Operating Manual BKS610

Digital microprocessor controlled web guide for chase and follow systems

Version 1.02 02/02 fg

Firmware Version 1.10
Hardware Rev. C

This operation manual is also available in German.
Please contact your local representative.

Diese Bedienungsanleitung ist auch in Deutsch erhältlich.
Bitte kontaktieren Sie die Vertretung im zuständigen Land.

1 Safety Instructions

1.1 Description Conditions

High danger of health injury or loss of life

Danger

This symbol refers to high risk for persons to get health injury or loss life. It has to be followed strictly.

Risk of damage to machines

Caution

This symbol refers to risk of heavy mecanical damage. This warning has to be followed absolutely.

Notice for proper function

Notice

This symbol refers to an important information about proper use. If not followed, malfunction can be the result.

1.2 List of Safety Instructions

- Proper function of the electronic unit is only guaranteed with the recommended application of the components. In case of other arrangement, heavy malfunction can be the result. Therefore, the installation instructions on the following pages must be followed strictly.
- Local installation regulations are to preserve safety of electrical equipment. They are not taken into consideration in this operating manual. However, they have to be followed strictly.
- Bad earth connection may cause electric shock to persons, malfunction of the total system or damage of the electronic unit! It is vital to ensure that proper earth connection is done.
- The processor board is mounted to the housing cover. Improper handling may damage the fragile electronic equipment! Don’t use rough tools such as screwdrivers or pliers! Touch processor board as little as possible! Touch earthed metal part to discharge static electricity before opening the housing!
- If external parts are in the travel range of the linear units, the sensors can be damaged while moving! It is to ensure that large enough distances are kept allover.
- With the line-up of the limit of travel positions, the software limit switches of the steering frame or the unwinding roller are set. Bad setting may cause damage of the steering frame or the unwinding roller! Therefore, the setting should only be made during the first initial operation and by authorized and specially trained personnel only!
- Wrong setting of the jumpers and solder bridges may cause malfunction of the electronic unit or the total system! Setting of the solder bridges and jumpers must be checked carefully prior to power on! Setting of the solder bridges should be carried out by trained personnel only!

Table of Contents

2 Definitions

Left and Right: Left and right are always seen in direction of the running web.

Linear unit: Motorized Sensor adjustment (option). The sensor is adjusted automatically by a linear guide with stepper motor to the edge or line to be detected.

Steering device: Hydraulic cylinder, steering frame or similar actuator.

Dead band: A free programmable range of tolerance in which the web may move freely without readjusting the steering device. Keep in mind that „0.3mm“ means ±0.3mm.
If the deviation is higher than the tolerance, the web will be readjusted into the range of the dead band.

Subprint: Electronic extension module which can be plugged to the main board of the electronic unit if required. That way, the possibilities of the electronic unit can be extended easily.

3 System Components

A BKS610 web guiding system consists of the following components (refer also to fig. 1):

Steering device
- Electrically or hydraulically driven
- Supports continuous control or double point control

Electronic unit BKS610
- For all control functions
- With operation panel for parametrization
- Steering frame with stepper motor, analog control output ±10V or 2x digital control outputs „turn left“ / „turn right“
- Power amplifiers for the stepper motors of the linear units
- *Interface RS232, PROFIBUS, CAN-Bus, DeviceNet*
- Digital inputs and outputs
- *Remote control box*
- With robust aluminium housing

Sensors
- For detection of web edge
- 2 to 4 analog sensors

Linear units
- *linear units with two phase stepper motor and limit switch for reference*

(Italic components as variant or option)

4 System Description

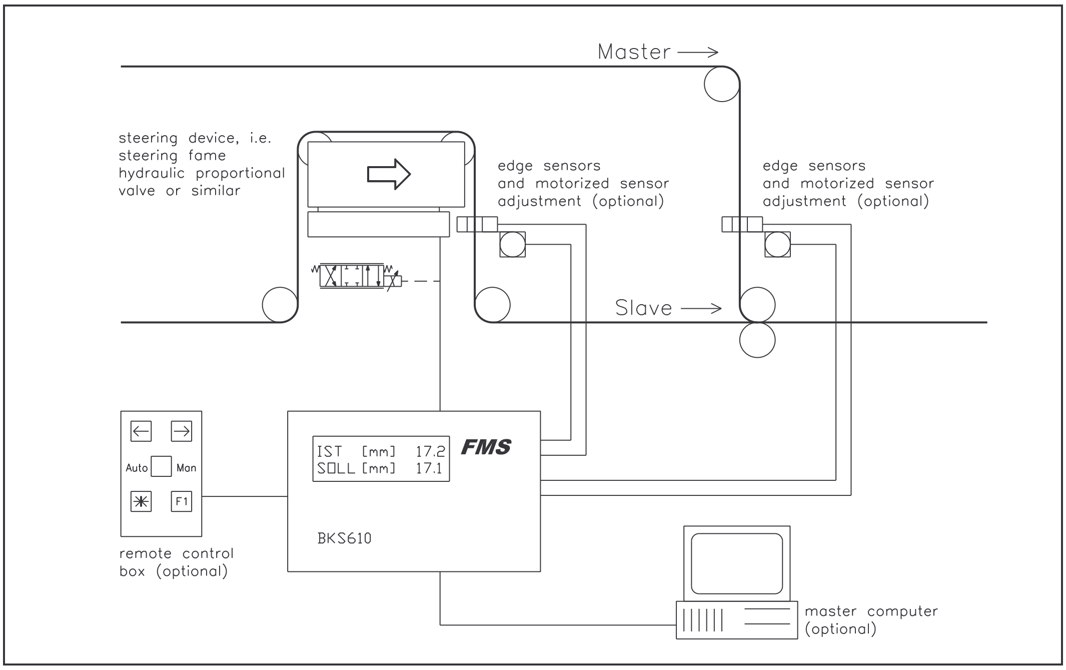

fig. 1: Basic structure of the BKS610 web guide K610006e

4.1 Functional Description

The sensors measure the position of the master and slave web edge and send this information as analog signals to the electronic control unit. The control unit compares the current position. If the difference is higher than a parametrized value (dead band), the steering device is adjusted. That way the slave web is aligned laterally to the master web.
If the sensors are equipped with linear units, the control unit automatically lets them follow the edge. The actual position of the sensors on the linear unit is taken into calculation for the actual web position.

4.2 Steering device

The steering device adjusts the slave web position laterally. Its width is depending on the web width.
Any steering device can be used if it can handle one of the signals of the electronic unit:

- Output for FMS steering frames, stepper motor driven
- Analogue output ±10V for any actuator
- Two relay outputs for double point control
- Optionally: ±300mA / ±10V for a moving coil controller (hydraulic actuator)

4.3 Electronic Control Unit

Common

The electronic unit is mounted to a robust aluminium housing. It contains the power amplifier to drive the actuator and the power amplifiers to drive the linear units. The electronic unit has no trimmers and only few jumpers to keep most accurate long-time and temperature stability.

Operation

The large backlit display with 2x16 characters, 4 LED's and large keys guarantee simple operation. All information is in plain text with the following languages selectable: English, German, French and Italian. Most of the functions may be paramterized. The parametrization can be done via the keys or the interfaces. All inputs are fail-safe stored in an EEPROM. Additional settings can be made with jumpers or solder bridges.

Interface

As an option, there are RS232, PROFIBUS, CAN-Bus or DeviceNet interfaces available. All inputs and settings can be made by the integrated operation panel or by the interfaces.

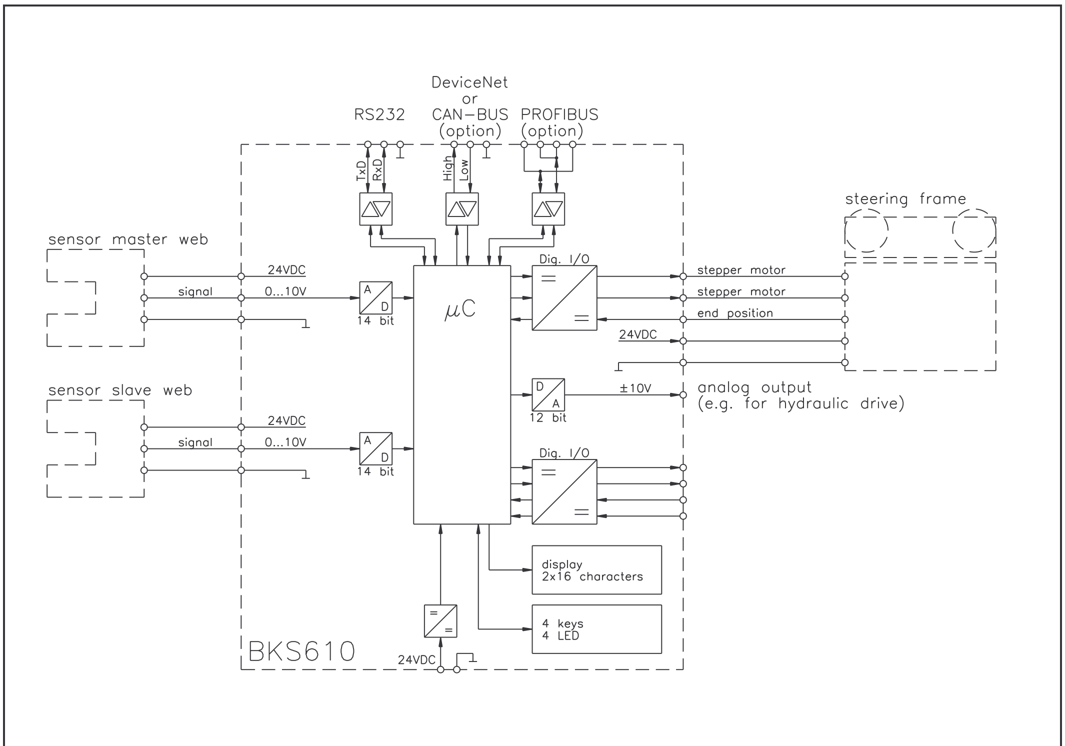

fig. 2: Block diagram BKS610 K610007e

4.4 Edge Sensors

An optical sensor (AZS01) and an ultrasonic sensor (US01) is available from FMS. Adjustment is done automatically. These sensors provide a signal of 0...8V.

4.5 Manual Sensor Adjustment

The manual sensor adjustment allows an easy positionning of the sensor across the whole material width. Focussing of the sensor is kept.

4.6 Linear Units

The linear units are also used for sensor positioning but give much more comfort than the manual one. The control unit automatically lets the sensors find the edge or the line across the whole material width.
This kit contains 1 or 2 linear units with travel range according to customer specification, the sensor mounting bracket and the necessary cables. The control unit detects automatically if 1 or 2 linear units are installed.
It is possible to define a fixed reference point (machine frame for example). Then, all position values will refer to this reference point.

4.7 Remote Control Box

The remote control box simplifies resetting the machine for a new job. The position reference can be adjusted with two keys on the box in 0.1mm steps. It enables the operator to stand beside the machine and get a direct feedback when adjusting the lateral position.

5 Quick Installation Guide

- Check all your requirements such as:
  – Control mode (edge left, edge right, center guiding)?
  – Number and setup of the edge sensors?
  – Steering device type (FMS steering frame, hydraulic drive or other device)?
  – configuration of the digital inputs and outputs?
  – linking by interface etc.?

