kajaaniKAPPA Q
Technical manual

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The Technical Manual is intended only for Metso Automation's authorized service personnel.

The material has been divided into several pdf files in order to keep the file size manageable. The cover lists the contents of each section.

The manual will be updated a few times a year. All updates will be indicated on this cover page, together with the date of the latest update.

This version released: July 2008

metso automation

kajaaniKAPPA Q analyzer

Main parts of analyzer

The analyzer always contains the following parts:

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

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

Analyzer's modules

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

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

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

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

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

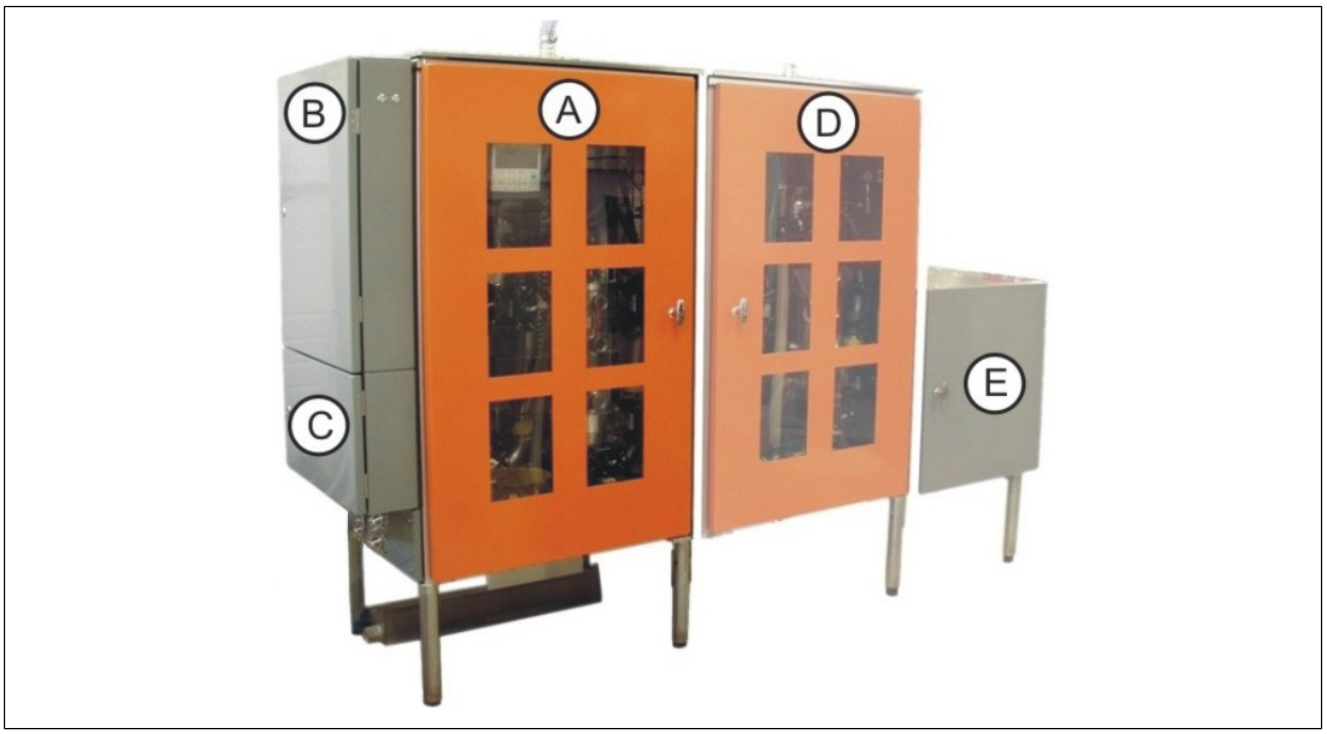


Fig. 1. kajaaniKAPPA Q: A - measurement unit 1, B - analyzer electronics box, C - connection box, D - measurement unit 2 (option), E - Fiber-Shive module (option).

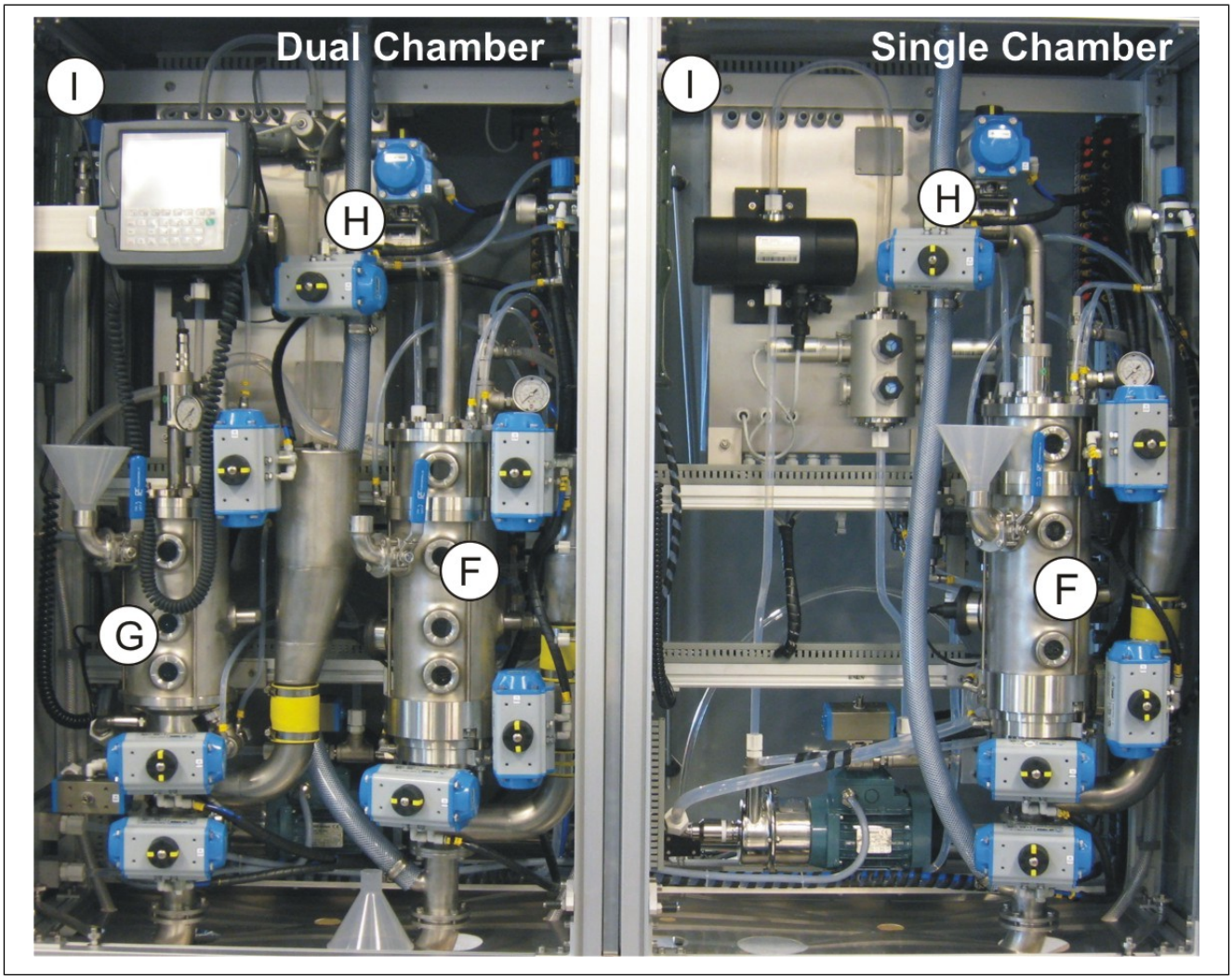


Fig. 2. kajaaniKAPPA Q: F - washing chamber, G - Sweep module, H - shive screen, I - connector for Communicator-i.

kajaaniKAPPA Q measurement principle

Kappa and Brightness measurement

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

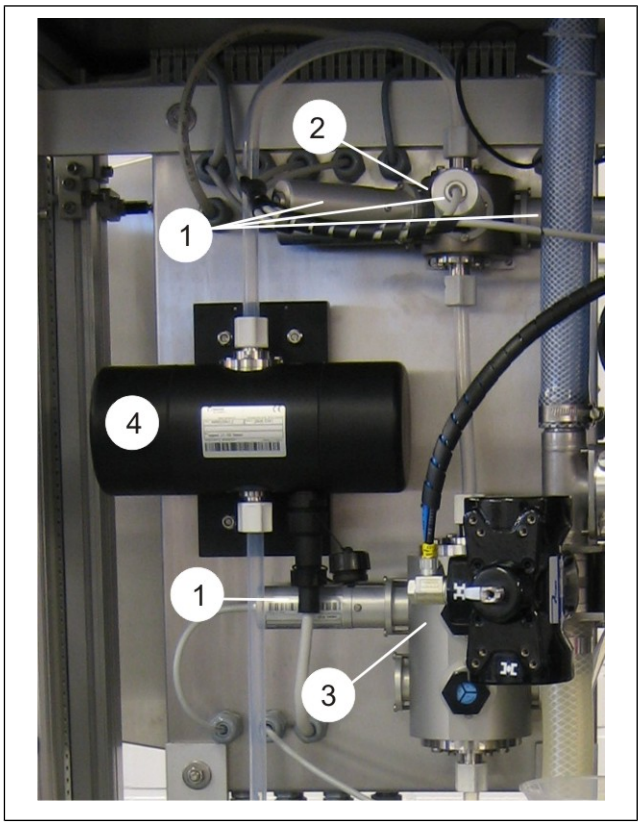


Fig. 1. Kappa and Brightness measuring cells, seen from the front side. 1 - detectors, 2 - Kappa measurement, 3 - Brightness measurement, 4 - LC100 consistency transmitter.

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

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

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

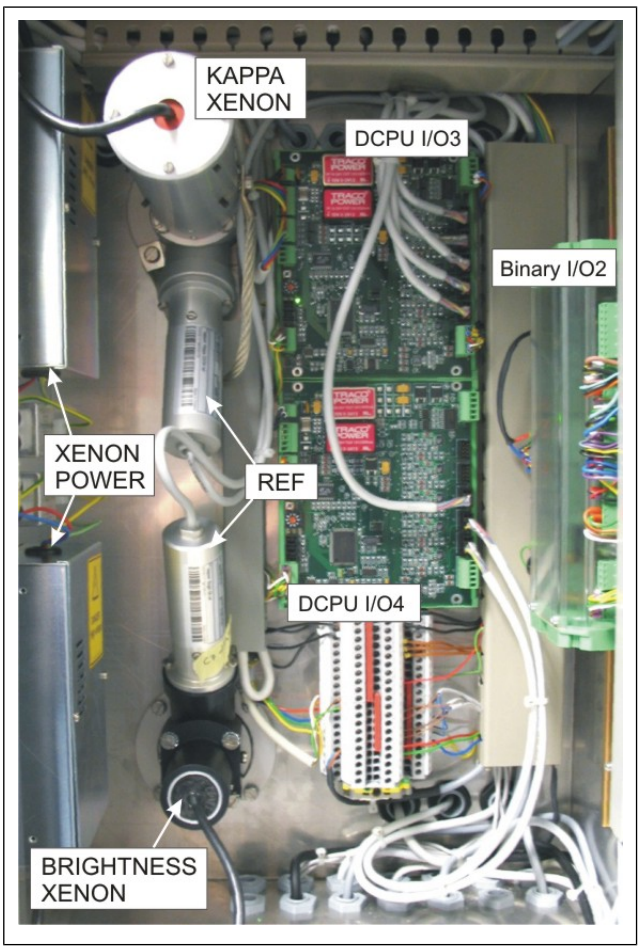


Fig. 2. Module electronics box, opened: Xenon Power = Xenon power supply, Xenon = Xenon lamp, REF = reference detector.

Measurement principle

For Brightness measurement, the entire optical path of the analyzer - light source, optics, measuring cell, electronics - is calibrated by using the water value measurement. This method stabilizes the measurement, and it also compensates for the distorting effects of contamination in the measurement cell. Variations in lamp intensity are detected and compensated for by using a reference measurement; the result indicates measuring cell contamination.

In Kappa measurement, measuring cell contamination is measured by light transmitted through the cell (Fig. 3). The principle of Kappa measurement is illustrated in Fig. 4.

Consistency is measured by a separate consistency transmitter (Fig. 5). The principle of Brightness measurement is illustrated in Fig. 6.

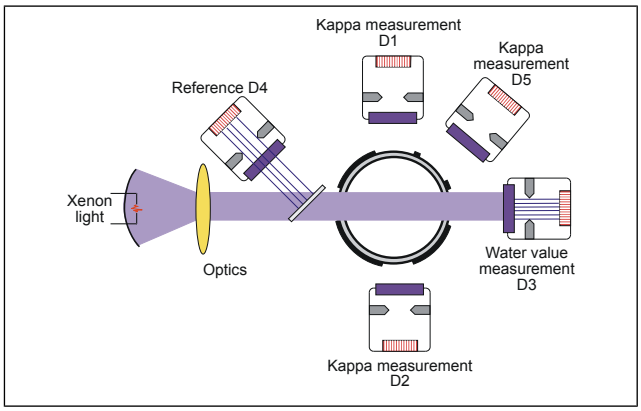


Fig. 3. Kappa measurement principle, clean water in measuring cell.

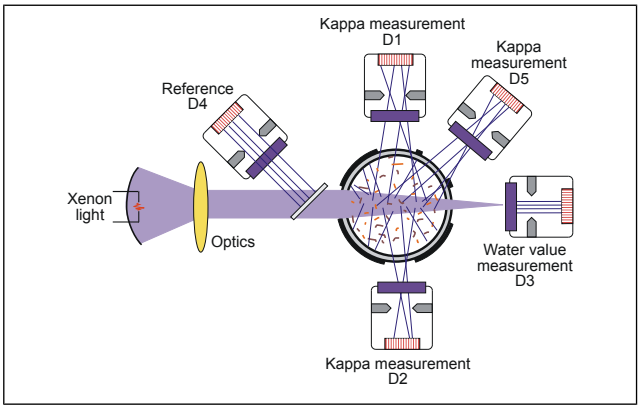


Fig. 4. Kappa measurement principle, sample in measuring cell.

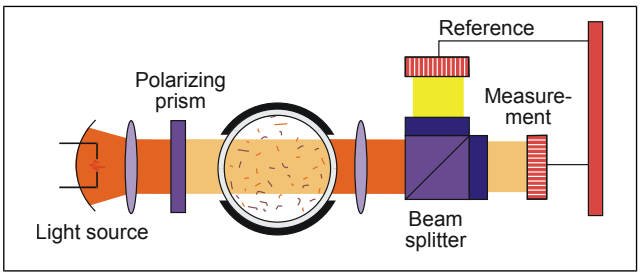


Fig. 5. Measurement principle of the consistency transmitter.

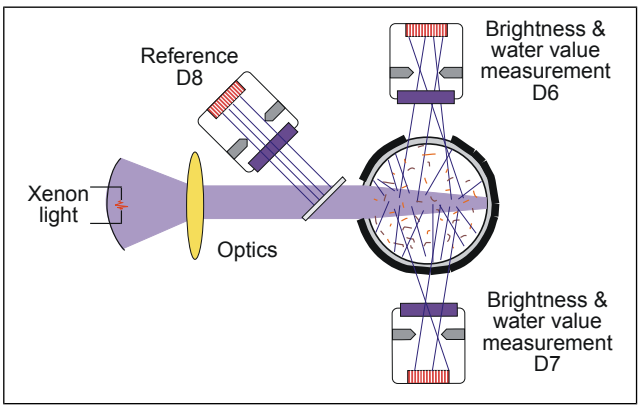


Fig. 6. Brightness measurement principle, sample in measuring cell.

When the sweep measurement has been completed, the raw (unscaled) Kappa result is calculated using one of the equations 1.1 - 1.5. See Table 1. Raw brightness (unscaled) is calculated with functions 1.6 - 1.8. See Table 2 (formula 1.7 is used in brightness range 75 - 95, formula 1.8 in brightness range 30 - 85).

Table 1. Calculation functions.

$$(1.1)\ Kappa(r_1) = f\left(\frac{D1(Cs1)}{D4(Cs1)/(D1_R/D4_R)}, \frac{D1(Cs2)}{D4(Cs2)/(D1_R/D4_R)}\right)$$

$$(1.2)\ Kappa(r_2) = f\left(\frac{D2(Cs1)}{D4(Cs1)/(D2_R/D4_R)}, \frac{D2(Cs2)}{D4(Cs2)/(D2_R/D4_R)}\right)$$

$$(1.3)\ Kappa(r_3) = f\left(\frac{D5(Cs1)}{D1(Cs1)}, \frac{D5(Cs2)}{D1(Cs2)}\right),$$

- detektorisignaalit valittavissa.

$$(1.4)\ Kappa(r_4) = f(r1,r2,r3,CV);\ r \text{ valittavissa.}$$

$$(1.5)\ Kappa(r_5) = f\left(\frac{D5(Cs1)}{D4(Cs1)/(D5_R/D4_R)}, \frac{D5(Cs2)}{D4(Cs2)/(D5_R/D4_R)}\right)$$

Table 2. Calculation functions.

$$(1.6)\ Vesiarvo = f\left(\frac{D6\ (vesi)}{D8(vesi)}\right)$$

$$(1.7)\ Vaaleus = f\left(\frac{D6(Cs)/D8}{D6(vesi)/D8}\right),$$

$$(1.7)\ Vaaleus = f\left(\frac{D7(Cs)/D8}{D7(vesi)/D8}\right)$$

Measurement principle of Fiber-Shive module

The Fiber-Shive module measures the fiber and shive values of the sample. This data can be applied to monitor the quality of pulp components and to optimize the blending ratio. The measurement is based on image analysis. Image analysis detects all shives and fibers in the images. The images are analyzed and the results are calculated from them.

The sample is led into the sample loop (Fig. 7, point 1) and is photographed with a camera (2). When analysis begins, the background image is always captured first. The actual analysis can then start. Various fiber properties are analyzed from the captured images. Shive analysis looks for larger particles. The image analysis takes place on the module's own PC (3).

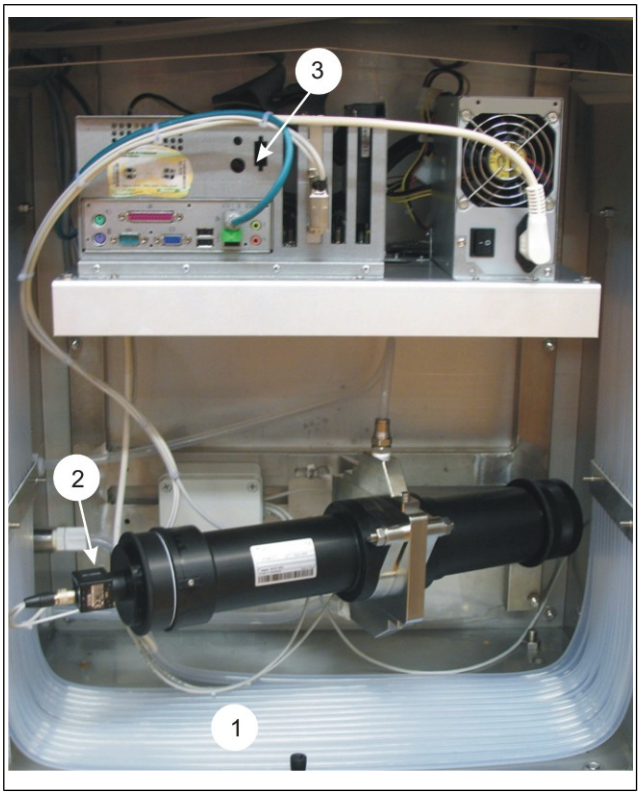


Fig. 7. Fiber-Shive module: 1 - sample loop, 2 - camera, 3 - PC unit.

Consistency tables

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

	Oletus 1	Oletus 2	Oletus 3	Oletus 4	Oletus 5
Vaaleus, ISO	> 95	75 - 95	30 - 85	-	-
Kappa			1 - 15	5 - 50	50 - 120
Sweep-mittausalue [%]	0.80 - 0.40	0.70 - 0.30	0.40 - 0.15	0.25 - 0.10	0.20 - 0.07
Vaaleus (r1), Sakeus [%]	0.70	0.60	0.35	-	-
Vaaleus (r2), Sakeus [%]	0.65	0.55	0.30	-	-
Vaaleus (r3), Sakeus [%]	0.60	0.50	0.25	-	-
Vaaleus (r4), Sakeus [%]	0.55	0.45	0.20		
Vaaleus (r5), Sakeus [%]	0.50	0.40	0.15		
Kappamitt., Sakeus as.arvo 1 [%]	-	-	0.36 - 0.26	0.22 - 0.12	0.16 - 0.10
Kappamitt., Sakeus as.arvo 2 [%]			0.35 - 0.25	0.20 - 0.11	0.14 - 0.09
Kappamitt., Sakeus as.arvo 3 [%]			0.32 - 0.22	0.18 - 0.10	0.12 - 0.08
Alkusakeus raja X * 0.9 [%]				0.234	0.180
Sakeuskompensointi rajat [%]	0.80 - 0.40	0.70 - 0.30	-	-	-
Sakeuskompensointi	kyllä	kyllä	ei	ei	ei
Sakeushystereesi [%]	0.013	0.013	0.013	0.013	0.013
Näytteenpesu 1, pesukerrat	-	-	1	2	2
Laskentakaava Vaaleus HW/SW	1/1	1/1	1/1	-	-
Laskentakaava Kappa HW/SW	-	-	1/1	1/1	1/1

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

	Oletus 1	Oletus 2	Oletus 3	Oletus 4	Oletus 5
Vaaleus, ISO	> 95	75 - 95	30 - 85	-	-
Kappa	-	-	1 - 15	5 - 50	50 - 120
Sweep-mittausalue [%]	0.80 - 0.30	0.70 - 0.30	0.65 - 0.30	0.30 - 0.10	0.30 - 0.08
Vaaleus (r1), Sakeus [%]	0.70	0.60	0.60	-	-
Vaaleus (r2), Sakeus [%]	0.65	0.55	0.55	-	-
Vaaleus (r3), Sakeus [%]	0.60	0.50	0.50	-	-
Vaaleus (r4), Sakeus [%]	0.55	0.45	0.45		
Vaaleus (r5), Sakeus [%]	0.50	0.40	0.40		
Kappamitt., Sakeus as.arvo 1 [%]	-	-	0.47 - 0.37	0.22 - 0.12	0.16 - 0.10
Kappamitt., Sakeus as.arvo 2 [%]	-	-	0.45 - 0.35	0.20 - 0.11	0.14 - 0.09
Kappamitt., Sakeus as.arvo 3 [%]			0.40 - 0.32	0.18 - 0.10	0.12 - 0.08
Alkusakeus raja X * 0.9 [%]	-	-	-	0.27	0.27
Sakeuskompensointi rajat [%]	0.80 - 0.30	0.70 - 0.30	-	-	-
Sakeuskompensointi	kyllä	kyllä	ei	ei	ei
Sakeushystereesi [%]	0.013	0.013	0.013	0.013	0.013
Näytteenpesu 1, pesukerrat	-	-	1	2	2
Laskentakaava Vaaleus HW/SW	1/1	1/1	1/1	-	-
Laskentakaava Kappa HW/SW	-	-	1/1	1/1	1/1

Operating sequences

Actuators

The following pictures show analyzer's actuators that control the operating sequence. Fig.1 and 2 are flow diagrams, Fig. 3 and 4 show the valve and tube numbers.

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

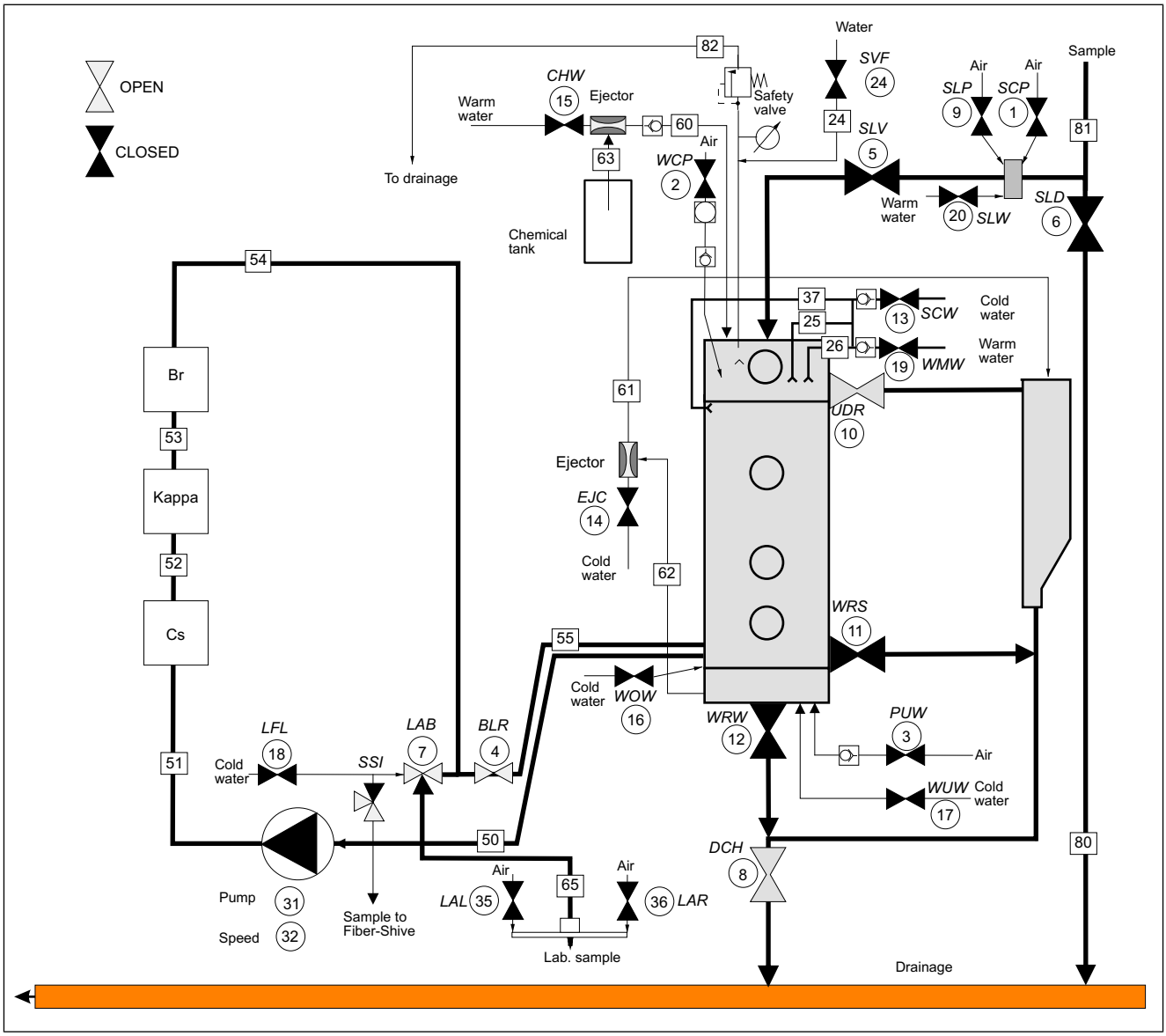


Fig. 1. Flow diagram, Single Chamber model.

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

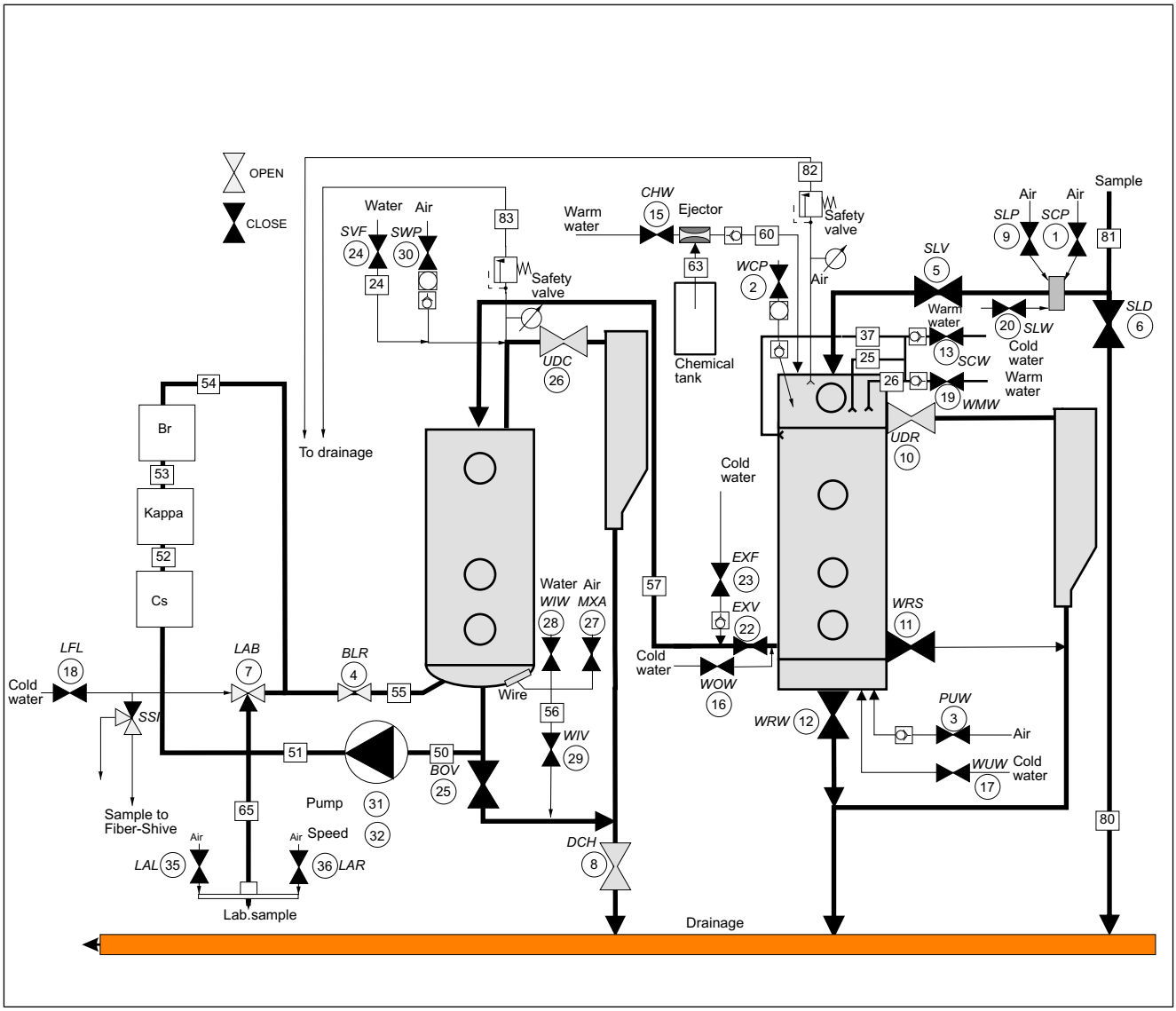


Fig. 2. Flow diagram, Dual Chamber model.

