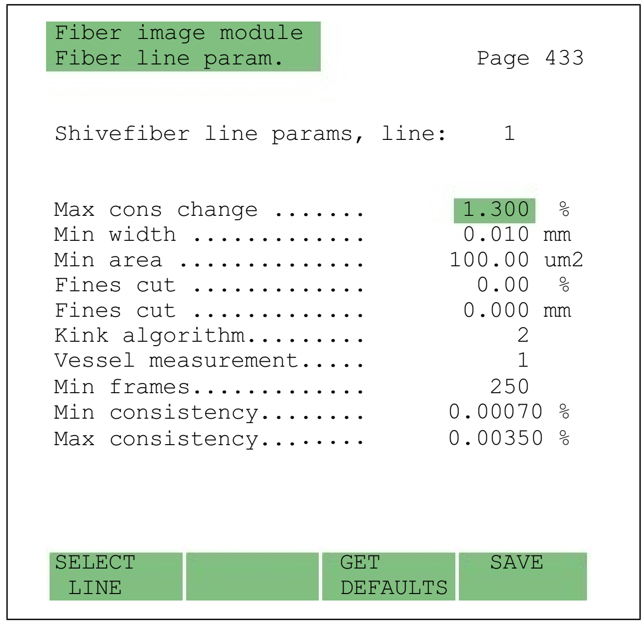


Fig. 8. Consistency limits for fiber and shive analysis.

Adjusting fiber consistency for HD Fiber measurement unit

Basic settings of valves:

– SSS fully open,
– SSD almost fully open,
– SSF about one third opened.

1. Watch the fiber measurement consistency, either from the shive measurement IO test page "Fiber sample consistency" (Fig. 7), or alternatively from the result database of the IMG software. The consistency reading must be in the range 0.0015–0.0030 %, a good average for the different channels is 0.0020–0.0025 %.
2. Adjust the consistency with the SSF valve:
   – fiber consistency too high => open the SSF valve more
   – fiber consistency too low => close the SSF valve more
3. Note that samples from the different sample lines may give different consistencies. If the average fiber consistency during the measurement cycle is > 0.0035 % or < 0.0007 %, and the error level of the "Fiber Cs low/high" error is 3 or 4, the sample analysis results will not be accepted. The consistency limits for fiber and shive analysis can be edited on the Line parameters page for the Fiber Image module (Fig. 8).

NOTE: When the HD Fiber measurement unit is included, the error level of errors "Fiber Cs low/high" and "Shive Cs low/high" must be set to level 1. Error levels are set on the "Error status" page for the Fiber Image module (Fig. 9).

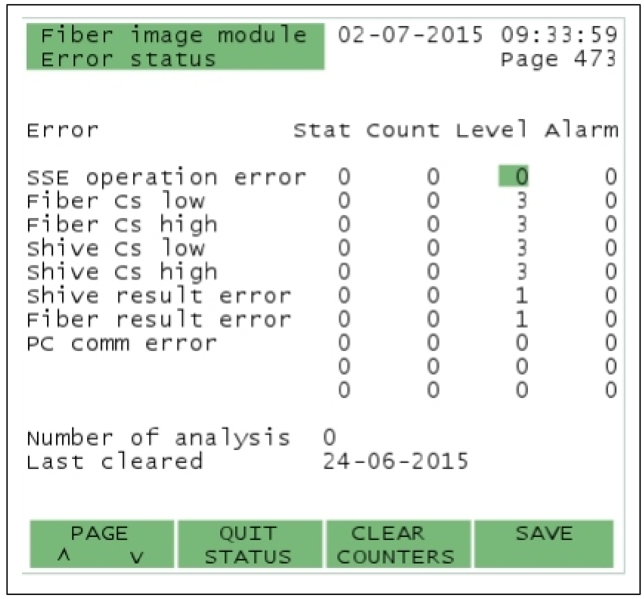


Fig. 9. Setting the error level.

12.9. Fiber-shive measurement unit optics W13499

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Open the optics fastening nuts (Fig. 10, part 1).
3. Pull the camera (part 2) out from the measurement cell (part 3).
4. Clean the lenses (Fig. 11, part 4) with a cleaning cloth and for example Deconex 26 cleaning chemical.
5. Reassemble in reverse order.

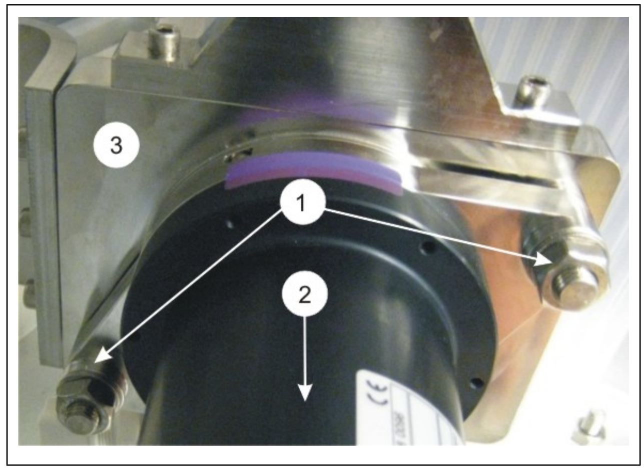


Fig. 10. Cleaning the Fiber-Shive measurement unit optics.

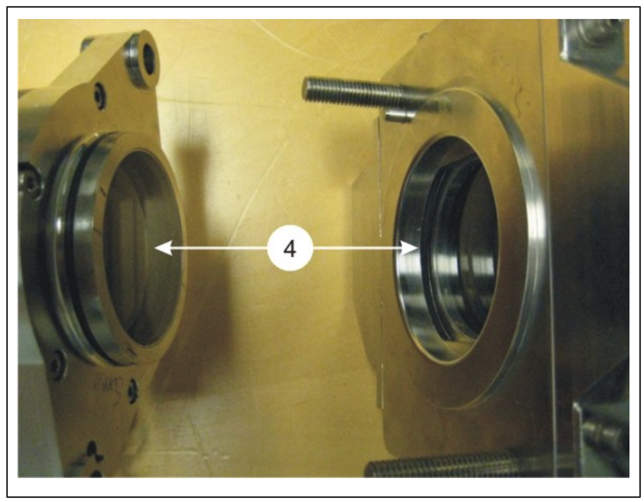


Fig. 11. Cleaning the lenses.

12.10. Tuning and calibration of Fiber-shive measurement unit optics

The optics assembly of the module (Fig. 12) has been tuned and calibrated by manufacturer. If necessary, it can be checked and the tuning and calibration repeated also in the field.

Before tuning or calibration, set the Fiber Image module to service mode. Select "Module" -› "Fiber Image module" -› "Diagn.info" -› "Service mode/info".

Tuning (steps 1–4) is necessary to obtain high-quality images. The image must be crisp and sharp, with uniform illumination and no shadows in the image area.

Calibration (step 5) involves determining the pixel size of the camera (millimeters) in both horizontal and vertical direction (X and Y).

Steps in tuning and calibration:

1. Image sharpness (tuning)
2. Uniformity of illumination (tuning)
3. Adjusting the exposure time (tuning)
4. Optics aperture (tuning)
5. Calibration of camera (calibration)

Taking a picture

Connect a separate monitor, keyboard and mouse to the Fiber Image module PC; if these are not available, set up a connection from your service PC to the Fiber Image module PC so that you can see the camera images.

On the service PC, start Oeclient and set the IP address of the Fiber Image module PC ("Oeclient" -› "Settings" -› "Network" -› "Connection" -› "TCP/IP Servers". Use Oeclient to make sure that the camera is able to capture images: "IMG" -› "Fiber" -› "Camera" -› "Display" and then press "Video".

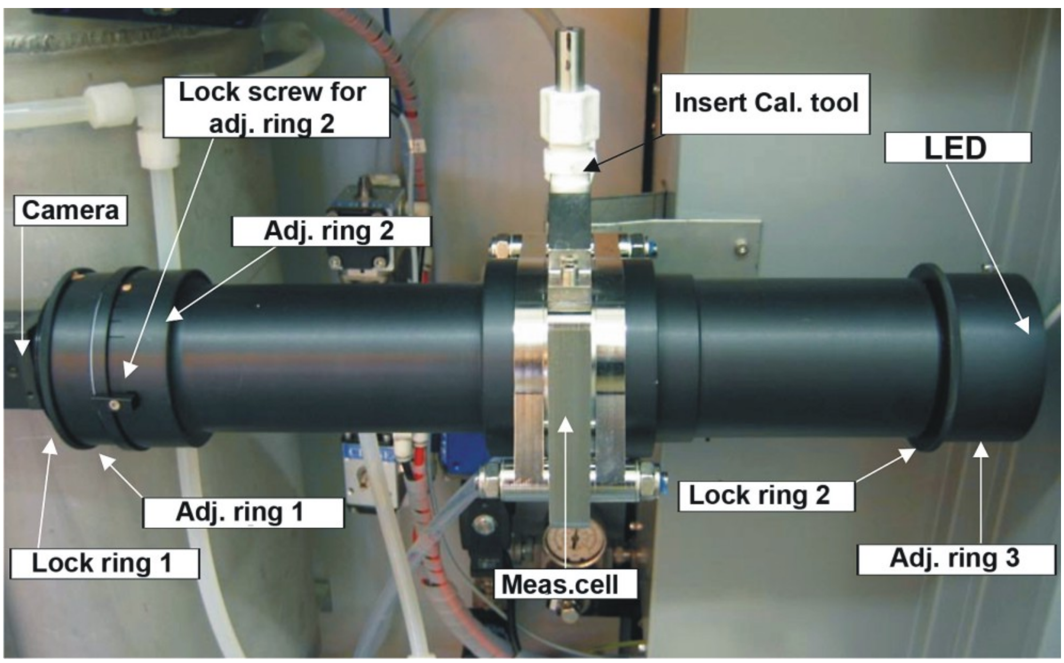


Fig. 12. Measuring cell and optics. Adj. ring 1 – 3 = optics adjustment rings, Lock ring 1 – 2 = optics lock rings, Lock screw = lock screw for lock ring 2, Insert Cal. tool = the arrow indicates where to insert the reference tool.

Tuning the optics

1. Adjusting image sharpness (tuning)

Adjust the image sharpness using either reference tool 1 (Fig. 13) or fibers. Using fibers will usually give a sharper image.

1. Fill the sample loop of the module with the SSD valve until the measurement cell is full of water. Also see the camera image to ensure that the cell is full.
2. When using the reference tool 1, wash it for example with a dishwashing liquid (this will reduce the number of air bubbles). Insert the reference tool or a small amount of fibers inside the measurement cell (Fig. 14). Move the tool back and forth until all air bubbles trapped in its holes disappear.
3. Select "Fiber" -› "Camera" -› "Calibration" and press "Start". Loosen the optics lock ring 1 and then turn adjustment ring 1 to change the camera position until the tool or fibers in the measurement cell are shown sharply on the screen, with clear and crisp outlines. Hold the camera with one hand while turning the adjustment ring, so that the image does not rotate on the screen. The ”Unsharpness” parameter of the camera calibration can be used for help while adjusting image sharpness. If no air bubbles are attached to the reference tool, the "Unsharpness" reading must be < 0.08.
4. Adjust the image until it gives the maximum visual sharpness and the outline of the reference tool/fibers are clear and crisp on the screen. This will ensure that the fibers have a good contrast against the background.
5. Turn the lock ring 1 against adjustment ring 1 to lock it. Remove the reference tool from the measurement cell, or rinse out the fibers.

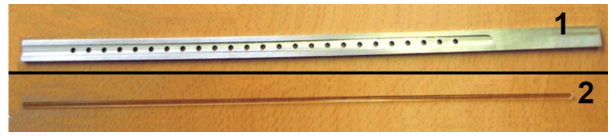


Fig. 13. Reference tools, 1 (metal) & 2 (glass).

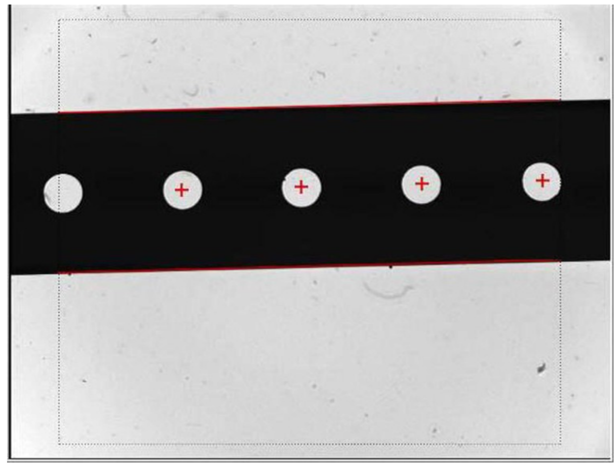


Fig. 14. Reference tool 1 inserted into the cell.

2. Adjusting the uniformity of illumination (tuning)

1. Loosen the optics lock ring 2.
2. Turn adjustment ring 3 and adjust the location of the LED light source until dark shadows disappear from the edges of the image and the light is evenly distributed throughout the image.
3. Turn the lock ring 2 against adjustment ring 3 to lock it.

3. Adjusting the exposure time (tuning)

When the measurement cell contains only water, take a new background image. The "median grey level" value of the background image must be in the range 170–180. You can get changes in the "median grey level" by changing the exposure time. Exposure time can be changed from the LED controller board (Fig. 15) by turning the potentiometer screw.

1. Select "IMG" -› "Fiber" -›"Camera" -› "Display" (Fig. 16).
2. Press "Display" and "Video" and "Quality", and you will also see the "median grey level" value on the left side of the picture. Now you can adjust the "median grey level" from the LED board and watch the changes in real time.
3. The image must not contain large, clearly visible fibers or dirt particles if the cell is not clean, clean it and try again
4. The "median grey level" value should be 170–180. If the "median grey level" is < 170, turn the potentiometer screw anti-clockwise until the "median grey level" reading is within the acceptable range, and then take a new background picture (step 2).
5. If the "median grey level" is > 180, turn the potentiometer screw clockwise until the "median grey level" reading is within the acceptable range, and then take a new background picture (step 2).
6. Select "Fiber" -› "Visualize" -› "Advanced" -› "Backgr" (Fig. 17). The software will automatically take a new background image.
7. Select "Fiber" -› "Background". This page shows the values for the new background image.