- Draw your final wiring diagram according to the wiring diagram (refer to „7.2 Wiring diagrams“)

- Install and wire all your components (refer to „7. Installation and wiring“)

- Turn power on and do the setup according to „8. Operating“

- Proceed a test run with low speed

6 Dimensions

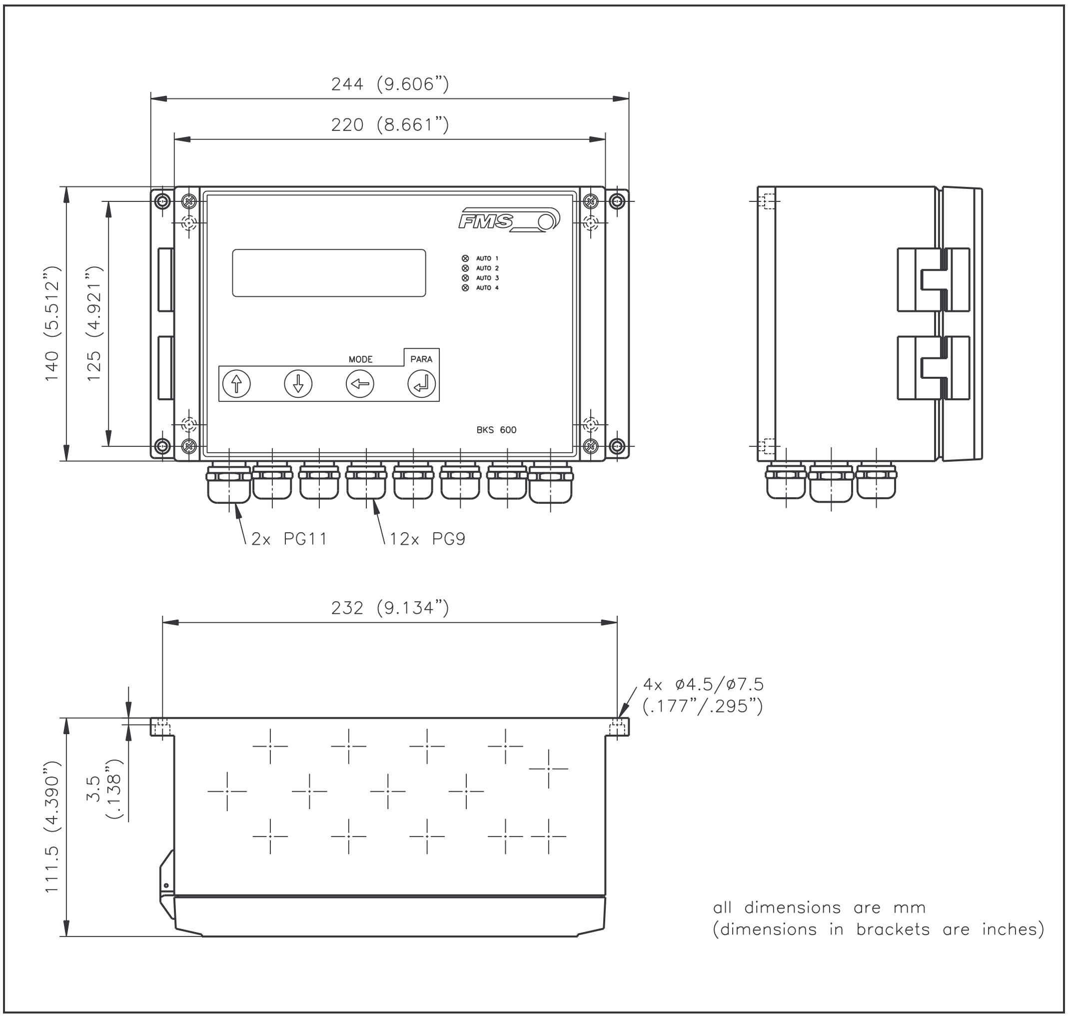

fig. 3: Dimensions K600019e

7 Installation and Wiring

Caution

Proper function of the electronic unit is only guaranteed with the recommended application of the components. In case of other arrangement, heavy malfunction can be the result. Therefore, the installation instructions on the following pages must be followed strictly.

Caution

Local installation regulations are to preserve safety of electrical equipment. They are not taken into consideration in this operating manual. However, they have to be followed strictly.

Caution

Bad earth connection may cause electric shock to persons, malfunction of the total system or damage of the electronic unit! It is vital to ensure that proper earth connection is done.

7.1 Mounting the Electronic Unit

The housing can be mounted in a control cabinet or directly beside the machine. All connections are led into the housing through glands and are connected to the plug-in screw terminals according to the wiring diagrams (fig. 7...12).

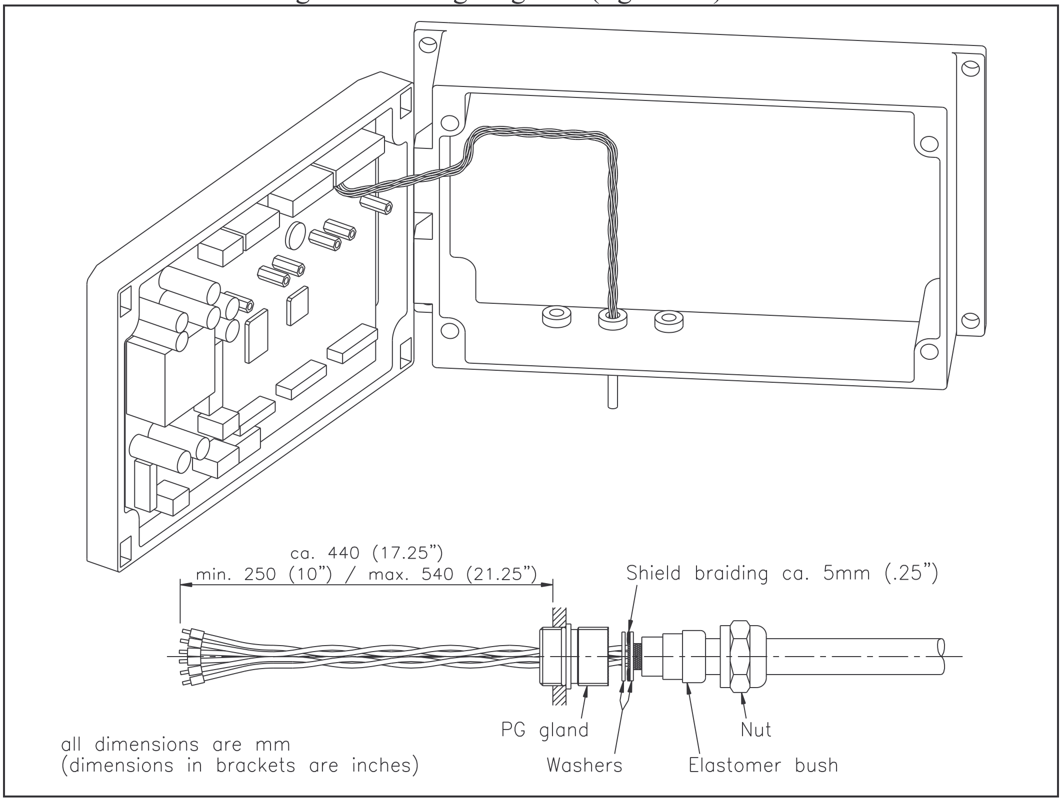

fig. 4: Wiring path inside the housing E600002e

Caution

The processor board is mounted to the housing cover. Improper handling may damage the fragile electronic equipment! Don’t use rough tools such as screwdrivers or pliers! Touch processor board as little as possible! Touch earthed metal part to discharge static electricity before open the housing!