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

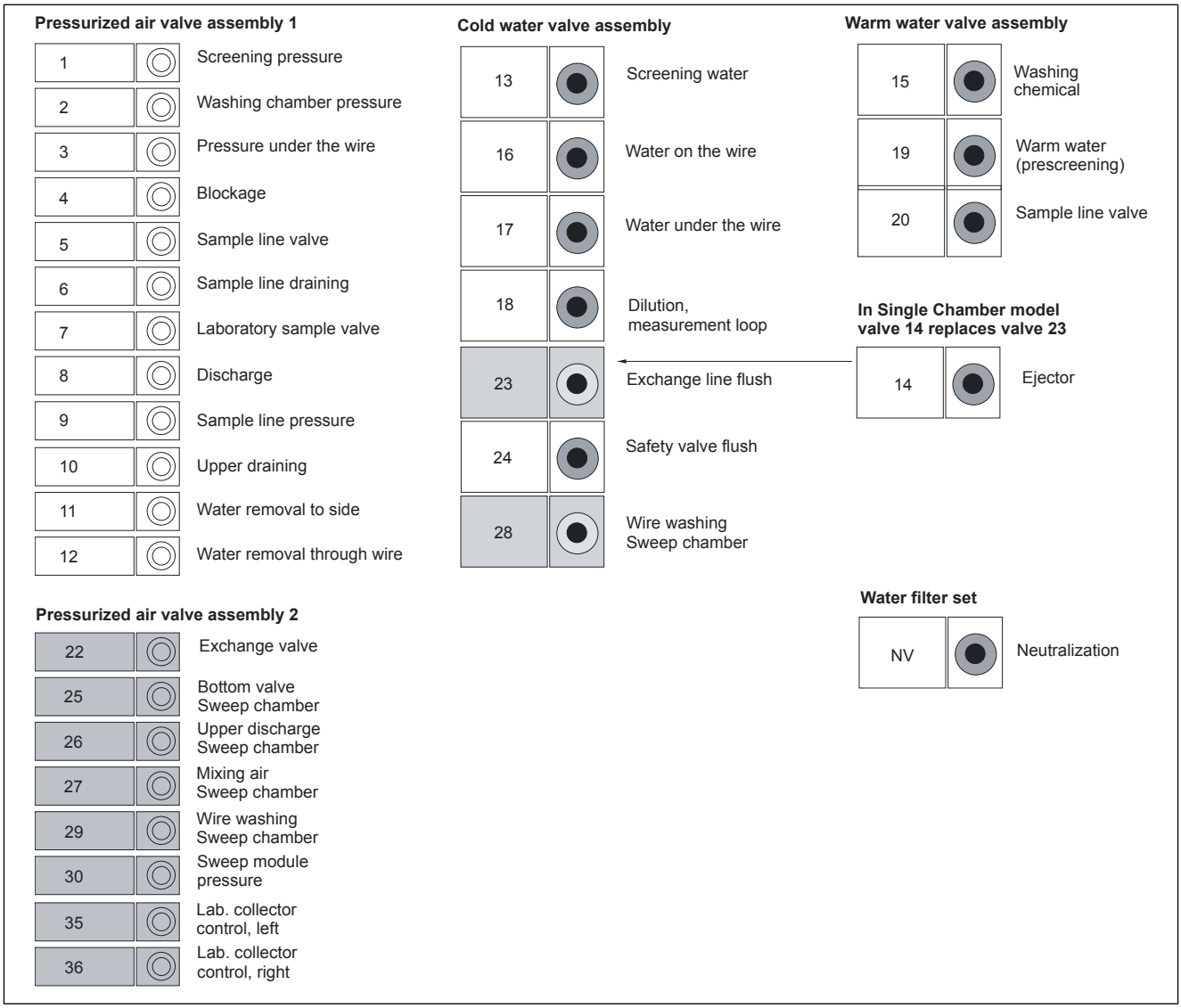


Fig. 3. Valve numbers. Single Chamber = only the valves shown as white; Dual Chamber = all valves (including the ones shown as gray).

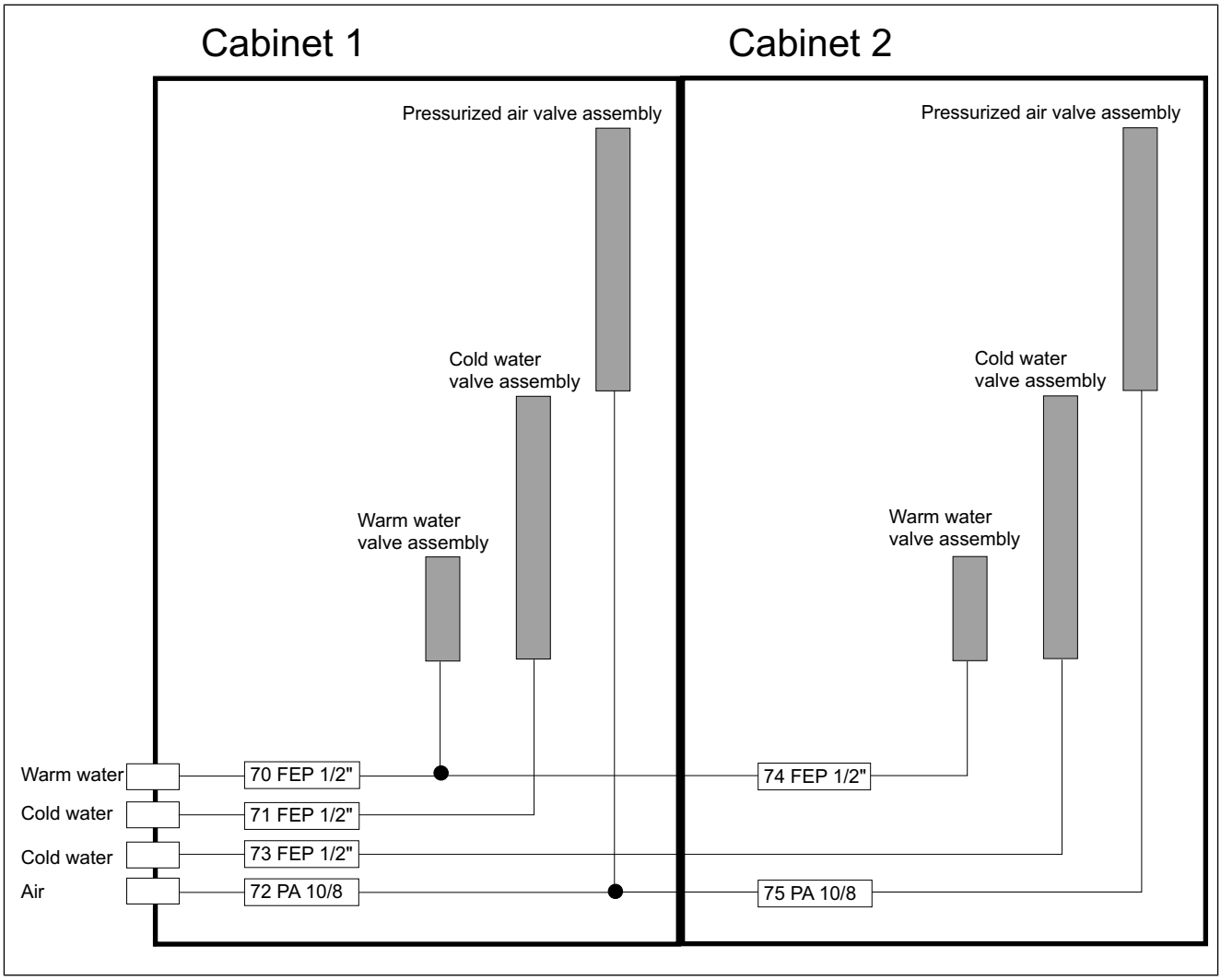


Fig. 4. Tubing scheme, Cabinet 1 & 2.

Sequences

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

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

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

Sampling, sample transport, prescreening

A sampler takes a process sample from the pipeline, and transports 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.

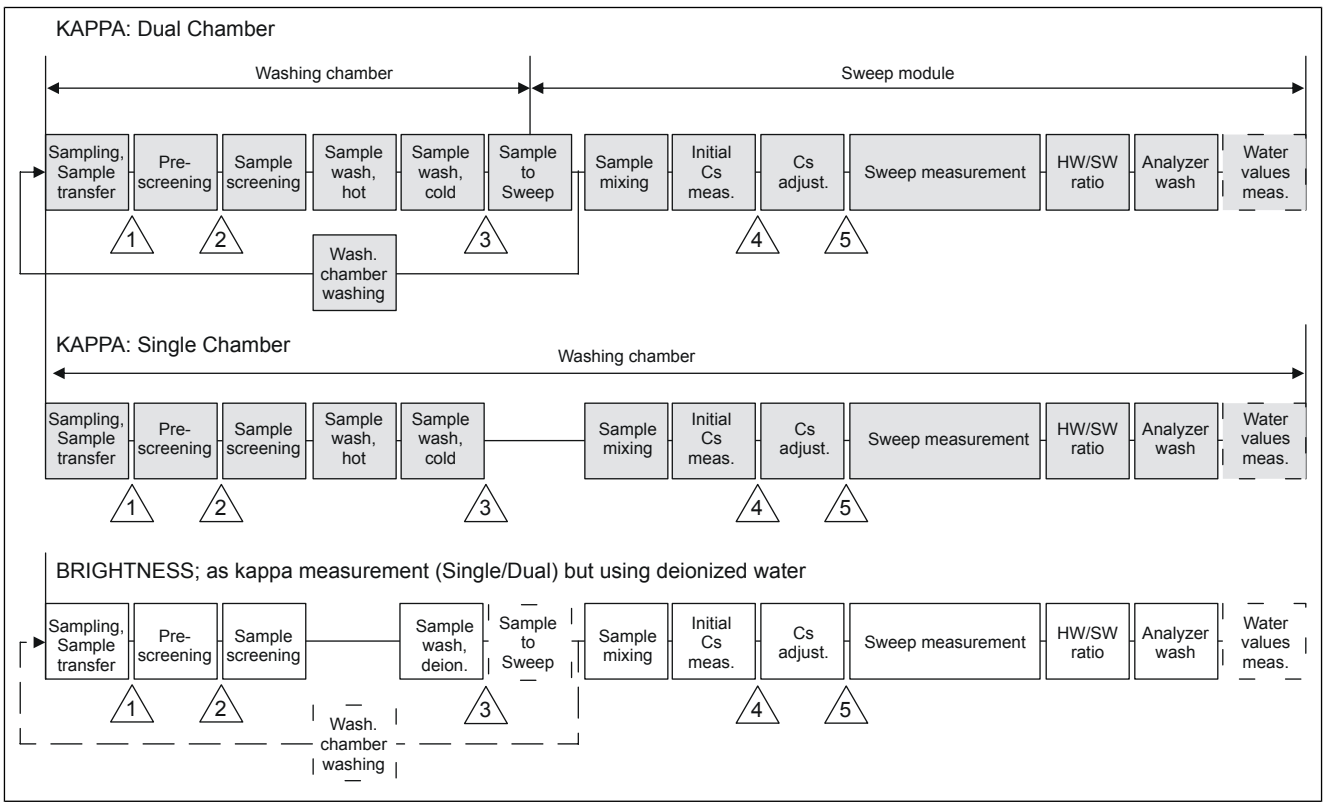


Fig. 5. Operating sequences. Numbers 1 - 5 indicate the stopping points that can be set in the Sequence test display.

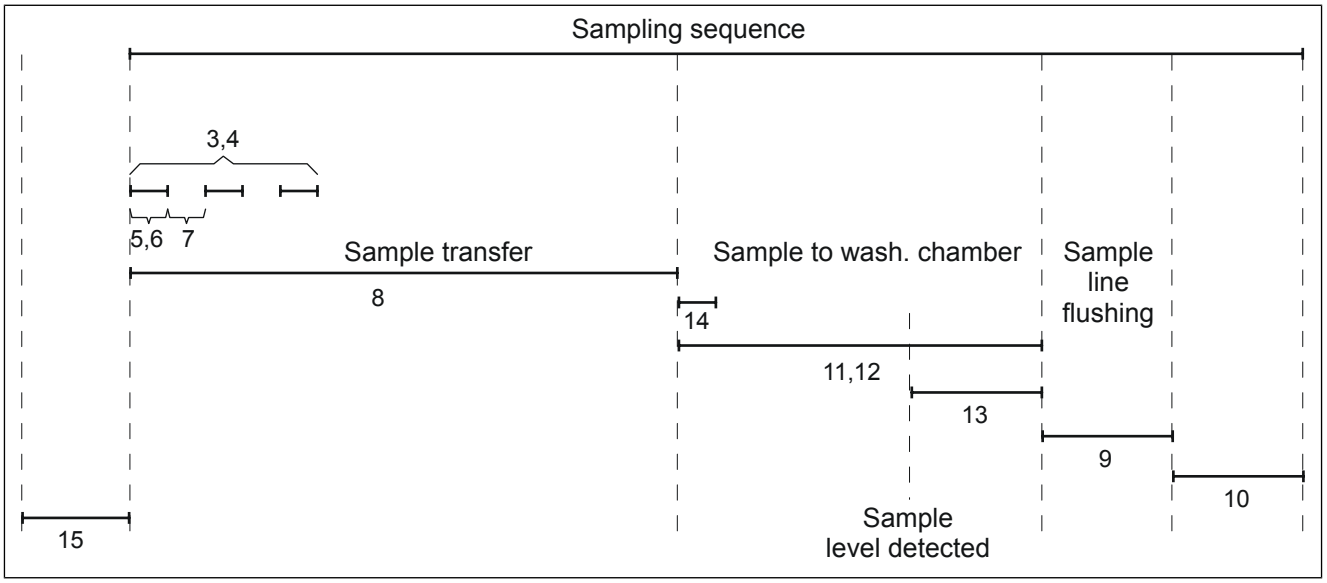


Fig. 6. Sampling sequence

Filtering

The filtering method is configured separately for each line:

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

Sample washing

During sample washes the washing chamber is pressurized.

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

Sample transfer, washing chamber wash

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

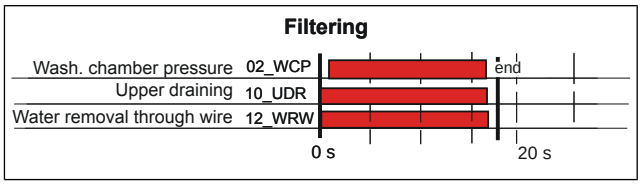


Fig. 7. Filtering sequence.

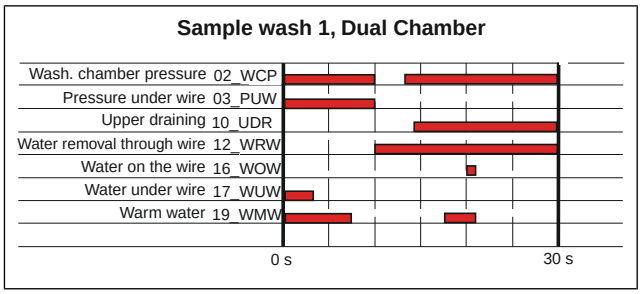


Fig. 8. Sample washing 1, Dual Chamber.

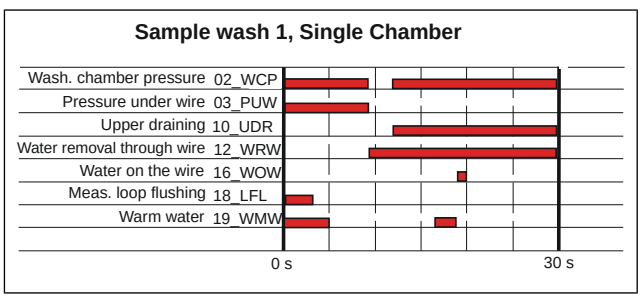


Fig. 9. Sample washing 1, Single Chamber.

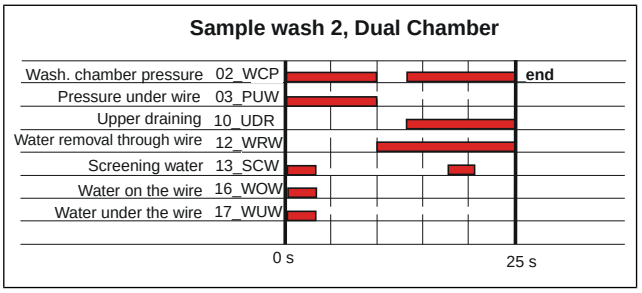


Fig. 10. Sample washing 2, Dual Chamber.

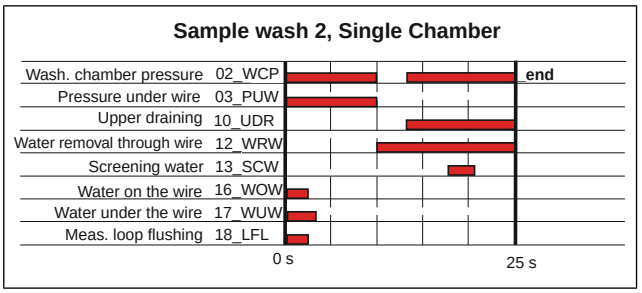


Fig. 11. Sample washing 2, Single Chamber.

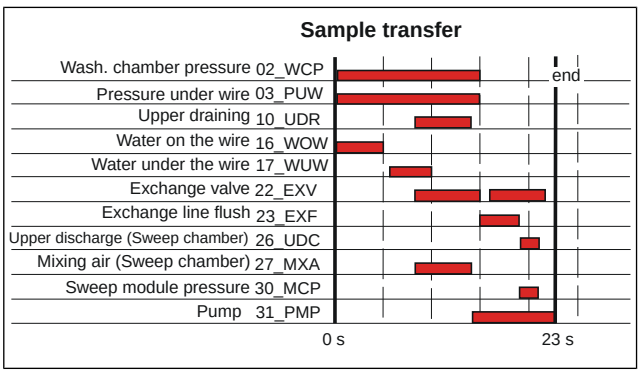


Fig. 12. Sample transfer sequence.

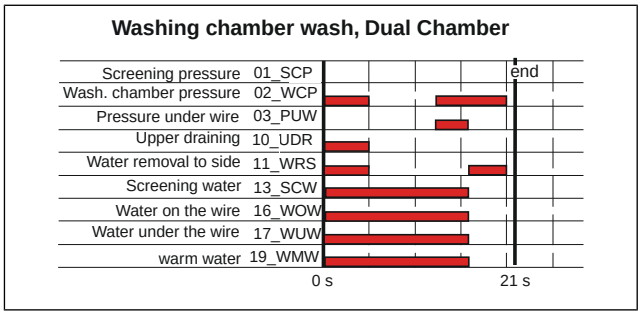


Fig. 13. Washing chamber wash, Dual Chamber.

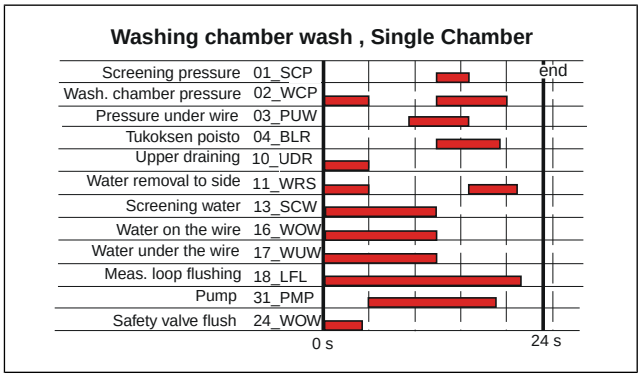


Fig. 14. Washing chamber wash, Single Chamber.

Sample mixing

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

Measuring initial consistency

Adjustment of the Sweep start consistency:

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

Sweep measurement

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

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

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

HW/SW measurement

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

Analyzer washing

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

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

Water value measurement

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

Analyzer's flow chart is shown in Fig. 1(Single Chamber) and Fig. 2 (Dual Chamber).

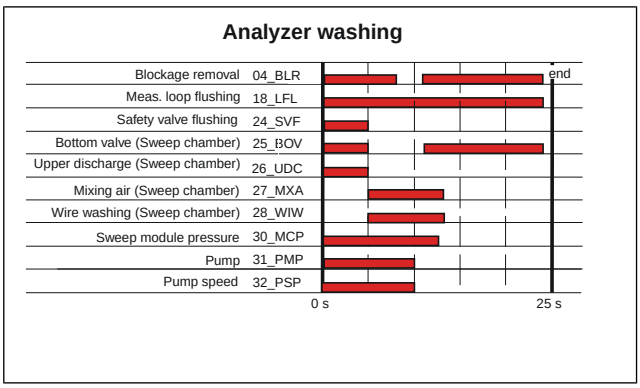


Fig. 15. Sweep module washing.

Fiber-Shive sequences

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

Background image

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

Rinse

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

Wait sample

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

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

Sampling

The module takes 2.4 L of sample from the analyzer.

Fiber analysis

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

Shive analysis

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

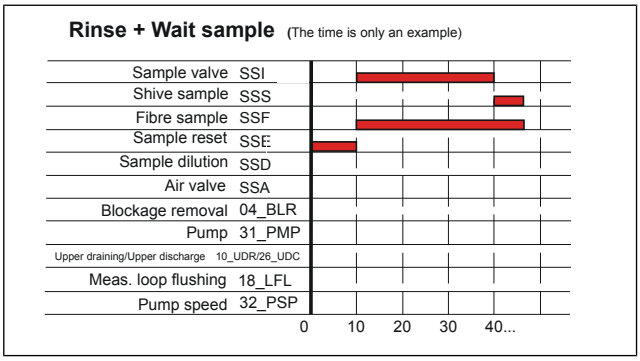


Fig. 16. Rinse sequence.

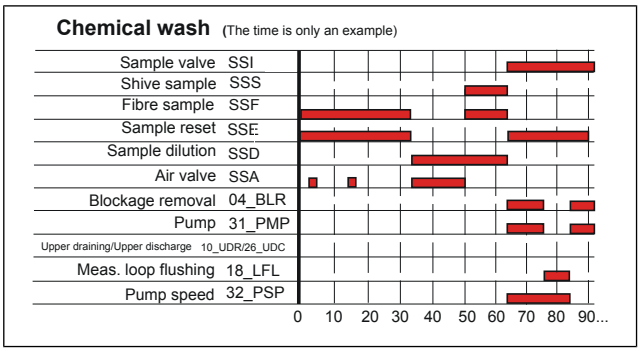


Fig. 17. Chemical wach sequence.

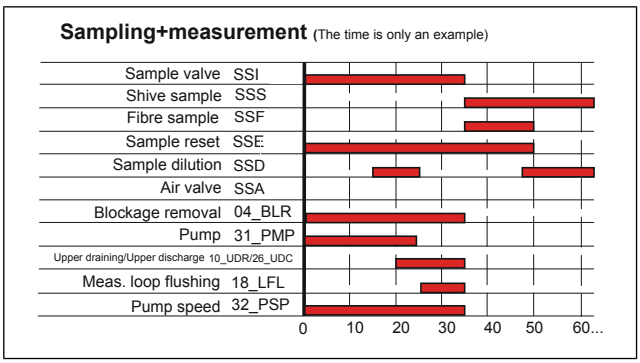


Fig. 18. Samplinq sequence.

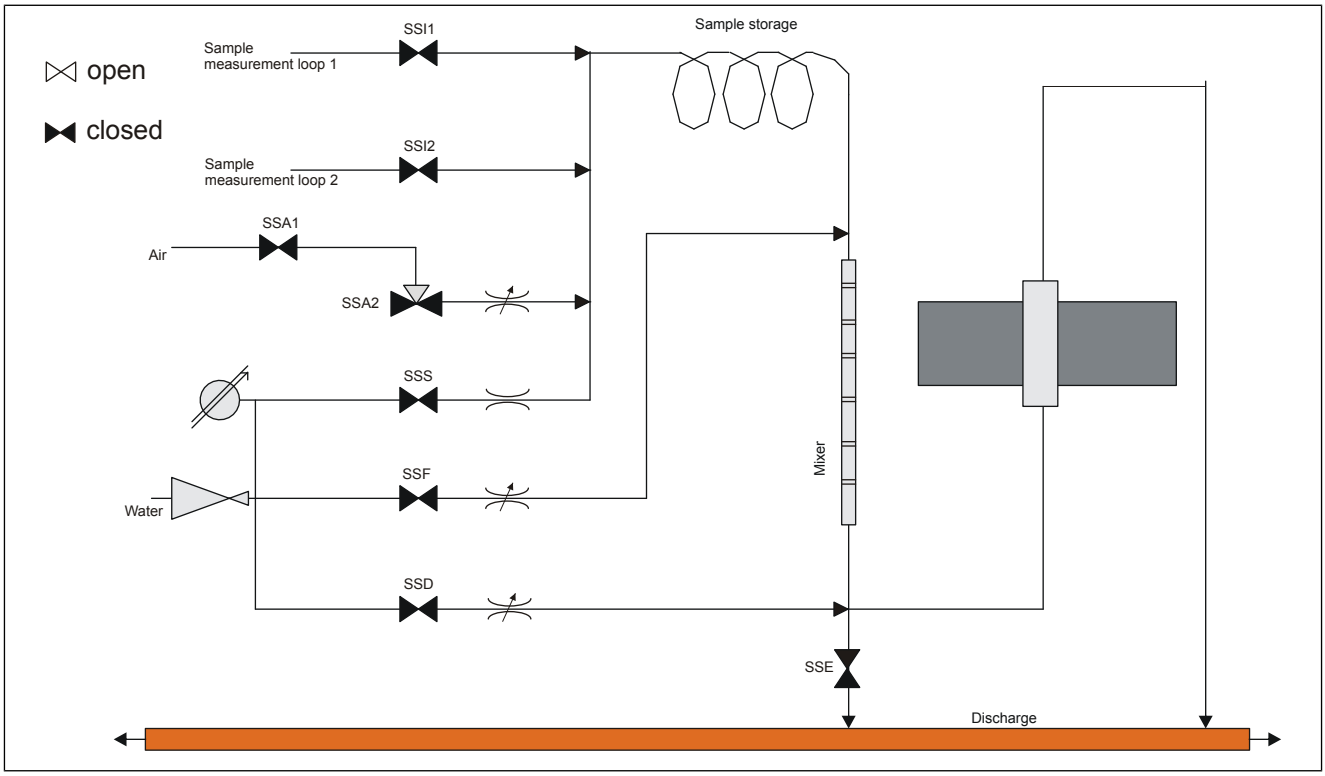


Fig. 19. Flow diagram, Fiber-Shive-module.

Password-secured parameters

Software settings

Choose "Config" -› "Software settings". This display (Fig. 1) allows the user to check the various settings.

Product selection and serial number: The display shows for example the serial number of the software.

Network settings: see the corresponding section for further information.

Date & time: see the corresponding section for further information.

Language and units: Choose the interface language.

Connection to metso server:

To restart the software select [F5] "REBOOT" and then select "REBOOT" from the pop-up menu (Fig. 1). To switch off the device, select "Shutdown".

Pressing SHIFT + [F8] opens the software locking.

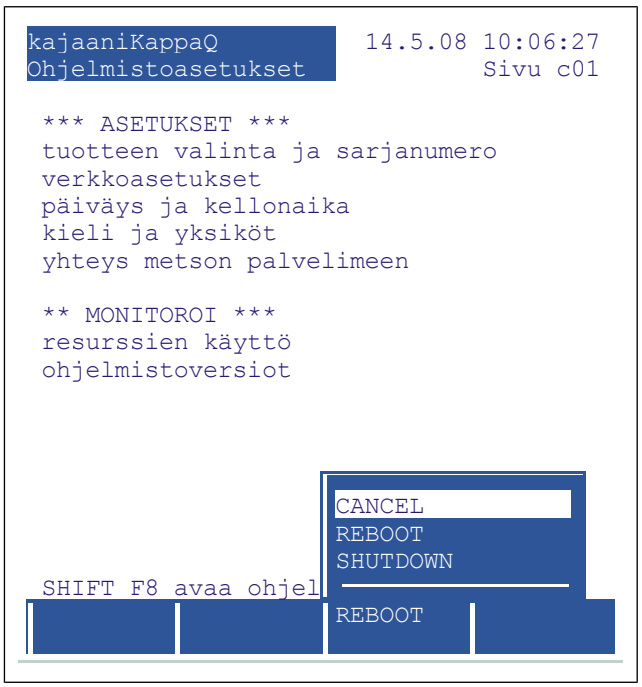


Fig. 1. Software settings

Network settings

Choose "Config" -› "Software settings" -› "Network settings". On this page you can check and edit the settings, and also reboot the software if needed.

Press SHIFT + [F8] and give the password (3121). This will open the software lock so that the settings can be edited. Date and time can also be changed without the password.

Network address/Gateway/Subnet mask: Address settings for communication. Make sure that the settings are correct.

Computer name:name of the computer in use.

Modem connected: On/Off.

Fig. 2. Network settings.

Date & time

Choose "Config" -› "Software settings" -› "Date and time". On this page you can check and edit the time zone, date, and time settings for the software.

Language and units

Choose "Config" -› "Software settings" -› "Language and units". On this page you can check and edit the selected languages.

