Product: **KKV dosing system**

Customer:

sera - Order No.

Drawing No.:

Manufacturer: **Seybert & Rahier**
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KKV Dosing System

Operating Instructions for Controller

sera
Dosieren
Fördern
Verdichten

Table of Contents:

1 General

Before commissioning and while operating **sera** products the regulations valid at the place of installation must be strictly observed.

sera products are delivered ready for operation. Carefully read these instructions and especially the safety instructions herein contained before putting the system into service.

The user / operator is obliged to comply with the valid regulations for prevention of accidents when the dosing system is installed.

2 Technical Specifications

Medium head 1	Dyeing solution pH 4
Medium head 2	Caustic soda solution 3.5%, without solid matters, appr. 20°C, max. 100 mPas
Operating temperature	5°C..0.30°C
Solid matters	none
Water quality	Similar to drinking water, i.e. chemically neutral and free from solid and suspended matters as well as disturbing ion concentrations
Installation	Inside

Dosing pump	
Type	RF 411.1-1100e / RK 411.1-550e (KKV pump)
Pump capacity head 1	1,100 l/h
Pump capacity head 2	0-430 l/h
Max. feed pressure	1 bar
Serial No.	

Technical data of switch cabinet	
Mains voltage	400V / 50Hz / N / PE
Control voltage 1	230V /50Hz
Control voltage 2	24V DC
Power consumption	0.8 KW

3 Safety Instructions

3.1 Quality Instructions

Read these operating instructions carefully before the unit is commissioned or serviced. Observance of these operating instructions and, in particular, safety instructions, helps to

- Avoid danger to staff, machines, and environment.
- Increase the reliability and service life of the equipment and the entire system.
- Reduce expenses for repairs and downtimes.

The **sera** quality management and quality assurance system for pumps, systems, fittings and compressors is certified according to DIN EN ISO 9001:2000.
sera – products are compliant with the valid safety requirements and regulations for accident prevention.

CAUTION!

Always keep these operating instructions within reach at the workplace!

CAUTION!

Pay attention to the safety data sheet of the pumped fluid! Take appropriate accident prevention measures to avoid that operators are endangered by the used pumped media!

3.2 Purpose

These operating instructions contain basic instructions which must be observed when installing, operating and servicing the dosing system. Therefore, the mechanical engineer, as well as the responsible specialists/operator must read these operating instructions carefully before installation and commissioning. Moreover, always keep these instructions within reach at the workplace.

Beside the general safety instructions mentioned under this main topic "Safety Instructions" the special safety instructions inserted at other points of this documentation must be observed as well.

3.3 Marking of Instructions

Information signs which are directly attached to the unit, such as arrows of direction of rotation or signs for fluid connections must be observed and kept in a legible condition.

3.4 Qualification and Training of Personnel

The personnel who operate, maintain, carry out inspections or install the machine must be suitably qualified for their tasks. The operator has to define clearly the responsibility, and the supervision of the personnel. If the personnel do not have the knowledge required, then the operator has to carry out corresponding training and instructions. Such a training can be realized - if required - upon order of the operator of the machine by the manufacturer / supplier. The operator has to ensure furthermore that the personnel have understood the contents of the operating instructions completely.

3.5 Dangers in Case of Inobservance of the Safety Instructions

The inobservance of the safety instructions may result in personal injuries, hazards to the environment and damages to the machine.

The inobservance of the safety instructions may have the following consequences:

- Failure of important functions of the machine/system/unit
- Failure of prescribed methods for maintenance and upkeep
- Danger to persons by electrical, mechanical and chemical influences
- Danger to the environment due to leakage of hazardous substances

3.6 Safety-Conscious Working

The safety instructions mentioned in these operating instructions, the national regulations for accident prevention as well as all internal working-, operating and safety instructions must be observed.

3.7 Safety Instructions for the User / Operator

Hot or cold machine parts which present a risk, are to be protected against contact by the customer.

The protection against contact of moving parts (e.g. coupling) must not be removed while the machine is running.

Leakage of dangerous pumped fluids, and operating supplies must be drained off so that a risk to persons and the environment can be excluded. The legal regulations must be observed.

Dangers caused by electrical energy are to be prevented.

3.8 Safety Instructions for Maintenance, Inspection and Installation

The operator has to ensure that all maintenance, inspection and installation tasks are carried out by authorized and sufficiently qualified personnel, who have carefully read and understood the operating instructions.

Only those spare parts and operating supplies are to be used that satisfy the requirements of the relevant operating conditions.

Only loosen screws and connections when the system is not under pressure.

Pumps, systems or units which feed harmful media have to be de-contaminated before start of work.

Immediately after the tasks have been completed, all safety and protection devices have to be installed again or re-activated.

Before the unit is set into operation, the items mentioned under "Commissioning" must be observed.

3.9 Arbitrary Modification and Spare Parts Production

Modifications of or changements to the unit are only allowed after previous agreement of the manufacturer. Original spare parts and accessories that are approved by the manufacturer are essential for safety reasons.

If parts are used that are not approved or the unit or its subsystems is modified arbitrarily the supplier rejects all guarantee claims.

3.10 Inadmissible Operating Procedures

The operational safety of the system or machine can only be guaranteed in case of proper use in accordance with section 3.11 of the operating instructions.

3.11 Proper Use

Use **sera** products only for the purpose indicated in the corresponding confirmation of order and in the accompanying acceptance test certificate.

If the unit is to be used for other purposes, it is required to consult **sera** beforehand to settle whether the product is suitable for the new usage!

Criteria for proper use are:

- Properties of the pumped medium (refer to the safety and product data sheet of the used medium – the safety data sheet is to be provided by the supplier of the chemical)
- Stability of the materials which have contact with the pumped medium
- Operating conditions at the place of installation
- Pressure and temperature of the pumped medium

sera accepts no liability when these criteria are not or only partially indicated or observed by the customer /operator.

sera pumps are positive displacement pumps which can theoretically build up an unlimited pressure.

If the pressure pipe is blocked, for example when the pipes are clogged or a valve is shut, the pressure generated by the pump can achieve a multiple of the permissible pressure value of the equipment. This may lead to damages of the pipes with dangerous consequences, especially when aggressive or toxic media are conveyed. Therefore the unit must be equipped with appropriate safety devices.

3.12 Personal Protection for Service and Maintenance

It is required to consider the recommended safety measures included in the German ordinance concerning hazardous materials (§ 14 of Safety Data Sheet) and/or the relevant national safety regulations applying to the usage of the pumped medium, as well as the conditions of operating the pump.

In case of accidents check whether substances are emitted.

Emissions must be monitored by monitoring systems of the total plant.

CAUTION!

Use protective clothing, gloves, breathing mask and suitable goggles for face protection!

CAUTION!

Personal protective equipment must be provided by the equipment operator at all times!

3.13 Operating Conditions

Operating conditions please see also chapter 2 "Technical Specifications".

All other operating conditions must be agreed upon with the manufacturer.

4 Transportation and Intermediate Storage

4.1 General

Before shipment **sera** products are tested for proper functioning and quality.

The packaging is made dependent on and according to the transport conditions.

The unit may only be handled with suitable lifting devices.

4.2 Storage

An undamaged packing protects the unit during subsequent storage and should only be opened when the unit will be installed.

A proper storage will increase the service life of the dosing system. Proper storage means avoidance of negative influences, such as heat, humidity, dust, chemicals etc.

- The following storage conditions must be observed:
- Storage place: cool, dry, dust-free and slightly ventilated
- Storage temperature between –10°C and +30°C
- Relative humidity not more than 50%

If these values are exceeded, products made from metal should be sealed in foil and protected against condensation water using suitable dessicants.

Do not store solvents, fuels, lubricants, chemicals, acids, disinfectants and similar together with the product in the storage room.

