**wSValmet Kappa Analyzer – Valmet Kappa QC**

**Owner’s manual**

**K03303 V2.51 EN**

**Warnings & safety information Recycling and disposal**

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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 ap plicable 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 (pres sure > 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!**

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**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 in structed below:**

**- After ingestion: Do NOT induce vomiting! Find out if vomiting is neces sary, 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 thor oughly 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!**

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**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 manufac turer 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.**

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**1.1. Analyzer's basic functions**

**1. Introduction 1.3. Analyzer's modules**

Valmet Kappa Analyzer (Valmet Kappa QC) is a mod ularanalyzer, with measurements selectableaccording to customer needs.

It measures various pulp properties from different parts of the pulping process, using the installed meas urement 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 measure ment 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 thesamplepreparation 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,** loc ated 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 ana lyzer's left side. All cables are connected to the connec tion box.

Valmet Kappa Analyzer

The measurementpropertiesof thedevicearedepend ent 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 onechamber (washingchamber) wheresampleprepar ation and measurement take place. Dual Chamber measurement unit (Fig. 2) also contains a separate Sweep module, where the prepared sample is trans ferred for measurement. This enables faster operation, as theanalyzer isabletopreparethenext 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.

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

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

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**1.4. Kappa and Brightness measurement**

The analyzer measures pulp kappa number and brightnessusinganoptical measurementprinciple(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.

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*Fig. 3. Kappa and Brightness measuring cells, seen from the front side. 1 - detectors, 2 - Kappa measure ment 3 - Brightness measurement, 4 - LC100 consist ency transmitter.*

Valmet Kappa Analyzer

The kappa measurement cell (2) is used to determ ine 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 moduleelectronicsbox contains sensitiveoptical 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.

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

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**Notes**

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**2.1. Flexi-U**

**2. Operating terminal 2.2. Operating with Flexi-U**

Flexi-U (upgrade, Fig. 1) is a Linux-based, 10.1" oper ating 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 (Powerover 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 recon nect 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.

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*Fig. 1. Flexi-U operating terminal.*

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*Fig. 2. Connections of Flexi-U.*

The display images in this manual are views from the analyzer software. To view the displays, first select the devicefrom the menuontheleftandthenuseoperating buttons on the display. If necessary, select "communic ator" from the menu (Fig. 3).

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

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*Fig. 3. Opening the operating displays.*

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*Fig. 4. Accessing virtual keyboard in Linux.*

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**2.3. IP address**

When using the Flexi-U for the first time, make sure that thedate & timeandIP address settingsarecorrect. See Fig. 5 & 6.

1. Close Analyzer clientandgoto *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 ed ited.

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*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,andthenpressbutton **+Add** to give a fixed IP address for the network connec tion.

5. Using a fixed IP address requires the correct set tings 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.

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

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**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.

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*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 Man ager 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.

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*Fig. 8. Display sleep mode.*

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**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

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*Fig. 9. User interface settings.*

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**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" -› "Devicecontrol" -› "Reboot" -› "Shutdown". Thisensures that all open files are closed and saved correctly. After thesoftwarehas stopped, switchpoweroffby 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 configura tion and measurement monitoring:

• Analyzer's operating terminal.

• **Valmet Analyzer Interface,** Windows software. • **Connection to mill DCS,** using the Modbus pro tocol.

**NOTE: Connections for the different communication al ternatives 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.

| Measurements Page 001 Line Status Line Status  1 Line1 on 9 Line9 on 2 Line2 on 10 Line10 off 3 Line3 off 11 Line11 off 4 Line4 off 12 Line12 off 5 Line5 off 13 Line13 off 6 Line6 off 14 Line14 off 7 Line7 off 15 LIne15 off 8 Line8 off 16 Line16 off  17 Manual17 off 18 Manual18 off  2: Sampling 1 ok 9: Sampling 9 ok 1: Water meas wash 9: Remove sample Results Config Calibr Diagn |
| --- |

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

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Results [F1 / F2] Configuration [F3 / F4]

140

All results

200

Device settings

Line results

Primary

results

Fiber-Shive

100 110 120

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Level

transmitter

340

Calibr341

Detector test 1

Detector test 2

454 458

Meas.

Unit 2

Custom.

455- 457

459

Fiber Shive IO460

IO boards

Defibrator IO

461

*Fig. 2. Analyzer's operating diagram.*

IOcounters

Sequence test

Device

control

460 500 510

Sampling device

Meas.

Unit 2

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Meas. Unit 1

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**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 temperat ure, 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 cap tured, etc.).

**Trend displays**(fig.4)areusedtoshow oneor several variables as a trend for easy monitoring. Several differ ent variables can be selected, and the Y-axes can be scaled separately.

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*Fig. 3. Results menu.*

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*Fig. 4. Trend display.*

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**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 mes sages 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 madeduringoperation,arranged according to the time of occurrence.

**Flow diagram** showsareal-timeflow chartofanalyzer 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.

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*Fig. 5. Tools menu.*

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**Notes**

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**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 thegeographicalareaand then the more precise location from the list.

**NOTE: If you connect a PC with the Valmet Analyzer In terface 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 se lected 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.*

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**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 sec tion 4.8). The set measurement order determines which lines are active, and in which order they are measured.**

| Line parameters Page 210 Line 1  Line1  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 config uration, 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, alternat ives:

– SD501,

– SD502,

– SD505 (also use for sampler SD506).

**Partial sample number HW/SW:** When process con sistency is < 5 %, the sampling device must extract pulp several times from the pipeline to obtain a suffi cient 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 thetimeseparately 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 ne cessary.

**Time between samples:** Set this timeif severalpartial 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.

**Lineflushing time:** How longthesamplelineis 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.

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

**Prescreening time:** Timeat theendof sampletransfer, sample flows from waiting mode (= in sample line) into the washing chamber.

**Prescreening delay:** Delay after the sample level is detected,beforescreeningsequencebegins. Paramet er 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 previ ous sample wash is ready. With any other setting, sampling begins when the set delay is up after the previous sampling. Example: setting 2 = sampling be gins again 2 seconds after the previous sampling.