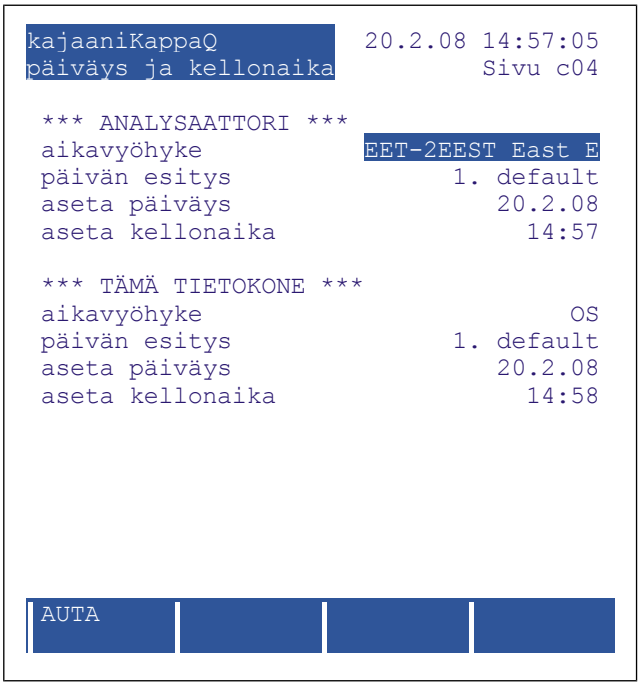


Fig. 3. Date & time settings

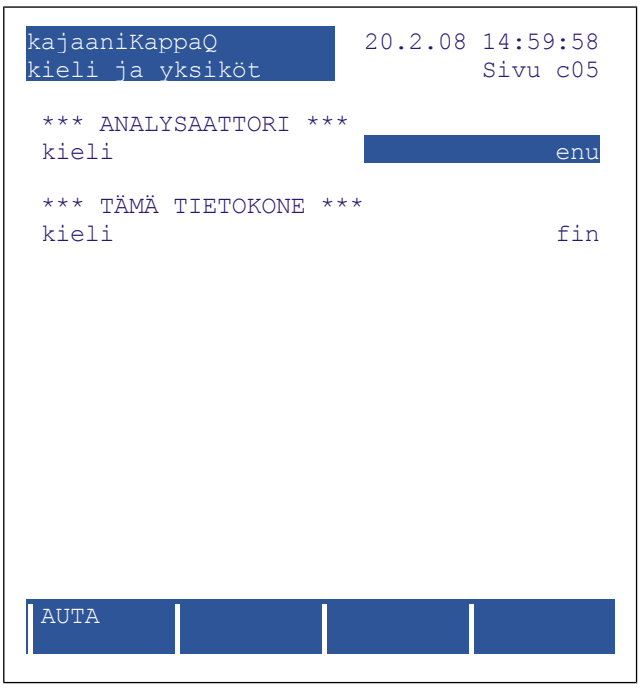


Fig. 4. Language settings for the analyzer and PC.

Trend view

In the main display, press SHIFT + F8 and give the password (3121). Then select "Results" and "Trend display". You can view trends from a selected period on the display.

1. To choose the required time period, enter the start and end times in the fields in the top right corner of the display.
2. Choose from the top left corner the duration of the trends.
3. Then choose the line from the bottom left corner of the display. Here you can also choose the database and signal to be shown.
4. When a trend is displayed, you can zoom in by pressing F5/F6 (+/-) and scroll by pressing F7/F8.

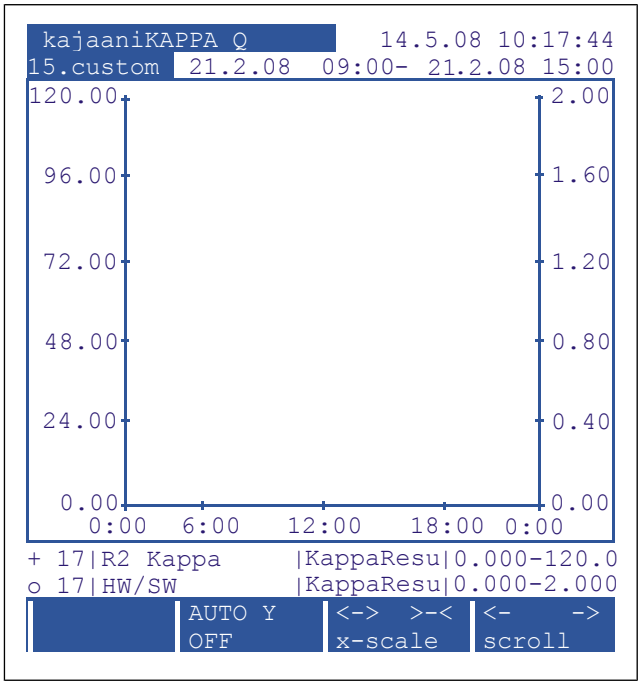


Fig. 5. Trend view.

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 "Config" -› "Software settings" -› "Reboot" -› "Shutdown". This ensures that all open files are closed and saved correctly. After the software has stopped, switch power off by the main switch.

NOTE: Never switch analyzer's power off when an operating sequence is running!

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

Remote operation of analyzer

The analyzer can be remote-operated by using a PC and the Kajaani Interface software (Windows).

Installing

The software is delivered on a CD that contains all the necessary programs and installation instructions. In customer use the software requires a USB dongle to operates

The dongle may grant the user either "administrative" or "user" rights. "Administrative" dongle enables reading and writing data. With a "user" dongle only the reading of data is allowed.

1. Insert the CD into the drive and double-click on "My Computer" icon.
2. Double-click on the icon of the inserted CD, and open the help folder. This folder contains the software installation instructions.
3. To start installation, double-click on "Setup.exe". Follow the on-screen instructions.
4. When the installation is complete, insert the dongle to the PC's USB port. The dongle driver with install automatically.

NOTE: Run the "Found New Hardware Wizard" for every USB port where you might connect the dongle.

Computer settings

1. Select "View network connections" and then select "My network places".
2. Double-click on "MetsoNet" (or other network you want to use) and click "Properties".
3. Activate "Internet-protocol (TCP/IP)" so that it turns blue, and then click "Properties".
4. Choose "Use the following IP address" and then enter the IP address that you have received from the customer's IT department; this address is needed for an external PC to be connected to the analyzer.

NOTE: Every external PC that is connected to an analyzer must have its own IP address!

5. If the analyzer is not connected to a network, the external PC can also have an address that is slightly higher than the address of the kajaani-WEM computer.
6. Click "OK" to accept the settings, and then click "Close" to exit from the window.
7. If you wish to revert to the earlier address settings, click "Obtain an IP address automatically". Click "OK" to accept, and then click "Close" to exit from the window.

Device settings

1. Start the Kajaani Interface software.
2. Click "New" and give a filename for the .syf file (e.g. analyzer's name).
3. Click "File" -› "Device options" or click on the "spanner" icon.
4. Click "Add" and set the following parameters:
   Device type = kajaaniWEM
   Address = network address, from customer's IT department
   Device name = e.g. WEM + full serial number of device
5. Click "Save" to save the data and then close the window.
6. If the connection between kajaaniWEM analyzer and the remote PC works, the "Ping" button will turn green.

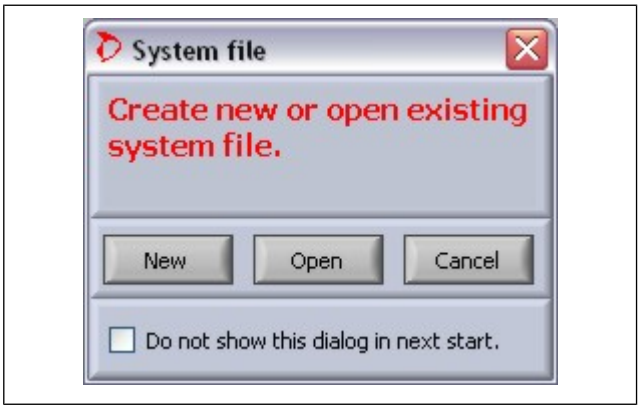


Fig. 1. Device settings, step 1.

Fig. 2. Device settings, step 2.

Kajaani Interface Software registration & upgrade

Registering Kajaani Interface

Up until version V2.0.54 the Kajaani Interface software has operated without registration. Later versions require a registration key, or "dongle", to operate. Connect the dongle to the USB port of the PC where the software is installed.

Kajaani Interface dongles come in two categories:

- Administrator level = all Kajaani Interface functions are available
- User level = all Kajaani Interface functions are available, except that sending data from PC to analyzer is not allowed

Upgrading the Kajaani Interface

When an older, unregistered Kajaani Interface software is upgraded to the later versions, you need to order a dongle for it from Metso's in-house service (email service.kajaani@metso.com).

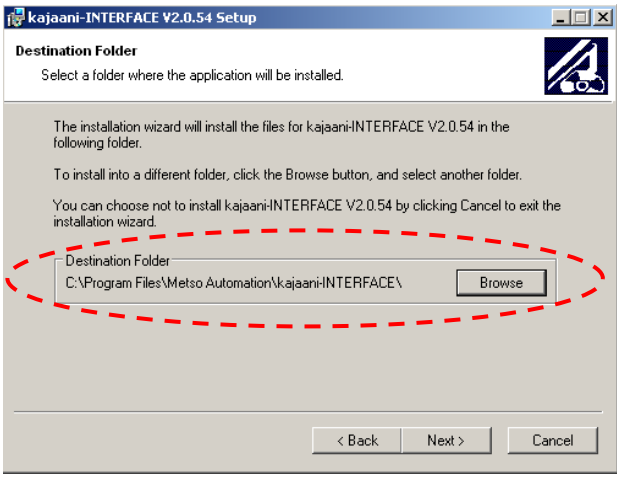
The same dongle will also work with subsequent upgrades, and thus the registration need not be renewed after it has been done once.

NOTE: The installation folder has changed:

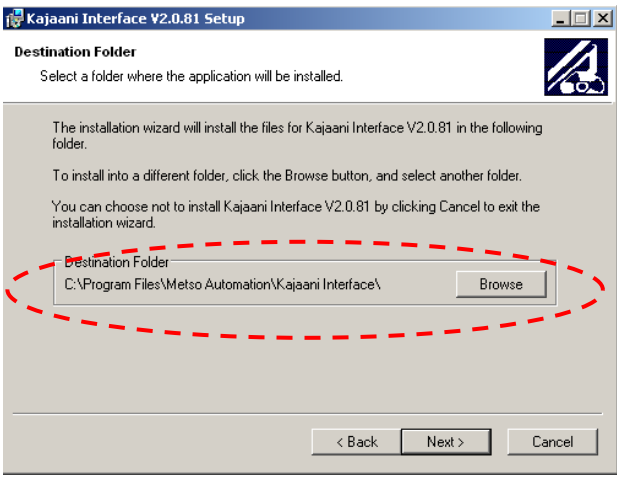
- **older versions: …\Metso Automation \kajaani-INTERFACE**
- **from V2.0.81 upwards: ...\Metso Automation\Kajaani Interface**

When upgrading, make sure to install the new version in the same destination folder as the previous version – this way it will find the old settings and files!

Installation folder up to version V2.0.80



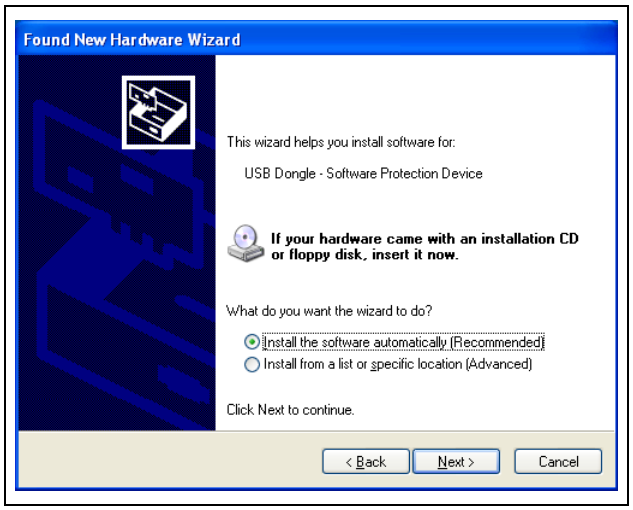
Installation folder from V2.0.81 upwards



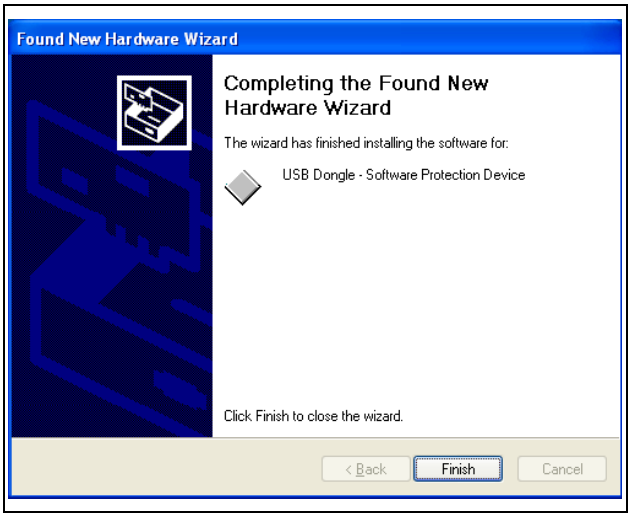
Installing dongle driver

1. The software dongle driver is included in the Kajaani Interface installation package. Install the Interface software before you connect the dongle to the PC for the first time.
2. When the Kajaani Interface installation is complete, connect the dongle to the PC's USB port. The driver installation will be finalized at this point.
3. Windows asks if you wish to search for the driver from the Windows Update site. Select "No, not this time" (the last option) and click "Next".

4. Windows then asks where you want to search for the driver. Select "Install the software automatically" (the first option) and click "Next".



5. When the driver has been found, the necessary files are copied automatically and the "Completing..." window will then appear. Click "Finish".

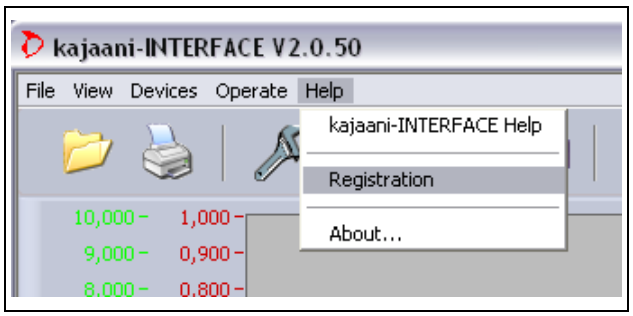


6. The driver has now been installed and the software reads registration data from the dongle.
7. Keep the dongle connected to the PC always when using Kajaani Interface. It need not be detached from the PC when upgrading the software later on.

Kajaani Interface — Acquiring key code from Metso

NOTE: This instruction is only for use by Metso Automation's personnel! Never forward the key codes to customers – the software packages for customer use are invoiced products and the hardware key (dongle) has a price tag!

1. Start the Kajaani Interface software.
   - If the software version is earlier than 1.5.10 or 2.0.44, go to "Help" => "Registration".



   - If the software version is 1.5.10 or 2.0.44 or greater, the following window will appear after the software is started; click "Registration".

2. The registration window will then appear:

3. Locate the field that contains the key code retrieval information (e.g. labview*,a;if…..) and click "Copy" to copy the string. Then paste the string into an email and send it to Metso's analyzer service, service.kajaani@metso.com
4. You will get the registration key in email. Copy-paste the key code from the email message into the box "register with key code" and then click "register".
5. Registration is now completed, and you can use the Kajaani Interface software without a dongle.
6. Once the software has been registered, it need not be registered again for subsequent upgrades.

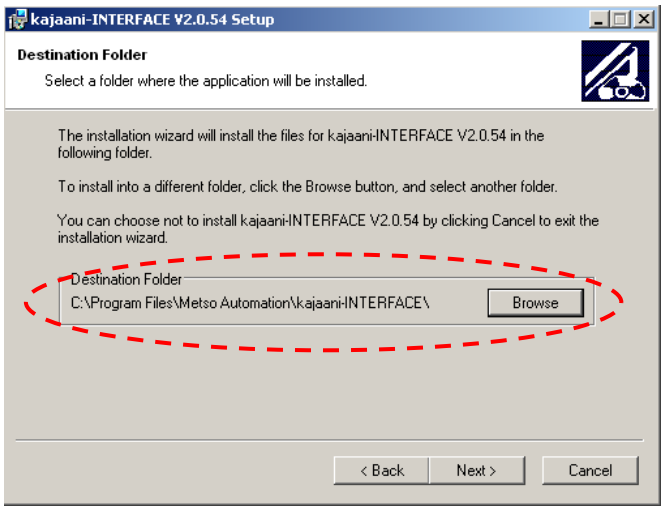
   NOTE: The installation folder has changed:

   - **older versions: …\Metso Automation \kajaani-INTERFACE**
   - **from V2.0.81 upwards: ...\Metso Automation\Kajaani Interface**

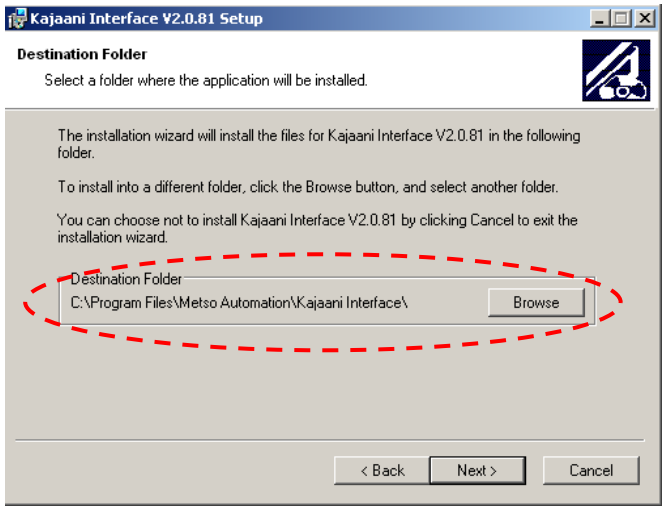
   When upgrading, make sure that the new version is installed in the same destination folder as the previous version – this ensures that the registration remains valid!

Kajaani Interface — Acquiring key code from Metso

Installation folder up to version V2.0.80



Installation folder from V2.0.81 upwards



Electronics

Location of boards in the analyzer

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

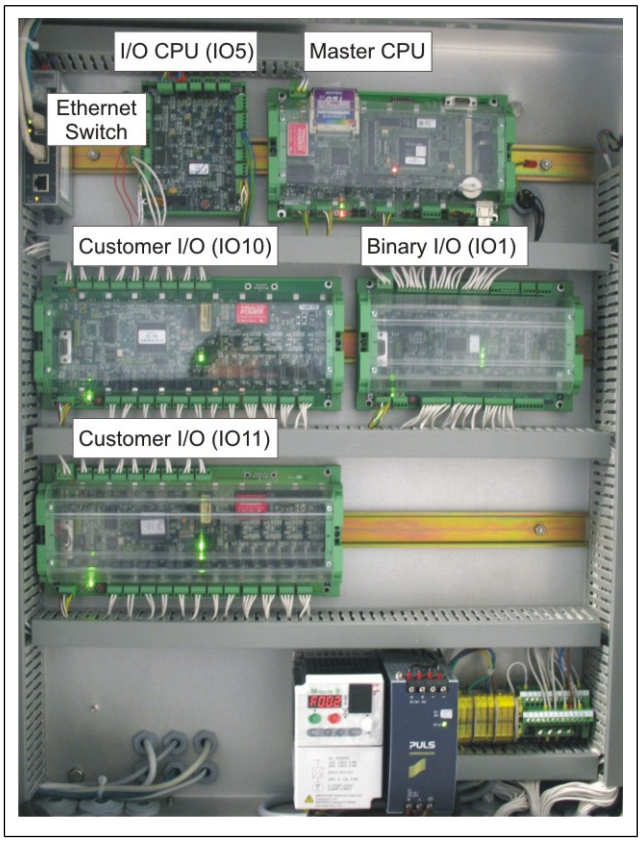


Fig. 1. Analyzer electronics box, analyzer furnished for analog/binary connections. If serial communication is used instead, the box contains no Customer IO boards.

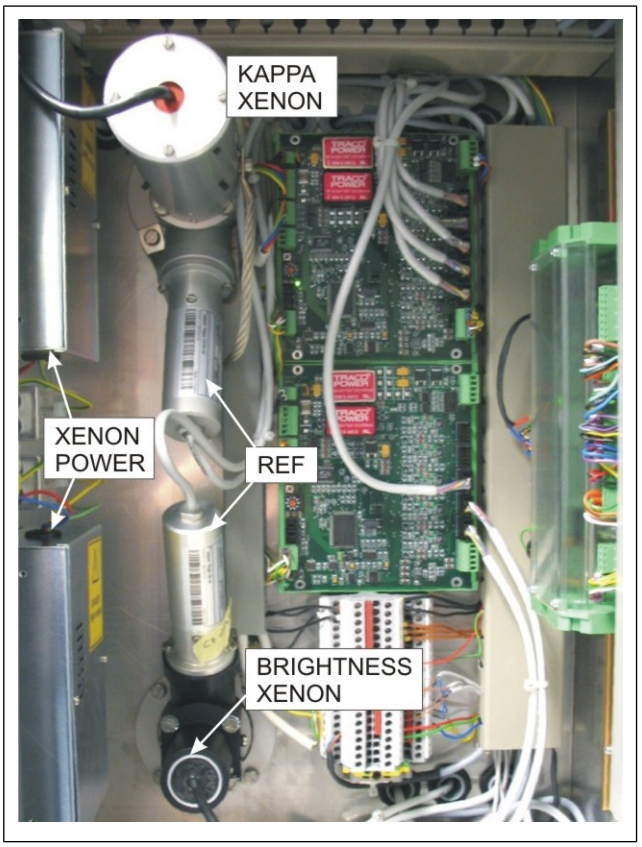


Fig. 2. Module electronics box.

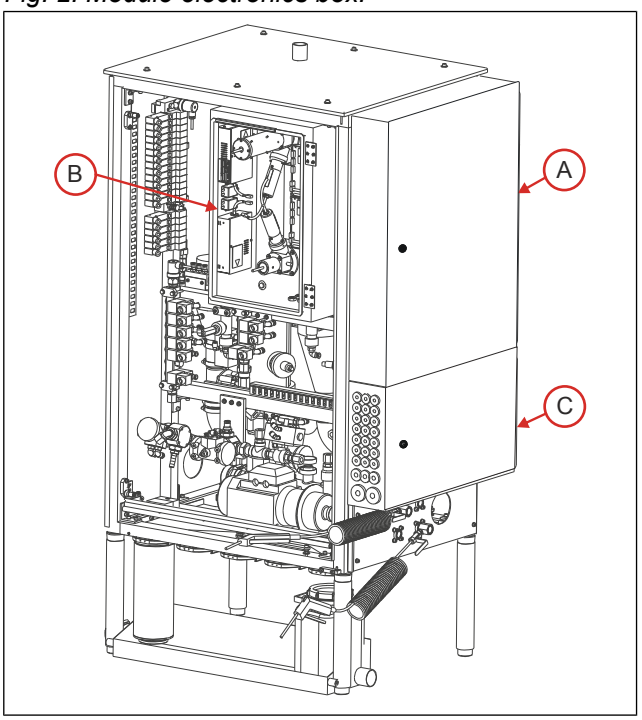


Fig. 3. Measurement cabinet (some doors removed); A - analyzer electronics box, B - module electronics box, C - connection box.

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

OeClient-name	Board	Usage	Location	CAN address	CAN bus
IO1	Binary IO	Sample controls	Analyzer electronics box	0	1
IO2	Binary IO	Cabinet 1 IO-board	Cabinet 1 module electronics box	1	1
IO2_2	Binary IO	Cabinet 2 IO-board	Cabinet 2 module electronics box	2	1
IO3	DCPU	Cabinet 1 Kappa measurement	Cabinet 1 module electronics box	0	1
IO4	DCPU	Cabinet 1 Brightness measurement	Cabinet 1 module electronics box	1	1
IO3_2	DCPU	Cabinet 2 Kappa measurement	Cabinet 2 module electronics box	2	1
IO4_2	DCPU	Cabinet 2 Brightness measurement	Cabinet 2 module electronics box	3	1
IO5	IOCPU	Pump controls, temperature measurement, calibration buttons	Analyzer electronics box	0	1
IO6	IOCPU	Fiber-Shive module IO	Fiber-Shive module	1	1
IO7	IOCPU	Midpoint / 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. 17-24 / 1-8	Customer IO Box	0	2
IO13	Customer IO	Analog conn. 25-32 / 9-16	Customer IO Box	1	2
IO14	Customer IO	Analog conn. 32-40 / 17-24	Customer IO Box	2	2
IO15	Customer IO	Analog conn. 41-56 / 25-32	Customer IO Box	3	2
IO16	Customer IO	Analog conn. 57-72 / 32-40	Customer IO Box	4	2

MasterCPU

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

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

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

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

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

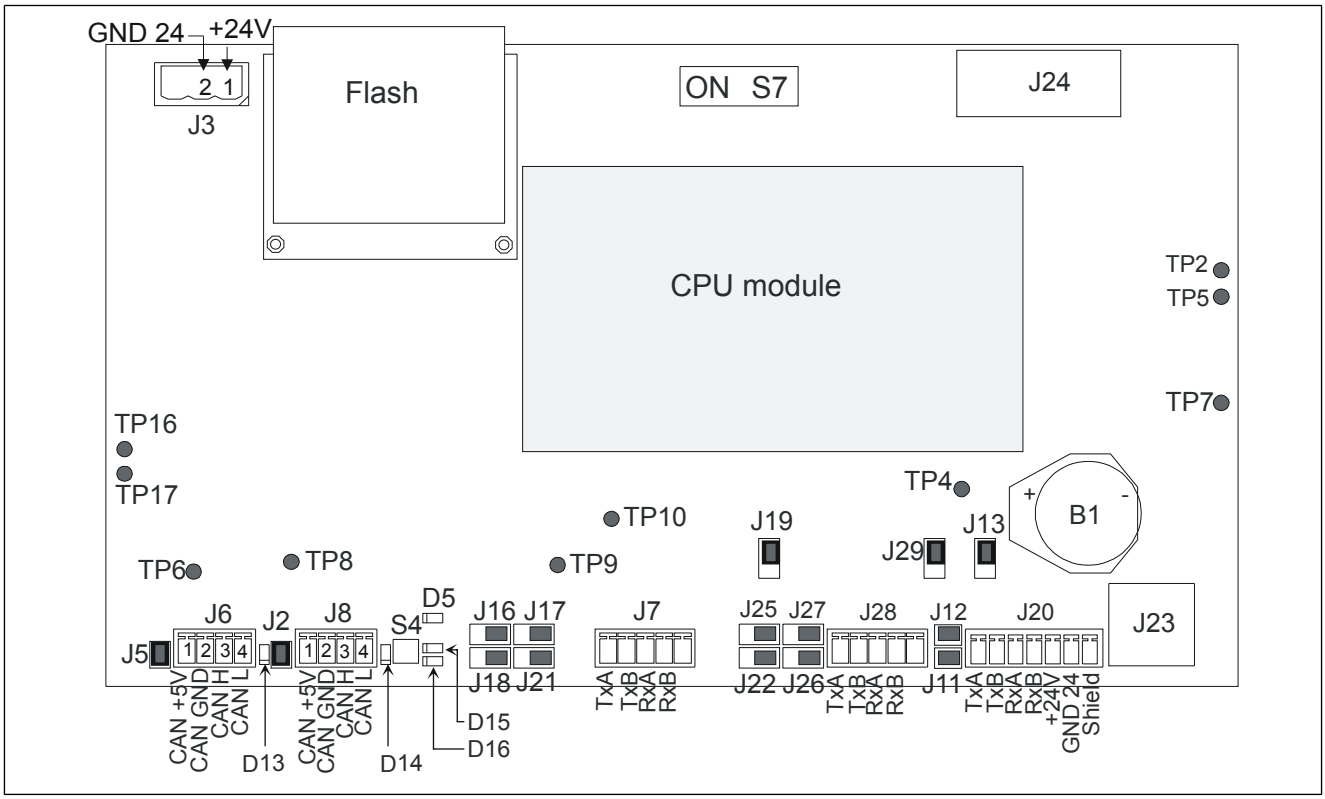


Fig. 4. MasterCPU board.

Binary IO

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

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

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

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

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

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

IO1 (Binary IO)

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

IO2 and IO2_2 (Binary IO)

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

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

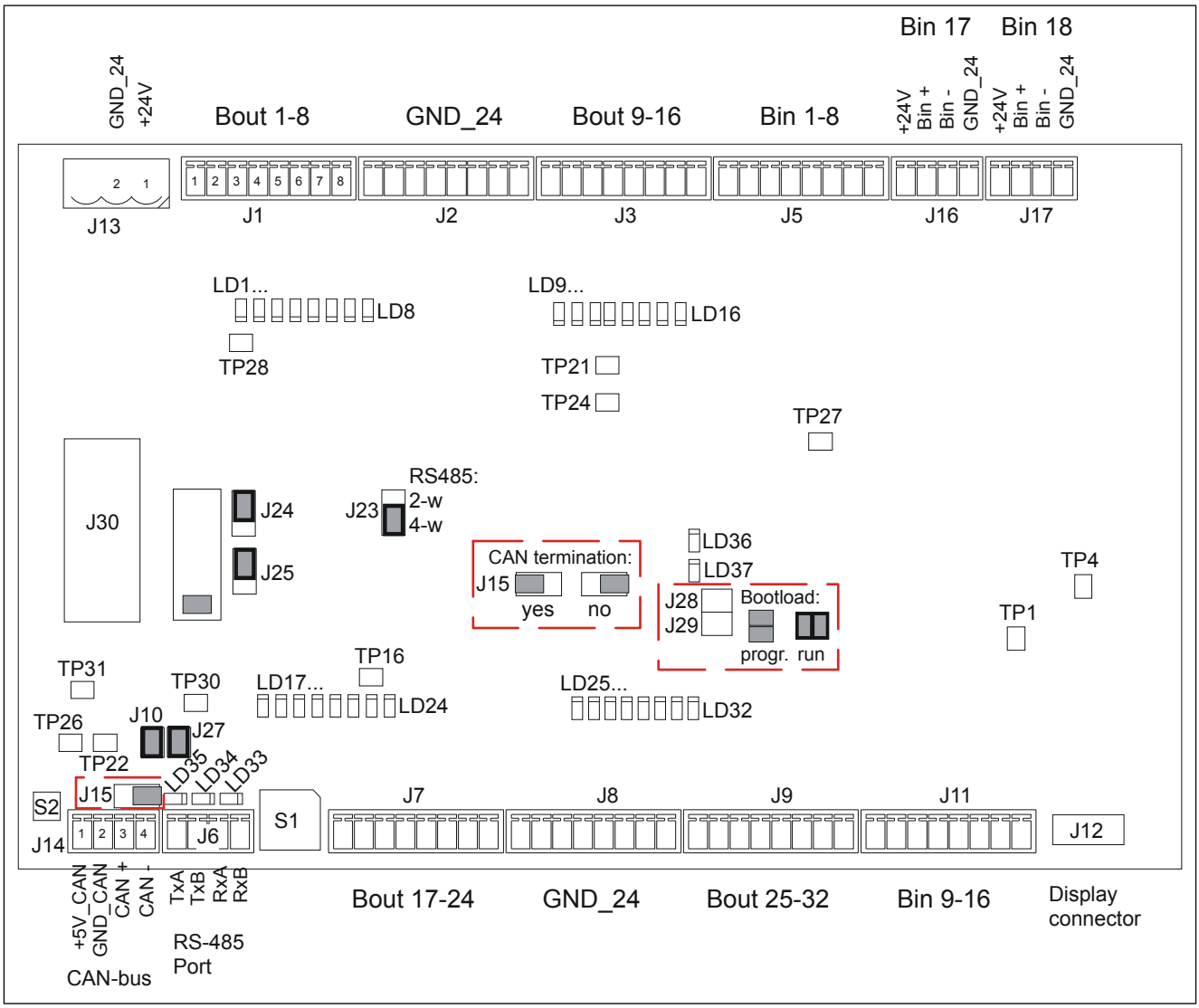


Fig. 5. Binary IO board (IO1).