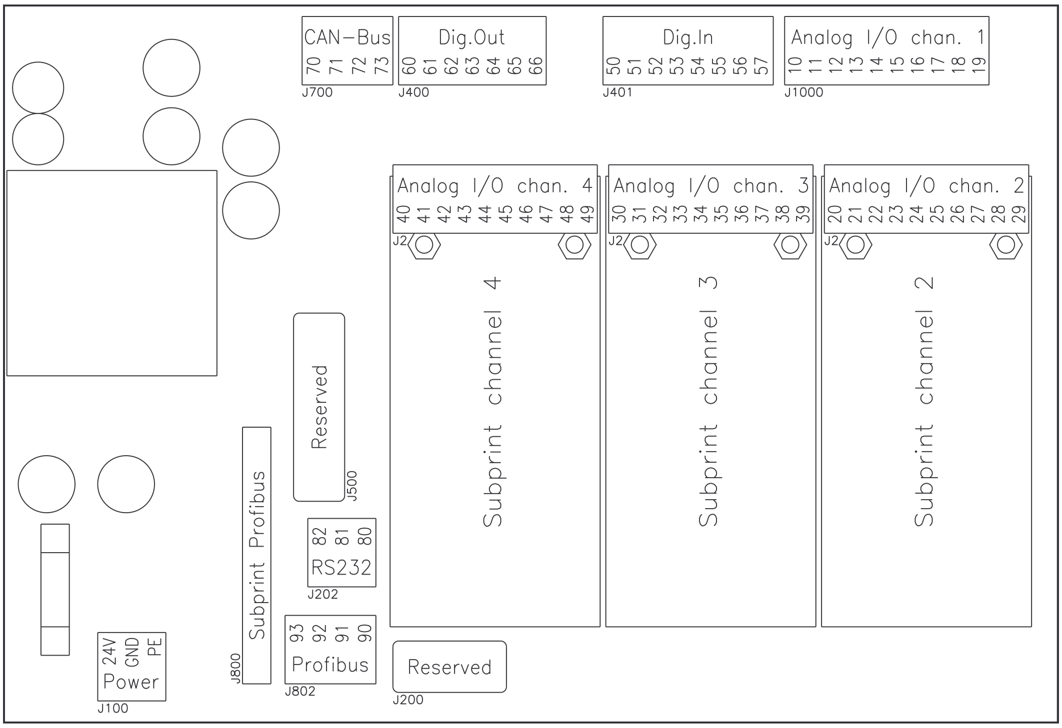

fig. 5: Screw terminal arrangement on the processor board E600003e

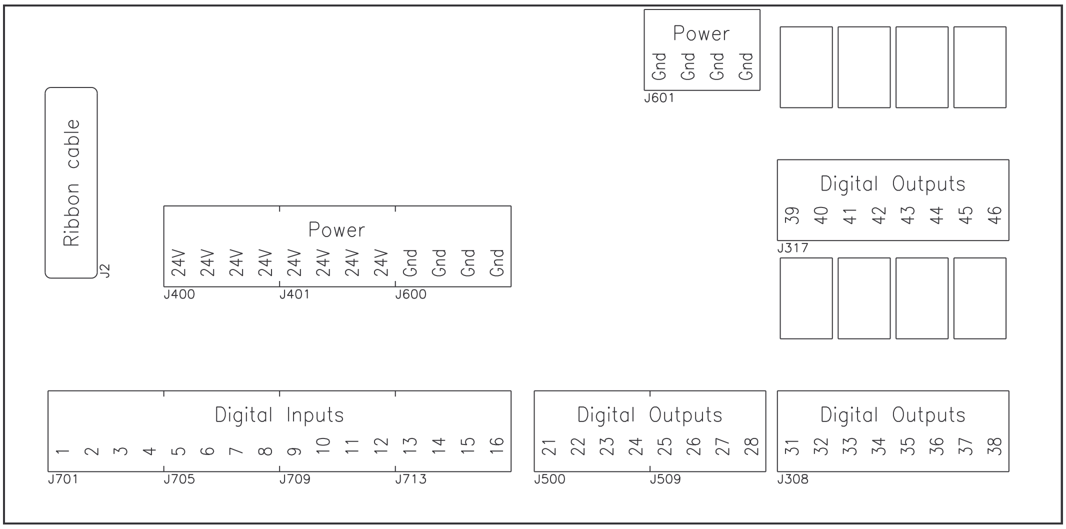

fig. 6: Screw terminal arrangement on the extension board E600009e

7.2 Wiring Diagrams

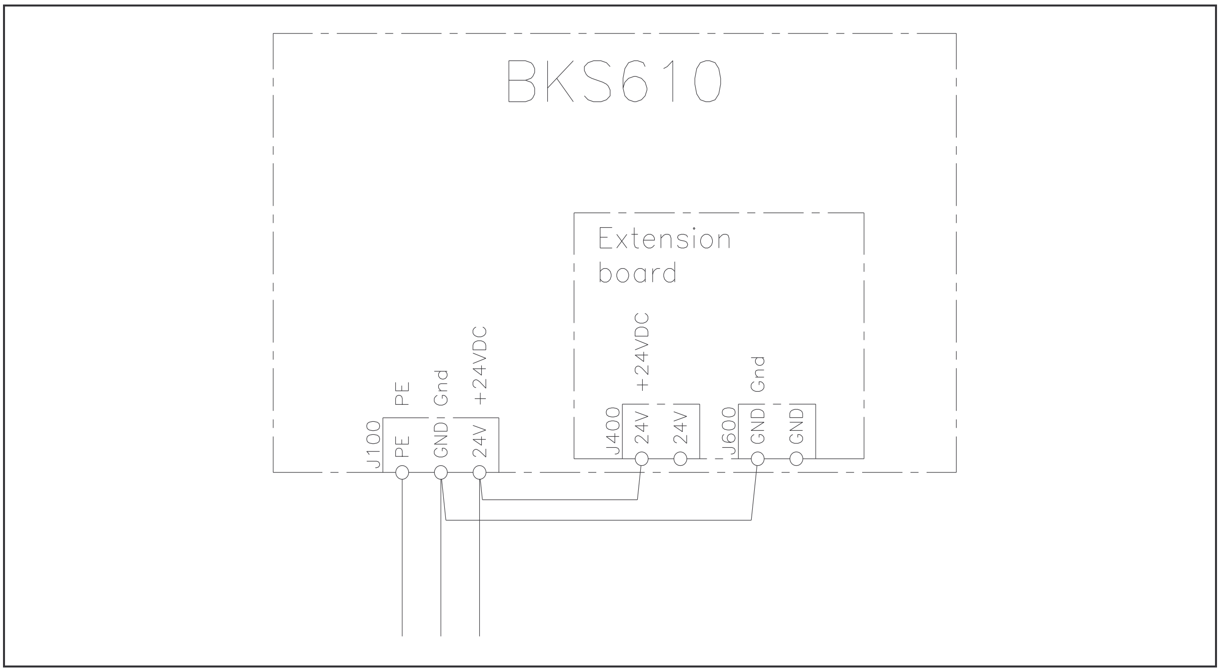

fig. 7: Wiring of the power supply to the electronic unit K610012e

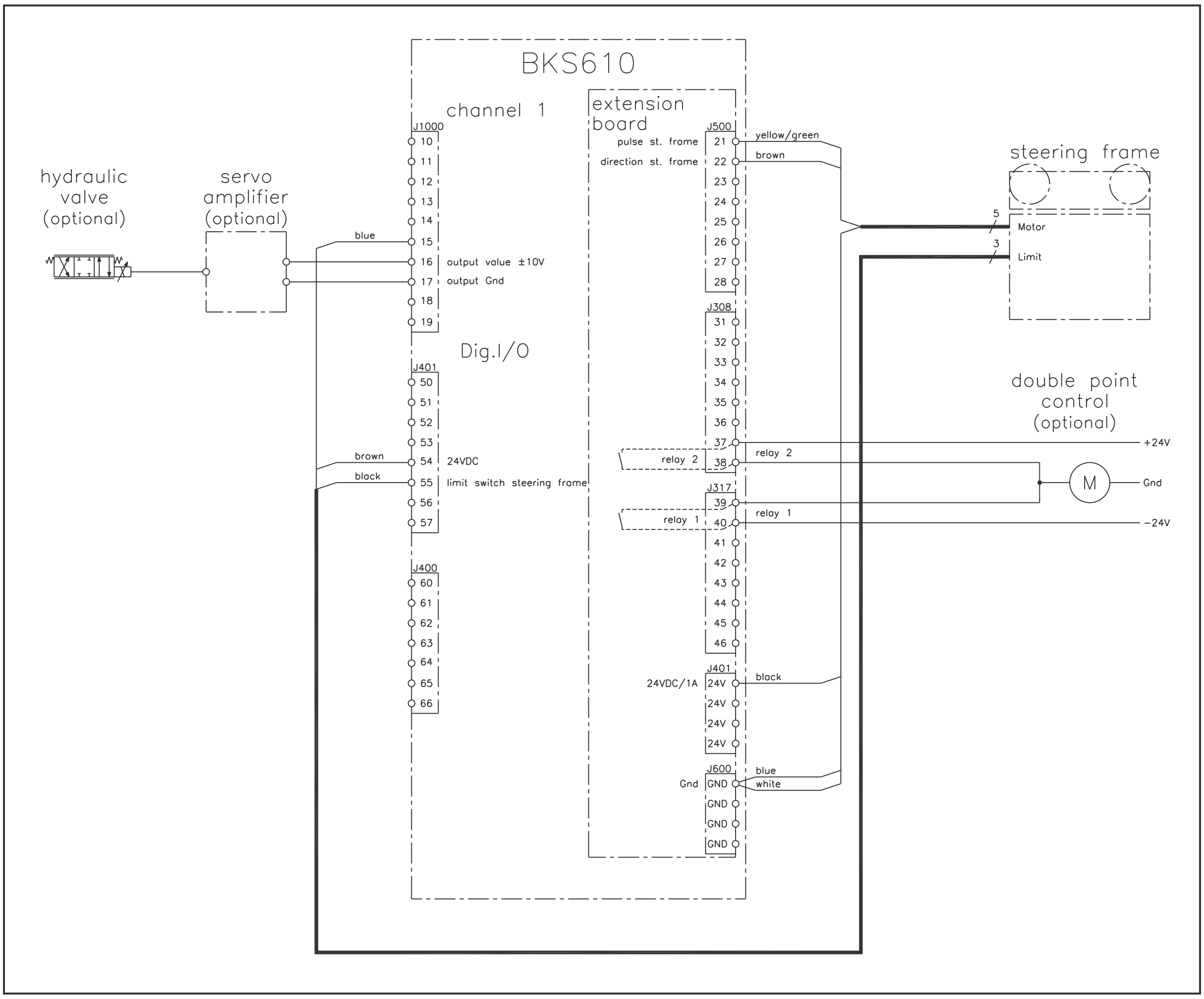

fig. 8: Wiring of steering frame or other steering device K610003e

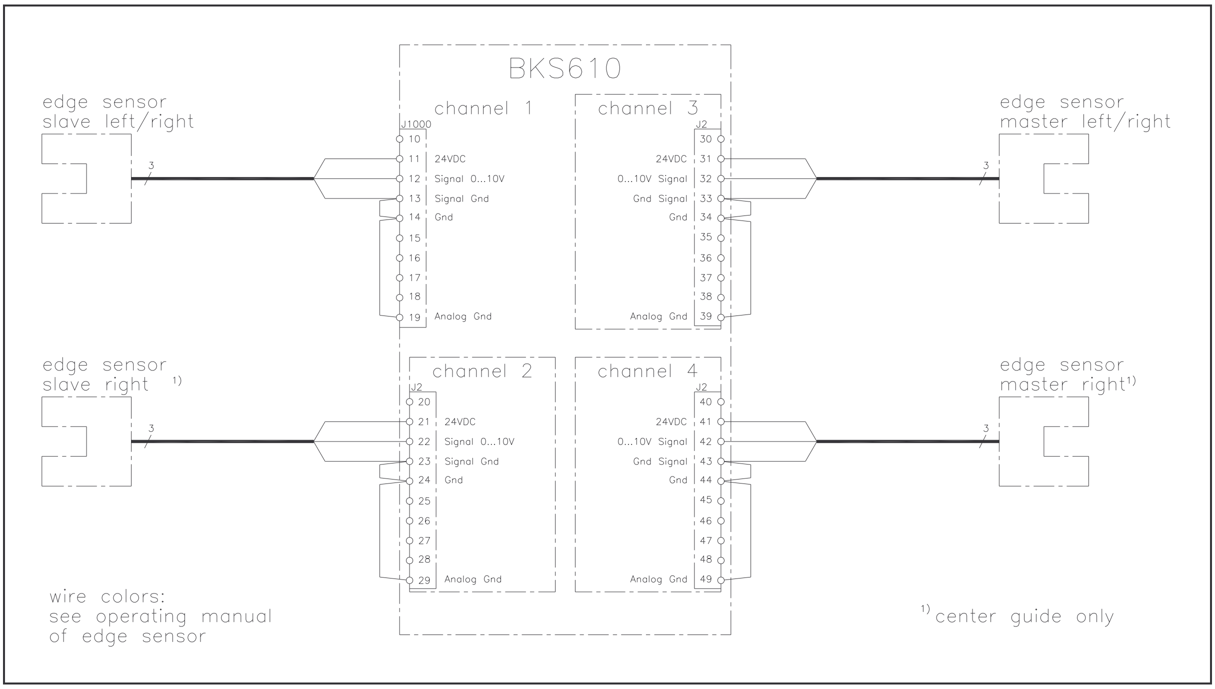

fig. 9: Wiring of the edge sensors K610002e

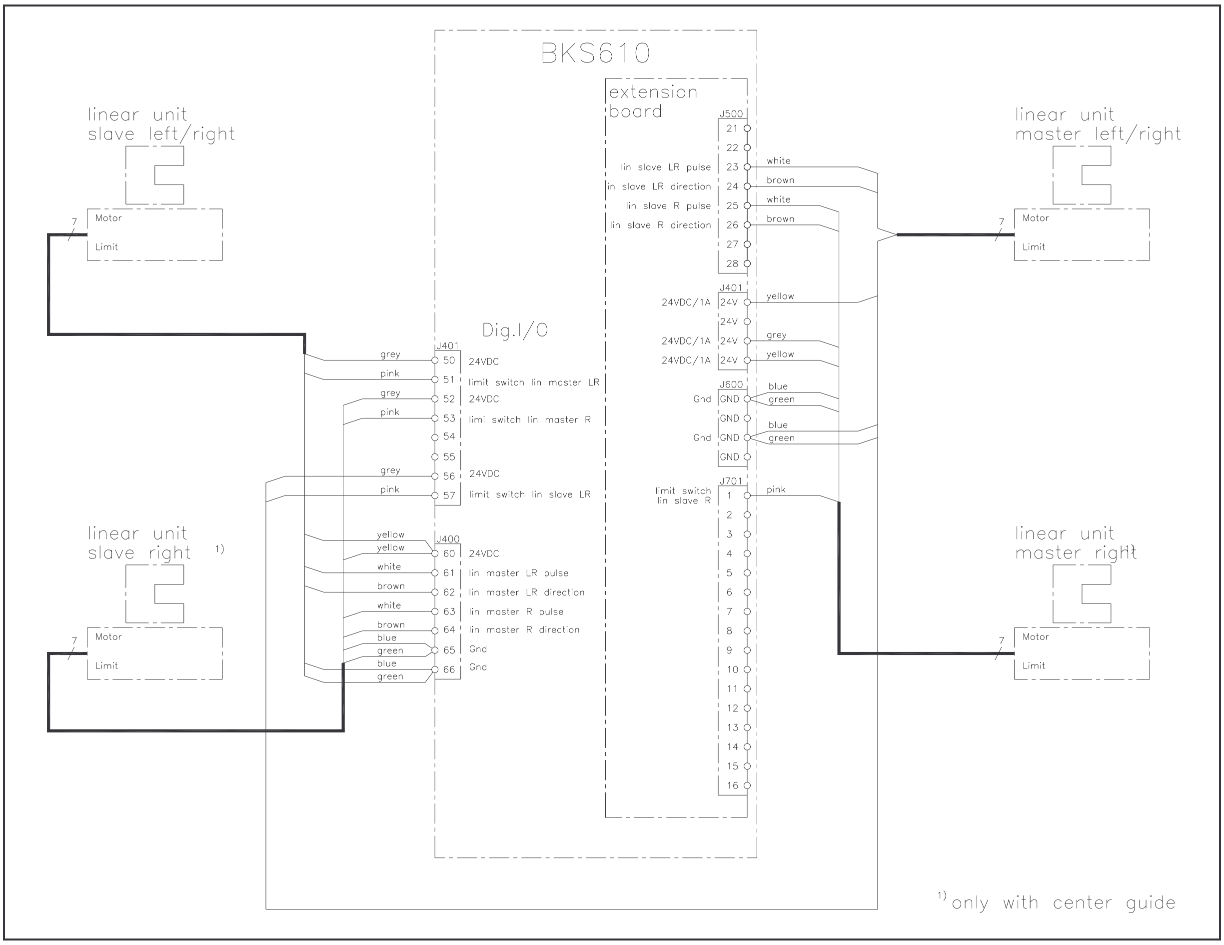

fig. 10: Wiring of the linear units K610004e

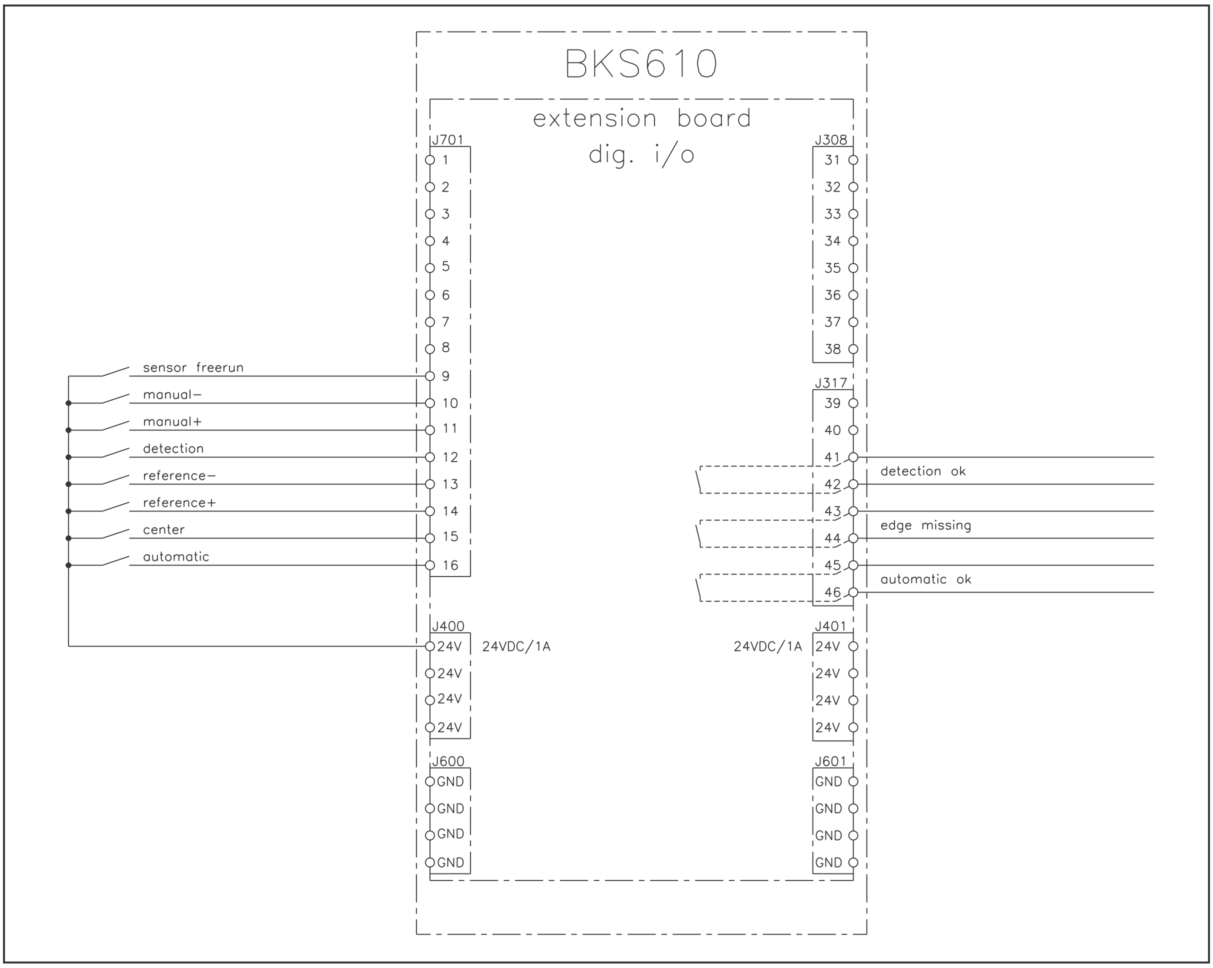

fig. 11: Wiring of the digital inputs and outputs K610005e

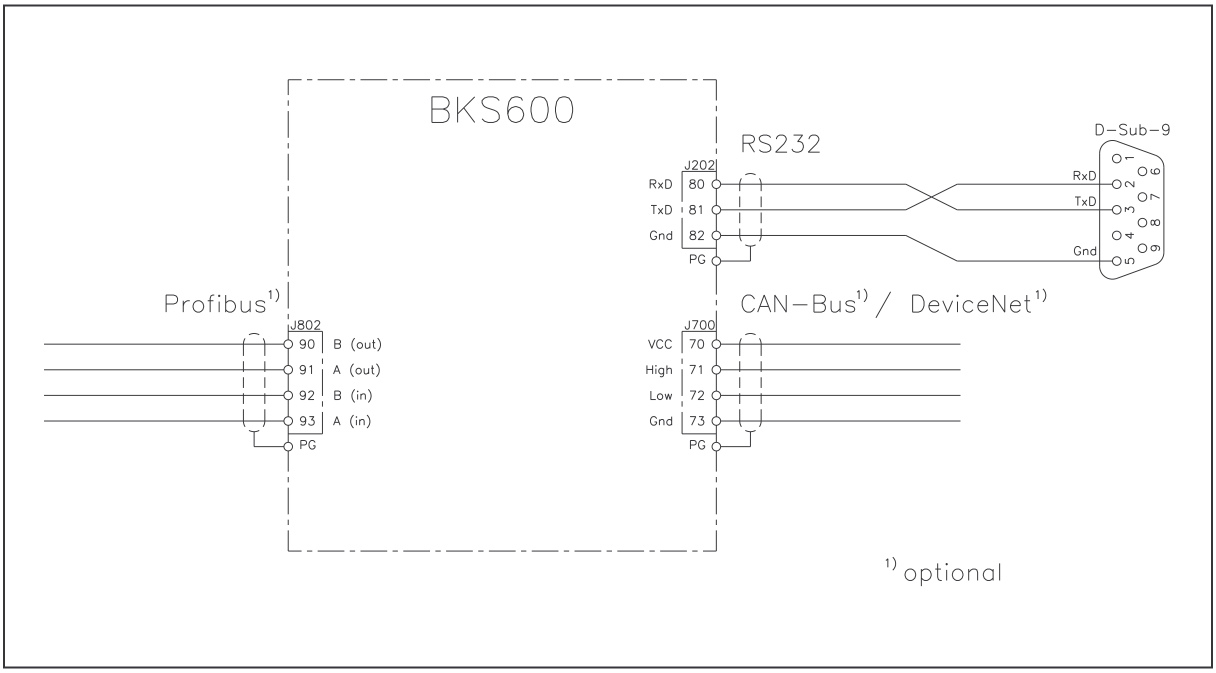

fig. 12: Wiring of the interfaces K600004d

7.3 Mounting the Steering Device

Mounting and wiring is done according to manufacturer's specifications. Take care that the steering device is mounted in the right position regarding the running direction of the material web. If a steering frame is used, the pivot point mus be located at the entry side and the edge sensors must be located at the exit side (fig. 13).
Wiring to the screw terminals of the electronic unit is done according to wiring diagram (fig. 8).

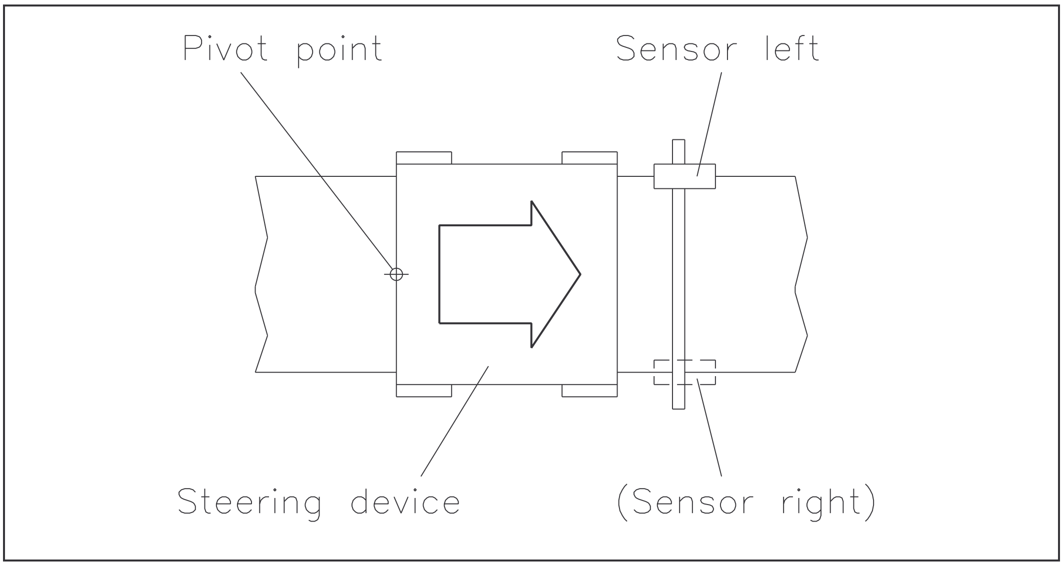

fig. 13: Notice the running direction of the web when mounting the steering device.
K600005e

7.4 Mounting of Manual Sensor Adjustment

The manual sensor adjustment of the **slave web** (ref. to fig. 1) must be installed *after* the steering device regarding running direction (fig. 13). It will be mounted directly to the machine frame.
The manual sensor adjustment of the **master web** must be installed as close as possible to the sensor adjustment of the slave web (fig. 1). It must be mounted beside the same edge of the material web as the slave web sensor adjustment is mounted (either both left or both right).