5 Functional Description

5.1 Short Description

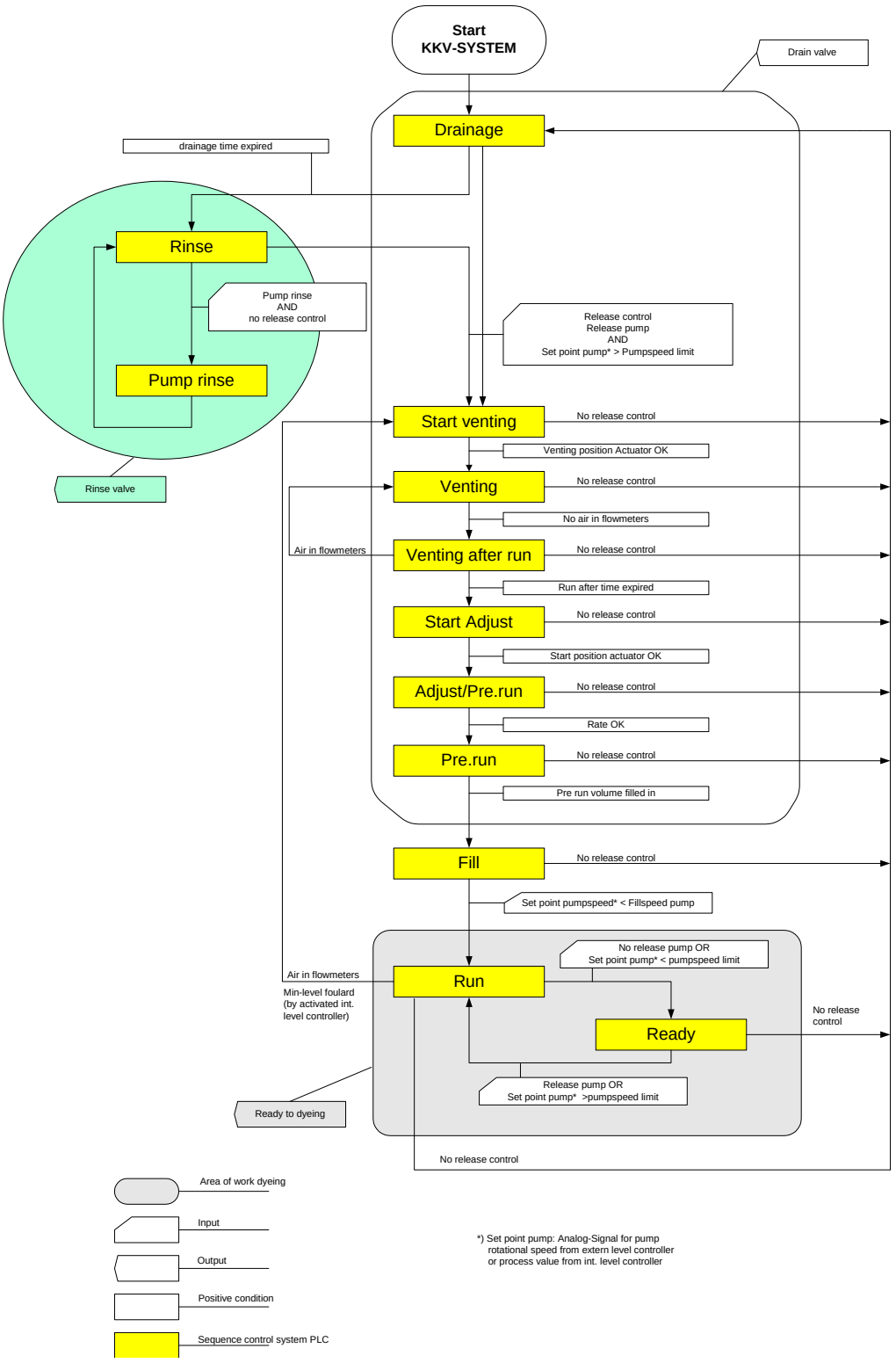
The KKV dosing system is used to convey dye and lye in the ratio of 3:1...6:1 into the foulard. The pump head, which pumps the lye, is equipped with an electrical actuator for automatic adjustment of the stroke length. The delivered quantities of lye and dye are recorded volumetrically by two **M**agnetic-**I**nductive (**D**urchflußmesser) flow-meters (MID's). The SPC records these quantities and if required, corrects the stroke length of the lye head by means of the actuator. Consequently, the ratio of the two chemicals is always kept constant even when the stroke frequency changes. The ratio is controlled by a PID regulator (**P**roportional-**I**ntegral-**D**ifferential) implemented in the control system.
Two capacitive sensors on the suction side monitor that lye and dye are free from air bubbles. This ensures that in the absence of the chemicals the dyeing is aborted and a fault is reported.

The ratio, the control parameters as well as a limiting value for the quantity deviations can be individually set at the control system from an operator panel. Furthermore, the panel provides information about the delivered quantities of lye and dye, the total of the deviation of the lye quantity from the set value and the controller status. There is also a provision for manual operation of the actuator.

Since, owing to different pipe lengths and cross sections, at the time of the first filling of the foulard, dye and lye do not arrive simultaneously in the foulard, the mixing ratio is not correct at the beginning. A starting sequence that has been specially developed for this purpose facilitates a fast start that saves on chemicals. The pump heads and MID's are automatically vented, the ratio is controlled with a pre-set actuator and the feed pipes and the foulard are filled.
Rinsing water and residual dye mixture are let off in two separate channels.
For plants in which there is no facility, in the rinsing phase, to get an analog signal from the foulard level controller, there is an inlet called "Rinse pump" available, with which the pump can be brought to 100% operation.
The analog input signal for the pump speed can be read directly from the level meter or from the outlet of the level control. If the pump is directly connected to the level sensor, the pump speed is controlled by the internal controller.

5.2 Cycle Description

During operation of the KKV dosing system the controller executes or edits the indicated steps. The interfaces to the imposed system are integrated in the flow diagram according to the legend.



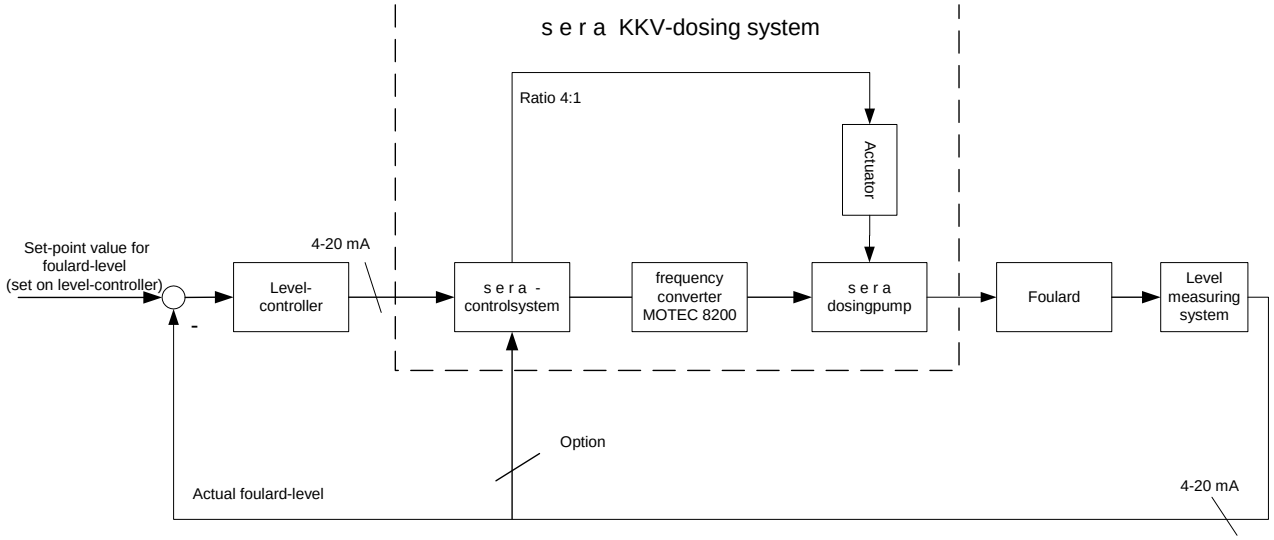
6 Installation and Assembly

6.1 Absolutely Necessary Preconditions for Operation

- A pressure keeping valve must be integrated in the common pressure pipe of the KKV pump to avoid instabilities of the control.
- The suction and pressure pipes must be laid in such a way that no larger air quantities can collect.
- The four potential-free outputs must be connected to the control system to be provided by the customer (see Chapter 6.5.2).
- The four digital inputs must be connected to the controller to be provided by the customer (see Chapter 6.5.1). All control signals to the system must be potential-free (danger of destruction)!
- The analog signal from the output of the local level controller or the measured value from the level meter for the set speed (signal *Set value pump*) of the pump must be connected to the control system of the system. If the external controller is used, the pump speed is set by the on-site level controller in the foulard. The signals must be applied in every operating status so that the control system is operating properly.

6.2 Recommendations for Optimum Operation

- Keep the suction pipes for lye and dye equally long and as short as possible.
- Provide suction tank with same filling level as the pump (e.g. tank with float valve), if longer suction pipes are unavoidable.
- Adjust the cross section of the dye and lye pipes to the discharge ratio. The cross section of the dye pipe should be 4 times larger than that of the lye pipe.
- Lay the suction pipes with a slight incline towards the pump so that air bubbles can escape.
- Use the signal for controlling a drain valve and rinsing valve at the foulard, to rinse the pipes and the foulard before filling the foulard.



The pump speed can be set by the on-site level controller. During the start-up phase the signal is only limited to the top. In all the other program steps the input signal is directly transmitted to the pump. The **sera** KKV dosing system regulates the ratio between dye and lye. A level measurement signal (4...20mA) can be directly connected as an option when a complete level control system is installed.
In this case an internal level controller is activated which replaces the external level controller.

6.3 Required Devices for Optimum Operation

For automatic venting, adjustment and pre-rinsing an electrically controlled rinse valve with drain to the sewer and a drain valve with drain to the chemicals channel at the foulard is required. These valves are controlled by the KKV dosing system.
Without these valves, a defined ratio at the time of first filling of the foulard is difficult. Manual draining, though possible, is too inexact (high chances of faulty operation).

6.4 Mechanical Installation

The following points must be observed when the equipment is installed:

- Check the complete system for transportation and storage damages.
- Install the system on even, inflexible ground that is free from vibrations according to drawing (SK 13405).
- Place and fasten the system.
- Connect the suction and pressure side as shown on the drawing.
- Connect all pipes and make sure that they are not under tension and vibrations. An offset of the pipes within the screwed connections has to be avoided.