Table 2. IO1 - sampler connectors.

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

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

Special cases:

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

etc.

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

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

Control	Purpose	IO2 connector
22_EXV	Exchange line valve	J7-6
23_EXF	Exchange line flush	J7-7
24_SVF	Safety valve flush	J7-8
25_BOV	Bottom valve	J9-1
26_UDC	Upper discharge	J9-2
27_MXA	Mixing air	J9-3
28_WIW	Wire wash	J9-4
29_WIV	Wire valve	J9-5
30_SWP	Sweep chamber pressure	J9-6
33_CLG	Chamber light	J9-7
34_WLG	Working light	J9-8
37_NTR	Neutralization valve	J7-5

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

Customer IO (IO10-IO16)

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

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

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

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

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

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

LEDs LD4 and LD5 indicate the CAN-bus baud rate:
- 1000 kbit/s = LD4 and LD5 are on
- 500 kbit/s = LD5 is on
- 250 kbit/s = LD4 is on
- 125 kbit/s = both LEDs are off
- 62,5kbit/s = LD4 and LD5 are on

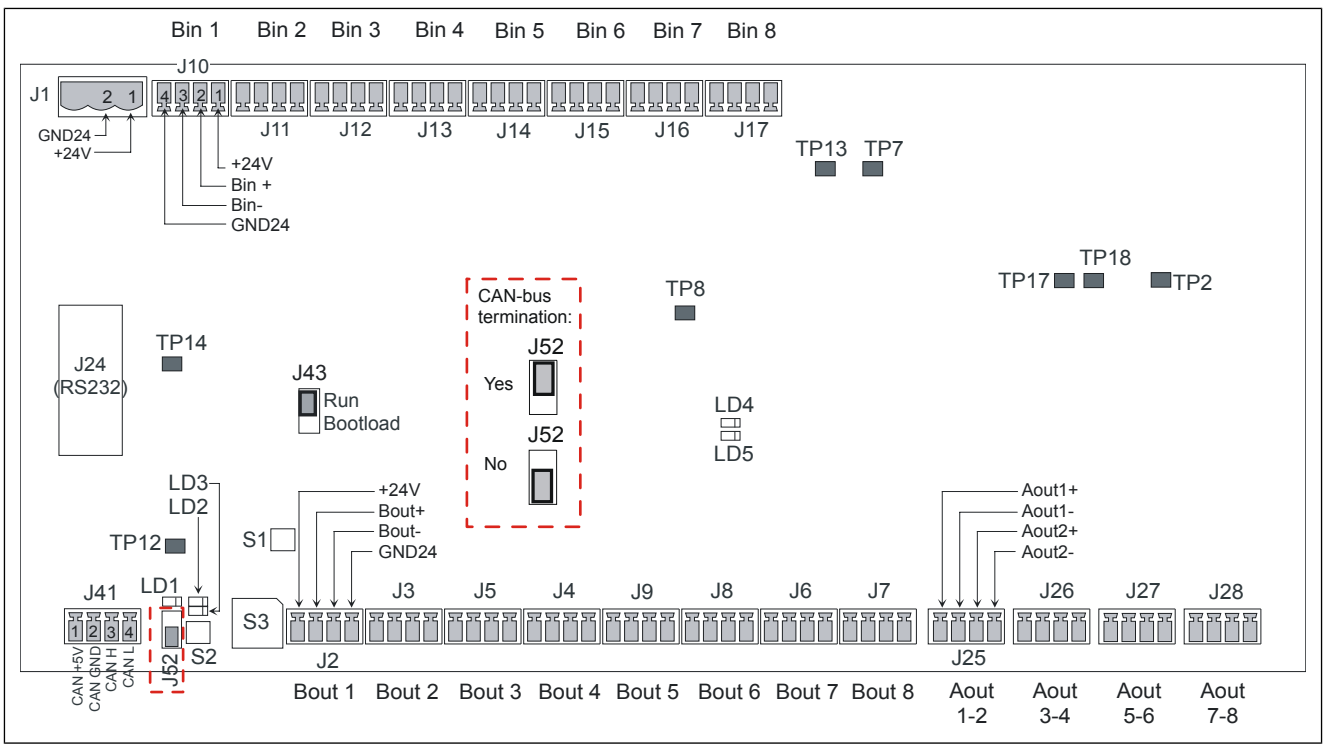


Fig. 6. Customer IO board.

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

Binary output

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

Load 1A 30VDC

Binary input

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

Input voltage range 24VDC, 50mA

Analog output

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

Loop resistance max. 600 ohm

DCPU (IO3 & IO4, IO3_2 & IO4_2)

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

Table 5. IO3 & IO4, DCPU board terminals.

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

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

Connections:

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

Test points:

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

LEDs:

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

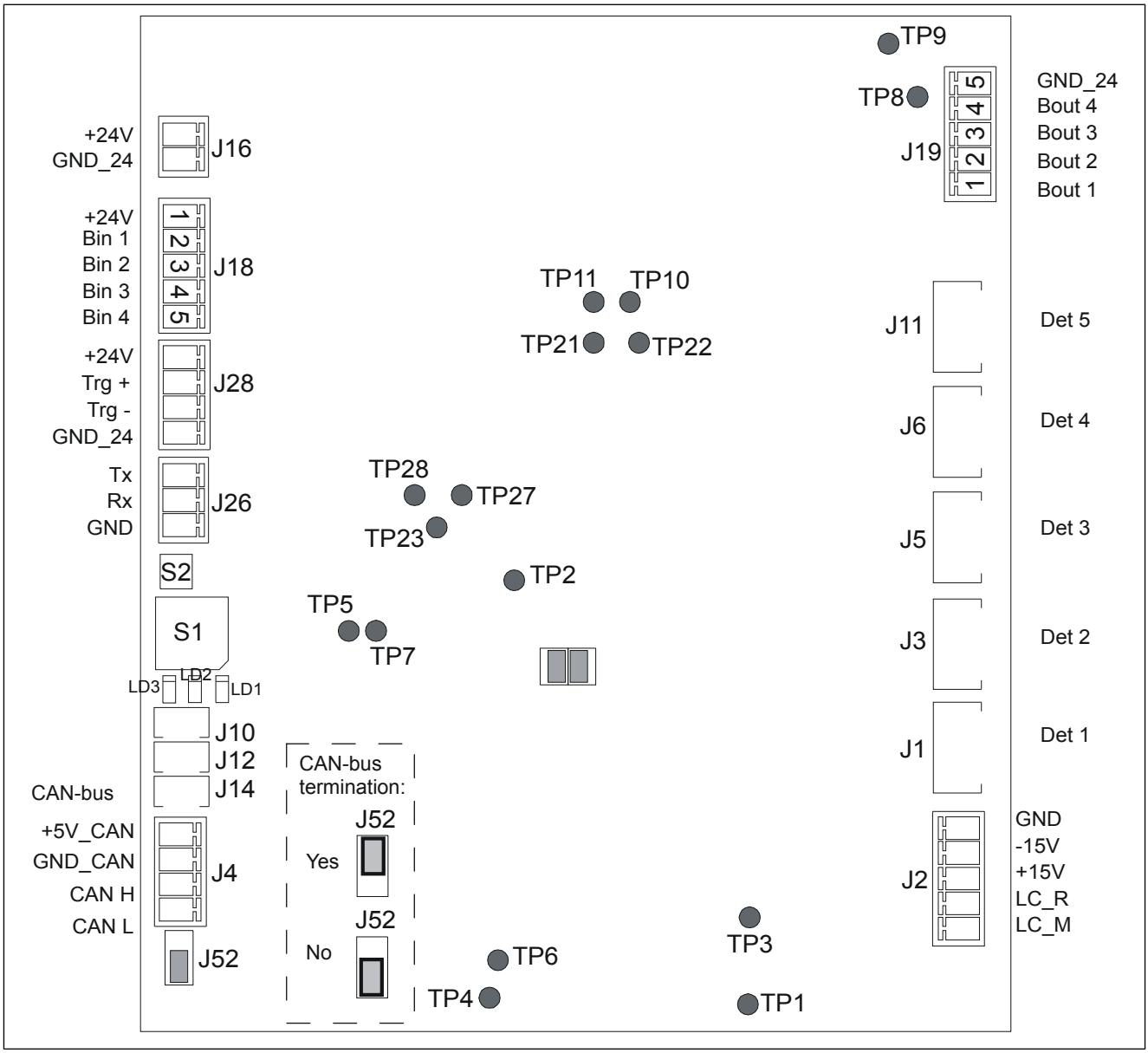


Fig. 7. DCPU board (IO3 & IO4).

IOCPU

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

Connections:

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

Test points & jumpers:

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

IO5

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

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

IO5 board connections:

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

LEDs:

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

IO6

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

IO7

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

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

Control	Purpose	IO5 connector
32_PSP 2	Measurement unit 2 pump speed	J6-1
31_PMP 2	Measurement unit 2 pump on/off	J6-2
32_PSP 1	Measurement unit 1 pump speed	J6-3
31_PMP 1	Measurement unit 1 pump on/off	J6-4
Cal_light	Calibration button light	J10-4
Line_light	Line select switch light	J10-4
Input	**Purpose**	**IO5 connector**
S2	Level transmitter (float), unit 2	J1
S1	Level transmitter (float), unit 1	J3
Temp	Warm water temperature	J5
LINE button	Calibration sample, line selection	J11-2
Cal_button 2	Calibration sample, reset	J11-3
Control	**Purpose**	**IO6 connector**
SSE	Shive Sample Empty	J6-1
SSF	Shive Sample Fiber	J6-2
SSS	Shive Sample Shive	J6-3
SSI1	Shive Sample In 1	J6-4
SSI2	Shive Sample In 2	J10-2
SSA1	Shive Sample Air 1	J10-3
SSA2	Shive Sample Air 2	J10-3
SSD	Shive Sample Dilution	J10-4

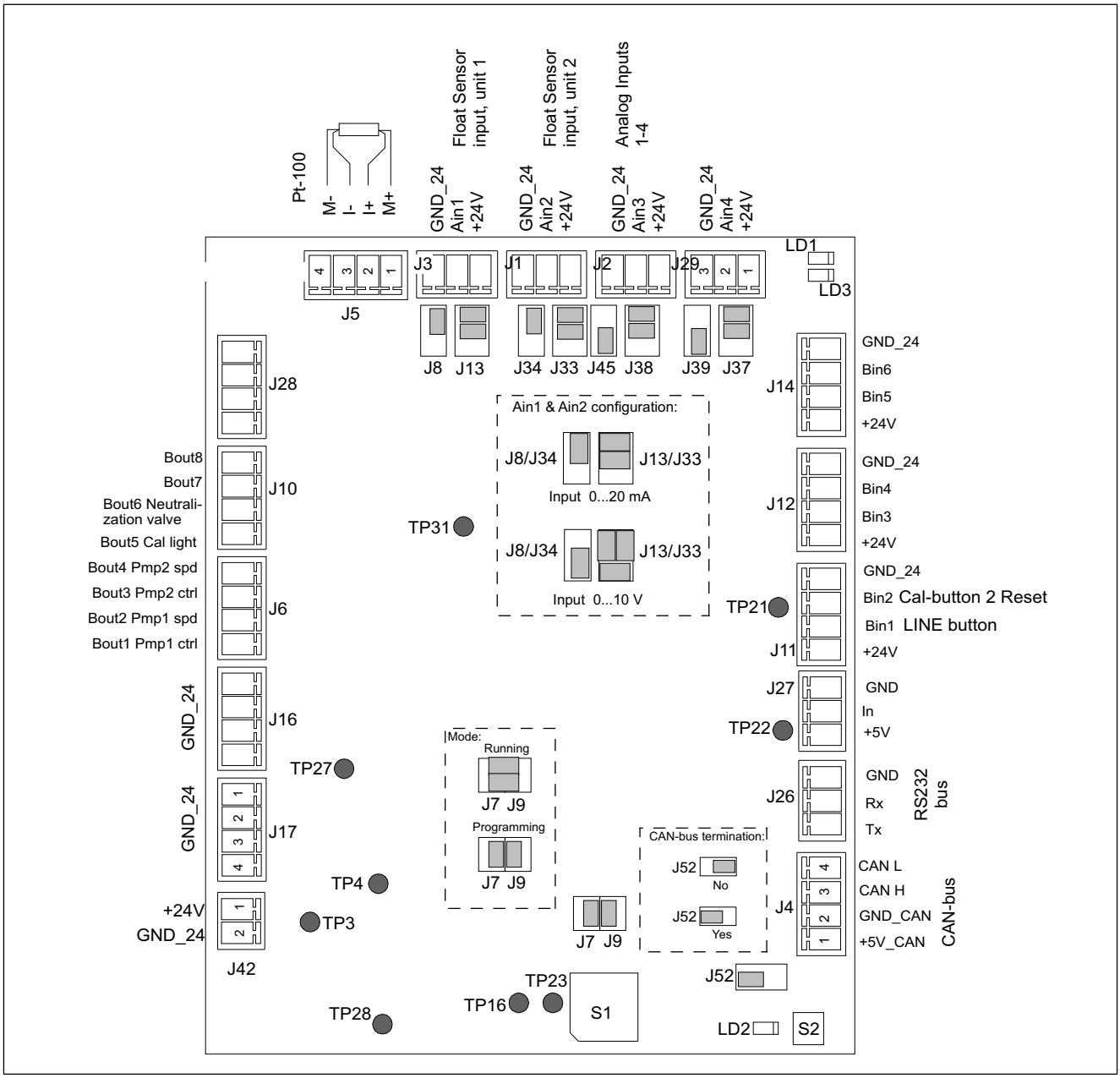


Fig. 8. IOCPU board (IO5).

PROGRAMMING INSTRUCTION: M16C MICROCONTROLLER BASED BOARDS

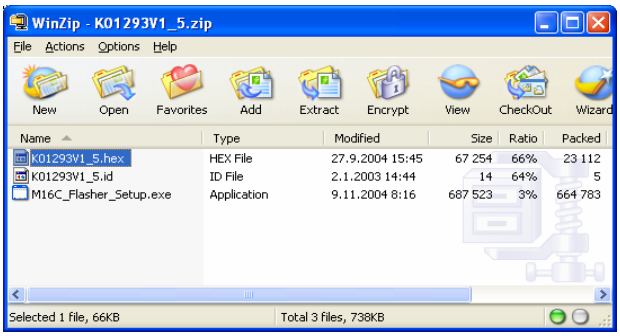
Examples: IOCPU K00693, SensorCPU K01446.

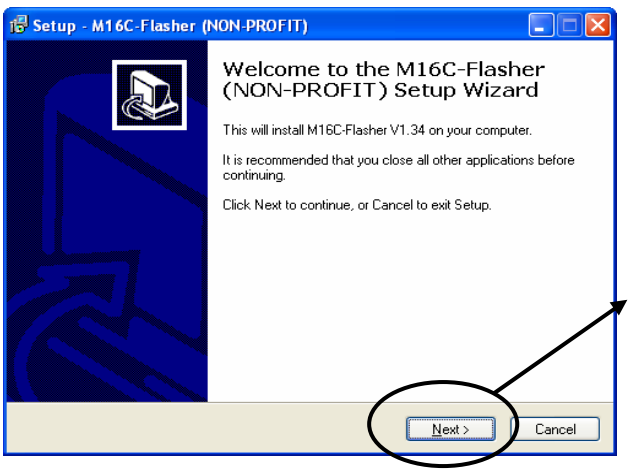
Boards can be programmed either with a suitable programmer + adapter before layout, or by connecting the board to a PC's serial port with an RS cable after the layout. This document describes the latter method.

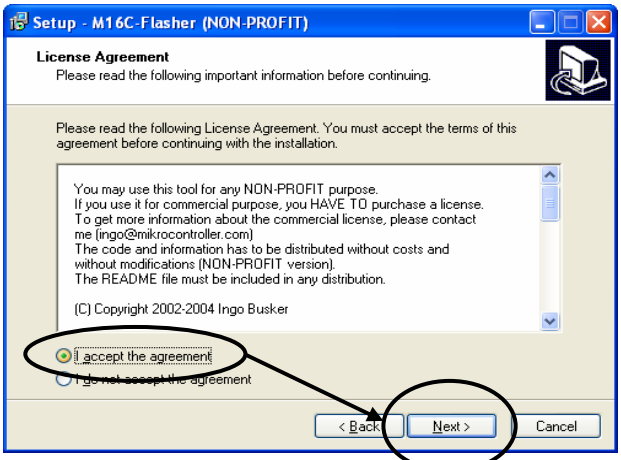
The PC must contain the M16C Flasher software. This software is available as a Zip file that contains the actual program code.

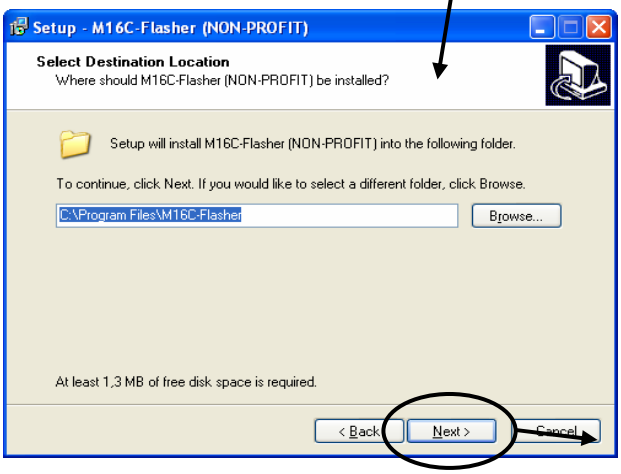
1. *INSTALLING THE PROGRAM*

M16C-Flasher V1.33 (or greater) works in Windows 95/98/ME/2000/XP. The board program package contains the Flasher software and the .HEX and .ID files to be programmed to the board. Unzip the software package in a directory and start M16C_Flasher_Setup.exe.

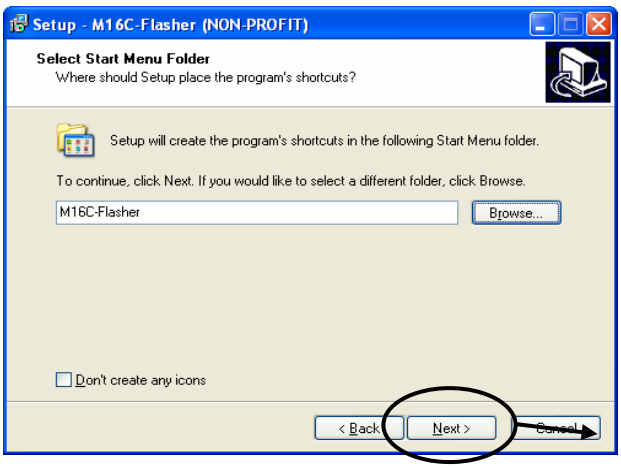




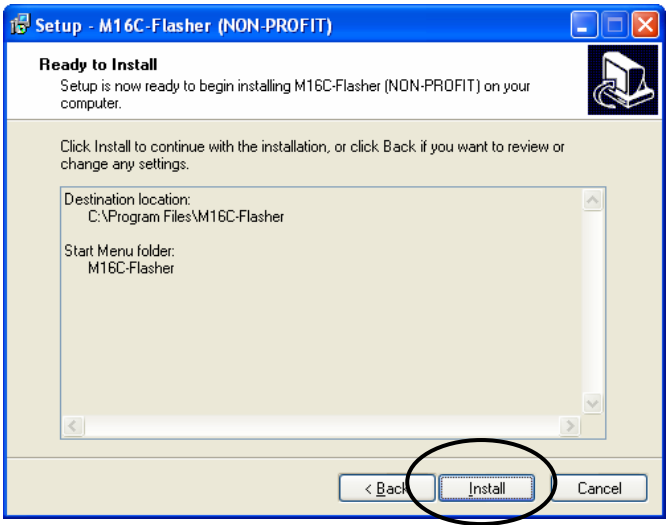


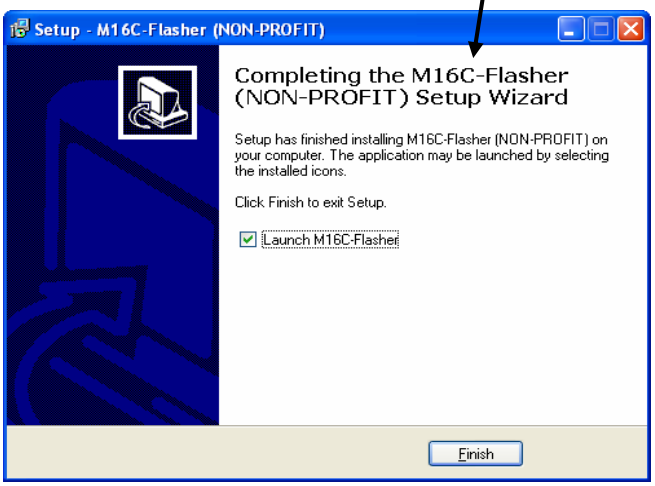


If you wish to use another folder instead of the default location, click "Browse" and choose the location; otherwise click "Next".



The program will create a start icon in the Start menu.

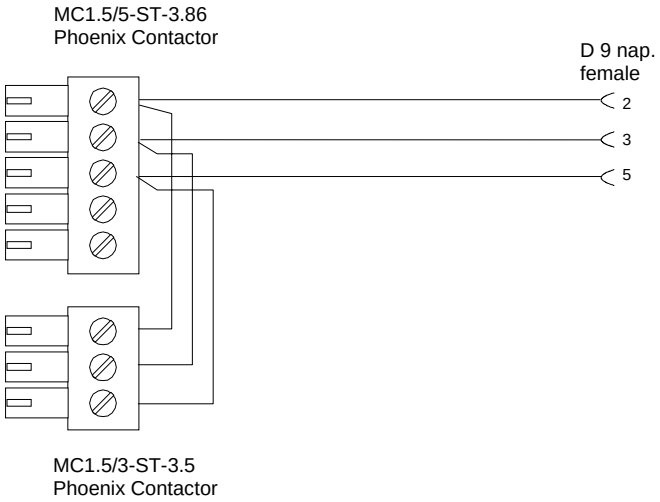




The Flasher program is now ready to use.

2. *SERIAL CABLE*

Programming is done with a direct cable connection: the serial cable only needs three wires connected directly, Tx, Rx and GND (see picture).



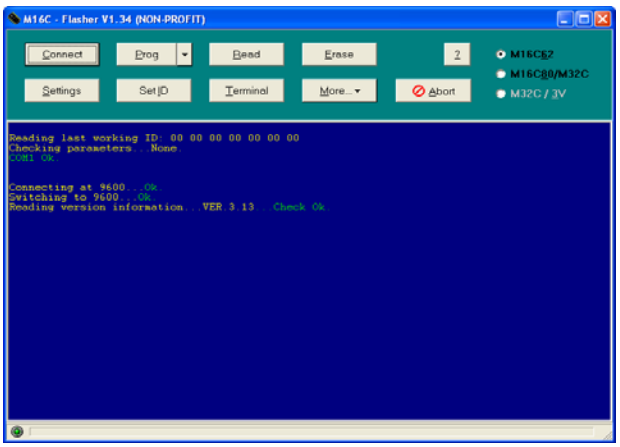
Connect the cable to PC's free serial port (COM1 or COM2) and the other end of the cable to the board to be programmed.

3. *PROGRAMMING*

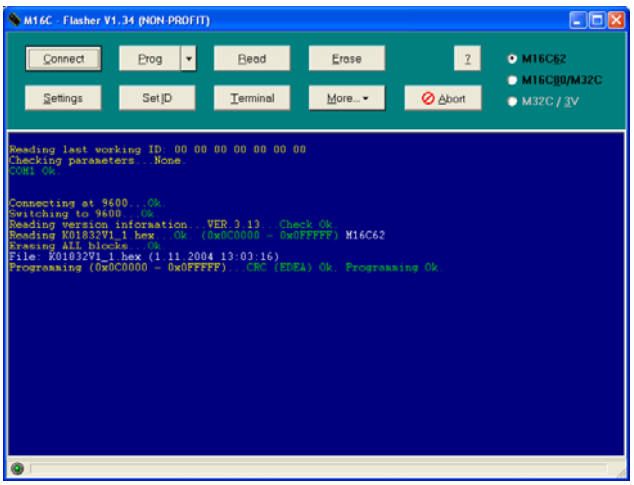
Make sure that

- the board has operating voltage connected,
- programming cable is connected,
- Flasher program has been started.

Before programming, put the board to programming mode by setting its Bootload jumpers to programming position (see attachments). Then press RESET, and the board is ready to receive the program. Click "Connect".



When the program connects with the board, click on the arrow on the right side of the "Prog" button and select "Prog. new file" from the menu. Locate the correct file (.hex) and click "Open". Programming will begin, and after a while the display reads "Ok" if the programming was successful.



While the board is being programmed, the bar will move from left to right (within a few seconds). When the programming is ready, set the Bootload jumpers back to running position and press RESET. The program will start and the indicator LED(s) begin to blink.

If the program cannot connect to the board, it gives the error message "Connecting … Failed!"

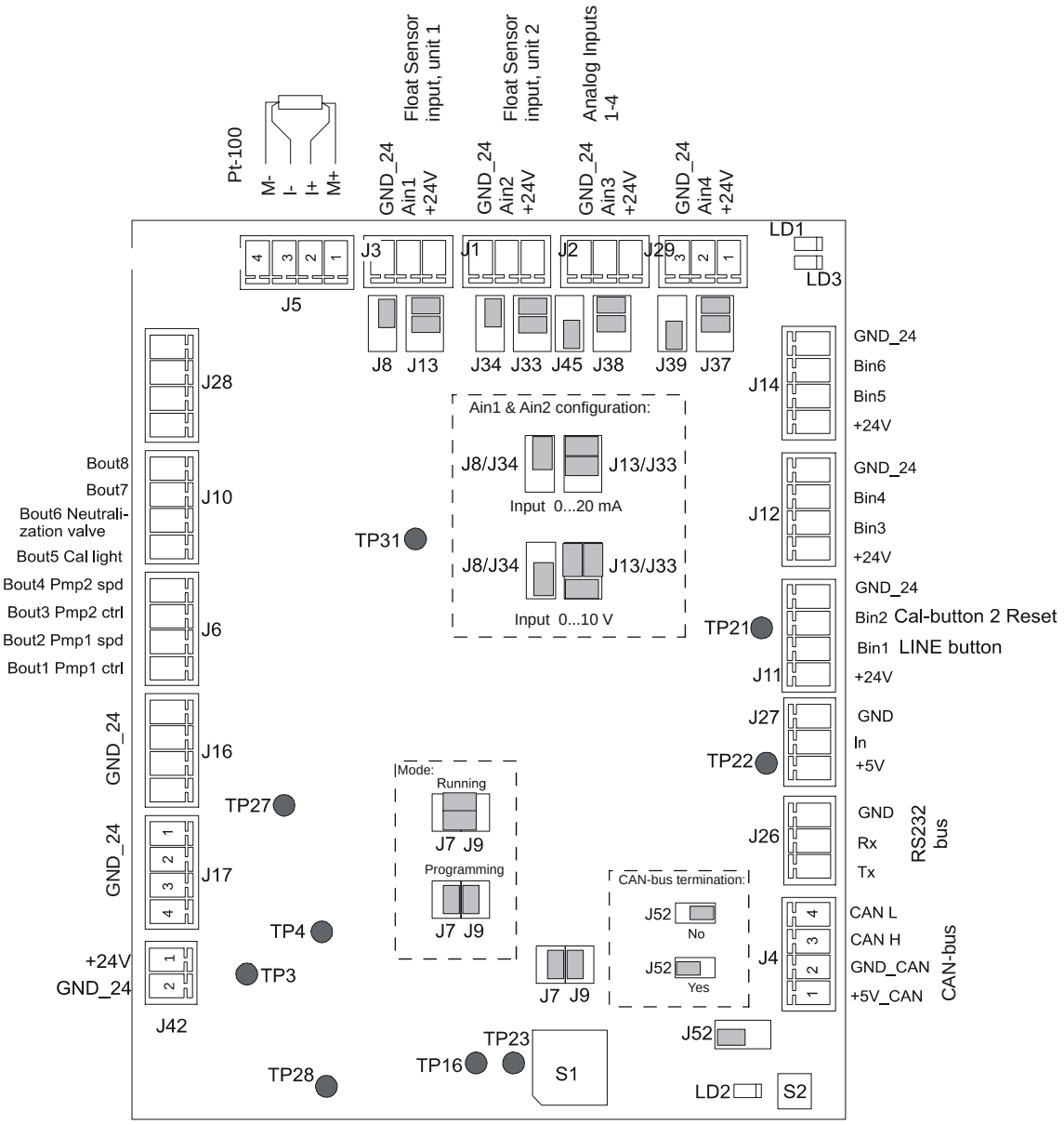
This means that programming could not proceed. The reason may be:

- wrong serial port
- programming cable not connected
- board's operating voltage not connected
- board is not in programming mode
- board is defective
- PC's serial port is defective

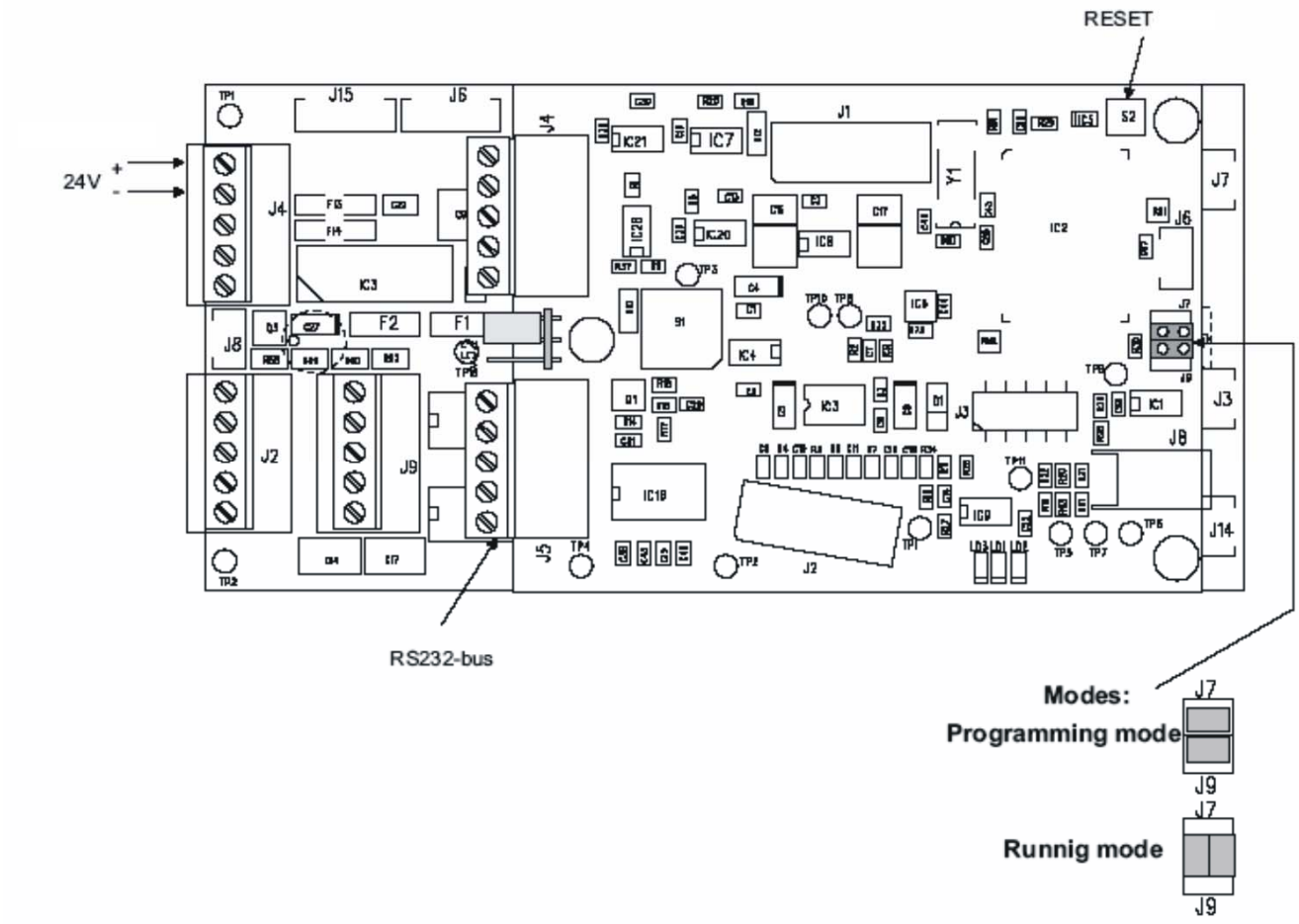
4. *IDENTIFICATION*

After successful programming, attach a sticker with the program identidication code and version on the CPU chip.