The sensors can be moved on the location rail. Use the fixing nut to lock the sensor.

Notice

For optimum control results, the sensors adjustment has to be placed in a way that the sensors are placed next to the exit roller of the steering frame. If the sensors are placed far from the steering frame, control dynamics will be reduced drastically.

7.5 Mounting of the Linear Units

The linear units of the **slave web** (ref. to fig. 1) must be installed *after* the steering frame regarding running direction (fig. 13). They will be mounted directly to the machine frame using the supplied brackets.

The linear units of the **master web** must be installed as close as possible to the sensor adjustment of the slave web (fig. 1). It must be mounted beside the same edge of the material web as the slave web sensor adjustment is mounted (either both left or both right).

Wiring of the linear units is done according to wiring diagram (fig. 10). The electronic control unit detects automatically if 1 or 2 linear units are connected.

Notice

For optimum control results, the linear units have to be placed in a way that the sensors are placed next to the exit roller of the steering frame. If the sensors are placed far from the steering frame, control dynamics will be reduced drastically.

Caution

If external parts are in the travel range of the linear units, the sensors can be damaged while moving! It is to ensure that large enough distances are kept allover.

7.6 Mounting of the Edge Sensors

The edge sensors will be mounted by brackets to the sensor adjustment (refer to operating manual AZS01 and US01). The sensors may be mounted to the left or right web edge. However the same web edge must be used for master and slave sensor.

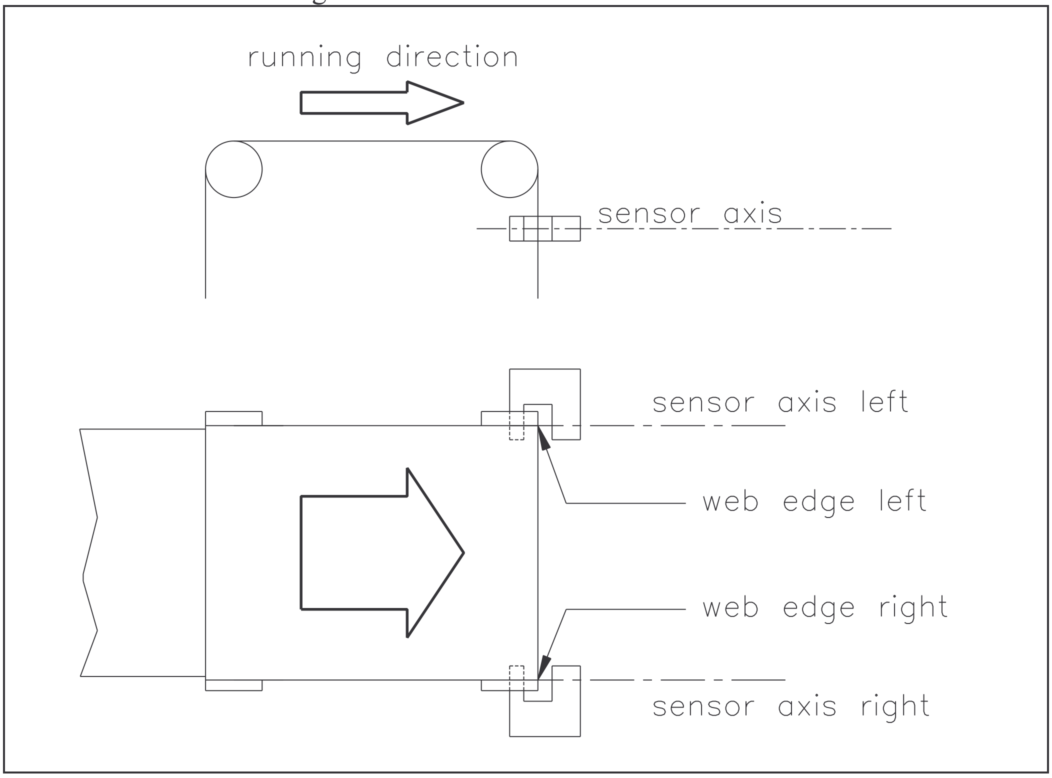

fig. 14: Position of the edge sensors referring to the web. They may be mounted to the left-hand or right-hand side. K400005e

Wiring of the edge sensors to the terminals is done according to wiring diagram (fig. 9).