Fig. 15. Adjusting the median grey level value on the LED board.

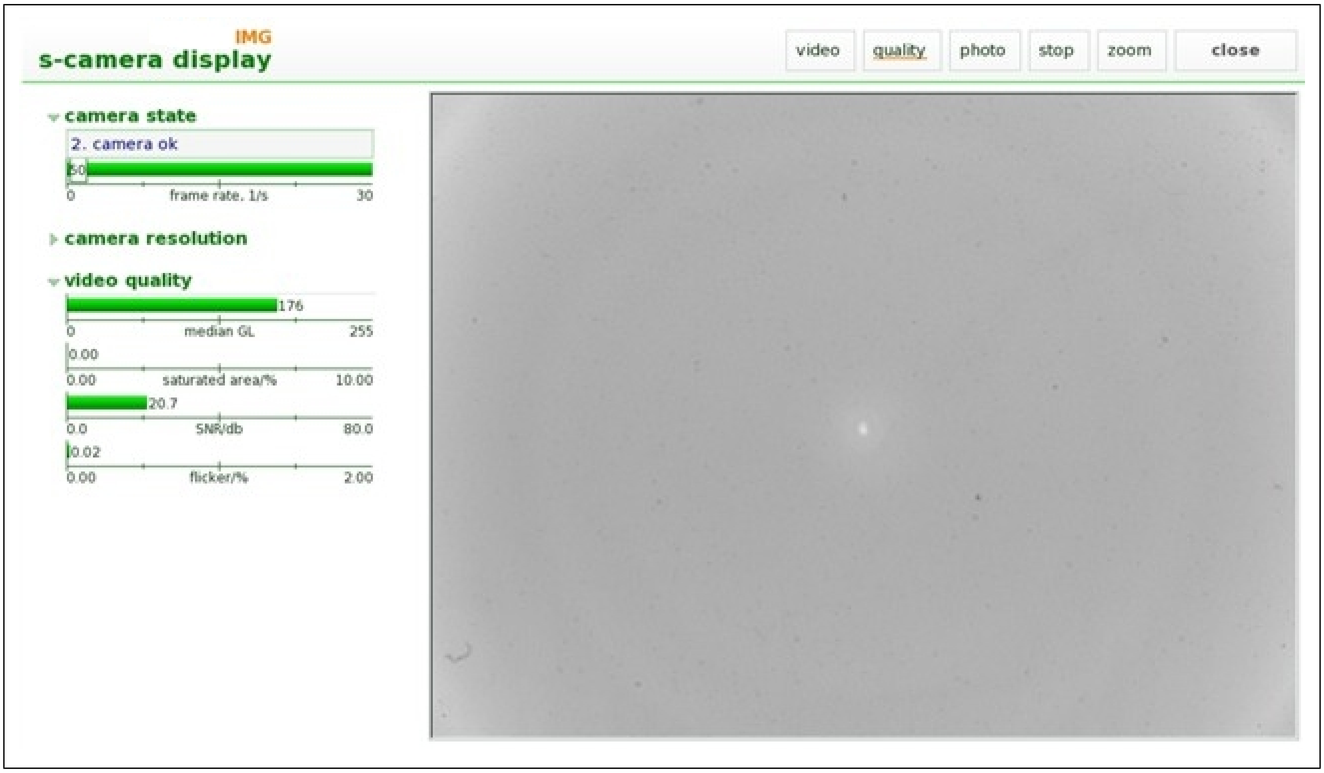


Fig. 16. Adjusting the median grey level value in the "Camera display" window.

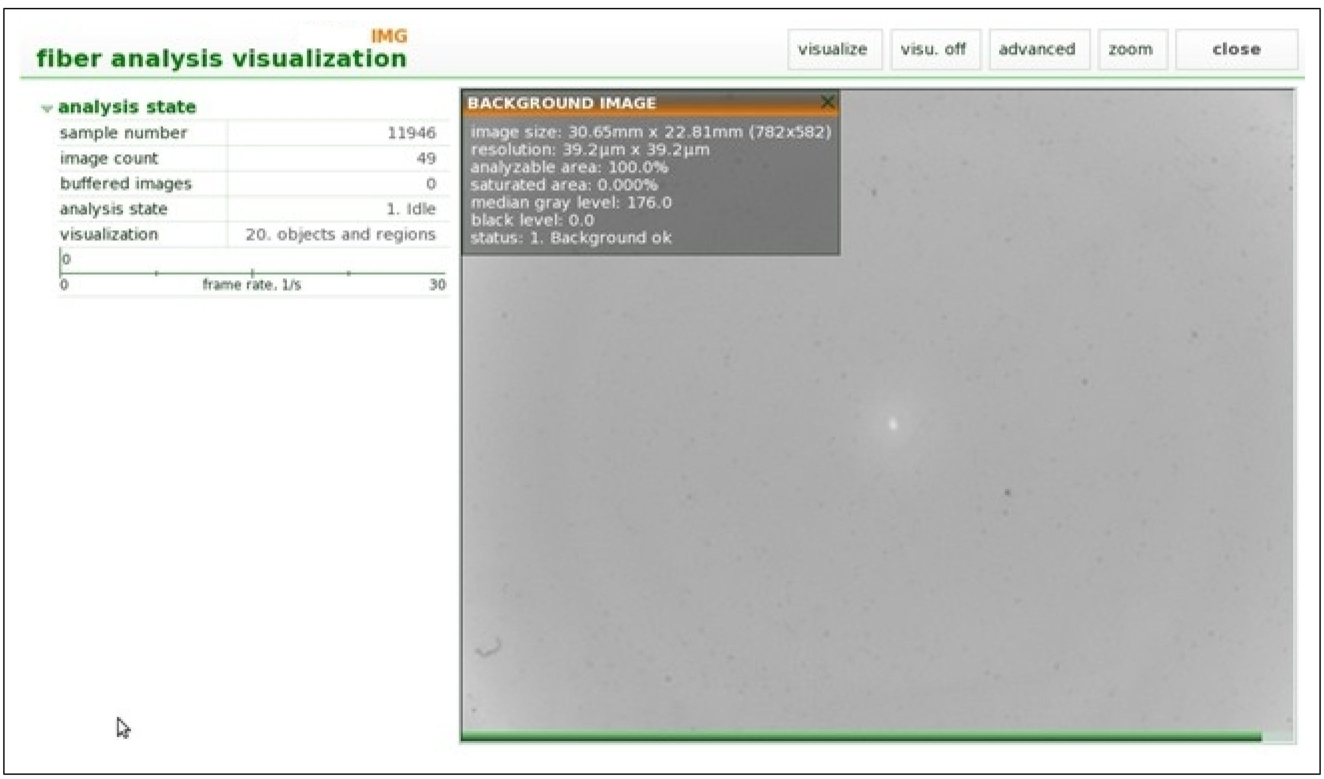


Fig. 17. "Fiber analysis background image" window.

4. Adjusting the optics aperture (tuning)

1. Insert reference tool 2 (glass rod) into the optics (Fig. 18).
2. Select "Fiber" -› "Camera" -› "Calibration" (Fig. 19).
3. On the line "Calibration" select "3. pupil adjustment". Then press "Start". The bright line visible in the middle of the reference tool is measured. Watch the monitor to make sure that the tool is visible and the calibration software locates it. If necessary, you can turn the camera by rotating adjustment ring 1 while the lock ring 1 is locked in position. The camera will now rotate but its distance from the optics does not change. If necessary, select "tool horizontally" and the software will try to locate the tool along the Y-axis of the camera instead of the X-axis.
4. Loosen the lock screw of adjustment ring 2 and turn the ring until the "stripe width %" is 3.90–4.10%.
5. Lock the screw of adjustment ring 2.
6. Ensure that the "stripe width %" value did not change while the ring was locked, then click "Stop".
7. If the edges of the image have gone blurry, return to step "Adjusting the uniformity of illumination".
8. Remove reference tool 2 from the measurement cell.

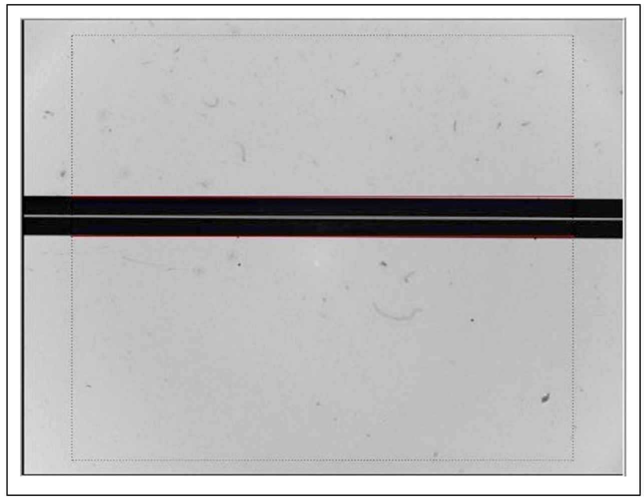


Fig. 18. Reference tool 2 inserted into the cell.

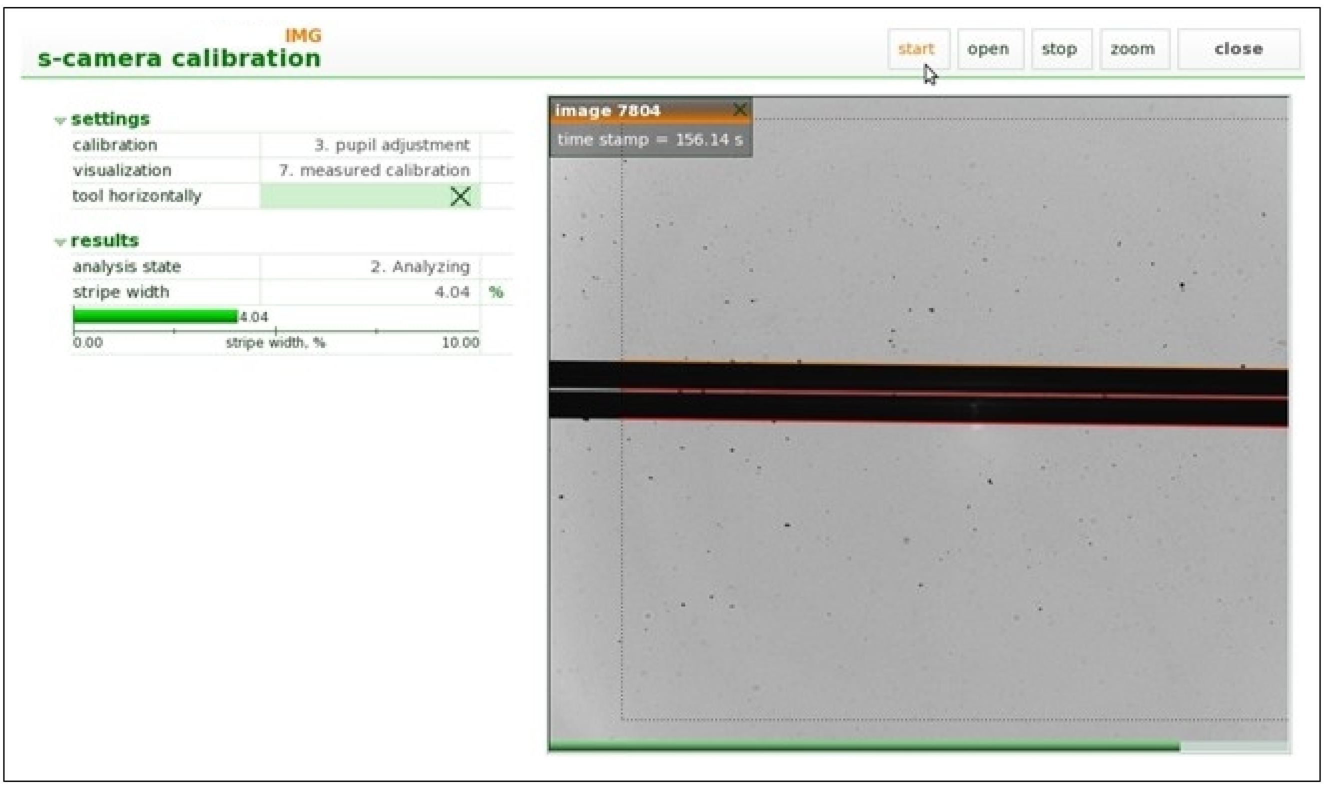


Fig. 19. "Pupil adjustment" window.

5. Calibration of camera (calibration)

1. The camera is calibrated using reference tool 1. Wash the tool before use for example with a dish-washing liquid (this will reduce the number of air bubbles).
2. Insert reference tool 1 into the measurement cell (Fig. 18) and move it back and forth until all air bubbles trapped in its holes disappear. During calibration there must be no bubbles on the tool edges or in its holes!
3. Select "IMG" -› "Fiber" -› "Camera" -› "Calibration" (Fig. 20) and make sure that "Tool width" = 8 mm and "hole distance" = 6 mm.
4. Press "Start". Watch the monitor to make sure that the tool is visible and the calibration software locates it. If necessary, you can turn the camera by rotating adjustment ring 1 while the lock ring 1 is locked in position. The camera will now rotate but its distance from the optics does not change. If necessary, select "Tool horizontally" and the software will try to locate the tool along the Y-axis of the camera instead of the X-axis.
5. When the software has located the edges of the tool and the centers of the holes in it, click "Accept" to save the calibration. The location of at least four holes must be marked before the calibration can be accepted.
6. When the software has accepted the calibration, click "stop" and remove the tool tool from the cell. Connect the sample outlet tube again to the measurement cell.
7. Remember to put the Fiber Image module back to the normal operating mode (Service mode off).

NOTE: If the LED location, aperture size or distance is changed, the tuning of aperture and camera calibration must be done again!