Note: To guarantee quick venting of the pump heads, keep the suction pipes for lye and dye equally long and as short as possible. Lay the pipes with a short incline towards the pump heads.

6.5 Electrical Installation

The controller is supplied with voltage via the connection cable with CEE plug. The input and output signals are applied to plug-in connections on the left side of the controller housing.

CAUTION !

Electrical connections are to be implemented in accordance with the VDE- (in Germany) or local electrical regulations applicable.

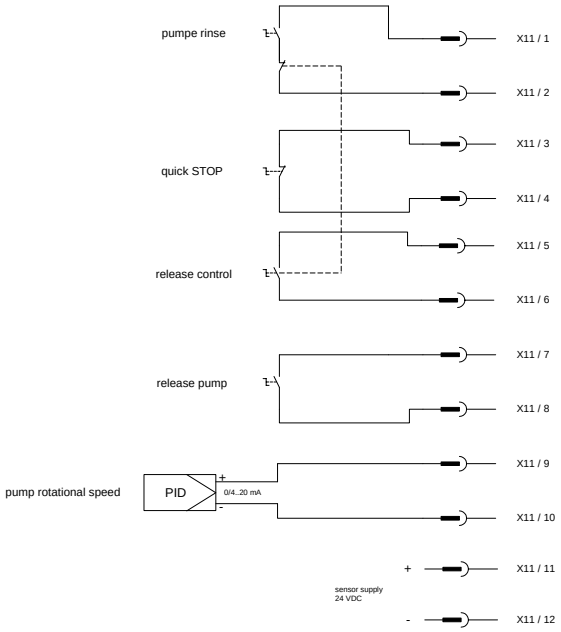
CAUTION !

When an external level controller is used, the analog input signal for the pump speed must be generated by the on-site control system (level controller).

6.5.1 Inputs

The KKV dosing system is controlled by the four digital inputs and the analog input signal.

Example of application of the external level controller



CAUTION !

All control signals <u>to</u> the system must be potential-free (danger of destruction)!

Operation	Digital input				Analog input
	Quick stop X11 / 3-4	Pump rinse X11 / 1-2	Release control X11 / 5-6	Release pump X11 / 7-8	X11 / 9-10
Rinse 1	OFF	OFF	OFF	ON	mA-Signal
Rinse 2	OFF	ON	OFF	X	X
Dyeing	OFF	X	ON	ON	mA-Signal
Dyeing break	OFF	X	ON	OFF	X
Quick stop	ON	X	X	X	X

X = no effect

Rinse 1: Start via the analog input signal of the level controller and digital signal: *Release of pump* in step *Rinse*.

or

Rinse 2: Start via the digital signal *Rinse pump* (pump speed 100%) in step *Rinse.*

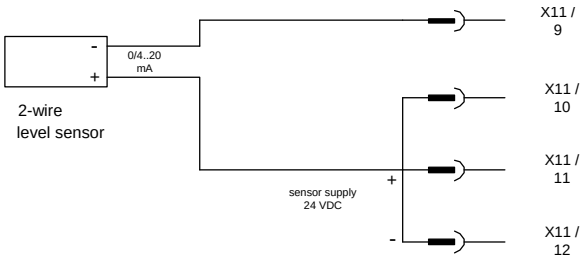
Dyeing: Start via the digital signal *Release control* and *Release pump*. Pump speed is controlled by the analog input signal.

Note: The release signal for the controller (signal *Release control*) may only be applied during operation with dyeing chemicals and not while rinsing the foulard or cleaning the dyeing rollers. If this is not observed error messages may be triggered!

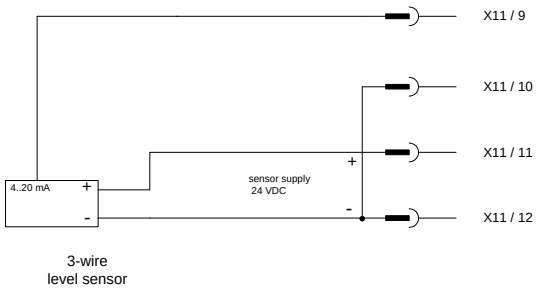
The signal *Release control* must not be applied during the rinsing process since otherwise the rinsing sequence is impeded and the start adjustment of the controller is shifted.

Note: Rinsing of the pump must be carried out only with the pump running; otherwise, chemical residues remain in the pump heads.

Example of application of an internal level controller with 2-wire sensor



Example of application of an internal level controller with 3-wire sensor



CAUTION !

If the signal *Release control* is reset while dyeing, the foulard contents is emptied via the drain valve and the controller is switched to rinse operation! The pump continues to run until the signal *Release pump* is no longer applied.

When an external level controller is used make sure that the maximum *Set value pump* (100%) is output and the pump is stopped when the foulard is filled via the analog signal or the signal *Release pump* (overflow of the foulard). If this is not observed the filling recognition device does not function and the venting phase is delayed unnecessarily.

6.5.2 Outputs

The system provides four potential-free outputs for further processing in the on-site control system.

Control: Solenoid valve sewer (rinse valve)

Control: Solenoid valve chemicals channel (drain valve)

Message: Ready for dyeing

Message: Collective fault

- The control system of the KKV dosing system transmits a signal to open a rinse valve via a potential-free contact. When this signal is applied the fluid must be able to flow out of the foulard in the sewer.
- The control system transmits a signal to open a drain valve (signal *Drain valve chemicals channel*) via a potential-free contact. When this signal is applied the chemical must be able to flow out of the foulard in the chemicals channel.
- The dyeing process may only be started when the signal *Release dyeing* is output by the control system of the KKV dosing system (signal *Release dyeing*).
- The collective fault of the KKV system is transmitted via a potential-free contact for further processing in the on-site control system.

Note: The collective fault is always active in manual mode.

Note: The system can also be operated without external solenoid valves. In such a case the operator must open and close the corresponding valve at the foulard manually. Indicator lights (by the customer) should be used instead of solenoid valves to signalize the operating states to avoid operating errors.

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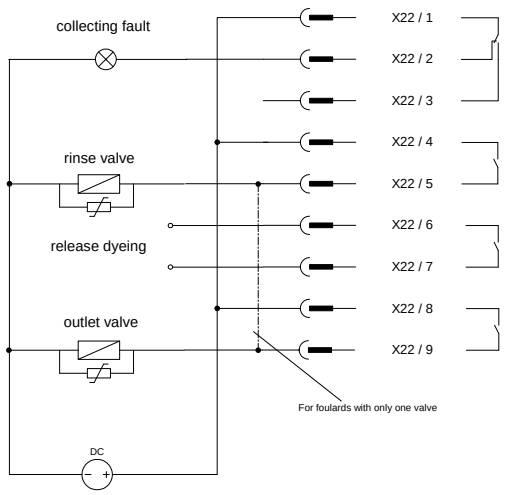
Terminal assignment

Output	Terminal
A1 collective fault	X22 / 1-3
A2 rinse valve	X22 / 4-5
A3 release dyeing	X22 / 6-7
A4 drain valve	X22 / 8-9



Foulard with rinse valve and outlet valve

CAUTION !

Pay attention to the contact rating of the outputs!
Max. load capacity 4A (ohmic load).

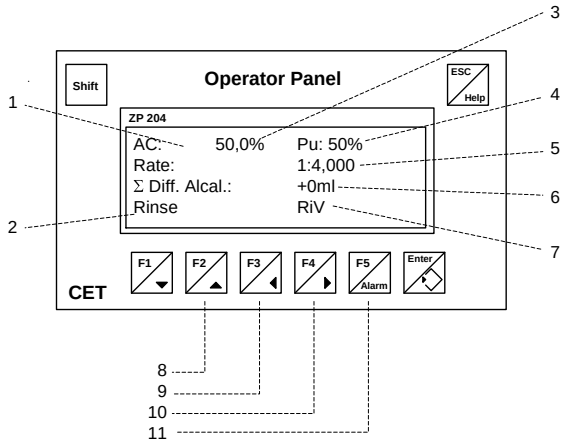
In case of a fault, the drain valve and the rinse valve are closed, the dyeing release is switched off and the pump is stopped.
If one of the two storage tanks is emptied during the dyeing process or the minimum level is fallen below when the internal level controller was triggered, the foulard contents can still be used after the fault has been acknowledged for the first time (with the F5 key or the Reset button). After the acknowledgement key is pressed a second time the solenoid valve for draining the residual volume towards the chemicals channel opens. Then the system is restarted.

Note: The dyeing release is also output in manual mode.