**Pre-sampleflush:** It ispossibletoaddtothesequence a sample line flush also before a sample is taken. Give here the required flushing time in seconds, 0 = no flushing.

| Sampling parameters 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".*

| Sampling sequence  3,4  5,6 7  Sample transfer Sample to wash. chamber Sample  line  814  flushing  11,12  13  9  16  10  Sample  15  level detected |
| --- |

*Fig. 4. Sampling sequence.*

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**Options: SD connections**

Control signal connections for the sampling devices (Fig. 5). In the list, ix = sampling device number, fol lowed 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 con nections. Samplelines1-4usetwocontrol signalsper 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 0  |  |  14  |  |  7  |  1  |  0 0  |  |  2  8  |  1 0 0  |  |  |  2  9  |  1 0 0  |  |  |  2  10  |  1 2  |  |  0 0  |  11  |  1  |  |  0 0  |  2  12  |  1  |  2 0 0  |  |  13  |  1  |  2 0 0  |  |  14  |  11  ||  2 0 0  |  |  15  |  122  |||  |  0 0  |  16  |  |  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.

| Batch sample Page 222 Line 1  1 Batch sample number 1 2 Batch sample interval 120  Line Save |
| --- |

*Fig. 6. Batch sample settings.*

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**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 se

quence: "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 thetimeseparately forhardwoodandsoftwood, inseconds. Thisparameter is used when the "Sample screening mode = 2".

**Sample screening:** This parameter is used when the "Samplescreening mode = 1". Thisparameterdeterm ines 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 measurementuseat least two washes (max.9). Brightness samples can be washed if necessary.

**Sample washing 2:** Numberof 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 cham ber).

**Neutralization liquid:** How longtheneutralizationliquid 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 = neutraliz ation 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:** Theconsistency levelsat which the sweep measurement starts and ends. Set separ ately 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.*

| Sweep end Cs  Sweep start Cs  0.9 \* sweep start Cs  +/- hysteresis  - if initial sample Cs is below this,  no Kappa/brightness measurement  Cs, %  0.38 0.33 0.30 0.27 0.09 |
| --- |

*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 %.*

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**4.6. Analyzer parameters**

Parameters controlling analyzer operation (Fig. 9):

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

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

**Chemical + water:** Duration for cleaning chemical in jection 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.**

**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.

| pp  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.*

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**4.7. Measurement order**

The measurement order of analyzer's sample lines 1 - 16 is freely selectable. Enter the required measure ment 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 independ ently, following the order set for each one.

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

| Measurement order Page 250 Unit 1:  ix Line Kappa/Brite Shive/Fiber  |  1 1 on off  |  |  |  2 2 on off  |  |  |  3 3 on off  |  |  |  4 4 on off  |  |  |  5 5 on off  |  |  |  6 6 on off  |  |  |  7 7 on off  |  |  |  8 8 on off  |  |  |  9 1 on off  |  |  |  10 1 on off  |  |  |  11 1 on off  |  |  |  12 1 on off  |  |  |  13 1 on off  |  |  |  14 1 on off  |  |  |  Unit2 ^  v |
| --- |

*Fig.10. Settingthe measurementorder for thecabinets.*

**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.

Theindicatedvalveisopen whenthecontrol charac ter 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.

| Screening (D) Page 260 ix Bo Sequence  |  1 2 \_================\_end  |  |  2 10 =================\_\_\_\_  |  |  3 12 =================\_\_\_\_  |  |  4 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |  |  5 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |  |  6 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |  |  7 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |  |  8 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |  |  9 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |  |  10 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |  |  11 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |  |  12 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |  |  Repeat 1 Next 0 0/ 0 s  Select Test Test  seq unit 1 unit 2 |
| --- |

*Fig. 11. Example of the Sequence programs display.*

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

– F7 = chemical wash of Cabinet 1, cleans the mod ules selected for line 17.

– F8 = chemical wash of Cabinet 2, cleans the mod ules selected for line 18.

| Wash. chamber wash  Page 264  Sequence 5  ix Bo Sequense  1 1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_end |  |  2 2 =====\_\_\_\_\_\_\_========\_\_\_\_ |  |  3 3 \_\_\_\_\_\_\_\_\_\_\_\_====\_\_\_\_\_\_\_\_ |  |  4 10 =====\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  5 11 =====\_\_\_\_\_\_\_\_\_\_\_====\_\_\_\_ |  |  6 13 ================\_\_\_\_\_\_\_\_ |  |  7 16 ================\_\_\_\_\_\_\_\_ |  |  8 17 ================\_\_\_\_\_\_\_\_ |  |  9 19 ================\_\_\_\_\_\_\_\_ |  |  10 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  11 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  12 0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1 Next 0 0/ 7 s  Repeat  9: Sample washing  Select Test Test Chemic seq unit 1 unit 2 1 2 |
| --- |

*Fig. 12. Example of the Sequence programs display.*

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**4.9. Customer IO configuration**

These configurations are not necessary if Modbus is used for data communication. Slide the bar in the bot tom 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 ix 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  |  |  |  Get  Defaults |
| --- |

*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.*

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**Notes**

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**5. Calibration**

**5.1. Principle of calibration**

In calibration, analyzer's raw measurement results are scaled in such a way that the obtained reading corres ponds 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 Ana lyzer 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,andthereferencesampleshavebeenanalyzed 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 con verted 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 suffi ciently good correlations. Parameters are set on display page 301.