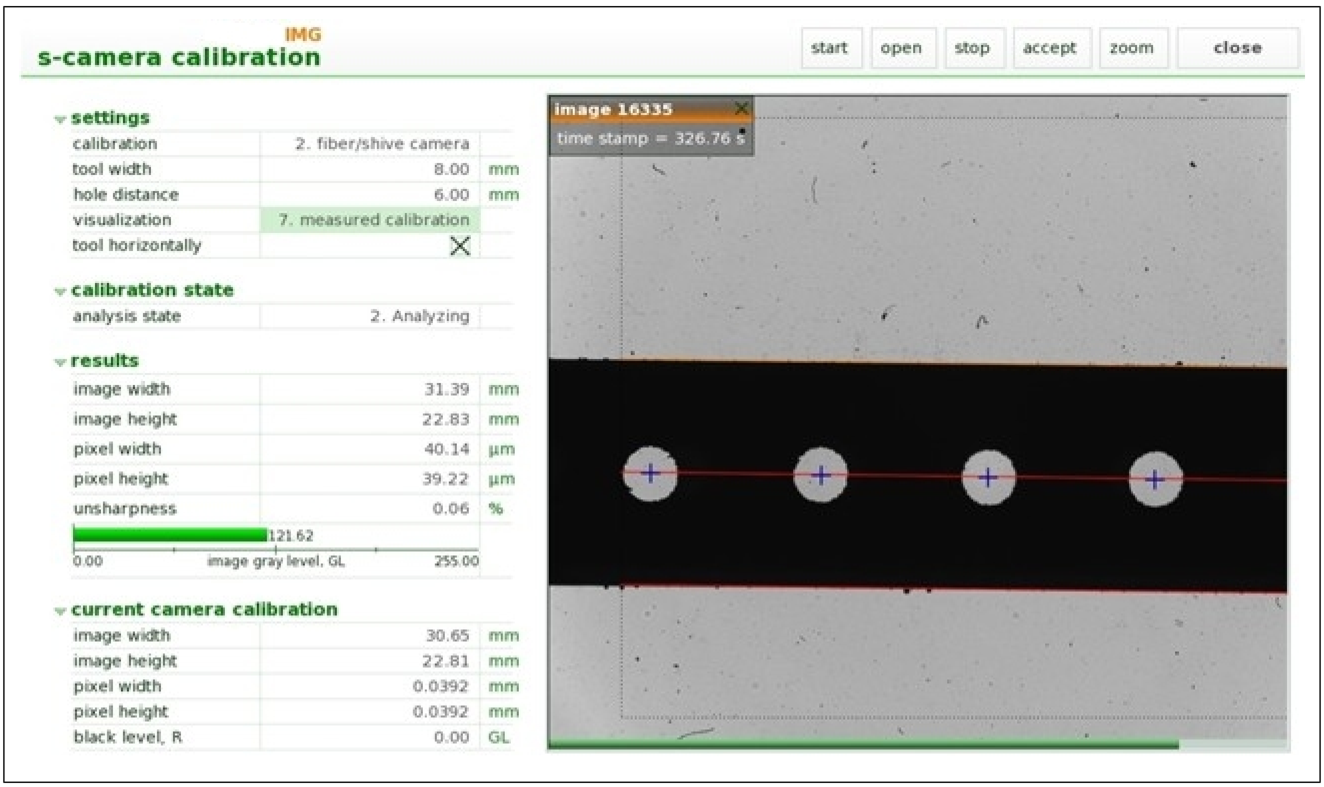


Fig. 20. "Camera calibration" window.

Checking the calibration of camera

Camera calibration can be checked with reference tool

1. Before checking, make sure that

- the camera image is sharp and of high quality,
- there are no shadow areas in the camera image,
- the optics lenses are clean,
- the "median grey level" value of the background image is in the range 170–180.

Before tuning or calibration, set the Fiber Image module to service mode: select "Module" -› "Fiber Image module" -› "Diagn.info" -› "Service mode/info".

Checking calibration

1. Insert reference tool 1 (metal tool) into the measurement cell and move it back and forth until all air bubbles trapped in its holes disappear. There must be no bubbles along the tool edges or in its holes!
2. Select "IMG" -› "Fiber" -› "Camera" -› "Calibration". Make sure that "tool width" = 8.00 mm and "hole distance" = 6.00 mm.
3. Press "Start". Watch the monitor to make sure that the tool is visible and the calibration software locates it. If necessary, you can turn the camera by rotating adjustment ring 1 while the lock ring 1 is locked in position. The camera will now rotate but its distance from the optics does not change. If necessary, select "Tool horizontally" and the software will try to locate the tool along the Y-axis of the camera instead of the X-axis.
4. When the software has located the edges of the tool and the centers of its holes, compare the "current camera calibration" values to the "results" values.
5. **If you now click "accept", the camera has been recalibrated. If you click "stop", the software will continue to use the earlier values shown in fields "current camera calibration".**
6. Remove the reference tool from the cell, and connect the sample outlet tube to the cell.
7. Remember to put the Fiber Image module back to the normal operating mode (Service mode off).

Your notes here:

13. Replacing components

13.1. IMPORTANT:

– Only trained, authorized service personnel may service the analyzer.
– Before any service or repairs, make sure that remote control is off!
– Always set the analyzer to Service mode before any service operations.
– Always test device operation after replacing any parts.

NOTE: Before replacing any parts, first make sure that the device is powered off, and that the water and air supply lines are shut off. Always do a controlled shutdown as instructed in Chapter 3.

Fig. 1 shows the location of replaceable parts in the analyzer, and their order codes.

1. Dehumidifier cartridge (252502).
2. Safety valve (258988), 1 or 2 pcs depending on device configuration.
3. Check valve (242461), 4 - 7 pcs depending on device configuration.
4. Ejector check valve (271593).
5. 2-way valve (K01180), 1 - 3 pcs depending on device configuration.
6. 3-way valve (K03105), 1 - 2 pcs depending on device configuration.
7. MARS 77-32 + PRISMA (K02448), 6 - 8 pcs.
8. Solenoid valve, press. air assembly (K00902).
9. Solenoid valve, water valve assembly (239483).
10. Work lamp (K03129).
11. Level switch (K03166).
12. Level transmitter (K03458).
13. LC100 consistency sensor cell (A4370336), located on rear wall, behind the operating terminal.
14. Washing chamber wire screen (K02990).
15. Prescreen assembly (K03085).

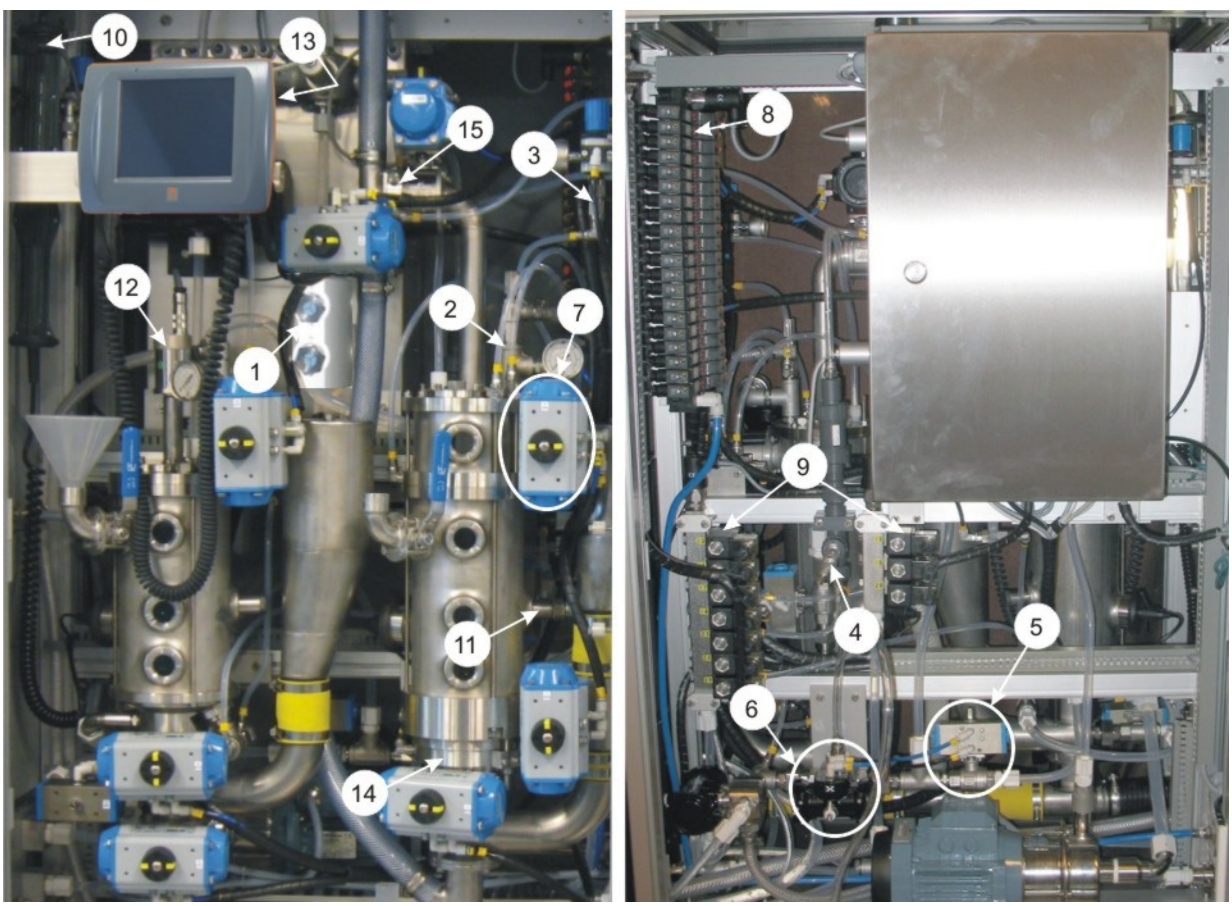


Fig. 1. Location of replaceable parts in the analyzer, Dual Chamber.

13.2. Dehumidifier cartridge 252502

If the water used for brightness measurement is colder than ambient air, humidity may condense inside the brightness measurement cell. This humidity is removed with the cartridges.

The cartridge can be seen through the measurement cell window (Fig. 2). All sectors of the cartridge (Fig. 3) must be light blue in color.

When sector 30 is pink, the cartridge should be replaced. If sector 40 or 50 is pink, the cartridge must be replaced immediately.

Replacing the cartridge:

1. Turn the cartridge anti-clockwise, use some tool if necessary.
2. Pull out the cartridge.
3. Insert a new cartridge and screw it tight.

Fig. 2. Brightness measurement cell.

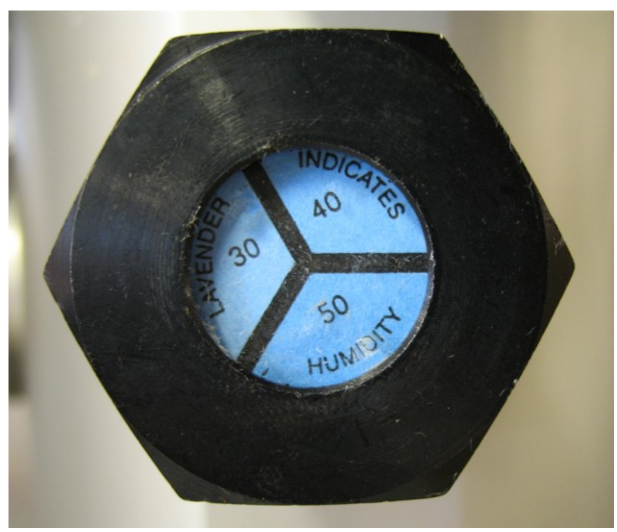


Fig. 3. Dehumidifier sectors.

13.3. Safety valve 258988

The safety valves located on top of the washing chamber and Sweep module must be replaced when necessary.

NOTE: Close the water & air supply lines and make sure to switch power off before starting the work. Make sure that the chamber is not pressurized!

1. Make sure that the analyzer is not operating, all chambers are empty, and pressures at zero.
2. Open the safety valve locking (Fig. 4).
3. Remove the safety valve, disassemble and clean carefully (Fig. 5). Be careful not to lose the flange located between the rod and the nozzle. Replace with a new valve if necessary.
4. Install the valve back. Clean the mounting faces carefully before reinstalling the valve.
5. Test valve operation: Open the water and air valves. Close valves 10_UDR, 11_WRS and 12_WRW, and open valve 3_PUW. Pressure begins to rise. Make sure that the pressure does not rise over 2.5 bar (~ 36 psi). If necessary, tune the safety valve: open the locking nut and turn the rod.

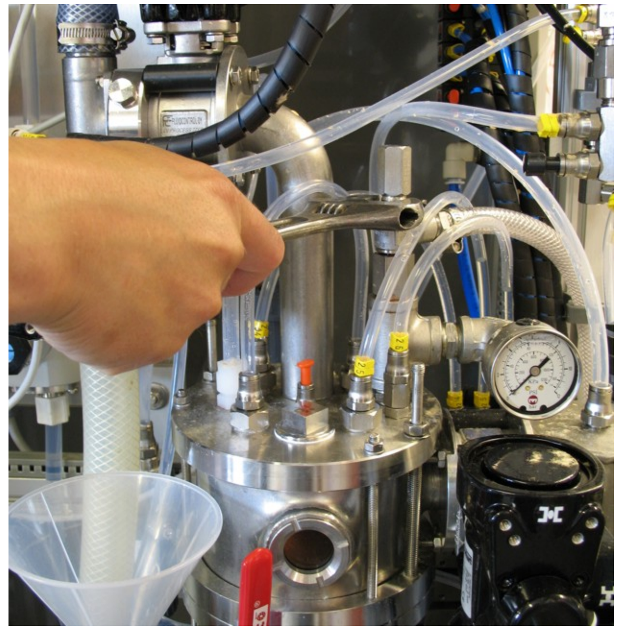


Fig. 4. Opening the safety valve connector.