7 Operating Instructions for the Control System

7.1 Basic Operation

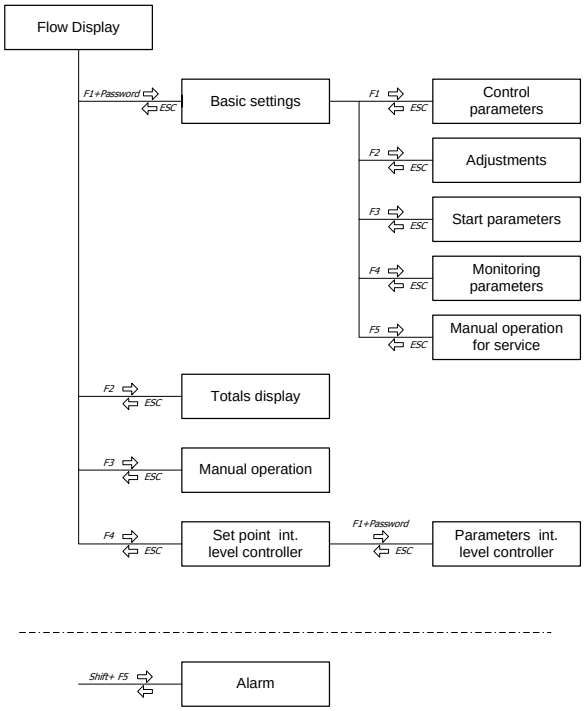
After switching on the main switch, the flow display becomes visible on the operator panel. After approximately 15 seconds the system is ready for operation. A fault in the system is signalized via the display, an illuminated push-button and an acoustic alarm. Acknowledgement of a fault is possible by actuating the illuminated push-button on the control console or the function key "F5" at the operator panel. Operation is not necessary in normal running.
The figure shows the operator panel in the flow display with the description of the most important function keys.



1 ..... Actuator reaction
2 ..... Status display
3 ..... Actuator position
4 ..... Pump rating
5 ..... Current ratio
6 ..... Total of lye difference
7 ..... Device status
8 ..... Totals and statistics displays
9 ..... Manual operation
10 ..... Internal level controller
11 ..... Acknowledge fault and acoustic alarm off

7.2 Menu Overview

The menu of the KKV control system is structured as follows:



Note: The alarm display can be called from any menu item.

7.3 Operation of the Controller

7.3.1 Basics

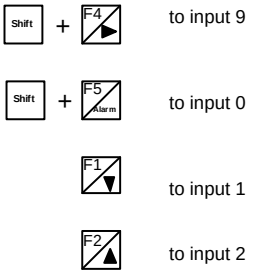
The operator panel is run with the following keys:

According to the list all the keys have two functions. The second function is called when the Shift key is pressed simultaneously.

CAUTION !

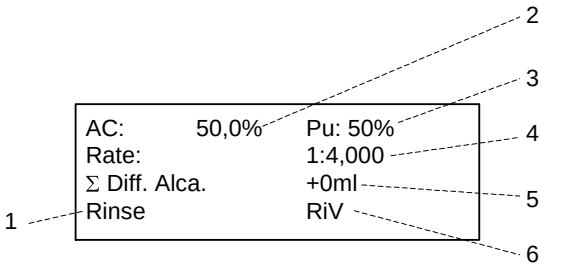
Do not actuate several function keys/soft keys simultaneously. Otherwise unintentional actions may be triggered.

A password is required to call the basic settings. The password that has been set is "**9021**" and can only be changed by the manufacturer. The password is entered with the following keys:



7.3.2 Flow Display

When the controller is switched on with the main switch the flow display appears:



1 ..... Status display
2 ..... Actuator position
3 ..... Pump rating
4 ..... Current ratio
5 ..... Total of lye difference
6 ..... Device status

The following are displayed: status of the actuator (SM), its position (corresponds to the pump capacity of the lye head in %), ratio of lye and dye, total of lye difference, status of the controller.

Note: The ratio can vary by appr. 1 / 3.7 and 1 / 4.3 and the total of lye difference by appr. +/- 30 ml. This is due to the physics of the pump and does not represent a fault.

The possible status displays are:

"QUICKSTOP*!"*
Quick stop switch has been actuated (if present)

"Rinse"
System in operating mode "Rinse"

"Drain off"
Contents of foulard is drained in chemicals channel

"Start venting"
Actuator is moved into the venting position

"Venting"
Venting is running

"Venting after run"
Venting after-running for the set time

"Start adjust"
Actuator is moved into the starting position

"Adjust/Pre-run"
Controller is adjusting system to set ratio

"Pre.run"
Pipes to the foulard are filled with chemicals

"Fill"
Foulard is filled

"Run"
Controller is active and pump discharges

"Ready"
Controller is ready and pump stops

"Hand"
System was switched to manual mode with "F3".

"Pump rinse!"
System is in pump rinse operation (via separate inlet)

"Fault!
Control system has a fault and fault message was acknowledged with the "Alarm" ("F5) key and switched back to the flow display by pressing "Shift" and "F5" simultaneously.

The following device status are possible:

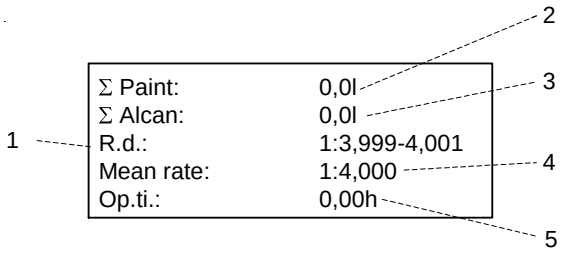
"RiV"	Drain valve towards sewer opened
"DrV"	Drain valve towards chemicals channel opened
"PaR"	The KKV dosing system signals *Dyeing release*

The following functions are assigned to the function keys in the flow display:

F1	Call basic settings (password protected)
F2	Call display of totals and statistics
F3	Call manual operation (controller is then switched off)
F4	Internal level controller
F5	Acknowledge fault (acoustic alarm off)
Alarm	Query alarm messages
Help	Display Help for flow display
ESC	No function

7.3.3 Display of Totals and Statistics

The totals and statistics display appears on pressing the "F2" key:



1 ..... Minimum and maximum ratio
2 ..... Total quantity of dye
3 ..... Total quantity of lye
4 ..... Mean ratio
5 ..... Operating hours

The total quantity of dye and lye that has been pumped so far, the minimum and maximum ratio that has occurred as well as the mean ratio are displayed. These displays refer to the current measurement period which has started with a release signal or a reset. The measured values can be deleted with the "F4" key. The total operating hours of the pump (line 5) cannot be reset.

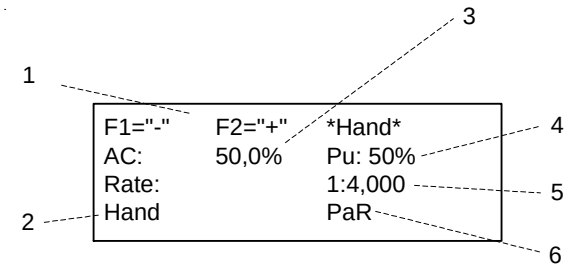
Note: The displays of totals are only updated after every measuring cycle. A measuring cycle is the result of the cycle period with the pulse valency of the dye MID (factory settings: cycle period 250 pulses, pulse valency of dye MID 4ml/pulse, results in a measuring cycle of 1000ml dye).

The following functions are assigned to the function keys in the statistics display:

F1-F2	No function
F3	Lamp test
F4	Reset display values
F5	Acknowledge fault (acoustic alarm off)
Alarm	Query alarm messages
Help	Display Help for statistics display
ESC	Return to flow display

7.3.4 Manual Operation

When the “F3” key is pressed in the flow display the display for manual operation is called:



1 ..... Actuator reaction
2 ..... Status display
3 ..... Actuator position
4 ..... Pump rating
5 ..... Current ratio
6 ..... Device status

The actuator reaction (SM), the actuator position, the pump rating, the current ratio in the last control cycle as well as the status display and the device display of the KKV control system are displayed.

Please note: In manual operation the KKV dosing system is operated manually and only the actuator position can be changed by pressing the keys. In this mode the control of the dosing ratio is disabled. The pump speed is set via the signal *Set value pump* from the on-site or the internal level controller. The signal **Dyeing release** is output as the device status.

The following functions are assigned to the function keys:

F1	Reduce stroke lye head (**-**)
F2	Increase stroke lye head (**+**)
F3	Lamp test
F4	Reset display values
F5	Acknowledge fault (acoustic alarm off)
Alarm	Query alarm messages
Help	Display Help for manual operation
ESC	Return to flow display

7.4 Parameter Settings

7.4.1 General

The values that can be set in the following menu items are displayed ***italic and bold***.

When arrows appear on the right-hand border of the display you can use the following keys for scrolling:

Shift + F1

Shift + F2

Press the following keys or shortcuts to change the values displayed:

Shift + F3

Shift + F4

Moves the cursor from one value to be changed to the next one.

Shift + Enter

Opens the editing phase.

F3 F4

Moves the cursor from one position of the selected value to the next one.

F1 F2

Changes the selected position.

ESC Help

Cancels a change.

Enter

Terminates a change.

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7.4.2 Basic Settings

On pressing the "F1" key in the flow display and inputting the password (see 7.3.1), the basic settings are displayed:

Norm.rate: 1/**004.00**	
00200ml Alcal. in	
1000ml total vol.	
Starting aid:	***Auto***
Auto.adjust:	**ON**

The following inputs are possible:

Norm rate.: 1/**004.00**	**Set ratio** – Input of the ratio between lye and dye
xxxxx ml Alcal. in 1000 ml total vol.	Default setting of the **lye volume** referred **to 1000ml total volume** (definition of the ratio lye : dye).
Starting aid: ***XXX*** ***OFF*** ***ON*** ***Auto***	The **starting aid** is a device for reliable and fast suction of the fluids when the pump suction pipe is empty. The sensors in the pump suction pipes are triggered and the pipe is checked for air pockets. If air pockets are present the actuator of the lye pump is moved to the position 100%. When the air pockets are removed, the actuator is moved in the start position after an adjustable venting after-running time (see Chapter 7.4.5) has elapsed. Setting **"Off"**: Starting aid not active. Setting **"On"**: The actuator is moved to 100% after **every** release of the controller. Setting **"Auto"**: The actuator is only set to 100% when the suction pipe of the lye head was drained.
Auto. Adjust: ***XXX*** ***OFF*** ***ON***	With the **Automatic adjust** switched on, the actuator position after the adjustment (with tolerance conformance) is taken as the new start position for the actuator.