☞ **Notice**

The inputs for the analog signals have different Gnd terminals. Therefore the terminals *Gnd* and *Signal Gnd* have to be bridged. If not, malfunction may appear.

8 Operating

8.1 View of the Operating Panel

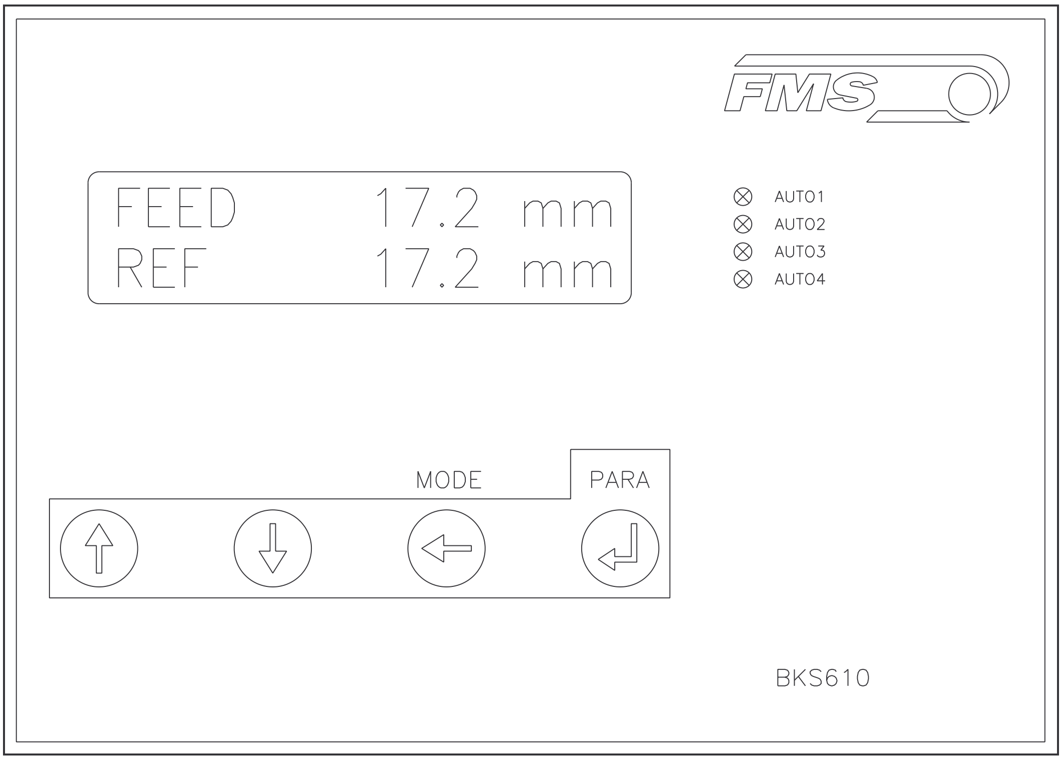

fig. 15: Operating panel BKS610 K610013e

8.2 Configuring the Electronic Unit

Prior to the first calibration, the following settings must be done (ref. to „9. Parametrization“ and „14. Technical reference“):

System parameters	
Language	Required display language

Parameters BKS601	
Control mode	According to requirements
Dead band	For the time being set to 0mm
Output manual [1)]	According to requirements
Offset output [1)]	For the time being set to 0
Limit output [1)]	For the time being set to 100%
Output config. [1)]	Standard
Base distance left	For the time being set to 0mm
Base distande right	For the time being set to 0mm

[1)] only if no steering frame is used

Notice

Wrong setting of the parameters may cause malfunction of the electronic unit! Setting of the parameters must be done carefully prior to setting into operation!

8.3 Main Operating Menu and Special Functions

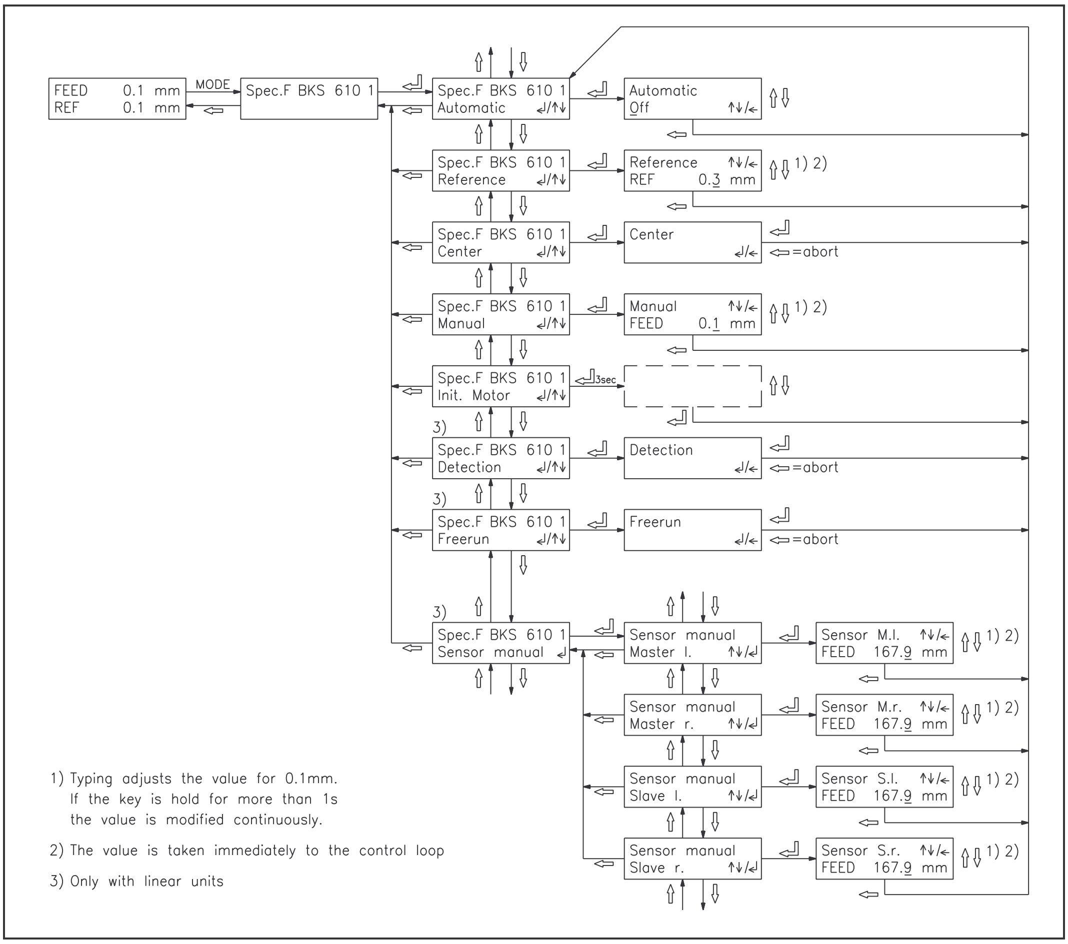

fig. 16: Main operating menu BKS610 K610009e

Special function	Operation
Automatic	↑ ↓ = automatic on / off ← = commit settings
Reference	↑ ↓ = enlarge / reduce reference value [1,2] ← = quit input mode
Center	↲ = drive to center position ← = (abort)
Manual	↑ ↓ = move steering frame manually left / right [1,2] ← = quit input mode
Init. Motor	(ref. to „9.7 Line-up of the Limit of Travel Positions“)
Detection [3]	↲ = proceed for edge detection ← = (abort)
Freerun [3]	↲ = proceed for sensor freerun ← = (abort)
Sensor manual [3]	↑ ↓ = move sensor manually left /right [1,2] ← = commit settings

[1] Typing adjusts the value for 0.1mm. If the key is hold for more than 1s the value is modified continuously.
[2] The value is taken immediately to the control loop
[3] Only with linear units

8.4 Manual Operation

The special functions (ref. to fig. 16) provide the following possibilities for manual operation:

Manual operation, generally

- *Center:* (Only with FMS steering device) The steering device will return to its center position with the ↵ key (also possible by digital input).
- *Manual:* The steering device can be moved manually in steps of 0.1mm to the left with the ↑ `LEFT` key and to the right with the ↓ `RIGHT` key. If the key is hold for more than 1s, the steering frame moves continuously in the respective direction.
  Using a double point control, either relay 1 or relay 2 is driven (ref. to fig. 10).
  If no FMS steering frame is used: The meaning of the control system can be inverted with parameter *Output config*.

Manual operation with linear units

- *Detection:* Edge detecion is started with ↵ key and the center of the sensor will be aligned to the web edge. If required, the sensors are moved away from the web and then are moved back again to the web. The detection is completed if the edge is read. It then goes stright through the center of the active window.
- *Freerun:* The sensor freerun is started with ↵ key. The sensors will move to the reference position of the linear units.
- *Sensor left / Sensor right:* The left or right sensor can be moved manually in steps of 0.1mm to the left with the ↑ `LEFT` key and to the right with the ↓ `RIGHT` key. If the key is hold for more than 1s, the sensor moves continuously in the respective direction.

8.5 Operation without Linear Units

Alignment of the sensors

- Align sensor axis to the web edge: Loosen the fixing nut on the bracket and adjust the sensor. Fix the sensor in the new position. The sensor will be positioned properly if the web edge goes through the sensor axis (center of active window; refer to fig. 17).

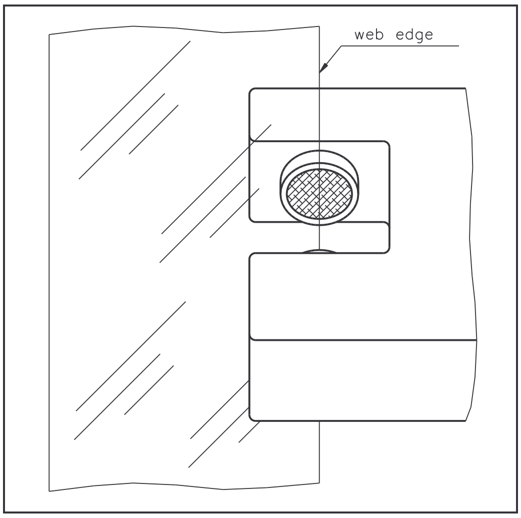

fig. 17: Aligning of the sensor axis to the web edge K100004e

Automatic operation

- Start automatic mode with special function *Automatic* (fig. 16) or digital input. The control LED *Auto* lights up. Reference position for the slave web is taken from the master web position. The controller starts to guide the slave web to reference position and to hold this guide point.
- The slave web position can be adjusted during automatic operation with the special function *Reference* (fig. 16) or using digital inputs (step width 0.1mm). With the ↑ key, the web moves out of the sensor; with the ↓ key, the web moves in. Using center guide, this description applies to the right sensor.
- Quit automatic mode with calling the special function *Automatic* again (fig. 16). The control LED *Auto* goes off.

☞ **Notice**

If the web leaves the sensor detection band, control is no longer effective. Hold the web edge strictly inside the sensor detection band.

☞ **Notice**

If web is not running, it can’t be guided properly to the reference position! The steering frame moves in the limit-of-travel position and may damage the web. Start automatic mode only when web is slowly running!

8.6 Operation with Linear Units

Start of detection

- If an edge is found with the preceding settings, the control LED on the rear side of the sensor lights (Exception: The ultrasonic sensor US01 has no LED).
- If no edge is found, a detection can be started with special function *Detection* (fig. 16) or by digital input. The master web linear units then search for the edge. At the same time the detection for the slave web edge is proceed.
- If no edge is found, the sensor must be aligned more precise to the material edge. If the problem persists it may have one of the following reasons:
  – Ultrasonic sensor US01: The material web is sound transmissive.
  – Optical sensor AZS01: The material web is too much light transmissive.
- If automatic mode is started without the sensor having found an edge, the control unit automatically starts a detection.