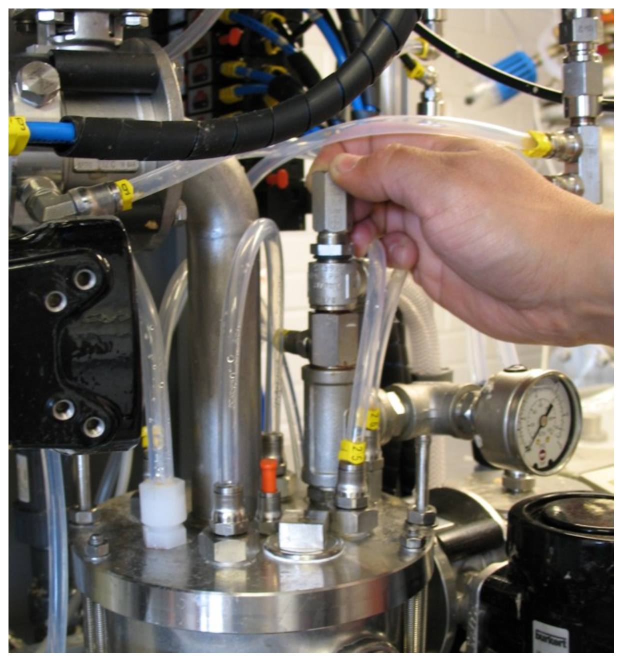


Fig. 5. Removing the safety valve.

13.4. Ejector check valves

Check valve 271593

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Detach the chemical tube from its connector (Fig. 6, part 1).
3. Open the nut (part 2) to release the check valve assembly from the ejector.
4. Detach the check valve (part 3) from the assembly, and clean all threads.
5. Attach the connectors to the new valve, use Loctite 577 to seal the threads. Then install the new check valve. Pay attention to the correct flow direction and the position of the nipples.
6. Reassemble in reverse order.

Check valve K03112

1. Open the ejector nuts (Fig. 6, part 4).
2. Detach the check valve (part 5) and install a new one. Make sure that the direction of flow is correct, also make sure that all seals are properly in place.
3. Tighten the ejector nuts by hand and make sure that all connections are tight.

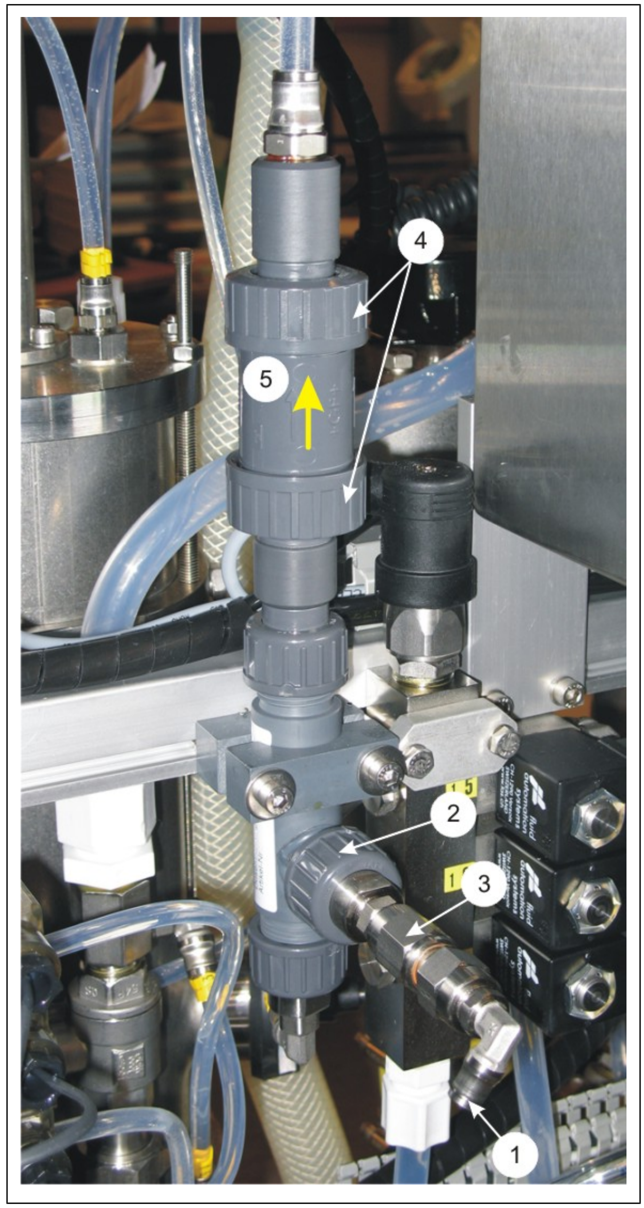


Fig. 6. Replacing check valves of chemical ejector.

13.5. Check valve 242461

1. Close the water & air supply lines and make sure to switch power off.
2. Detach tubes from the connectors (Fig. 7, parts 1 & 2) and detach the valve from its plastic holder (if any).
3. Detach the check valve (part 3) from the assembly, and clean all threads.
4. Attach the connectors to the new valve, use Loctite 577 to seal the threads. Then install the new check valve. Pay attention to the correct flow direction and the position of the nipples.
5. Reassemble in reverse order.

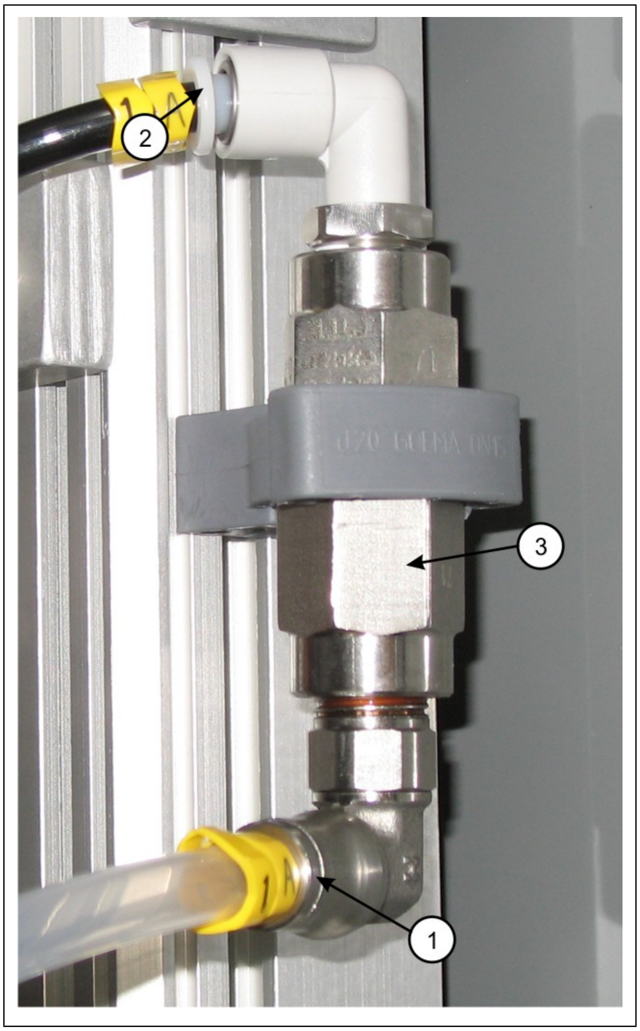


Fig. 7. Replacing the check valve.

13.6. 2-way valve + actuator K01180

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Detach the air tubes (Fig. 8, part 1). Make sure you have the order of the air tubes right before detaching them from the valve!
3. Detach water tubes (part 2).
4. Open the conical connector (part 3) and pull the assembly out.
5. Open the conical connector (part 4), then unscrew the valve and actuator from the assembly.
6. Detach all connectors from the removed valve, and clean their threads.
7. Attach the connectors to the new valve, use Loctite 577 to seal the threads.
8. Install the new valve in reverse order. NOTE: Make sure that the valve turns in the correct direction. Test valve operation with manual control.
9. Open the water and air supply lines, and switch the analyzer on.

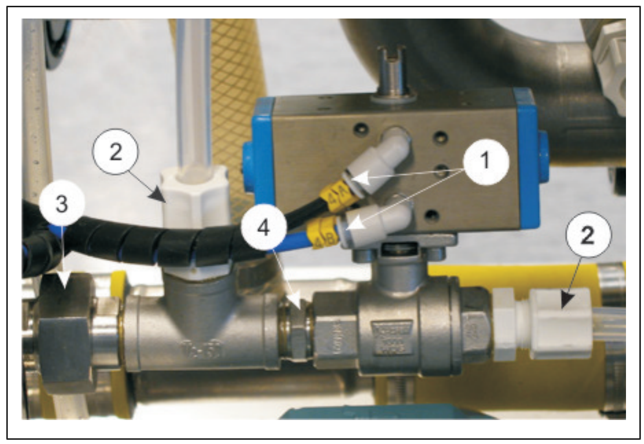


Fig. 8. Replacing the 2-way valve and actuator.

13.7. 3-way valve 1/2", 262360

3-way valve 262360 + actuator K00898

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Make sure you have the order of the air tubes right before detaching them from the valve.
3. Detach the air and water tubes (Fig. 9, parts 1 & 2).
4. Before detaching the valve, make sure to note the ball position and the turning direction of the actuator. Release the assembly: open the conical connector (part 3) and the nuts on the upper part of the mounting plate (part 4, 3 pcs).
5. Release the valve assembly from the mounting plate by opening 4 screws on the back side of the plate. Unscrew the ball valve, release the actuator from the valve.
6. Detach all connectors from the removed valve, and clean their threads.
7. Attach the connectors to the new valve, use Loctite 577 to seal the threads.
8. Check the actuator turning direction and ball position (Fig. 10, part A).
9. Install the new valve and/or actuator to the mounting plate in reverse order, and fasten the plate to the device.
10. Connect the tubes.

NOTE: Make sure that the valve turns in the correct direction. Test valve operation with manual control.

11. Open the water and air supply lines, and switch the analyzer on.

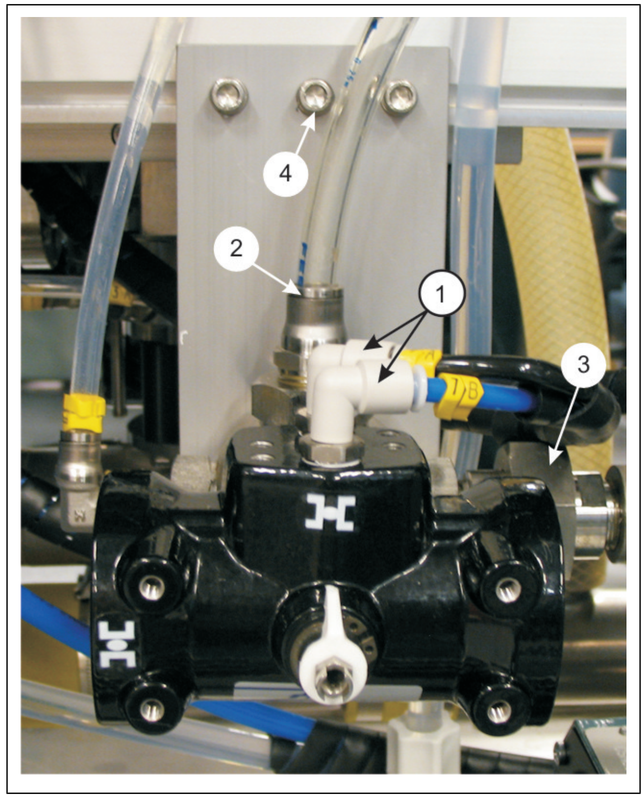


Fig. 9. Replacing the 3-way valve and actuator.

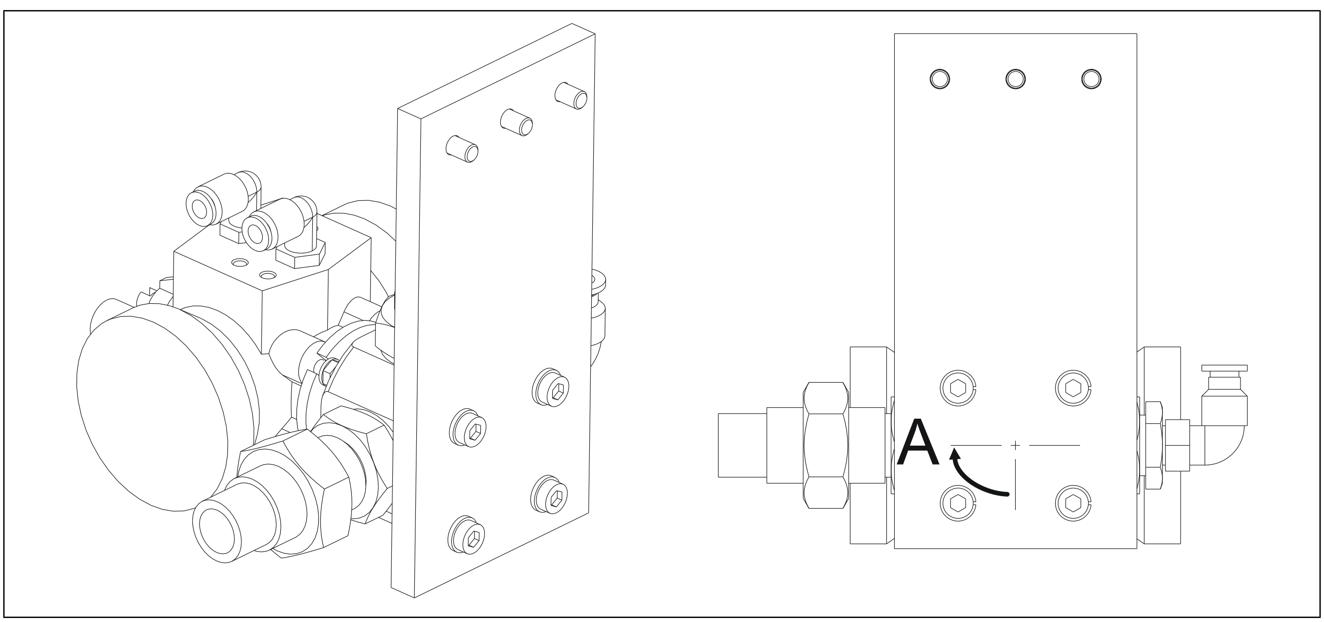


Fig. 10. 3-way valve assembly, and ball position.

13.8. MARS 77-32+PRISMA K02448

Ball valve K02445 + actuator K02437

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Make sure you have the order of the air tubes right before detaching them from the valve.
3. Detach the air tubes (Fig. 11, part 1) and water tube (part 2).
4. Before detaching the valve, make sure to note the ball position and the turning direction of the actuator. Loosen the fastening screws (part 3, 4 pcs) so that you can unscrew the valve. Detach the actuator from the valve by opening the screws (part 4, 4 pcs).
5. Detach all connectors from the removed valve, and clean their threads.
6. Attach the connectors to the new valve, use Loctite 577 to seal the threads.
7. Install the new valve and/or actuator in reverse order. Make sure that the actuator turning direction and ball position are correct. Attach tubes to the connectors. NOTE: Make sure that the valve turns in the correct direction. Test valve operation with manual control.
8. Open the water and air supply lines, and switch the analyzer on.