The following functions are assigned to the function keys:

F1 Call the parameters of the proportional controller
F2 Call adjustments
F3 Call start parameters
F4 Call configuration
F5 Manual operation for service
Alarm Query alarm messages
Help Help for the basic settings
ESC Return to flow display

7.4.3 Parameters of Proportional Controller

The parameters of the proportional controller are displayed when the “F1” key is pressed in the basic settings display.

Reg.P-value:	***01,000***
Reg.I-value:	***00,100***
Reg.D-value:	***00,200***
Pulse p. cyc.:	***00230***P
Stroke-sensor:	ON ▼

Reg.P-value: ***xx.xxx***	Controller proportional portion
Reg.I-value: ***xx.xxx***	Controller integral portion
Reg.D-value: ***xx.xxx***	Controller differential portion
Pulse p. cycle: ***xxxxx***P	The cycle range is the number of pulses of the dye MID’s after which a new control cycle starts.
Stroke sensor: ***OFF*** ***ON***	With the stroke sensor activated the cycle range is only queried after every complete stroke of the pump.

Caution

When the cycle range and the stroke sensor are changed a new system start will be triggered! The contents of the foulard is then drained and a new filling is started!

Note: The integral portion is only active in the step “Operation” (see Chapter 5.2). In all other steps, this portion is switched off for faster regulation (zero).

The following functions are assigned to the function keys:

F1-F4 No function
F5 Acknowledge fault (acoustic alarm off)
Alarm Query alarm messages
Help Display Help for the controller settings
ESC Return to the basic settings

7.4.4 Configuration

The configuration is displayed when the “F2” key is pressed in the basic settings.

MID-Alca.:	***1,00***	ml/P
MID-Paint:	***04,000***	ml/P
Pumpsig.inp.:	***4-20***	mA
Pumpsig.out.:	***4-20***	mA
Position-sensor	***ON***	
Intern LC :	***OFF***	▼

MID-Alca.: ***xx.xxx***ml/P	**Pulse valency** lye-MID
MID-Paint: ***xx.xxx***ml/P	Pulse valency **dye-MID**
Pumpsig.inp.: ***XXXX*** ***-*** ***0-20mA*** ***4-20mA*** ***4-20mA**** ***200mA*** ***20-4mA*** ***20-4mA****	The type of the input signal from the on-site level controller or level sensor is set with the signal **Input set value pump** (see Chapter 7.4.7) The following setting options are available: **„-“** no analog input signal connected to the KKV control system, system is operated with 100% pump speed Signals with normal direction of flow transferred (0/4..20mA=0..100% set capacity from level controller or level signal): **„0-20mA“** 0 to 20mA **“4-20mA“** 4 to 20mA with monitoring **“4-20mA*“** 4 to 20mA without monitoring signals with inverse direction of flow transferred (20../0/4mA=0..100% set capacity from level controller or level signal): **“20-0mA“** 0 to 20mA **“20-4mA“** 4 to 20mA with monitoring **“20-4mA*“** 4 to 20mA without monitoring
Pumpsig.out.: ***XXXX*** ***0-20mA*** ***4-20mA***	The type of the output signal from the KKV control system to the dosing pump is set with the signal **Output set value pump**. The following setting options are available: **“0-20mA“** 0 to 20mA **“4-20mA“** 4 to 20mA
Position-sensor ***XXXX*** ***OFF*** ***ON***	The option **position feedback** allows switching off the position sensor and evaluation of the actuator position. **Note:** When the position feedback is disabled, the starting aid, the movement of the actuator to the start position (see Chapter 5.4.5) and the display of the actuator position (display 0%) are not available!
Intern LC : **OFF** **On**	**Internal level controller** **“Off”:** the internal level controller is deactivated, the analog input signal must be connected to the on-site controller. **“On”:** the internal level controller is activated, the analog input signal must be connected to the level controller. See also “Setting of analog input signal”.

Caution

When the MID pulse valencies are changed, a new system start will be triggered! The contents of the foulard is then drained and a new filling is started!

The following functions are assigned to the function keys:

F1-F4	No function
F5	Acknowledge fault (acoustic alarm off)
Alarm	Query alarm messages
Help	Display Help for the adjustments
ESC	Return to the basic settings

7.4.5 Startup Parameters

On pressing the "F3” key in the basic settings display, the startup parameters are displayed:

Drain run after.:	***05***s	▲
Fillspeed lim.:	***050***%	
Start pos. AC:	***50,0***%	
Rate tolerance.:	***003***%	
min.Pre.volum.:	***010***l	
drainage time:	***030***s	▼

Drain run after: ***xx***s	The **venting after-running** delays the end of venting by the set time, to ensure the freedom from air of the MID’s.
Fillspeed lim: ***xxx***%	The **fill speed** of the **pump** limits the pump speed during the setting, pre-rinsing and filling phases. This ensures an optimum ratio when the foulard is filled.
Start pos. AC: ***xxx.x***%	The **start position of the actuator** (SM) facilitates the pre-positioning for a faster system start with less consumption of chemicals. Note: If an automatic adjustment is activated in the basic settings, this setting is overwritten with the setting detected after adjustment.
Rate tolerance: ***xxx***%	The **rate tolerance** is a difference in percent (+/-) from the desired dosage ratio. If this maximum difference is fallen below during start-up phase after the controller is released, the pre-run phase is activated. If automatic adjustment has been selected in the basic settings the current position of the actuator is set as the new start position.
min.Pre.volum.: ***xxx***l	The **minimum pre-run quantity** defines the volume of dye (in liters), with which the pipes are filled with chemicals.

drainage time: ***xxx***s	The **drainage time** defines how long the valve is opened to drain the chemicals into the chemicals channel before the step R*inse* is activated by the SPC. The time must be set so that the foulard is emptied completely before this time has elapsed. Please note: When the time is set to zero step 14 *Drain* of the step control is skipped and the chemicals are drained into the sewer in steps 2 to 7.

The following functions are assigned to the function keys:

- **F1-F4** No function
- **F5** Acknowledge fault (acoustic alarm off)
- **Alarm** Query alarm messages
- **Help** Display Help for the adjustments
- **ESC** Return to the basic settings

7.4.6 Monitoring Parameters

On pressing the "F4" key in the basic settings display, the monitoring parameters are displayed:

max.rate:	+/-***02***0%
max.ΔAlcal.:	***00100***ml
max.Start time:	***300***s
max.Startcycle:	***100***
Tmax.be.MID-P.:	***10,0***s
Safty-factor.:	***3,0***
Pu.start speed:	***015***%
Com.port:	***Service***

Max.rate.: +/- ***xxx***%	A **ratio limit value** can be defined on exceeding which a fault message shall be output. The set limit value is active during dyeing operation.
max.ΔAlcal.: ***xxxxx***ml	The **limiting value** can be set for the **total of lye deviation**, on exceeding which a fault message shall be output.
max.Start time: ***xxx***s	After the **maximum start-up time** has elapsed, the starting of the KKV control system is aborted with an error message.
max.Startcycle: ***xxx***	On exceeding the **maximum start-up cycles**, the starting of the system is interrupted with an error message.
Tmax.be.MID-P.: ***xx.x***s	The pulses from the MIDs are monitored by a slug integrated in the control system. If the defined time is exceeded between two MID pulses, an error message is output.

safety-factor.: ***x.x***	A **safety factor** is defined to monitor the lye quantity which is necessary for the dyeing process. This factor is based on the number of pulses set for one cycle phase as well as the pulse valency referred to the dye MID. The lye quantity required is calculated on basis of the pulses from the dye MID. If the actual value of the lye quantity exceeds the value calculated on basis the dye quantity multiplied by the safety factor, an alarm message is output.

Pu. start speed: ***xxx%***	The **pump start-up** defines the minimum permissible pump speed. The pump is stopped below this value. This value prevents incorrect measurements.
Com.port: ***Reset*** ***Service*** ***Printer*** ***PC***	The option **Port** is used to define its settings. The following setting options are available: **"Reset"** Resets the port. **"Remote maintenance"** Mode Remote maintenance **"Printer"** A log is output to a serial printer per control cycle. **"PC"** Access via PC (e.g. Hyper Terminal) **Note:** The port serves to monitor the KKV dosing system or to record the measured data. Configuration of the port and the functions available are compiled in a separate manual.

