Operating Manual BKS600A

Digital microprocessor controlled web guide
for DC drive

Version 1.11 08/02 pw
Firmware Version: ab 2.00
Hardware Rev. D

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.

Note for proper function

Note

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 BKS600A web guiding system consists of the following components (refer also to fig. 1):
Steering device
- Electrically or hydraulically driven

Electronic unit BKS600A
- For all control functions
- With operation panel for parametrization
- Steering frame with DC motor or analog control output
  ±10V / 0...10V / 0...20mA / 4...20mA
- 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
- 1 or 2 analog sensors

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

(components and variants in italic letters are options)

4 System Description

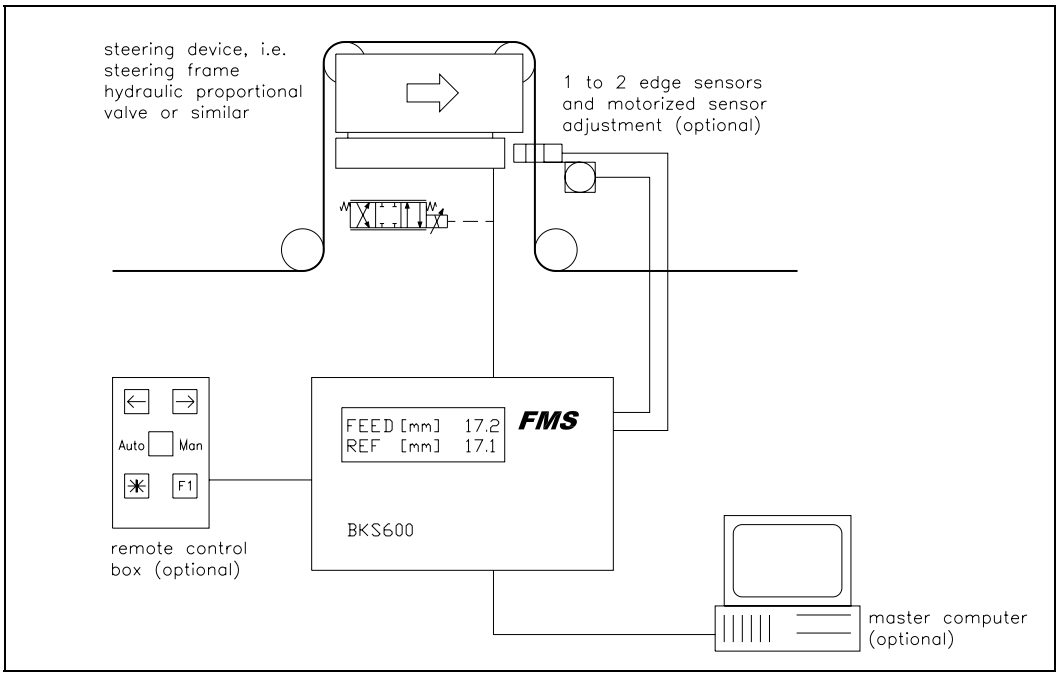

fig. 1: Basic structure of the BKS600A web guide K600023e

4.1 Functional Description

The sensors measure the position of the web edge and send this information as an analog signal to the electronic control unit. The control unit compares the position feedback signal with the reference. If the difference is higher than a parametrized value (dead band), the steering device is adjusted to bring the web into the right position.
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 web position laterally. Its width is depending on the web width. Any steering device can be used if it can handle the signal for an FMS steering frame with DC motor drive:

- FMS steering frame with DC drive
- any actuator with analog input ±10V / 0...10V / 0...20mA / 4...20mA
- 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.