Automatic operation

- Start automatic operation with special function *Automatic* (ref. to fig. 16) or digital input. The control LED *Auto* lights up. Reference position for the slave web is taken from the master web position. The controller starts to guide the slave web to reference position and to hold this guide point.
- The slave web position can be adjusted during automatic operation with the special function *Reference* (fig. 16) or using digital inputs (step width 0.1mm). The sensors will follow the web edge automatically.
- Quit automatic mode with calling the special function *Automatic* again (fig. 16). The control LED *Auto* goes off.

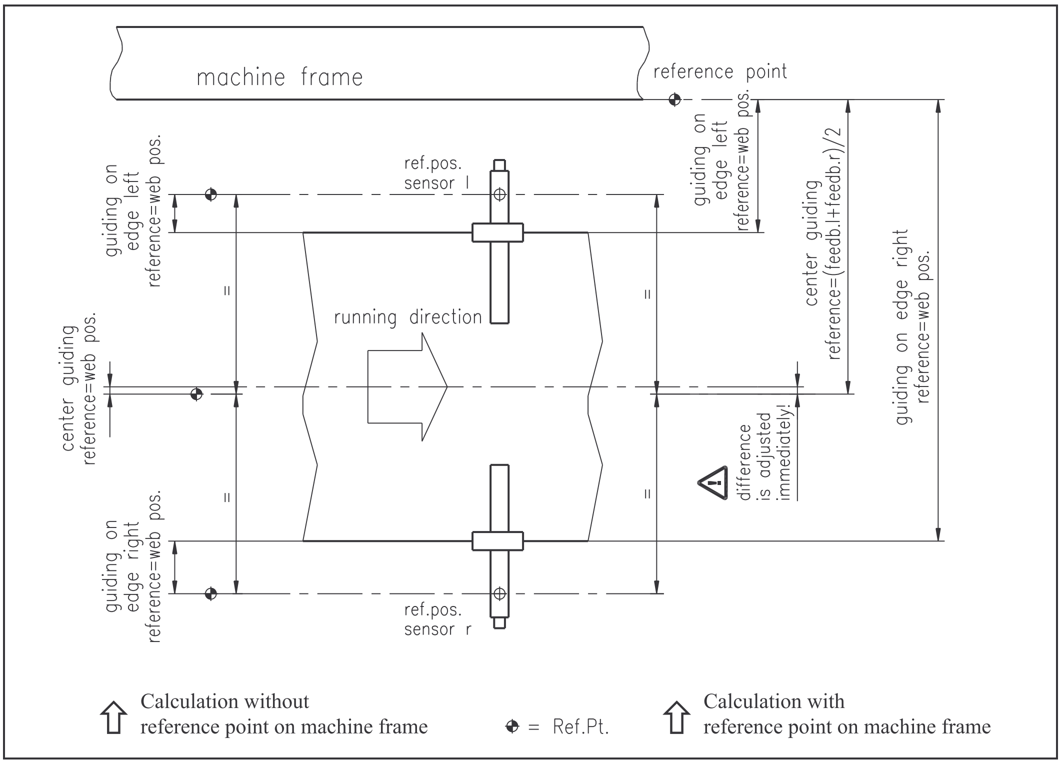

fig. 18: Calculation of the reference value during automatic start by using linear units K400010e

8.7 Measuring from a Reference Point on the Machine Frame

With or without linear units a reference point can be defined. Then, all position vaules will refer to this reference point. The reference point can be on the machine frame, for example (fig. 19).

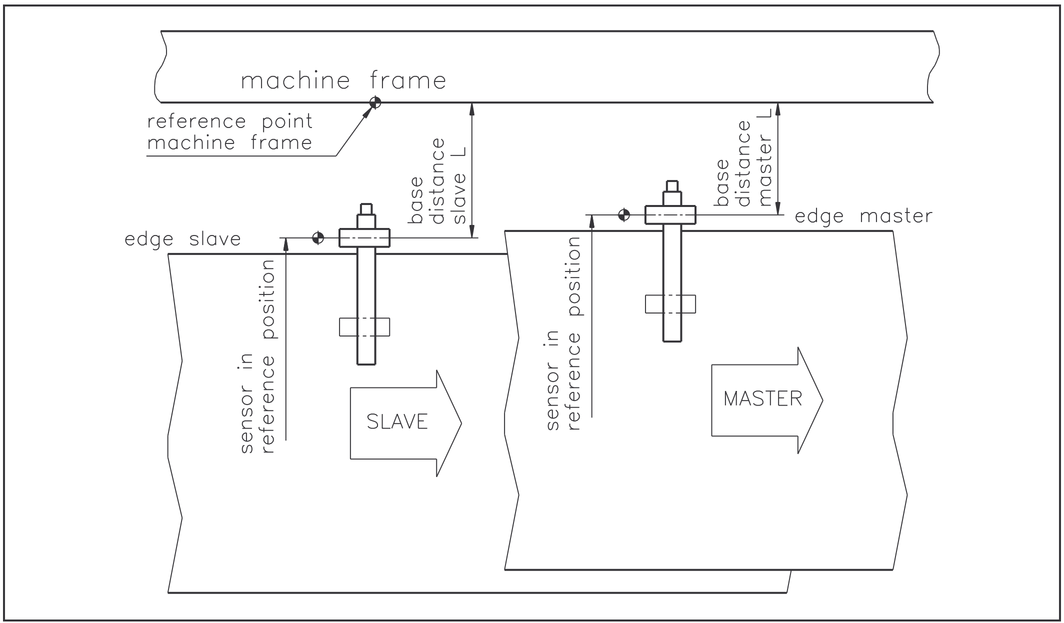

fig. 19: Base distances and reference point when using linear units K610011e

If measuring from a reference point should be activated, the parameters *base distance Master left, base distance master right, base distance slave left* and *base distance slave right* have to be set as follows (ref. to „9. Parametrization“):

- Execute special function *Freerun* (fig. 16) to move the sensors to the reference positions of the linear units.
- In parameter *Base distance master left* set the distance between reference point (i.e. machine frame) and axis of left master web sensor (fig. 19).
- In parameter *Base distance master right* set the distance between reference point (i.e. machine frame) and axis of right master web sensor (fig. 19).
- In parameter *Base distance slave left* set the distance between reference point (i.e. machine frame) and axis of left slave web sensor (fig. 19).
- In parameter *Base distance slave right* set the distance between reference point (i.e. machine frame) and axis of right slave web sensor (fig. 19).

> **Notice**
>
> The reference point must always have a greater distance to the web edge than the sensor has (fig. 19).

If measuring from a reference point is not needed, the parameters *base distance master left, base distance master right, base distance slave left* and *base distance slave right* have to be set to Zero. In this case, the position values are referring to the sensor positions. If linear units are used, the position values are referring to the reference positions of the linear units (fig. 19).

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9 Parametrization

9.1 Schematic Diagram of Parametrization

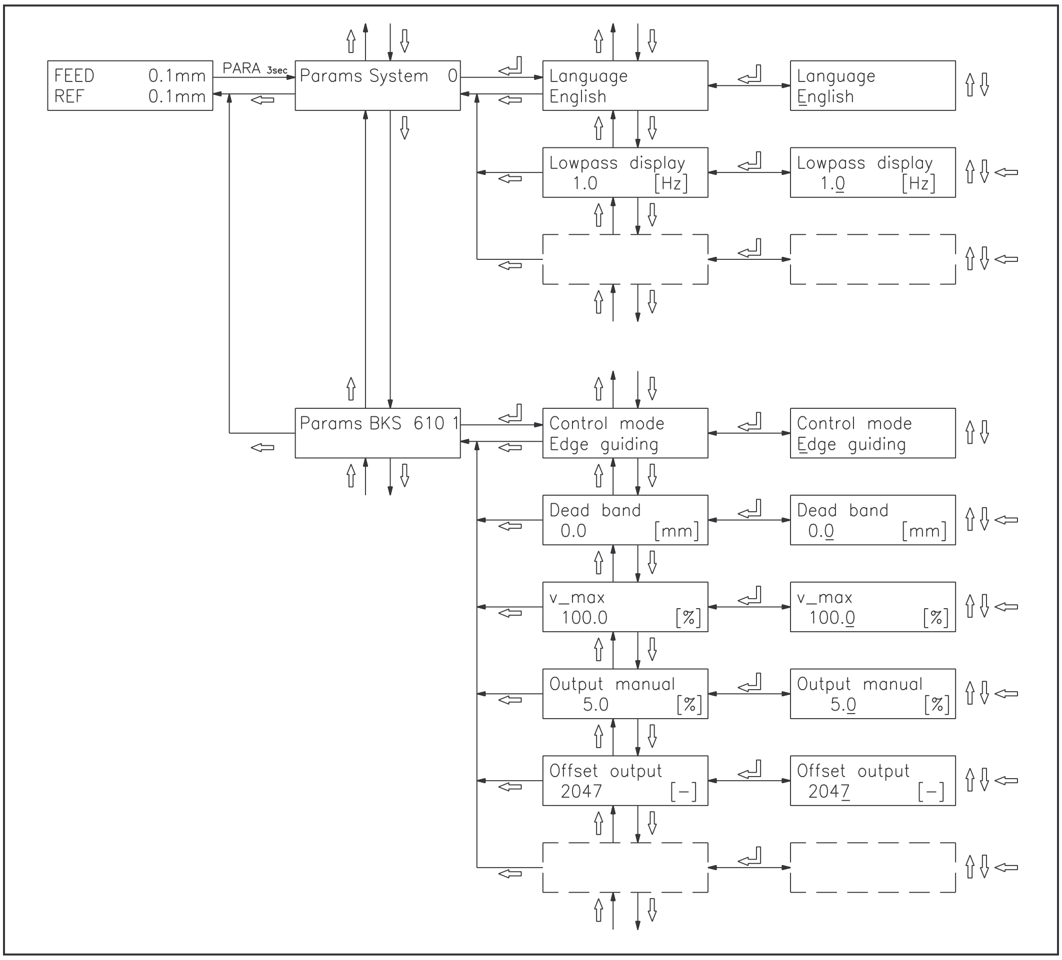

fig. 20: Parametrization BKS610 K610001e

The parameters are split into the modules *system parameters* and parameters *BKS 610 1*. The parameter changing mode is activated by pressing the PARA ↵ key for 3 seconds. The required module is then searched with the ↑ ↓ keys and selected with the PARA ↵ key (fig. 20). Each module has its own parameter set. Generally, the parameters are settable using the keys as follows:

↵	choose and enter
↑ ↓	switch the selections or increase / decrease numeric values, as well as change the sign
←	change the decimal (while inputting a numeric value) or abort setting

9.2 List of the System Parameters

Parameter	Unit	Min	Max	Default	Selected
Language	English, French, Italian, German				
Lowpass display	[Hz]	0.1	10.0	1.0	
Identifier	[-]	0	255	0	
Baud rate	2400, 4800, 9600, 19200			9600	

9.3 List of the Parameters BKS610

Parameter	Unit	Min	Max	Default	Selected
Control mode	Edge guiding, Center				
Dead band	[mm]	0.0	5.0	0.0	
v_max	40%, 65%, 100%			100.0	
Output manual	[%]	–100.0	100.0	5.0	
Offset output	[Digit]	0	4095	2047	
Limit output	[%]	10.0	100.0	100.0	
P value output	[-]	0.01	320.00	1.00	
I value output	[s]	0.01	320.00	1.00	
Output config.	Standard, Inverted			Standard	
Base distance master left	[mm]	0.0	5000.0	0.0	
Base distance master right	[mm]	0.0	5000.0	0.0	
Base distance slave left	[mm]	0.0	5000.0	0.0	
Base distance slave right	[mm]	0.0	5000.0	0.0	

9.4 Description of the system parameters

The parameter changing mode is activated by pressing the PARA ↵ key for 3 seconds. By pressing the PARA ↵ key again, the system parameters are selected (ref. also to fig. 20).