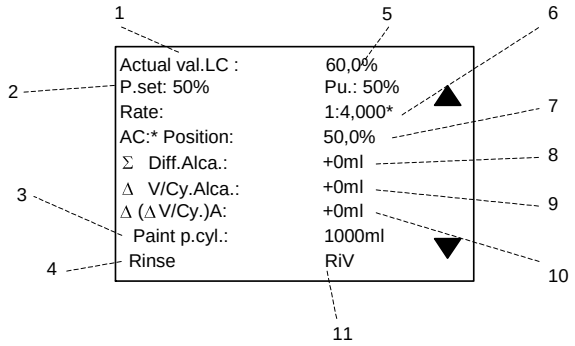
The following functions are assigned to the function keys:

F1-F4 No function
F5 Acknowledge fault (acoustic alarm off)
Alarm Query alarm messages
Help Display Help for the monitoring parameters
ESC Return to the basic settings

7.4.7 Manual Operation for Service

On pressing the "F5" key, the display for manual operation appears. This menu item is only used for commissioning or service tasks. This operating mode is **not** suitable für normal operation.

Please note: The speed of the pump motor is set via the on-site or the internal level controller.



1 ..... Actual value of foulard level
2 ..... Pump set value
3 ..... Dye quantity that was pumped during the last control cycle
4 ..... Status display
5 ..... Pump rating
6 Current ratio (star is displayed at every second control cycle)
7 ..... Actuator position
8 ..... Total of lye difference
9 ..... Lye difference during last cycle
10 ..... Change of lye difference referred to last control cycle
11 ..... Device status

Note: If an external level controller is used a zero is displayed in the *Actual value FR* display.

The following functions are assigned to the function keys:

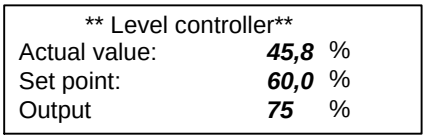
F1 Reduce stroke lye head (**-**)
F2 Increase stroke lye head (**+**)
F3 Switch controller on and off
F4 Reset display values
F5 Acknowledge fault (acoustic alarm off)
Alarm Query alarm messages
Help Display Help for manual operation
ESC Return to the basic settings

7.5 Internal Level Controller

7.5.1 Set Value of Internal Level Controller

On pressing the "F4" key in the flow display the settings of the internal level controller are displayed.

The internal level controller is activated in the Configuration menu (see Chapter 7.4.4).



Actual value : xxx.x %	Display of the actual foulard level in %
Set point : ***xxx.x***	Input of the **set value** of the foulard level in %
Output: xxx %	Display of the adjusted value of the internal level controller

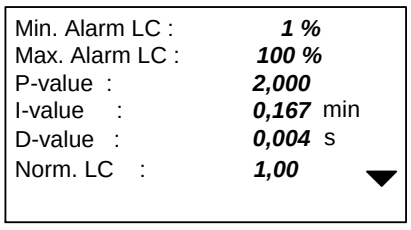
The following functions are assigned to the function keys:

F1 Call control parameters of internal level controller
F2-F4 No function
F5 Acknowledge fault (acoustic alarm off)
Alarm Query alarm messages
Help Display Help for set value of internal level controller
ESC Return to flow display

7.5.2 Parameters of Internal Level Controller

By pressing the "F1" key in the basic settings display for the internal level controller and inputting the password, the control parameters are displayed.

The password that has been set is "**1111**" and can only be changed by the manufacturer. Further details see Chapter 7.3.1



Min. Alarm LC : ***xx.x***	**Minimum foulard level** for alarm message (dry running) 0= OFF If the minimum level is fallen below during dyeing operation when the internal level controller was triggered, the foulard contents can still be used after the fault has been acknowledged for the first time (with the F5 key or the Reset button). After the acknowledgement key is pressed a second time the solenoid valve for draining the residual volume towards the chemicals channel opens. Then the system is restarted.
Max. Alarm LC : ***xx.x***	**Maximum foulard level** for alarm message (overflow)
P-value: ***xx.xx***	**Increase** for internal level controller
I-value: ***xx.xxx***	**Reset time** in minutes for internal level controller
D-value: ***xx.xxx***	**Derivative time** in seconds for internal level controller
Norm. LC : **xx.xx**	**Scaling of input signal** for internal level controller. Adjustment of the input to 100%. e.g. at setting 4-20mA: 1.00 if 20 mA is 100% 2.00 if 12mA is 100%

The following functions are assigned to the function keys:

F1-F4 No function
F5 Acknowledge fault (acoustic alarm off)
Alarm Query alarm messages
Help Display Help for parameters of internal level controller
ESC Back to set value display of internal level controller

7.6 Setting of Sensors for Air Detection

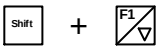
Sensors for detecting air pockets in the pumped medium are integrated in the suction pipes of the pumps. These sensors are triggered with a delay time of 0..6.4 s. They are set via two potentiometers directly on the CPU of the SPC. The potentiometers are located on the right-hand side of the SPC.

The following assignment is valid for the potentiometers:
- Potentiometer "0" Delay time for empty pipe
- Potentiometer "1" Delay time for filled pipe

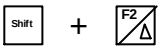
7.7 Error Messages

Error messages are displayed in plain text. Alarms can be queried as follows:

Active alarms are called and displayed



Further alarms are called



Example of an error message:

Fault!
Fault indication
Paint-MID!

The following functions are assigned to the function keys:

F1-F4 No function
F5 Acknowledge fault (acoustic alarm off)
Shift+F1 Scrolling the display downwards
Shift+F2 Scrolling the display upwards
Alarm Query alarm messages and acknowledge
Help Display Help for the alarm messages
ESC No function

7.8 Help Function

Help information is assigned to all pages (even alarm pages). The key mappings of the function keys "F1" to "F5" are marked in these pages and there are some hints as well. The function keys are disabled while the Help page is called.

Call the Help page

Exit the Help page

8 Parameter Lists

The KKV dosing system is programmed on basis of experience during operation and the requirements of the customer. For this reason the programming of the MIDs, the frequency converter and the parameters should only be changed after previous consultation with **sera**.

8.1 Parameters of Lye and Dye MID

The MIDs for lye and dye are programmed as follows and deviate from the manufacturer programming:

Alcaline-MID		
System units	Unit volume flow	l/h
	Unit volume	ml
User interface	Assign line 1	Off
	Assign line 2	Operating-/Systemcondition
Current output	Assign current	Off
Pulse/Freq.output	Pulse value	1.000 ml/pulse
	Pulse width	0.5 ms
Status output	Assign status	On
Process parameter	On-val.lf-cutoff	5 l/h
	Empty pipe detection	Off
System parameter	System damping	0
Supervision	Alarm delay	1 s

8.2 Parameters of Frequency Converter

The frequency converter, model 8200 motec (Lenze) is parameterized as follows and deviates from the manufacturer programming:

Parameters	**Designation**	**sera - setting**
C0008 / 000	Relay output	TRIP - 1 -
C0010 / 000	minimum frequency	0.00 Hz
C0011 / 000	maximum frequency	50.00 Hz
C0012 / 000	Acceleration time Tir	1.00 s
C0013 / 000	Deceleration time Tif	1.00 s
C0026 / 000	AIN1 – OFFSET	-0.30 % *
C0027 / 000	AIN1 – GAIN	102.0 % *
C0034 / 000	Analog set point	X3 / 8 4...20mA - 1 -
C0087	Rated motor speed	1360 rpm
C0088	Rated motor current	2.1 A
C0089	Rated motor frequency	50 Hz
C0090	Rated motor voltage	400 V
C0091	Motor-cos φ	0.7
C119	PTC thermistor	1
C016	Boost	6%

* Depending on the drive motor

8.3 Parameters of Controller

The basic settings of the control system have been defined by **sera** as follows:

Basic settings	
Norm. rate	1/004.00
ml Alcal. in 1000ml total vol.	200ml
Starting aid	Auto
Auto. adjust	ON
Control settings	
Reg. P-value	1.000
Reg. I-value	0.100
Reg. D-value	0.200
Pulse p. cyc.	230P
Stroke-sensor	ON
Adjustments	
MID-Alca.	1ml/P
MID-Paint	4ml/P
Pumpsig.inp.	4-20mA
Pumpsig.out.	4-20mA
Position sensor.	On
Interner LC :	Off
Start parameters	
Drain run after	10s
Fillspeed lim.	50%
Start pos.AC	50%
Rate tolerance	3%
min.Pre.volum..	20l
drainage time	30s

Monitoring parameters		
max.rate	+/-15%	
max.∆Alcal.	100ml	
max.Start time	300s	
max.Startcycle	100	
Tmax.be.MID-P	10s	
Safty-factor.	3.0	
Pu.start speed	15%	
Com. port	Service	
Potentiometer for detection of air pockets		
Dely time pipe empty	Potentiometer 0	2s
Dely time pipe filled	Potentiometer 1	0s

Set point int. level controller	
Set point	50.0 %
Parameters int. level controller	
Min. Alarm LC	1.0 %
Max. Alarm LC	100.0 %
P-value	2.00
I-value	0.167
D-value	0.004
Norm. LC	1.00

9 Commissioning

- Before commissioning the system check all pipe connections, threaded joints, flanged connections etc. and tighten if necessary.
- Before switching on the control system for the first time check the electrical connections and the terminal assignment and check whether the data on the rating plate correspond with the local voltage supply and frequency.
- Start the commissioning with water. Note the water quality as per chapter 2.
- Open all shut-off devices required for operation. Close the shut-off devices for emptying the pipes.