IOCPU:


Pt-100
M-
I-
I+
M+
Float Sensor input, unit 1
GND_24
Ain1
+24V
Float Sensor input, unit 2
GND_24
Ain2
+24V
Analog Inputs 1-4
GND_24
Ain3
+24V
GND_24
Ain4
+24V
LD1
LD3
J5
J3
J1
J2
J29
J8
J13
J34
J33
J45
J38
J39
J37
J28
J10
J6
J16
J17
J42
J14
J12
J11
J27
J26
J4
Bout8
Bout7
Bout6 Neutrali-zation valve
Bout5 Cal light
Bout4 Pmp2 spd
Bout3 Pmp2 ctrl
Bout2 Pmp1 spd
Bout1 Pmp1 ctrl
GND_24
GND_24
+24V
GND_24
GND_24
Bin6
Bin5
+24V
GND_24
Bin4
Bin3
+24V
GND_24
Bin2 Cal-button 2 Reset
Bin1 LINE button
+24V
GND
In
+5V
GND
Rx
Tx
RS232 bus
CAN L
CAN H
GND_CAN
+5V_CAN
CAN-bus
Ain1 & Ain2 configuration:
J8/J34
J13/J33
Input 0...20 mA
J8/J34
J13/J33
Input 0...10 V
TP31
TP21
TP22
TP27
TP4
TP3
TP23
TP16
TP28
Mode:
Running
J7 J9
Programming
J7 J9
J7 J9
CAN-bus termination:
J52
No
J52
Yes
J52
S1
S2
LD2

SensorCPU:


RESET
24V
+
-
RS232-bus
Modes:
Programming mode
Runnig mode
J7
J9

Troubleshooting

Troubleshooting

Analyzer's problems and malfunctions may be observed as error messages in the diagnostics displays (Communicator) 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.

Pressurized air

Insufficient warm water pressure. Possible error sources (Fig. 1):

- Air pressure regulator
  The regulator is defective or its setting has drifted. Check the regulator, and adjust the pressure if necessary. Proceed as follows:

1. Choose "Diagn" -› "IO-test".
2. Set 03_PUW Pressure under wire = ON.
3. Adjust air pressure to 4.5 bar ± 0.5 bar by the regulator.
4. Set 03_PUW Pressure under wire = OFF.

- Instrument air
  Analyzer gets no instrument air. Check the instrument air inlet line.

- Filter
  The air filter is dirty. Clean the filter.

Cold water

Insufficient warm water pressure. Possible error sources (Fig. 2):

- Cold water regulator
  The regulator is defective or blocked, or its setting has drifted. Check the regulator, and adjust the pressure if necessary. Proceed as follows:

1. Choose "Diagn" -› "IO-test".
2. Set 11_WRS Water removal to side = ON.
3. Set 16_WOW Water on the wire = ON
4. Adjust air pressure to 3.5 bar ± 0.5 bar; use a 14mm fork spanner to adjust.
5. Set 16_WOW Water on the wire = OFF and 11_WRS Water removal to side = OFF.

- Cold water inlet
  Water pressure in the cold water supply line to analyzer is too low; check and correct the situation.

- Filter
  The cold water filter is blocked; clean it. Clean the filter.

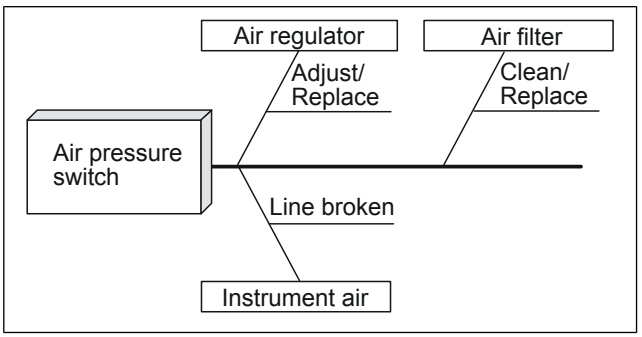


Fig. 1. Troubleshooting diagram for the air pressure.

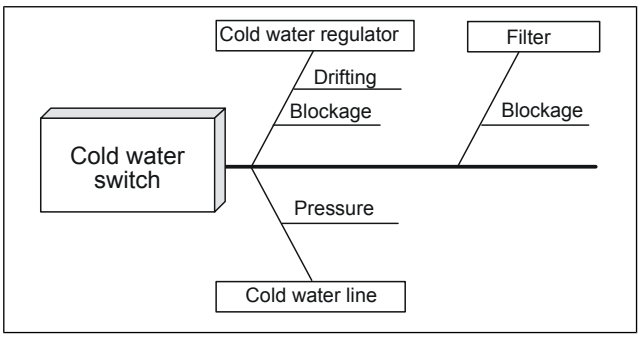


Fig. 2. Cold water, error diagram.

Warm water
Insufficient warm water pressure. Possible error sources (Fig. 3):

- Hot water inlet
  Water pressure in the hot water supply line to analyzer is too low; check and correct the situation.

- Filter
  The hot water filter is blocked; clean it. Clean the filter.

Water value
Kappa measurement cell is dirty, or the water is dirty. Possible error sources (Fig. 4):

- Measurement cell
  If the measurement cell is dirty, the analyzer may show higher kappa results than it should. Before cleaning, do the following:
- Make sure that the cleaning chemical tank contains chemical.
- Reduce the washing interval (= number of analyses between washes) by setting a smaller "Chemical washing cycle" value (Config -› Analyzer parameters). You can also set the chemical valve to stay open longer (parameter "Chemical + water"), to add more cleaning chemical during the washing sequence.

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

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

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

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

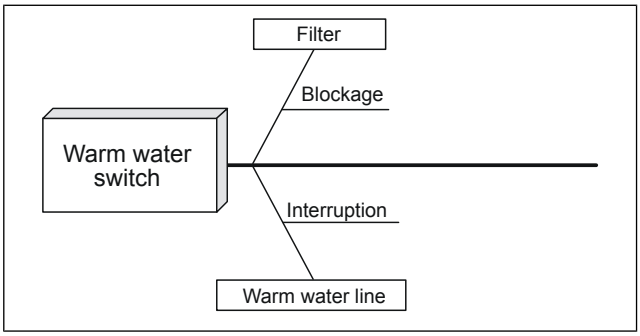


Fig. 3. Warm water, error diagram.

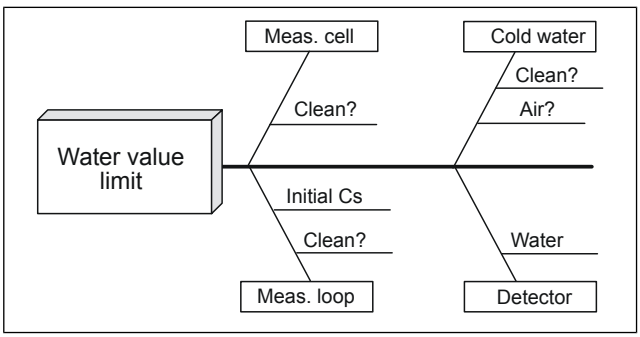


Fig. 4. Water values, error diagram.

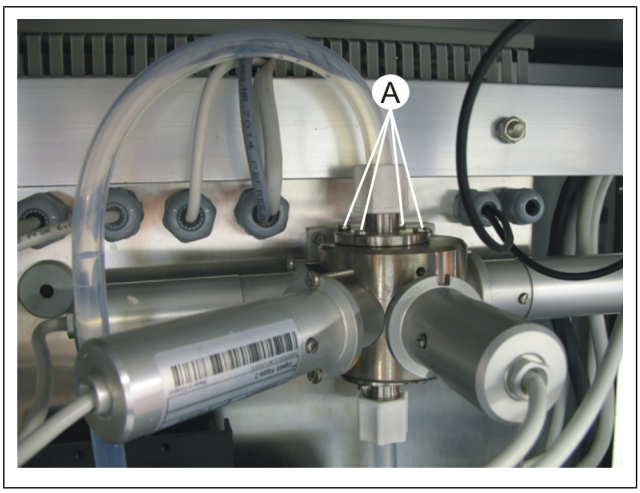


Fig. 5. Opening the Kappa measurement cell.

- Cold water
  Impurities and/or air in the cold water cause deviations in the water measurement results. Check the air purity and air content.

- Measurement loop
  If fibers remain in the measurement loop after washing, the initial water consistency will be high and cause errors in the water measurement results. Add a higher number of analyzer washes ("Config" -› "Sequence parameters", display 230) and make sure that all fibers are rinsed out of the measurement loop.

- Detectors 3 & 4
  Water between the detector and measurement cell will cause an alarm. Mark the precise location of the detector on the measurement cell body - the detector must be installed back in exactly the same position as it was! Detach the detector from the measurement cell and check if there is water between the cell and detector.

NOTE: Do not use instrument air to clean or dry the detector - the air may contain dispersed oil!

Low init. Cs

Initial sample consistency for the indicated channel is too low. Possible error sources (Fig. 6):

- Shive screen, lower wire screens
  Remove the wire screens and check them for blockages etc.

- Upper cleaning nozzles of washing chamber, water and air valves
  Make sure that the cleaning nozzles and the water and air valves are not blocked.

- Transport water
  The delivery water pressure has dropped. Either the sample does not flow into the washing chamber within the set delivery time and some of it remains in the sample line, or the sampling device has not taken any sample because of too low pressure. If the delivery water pressure is higher, the sample is delivered sooner to the analyzer and some of the fibers in the sample are flushed into overflow during the too long delivery time. Watch how long the sample delivery water flows into the washing chamber after the sample; too much delivery water will dilute the sample too much. Check the delivery water pressure and compare them to the earlier values.

- Process
  Very low process consistency indicates possible disturbances in the process. Check the situation from the trends recorded by the automation system.

- Sample line
  Check if the sample line is blocked or damaged.

- Grade change
  During grade changes (HW/SW), problems in obtaining sample usually occur (1 - 2 times/grade change), as the sampling devices have different sampling parameters for the different grades.

- Sampler
  Check the operation of the sampling device.

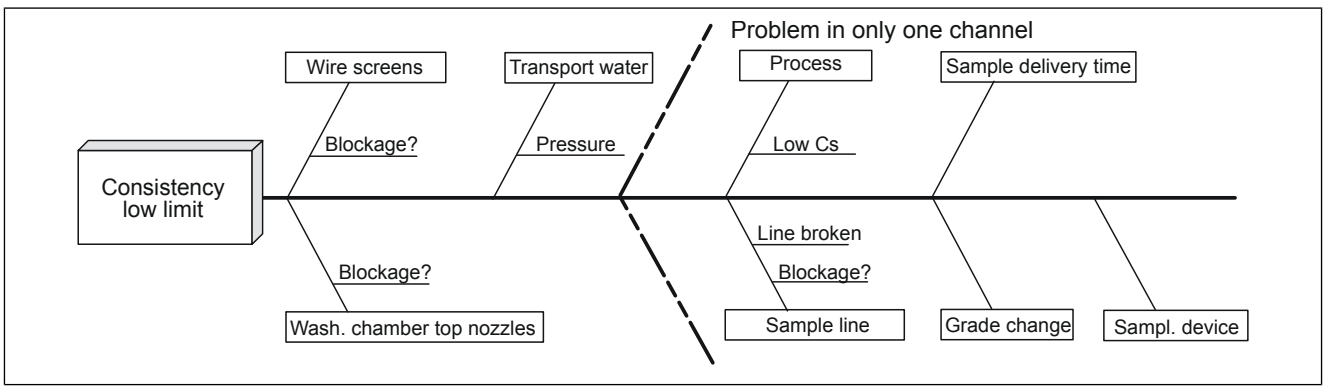


Fig. 6. Troubleshooting: consistency low limit.

Cs timeout

Consistency error means that consistency adjustment has failed for the indicated channel. Possible error sources (Fig. 8):

- Measurement loop
  Blockages in the measurement loop will cause consistency errors. Check the measurement loop check valve 18_LFL, nozzles, and the operation of v alve 17_WUW.

- Pump
  The pump has stopped during measurement; check the pump. Check the operation of the pump.

- Consistency transmitter LC-100
  Check the Error status pages to see if any LC-100 signal alarms have occurred. If the results of initial consistency measurement are in the range 0.15 - 0.8%, the problem is somewhere else, not in the consistency transmitter. Blockages in the consistency transmitter may be caused by too high initial consistency or too short mixing time.

- Cold water regulator
  The regulator is defective or its setting has drifted. Adjust water pressure to 3.5 ± 0.5 bar by the regulator.

- Lower wire screen
  Make sure that the lower wire screen (on the bottom of washing chamber) is intact and not blocked. Also check the operation of valves 10_UDR and 12_WRW.

- Check operation of level transmitter.

Detector signal

Detector signal level is either < 0.025 or > 4.9. Possible error sources (Fig. 7):

- Detecor X

1. See whether the obtained Kappa measurement results are within a reasonable range for the sampling point in question; e.g. in SW blowline the Kappa number should be roughly 25.
2. Check the raw signals from the detectors on the detector test page to see if they look normal. Pay attention to the Kappa level of the measurement - for example, in high Kappa measurement detector D5 is used, and in this case the readings from the other detectors are not significant. Detector D3 does not measure pulp Kappa, and therefore its alarms need not be observed. If deviating readings are observed, check the corresponding detector.
3. Humidity between the detector and its lens may cause too low/high results and detector signal alarms. If the detector signals are suspect, do a detector test and compare the obtained results to the original values.

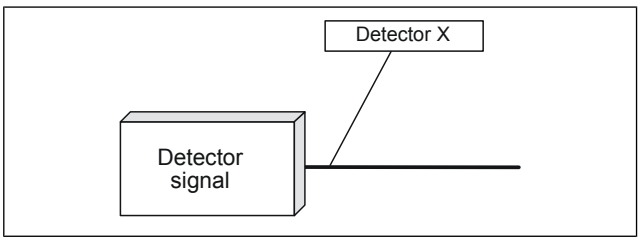


Fig. 7. Troubleshooting: detector signal.

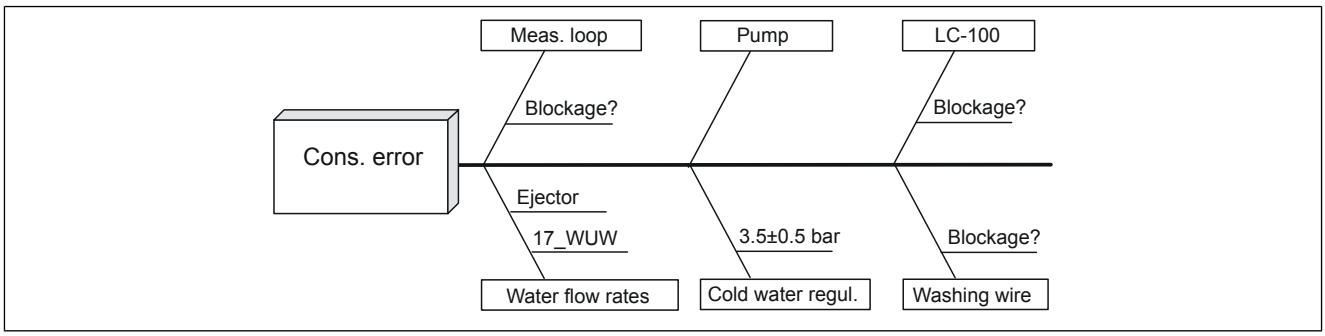


Fig. 8. Troubleshooting: consistency error.

Problems observed during operation

Fig. 9 shows a troubleshooting diagram for those measurement and consistency adjustment disturbances that may cause incorrect measurement results.

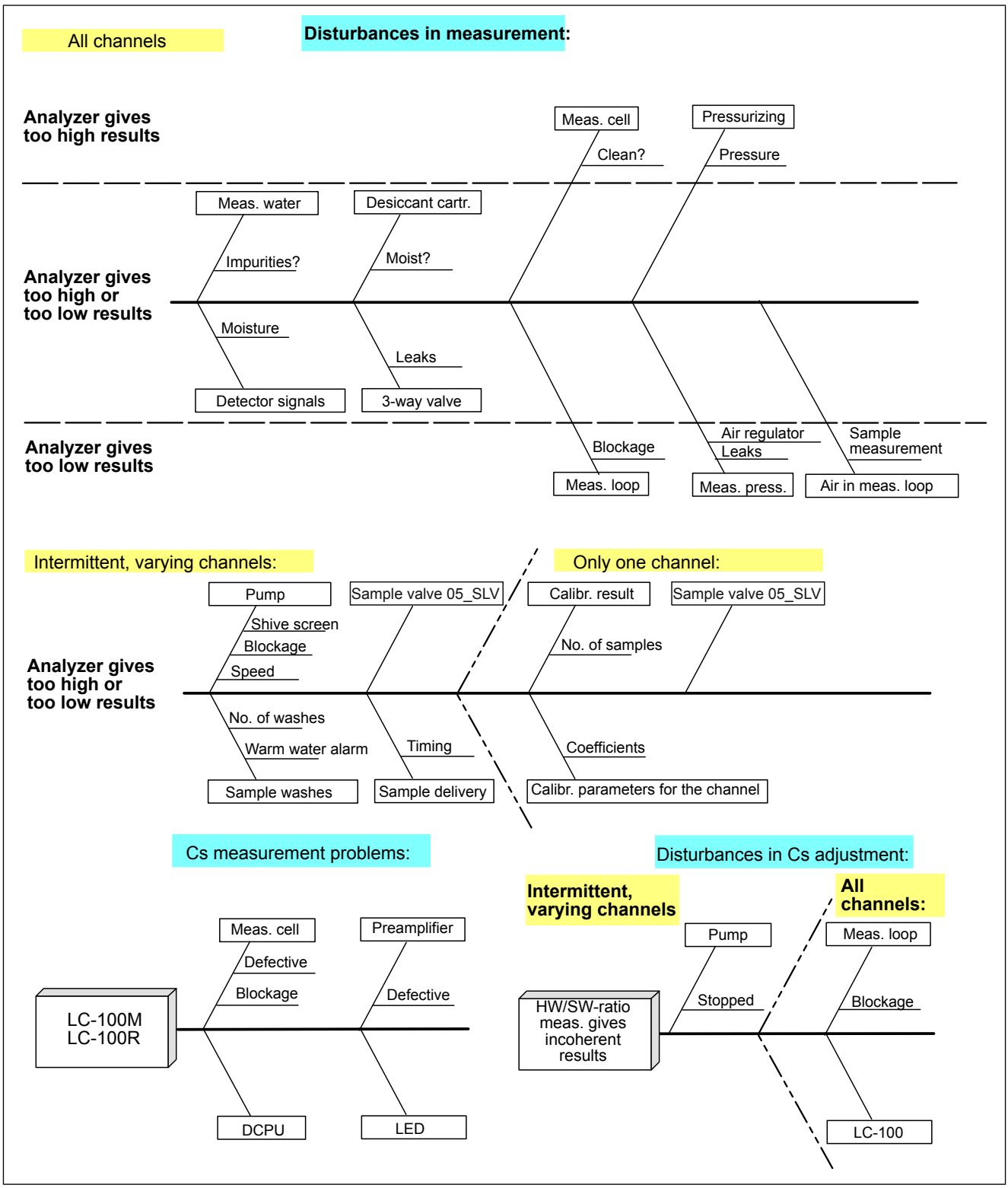


Fig. 9. Troubleshooting diagram: analyzer gives incorrect results.

Too high/Too low results, all channels

The incorrect result may be caused by any of the following:

- Detector signals

1. Humidity between the detector and its lens may cause too low/high results and detector signal alarms. Check the raw signals from the detectors on the detector test page to see if they look normal.
2. Also check the Error status page to see if any detector signal alarms have occurred. If deviating readings are observed, check the corresponding detector. If the detector signals are suspect, do a detector test and compare the obtained results to the original values.

Detector test:

1. Before the test, wash the analyzer twice: "Config" -› "Sequence programs" -› "Wash. chamber wash" (Single Chamber) or "Sweep module wash" (Dual Chamber). If you also run a chemical wash, analyze at least one normal pulp sample before the washes.
2. In the main display, press [F7] "Diagn" -› "IO test" -› [F1] -› "Detector test 1 or 2".
3. Return to the previous display. 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..
4. Pressurize the measurement loop: Single Chamber: Set 02_WCP Wash. chamber pressure = ON Dual Chamber: set "30_SWP Sweep module pressure" = ON.
5. In the main display, press [F7] "Diagn" -› "IO test" -› [F1] -› "Detector test 1 or 2".
6. Measure the signal levels: [F5] "Xenon ON" and [F7] "Test ON". Write down the results.
7. Set [F5] "Xenon OFF" and [F7] "Test OFF".
8. Release the pressure.
9. Drain water from washing chamber.

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

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

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

- Water values
  Variations in water purity may cause error in the measurement results. To check the purity of the water used in measurement, the water values measured from each line are compared to values obtained earlier. After analysis, water consistency is measured with the LC-100 and the water value is measured with Kappa detector D3.

- Desiccant cartridges
  If the water used in the analyzer is colder than the environment, moisture may condense on the brightness measurement cell. Moisture is absorbed by desiccant cartridges placed in the measurement cell. The cartridge is illustrated in the picture; its all sectors should be light blue in color.
  - If sector 30 is pink, replacing the cartridge is recommended.
  - If sector 40 or 50 is pink, the cartridge must be replaced at once.
  A moist cartridge can be refreshed by drying it in an oven for a couple of hours at temperature 130 - 150°C (266 - 302 °F).

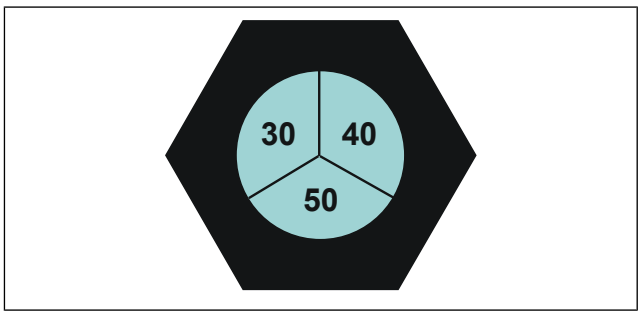


Fig. 10. Dehumidifier sectors.

Too high results, all channels
The incorrect result may be caused by any of the following:

- Kappa measuring cell
  See under point "Water value low lim".

- Pressurizing
  The washing chamber must be pressurized during analysis. Check the pressure from the manometer.

Too low results, all channels
The incorrect result may be caused by any of the following:

- Measurement loop
  Watch the FEP-tubes of the measurement loop to see if the sample moves while the pump is operating. To see the loop better, use a torch to illuminate it. Also check if air bubbles can be seen in the sample flow. If the blockage cannot be removed by the blockage removal valve, check the LC-100 consistency transmitter.

- Measurement pressure
  During sample measurement the pressure must be 2.5 bar (29 psi); this can be checked from the manometer located on the washing chamber. The measurement pressure is regulated by the air regulator. Also make sure that there are no leaks in the sample loop.

- Air in measurement loop
  If air leaks into the measurement loop during measurement, the CV-value will be abnormally high. This may caused by too low sample level; the sample level should be at the level sensor during measurement.

Intermittent too high/too low results, varying channels

The incorrect result may be caused by any of the following:

- Pump
  If the analyzer occasionally gives abnormally high/low results from different channels, watch the pump operation. Make sure that the pump is not blocked or stopped. If the pump stops while measurement is going on, it will cause irregular swings in the measurement results. Also check that the shive screen is in good condition.

- Sample washing
  If the sample is not properly washed, residuals of process chemicals remain in the pulp and cause error in measurement. Check the warm water alarms. If the water is not hot enough or its temperature has dropped (e.g. from 60° to 40°), the sample is not washed as efficiently as it was during calibration. Increase the number of line washes in the Sequence parameters display ("Config" -› "Sequence parameters").

- Sample valve 05_SLV
  If the sample delivery is not correctly timed, pulp and black liquor will remain in the sample line. If the valve SV5 leaks, black liquor will be mixed with the samples and cause abnormally high Kappa results. The sample delivery time must be configured so that the sample line closes only 5 - 10 seconds after the entire sample has flown to the analyzer. Leaks in the ball valve may be caused by fibers stuck between the ball and its seat, or by damage to the sealing surfaces. Clean the valve and replace its seals.

- Sample delivery
  If the sample delivery is not correctly timed, pulp will remain in the sample line and mix with the next sample. Increase the line flushing time in the Sampling parameters display.

Too high/too low results, one channel

The incorrect result may be caused by any of the following:

- Calibration result
  When the analyzer is being calibrated, a sufficiently large number of calibration points is needed: use at least 20 points for each channel, and make sure that the difference between the minimum and maximum Kappa value is at least 5 Kappa points.

- Calibration coefficients
  If the calibration coefficients for the channel have been accidentally changed, the measurement results will be incorrect. Check the coefficients from the configuration display.

- Sample valve 05_SLV
  See above.

Swings in Results

Troubleshooting diagram for swings, see Fig. 11.

- Result drops to zero occasionally
  Electric disturbances in the Xenon power supply cause this kind of errors in the results. If all detector signals D1 - D5 jump high at the same time but the CV-value shows no deviation at the moment, the power supply is probably defective. If the error is caused by an air leak, also the CV-value will be out of the normal range.

- Occasional downward swings in results
  This disturbance is caused by air leaking into the measurement loop through some valve. The air leak may be intermittent (not steady), so the valves must be inspected very carefully. If there is air in the measurement loop, also the CV-value will be abnormally high. Other causes for this disturbance: wet dehumidifier cartridge; defective Xenon power supply or interference suppressor; defective detector; or defective Peak Detector board.

- Occasional up- or downward swings in results
  If the sample line between sampling device and analyzer is very long or pressure inside it varies, old sample may remain in the line. Check the sample delivery time and sample line washing operations. If air locks are formed inside the discharge tube, the sample line gets no replacement air through it and will not be drained completely empty. Check the discharge tube and support it in position so that no air locks cannot form inside it. If the sample valve leaks, black liquor from another line may be mixed with the sample and cause an upward swing in the Kappa result. Check the sample line valve. Note that the CV-value will not indicate the presence of black liquor in the sample.

Consistency transmitter LC-100

The blockage removal sequence is always run after a consistency error. The LC-100 consistency signal is affected by the following factors:

- Measurement cell
  If the measurement cell is broken, the Cs(water) value will not be zero and also the consistency measurement results will be incoherent. The cell may also be blocked; use for example a flexible wire tie to open it. Do not use any hard tools (e.g. screwdriver) to remove blockages, as these will scratch and break the cell!

- Preamplifier
  The LC-100 preamplifier is located inside the transmitter, next to the receiver optics. If the preamplifier is defective, the Cs(water) value will not be zero and also the consistency measurement results will be incoherent.

- DCPU
  The processor board SCPU processes the signals amplified by the LC-100 preamplifier.

- LED LC-100
  The light from a semiconductor LED is transmitted through the LC-100 measurement cell. The LED is located on the opposite side of the LC-100 preamplifier board. The LED light cannot be seen with the naked eye. The LED operation can be checked on the detector test display: look at values LC100R (=Vref) and LC100M (=Vmeas) when the measurement cell contains water.