Language

Use:	This parameter stores the display language.				
Range:	English, French, Italian, German				

Lowpass display

Use:	The electronic unit provides a lowpass filter to prevent noise which is added to the integrated display. This parameter stores the cut off frequency. The lower the cut off frequency, the more sluggish the output signal will be. Due to this filter, the value shown in the display will be much more stable in the case of high fluctuations of the force value. The lowpass display filter is independent to the other filters.				
Range:	0.1	to	10.0	**Default:**	1.0
Increment:	0.1			**Unit:**	[Hz]

Identifier

Use:	This parameter stores the ident number of the device when linked to PROFIBUS, CAN-Bus resp. DeviceNet.				
Range:	0	to	255	**Default:**	0
Increment:	1			**Unit:**	[-]

Baud rate

Use:	This parameter stores the speed of the serial interface (RS232). The other settings are fixed: 8 data bits, even parity, 1 stop bit („8 e 1“).				
Range:	2400, 4800, 9600, 19200			**Default:**	9600
				Unit:	[Baud]

9.5 Description of the Parameters BKS610

The parameter changing mode is activated by pressing the `PARA` ↲ key for 3 seconds. The module *Params BKS 610 1* is then searched with the ↑ ↓ keys and selected with the `PARA` ↲ key (ref. also to fig. 20).

Control mode

Use:	This parameter defines if 2 or 4 sensors are used. When edge guiding, the sensors must be mounted at the same side of the material web. When center guiding there must be sensors on both sides of the web.		
Range:	Edge left, Edge right, Center	**Default:**	Edge left

Dead band

Use:	This parameter declares how great the tolerance for the slave web position will be. The slave web position is adjusted only when the deviation is greater than the dead band value. „0.3mm dead band“ means a tolerance of ±0.3mm.				
Range:	0.0	to	5.0	**Default:**	0.0
Increment:	0.1			**Unit:**	[mm]

v_max

Use:	With this parameter you can limit the maximum speed of the steering device (stepper motor equipped steering frame).		
Range:	40, 65, 100	**Default:**	100
		Unit:	[%]

Output manual

Use:	For the analog control output, this parameter defines the tension value which drives the actuator when using the manual mode. If the sign is changed, the polarity of the analog output signal is changed too. „5%“ means 5% of +10V.				
Range:	-100.0	to	+100.0	**Default:**	+5.0
Increment:	0.1			**Unit:**	[%]

Offset output

Use:	If the actuator is moving although the control unit (analog control output) gives no signal to move, the faulty movement can be compensated here. This ensures that the actuator will stay if no movement signal is given. This parameter can be adjusted also while automatic mode is active.				
Range:	0	to	4095	**Default:**	2047
Increment:	1			**Unit:**	[Digit]

Limit output

Use:	For the analog control output, this parameter defines the maximum output tension. „80%“ means to 80% of ±10V. This parameter can be adjusted also while automatic mode is active.				
Range:	1	to	100	**Default:**	100
Increment:	1			**Unit:**	[%]

P value output

Use:	For the analog control output, this parameter defines the P component of the PI controller. This parameter can be adjusted also while automatic mode is active.				
Range:	0.01	to	320.00	**Default:**	1.00
Increment:	0.01			**Unit:**	[-]

I value output

Use:	For the analog control output, this parameter defines the I component of the PI controller. This parameter can be adjusted also while automatic mode is active.				
Range:	0.01	to	320.00	**Default:**	1.00
Increment:	0.01			**Unit:**	[s]

Output config.

Use:	For the analog control output and the relay outputs, this parameter defines how the control error is calculated. With this parameter, the polarity of the actuator signal can be changed. Thus the meaning of control system changes too.	
Range:	Standard, Inverted	**Default:** Standard

Base distance master left

Use:	This parameter stores the distance from the reference point on the machine frame to the reference point of the left master web linear unit.				
Range:	0.0	to	5000.0	**Default:**	0.0
Increment:	0.1			**Unit:**	[mm]

Base distance master right

Use:	Identical with *Base distance master left* but the parameter refers to the position of the right master web linear unit.

Base distance slave left

Use: Identical with *Base distance master left* but the parameter refers to the position of the left slave web linear unit.

Base distance slave right

Use: Identical with *Base distance master left* but the parameter refers to the position of the right slave web linear unit.

9.6 Service Mode

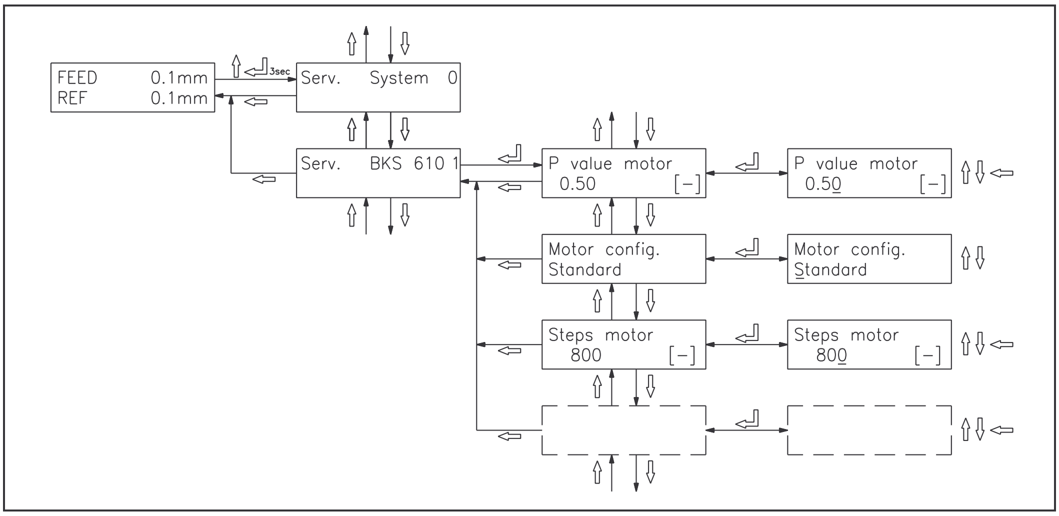

fig. 21: Service Mode Overview K610010e

The service mode contains parameters for configuration of the connetced devices. If a FMS steering frame and FMS linear units are used, these parameters are factory-adjusted and need no modification. Any setting is only needed if the web guide is used with a steering device other than FMS steering frames or linear units other than FMS. Each function module has its own set of service parameters.

> **Notice**
>
> Bad setting of the service mode parameters may result in heavy malfunctions! Therefore, these settings should be made by specially trained personnel only!

The service mode is activated by pressing the ↑ and ↵ keys for 3 seconds. Generally the service mode parameters can be modified the same way as the other parameters.

P value motor

Use:	This parameter defines the P value of the steering frame position controller.				
Range:	0.01	to	320.00	**Default:**	0.50
Increment:	0.01			**Unit:**	[-]

Motor config.

Use:	This parameter defines the meaning of control system.	
Range:	Standard, Inverted	**Default:** Standard

Steps motor

Use:	This parameter stores the number of steps per rotation of the stepper motor.				
Range:	200	to	1600	**Default:**	800
Increment:	1			**Unit:**	[-]

Pitch of spindle

Use:	Pitch of the steering frame or actuator spindle.				
Range:	5.0	to	20.0	**Default:**	10.0
Increment:	0.1			**Unit:**	[mm]

Center pos. motor

Use:	Number of steps the stepper motor takes from the limit switch to the steering frame center position. This value is determined with special function *Init. Motor*.				
Range:	0	to	16000	**Default:**	-
Increment:	1			**Unit:**	[-]

End pos. motor

Use:	Number of steps the stepper motor takes from the limit switch to the opposite end position of the steering frame. This value is determined with special function *Init. Motor*.				
Range:	0	to	32000	**Default:**	-
Increment:	1			**Unit:**	[-]

Length of rail master

Use:	This parameter defines the length of stroke of the master linear units. This value is required to determine the limit position on the side opposite to the limit switch.				
Range:	100.0	to	1300.0	**Default:**	200.0
Increment:	0.1			**Unit:**	[mm]

Length of rail slave

Use:	This parameter defines the length of stroke of the slave linear units. This value is required to determine the limit position on the side opposite to the limit switch.				
Range:	100.0	to	1300.0	**Default:**	200.0
Increment:	0.1			**Unit:**	[mm]

9.7 Line-up of the limit positions

Notice

FMS steering frames are factory adjusted. Line-up of the limit positions are normally not necessary.

However if a line-up is necessary, proceed as follows:

- Turn web guide off.
- Turn web guide back on. The steering frame moves to its reference position and then back to the center position. (The reference position is the first limit position.)
- Call special function *Init. Motor* with `MODE` ↑ ↓ ↵ keys (ref. to „8.3 Main Operating Menu and Special Functions“). After pressing the ↵ key for 3 seconds the display shows

```
Init. Motor          ↑↓↵
Center pos.
```

- With the ↑ ↓ keys set the steering frame to the new center position and save it with ↵ key for 3 seconds. The center position is saved into the EEPROM. The display shows

```
Init. Motor          ↑↓↵
End pos.
```

- With the ↑ ↓ keys set the steering frame to the second limit position, which is opposite to the reference position, and save it with ↵ key for 3 seconds. The limit position is saved into the EEPROM. The display returns to the main operating menu.

Caution

With the line-up of the limit positions, the software limit switches of the steering frame or the unwinding roller are set. Bad setting may cause damage of the steering frame or the unwinding roller! Therefore, the setting should only be made during the first initial operation and by authorized and specially trained personnel only!

10 Serial Interface (RS232)

(Optional)

11 Interface PROFIBUS

(Optional)

12 Interface CAN-Bus

(Optional)

13 Interface DeviceNet

(Optional)

14 Technical Reference

14.1 Additional Setting Elements

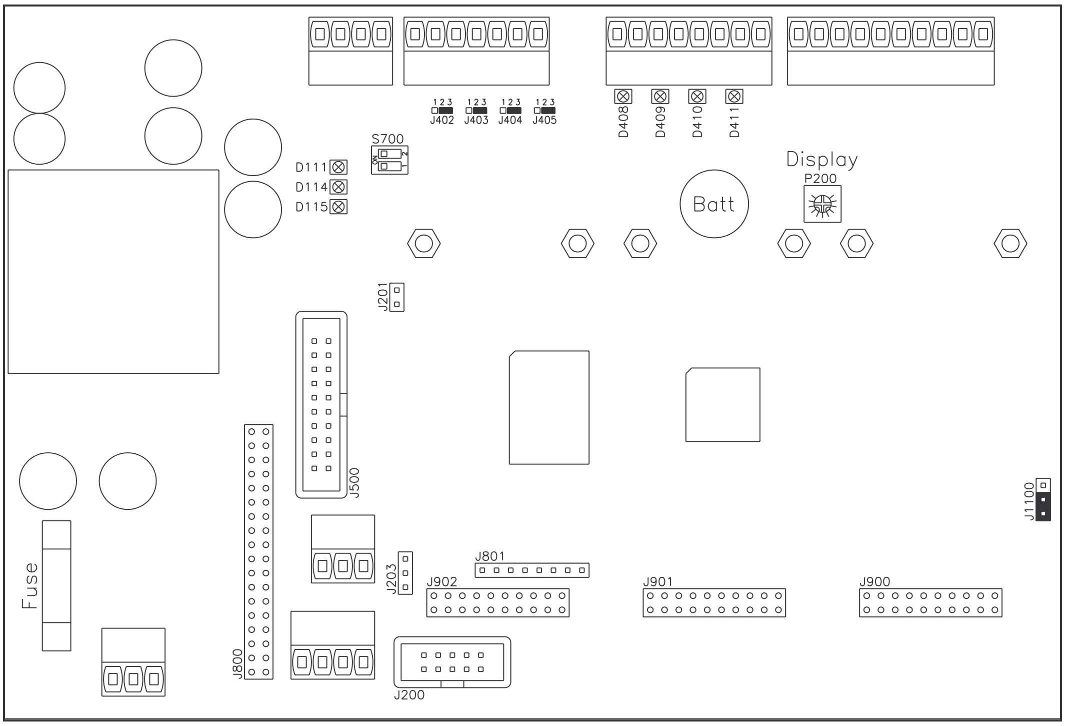

fig. 22 K600022e

Element	Function
D111	Status LED power supply: VCC ok
D114	Status LED power supply: +15VDC ok
D115	Status LED power supply: –15VDC ok
D408	Status LED dig. input 1
D409	Status LED dig. input 2
D410	Status LED dig. input 3
D411	Status LED dig. input 4
J200	(Reserved)
J201	(Reserved)
J203	(Reserved)
J402...405	Solder bridges for dig. output 1...4 (24V)
J500	Add-on board for dig. I/O
J800	Socket subprint PROFIBUS
J801	(Reserved)
J900	Socket subprint channel 2
J901	Socket subprint channel 3
J902	Socket subprint channel 4
J1100	Configuration analog output channel 1
P200	LCD display contrast
S700	CAN Bus termination
Battery	Buffer battery for the internal clock
Fuse	Fuse of the power supply, 1A / 250V (fast blow)