• R5, calculation uses raw measurement results from detector D5. Use when pulp kappa # is > 40. Coeffi cients 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.

| KAPPA  x  y2  xx  y=ax+b  x xx  y1  (y2 - y1)  a =  (x2 - x1)  b = y1 - a \* x1  x1 x2  LAB |
| --- |

*Fig. 1. Calibration principle.*

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**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

Whenstarting model calculation,usetherecommended detectors, Cs pairs and sweep ranges (see the Tables). Start model calculation by combining data collected from bothsidesof 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.*

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*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

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**5.3. Consistency calibration**

When the analyzer contains the Fiber-Shive module (option), consistency calibration should be made sep arately for each line and grade. In other cases it is enoughtocalibrateonelineandthensavetheobtained 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 re main 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.

| Cons parameters Page 320 Line 1 Line1  0.0250  1 Gain HW  2 Offset HW 0.0160  -  3 Gain SW 0.0260 4 Offset SW 0.0200  -  5 Filtering 5.0000 Line Calibr Save |
| --- |

*Fig. 3. Consistency parameters display.*

| Cons calibration Page 320 Line 1 Line1  1  1 Sample time 2.1.11 13:20 2 Measured Cs 0.00000 3 Vcs sample 0.00000 4 Vcs water 0.00000 5 Gain 1.00000 6 Offset 0.00000  7 Laboratory Cs 0.00000  Idle  Line Start Calc Save |
| --- |

*Fig. 4. Consistency calibration display.*

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**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 calibra tion, separately for each channel and grade. The first consistency used in compensation is higher than the normal analysis consistency; make sure that the ana lyzer gets enough sample.

Start compensationfrom the"Brightnessparameters" 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. Thecalculatedcoefficients 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 calibra tion.

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 thesamplevessel remaininthesamplecollect or 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 calcula tion 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 calibra tion.

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).

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**5.7. Kappa parameters**

In the main display, select "Calibr" -› "Kappa paramet ers" 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:** Whenoneof thecalculationformu lae R1 - R3 is used, choose here the required calibra tion 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 R3calculationisused, selecthere 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 calcula tion 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 whenconvert ing the obtained Cv result into a wood grade percent age.

**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.

| Kappa Calibr. param Page 300 Line 1 Line1  1 HW model no 1  2 SW model no 1  3 R3 Dn1/Dn2 1/2  4 Cs pair 1 0.2500 0.1500 5 Cs pair 2 0.2200 0.1300 6 Cs pair 3 0.2000 0.1200  7 Cv variation limit 1.00000 8 Cv variation hysteresis 0.10000  9 Grade determination (Cv=1) 1 10 HW/SW coefficient Gain 1 11 HW/SW coefficient Offset 0  Line R4 R5  Models |
| --- |

*Fig. 5. Kappa calibration parameters.*

| Kappa Calibr. param Page 303 Line 1 Line1  Gain Offset Cs-pair r-calc.  1 HW Models  2 1 1.000000 0.000000 1 2 3 2 1.000000 0.000000 1 2 4 3 1.000000 0.000000 1 2 5 4 1.000000 0.000000 1 2 6 5 1.000000 0.000000 1 2  7 SW Models  8 1 1.000000 0.000000 1 2 9 2 1.000000 0.000000 1 2 10 3 1.000000 0.000000 1 2 11 4 1.000000 0.000000 1 2 12 5 1.000000 0.000000 1 2  < Save |
| --- |

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

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**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 cal culation 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.

| Kappa Calibr. param Page 301 Line 1 Line1  1 R4/R1 gain 1.00000 2 R4/R2 gain 1.00000 3 R4/R3 gain 1.00000 4 R4/Cv gain 1.00000 5 R4 offset 0.00000  6 Cv high limit 1.00000 7 Cv max. value 1.00000 8 Cv low limit 1.00000 9 Cv min. value 1.00000  10 R1 gain 1.00000 R3 gain 1.00000 11 R1 offset 0.00000 R3 offset 0.00000 12 R2 gain 1.00000 Cv gain 1.00000 13 R2 offset 0.00000 Cv offset 0.00000  Line < |
| --- |

*Fig. 7. Calibration coefficients for formula R4.*

| Kappa Calibr. param Page 302 Line 1 Line1  1 R5/R5a gain 1.00000 2 R5/R5b gain 1.00000 3 R5/Cv gain 1.00000 4 R5 offset 0.00000  Line < |
| --- |

*Fig. 8. Calibration coefficients for formula R5.*

Owner´s manual, K03303 V2.5 EN 39 Valmet Kappa Analyzer

**5.8. Brightness parameters**

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

**Brightn. Cs 1 - 3:** Consistencies at which the bright ness 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 con sistency 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 consist ency 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.

| Brightn. calibr. Page 310 Line 1 Line1  1 Brightn. Cs 1 0.60000 2 Brightn. Cs 2 0.24000 3 Brightn. Cs 3 0.23000 4 Brightn. Cs 4 1.00000 5 Brightn. Cs 5 0.00000 6 Brightn. HW model (1-5) 1 7 Brightn. SW model (1-5) 1  8 Brightn. Cs compensation 0 9 Det7 HW Gain 1.00000 10 Det7 HW Offset 0.00000 11 Det7 SW Gain 82.6805 12 Det7 SW Offset 0.99567  14 Next meas. Cs compensation 0  Line Manual  Cs Comp. Models |
| --- |

*Fig. 9. Brightness parameters, first display.*

| Brightn. calibr. Page 311 Line 1 Line1  Gain Offset Cs  1 HW Models  2 1 2.000000 3.000000 1  3 2 1.000000 0.000000 1  4 3 1.000000 0.000000 1  5 4 1.000000 0.000000 1  6 5 1.000000 0.000000 1  7 SW Models  8 1 1.000000 0.000000 1  9 2 1.000000 0.000000 1  10 3 1.000000 0.000000 1  11 4 1.000000 0.000000 1  12 5 1.000000 0.000000 1  Line < |
| --- |

*Fig. 10. Brightness parameters, second display.*

Owner´s manual, K03303 V2.5 EN 40 Valmet Kappa Analyzer

**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 but

ton. 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 in creases 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.*

Owner´s manual, K03303 V2.5 EN 41 Valmet Kappa Analyzer

**5.10. Level transmitter calibration**

The level transmitter has been calibrated by manufac turer. 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 "Meas ured 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 waterfrom 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 us ing the calculated values.