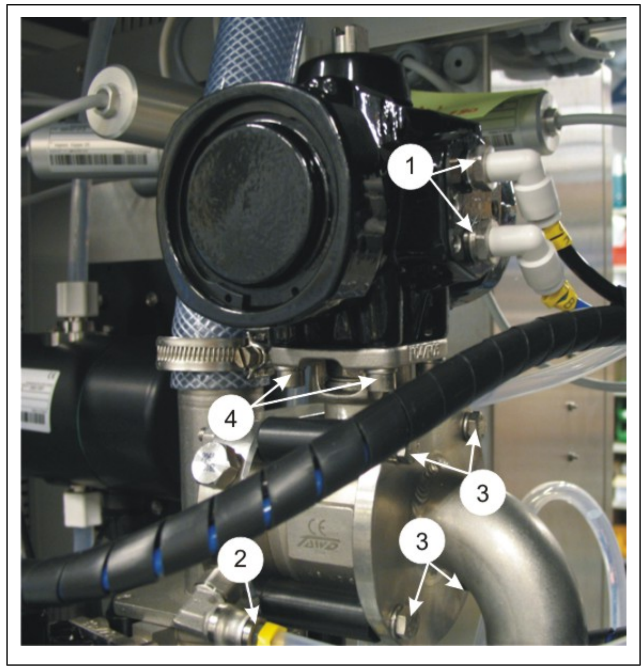


Fig. 11. Replacing the MARS valve and actuator.

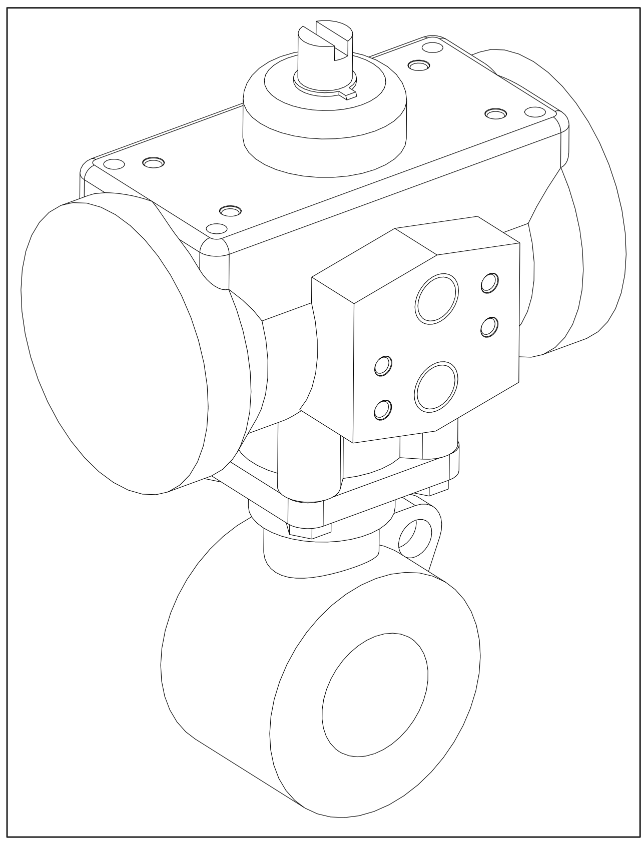


Fig. 12. MARS ball valve.

Ball valve seal K03477

If the valve leaks, check the condition and position of its seals. If necessary, replace the seals.

1. Place the valve on a clean surface. Remove the O-ring from the center of the valve seat, also remove the seal from the groove (Fig. 13, steps A & B).
2. Clean all sealing surfaces of the ball (step C).
3. Insert a new seal in the groove (step D) and a new O-ring (step E).

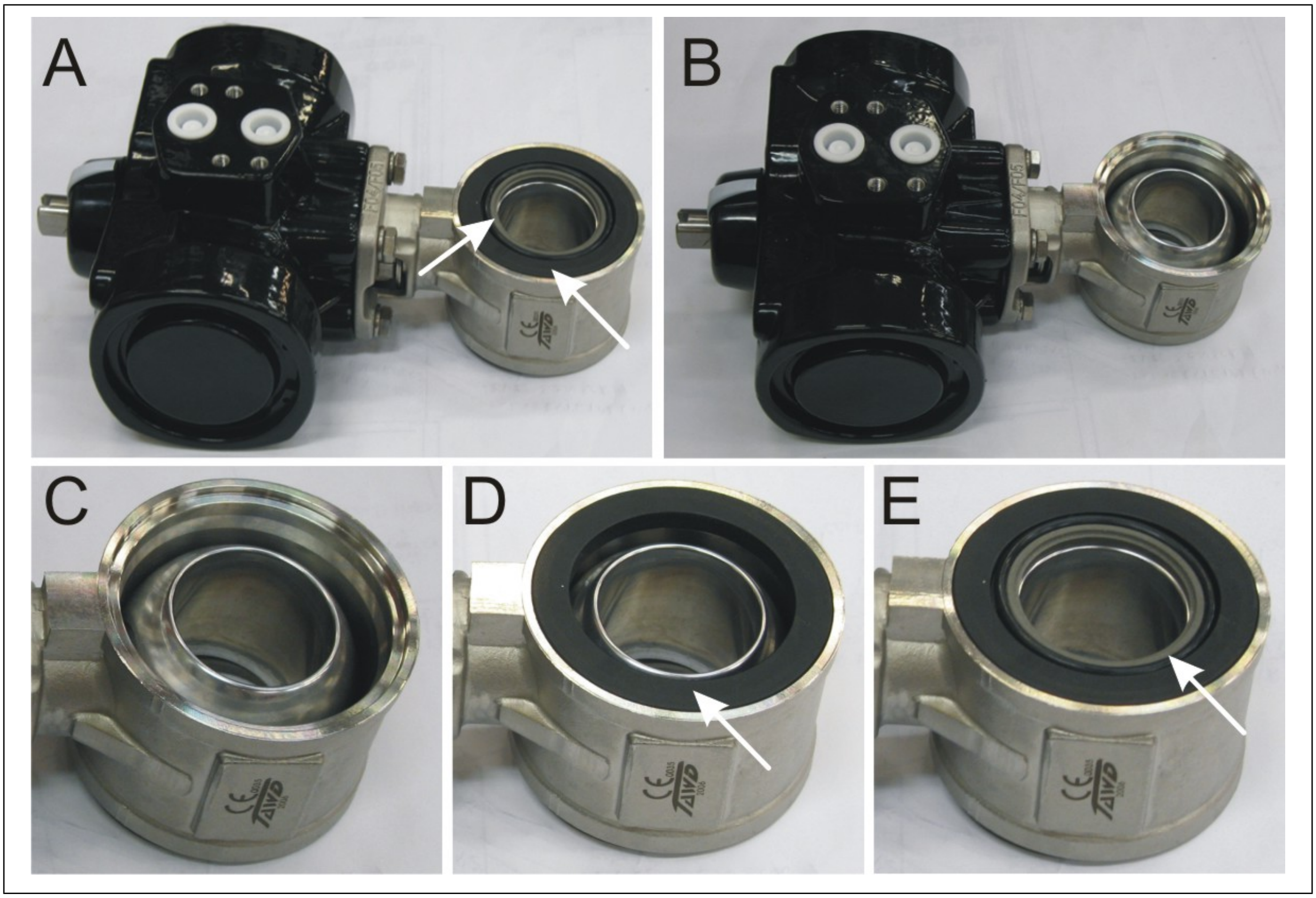


Fig. 13. Replacing the seals.

Replacing the ball valve stem seals

1. Detach the actuator from valve by removing the mounting screws (4 pcs).
2. Open the fastening nut (Fig. 14, part 1). To open the nut, use a 22mm socket (part 2) with an outer diameter less than 28.5mm.
3. Turn the valve around so you can get the fastening nut out.
4. Push out the stem (Fig. 15, part 1), and the seals and washers will come loose. NOTE: Make sure to remember the correct order of the seals and washers!
5. Replace the stem O-ring (Fig. 16, part 1) and the three seals (parts 2).
6. Reassemble in reverse order. Make sure to insert the seals in the correct order, and the curved washers so that their convex sides face out.
7. Tighten the fastening nut. Tighten the nut manually as much as you can, then open by 1/3 turns. Make sure that the stem turns without difficulty.

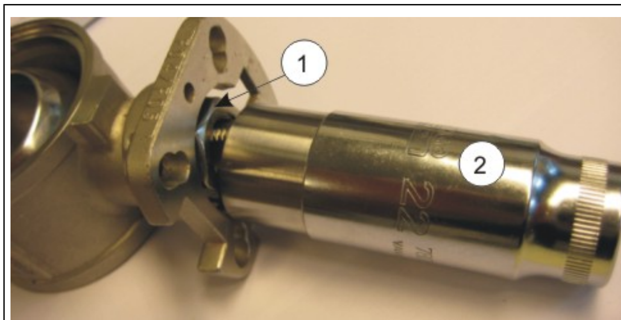


Fig. 14. Opening the nut.

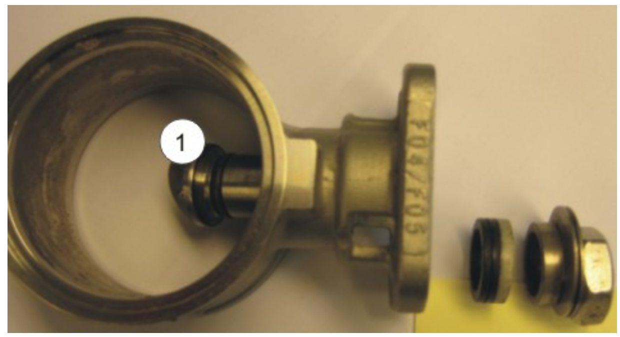


Fig. 15. Removing the stem, seals and washers.

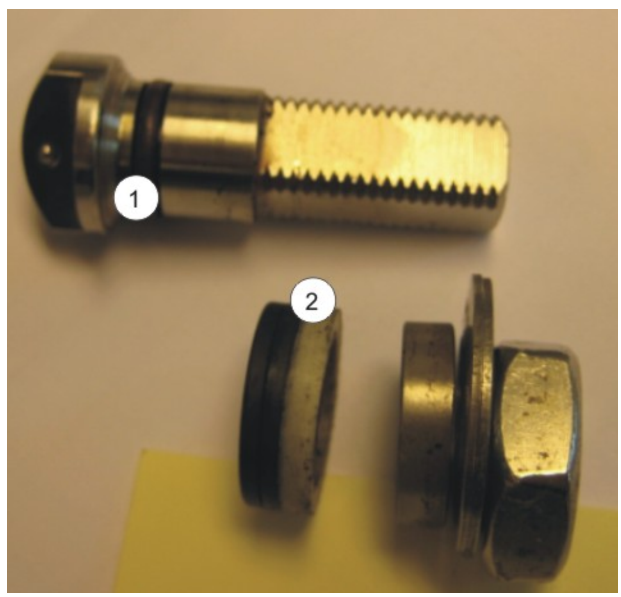


Fig. 16. Replace these seals.

13.9. Solenoid valve assembly

Solenoid valves for pressurized air, cold water and warm water are located on the back side of the analyzer.

Press. air assembly, solenoid valves K00902

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Detach the valve caps.
3. Release the nuts holding the assembly in place, and pull the valve assembly out.
4. Service the valve block as necessary and install it back.
5. Open the water and air supply lines, and switch the analyzer on.

Replacing individual solenoid valves

1. Open the screw on the end of the solenoid and remove the valve cap.
2. Disconnect the air tubes.
3. Loosen the nuts of the assembly. Locate the valve you wish to replace, and use a flat screwdriver to carefully open its locks so that you can remove it from the assembly. Be careful not to lose the valve seal rings.
4. Replace/repair the valve, then reassemble in reverse order. Turn the solenoid to the right position. Make sure that the seal rings are in place. Pay attention to the flow direction of the valve when attaching the tubes.
5. Check all connections to make sure there are no leaks, and test valve operation with manual control.
6. Open the water and air supply lines, and switch the analyzer on.

Fig. 17. Pressurized air valves.

Water valve assembly, solenoid valves 239483 & seals 250191

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Detach the tubes from their connectors, release the solenoid from the valve.
3. Detach the valve fastening bolt from the manifold and unscrew the valve.
4. When detaching the valve, watch the seals on both sides of the manifold (Fig. 19).
5. Detach all connectors from the removed valve and clean their threads.
6. Screw the connectors to the new valve.
7. Install the new valve in reverse order and turn the solenoid to the right position. Pay attention to the flow direction of the valve when attaching the tubes.
8. Check all connections to make sure there are no leaks, and test valve operation with manual control.
9. Open the water and air supply lines, and switch the analyzer on.

Fig. 18. Cold water valve assembly.

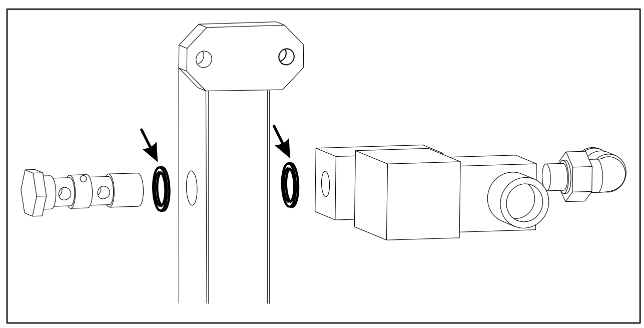


Fig. 19. Solenoid valve seals.

13.10. Work lamp K03129

NOTE: Before changing the work lamp, make sure to switch analyzer off by the main switch. Alternatively, detach connector J9 from the Binary I/O board.

When replacing the lamp, the easiest way is to cut its cable at the extension joint, before the spiral. Then make a new connection and connect the cable to the board.