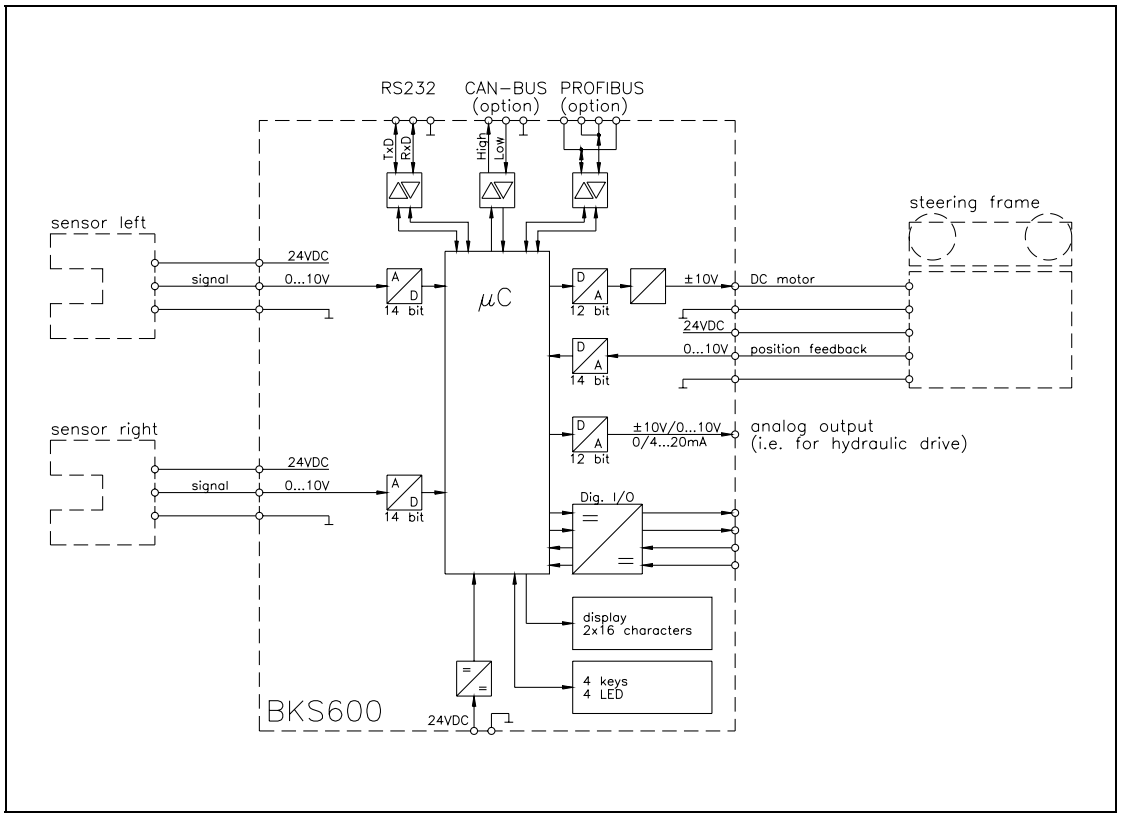

fig. 2: Block diagram BKS600A K600024e

4.4 Edge Sensors

An optical sensor (AZS01) and an ultrasonic sensor (US01) is available from FMS. Adjustment is done automatically.

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)?
  (if a linear DC drive for unwind or rewind stands is used it must be setup; refer to „9.7 Line-up of the limit positions and Offset Compensation“)
  – 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