11. Select "Meas" [F3] -› "Meas volumes". 12. Goto menu"Config" [F3] -› "Analyzerparameters". 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.

| Level transmitter Page 340 Level transmitter 1:  1 Level gain 0.860  -  2 Level offset 5.000 3 Level filt 0.100  Level transmitter 2:  4 Level gain 0.860  -  5 Level offset 5.000 6 Level filt 0.200  Calibr |
| --- |

*Fig. 12. Level transmitter calibration, display 1.*

| Level transmitter Page 341 Level transmitter 1  0  1  2.1.11 7:50  1 Calibration time  4.91180  2 Measured level 1  0.69540  3 Measured level 2  -0  .8593  4 Calculated gain  5.19621  5 Calculated offset  5.01432  6 Measured max volume  0.97516  7 Measured min volume  1.40000  8 Volume 1  4.60000  9 Volume 2  Transmtr Meas Calc Save |
| --- |

*Fig. 13. Level transmitter calibration, display 2.*

Owner´s manual, K03303 V2.5 EN 42 Valmet Kappa Analyzer

**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 thedevicefrom behind, thevesselsarenumberedfrom 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.

| 2  1  3 4  5 |
| --- |

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

| A B C |
| --- |

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

Owner´s manual, K03303 V2.5 EN 43 Valmet Kappa Analyzer

**6.2. Sample collector settings**

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

Toview the meausurement results foreachcollected 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:** Kappaandbrightness results measured for the sample with calculation models 1 - 5.

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

| Sample collection Page 330  Sample cup No 1 f  O  Status (full=on) f Line Manual17 7  1  Sample number 2032 Sample time 12.1.11 13:45  0.321  Kappa  8  4.996  Brightness  0.579  Cv  5.433  R1 Kappa R1 Brightn  4.996  8  0.321  R2 Kappa R2 Brightn  2.456  8  1.783  R3 Kappa R3 Brightn  0.012  8  7.659  7  R4 Brightn  8.537  R4 Kappa  5.398  7  R5 Brightn  8.328  R5 Kappa  83  Kappa lab. result  01  Brigtn. lab. result  S  Cup Config Diagn Results  v ^ |
| --- |

*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 (:).

| Sample collection Page 332 Line 1 Line1  1 Sample cup number 1  2 Collection timer off 3 Repeated collect. (0=off) 0 min  4 Every day mode off 5 Weekly mode off  6 Collection time 1 1.1.00 0:00 7 Collection time 2 1.1.00 0:00 8 Collection time 3 1.1.00 0:00 9 Collection time 4 1.1.00 0:00  10 Collection time 5 1.1.00 0:00 11 Collection time 6 1.1.00 0:00  Line  Trigger |
| --- |

*Fig. 4. Timed sample collection, parameters.*

Owner´s manual, K03303 V2.5 EN 44 Valmet Kappa Analyzer

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 isoutsidetheset limits,alab. sample is collected.

| Kappa Calibr. param Page 331 Line 1  1 Collection trigger mode 0  2 Kappa Upper limit 0 3 Kappa Lower limit 0  4 Brightn. Upper limit 0 5 Brightn. Lower Limit 0  < Save |
| --- |

*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 samplecollectionon/off for theselected 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"

| Sample coll. status Page 333  Line Collection SC Line Collection SC 1 Line1 off 1 9 Line9 off 0 2 Line2 off 0 10 Line10 off 0 3 Line3 off 0 11 Line11 off 0 4 Line4 off 0 12 Line12 off 0 5 Line5 off 0 13 Line13 off 0 6 Line6 off 0 14 Line14 off 0 7 Line7 off 0 15 LIne15 off 0 8 Line8 off 0 11 Line16 off 0 17 Manual17 off 0 18 Manual18 off 0  Status (full=on)  SCup 1 off SCup 6 off  SCup 2 off SCup 7 off  SCup 3 off SCup 8 off  SCup 4 off SCup 9 off  SCup 5 off SCup 10 off  Clear Trigger  Popup quit |
| --- |

*Fig. 6. Sample collection control.*

Owner´s manual, K03303 V2.5 EN 45 Valmet Kappa Analyzer

**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).

| SCup type Page 334  on=kappa Brite sample  off=Brite vol  1 SCup 1 on 4.0  2 SCup 2 on 4.0  3 SCup 3 on 4.0  4 SCup 4 on 4.0  5 SCup 5 on 4.0  6 SCup 6 on 4.0  7 SCup 7 on 4.0  8 SCup 8 on 4.0  9 SCup 9 on 4.0  10 SCup 10 on 4.0  Save |
| --- |

*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).

| Line parameters Page 335  Selected cup number (1-10) 2 Measurement unit 1  SB\_CMD, Go to location 0 SB\_STAT, Status of motion 0 SB\_CMDID, Can command id 0  Measurement unit 2  SB\_CMD, Go to location 0 SB\_STAT, Status of motion 0 SB\_CMDID, Can command id 0  Test |
| --- |

*Fig. 8. Sample collection, diagnostics.*

Owner´s manual, K03303 V2.5 EN 46 Valmet Kappa Analyzer

**7. Results**

The maindisplayalways shows thelatest 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, op tion).

**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 calib ration coefficients.

**Water value:** The result of the latest water measure ment.

**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 ad justment.

**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.

| 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.*

| 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.*

Owner´s manual, K03303 V2.5 EN 47 Valmet Kappa Analyzer

**7.3. Line results / Brightness**

**Brightness:** Brightness measurement result, calculated from the selected "raw brightness" data with the selec ted 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 ad justment.

**Water Cs:** Consistency measurement result for water. **Water temp:** Temperature of hot water.

**R1 - R3 Brightn.:** "Raw" brightness results with calcu lation models 1 - 3.

**Ax2+Bx+C correl:** Correlationbetween measurement results and calculation model.

**7.4. Primary results**

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

**Show 1/2:** Show/hidetheresultsof theselecteddetect or (1 = D1, 2 = D2).

| Results Page 101  Line 2. Line2  13.1.11 14:49  Sample number 25863 Brightness 2.681 Start Cs 0.263 %  8  Stop Cs 0.129 %  Water value Initial Cs 0.300 %  0.610  Cv 0.000 Water Cs 0.001 % HW/SW 1.000 % Water temp 32.0 °C  R1 Brightn. 2.681  8  R2 Brightn. 2.311  8  R3 Brightn. 1.907  8  Ax2+Bx+C correl. 0.9957  Line Kappa Brightn.  v ^ |
| --- |

*Fig. 3. Primary results.*

| Results Page 110 Line 9 Line9 12.1.11 13:01 5.0000  4.3750  3.7500  3.1250  2.5000  1.8750  1.2500  0.6250  0.0000  0.00 0.10 0.20 0.30 0.40 Line show 1 >  show 2 v ^ |
| --- |

*Fig. 4. Brightness results.*

Owner´s manual, K03303 V2.5 EN 48 Valmet Kappa Analyzer

**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!**

| **AB** |
| --- |

*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 as semblies, 5. discharge.*

Owner´s manual, K03303 V2.5 EN 49 Valmet Kappa Analyzer

**8.2. Sequences, Fiber-Shive**

The Fiber-Shive module is able to perform three differ ent 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 valvesareclosed. The modulechecks theparameter "Background image interval" to see if it is time to take anew backgroundimage. Ifanew imageis taken,dilu tion 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 max imum 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.