Replacing the work lamp & cable

1. Disconnect the work lamp cable from Binary I/O board (in electronics box), connector J9 (Fig. 20).
2. Open the bushing connector (Fig. 21) and pull the cable out of the electronics box.
3. Push the cable along the cable conduit so that you get it completely loose.
4. Remove the old lamp, and connect the new lamp in reverse order.
5. Start the analyzer.

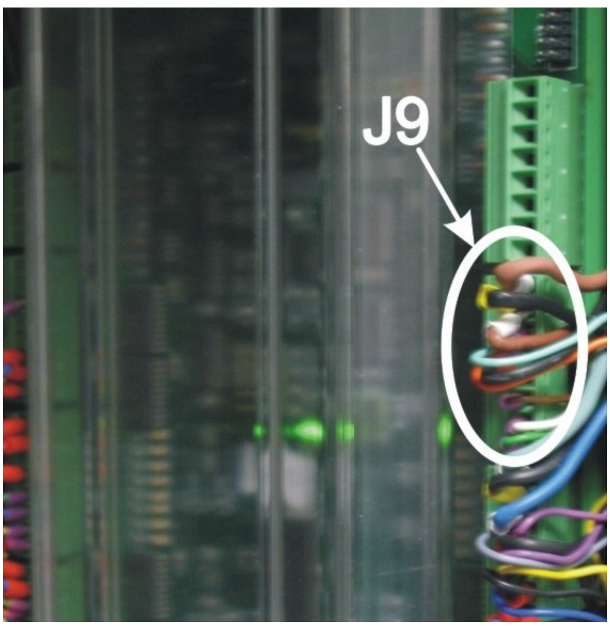


Fig. 20. Work lamp connection on Binary I/O.

Fig. 21. Inserting work lamp cable into electronics box.

13.11. Level switch (K03166)

1. Close the water & air supply lines and make sure to switch power off.
2. Turn the sensor clockwise to release it from the chamber (Fig. 22).
3. Carefully tighten the new level switch in position; max. tightening torque 1.5 Nm.

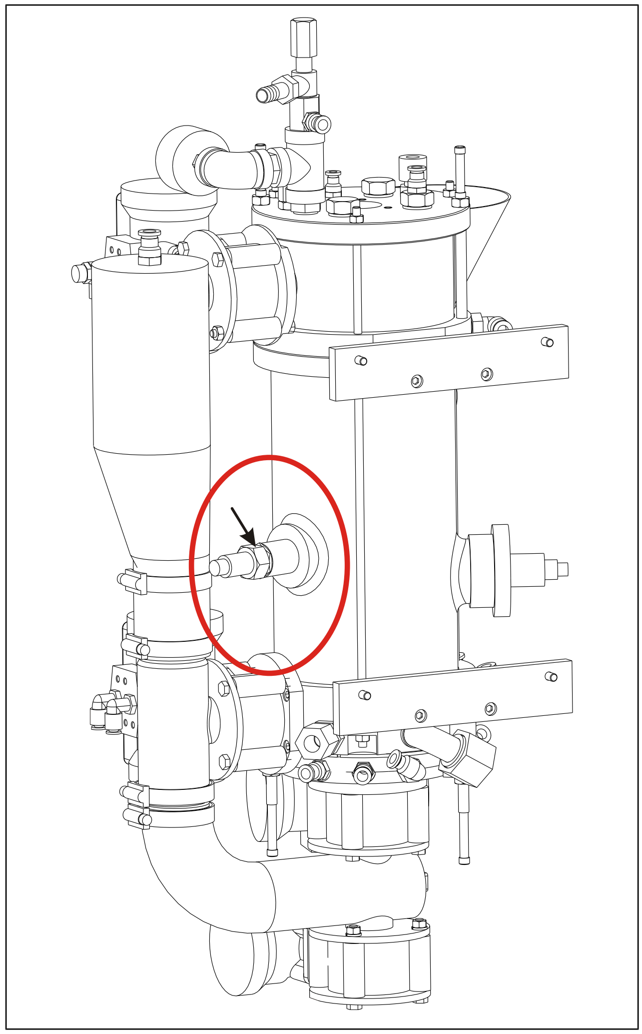


Fig. 22. Replacing the washing chamber level switch.

13.12. Level transmitter (K03458)

1. Close the water & air supply lines and make sure to switch power off.
2. Detach the level transmitter from the module cover by opening 4 screws (Fig. 23, part 1).
3. Lift the transmitter out of the chamber, and release the electronics part by turning it anti-clockwise.
4. Reassemble in reverse order.

NOTE: After replacement calibrate the level transmitter as instructed in section "Level transmitter calibration".

Fig. 23. Sweep module level transmitter.

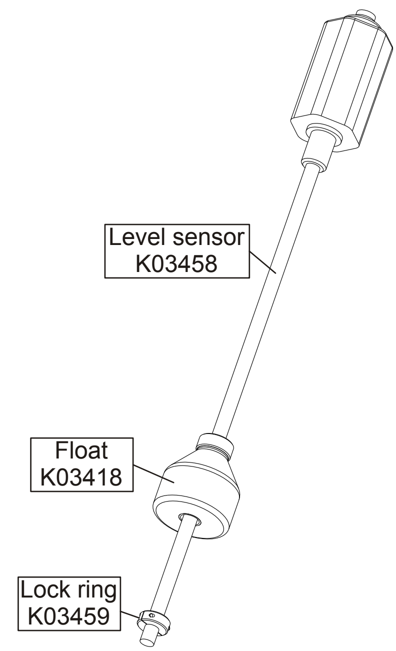


Fig. 24. Parts of level transmitter.

13.13. LC100 measurement cell A4370336

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Detach the sample tube from its connector (Fig. 25, part 1), and unscrew the connectors from the sensor.
3. Open the 3 fastening screws (part 2) to release the O-ring.
4. Remove three screws (part 3) from the top part of the sensor, and pull the measurement cell up so that it comes out.
5. If the cell is blocked, you can try to remove the blockage by pushing a stiff, thin plastic (e.g. cable tie) into the cell, against the sample flow direction. If this does not help, replace the cell.
6. Install the measurement cell back in reverse order. Attach all connectors and sample tubes.

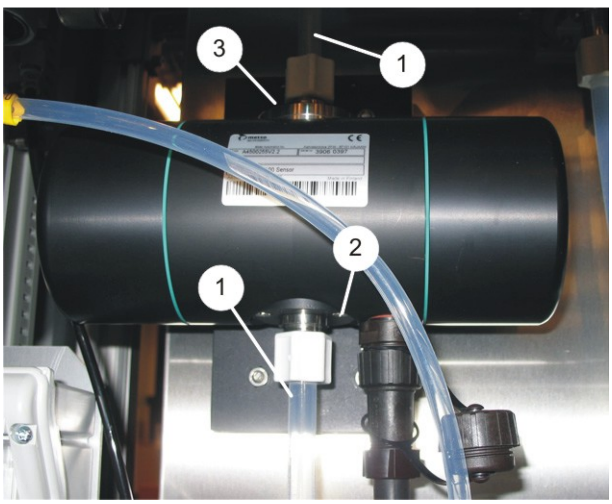


Fig. 25. LC100 consistency sensor, replacing the measurement cell.

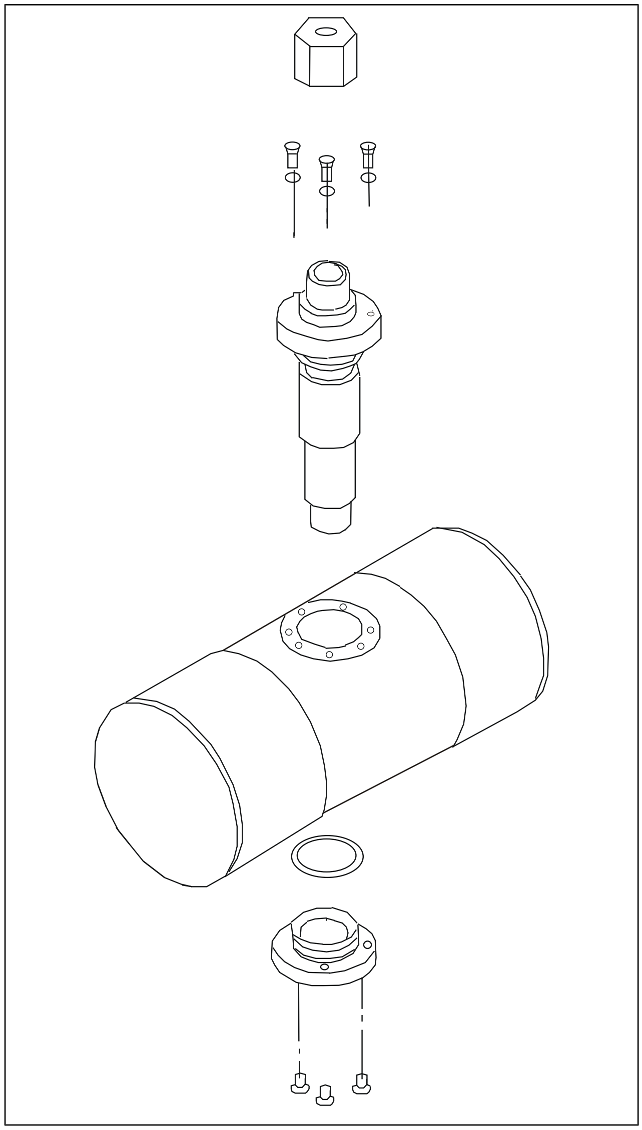


Fig. 26. LC100 consistency transmitter.

13.14. Washing chamber wire screen K02990

1. Set the analyzer to Service mode.
2. Open the wire fastening nuts (Fig. 27, 13 mm ring spanner).
3. Pull the wire screen loose from the chamber bottom (Fig. 28). Check the wire screen, replace if necessary. Clean all sealing surfaces carefully before installing the wire screen back.
4. Test the chamber tightness: run water into the chamber, for example with valve 17_WUW. Pressurize the chamber: close valves 10_UDR, 11_WRS & 12_WRW, open valve 2_WCP. Make sure that water does not leak out from above or below the wire screen.
5. Set Service mode OFF again.

Fig. 27. Fastening nuts of washing chamber wire screen.

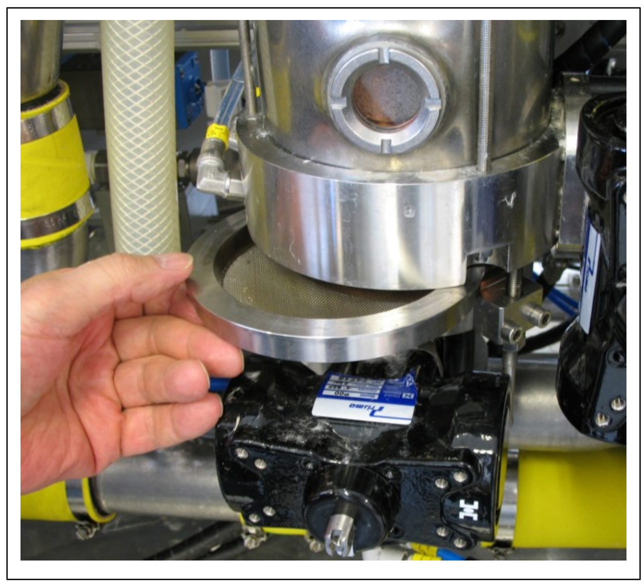


Fig. 28. Releasing the wire screen from chamber.

13.15. Pump O-ring K03287

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Remove the connectors (Fig. 29, part 1, 2 pcs).
3. Detach the pump from its base by opening the screws on its both sides (part 2, 4 pcs).
4. Open the pump cover fastening screws (part 3, 4 pcs).
5. Detach the pump seal (Fig. 30, part B) and replace it with a new one.
6. Reassemble in reverse order.

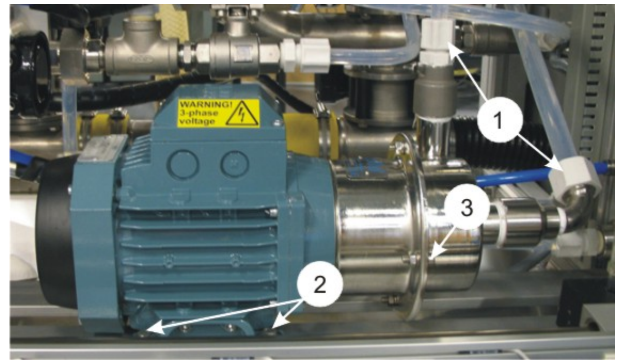


Fig. 29. Detaching the pump from analyzer.

Fig. 30. O-ring.

13.16. Pump shaft sleeve K03286, adjusting

1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Detach the pump from the analyzer, also detach its cover. See section Pump O-ring above.
3. Loosen the Allen screw that locks the shaft sleeve (Fig. 31, part 1) through the opening below the back cover (Fig. 32, part E). Use a 3mm Allen key.
4. Push the sleeve (Fig. 32, part D) deeper on the motor shaft, so that the impeller is as close to the cover as possible.
5. Tighten the shaft sleeve screw.
6. Reassemble in reverse order.

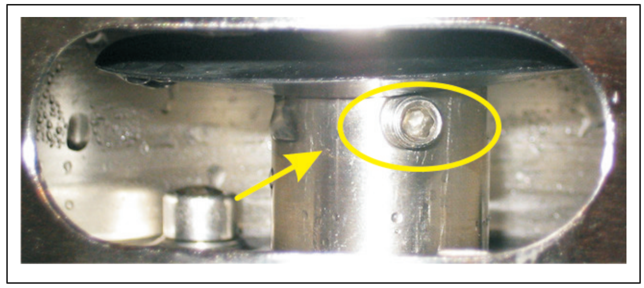


Fig. 31. Adjusting the shaft sleeve.