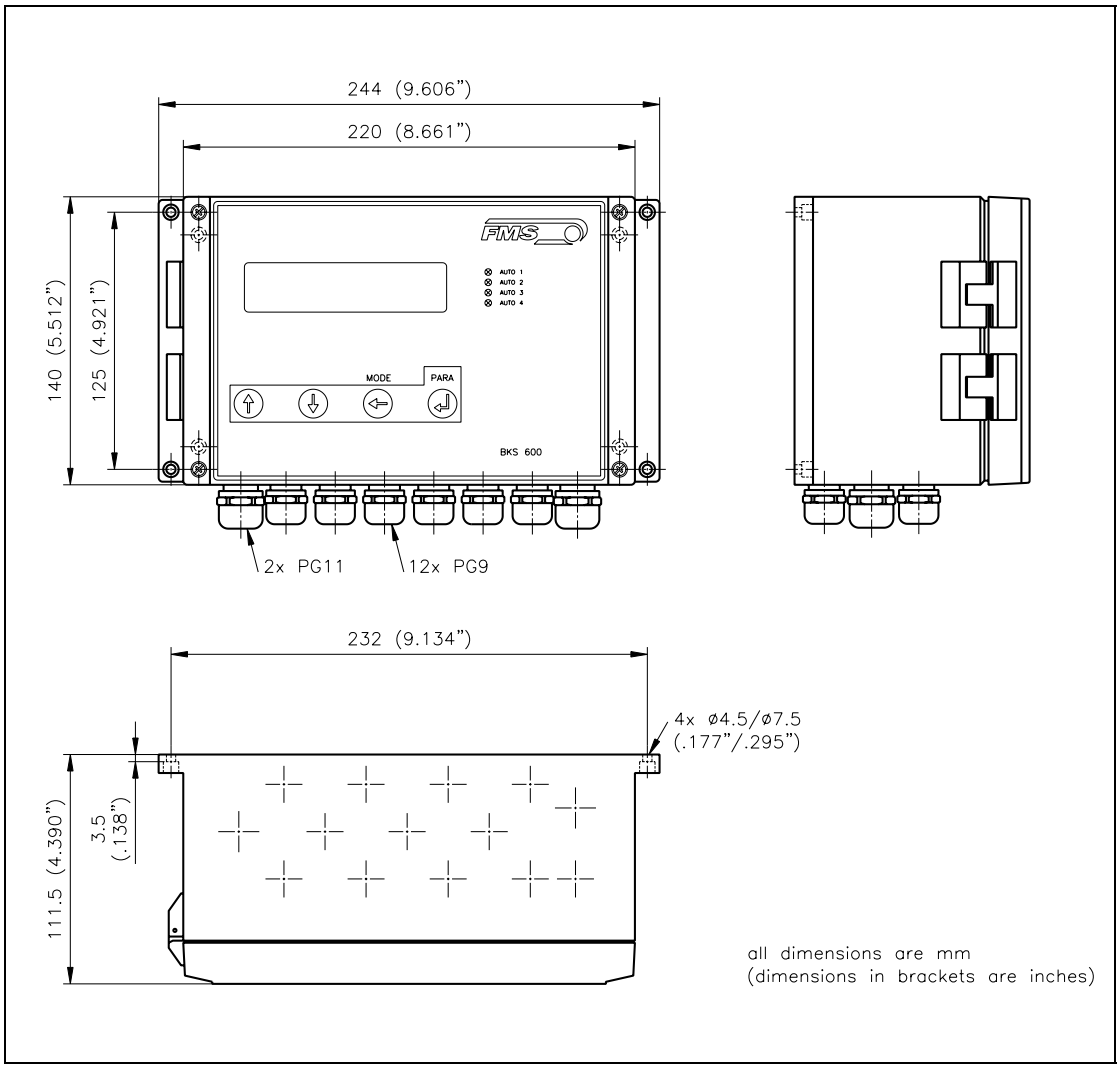

fig. 3: Dimensions K600019e

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).