CAUTION !

No shut-off devices may be located on the pressure side of the KKV dosing system.

- Switch on the main switch of the KKV system.
- Set the level controller used in the Configuration menu.
- Set the analog input signal of the pump speed in the Configuration menu.
- Program the level controller to the required liquor speed and receptivity for dyes and set the necessary foulard level.
- Check the parameter settings on the operator panel of the KKV dosing system and correct, if necessary.
- Set the start-up parameters at the operator panel (see 7.4.5) to the required values.

Note: The parameter for start-up of the pumps (see 7.4.6) is factory-adjusted and shouldn't be changed. The pump start-up defines the minimum permissible pump speed. The pumps are not started below this value. If the system is in step *Operation* and this value is fallen below, the pump stops and the system changes to step *Ready* (see Chapter 5.2.2).

- After the KKV dosing system has been switched on the step *Drain* is activated for the defined time. Set this time in such a way that the foulard is emptied completely.
- The signal to open the drain valve is output (signal *Drain valve chemicals channel*). When this signal is applied the chemical must be able to flow out of the foulard in the chemicals channel.
- Then the status display *Rinse* appears and the system is ready for rinsing.
- Switch the pump to rinsing mode with *Release pump*. Run the pump at full speed and check for tightness. The signal to open the rinse valve is output. When this signal is applied the fluid must be able to flow out of the foulard in the sewer.
- Check the analog input signal at the operator panel. The pump speed must be 100% or the foulard level 0% when the foulard is empty.
- Fill the foulard and observe the pump speed from the output of the level controller. The pump speed must be 0% when the foulard is filled to avoid overflowing.
- Start the test run with liquor by closing the input contacts *Release control* and *Release pump*. Check the foulard level while doing so and adjust the level controller if necessary. When the start-up phase has finished successfully (venting and adjustment), the drain valve is closed and filling of the foulard is started. If the value at the analog input is lower than the filling capacity (see Chapter 7.4.5), the system changes to operation mode and the signal *Release dyeing* is transmitted. The liquor can then be started via this signal.
- After commissioning drain the water completely from all pipes, the container and the dosing pump. Then start operation with the chemical.

Note: The passing from step *Filling* to step *Operation* is dependent on the filling capacity of the pump (see Chapter 7.4.5). If the current pump output is below the filling capacity, the system changes to step *Ready* and the signal *Dyeing release* is output.

10 Maintenance

All maintenance work must be documented carefully.

To guarantee functionality of the system the technical components must be serviced. The maintenance intervals depend on many different factors so that generally valid statements are not possible.

- Service the pump according to the separate instructions.
- The maintenance of the actuator and the magnetic-inductive flow meter must be carried out according to the separate instructions.
- Rinse the dosing pump at regular intervals.
- Check the piping and the containers for tightness at regular intervals, and repair, if necessary.
- Check the screwed connections regularly and tighten, if necessary.
- Carry out a visual inspection and a pressure test.
- Check the electrical lines and components for visible damages at regular intervals (loose connections, damaged cables, defective devices etc.)

11 De-Commissioning

The following points must be observed when you de-commission the system:

- Drain the chemical from the pipes.
- Purge the pipes with water and then drain them. Note the water quality as per chapter 2.
- Set the stroke length of the pump to 50% to relieve the diaphragm.
- Disconnect the unit from the power supply.

12 Fault Analysis and Corrective Action

sera units are proven technical products which are only shipped after an extensive final test in our works.
Should any malfunctions occur, these can be located and corrected easily with the help of the following reference guide.

12.1 Malfunctions, Causes, Corrective Action

- For fault analysis and corrective action concerning dosing pumps, please refer to TA-005 of the total documentation.
- For fault analysis and corrective action of the flow meter, please refer to the total documentation.
- For fault analysis and corrective action of the actuator, please refer to the total documentation.

12.1.1 Error Messages

Error messages are displayed in plain text on the operator panel, indicated visually by an indicator light at the front side of the switch cabinet and acoustically by an acoustic alarm. In addition, a collective fault is triggered.

Please note: All error messages with the exception of "Actuator at limit stop" will stop the system.

Note: If one of the storage tanks is emptied during the dyeing process (air is sucked in) or the minimum level is fallen below when the internal level controller was triggered, the foulard contents can still be used after first acknowledgement of the fault. After the acknowledgement key is pressed a second time the solenoid valve for draining the residual volume towards the chemicals channel opens. Then the system is restarted.

Fault message	Cause	Corrective action
Fault at the SPC or the operator panel	No error message is displayed. Please contact the manufacturer for corrective action.	
Limit-fault! Alcaline soluti. sum difference exceeded	Lye stock over.	Check lye stock and replenish if required.
	Actual value of lye quantity outside the permitted range, hence actuator at limit stop.	Check whether actuator is at the limit stop, if yes, check lye volume setting.
	Actuator has failed, hence no automatic adjustment.	Call manual operation with "F3" and manually operate the actuator. The actuator must be movable in both directions, unless it is at the limit stop. In that case, it must be possible to move the actuator away from the limit stop; if not, the output couplers in the control panel have to be checked.
Limit-fault! Rate difference exceeded!	Settings of the MID's do not tally with those of the control.	Check settings at the MID's. The settings at the MID's must tally with the MID settings of the control, if required, correct them.
	One of the MID's is not completely filled with the pumped medium, hence wrong measurement.	Check whether both MID's are fully filled with pumped medium else vent if required.
	Control unstable.	See "Oscillation of the value difference lye or the ratio".
	Pump faulty.	Check pump according to separate instructions.
Note: If the error message "Total of lye difference" is acknowledged, "Total of lye difference" is automatically reset in the flow display.		
Limit-fault! Required paint quantity to low	Dye stock over.	Check dye stock and if required, replenish.
	Settings of the MID's do not tally with those of the control.	Check settings at the MID's. The settings at the MID's must tally with the MID settings of the control, if required, correct them.
	One of the MID's is not completely filled with the pumped medium, hence wrong measurement.	Check whether both MID's are fully filled with pumped medium else vent if required.
	Pump faulty.	Check pump according to separate instructions.

Fault message	Cause	Corrective action
Fault! **No pulse from alcaline solut.MID!**	Storage tank empty.	Replenish storage tank.
	Especially: No pulses from lye and dye MID: Lye setting set to 0 ml, hence no discharge.	Do not set ratio under 50 ml lye per 1000 ml dye.
	Pump faulty.	Check pump according to separate instructions.
	MID has no supply voltage.	Check whether MID is getting voltage.
	Setting of the MID wrong.	Check settings of the MID's and correct.
Fault! **No pulse from paint-MID**	Wire fracture in the control line from MID to controller.	Check control line from MID to controller and repair it.
Fault! **Error message from dye MID**	MID has no supply voltage.	Check whether MID is getting voltage or whether fuse has blown.
	MID not fully filled.	Check whether storage tank empty, vent MID.
Fault! **Error message from lye MID**	MID faulty.	Check MID according to separate instructions.
Alcaline solution pipe empty!	Lye or dye pipe empty, since storage tank empty.	Replenish storage tank.
Paint pipe empty The capacitve sensors in the suction pipe detected air pockets.	Suction pipes leaky, hence air inlet.	Seal suction pipes.
	Large air bubbles in the feed pipe.	Always lay the feed pipe (suction pipe) slightly inclined so that the air can escape during the venting phase.
Caution: If the contents of the foulard is to be used furtheron, press the acknowledgement key once! If the alarm is acknowledged twice, the foulard is drained towards the chemicals channel and the dosing system is restarted.		

Fault message	Cause	Corrective action
Drain fault! **Maximal start time crossing**	Lye or dye storage tank still empty.	Replenish storage tank.
	Suction pipe leaky.	Seal suction pipes.
	Suction pipe too long, hence starting time limit too short.	Extend maximum starting time.
Maximal start time crossing!	Venting after-running time set too high or starting time set too low.	Extend the maximum starting time and reduce the venting after-running time to the minimum required value.
Justage fault! **Maximal start cycles crossing!**	Ratio limit value set too low.	Correct limit value.
	Oscillation of the controller.	See "Oscillation of the value difference lye or the ratio".
Maximal start cycles crossing!	Pre-run quantity set too high or starting cycle limitation set too low.	Increase maximum number of starting cycles and reduce pre-run quantity to smallest possible value.
Filling fault! **Maximal start cycles crossing!**	The control system has not recognized the end of filling, since the pump, on reaching the set filling level in the foulard was not stopped via the release signal or analog signal.	The pump must be switched off via the signals *Release pump* or *Set value pump*! These signals must be fed via the control system!
	Valve towards the chemicals channel does not close.	Check drain valve and output coupler.
	Dyeing was started before the signal *Ready for dyeing* was applied.	The signal *Ready for dyeing* must be taken into account when the on-site host computer is configured.
Actuator on limit! Actuator has left the operating range (5-95%)	Delivery rating of the lye or dye head is inadequate.	Check pump valves for tightness, if required, replace.
Note: The error message "Actuator at limit stop" will stop the system.		
Fault actuator! **Max. start time crossing! Set position not achieve!**	Actuator moves in the wrong direction.	Check connection of actuator and correct, if necessary.
	Actuator does not move.	Check setting of the limit switches. It must be possible to move the actuator from 0-100%.
	Actuator does not move despite of correctly set limit switch.	Check actuator and replace if required.
	Actuator does not get voltage.	Check feed line and output coupler.