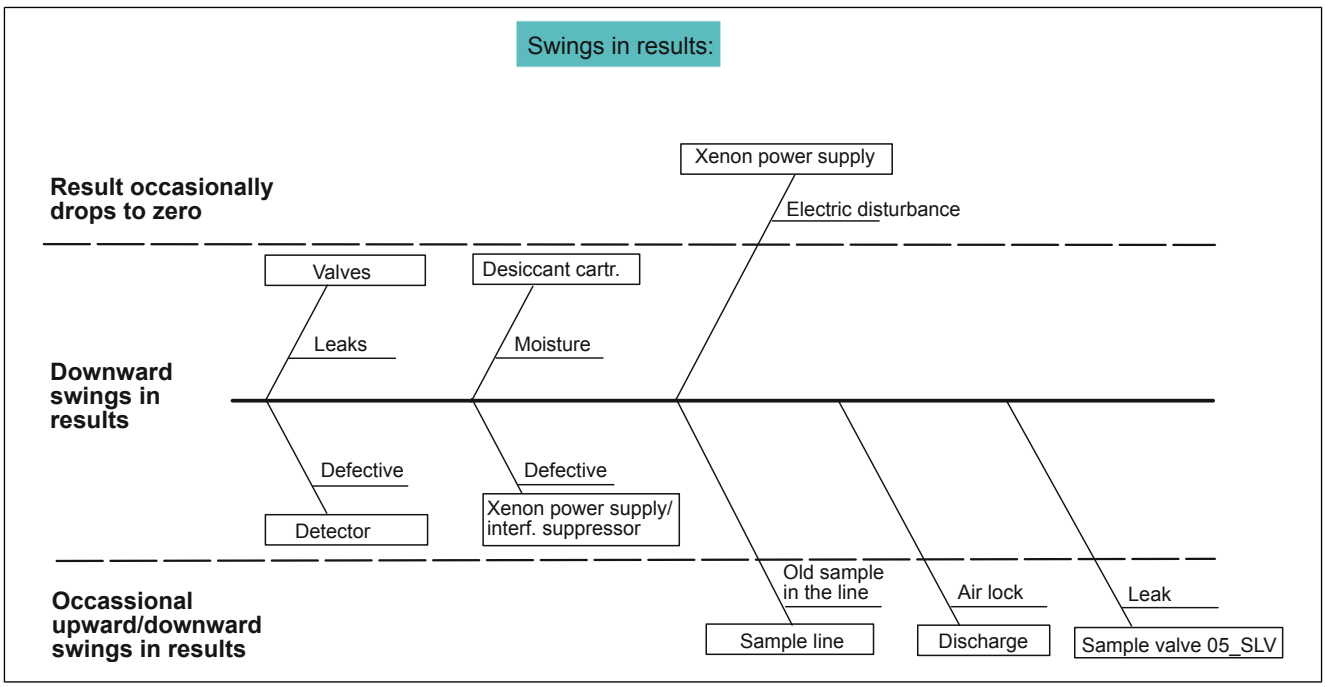


Fig. 11. Troubleshooting diagram: swings in results.

Error status

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

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

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

Level: Error on or off.

Cnt: Counter, number of errors occurred.

Level: How serious the error is; parameter.
- 0 = error has no effect.
- 1 = error count increases, error data is stored in the log.
- 2 = as in level 1 + alarm is set.
- 3 = as in levels 1 & 2 + analysis is interrupted, analyzer continues with washing.

Common errors
- Press. air
- Cold water 1/2, warm water 1/2
- Warm water
- Water temp low/high
- Reset

Unit errors, 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 transfer 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
- Fiber start/stop error
- Fiber/Shive Cs low/high
- Fiber / Shive result rejected
- SSI/SSE valve error

Errors:

Underdilution, Single Chamber

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

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

Underdilution, Dual Chamber

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

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

Low init. Cs

- Too low incoming sample consistency -› no analysis.

-› blockage in measurement loop or sample line
-› LC100 consistency sensor is defective
-› check the pump

Initial volume error, Single chamber

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

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

CV measurement error, Single chamber/Dual chamber

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

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

Det1 offset - Det5 offset

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

-› check the detectors (IO3)

Det6 offset - Det10 offset

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

-› check the detectors (IO4)

No sample cup, Single chamber/Dual chamber

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

Prescreen error, Single chamber/Dual chamber

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

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

Kappa measurement Det1 level - Det5 level

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

-› check the detectors (IO3)

Kappa/brightness water value, Single chamber

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

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

Kappa/brightness water value, Dual chamber

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

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

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

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

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

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

Cold water 1/2, warm water 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 transfer 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

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

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

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

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

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

Sweep Cs error
- Sweep end consistency could not be reached during the sweep.

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

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

Cs timeout
- Consistency adjustment does not succeed within the allowed time.

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

SSI/SSE valve error
- Not in use at the moment.

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

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

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

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

Shive start/stop error
- Error in the start/end of shive measurement.

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

Brightness measurement Det6 level - Det10 level
- Detector signal level under 0.025 V or over 4.80 V.

-› check the detectors (IO4)

Water temp low
- Warm water temperature is below the set limit.

Water temp high
- Warm water temperature is over the set limit.

Water remove error, Single Chamber
- Sample thickening did not succeed. The volume is at least 0.5 L below target.

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

Water remove error, Dual Chamber
- Sample thickening did not succeed. The volume is at least 0.5 L below target.

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

Leaking error, Single Chamber
- Sample level drops (by more than 0.5 L) after consistency adjustment.

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

Leaking error, Dual Chamber
- Sample level drops (by more than 0.5 L) after consistency adjustment.

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

Overdilution, Single Chamber
- Diluted volume is over the target (by more than 0.25 L).

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

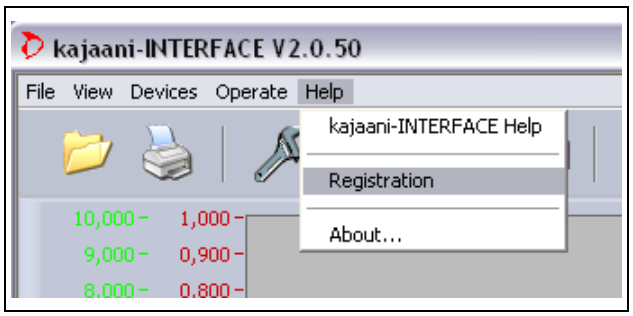
Overdilution, Dual Chamber
- Diluted volume is over the target (by more than 0.25 L).

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

Kajaani Interface Acquiring key code from Metso

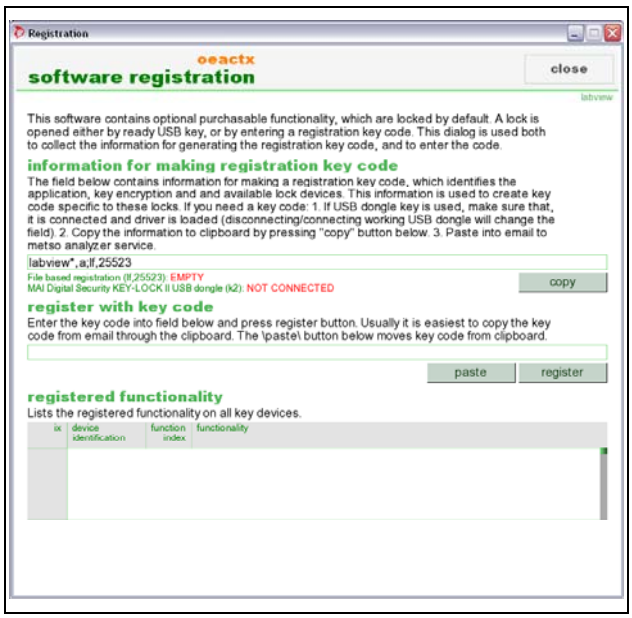
NOTE: This instruction is only for use by Metso Automation's personnel! Never forward the key codes to customers – the software packages for customer use are invoiced products and the hardware key (dongle) has a price tag!

1. Start the Kajaani Interface software.
   - If the software version is earlier than 1.5.10 or 2.0.44, go to "Help" => "Registration".



   - If the software version is 1.5.10 or 2.0.44 or greater, the following window will appear after the software is started; click "Registration".

2. The registration window will then appear:



3. Locate the field that contains the key code retrieval information (e.g. labview*,a;if…..) and click "Copy" to copy the string. Then paste the string into an email and send it to Metso's analyzer service, service.kajaani@metso.com
4. You will get the registration key in email. Copy-paste the key code from the email message into the box "register with key code" and then click "register".
5. Registration is now completed, and you can use the Kajaani Interface software without a dongle.
6. Once the software has been registered, it need not be registered again for subsequent upgrades.

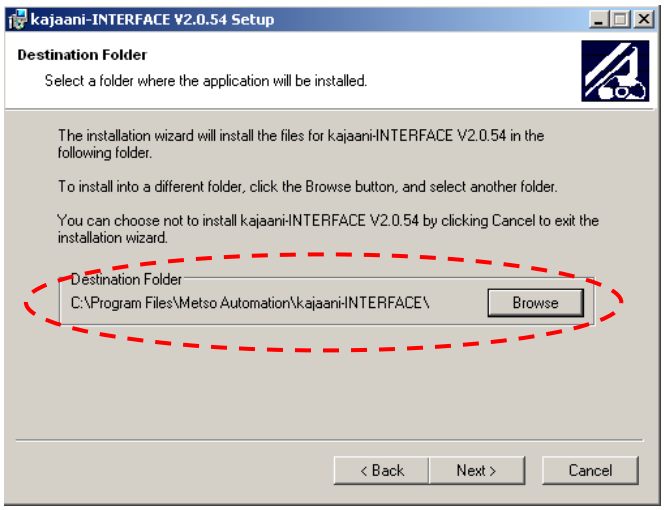
   NOTE: The installation folder has changed:

   - **older versions: …\Metso Automation \kajaani-INTERFACE**
   - **from V2.0.81 upwards: ...\Metso Automation\Kajaani Interface**

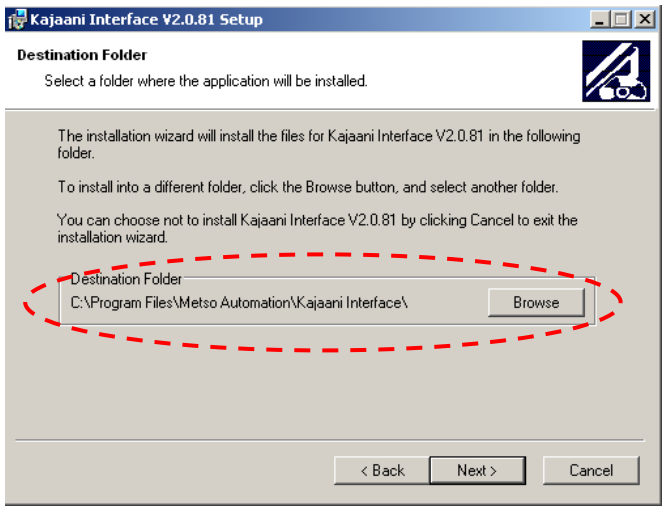
   When upgrading, make sure that the new version is installed in the same destination folder as the previous version – this ensures that the registration remains valid!

Kajaani Interface — Acquiring key code from Metso

Installation folder up to version V2.0.80



Installation folder from V2.0.81 upwards



Kajaani Interface Software registration & upgrade

Registering Kajaani Interface

Up until version V2.0.54 the Kajaani Interface software has operated without registration. Later versions require a registration key, or "dongle", to operate. Connect the dongle to the USB port of the PC where the software is installed.

Kajaani Interface dongles come in two categories:

- Administrator level = all Kajaani Interface functions are available
- User level = all Kajaani Interface functions are available, except that sending data from PC to analyzer is not allowed

Upgrading the Kajaani Interface

When an older, unregistered Kajaani Interface software is upgraded to the later versions, you need to order a dongle for it from Metso's in-house service (email service.kajaani@metso.com).

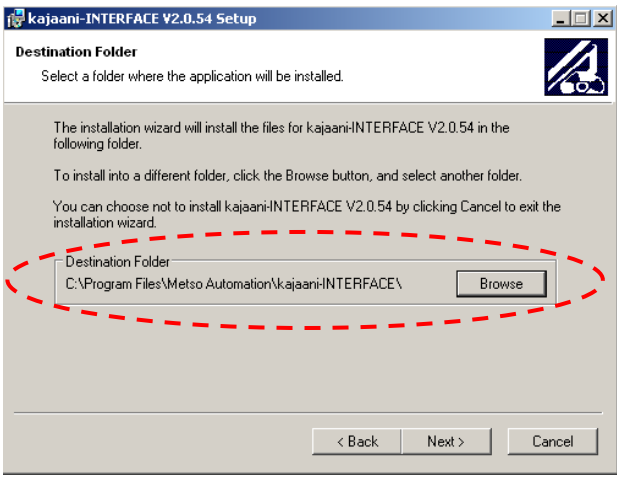
The same dongle will also work with subsequent upgrades, and thus the registration need not be renewed after it has been done once.

NOTE: The installation folder has changed:

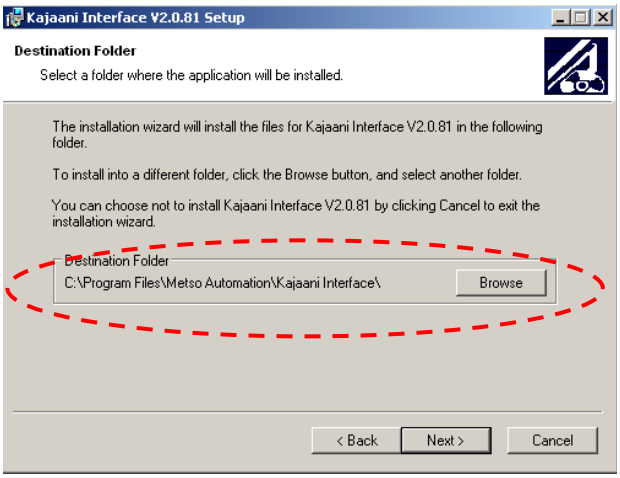
- **older versions: ...\Metso Automation \kajaani-INTERFACE**
- **from V2.0.81 upwards: ...\Metso Automation\Kajaani Interface**

When upgrading, make sure to install the new version in the same destination folder as the previous version – this way it will find the old settings and files!

Installation folder up to version V2.0.80



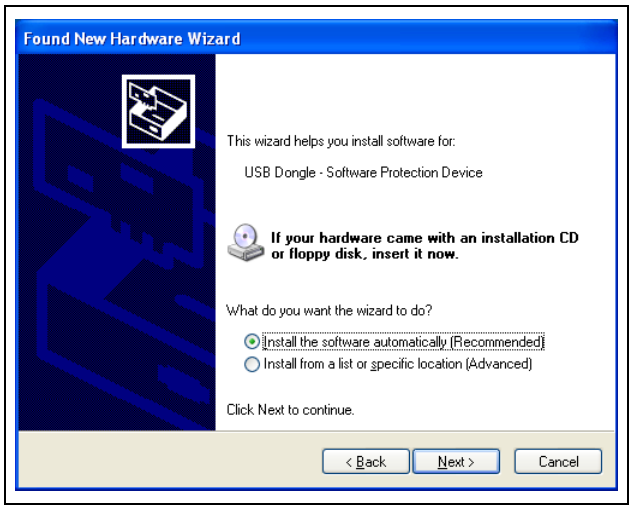
Installation folder from V2.0.81 upwards



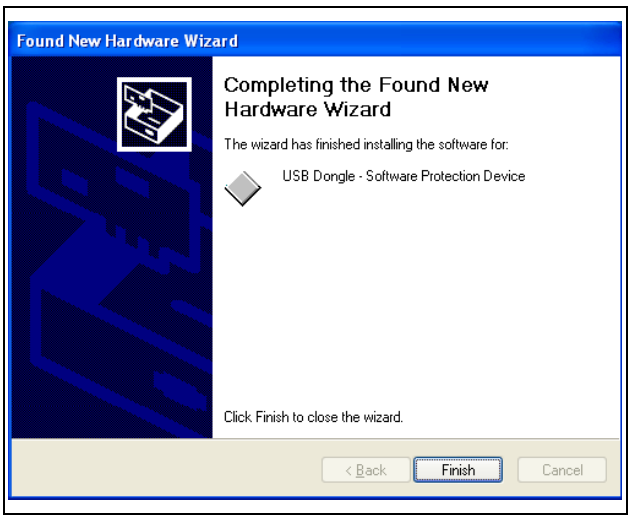
Installing dongle driver

1. The software dongle driver is included in the Kajaani Interface installation package. Install the Interface software before you connect the dongle to the PC for the first time.
2. When the Kajaani Interface installation is complete, connect the dongle to the PC's USB port. The driver installation will be finalized at this point.
3. Windows asks if you wish to search for the driver from the Windows Update site. Select "No, not this time" (the last option) and click "Next".

4. Windows then asks where you want to search for the driver. Select "Install the software automatically" (the first option) and click "Next".



5. When the driver has been found, the necessary files are copied automatically and the "Completing..." window will then appear. Click "Finish".



6. The driver has now been installed and the software reads registration data from the dongle.
7. Keep the dongle connected to the PC always when using Kajaani Interface. It need not be detached from the PC when upgrading the software later on.

Kajaani analyzers Contact for LabView software

Contact person

Several LabView based software applications are used in connection with various Kajaani analyzers. We are happy to receive your feedback (observed bugs, suggestions for improvement or new features, etc.) concerning these applications.

The development of these software applications has been outsourced, but the same people are still working on them. However, feedback concerning them should be directed to Kajaani Product Line's product development.

The contact person for this feedback is **Mr. Petri Pekkarinen** (petri.pekkarinen@metso.com).

Software in question

- Kajaani Interface
- Bleaching Tool
- Kappa/Bright Tool
- KajaaniTool
- SAMTool
- Individual board testers

kajaaniKAPPA Q Software versions

Latest version: V1.37 (14.05.2008)

- Change: New time zone selection menu.
- Change: The time when sample is taken into Defibrator is set with a parameter.
- Bug fix: Laboratory sampling for Unit 2 corrected.
- Bug fix: Saving of measured consistency (in consistency calibration) corrected for Unit 2.

Older versions, from newest to oldest

V1.36 (17.03.2008)

- Change: Shive screen flushing added to Defibrator's sampling sequence.
- Change: Valve UDR now stays open during manual sampling.
- Change: Safety valve flushing valve (SVF_24) and its control have been added to the sequence.
- Change: Configuration alternative 11 (two single chamber units) has been added to the software.

V1.35 (26.02.2008)

- Change: Lab. sample collector controls for Unit 2 added.
- Change: Two Customer IO boards added to IO-configuration.

V1.34 (04.02.2008)

- Change: Defibrator error table has been added.
- Change: calibration button light flashes when the button is pushed.
- Change: configuration files added for devices measuring only Brightness. For more information see document D05365.
- Change: line status can now be changed with a popup menu in the main display.
- Change: neutralization liquid parameter decimals added (Sequence parameters).
- Change: gain and offset parameters added for temperature measurement (Analyzer parameters).
- Change: max. sample initial volume changed, from 2.5 to 2.8 L.
- Bug fix: LFL valve control removed from neutralization sequence.

V1.33 (21.01.2008)

- Change: changes in Defibrator sequence.
- Change: stop consistency limit added for fiber measurement (Communicator interface).
- Change: Kappa result remains unchanged if calculated kappa result is below zero.
- Change: event database rows increased to 60000.
- Bug fix: fiber width range changed to 0…1000 for Modbus Interger register
- Bug fix: result array of shive matrix has been fixed.
- Bug fix: single chamber measurement status in Modbus register fixed.

V1.32 (18.12.2007)

- Bug fix: new oeCore version (memory handling fixed).
- Bug fix: code error in SampleSeq </else>
- Bug fix: Fiber/Shive error alarm is quitted when error disappears.

V1.31 (14.12.2007)

- Change: SCP removed from Sample Wash 1 (s) and 2 (s) sequence programs.
- Bug fix: Shive sample low error added to Modbus register #9118
- Bug fix: Shive matrix added to Modbus Integer registers.

V1.30 (22.11.2007)

- Change: Defibrator level switch input logic changed.
- Change: new vxWorks version with increased wait states for new Modnet50 version.
- Change: no shive analysis when laboratory sample is measured.
- Bug fix: sample remove to laboratory with single chamber version.

kajaaniKAPPA Q Software versions

V1.29 (07.11.2007)

- Change: Fiber-Shive error status & counters added to Modbus registers #4000…
- Bug fix: selected consistency pair parameter on Kappa parameter page.

V1.28 (30.10.2007) TEST

- Change: Defibrator IO test page added.
- Bug fix: water removing time bug fixed for HW samples.

V1.27 (24.10.2007)

- Change: Shive air rinse sequence and sample intake sequence modified.
- Change: limited Modbus register range parameter added.
- Change: Integer Modbus values added
- Change: Shive sample & chemical delivery timeout added.
- Change: Sample screening mode 3 added.
- Bug fix: Line parameter selection.

V1.26 (01.10.2007)

- Change: error flags for levels 1,2 & 3 added to Modbus.
- Change: sample inlet shive screen flushing modified.
- Change: sample transfer water opens 3 sec. before sample valve opens.
- Change: function code 08 added to Modbus communication.

V1.25 (30.08.2007)

- Bug fix: pressure & water error (system error) handling delayed actions.

V1.24 (28.08.2007) TEST

- Change: tube flushing added to chemical transfer.
- Change: water washes after chemical wash: new parameter & sequence changed.
- Bug fix: result ready and wood grade connection to Binary output.
- Bug fix: wood grade selection from Modbus.

V1.23 (16.08.2007) TEST

- Change: more system OK checks added to sequence.
- Change: sample collection trigger sequence added.
- Change: sample & analysis counters for Fiber-Shive measurements.
- Change: kappa detector errors depending on calculation mode.
- Change: various error alarms can be connected to one binary output (using OR function).

V1.22 (02.08.2007) TEST

- Change: error alarm output cleared if error status -> 0
- Change: sample in after Cs ready (test).

V1.21 (29.06.2007)

- Change: UDC and UDR valves are closed when sample is removed.

V1.20 (25.05.2007)

- Change: Modbus status page added.
- Change: measurement permission status page added.

V1.19 (16.05.2007) TEST

- Change: neutralization valve control, sequence and parameters added.

V1.02 (09.05.2007) TEST

- Some bug fixes and new features.
- Whole installation in a single package.

V1.01 (03.05.2007) TEST

- Some bug fixes and new features.

V1.00 (16.04.2007) TEST

- The first 0-series version.

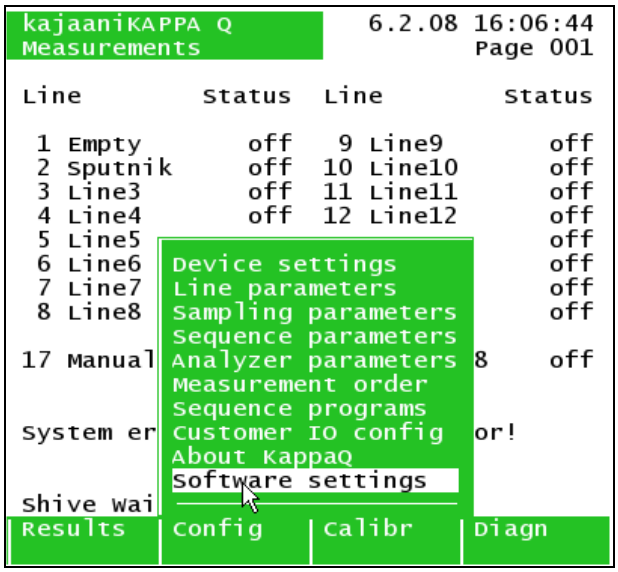
V0.01…0.99 (01.01.2006)

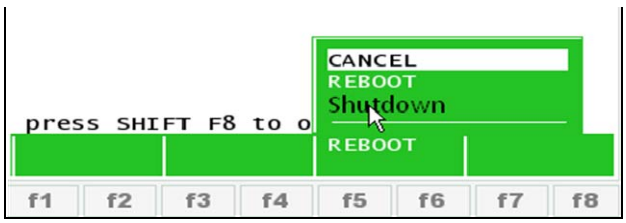
- Proto versions.

kajaaniKAPPA Q Software upgrade procedure

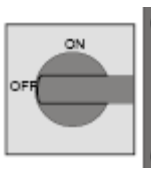
Installation procedure

1. Set all channels OFF and wait until analyzer status is "Idle".
2. Stop analyzer operation from Communicator: Config [F3] → Software settings → REBOOT [F5] → Shutdown

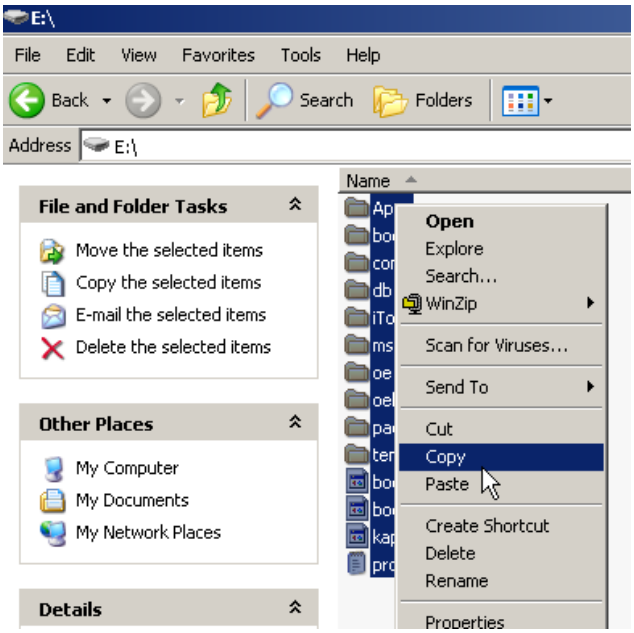




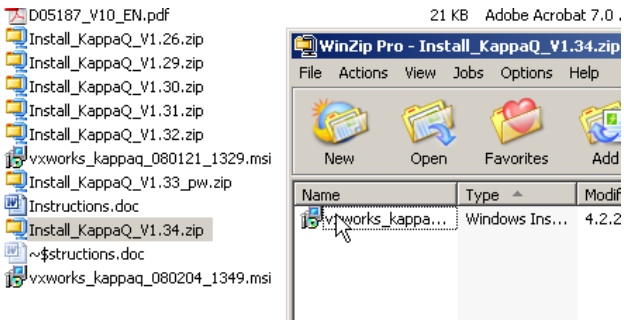
3. Turn power off by analyzer's main switch.



4. Remove the Compact Flash (CF) card from analyzer.
5. Insert the CF to a card reader, make sure that the card reader is connected to your PC.
6. Copy the files on the CF to your PC. **Do not delete the files from the CF!** Make sure that all files are copied successfully to the PC.



7. Locate the new software package and unzip the file on your PC.



8. Double-click the **vxworks_kappaq_xxxx.msi** installation file (found on the .zip file).
9. Enter the correct installation target, (example E:) → and press the install to compact flash
10. Wait until the screen reads "Package successfully installed on compact flash", then click "Close".
11. Insert the Flash card again to the analyzer and switch power on.
12. Wait until the analyzer has rebooted; this will take some time. The device is ready when status is again "Idle".

kajaaniKAPPA Q Configuring analyzer setup

PLEASE NOTE: This instruction only applies to software version V1.34!

After installing software version V1.34, you need to check that the correct device setup is selected for the software.

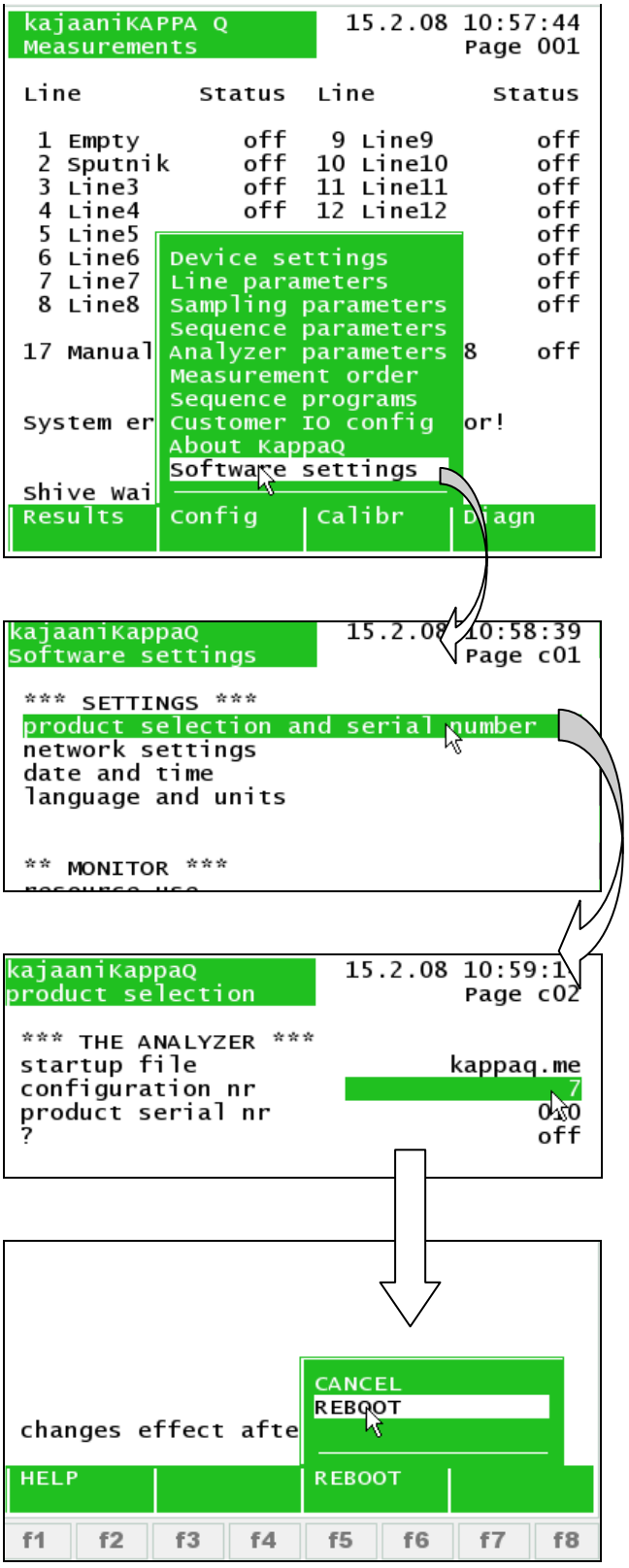
Instructions on software upgrading: see document D05366.

On the main page, go to Software settings → Product selection and serial number → Configuration nr.