Ifacommandis received withinthis 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 waitsuntil the"Maximum sample wait" time is up, and then starts again from step Back ground 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 moduleperformsashiveanalysis, thenstartsagain from step Background image.

| Sample storage  SSI1  Sample  open  measurement loop 1  closed  SSI2  Sample  measurement loop 2  SSA1  Air  SSA2  SSS  r  e  x  i  SSF  M  Water  SSD  SSE  Discharge |
| --- |

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

Owner´s manual, K03303 V2.5 EN 50 Valmet Kappa Analyzer

**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 thefiber & shive measurementconsistency** – 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 en able/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 per centage.

**Lc(l) [mm]:** Length-weighted fiber length. **Sh:** Shive measurement on/off.

**Fi:** Fiber measurement on/off.

| Fiber-Shive module Page 120 Line Shive% Lc(l)[mm] Sh Fi 1 Line1 ÿ off off 2 Line2 off off 3 Line3 off off 4 Line4 off off 5 Line5 off off 6 Line6 off off 7 Line7 off off 8 Line8 off off 9 Line9 off off 10 Line10 off off 11 Line11 off off 12 Line12 off off 13 Line13 off off 14 Line14 off off 15 LIne15 off off 16 Line16 off off 17 Manual17 off off 18 Manual18 off Results Config. |
| --- |

*Fig. 5. Fiber-Shive, main page.*

Owner´s manual, K03303 V2.5 EN 51 Valmet Kappa Analyzer

**8.5. Parameters**

Press "Config" in the Fiber-Shive module main display toset theparameters for fiberandshive 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 ana lysis.

**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 longthe measurement cell is flushed before a background image is captured.

**Shive sample tube volume:** How much sample is takenfor Fiber-Shiveanalysis. If thereavailablevolume of ready sample is lower than this limit, analysis will notbeperformedandthedisplay 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.

| Fiber-Shive param. Page 125  1 Fiber sample predilution 10 sek 2 Measurement cell flushin 10 sek 3 Background picture inter 5 4 Shive anal. start delay 2 sek 5 Shive analysis time 180 sek 6 Fiber analysis time 60 sek 7 Sample wait time max. 600 sek  8 Background pic. flushing 60 sek  9 Shive sample tube volume 2.20 l 10 Sample pipe time to fill 100 sek  11 ShiveIP 139.74.56.231 12 Fiber-Shive enabled offSave |
| --- |

*Fig. 6. Fiber-Shive parameters.*

Owner´s manual, K03303 V2.5 EN 52 Valmet Kappa Analyzer

**Shive line parameters**

**Sample line name:** User-defined name.

**Consistency stop limit:** Limit for reduction in consist ency. Example: Setting 0.5 means that measurement stops if sampleconsistencydropsby50% or morefrom the initial value.

**Accuracy target:** Target accuracy of shive measure ment,percentage. Measurement stops whentheuncer tainty of the result is below the set limit. Example: set ting 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.

| Shive line param. Page 126 Line 1  1 Sample line name Line1  2 Consistency stop limit 0.500000 3 Accuracy target uncertai 7 %  4 Min. shive width 0.07500 mm 5 Shive length limit 0.30000 mm  Line Save |
| --- |

*Fig. 7. Shive line parameters.*

**Fiber line parameters**

**Sample line name:** User-defined name.

**Min. object width:** Minimum widthofobjects regarded as shives.

**Min. object area:** Size of the smallest object to be de tected.

**Remove short:** What proportion (percentage) of zero length particles will be omitted from the results. This parameter canbeused whenthe 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 re moval 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 con sistencybeforeit isdeliveredtothe Fiber-Shive module. This value can now be edited.

**Consistency hysteresis**: Accepted accuracy when checking/adjusting consistency.

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**Consistencylow limit1**: Incomingsampleconsistency 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 per formed, as there is not enough sample to complete all measurements.

**Consistency low limit 2**: As parameter 9, but this low limit isapplied when Fiber+Shive willbe measuredafter 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 dis plays.

**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.*

Owner´s manual, K03303 V2.5 EN 54 Valmet Kappa Analyzer

**8.7. Results**

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

**Shive measurements**

**Sample Number:** Number of sample.

**Shive cons:** Average consistency during shive analys is.

**Image count:** How many images were analyzed.

**Analyzed pulp, mg:** Estimated dry weight of the ana lyzed pulp sample.

**Shive %:** Shivesaspercentageof theanalyzedsample (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).

| Shive results Page 121  Line 4 Valikappa  13.1.11 9:06  sample no 71397  shive cons 0.0168 % image count 8251 n analyzed pulp 2743.858 mg  shive 0.326 % wide shives 0.008 %  shive 2483.7 n/g wide shives 10.6 n/g  shive 6815 n wide shives 29 n  Line  v ^ |
| --- |

*Fig. 10. Shive measurement results.*

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

**Wideshives, n:** Numberof largeshives intheanalyzed 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).

| Fiber results Page 122  Line 4 Valikappa  13.1.11 9:06  sample no 71397  image count 444 n fines A 6.79 % fines B 3.60 % Lc(n) ISO 1.328 mm  Lc(l) ISO 2.111 mm Lc(w) ISO 2.642 mm  fiber cons 0.0013 % width 30.64 um  Line  v ^ |
| --- |