14.2 Setting Elements on the Extension Board

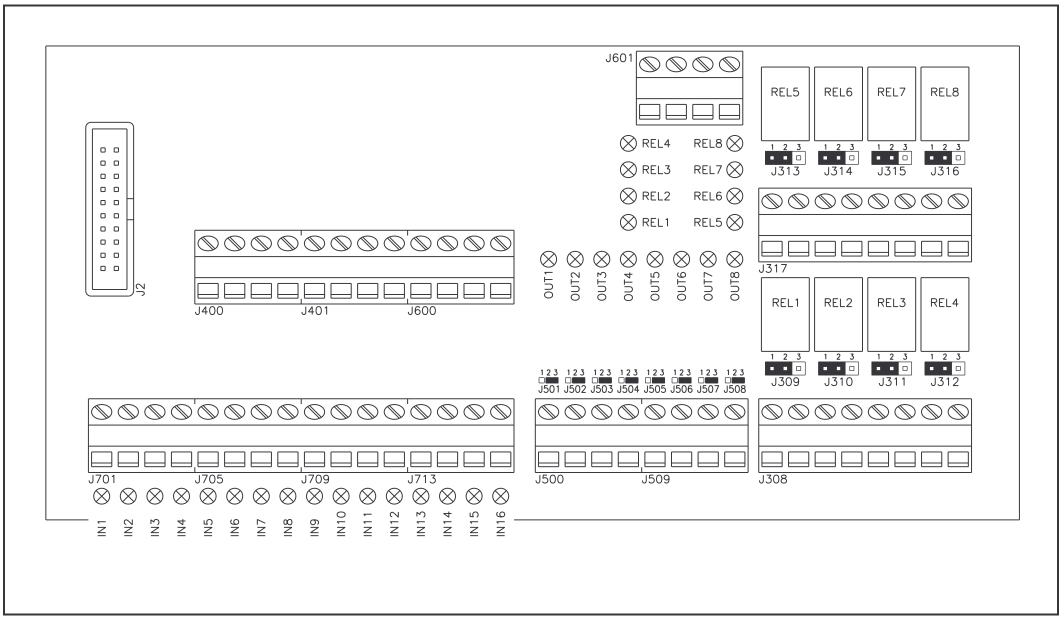

fig. 23 K600002

Element	Function
IN1...16	Status LED dig. input 1...16
OUT1...8	Status LED dig. output 1...8 (24V)
REL1...8	Status LED and relay dig. output 9...16
J308 / J317	Terminal for dig. output 9...16 (relay)
J309...316	Jumper for dig. output 9...16 (relay)
J400 / 401	8 x Terminal +24VDC
J500 / J509	Terminal for dig. output 1...8 (24V)
J501...508	Solder bridges for dig. output 1...8 (24V)
J600 / 601	8 x Terminal Gnd
J701...713	Terminal for dig. input 1...16
J2	Ribbon cable to processor board

Setting of the relay contacts (jumper)

Jumper	Relay operates as „make contact“ (Default)	Relay operates as „break contact“
J309...316	**1-2**	**2-3**

14.3 Jumper for the Analog Inputs / Outputs

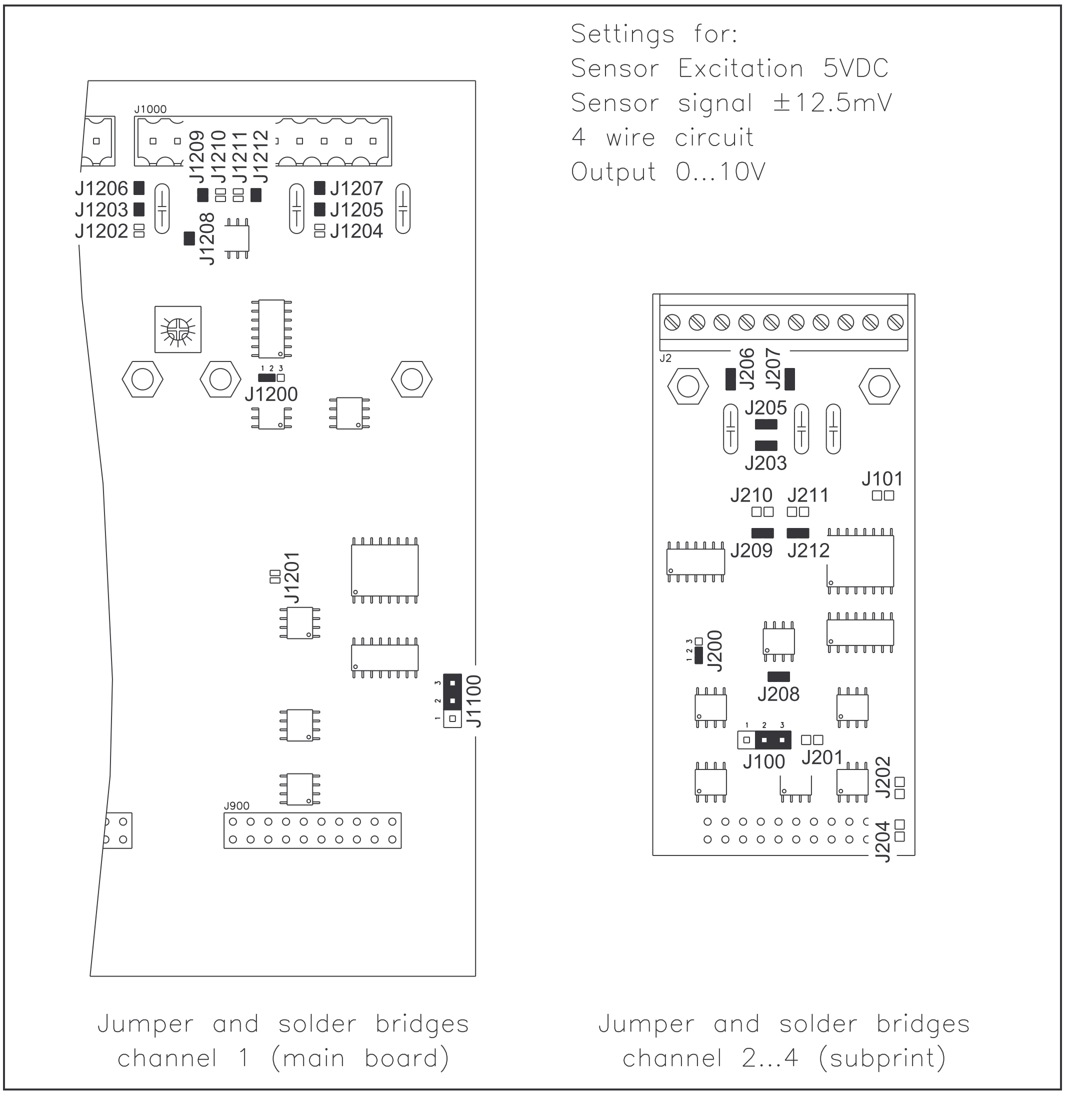

fig. 24 E600005e

Caution

Wrong setting of the jumpers and solder bridges may cause malfunction of the electronic unit or the total system! Setting of the solder bridges and jumpers must be checked carefully prior to power on! Setting of the solder bridges should be carried out by trained personnel only!

Notice

On the subprint, the solder bridges which are closed by default are made with small printed bridges. When opening the solder bridges the first time these printed bridges must be cut. Otherwise malfunction can be the result!

Setting the analog output (jumper)

Channel 1 (main board)	Channel 2...4 (subprint)	Analog output 0...10V	Analog output ±10V (default)
J1100	J100	**2-3**	**1-2**

Setting the sensor excitation (solder bridges)

Channel 1 (main board)	Channel 2...4 (subprint)	Sensor excitation 24VDC (default)	
J1200	J200	**1-2**	
J1201	J201	**closed**	
J1202	J202	**closed**	
J1203	J203	open	
J1204	J204	**closed**	
J1205	J205	open	

Setting the sensor signal (solder bridges)

Channel 1 (main board)	Channel 2...4 (subprint)	Sensor signal 0...10V (default)	
J1208	J208	open	
J1209	J209	open	
J1210	J210	**closed**	
J1211	J211	**closed**	
J1212	J212	open	

Setting to 4 wire or 6 wire circuit (solder bridges)

Channel 1 (main board)	Channel 2...4 (subprint)	4 wire circuit (default)	
J1206	J206	**closed**	
J1207	J207	**closed**	

Notice

The jumpers and solder bridges are normally factory set and need no customization.

14.4 Technical Data

Function	Chase and follow system
Number of actuators (steering frames)	1
Drive of the actuator	FMS steering frames with integrated stepper motor or actuator with input ±10V (i.e. hydraulic valve) or double point controlling by means of two relays
Position reference	in steps of 0.1mm
Dead band	±5mm, adjustable in steps of 0.1mm
Edge signal	0...8V corresponding to 0...10mm
Number of edge sensors	1...2 sensors for the master web and 1...2 sensors for the slave web
Resolution A/D converter	±8192 Digit (14 Bit)
Measuring error	<0.05% FS
Motorized sensor adjustment	For up to 4 sensors, with stepper motor
Cycle time	2ms
Operation	4 keys, 4 LED's, LCD display 2x16 characters (8mm height)
Digital inputs	8 inputs; signal 24VDC must be on for at least 100ms
Digital outputs	5 relay outputs 24V / 1A
Interface RS232	Optional
Interface PROFIBUS	PROFIBUS DP (EN50170), optional
Interface CAN-Bus	Optional
Interface DeviceNet	Optional
Power supply	24VDC (18...36VDC) / max. 140W (6A) depending on device configuration
Temperature range	0...45°C (32...113°F)
Weight	1.5kg (3.35lbs)

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15 Trouble Shooting

Error	Cause	Corrective action
Controller guides web edge immediately out of the sensor	Sensor mounted to the wrong side	Mount sensor to the correct side (both sensors for master and slave web must be on the same side)
	Parameter *Output config.* is set wrong	Change parameter *Output config.*
No edge found **Edge missing**	The sensor is not adjusted properly	Adjust sensor more accurate
Steering frame does not move	No signal; sensor not correctly connected	Connect sensor correctly according to wiring diagram and installation guide
	No signal; cable break	Replace cable or send sensor to FMS
	No signal; sensor defect	Send sensor to FMS; use other sensor
	Steering device not correctly connected	Connect steering device correctly according to wiring diagram and installation guide
Steering device moves in the wrong direction	Parameter *Output config.* is set wrong	Change parameter *Output config.*
Motors of the linear units don't move	Motors are not correctly connected	Connect motors correctly referring to wiring table
	Hardware defect	Contact FMS customer service
Linear units don't move properly to its reference positions	Limit switches are connected wrong	Connect limit switches correctly referring to wiring diagram
Display shows `not determinable`	A function can't be performed at that time (i.e. wiring error)	Check wiring, parametrization and overall system shape
Dig. outputs do not work	Wiring error	Check wiring of the dig. outputs (ref. to wiring diagram)
	Grounding not connected	Connect Grounding wire to the PE terminal (re. to wiring diagram)
`C.n HW error`	Hardware of channel n defect	Contact FMS customer service
	Subprint of channel n is not detected	Check if subprints are seated correctly (ref. to „14.1 Additional Setting Elements") Contact FMS customer service

Error	Cause	Corrective action
Subprint missing contact FMS AG	One or more subprints are missing or are not detected	Check if subprints are seated correctly (ref. to „14.1 Additional Setting Elements“) Contact FMS customer service
System Error contact FMS AG	Electronic unit defect	Contact FMS customer service
No message on the display	Display contrast setting is bad	Set display potentiometer P200 correctly (ref. to „14.1 Additional Setting Elements“)
	Fuse blown	Replace fuse (ref. to „14.1 Additional Setting Elements“)
	Power supply not correct	Check status LED’s of the power supply (D111...D115, ref. to „14.1 Additional Setting Elements“) Check / correct power supply
	Electronic unit defect	Check status LED’s of the power supply (D111...D115, ref. to „14.1 Additional Setting Elements“) Contact FMS customer service
Electronic unit does not answer to interface commands	Interface not supported yet	Contact FMS customer service

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