Choose the correct configuration:

Number	Configuration
1	One-cabinet, Dual chamber
2	One-cabinet, Single chamber
3	Two-cabinet model: Cabinet 1 Dual chamber Cabinet 2 Single chamber
4	Two-cabinet model: Cabinet 1 Dual chamber Cabinet 2 Dual chamber
5	One-cabinet, Dual chamber, Brightness only
6	One-cabinet, Single chamber, Brightness only
7	Two-cabinet model: Cabinet 1 Dual chamber Cabinet 2 Single chamber, Brightness only
8	Two-cabinet model: Cabinet 1 Dual chamber Cabinet 2 Dual chamber, Brightness only
9	Two-cabinet model: Cabinet 1 Single chamber, Brightness only Cabinet 2 Dual chamber
10	Two-cabinet model: Cabinet 1 Dual chamber, Brightness only Cabinet 2 Dual chamber

After configuring, reboot the analyzer. The changes will be in effect after restart.



Kajaani analyzers Change in FEP connectors

What was changed and why

There have been some cases where the FEP tube connectors used in the analyzers have failed, and the tube has got loose.

The FEP connector type has now been changed. The actual connector remains the same, but the nut now contains plastic grippers that secure the tube when it is tightened to the connector.

The new nut can be used with the old connectors to replace the older nuts. 3/4" nuts of the same type are already in use.

To avoid confusion, the same connector type will be used in all new analyzers. The codes of all new and changed parts are listed in a table (next page).

NOTE: The old and new connector type have been used side by side, and for this reason the table gives two codes for some connectors. The new connector type will always be shipped, regardless of which code is used when ordering.

Replacement policy

New type connectors will be used in all new devices and spare part deliveries. Further information on individual products is given below.

kajaaniWEM, kajaaniRM3:

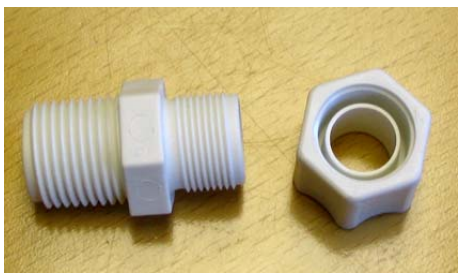
- new FEP connector will be used in all new units
- installed units will be upgraded in connection with normal service visits
- units used in mill trials will be upgraded immediately

kajaaniKAPPA Q:

- new FEP connector will be used in all new units
- all installed units will be upgraded in connection with normal service visits

Other Kajaani-analyzers:

- new FEP connector will be used in all new units
- installed units will be upgraded when necessary in connection with normal service visits



Old connector

New connector – pay attention to the correct order and position of gripper parts!

Kajaani analyzers Change in FEP connectors

Code	Type	Material	Type, thread, tube diameter	Notes
214338	JACO 10-8-8-P-PG	PP	Straight R1/2-1/2”	Use K03047
K03047	JACO 10-8-8-P-PG	PP	Straight R1/2-1/2”	
214320	JACO 10-8-6-P-PG	PP	Straight R3/8-1/2”	
260547	JACO 10-12-8-P-	PP	Straight R1/2-3/4”	
252437	JACO 10-12-12-P-	PP	Straight R3/4-3/4”	Use W14338
K03329	JACO 10-8-8-P-PG	PP	Straight R1/2-1/2”	Special model, separate drawing
180620	JACO 10-8-8-K-PG	PVDF	Straight R1/2-1/2	
272021	JACO 15-12-P-PG	PP	Union connector for 3/4" tube	
215574	JACO 20-8-P-PG	PP	Bulkhead union connector for 1/2" tube	
214312	JACO 40-8-8-P-PG	PP	90º elbow R1/2-1/2”	Use K03048
K03048	JACO 40-8-8-P-PG	PP	90º elbow R1/2-1/2”	
214346	JACO 40-8-6-K-PG	PP	90º elbow R3/8-1/2”	
200139	JACO 40-8-8-K-KG	PVDF	90º elbow R1/2-1/2”	
K02480	JACO 45-8-8-K-KG	PP	90º elbow for ½ tube	
215053	JACO 70-8-P-PG	PP	Union Tee for 1/2" tube	
241968	JACO 70-8-K-PG	PP	T-jatkoliitin 1/2" tube	
214353	JACO 75-8-8-P-PG	PP	Union Tee +thread R1/2-1/2”	Use K03060
K03060	JACO 75-8-8-P-PG	PP	Union Tee +thread R1/2-1/2”	
K02111	JACO 75-12-8-P-	PP	Union Tee +thread R1/2-3/4”	
180638	JACO 75-8-6-K-PG	PVDF	Union Tee +thread R3/8-3/4”	
214528	JACO 75-8-8-K-PG	PVDF	Union Tee +thread R1/2-1/2”	
238592	JACO PG-8-P	PP	Compression nut for 1/2" tube	Use 264820
264820	JACO PG-8-P	PP	Compression nut for 1/2" tube	
264838	JACO PG-12-P	PP	Compression nut for 3/4" tube	
K05485	JACO PG-8-K	PVDF	Compression nut for 1/2" tube	

kajaaniKAPPA Q

Opening problems with ball valve K02448

Observed problem

K02448 Mars ball valve + Prisma actuator:

Occasionally the valve does not work properly, the actuator cannot turn the valve.

Possible reasons:

1. Valve tightened too much

   → loosen the mounting bolts (see Fig. 1)

2. Valve seal (K03477) is too thick

   → measure the seal; if > 5 mm, it needs to be made thinner. Place extra fine sandpaper (grit about P300) on a table or other level surface, and tub the seal against it to remove extra thickness (Fig. 2).

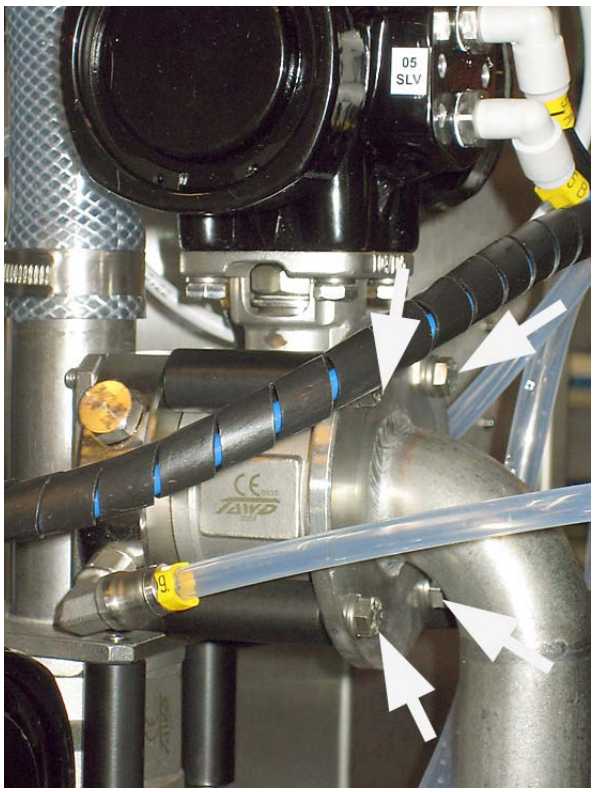


Figure 1. Location of valve mounting bolts (4 bolts).

Corrective action

If the described problem is observed with delivered valves, check and sand them as instructed in this document.

The valves of all new analyzers will be inspected prior to shipment.

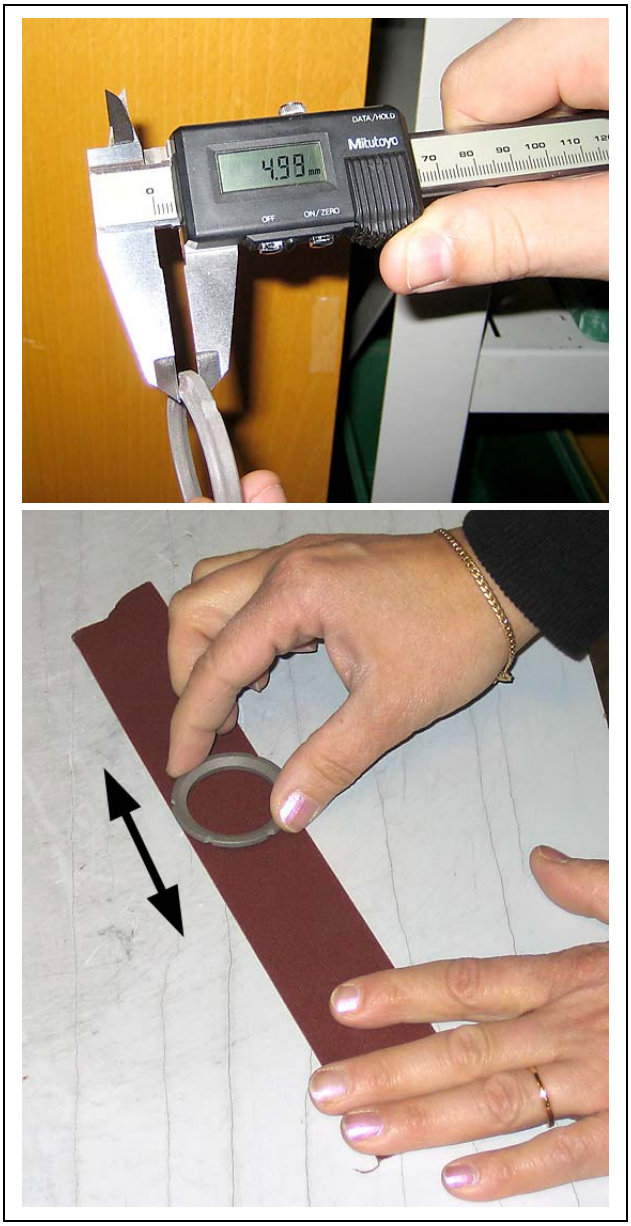


Figure 2. Measuring and grinding seal K03477.

kajaaniKAPPA Q, kajaaniMAP, kajaaniWEM

Replacing gaskets of ball valve 262360

What has changed and why?

The lifetime of the gaskets used in 3-way valve 262360, used in the analyzers listed above, has not met our expectations. New PEEK gasket sets have been introduced to improve the situation.

Defective gaskets are replaced under warranty if the analyzer is still covered by warranty. In other cases the work is invoiced according to the valid spare part price lists.

Available spare part sets:

K05497, Gasket set 1: PEEK gaskets

- Install immediately if the valve leaks.
- If there have been no problems, install the gaskets during the next scheduned preventive maintenance visit.

K05498, Gasket set 2: PEEK gaskets + chromium ball

- If the valve has old gaskets and ball, use this set.
- Later on only the gaskets (K05497) need to be replaced.

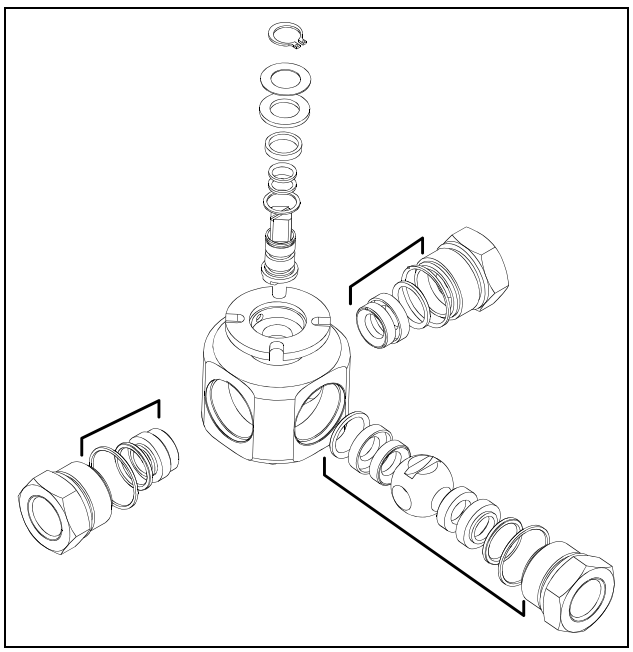


Figure 1. Old gaskets of ball valve. Remove all parts indicated here with a bracket, and replace them with new ones. ***Note that the new gasket set contains fewer parts than the old one – do not reuse any old parts!***

Installing the gasket set

1. Remove the old ball valve gaskets (Fig. 1). **The new gasket set contains fewer parts than the old set – do not reuse any old parts!**
2. See the drawing of the new gasket construction on the next page. The following part numbers refer to Fig. 2.
3. Install the compression O-rings (part 10), 4 pcs. Place one ring in the valve body (part 1) parallel with the center hole, the other 3 rings inside the connection nuts (part 2), in the bottom of the "cup", one in each nut.
4. Install PEEK gaskets (part 8), 4 pcs. Place these gaskets against the O-rings (part 10) installed in the previous step, shoulder side first.
5. Install the large O-rings (part 11), 3 pcs. Place these in their grooves on the connection nuts (part 2), one in each nut.
6. Apply some copper paste (Rocol Anti-Seize Compound J166) on the outer threads of connection nuts (part 2). **Be careful not to smear the paste on any other surfaces!**
7. Install the ball (part 9) to the body (part 1). Place the ball againstg the PEEK gasket (part 8) installed earlier, so that the groove on the ball matches the shoulder on the end of the stem (part 3).
8. Hold the ball (part 9) in place with your fingers, and screw the connection nuts (part 2) to the body (part 1) by hand. In order to keep the gaskets in place, screw in the nuts one by one, holding the parts so that the nut points up when screwing.
9. Attach the valve **by its body** (part 1) to a vise. Tighten the **center** nut (part 2) with a fork wrench (32).
10. Attach the valve to a vise by one of the other connection nuts (part 2) that so far has only been tightened manually. Turn the other manually tightened nut with a fork wrench (32). In this way both the nut attached to the vise and the nut being turned are tightened at the same time, and the ball (part 9) remains properly centered inside the valve.

kajaaniKAPPA Q, kajaaniMAP, kajaaniWEM

Replacing ball valve gaskets

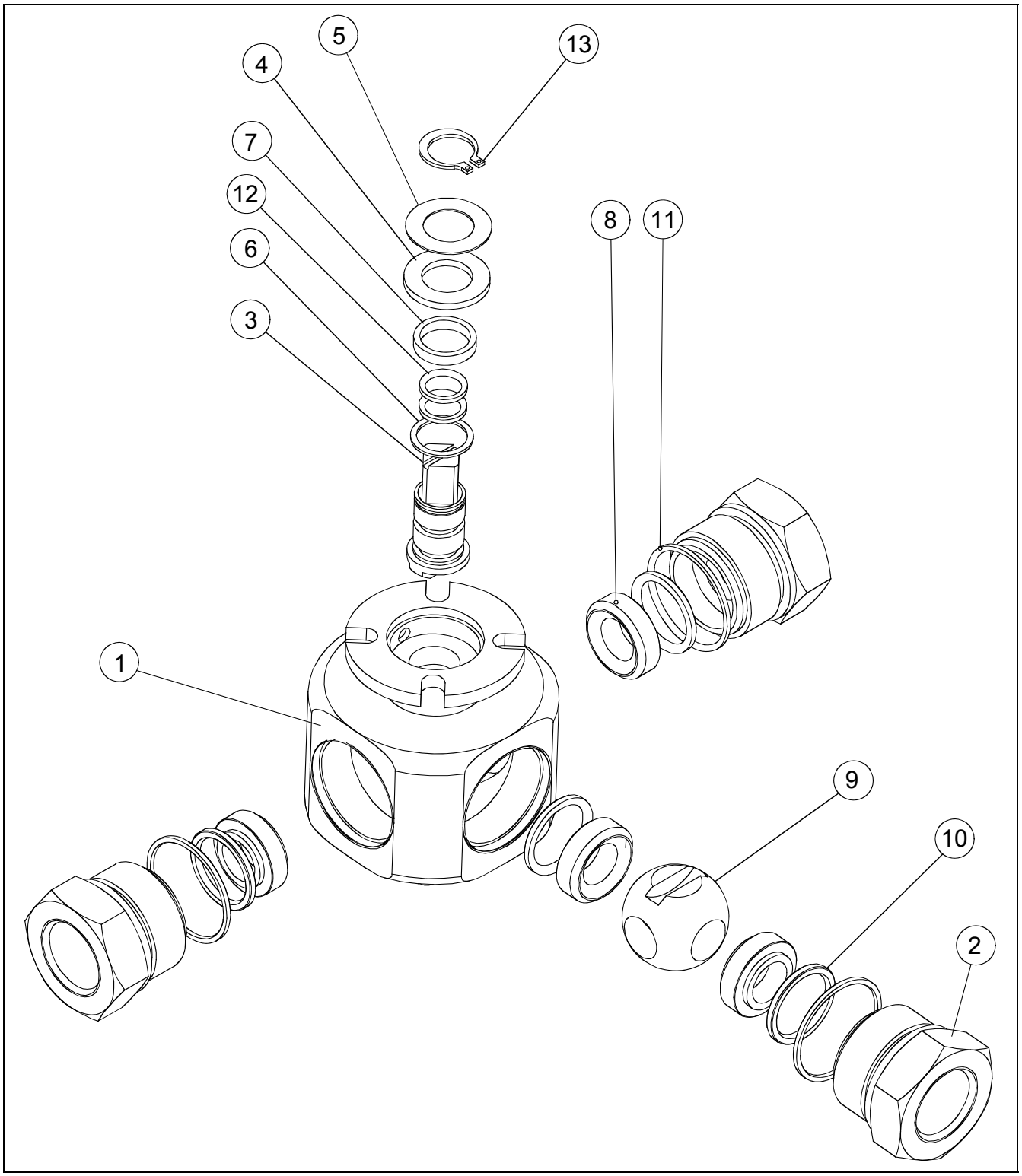


Figure 2. New gasket set.

kajaaniKAPPA Q, kajaaniMAP, kajaaniWEM, kajaaniFS300

Replacing the ModNet50 CPU module on MasterCPU board

Affected devices

The problem has occurred in some kajaaniMAP, kajaaniWEM, kajaaniFS300 and kajaaniKAPPA Q analyzers delivered after June 2006. Note that not all analyzers delivered after this date have had malfunctions!

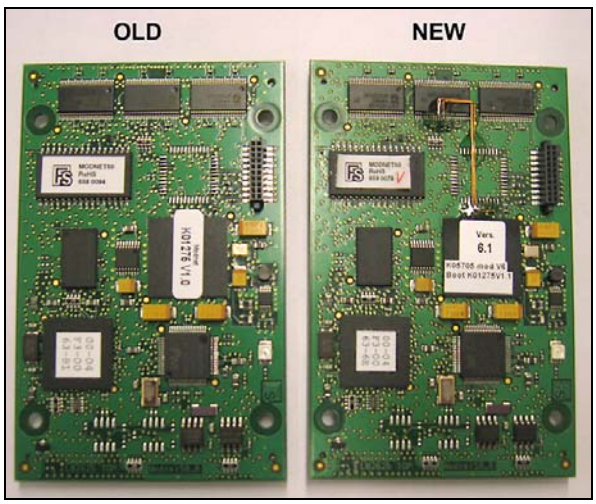
Description of the problem

Intermittent corruption of the Compact Flash card (containing analyzer software). In serious cases the analyzer software stops working and does not reboot properly even though the device is restarted. With the worst affected devices, it has been necessary to reformat the Flash card before analyzer operation has been fully restored.

Explanation of fault

Originally the problem was investigated as a software bug. However, we have found out that the real reason was incorrect signal timing in the CPU module (ModNet50, supplied by Digi International). Signal synchronization did not fully meet the technical specifications of the Flash card, which resulted in read/write errors. When these errors affected analyzer's parameters and/or results, the device no longer operated correctly.

We now have a new version of the CPU module, with correct signal synchronization.



Corrective action

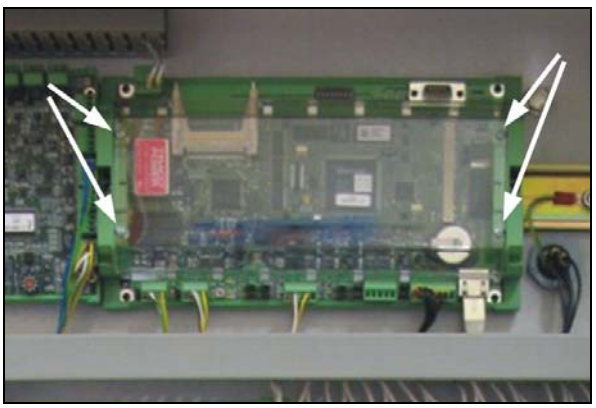
- Install a new CPU module, **code K05705**, to analyzer's MasterCPU board, and update the MasterCPU device plate (see below).
- Install new analyzer software (see below).
- Send the old CPU module to Metso's in-house service in Kajaani.

Replacement policy

All devices that have been affected by the malfunctions described above will be upgraded **immediately**. Device warranty covers the related costs (parts, labor, travel expenses).

Replacing the module

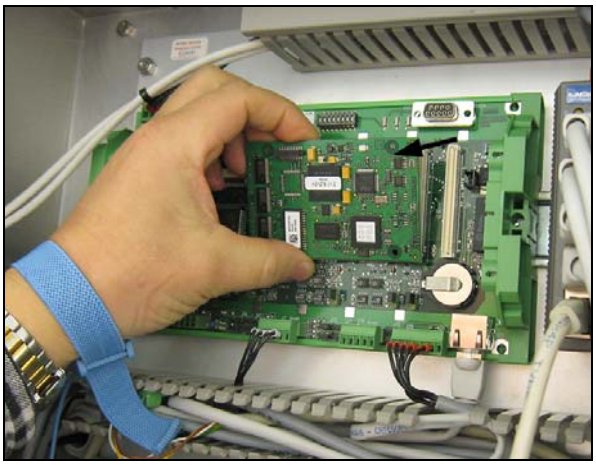
- Stop all lines of the analyzer and wait until the device stops.
- If the analyzer software includes the "Shutdown" function, use this command to stop its operation completely.
- Switch power off by the device's main switch.
- Make sure to wear the static control wrist strap delivered with the device before doing any work with the electronic boards!
- Open the four screws on the plastic cover of the MasterCPU board and remove the cover.



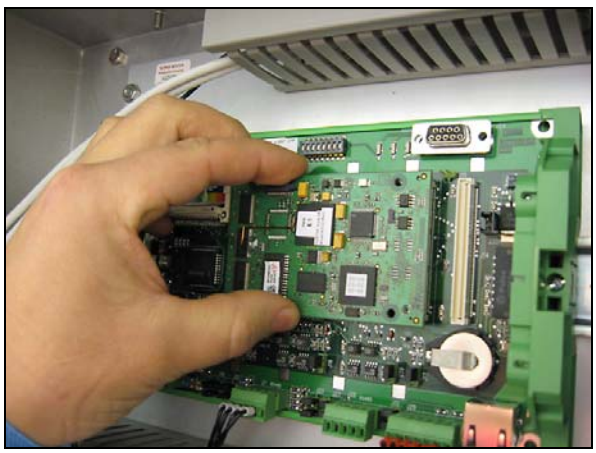
kajaaniKAPPA Q, kajaaniMAP, kajaaniWEM, kajaaniFS300

Replacing the ModNet50 CPU module on MasterCPU board

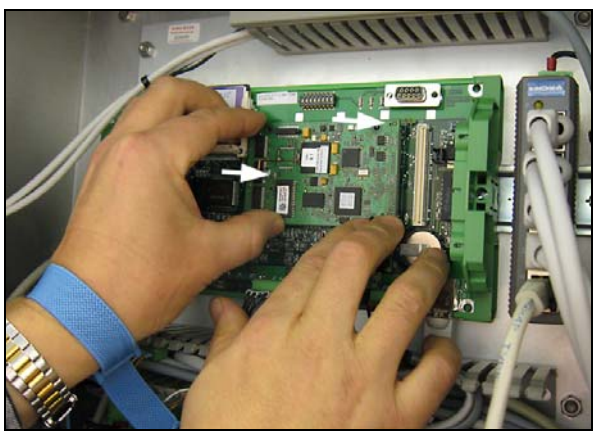
- Release the CPU module from the board by hand, top edge first. **Do not use any tools to remove the module!**



- Install the new module: First place it gently against the connectors, make sure that the board is the right side up and all connectors match properly.



- Then press the module into place – this requires some force.



- Change the version on MasterCPU board's device plate: A4910033 V2.3 => **V2.4**
- Put the plastic cover back on the MasterCPU board and fasten with the four screws.
- Update the analyzer software on the CF card:
  - kajaaniMAP: V2.08 (or greater)
  - kajaaniKAPPA Q: V1.30 (or greater)
  - kajaaniWEM: V1.3 (or greater)
  - kajaaniFS300: V1.30 (or greater)
- Install the CF card back and switch power on by analyzer's main switch.
- Wait until the device starts. Switch the measurement lines on and watch its operation for a while to make sure everything works correctly.
- Send the old CPU module to Metso's in-house service in Kajaani.

Problems?

- If the analyzer cannot start after the replacement, check the following:
  - Is operating power on?
  - Is the new module properly in place, its connectors pressed all the way in?
  - Have you installed the new analyzer software?

NOTE: The analyzers are used in **demanding mill conditions** (vibration, temperature, etc.). Always use **only industrial grade CF cards!** Consumer-grade CF cards must not be used; they are likely to fail prematurely and cause further problems!

kajaaniMAP, kajaaniWEM, kajaaniKAPPA Q

PowerFail function for MasterCPU board

Applies to these devices:

kajaaniMAP, kajaaniWEM, kajaaniKAPPA Q

Description of problem

If Compact Flash corruption still continues after the analyzer's CPU module has been upgraded (document D05294), the reason may be repeated failures of operating power (110 / 230 VAC). If the power fails while data is being written to the CF card, the data may be faulty and the analyzer will not start. In this case the CF card must be initialized and the analyzer program and all parameters installed back before normal operation can continue.

Corrective action

If the operating voltage cannot be secured in some other way, a buffer unit can be installed to the analyzer. This unit maintains a power feed to the CPU even when analyzer's mains power fails. When a power failure (PFi) occurs, the MasterCPU terminates the analyzer program in a controlled fashion before shutting down.

NOTE: In order to use this function the CPU module must be upgraded as instructed in document D05294!

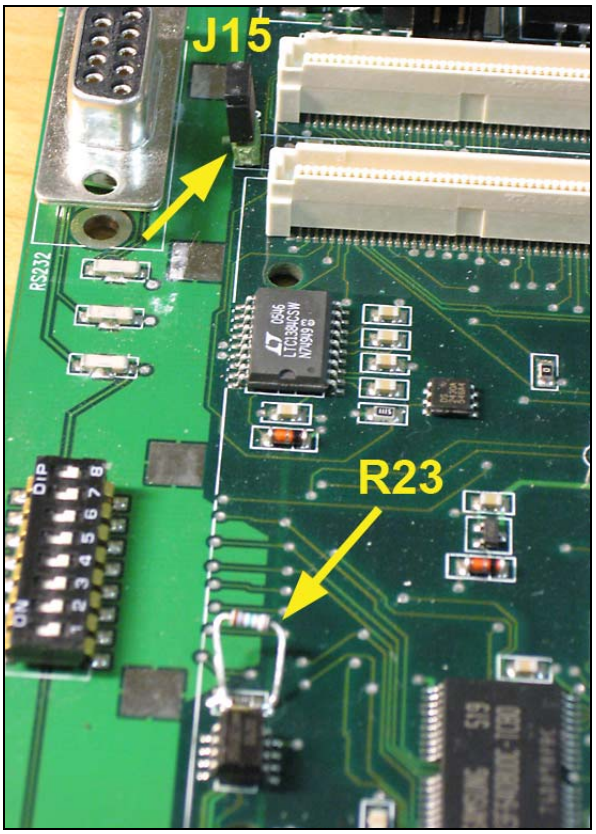
Buffer unit assembly K05770 V1.0:

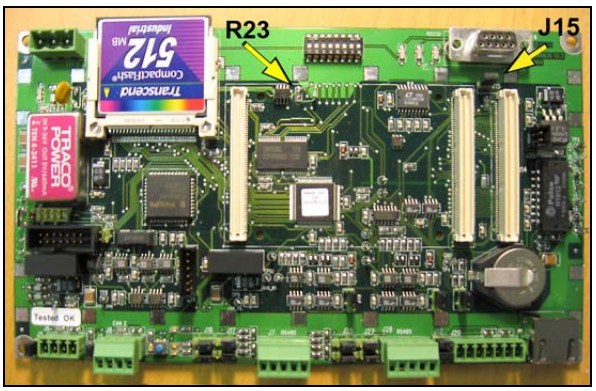
1	K05764	Buffer unit
2	K05765	Terminal with diode
5	140582	Resistor 1k21 0,25W
6	182469	Shunt connector
		Wires, 4 pcs

Wiring diagram: document K05770 V1.0

MasterCPU upgrade A4910033

- Switch power off by analyzer's main switch, and detach the MasterCPU board from the device.
- Use a static control wrist strap to prevent ESD charges. Work on a table when making the changes.
- Add a resistor parallel with R23 (below the CPU module).
- Install a shunt connector to jumper J15.





kajaaniKAPPA Q, kajaaniMAP, kajaaniWEM — PowerFail function for MasterCPU board

- Attach a new version label on top of the unit (7, see document K05770).
- If you cannot do the changes in field conditions, order a modified MasterCPU board from the Metso in-house service in Kajaani, and send the old card to in-house service.