*Fig. 11. Fiber measurement results.*

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Shive results can be viewed as a matrix, either with the number of shives per gram of sample, or as a percent age. 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 lengthof 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 cat

| Shive matrix(%) Page 124  Line 4 Valikappa 71397 Length  |0.300-|1.500-|3.000-| 6.000-  W |1.500 |3.000 |6.000 |40.000 i \_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_\_ d 0.075-| | | |  t 0.150 |0.3023|0.0152|0.0006|0.0000 h \_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_\_ 0.150-| | | |  0.300 |0.0044|0.0021|0.0000|0.0000 \_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_\_ 0.300-| | | |  0.600 |0.0000|0.0016|0.0000|0.0000 \_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_\_ 0.600 | | | |  3.000 |0.0000|0.0000|0.0000|0.0000 | | | |  Line Count/g Matrix |
| --- |

egory, as percentages of analyzed solids.*Fig. 12. Shive matrix display.*

| Count/g matrix Page 123  Line 4 Valikappa 71397 Length  |0.300-|1.500-|3.000-| 6.000-  W |1.500 |3.000 |6.000 |40.000 i \_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_\_ d 0.075-| | | |  t 0.150 |2422.8| 49.57| 0.73| 0.00 h \_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_\_ 0.150-| | | |  0.300 | 8.02| 2.19| 0.00| 0.00 \_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_\_ 0.300-| | | |  0.600 | 0.00| 0.36| 0.00| 0.00 \_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_|\_\_\_\_\_\_\_ 0.600 | | | |  3.000 | 0.00| 0.00| 0.00| 0.00 | | | |  Line Percent. Matrix |
| --- |

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

*pulp).*

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**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, thenumberof 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 pres surized.

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 mustbeconfiguredindi vidually 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 loopispressur ized 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 measure ment, 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-meas urement).

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**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 se lected 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**

Theanalyzerpressurizes the measurement loopagain and measures thevalues for water. Thesevalues reflect thecleanlinessof the measurement loopandthe water used in measurement, and they are used for self-dia gnostics.

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

| KAPPA: Dual Chamber  Washing chamber Sweep module  Sampling,  Sample  Sample  Sample  Initial  Water  Cs  Sample  Sample  Analyzer  mixing Sweep measurement HW/SW  Pre  Sample  wash,  wash,  to  Cs  values  adjust.  screening  wash  ratio  screening  transfer  hot  cold  Sweep  meas.  meas.  1 2 3 4 5  Wash.  chamber  washing  KAPPA: Single Chamber  Washing chamber  Sampling,  Sample  Sample  Initial  Water  Cs  Sample  Sample  Analyzer  mixing Sweep measurement HW/SW  Pre  Sample  wash,  wash,  Cs  values  adjust.  screening  wash  ratio  screening  transfer  hot  cold  meas.  meas.  1 2 3 4 5  BRIGHTNESS; as kappa measurement (Single/Dual) but using deionized water  Sample  Initial  Water  Sampling,  Sample  Cs  Analyzer  Sweep measurement HW/SW  Sample  Sample  Pre  to  Cs  values  Sample  wash,  adjust.  wash  ratio  screening  mixing  screening  Sweep  meas.  meas.  transfer  deion.  1 2 3 4 5  Wash.  chamber  washing |
| --- |

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

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**9.2. Flow diagrams**

| Water  82  Sample  *SVF*  Air  Air  *CHW*  24  OPEN  *SLP*  *SCP*  Ejector  Safety  15  Warm  valve  9  1  water  24  81 60  *SLV*  Air  CLOSED  5  63  *WCP*  To drainage  2  *SLD*  Warm  20 *SLW*  water  6  Chemical  tank  54  37  Cold  *SCW*  water  13  25  Warm  26  water  *WMW*  19  Br  61  *UDR*  10  53  Ejector  Kappa  *EJC*  14  Pesukammio  Cold  52  62  water  *WRS*  11  Cs  55  Cold  *WOW*  water  *PUW*  *WRW*  16  *LAB BLR*  *LFL*  3  12  18 7 4  Air  *SSI*  51  Cold  water  Cold  *WUW*  water  17  50  80  *DCH*  Air Air  8  65  Pump  *LAL LAR*  31 35 36  Sample to  Fiber-Shive  32  Speed  Lab. sample  Drainage |
| --- |

*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

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| 82  OPEN  Sample  *CHW*  Air  Air  Water  Air  Ejector  Warm  15  Safety  *SLP*  *SCP*  83  CLOSE  water  valve  *SVF*  *SWP*  60 81  9  1  *SLV*  24  30  *WCP*  63  5  Safety  Air  24  2  valve  *SLD*  Warm  water  20 *SLW*  6  37  Cold  13  25  water  *UDC*  *SCW*  Chemical  Warm  tank  26  26  54  water  19  *WMW*  Br  *UDR*  To drainage  10  Cold  Mittaus  53  water  Kappa  Sweep-kammio  700e  52  *EXF*  23  Water  Air  57  Cs  *WIW MXA*  *WRS*  *EXV*  28 27  11  22  *LFL*  *LAB BLR*  Cold  water  18 7  4  *WOW*  Cold  55  Wire  water  *PUW*  16  56  *SSI*  3  *WRW*  12  Air  *WIV*  51 50  29  Cold  *WUW*  *BOV*  water  17  25  Pump  31  65  Sample to  80  Fiber-Shive  Speed  32  Air Air  *DCH*  8  *LAL* 35 36 *LAR*  Lab.sample  Drainage |
| --- |

*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

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| **Pressurized air valve assembly 1 Cold water valve assembly Warm water valve assembly** Screening pressure  1  Washing  Screening water  13  15  chemical  Washing chamber pressure  2  Warm water  Pressure under the wire  Water on the wire  3  19  16  (prescreening)  Blockage  4  20 Sample line valve  Water under the wire  17  Sample line valve  5  Sample line draining  6  18  Dilution,  **In Single Chamber model**  measurement loop  Laboratory sample valve  **valve 14 replaces valve 23**  7  Discharge  8  Exchange line flush Ejector  23  14  9 Sample line pressure  Safety valve flush  24  Upper draining  10  Water removal to side  11  Wire washing  28  Sweep chamber  Water removal through wire  12  **Water filter set**  **Pressurized air valve assembly 2**  Exchange valve  Neutralization  22  NV  Bottom valve  25  Sweep chamber  Upper discharge  26  Sweep chamber  Mixing air  27  Sweep chamber  Wire washing  29  Sweep chamber  Sweep module  30  pressure  Lab. collector  35  control, left  36Lab. collector  control, right |
| --- |