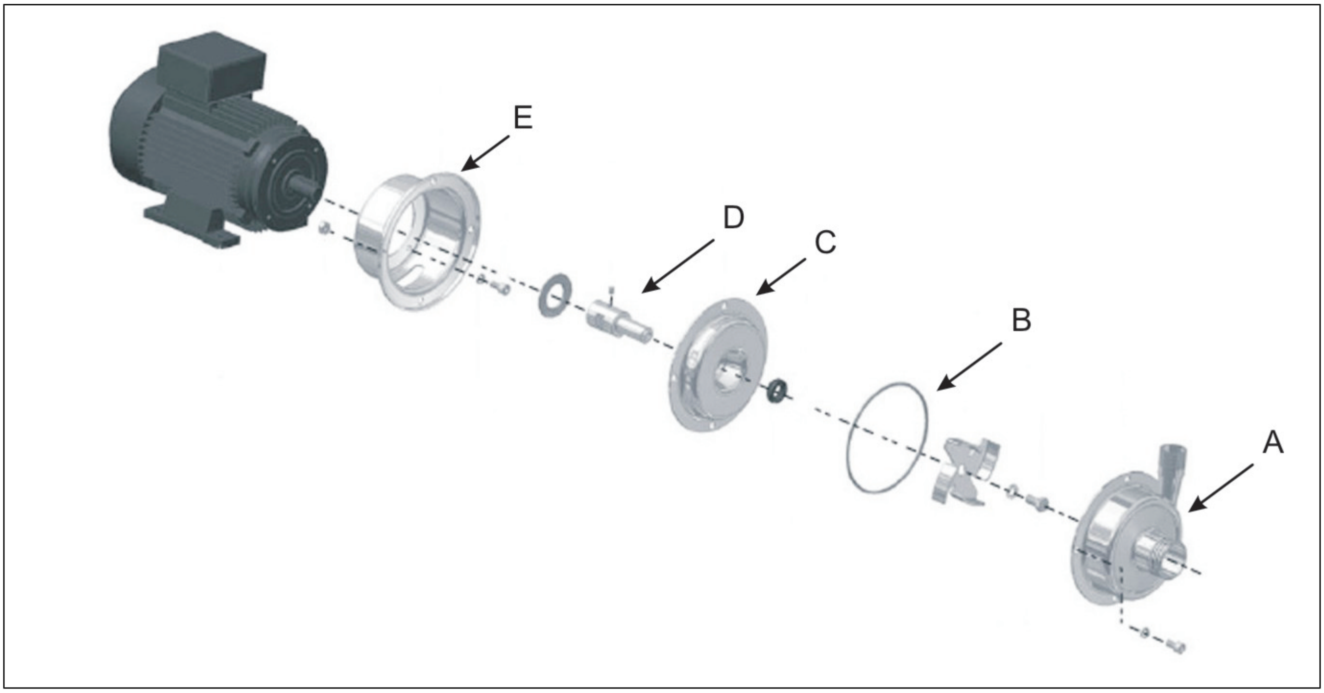


Fig. 32. Parts of Tapflo pump: A. Cover, B. O-ring, C. Ring, D. Shaft sleeve, E. Back cover.

13.17. Pump gaskets K03285

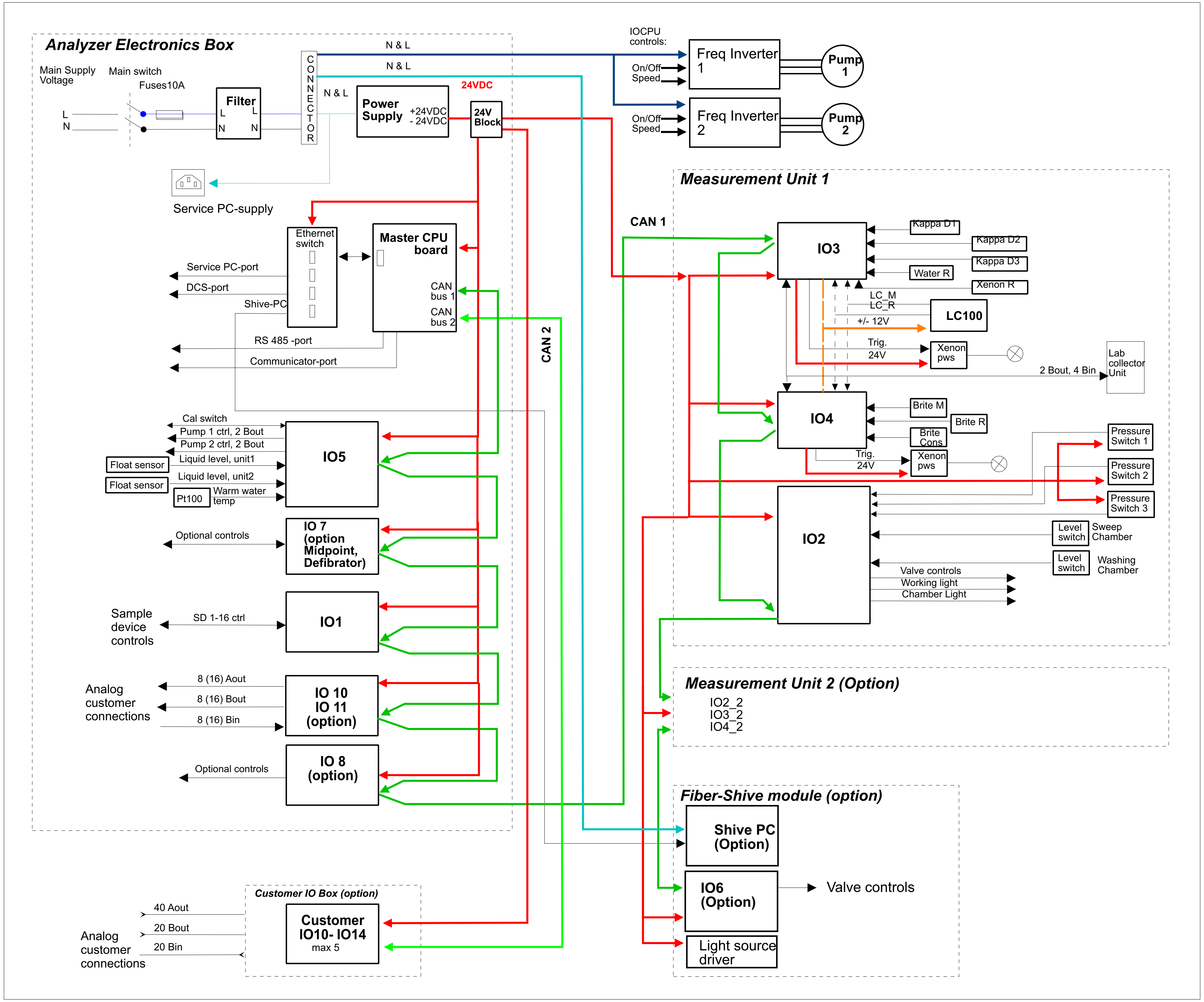
1. Close the water & air supply lines and make sure to switch power off before starting the work.
2. Detach the pump from the analyzer, also detach its cover. See section Pump O-ring above.
3. Open the nut on the center of the impeller (Fig. 33, step A).
4. Release the shaft sleeve from the pump (step B).
5. Release the spring and middle part from shaft sleeve (step C).
6. Remove the seals in the order shown in step D.
7. Install new seals. Remember to adjust the shaft sleeve tightness! See section 13.16.
8. Reassemble in reverse order.

Fig. 33. Replacing the pump seals.

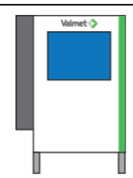
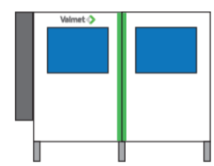
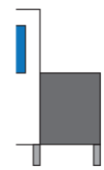
14. Electronics block diagram

The diagram contains the following operational units:
- Analyzer Electronix Box
- Measurement Unit 1 (Cabinet 1), module electronics box
- Measurement Unit 2, as measurement unit 1
- Fiber-Shive module electronics

The block diagram illustrates the electric cabling and CAN-bus connections between the units.
The device has two CAN-buses:
CAN1 = analyzer's interior bus,
CAN2 = external, for Customer IO Box (option).
Also the connections and sensors/valves/units connected to each unit are shown in the diagram.



Valmet Kappa Analyzer Technical specification

	 **One-Cabinet**	 **Two-Cabinet**	 **+ Fiber-Shive (option)**
Height	1650 mm (64.96")	1650 mm (64.96")	1050 mm (41.34")
Width	1000 mm (39.37")	1870 mm (73.62")	600 mm (23.62")
Depth	720 mm (28.35")	720 mm (28.35")	720 mm (28.35")
Weight	210–240 kg (460–530 lbs)	400–470 kg (880–1040 lbs)	90 kg (198 lbs)
Consumptions – for connections, see next page			
Instrument air	11.000 NL/h	12.500 NL/h	–
Cold water / deionized water:			Intermittent, 45 L/analysis (approx. 6 minutes)
- Average:	240 L/h (63 US gal/h)	360 L/h (95 US gal/h)	
- Momentary peak value:	17 L/min (4.5 US gal/min), corresponds to flow rate 1020 L/h (270 US gal/h)	24 L/min (6.3 US gal/min), corresponds to flow rate 1440 L/h (380 US gal/h)	
- During sample transfer:	40–50 L/min (10.6–13.2 US gal/min), corresponds to flow rate 2400–3000 L/h (634–793 US gal/h)		
Hot water			–
- Average:	50–100 L/h (13–26 US gal/h), depends on the number of hot water washes		
- Momentary peak value:	280 L/h (74 US gal/h)		
- During sample transfer:	Only if used also for sample transfer; 40–50 L/min (10.6–13.2 US gal/min), corresponds to flow rate 2400–3000 L/h (634–793 US gal/h)		
Cleaning chemical	Dependent on device settings. Example: 10 measurements / hour, chemical wash every 100 measurements, chemical added for 5 seconds		–
	0.2 L/day (example)	0.4 L/day (example)	
SO_2-water	~ 0.5 L/day		–
Electric & data connections			
Operating voltage	Connection to analyzer's connection box. 180–250 VAC, 50–60 Hz, 10 A, stabilizer recommended.		
Power intake	610 W	980 W	300 W
Data connections	**Serial connections:** PC.............................. Ethernet Flexi-U .... Ethernet Communicator-i.......... RS-485 (4-wire) Modbus-TCP/IP .... Ethernet (copper or fiber) Modbus-RTU............. RS-485 (2/4-wire)	**Option** (depending on the number of Customer IO boards) 0–56 analog inputs, 4–20 mA, isolated, max. load 600Ω 0–36 binary outputs, max. 48 V / 1 A, relay 0–36 binary inputs, 24–48 VDC, isolated	
Environmental conditions, protection class of enclosure, generated noise			
Temperature	5–50 °C (41–122 °C), protect from direct sunshine		
Relative humidity	10–90%, no condensation, protect from direct rain and dripping/splashing water		
Protection class	Measurement cabinet: IP54 (NEMA 3S). Analyzer electronics box, connection box & module electronics box: IP65 (NEMA 9)		
Noise generated by device	max. 75 dB, measured at a distance of 1 meter from analyzer		

Valmet Kappa Analyzer Technical specification

Sample / water / air connections	One-Cabinet / Two-Cabinet	Fiber-Shive (option)
Sample inlets	With trunk line, connection at analyzer with R1" inside thread. Max. 16 sample lines divided between the cabinets + manual sample inlet. The entire trunk line must be made using the same pipe diameter. Recommended: tube with inside diameter 19 mm (3/4"). If 25 mm (1") tube is used, water consumption and sample transfer times will increase. Metal pipe: DN15 (or DN20) acid-proof steel pipe only, all connections to analyzer and samplers with flexible, non-conducting tube. **Max. pipe size: 25 mm (1") / DN20.**	Sample from analyzer
Discharge	Separate discharge connection from each chamber (1 or 2 per cabinet). Inside diam. 50 mm (2"), fastening with hose clamp.	Inside diam. 25 mm, R1"
Instrument air	**Needed for all applications.** Filtered instrument air. Pressure 4–6 bar (400–600 kPa, 58–87 psi). Connection at analyzer: ISO 7/1–Rp 1/2" Filter at analyzer: 5 µm Recommended tube size: DN15	From analyzer.
Cold water	**For Kappa measurement.** Chemically purified, Ca- and Mg-free water. Pressure: 5–8 bar (500–800 kPa, 73–116 psi) Temperature: 18–30 °C (64–86 °F), allowed variation during sequence ± 5 °C (9 °F); if temperature is lower, air humidity will begin to condense inside the analyzer. Connection at analyzer: ISO 7/1–Rp 1/2" Filter at analyzer: 100 µm Recommended tube size: DN20	From analyzer, uses whichever alternative is connected.
Deionized water	**Only for Brightness measurement** – recommended in brightness range > 85. "Boiler water" specification + conductivity < 0.3 mS/m, pH 6–8, $KMnO_4$ consumption < 4 mg/L, SiO_2 < 0.02 mg/L Pressure: 5–8 bar (500–800 kPa, 73–116 psi) Temperature: 18–30 °C (64–86 °F), allowed variation during sequence ± 5 °C (9 °F); if temperature is lower, air humidity will begin to condense inside the analyzer. Connection at analyzer: ISO 7/1–Rp 1/2" Filter at analyzer: 100 µm Recommended tube size: DN20	
Hot water	**Only in Kappa measurement** – recommended for washing & sample transfer when pulp contain alkali before D0-stage or there is no O_2-stage. Chemically purified, Ca- and Mg-free water. Pressure 3–6 bar (300–600 kPa, 44–87 psi) Temperature 50–60 °C (122–140 °F), allowed variation during sequence max. ± 2,5 °C (4 °F) Connection at analyzer: ISO 7/1–Rp 1/2" Filter at analyzer: 100 µm Recommended tube size: DN20	Not needed.
SO_2-water	**Only in final brightness measurement.** SO_2 concentration 10–60 g/L Pressure 1–6 bar (100–600 kPa). Temperature 10–50 °C (50–122 °F) Connection at SO_2-valve unit: R1/2" inside thread Recommended tube size: 6/8	Not needed

Valmet Kappa Analyzer Technical specification

Kappa measurement & Brightness measurement (option)