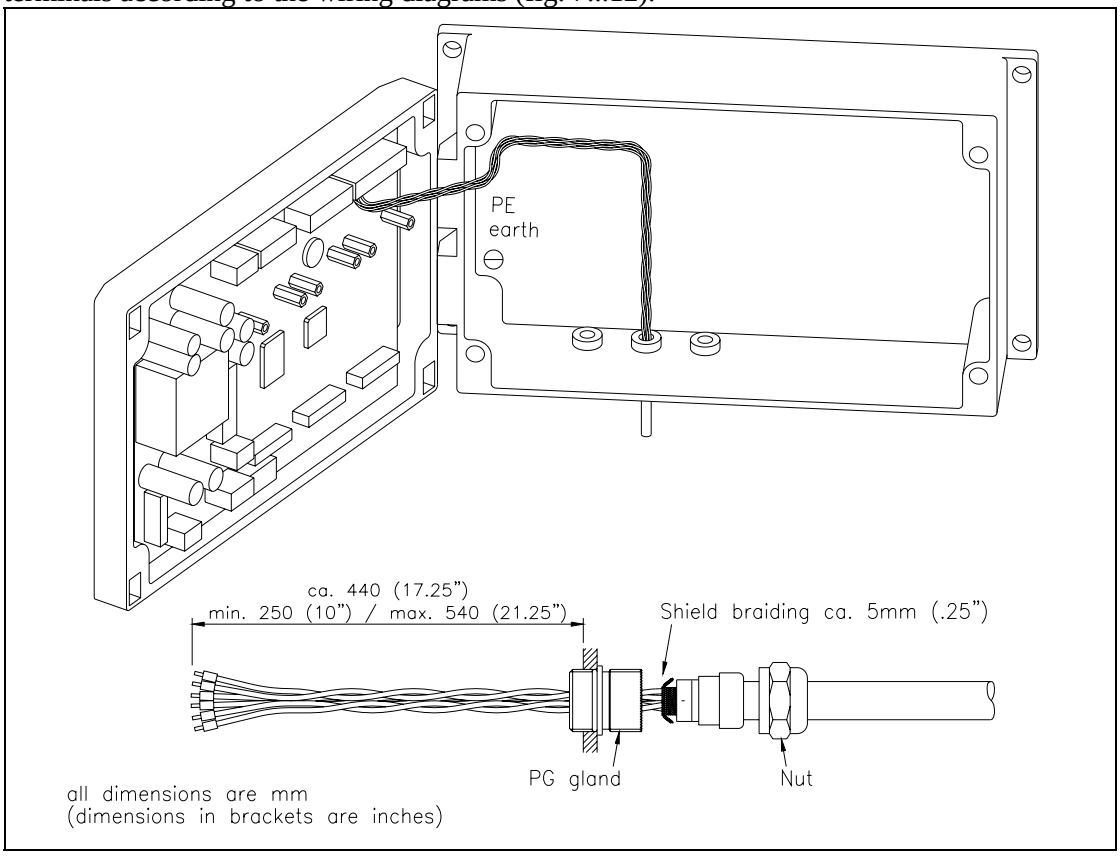

fig. 4: Wiring path inside the housing E600011e

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!