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

Owner´s manual, K03303 V2.5 EN 61 Valmet Kappa Analyzer

| Cabinet 2  Cabinet 1  Pressurized air valve assembly  Pressurized air valve assembly  Cold water  Cold water  valve assembly  valve assembly  Warm water  Warm water  valve assembly  valve assembly  Warm water  70 FEP 1/2"  74 FEP 1/2"  Cold water  71 FEP 1/2"  73 FEP 1/2"  Cold water  Air  72 PA 10/8  75 PA 10/8 |
| --- |

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

Owner´s manual, K03303 V2.5 EN 62 Valmet Kappa Analyzer

**10. Diagnostics and troubleshooting**

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

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

| Analysis counters Page 400 Line 1  Sample count 614 Analysis count 573  Total sample count 1601 Total analysis count 1577  Counters cleared 17.9.10 10:10 Last sample number 66168  Line Clear Clear FA/SA Counters Counters |
| --- |

*Fig. 1. Analysis counters display.*

| Analysis counters Page 400 Line 1  FA/SA sample count 0 FA/SA count 0  Total FA/SA sample 0 Total FA/SA count 0  FA/SA counters cleared 7.1.11 10:00 Last FA/SA sample n. 0  Line Clear  Counters |
| --- |

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

**10.1. Analysis counters**

Eachanalysis counterpage(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.

**Analysiscount:** How manyanalyseshavebeen 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.

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**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).

Theerrorsaregroupedaccordingtoextent: 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 mes sages 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, ana lyzer continues with washing.

• 4 = only the alarm output is activated.

• 5 = similar tolevel3,but thealarm output isactivated after the error has occurred three times.

• 6 = if the same error occurs three times in a row, the alarm output isactivatedandthechannel isdisabled.

| 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. Exampleof Error statusdisplay, Commonerrors.*

**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

Owner´s manual, K03303 V2.5 EN 64 Valmet Kappa Analyzer

**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  vent log 1  ime Text  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  Unit 2 < > ^  v |
| --- |

*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 connec ted to the analyzer.

– Ver = version number of IO board definition file. – Enable = boardstatus. ON = connectedto 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 mal functioning.

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 con nected 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 MODBUS Measperm  status status status |
| --- |

*Fig. 6. I/O-status display.*

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Ifnecessary, Modbus canbeconnectedsimultaneously over serial communication and Ethernet. Press [F3] MODBUS status to monitor the operation of Modbus communication and counters.

Notethat the Modbusaddress,baudrate,parityand stop bits for the serial connection Modbus cannot be edited on this page (Fig. 7); go to Config / Device set tings 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 permit ted.

| Modbus status Page 442 Modbus address 11  Baud rate 9600 Parity 0 Stop bits 1 Messages 0 Responces 0 Errors 0 Timeouts 0  TCP port 502 TCP connections 0 TCP messages 0 |
| --- |

*Fig. 7. MODBUS status display.*

| Measurement permit Page 443  Line Bin Modbus  1 off off  2 off off  3 off off  4 off off  5 off off  6 off off  7 off off  8 off off  9 off off  10 off off  11 off off  12 off off  13 off off  14 off off  15 off off  16 off off |
| --- |

*Fig. 8. Measperm status display.*

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**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 statusofpressuresensors, level sensors,andsampling 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)!

| Measurement unit 1 Page 451  01\_SCP, Screening pressure off 02\_WCP, Wash. chamber pressure off 03\_PUW, Pressure under wire off 04\_BLR, Blockage removal on 05\_SLV, Sample line valve off 06\_SLD, Sample line draining on 07\_LAB, Laboratory sample valve off 08\_DCH, Discharge on 09\_SLP, Sample line pressure off 10\_UDR, Upper draining off 11\_WRS, Water removal to side off 12\_WRW, Water removal through wi off 13\_SCW, Screening water off 14\_EJC, Ejector off 15\_CHW, Wash. chemical off 16\_WOW, Water on the wire off  Page  v |
| --- |

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

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**Detector test for the kappa and brightness detect ors:**

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, ana lyze 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 Cham ber: 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 0.05 - 0.2 2.0 - 4.8

Cs comp. detector voltage

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

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**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 (operat ing 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 meas urement 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.

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**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 set tings. Then press F3 to start the test. The sequence begins with sampling and continues until the first activ atedbreak. Whilethesequenceis stopped, thedisplay will read "Break on!"

To continue the sequence press F5 Cont. To inter rupt 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:** Thedevicestopsafter theset 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 measure ment.

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

Thebreaksarealsoindicated withthecorresponding numbers in chapter Sequences, Fig. 1.

| Sequence test Page 500 Line 1  1 Sampling break off 2 Sample in break off 3 Sample wash break off 4 Init Cs break off 5 Set Cs break off  6 Sample line status on 7 Sample transfer time 10 8 Initial Cs 0.325  1: Sampling 1 ok  1: Chamber washing  1: Meas init cons..  Line Start Cont Save Wash |
| --- |

*Fig. 11. Sequence tests display.*

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**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 rins ing/cooling is also stopped. Do not keep the module in service mode for longer periods, its PC may be over heated!

Set the device to Service mode always before maintenanceandserviceoperations. 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 testpage("Diagn" -› "IO-test"). Whenyou wishtorestart the analyzer, choose "Start device". The device will then washall chambers, measurethe water valuesand 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.

| Device control Page 510  1 Kappa service mode off 2 Fiber/Shive service mode off  Idle  Quick stop  Controlled shutdown  REBOOT Stop Start  device device |
| --- |

*Fig. 12. Service mode display.*

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**10.11. Errors**

**Underdilution, Single Chamber**

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

-› washing chamber level transmitter is incorrectly cal ibrated

-› 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 calib rated

-› 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 measurementerror,Singlechamber/Dualchamber** • Consistencyadjustment 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** • Thecollectordoesnot containanempty vessel (has not been reset after the previous sample).