	Kappa measurement			Brightness measurement		
Measurement range	0–120 Kappa points			40–90+ (% ISO)		
Stability	1 % of meas. range maximum per month			–		
Measuring loops	One-Cabinet: 1 loop; Two-Cabinet: 2 loops					
Speed, Single Chamber	new result every 4–6 minutes			new result every 4–6 minutes		
Speed, Dual Chamber	new result every 3–4 minutes			new result every 3–4 minutes		
NOTE!	The measurement speeds stated above are **averages**. The length of sample lines, and the device settings (e.g. the number of sample washes) may have an effect on actual speed!					
Repeatability (10 consecutive measurements from the same pulp)	Kappa < 2	± 0.1	(1 σ)	40–60	0.40	(1 σ)
	2–8	± 0.1	(1 σ)	60–85	0.35	(1 σ)
	8–20	± 0.25	(1 σ)	85–90+	0.30	(1 σ)
	20–40	± 0.5	(1 σ)			
	40–60	± 1.0	(1 σ)			
	> 60	± 1.2	(1 σ)			

Fiber-Shive module (option)

	Results	Meas. range	Repeatability
Shive content	% of pulp, n/mg, n/g, n	W: 75–2000 µm L: 0.3 – 20 mm	5 %, when shive content is > 400 n/g
Length-weighted fiber length	Lc(l) ISO, n, l, w	0.20 – 7.0 mm	1.5 %
Fiber width	weighted value	10 – 2000 µm	0.6 %
Fines	Surface area % (A) and length percentage (B)	100 – 2000 µm² 2 – 10 µm	Fines A: 3 % Fines B: 0.2 fines %
HW/SW ratio		0 – 100 %	HW/SW 3%
Curl		0 – 100 %	3 %
Vessels	n, n/1000, n/m		5 %
Kink	n/1000, n/m, angle		5 %
Measuring speed	Shive measurement: 4–6.5 minutes, sample > 1 g/min. Fiber measurement: 40 sec, measuring > 8000 fibers/second		

Valmet Kappa Analyzer Spare part sets

K03480	Kappa Analyzer, Spare parts set 1 – contents	pcs
K00902	Solenoid valve	1
K01180	Valve & actuator R 1/2 PEEK gasket	1
K01297	Flash card ADM-008 512MB	1
K02448	Valve & actuator MARS 77-32+PRISMA	1
K02990	Wire assembly	1
K03129	Work light F11BX/840	1
K03285	Gasket set for Tapflo pump	1
K03286	Shaft 5-003-16 (316L)	1
K03287	O-ring 5-003-18-2 (Viton)	1
K03418	Floater for level transmitter	1
K03477	Gasket for Mars valve	7
K05498	Gasket set 2 (for 3-way valve)	1
239483	Solenoid valve 85202-401 24V	1
242248	Pressure gauge 10 bar D6	1
242461	Check valve DRM-G1/4 AISI	1
243139	Lamp 24V/5W 100-13822 PHIL	1
250191	Gasket set for solenoid valve	1
258988	Relief valve NI5.2CAS	1
262360	3-way valve R1/2	1
271593	Check valve DRM-G1/4 PTFE, AISI 316	1
K03481	**Kappa Analyzer spare parts, single chamber, 1st or 2nd year – contents**	**pcs**
K01180	Valve & actuator R 1/2 PEEK gasket	1
K02990	Wire assembly	1
K03418	Floater for level transmitter	1
K03477	Gasket for Mars valve	6
K03482	**Kappa Analyzer spare parts, dual chamber, 1st or 2nd year – contents**	**pcs**
K01180	Valve & actuator R 1/2 PEEK gasket	3
K02990	Wire assembly	1
K03418	Floater for level transmitter	1
K03477	Gasket for Mars valve	8
K03483	**Kappa Analyzer spare parts, single chamber, 3rd year – contents**	**pcs**
K01180	Valve & actuator R 1/2 PEEK gasket	1
K02990	Wire assembly	1
K03129	Work light F11BX/840	1
K03285	Gasket set for Tapflo pump	1
K03286	Shaft 5-003-16 (316L)	1
K03287	O-ring 5-003-18-2 (Viton)	1
K03418	Floater for level transmitter	1
K03477	Gasket for Mars valve	6
K05497	Gasket set 1 (for 3-way valve)	1
242461	Check valve DRM-G1/4 AISI	4
243139	Lamp 24V/5W 100-13822 PHIL	1
250191	Gasket set for solenoid valve	9
271593	Check valve DRM-G1/4 PTFE, AISI 316	1

Valmet Kappa Analyzer Spare parts ALL

K03484	Kappa Analyzer spare parts, dual chamber, 3rd year – contents	pcs
K01180	Valve & actuator R 1/2 PEEK gasket	3
K02990	Wire assembly	1
K03129	Work light F11BX/840	1
K03285	Gasket set for Tapflo pump	1
K03286	Shaft 5-003-16 (316L)	1
K03287	O-ring 5-003-18-2 (Viton)	1
K03418	Floater for level transmitter	1
K03477	Gasket for Mars valve	8
K05497	Gasket set 1 (for 3-way valve)	1
242461	Check valve DRM-G1/4 AISI	6
243139	Lamp 24V/5W 100-13822 PHIL	2
250191	Gasket set for solenoid valve	9
271593	Check valve DRM-G1/4 PTFE, AISI 316	1

Wearing parts & consumables		
K05501	**Brightness module consumable spare parts – contents**	**pcs**
252502	Desiccant cartridge	2
K05502	**Fiber-Shive module consumable spare parts – contents**	**pcs**
K01180	Valve & actuator R 1/2 PEEK gasket	1
K05498	Gasket set 2 (for 3-way valve)	1
K05503	**Analyzer electronics consumable spare parts – contents**	**pcs**
K01297	Flash card ADM-008 512MB	1
K03129	Work light F11BX/840	1
243139	Lamp 24V/5W 100-13822 PHIL	1
K05504	**Analyzer wearing spare parts – contents**	**pcs**
K01180	Valve & actuator R 1/2 PEEK gasket	3
K03285	Gasket set for Tapflo pump	1
K03286	Shaft 5-003-16 (316L)	1
K03287	O-ring 5-003-18-2 (Viton)	1
K03477	Gasket for Mars valve	6

Optional spare parts		pcs
K03166	Level sensor (only for dual chamber model)	1
K05156	Air filter AF40P-060S	1
K05079	Pressure regulator 3/4	1
238618	Filter PG-100-1	1

Valmet Kappa Analyzer Spare parts ALL

Base Unit Electronics	K00990	Master CPU
	K01297	Flash card ADM-008 512MB
	K02772	Binary I/O
	K00956	I/O board
	K03436	Power unit 24V DC/10A
	K02950	Frequency inverter
	K03129	Work light F11BX/840
	243485	Chamber light 1.2 (lamp 24V/5W100-13822 TRIFA)
	K03166	Level sensor
	K03458	Gefran level transmitter
	K03418	Floater for level transmitter
	A4500307	Kappa LC-100 preamplifier
	K03054	Sensor PT-100
	K00991	Customer I/O board (1 board: 8xAout, Bout, Bin)
	K09555	Upgrade kit Communicator-I => Flexi-U
	K15182	Upgrade kit Flexi => Flexi-U
Base Unit Mechanics	K02448	Valve & actuator Mars 77-32+Prisma
	K02445	Valve 77-XX06SSX-DN32 PN64
	K02437	Pneumatic actuator P00 SF 03702 F05-11
	K03477	Gasket for Mars 77-32
	271593	Check valve DRM-G1/4 PTFE, AISI 316
	240150	O-ring 123.42X3.53 Viton
	210864	O-ring 110.0X5.0
	239483	Solenoid valve 85202-401 24V
	242917	Pressure regulator LR-1/8-D-
	K02990	Wire assembly
	H3500126	Support plate
	K00902	Solenoid valve
	242750	Pressure switch O186458031006
	H4500363	Ejector PVC
	171579	Check valve D20 21.360 V
	215301	Pressure regulator R1/2 SS
	263087	Solenoid valve Lucifer
	258988	Relief valve NI5.2CAS
	262006	Pressure gauge 1/4 NPT 160PS
	242750	Pressure switch O186458031006
	258988	Relief valve NI5.2CAS
	210542	O-ring 127X3 Viton
	K01180	Valve & actuator R 1/2 PEEK gasket
	K00898	Pneumatic actuator
	262360	3-way valve R1/2
	K05498	Gasket set 2 (for 3-way valve)
	K03091	Pump TAPFLO
	K03285	Gasket set for Tapflo pump
	K03286	Shaft
	K03287	O-ring
	242461	Check valve DRM-G1/4 AISI
	K03093	Lab. sample module
	250407	Air filter cartridge 40mm
	250191	Gasket set for solenoid valve
	238618	Filter PG-100-93/4
	A4501001	Kappa sample vessel
	K03460	Brightness sample bottle
	K19838	Sample delivery pipe to sweep chamber

Valmet Kappa Analyzer Spare parts ALL

Base Unit Optical	A4370336	Measuring cell, Kappa
K03136 Kappa Module		**Kappa Measuring Unit Electronics**
	A4501073	Power supply assembly Xenon
	243626	Lamp Xenon L4633-01
	K03164	Kappa D2
	K03145	Kappa D1
	K03147	Kappa D5
	K03144	Kappa D3/D4 Ref
	K03144	Kappa D3/D4 Ref
	K03236	DCPU
K03137 Brightness Module		**Brite Measuring Unit Electronics**
	A4501073	Power supply assembly Xenon
	243626	Lamp Xenon L4633-01
	K03163	Brightness I/reference, D8 (Brightness ref.)
	K03143	Brightness I detector, D6 (Brightness)
	K03142	Brightness consistency, D7 (Consistency meas. detector)
	K03236	DCPU
		Brite Measuring Unit Mechanics
	252502	Cartridge with desiccant
Shive Measuring Unit		**Shive Module Optics**
	W13499	Optics assembly Shive 0604
		Shive Module Electronics
	A4230631	Fan assembly
	K00956	Printed board assembly IO CPU
	K01509	Frame assembly computer
	K01525	Power supply
	K09416	Hard disk
	K01560	PCB assembly Shive LED driver
	K01488	Computer assembly
		Shive Module Mechanics
	215301	Pressure regulator R1/2 SS
	242248	Pressure gauge 10 bar D6
	K00902	Solenoid valve
	K00899	Solenoid valve G1/4 24VDC 10W AISI 316
	K01879	Throttle & check valve
	K00898	Pneumatic actuator
	262360	3-way valve R1/2
	K01180	Valve & actuator R 1/2 PEEK gasket
	K01487	Hose assembly
	K01707	Hose assembly
OTHER	K13869	Boiler 200 L

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NL	PL
RU	

EU

DECLARATION OF CONFORMITY
VAATIMUSTENMUKAISUUSVAKUUTUS
KONFORMITETSDEKLARATION
KONFORMITÄTSERKLÄRUNG
CONFORMITEITSVERKLARING
ДЕКЛАРАЦИЯ СООТВЕТСТВИЯ
DECLARATION DE CONFORMITE
DECLARACION DE CONFORMIDAD
DECLARAÇÃO DO CONFORMIDADE
DICHIARAZIONE DI CONFORMITA
DEKLARACJA ZGODNOŚCI

Manufacturer – Valmistaja – Fabrikant – Hersteller – Fabrikant – Производитель – Fabricant – Fabricante – Fabricante – Fabriccante – Producent	**Valmet Automation Oy** Kehräämöntie 3 / P.O.Box 177 87101 Kajaani, FINLAND
Device – Laite – Enheten – Gerät – Apparaat – Устройство – Artifice – Dispositivo – Dispositivo – Dispositivo – Urządzenie	**Valmet Kappa Analyzer** **(Valmet Kappa QC)**
Sampling devices – Näytteenottimet – Provtagare – Probenentnehmer – Monsternemers – Пробоотборники – Echantillonneurs – Dispositivos de muestreo – Dispositivos de amostragem – Dispositivi di campionatura – Urządzenie próbkujące:	**Valmet Kappa Samplers** **(Valmet SD501 / SD502 / SD505)**

This product is in conformity with the requirements of the following directives, and with standards and national legislation implementing these directives:

Tuote täyttää seuraavien säännösten asettamat vaatimukset sekä nämä voimaansaattavat kansalliset päätökset:

Denna produkt uppfyller kraven i följande direktiv och standarder samt nationell lagstiftning som inför dessa direktiv:

Dieses Produkt erfüllt die folgenden Richtlinien und Normen und die nationalen Gesetze, die die Anwendung der obigen Richtlinien durchsetzen:

Dit product is in overeenstemming met de eisen van de volgende richtlijnen en met normen en nationale wetgeving ter uitvoering van deze richtlijnen:

Данное изделие соответствует требованиям следующих директив, а также стандартам и национальным законодательным актам, вводящим в действие данные директивы:

Le produit est conforme aux directives et normes suivantes, et les dispositions nationales portant mise en œuvre desdites directives:

Este producto es conforme a los requisitos de las siguientes directivas y normas y legislación nacional de aplicación de estas directivas:

Este produto obedece aos requisitos das directivas e normas abaixo mencionadas e legislação nacional que transpõe as referidas directivas para o direito interno:

Questo prodotto è conforme ai requisiti delle seguenti direttive, norme e standard e legislazione nazionale implementata sulla base di queste direttive:

Ten produkt jest zgodny z wymaganiami następujących dyrektyw oraz ze standardami i przepisami krajowymi dotyczącymi wdrożenia tych dyrektyw:

2014/30/EU	**(EMC Directive)**
2014/35/EC	**(Low Voltage Directive)**
2006/42/EC	**(Machinery Directive)**
2011/65/EU	**(RoHS Directive)**
2012/19/EU	**(WEEE Directive)**

Sampling devices – Näytteenottimet – Provtagare – Probenentnehmer – Monsternemers – Пробоотборники – Echantillonneurs – Dispositivos de muestreo – Dispositivos de amostragem – Dispositivi di campionatura – Urządzenie próbkujące:	**2014/68/EC (Pressure Equipment Directive)**

	Juha Koistinen **Vice President** **Valmet Automation Oy** **Control & Measurement Systems**
Signature – Allekirjoitus – Underskrift – Unterschrift – Handtekening – Подпись – Signature – Firma – Firma – Assinatura – Podpis	Clarification of signature, position – Nimenselvennys, asema – Namnförtydligande, befattning – Unterschrift in Maschinenschrift, Position – Verduidelijking van handtekening, positie – Расшифровка подписи, должность – Nom en toutes letters, fonction – Nombre y cargo – Nome en função do assinante – Firma in stampatello, mansione – Imię i nazwisko, stanowisko

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