Installing the buffer unit

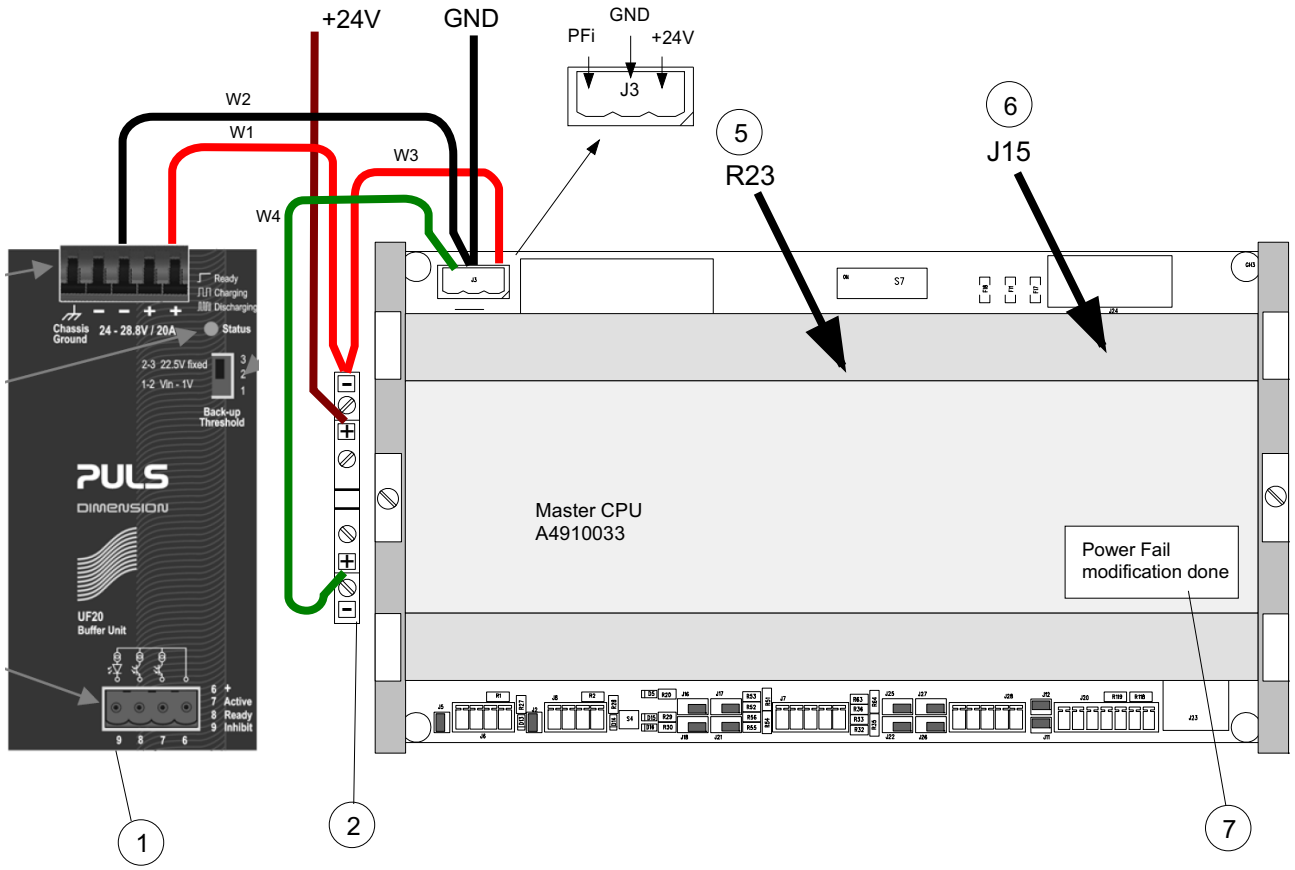
- Install the buffer unit on the left side of MasterCPU as shown in document **K05770**.
- Note that in kajaaniMAP and kajaaniWEM analyzers the Ethernet switch located on the right side of the MasterCPU must be installed to another place, for example lower down, next to the Ethernet connection!
- Install the diode module and buffer unit to the DIN rail.
- Detach the +24V wire from MasterCPU's power connector J3 pin 1, and connect it to the diode module as shown in the drawing.
- Connect the other wires as shown in the drawing.

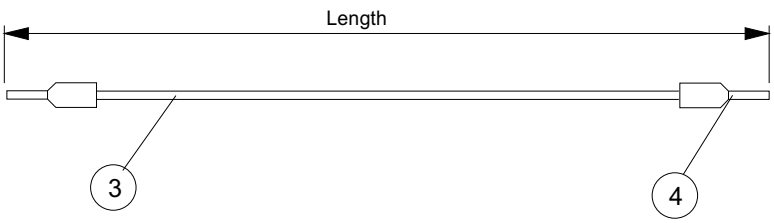
Start-up

- Double-check all connections.
- Switch analyzer's power on.
- The Status light on the buffer unit will flash, approximately one per second, to indicate that the unit is charging up. This will take about 20 seconds.
- Wait until the analyzer software has started up.
- Activate PowerFail monitoring with the Communicator:
  - **KAPPA Q, WEM:** Config => Software settings => [SHIFT] + [F8] => enter password 3121 [ENTER] => Product selection and serial number => "Monitor power fail signal = 1"
  - **MAP:** Device pages => Software settings => "Monitor power fail = ON" – **NOTE: This function is included in the MAP software from version V3.00 onwards!**

Checking operation

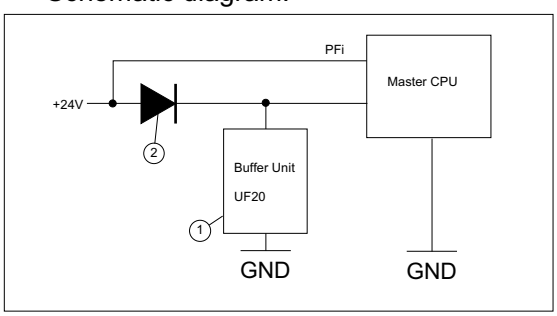
- Switch the analyzer off by its main switch, and watch the Communicator's display all the time.
- The display should soon read: "Waiting for power down…"
- The buffer unit supplies operating power to the MasterCPU for some time (some tens of seconds) and then go off as well.
- If the unit does not operate correctly, deactivate it: detach wire W4 and disable PF monitoring (= 0) in the analyzer's software.





Wire	Length (mm)
W1	170
W2	170
W3	110
W4	170

Schematic diagram:



Sticker 5

Power Fail modification done

Vers.	Description	Date	Prepd

Prepd	Checked	Approved
09.01.2008 JRi	09.01.2008 JRi	09.01.2008 PHä

Scale	Title	Item No.	Item Ver.
	Buffer Unit wiring instruction	K05770	V1.0
metso automation		Drawing No. K05770	Ver. V1.0

kajaaniKAPPA Q Safety valve blockages

Description of problem

We have observed problems with kajaaniKAPPA Q safety valves: the valve tends to get blocked.

The reason for this is that the pulp level rises too high during the sweep measurement, blocking the valve.

Solution and procedure

Change the device configuration:

1. Use a lower initial volume: [Config] –> [Analyzer parameters] –> **8. Volume init.** Use the values given on the next page for the Kappa range and device setup in question.

```
kajaaniKAPPA Q          12.2.08 14:22:24
Analyzer parameters             Page 240

Unit 1:

 1 Water measurement cycle            40
 2 Chemical washing cycle             50
 3 Chemical + water                   10
 4 Chemical washes                     1
 5 Water washes after chem wash        1

 6 Volume max.                       4.5
 7 Volume min.                       1.5
 8 Volume init.                      2.2

 9 Water temp. min.                    0
10 Water temp. max.                  100
11 Temperature gain               35.800
12 Temperature offset             -0.180

[     >     ][           ][ Get      ][ Save     ]
                           Defaults
```

2. Configure a narrower sweep range: [Config] –> [Sequence parameters], 13. Sweep start Cs & 14. Sweep stop Cs & 15. Cs hysteresis. Use the values given on the next page for the Kappa range and device setup in question.

```
kajaaniKAPPA Q          12.2.08 13:55:47
Sequence parameters             Page 230

Line   1

 1 Sample screening mode              1
 2 Water removing time HW            25
 3 Water removing time SW            25
 4 Sample screening                   1
 5 Sample washing 1                   1
 6 Sample washing 2                   1
 7 Wash. chamber washing              1
 8 Sweep module washing               1
 9 Sample mixing water                4
10 Sample mixing time                 4
11 Neutralization liquid            0.0
12 Neutralization flush              10
13 Sweep start Cs                 0.400
14 Sweep stop Cs                  0.150
15 Cs hysteresis                  0.013

[ Line      ][           ][ Get      ][ Save     ]
                           Defaults
```

3. Also make sure that all Cs pairs are in the sweep range.

Make this configuration change to all analyzers on the next scheduled service visit.

kajaaniKAPPA Q Safety valve blockages

Configuration: Single chamber model, no Fiber-Shive module

Kappa range 1–15:

- Sweep start Cs 0.40
- Sweep stop Cs 0.15
- Cs hysteresis 0.013
- Volume init. 2.2 L

Kappa range 5–50:

- Sweep start Cs 0.25
- Sweep stop Cs 0.10
- Cs hysteresis 0.013
- Volume init. 2.2 L

Kappa range 50–120:

- Sweep start Cs 0.20
- Sweep stop Cs 0.07
- Cs hysteresis 0.013
- Volume init. 2.2 L

Configuration: Single chamber model + Fiber-Shive module

Kappa range 1–15:

- Sweep start Cs 0.65
- Sweep stop Cs 0.30
- Cs hysteresis 0.013
- Volume init. 2.2 L

Kappa range 5–50:

- Sweep start Cs 0.30
- Sweep stop Cs 0.10
- Cs hysteresis 0.013
- Volume init. 2.2 L

Kappa range 50–120:

- Sweep start Cs 0.30
- Sweep stop Cs 0.07
- Cs hysteresis 0.013
- Volume init. 2.0 L

Configuration: Dual chamber model, no Fiber-Shive module

Kappa range 1–15:

- Sweep start Cs 0.40
- Sweep stop Cs 0.15
- Cs hysteresis 0.013
- Volume init. 1.9 L

Kappa range 5–50:

- Sweep start Cs 0.25
- Sweep stop Cs 0.10
- Cs hysteresis 0.013
- Volume init. 1.9 L

Kappa range 50–120:

- Sweep start Cs 0.20
- Sweep stop Cs 0.07
- Cs hysteresis 0.013
- Volume init. 1.9 L

Configuration: Dual chamber model + Fiber-Shive module

Kappa range 1–15:

- Sweep start Cs 0.65
- Sweep stop Cs 0.30
- Cs hysteresis 0.013
- Volume init. 1.9 L

Kappa range 5–50:

- Sweep start Cs 0.30
- Sweep stop Cs 0.10
- Cs hysteresis 0.013
- Volume init. 1.9 L

Kappa range 50–120:

- Sweep start Cs 0.30
- Sweep stop Cs 0.07
- Cs hysteresis 0.013
- Volume init. 1.9 L

kajaaniKAPPA Q Safety valve blockages

Use these consistency tables instead of the ones in manual version V1.2 (these will be updated to the next release). Changed values indicated with green.

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	30 - 85	-	-
Kappa			1 - 15	5 - 50	50 - 120
Sweep meas. range [%]	0.80 - 0.40	0.70 - 0.30	0.40 - 0.15	0.25 - 0.10	0.20 - 0.07
Brightness (r1), Consistency [%]	0.70	0.60	0.35	-	-
Brightness (r2), Consistency [%]	0.65	0.55	0.30	-	-
Brightness (r3), Consistency [%]	0.60	0.50	0.25	-	-
Brightness (r4), Consistency [%]	0.55	0.45	0.20		
Brightness (r5), Consistency [%]	0.50	0.40	0.15		
Kappa meas. Cs set value 1 [%]	-	-	0.36 - 0.26	0.22 - 0.12	0.16 - 0.10
Kappa meas. Cs set value 2 [%]			0.35 - 0.25	0.20 - 0.11	0.14 - 0.09
Kappa meas. Cs set value 3 [%]			0.32 - 0.22	0.18 - 0.10	0.12 - 0.08
Initial Cs limit X * 0.9 [%]				0.234	0.180
Cs compensation limits [%]	0.80 - 0.40	0.70 - 0.30	-	-	-
Cs compensation	yes	yes	no	no	no
Cs hysteresis [%]	0.013	0.013	0.013	0.013	0.013
Sample wash 1, no. of washes	-	-	1	2	2
Calculation formula Brightness HW/SW	1 / 1	1 / 1	1 / 1	-	-
Calculation formula Kappa HW/SW	-	-	1 / 1	1 / 2	5 / 5

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	30 - 85	-	-
Kappa	-	-	1 - 15	5 - 50	50 - 120
Sweep meas. range [%]	0.80 - 0.30	0.70 - 0.30	0.65 - 0.30	0.30 - 0.10	0.30 - 0.08
Brightness (r1), Consistency [%]	0.70	0.60	0.60	-	-
Brightness (r2), Consistency [%]	0.65	0.55	0.55	-	-
Brightness (r3), Consistency [%]	0.60	0.50	0.50	-	-
Brightness (r4), Consistency [%]	0.55	0.45	0.45		
Brightness (r5), Consistency [%]	0.50	0.40	0.40		
Kappa meas. Cs set value 1 [%]	-	-	0.47 - 0.37	0.22 - 0.12	0.16 - 0.10
Kappa meas. Cs set value 2 [%]	-	-	0.45 - 0.35	0.20 - 0.11	0.14 - 0.09
Kappa meas. Cs set value 3 [%]			0.40 - 0.32	0.18 - 0.10	0.12 - 0.08
Initial Cs limit X * 0.9 [%]	-	-	-	0.27	0.27
Cs compensation limits [%]	0.80 - 0.30	0.70 - 0.30	-	-	-
Cs compensation	yes	yes	no	no	no
Cs hysteresis [%]	0.013	0.013	0.013	0.013	0.013
Sample wash 1, no. of washes	-	-	1	2	2
Calculation formula Brightness HW/SW	1 / 1	1 / 1	1 / 1	-	-
Calculation formula Kappa HW/SW	-	-	1 / 1	1 / 2	5 / 5

kajaaniMAP, kajaaniWEM kajaaniKAPPA Q Error in the software of Binary IO board K02848

Description of error

The board program includes a feature which resets all control signals to zero if communication over the CAN bus stops. This feature ensures that no valve control signals are left on when an error occurs.

Normally the reset delay is 1 second, but in the Binary I/O board software it is much shorter.

The error can be observed as intermittent control signal interruptions on the Binary IO board. For example, with kajaaniMAP analyzer the work lamp may go on and off again, and the pump may operate erratically. On the board, the red LED indicating CAN error may also blink every now and then.

Affected devices

The error affects the analyzers listed in the heading of this note.

The error only occurs if an analyzer has simultaneously a Binary IO board with software version K03360 V1.3 or older **AND** Customer IO Box with 1–5 Customer IO boards.

Eliminating the error

To eliminate this software error, either

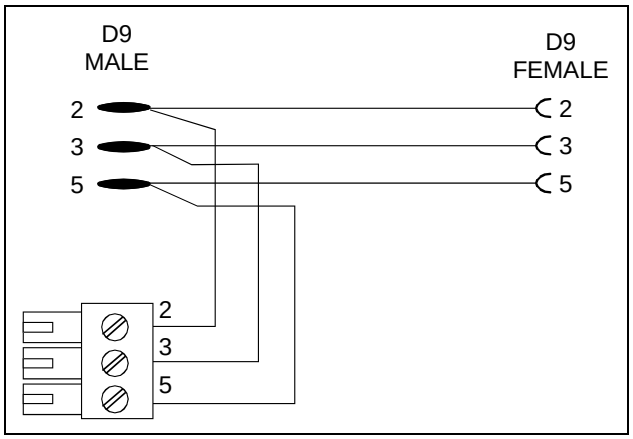
- update the board software using the RS202 cable **K03463** as instructed in each analyzer's own documents, or
- order a new Binary IO board from Metso Automation.

Kajaani sensors RS232 cable

An RS232 cable is needed when loading software for example to I/O boards, the TCU, sensors, etc.

The connection of the cable is shown below.

This cable is also available from Metso Automation with order code **K03463**.



RS232 cable K03463

kajaaniKAPPA Q Safety valve upgrade

What has changed and why?

Some kajaaniKAPPA Q analyzers have experienced safety valve blockages. To eliminate this problem, a water flushing valve has been added to the safety valve.

This change will be made to all new analyzers. It can also be made to existing analyzers if safety valve blockages have caused problems before.

Replacement policy

The normal spare part invoicing policy will be applied to the upgrade work.

Safety valve upgrade K06325 V1.0

T-piece 8 R1/8	K06169 V1.0	1
Solenoid valve R1/4"	239483	1
Cable	K06242 V1.0	1
Elbow fitting R1/4-8	253260	1
Reducing nipple 3/8-1/8	K06168	1
Hose 8/6	259572	1.5 m

Changes at analyzer

- Dual Chamber model: add a water inlet to the sweep module safety valve, parallel with the air inlet (30). See Fig. 1 & 2.
- Single Chamber model: add a water inlet to the washing chamber safety valve, parallel with the air inlet (2). See Fig. 1 & 3.
- In the tubing diagrams, the number of washing chamber hose 24 changes into 37 (see Owner's manual, chapter 9).

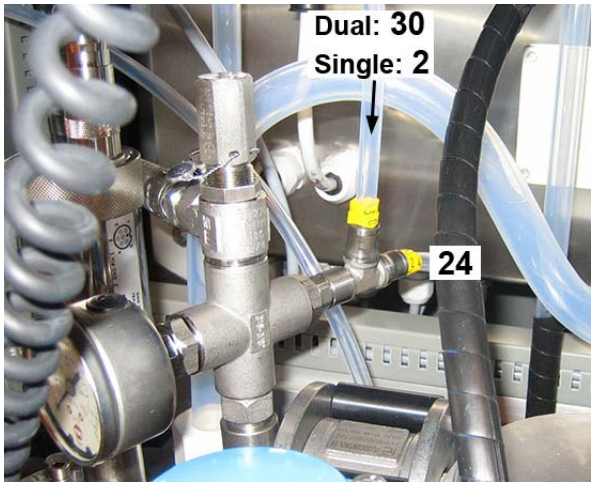


Figure 1. Water inlet, here installed to a Dual Chamber model.

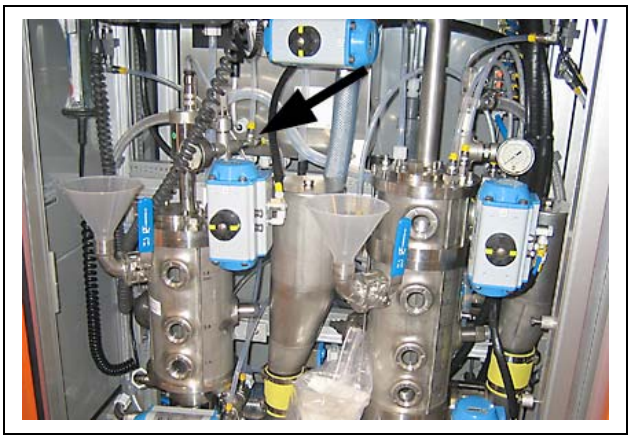


Figure 2. Safety valve flushing in a Dual Chamber analyzer.

Figure 3. Safety valve flushing in a Single Chamber analyzer.

- Install the water valve to the empty slot in the cold water manifold; Fig. 4.

Figure 4. Water valve installed to manifold.

- Connect a control cable to valve 24 from the Binary IO board (in module electronics box): BOUT +24 (J7/8) and GND_24 (J8/8 or other free terminal in J8). Fig. 5.

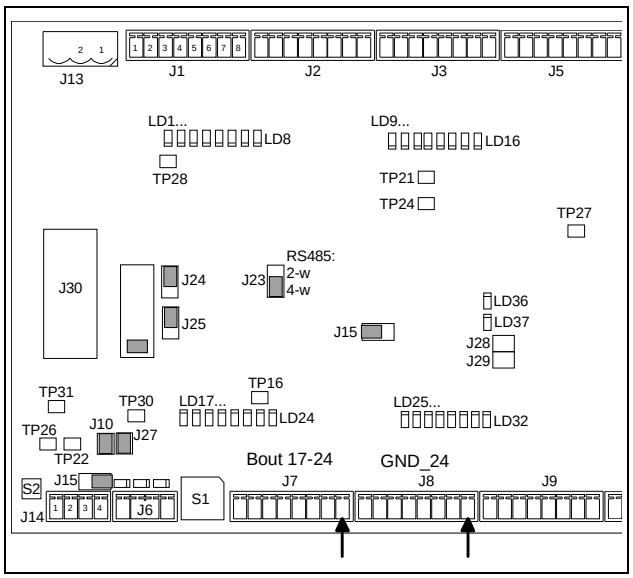
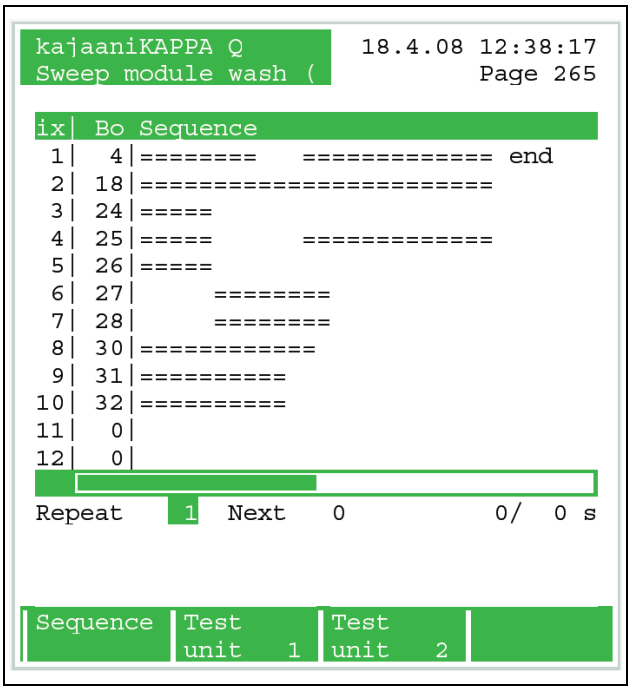


Figure 5. Control for valve 24 from Binary IO board.

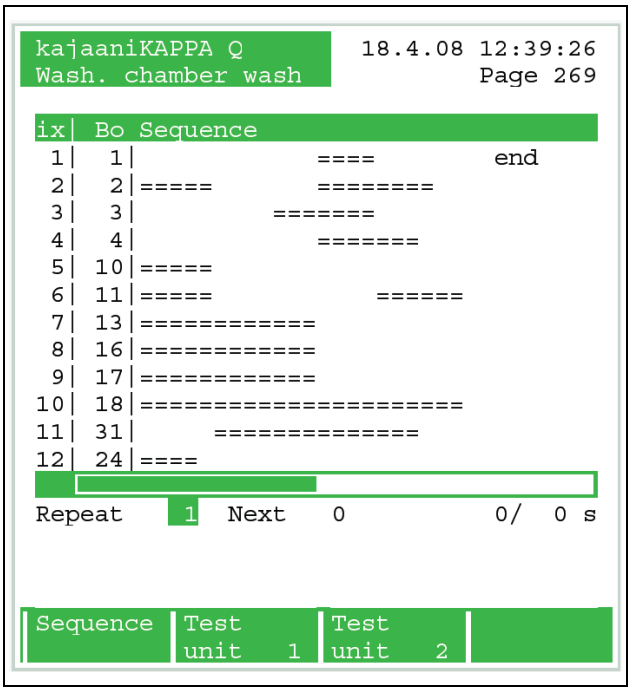
- Upgrading analyzer's software to version V1.36 (or greater) is recommended.

Configuration

- Dual Chamber: select Config => Sequence programs => Select seq. => Sweep module wash. Check the control settings for SVF_24 and add it if necessary.



- Single Chamber: select Config => Sequence programs => Select seq. => Wash. chamber wash. Check the control settings for SVF_24 and add it if necessary.



kajaaniKAPPA Q / kajaaniMAP / kajaaniPulpExpert

Fiber-Shive module: Service of optical assembly

Optical assembly

If the optical assembly used in the Fiber-Shive module becomes defective, it must be sent to Kajaani Product Line's in-house service **without taking it apart**. Only the service actions listed below may be done in the field.

If necessary, a replacement component can be ordered using the spare part code W13499 V1.1.

The inside of the optical assembly must be absolutely clean and dust-free. In field conditions it may be difficult to ensure that the assembly is not opened incorrectly. To ensure cleanliness, new optical assemblies are secured with seal (Fig. 2), which change color if removed

NEVER open the optical assembly in the field! Its warranty will be void if the seals are broken.

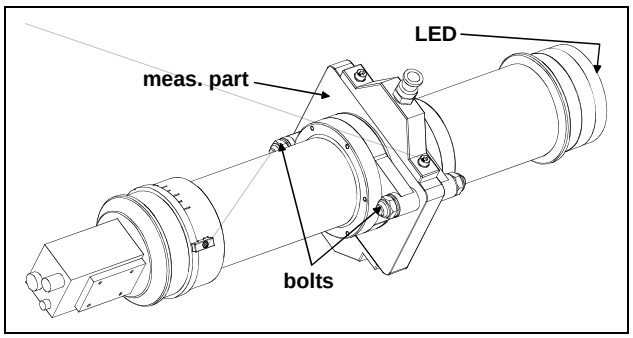


Figure 1. Construction of optical assembly. The measuring part will come loose when the bolts are removed.

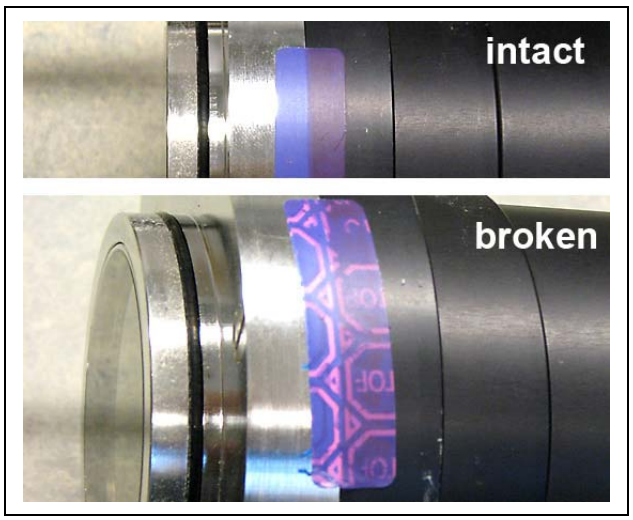


Figure 2. Do not break or peel off the seals! The photo above shows an intact seal, the lower photo shows a seal that has been removed and reattached.

Allowed service operations

- Removing the measuring part – Fig. 1 & 3.
- Replacing the LED unit – Fig. 1 & 3.

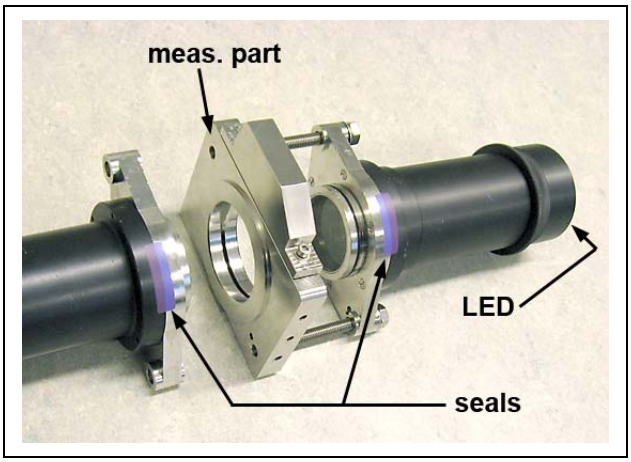


Figure 3. Optical assembly, with the measuring part detached. The seals must stay in place and undamaged!

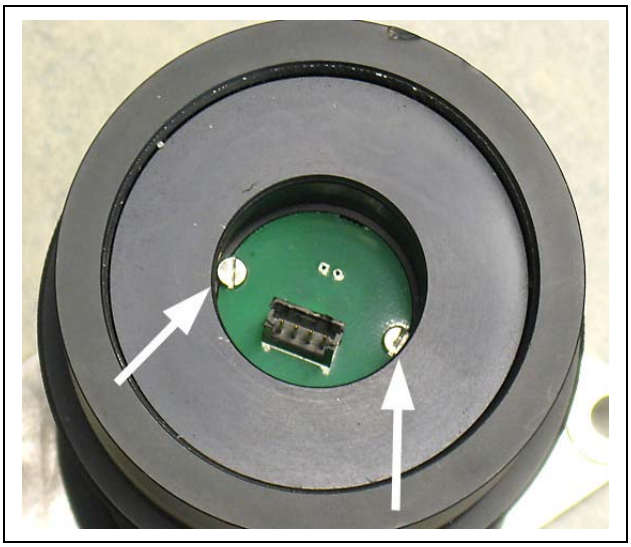


Figure 4. The LED unit, located in one end of the assembly, comes loose when the 2 screws are opened.

kajaaniWEM / kajaaniMAP / kajaaniKAPPA Q

Analyzer shutdown procedure

Background

When investigating the reason for the operating problems observed with some of the above listed analyzers, we have found one very likely reason: incorrect shutting down of the device.

Analyzer's power **must not** be switched off when it is operating! The analyzer contains a computer that is working all the time, reading and writing data in memory. Switching the power off "on the fly" interrupts the operation in an uncontrolled fashion, and data files are left open.

Depending on what the computer was doing when power switched off, this may cause for example errors in the measurement results. In severe cases, important parameter files may get corrupted and the analyzer may not restart at all, so that the entire system must be reinstalled and reconfigured.

Always run the shutdown sequence (from software) before switching power off by the main switch! Never use the Reset button (S4) on the MasterCPU!

Starting the analyzer, kajaaniMAP & kajaaniKAPPA Q

1. Switch the analyzer on by turning the main switch to position ON (1).
2. Wait until the software has started up and the flushing sequence begins.
3. Switch on the Fiber-Shive module's PC by turning its main switch to position ON (1).

Shutdown, kajaaniMAP

1. Choose "Analyzer Stop" => "Shutdown" => "Shutdoen analyzer => Yes". The software will now close all files in a controlled fashion.
2. Choose "Analys.Stop" => "Lines OFF" => "All lines off = YES".
3. Wait until the analyzer has stopped completely (no flushing, measurement or calculation going on) and its status is "Idle".
4. Choose "Analyzer Stop" => "Shutdown". This command allows the software to close all open files in a controlled fashion.
5. If the analyzer includes the Fiber-Shive module, also switch off its PC. The preferable method is to use the normal PC shutdown sequence (Start => Shutdown), but this requires a separate display + keyboard + mouse. If these are not available, just turn the PC's power switch to position OFF (0).
6. Then switch the analyzer off by the main switch.

Shutdown, kajaaniKAPPA Q

1. Set all channels OFF and wait until the analyzer status is "Idle".
2. Choose "Config" => "Software settings" => "Reboot" => "Shutdown".
3. Wait until the analyzer has stopped all open files and the display reads "System shutdown".
4. If the analyzer includes the Fiber-Shive module, also switch off its PC. The preferable method is to use the normal PC shutdown sequence (Start => Shutdown), but this requires a separate display + keyboard + mouse. If these are not available, just turn the PC's power switch to position OFF (0).
5. Then switch the analyzer off by the main switch.

Shutdown, kajaaniWEM

1. Choose "Control/Follow-up" => "Device control" => "Stop device" => "Controlled shutdown " and wait until all functions read "Stopped".
2. Choose "Configuration" => "Software settings" => "Reboot" => "Shutdown".
3. Then switch the analyzer off by the main switch.