**Prescreen error, Single chamber/Dual chamber** • Not enough sample, or the timing of sampling is in correct.

• Washingchamber level transmitter is stuckordefect ive.

-› 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

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**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 meas urement.

**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 ana lyzer washing.

• Washingchamber level transmitter is stuckordefect ive.

-› 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 ana lyzer washing.

• Washing chamber level sensor is dirty or defective. -› check washing chamber level transmitter (IO5) -› valve WRS 11 (IO2) does not open

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**Sweep Cs error**

• Thesetendconsistency couldnotbereachedduring 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 con sistency 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 con sistency 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 cal ibrated

-›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 calib rated

-› 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

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**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. 2. Module electronics box.*

| A  B  C |
| --- |

*Fig. 1. Analyzer electronics box, analyzer furnished for*

*analog/binary connections. If serial communication is*

*usedinstead, thebox containsno Customer IO boards.*

*Fig. 3. Measurement cabinet (some doors removed);*

*A - analyzer electronics box, B - module electronics*

*box, C - connection box.*

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

**OeClient**

**nameBoard Usage Location CAN**

**CAN**

**address**

**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

***IO4*** DCPU ***IO3\_2*** DCPU ***IO4\_2*** DCPU

Cabinet 1

Kappa measurement

Cabinet 1

Brightness measurement Cabinet 2

Kappa measurement Cabinet 2

Brightness measurement

Cabinet 1 module electronics box 0 1 Cabinet 1 module electronics box 1 1

Cabinet 2 module electronics box 2 1 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

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**11.2. MasterCPU K00990**

MasterCPU is thecomputerof theanalyzer. 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.

| GND 24 +24V  ON S7 J24  2 1  Flash  J3  TP2  CPU module  TP5  TP7  TP16  TP4  TP17TP10  + -  B1  J19  J13  J29  TP8 TP6 TP9  D5  J16 J17  J25 J27 J28  J7  J6 J2 J8  J23 J12 J20  S4  J5  1 2 3 4 1 2 3 4  J18 J21  J11  J22 J26  L  L  D  H  H  d  V  V  4  D  B  A  B  A  V  B  A  B  A  B  A  B  A  l  x  x  x  x  5  5  2  x  x  x  x  x  4  x  x  x  N  N  N  N  e  N  N  D15  i  +  +  T  T  T  2  T  R  R  T  T  R  R  R  R  D  G  A  A  G  h  A  A  +  N  N  D16  S  C  C  N  N  C  C  N  D13  D14  A  A  G  A  A  C  C  C  C |
| --- |

*Fig. 4. MasterCPU board.*

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**11.3. Binary IO K02772**

The board uses +24V operating voltage. The electron ics 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 commu nication stops.

In the middle of the board

– LD36 & LD37, blink alternately when the board software is running.

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**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 con figured 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.

| Bin 17 Bin 18  4  4  4  2  2  2  \_  \_  \_  -  V  +  -  +  V  Bout 1-8 GND\_24 Bout 9-16 Bin 1-8  V  D  D  D  4  n  n  n  n  4  4  N  N  i  i  N  2  i  i  2  2  +  B  B  B  G  G  B  G  +  +  1 2 3 4 5 6 7 8  2 1  J13 J1 J2 J3 J5 J16 J17  LD1...  LD9...  LD8  LD16  TP28 TP21  TP24 TP27  RS485:  2-w  J30 J24  J23  4-w  LD36  CAN termination:  TP4  LD37  J25  J15  Bootload:  J28  yes no  TP1  J29  progr. run  TP31 TP16  TP30  LD17...  LD25...  LD24  LD32  J10J27  TP26  TP22  LD35LD34  LD33  S2 J15  J7 J8 J9 J11  S1 J6  J12  1 2 3 4  J14  -  +  N  N  A  B  Bout 17-24 GND\_24 Bout 25-32 Bin 9-16 Display  A  B  N  x  x  N  A  A  x  x  R  R  C  A  connector  C  A  T  T  \_  \_  C  C  V  D  RS-485  5  N  +  Port  G  CAN-bus |
| --- |

*Fig. 5. Binary IO board (IO1).*

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*Table 2. IO1 - sampler connectors.*

Special cases:

terminal connector terminal connector terminal connector SD1 SDV1 141 J1-1 SD9 SDV1 161 J7-1 SD1 SDV1 141 J1-1 SDV2 142 J1-2 SDV2 162 J7-2 SDV2 142 J1-2 SDV3 143 J1-3

SD2 SDV1 143 J1-3 SD10 SDV1 163 J7-3

SDV2 144 J1-4 SDV2 164 J7-4 SD2 SDV1 144 J1-4 SDV2 145 J1-5

SD3 SDV1 145 J1-5 SD11 SDV1 165 J7-5 SDV3 146 J1-6 SDV2 146 J1-6 SDV2 166 J7-6

etc.

SD4 SDV1 147 J1-7 SD12 SDV1 167 J7-7

SDV2 148 J1-8 SDV2 168 J7-8

SD5 SDV1 149 J3-1 SD13 SDV1 169 J9-1

SDV2 150 J3-2 SDV2 170 J9-2

SD6 SDV1 151 J3-3 SD14 SDV1 171 J9-3

SDV2 152 J3-4 SDV2 172 J9-4

SD7 SDV1 153 J3-5 SD15 SDV1 173 J9-5

SDV2 154 J3-6 SDV2 174 J9-6

SD8 SDV1 155 J3-7 SD16 SDV1 175 J9-7

SDV2 156 J3-8 SDV2 176 J9-8

*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

**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

18\_LFL Loop flushing (dilution) J7-2 19\_WMW Warm water J7-3 20\_SLW Sample line water J7-4

06\_LS2 Washing chamber level sensor 2, functions as a level indicator when Sweep module is installed.

J5-6

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