Fault message	Cause	Corrective action
Fault position sensor!	Connecting cable to the position sensor in actuator broken or has a short-circuit.	Check the feed line to the position sensor and repair it.
	Position potentiometer in actuator defective.	Replace position potentiometer.
	Detector of actuator position defective. The system can only be operated in manual mode.	Set position feedback to “Off” until the detector of the actuator position can be repaired. When the position feedback is switched off, the starting aid, pre-positioning and indicator of the actuator position are not available! (automatic operation is possible)
Fault pump signal!	Analog signal line broken or short-circuited.	Check signal line to control system.
	Reverse polarity of connecting lead or pump set value out of defined range.	Check polarity and signal and correct if necessary.
	Pump set value not potential-free.	Ensure that set value is potential-free. If the message continues to be displayed check the analog component of the SPC.
Fault frequency converter!	Frequency converter has no mains voltage supply.	Check whether mains voltage is present at the frequency converter.
	Input signal outside valid range.	Check whether analog signal is present at the frequency converter. If not, check the control cables to the frequency converter. Check whether the magnitude of the signal is in the valid range.
	Frequency converter faulty.	Check frequency converter according to separate instructions.
Fault pump!	Pump motor does not rotate, since motor blocked or faulty.	Have motor and pump checked.
	Release or analog signal for frequency converter is not applied.	Check and repair signal lines from the control system to the frequency converter and repair if necessary.
	Pump faulty.	Check pump according to separate instructions.
Fault stroke sensor!	No pulses from stroke sensor.	Check stroke sensor and its connection.
Foulard level too low!	Set value for minimum level fallen below when the internal level controller was triggered.	Check parameters. Check level meter. Reduce speed of liquor. Drain valves do not close.
	If the minimum level is fallen below during dyeing operation when the internal level controller was triggered, the foulard contents can still be used after the fault has been acknowledged for the <u>first</u> time (with the F5 key or the Reset button). After the acknowledgement key is pressed a <u>second</u> time the solenoid valve for draining the residual volume towards the chemicals channel opens. Then the system is restarted.	
Foulard level too high	Set value for maximum level exceeded when the internal level controller was triggered.	Check parameters. Check level meter. Drain valves do not open during rinsing operation.

Fault message	Cause	Corrective action
Controller does not function (no display)	Controller switched off or without voltage.	Switch on controller or check whether supply voltage is present.
	Menu Manual operation has been called (Display: "Hand").	Quit the manual operation mode with the "ESC" key on the operator panel. Particularly in the screen "Manual operation for Service" (under basic settings): with the "F3" key, switch on controller or switch to the flow display (press "ESC" twice).
	Release signal absent, hence, despite higher rate of delivery, continuous display "Rinse".	Check whether the release input **I1.0** is set at the SPC (display at the SPC). If not, check line and host control system and repair, if necessary. If a signal is applied continue with the following steps.
	MID's have no supply voltage.	Check whether MID's are getting voltage (check fuses).
	Setting of the MID wrong.	Check settings of the MID's and correct if necessary.
	Wire fracture in the control line from the MIDs to the controller.	Check the control line from the MID's to the controller and repair if necessary.
	MID's faulty.	Check MID's according to separate instructions.
Keys on the operator panel do not react (no display)	Function keys pressed too quickly in succession or simultaneously.	Before pressing another key, wait min. 1s. Key functions that have hung can be unlocked with "F4" (Reset) or "F5" (Quit) or the illuminated push-button (note function!). If there is no reaction, briefly switch off the KKV system at the main switch. **Caution:** In this case the foulard contents is drained towards the chemicals channel and the dosing system is restarted.
Fault message	Cause	Corrective action
Oscillation of the value difference lye or of the ratio (no display)	Pressure keeping valve leaky or defective.	Check pressure keeping valve for tightness and proper functioning. The opening pressure should be appr. 0.8 bar.
	Pump valves dirty, leaky or worn.	Clean pump valves and check for tightness. Replace if necessary.
	Parameters of controller set wrongly. An oscillating controller can manifest itself in dye deviations in the longitudinal direction.	Watch flow display. If an oscillation of the ratio or the total of lye difference by a large amount is observed, immediately contact the manufacturer and have the controller parameters set again by specialized personnel. Oscillation by a "small" amount (about +/-30ml for the lye fault total and between 3.7 and 4.3 for the ratio) is normal. During the start, the values can also be greater for a short time.
Oscillation of the actual value (internal level controller)	Parameters of controller set wrongly.	Have parameters set by specialized personnel.

13 Disposal

Switch the unit off, please see „Decommissioning“.

13.1 Dismounting and Transport

- Remove all remaining fluid, clean, neutralize and decontaminate the system carefully.
- Pack the dosing system properly and arrange everything for transport.
- When shipping the product for repair, make sure that the gearbox is filled with oil.

13.2 Complete Disposal

- Remove all remaining fluid out of the unit.
- Drain off all lubricants and hydraulic fluids and dispose of them in accordance with the regulations.
- Dismount all materials homogeneously and send them to a suitable waste disposal company.

CAUTION !

The consignor is liable for any defects resulting from leaking lubricants or residual fluids!

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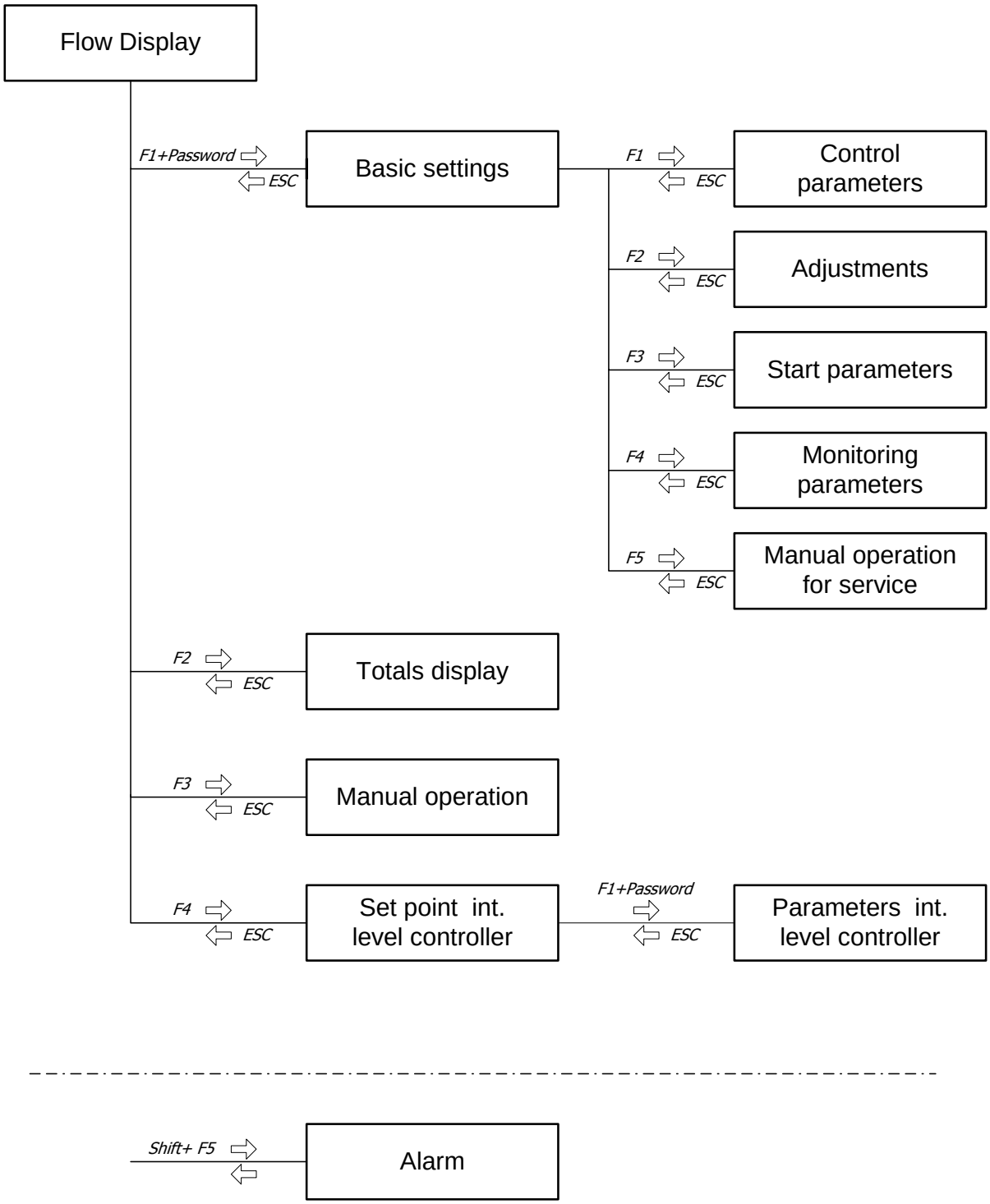
14 Annex

14.1 Menu Overview



For notes

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