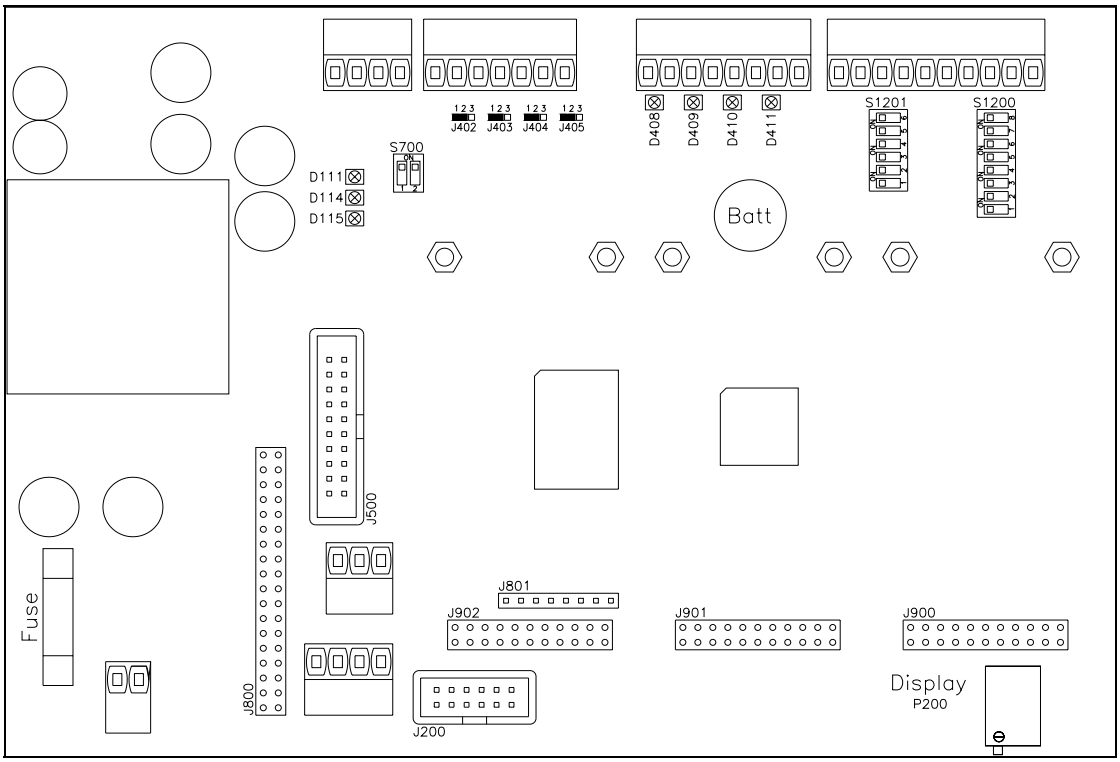

fig. 5: Screw terminal arrangement on the processor board K600028e

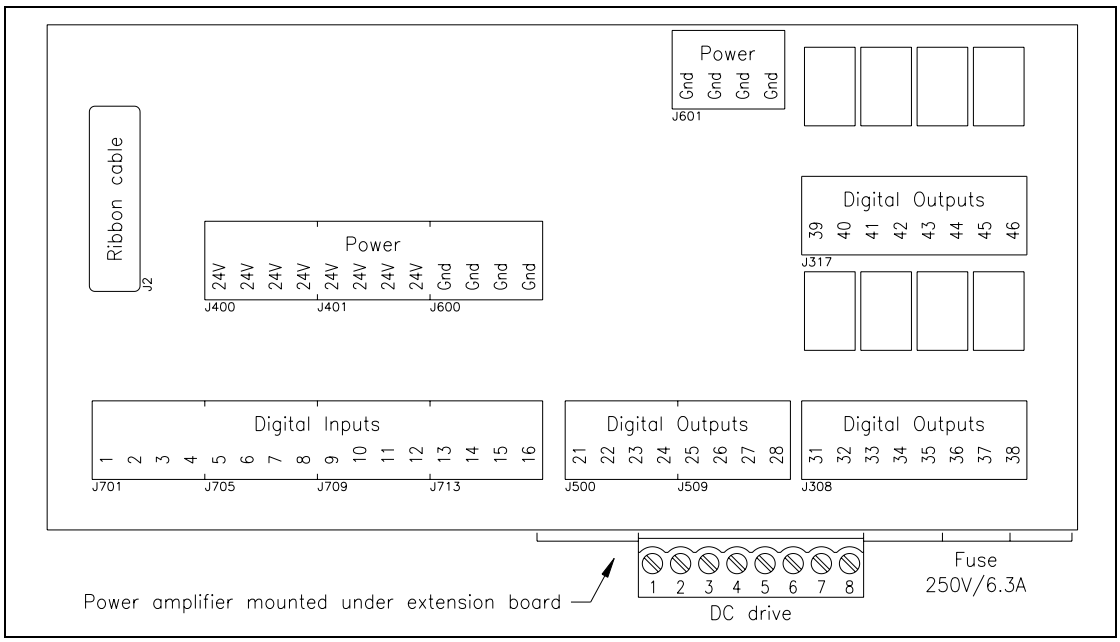

fig. 6: Screw terminal arrangement on the extension board and the power amplifier for the DC drive K600007e

7.2 Wiring Diagrams

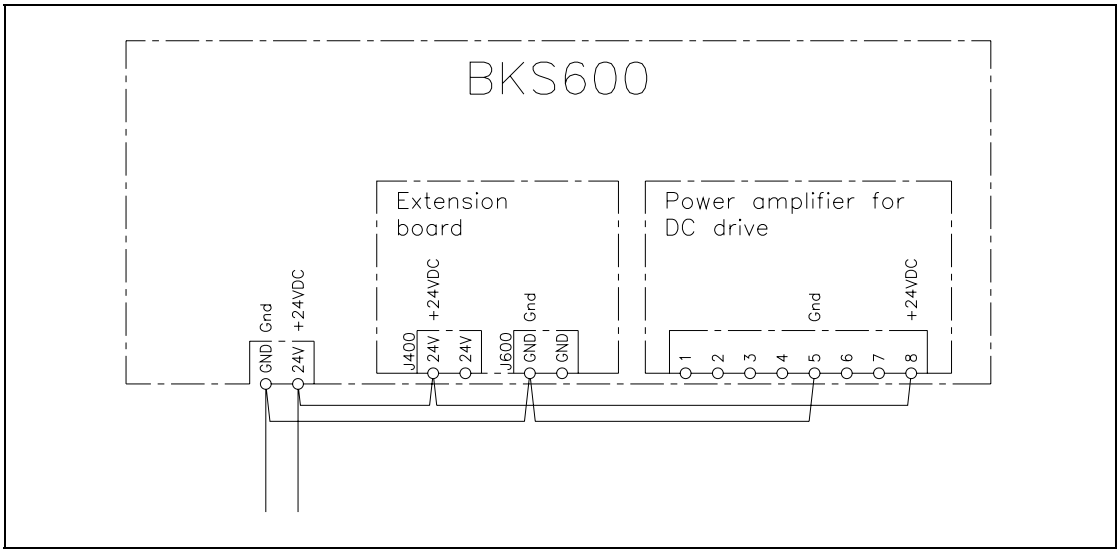

fig. 7: Wiring of the power supply to the electronic unit K600027e

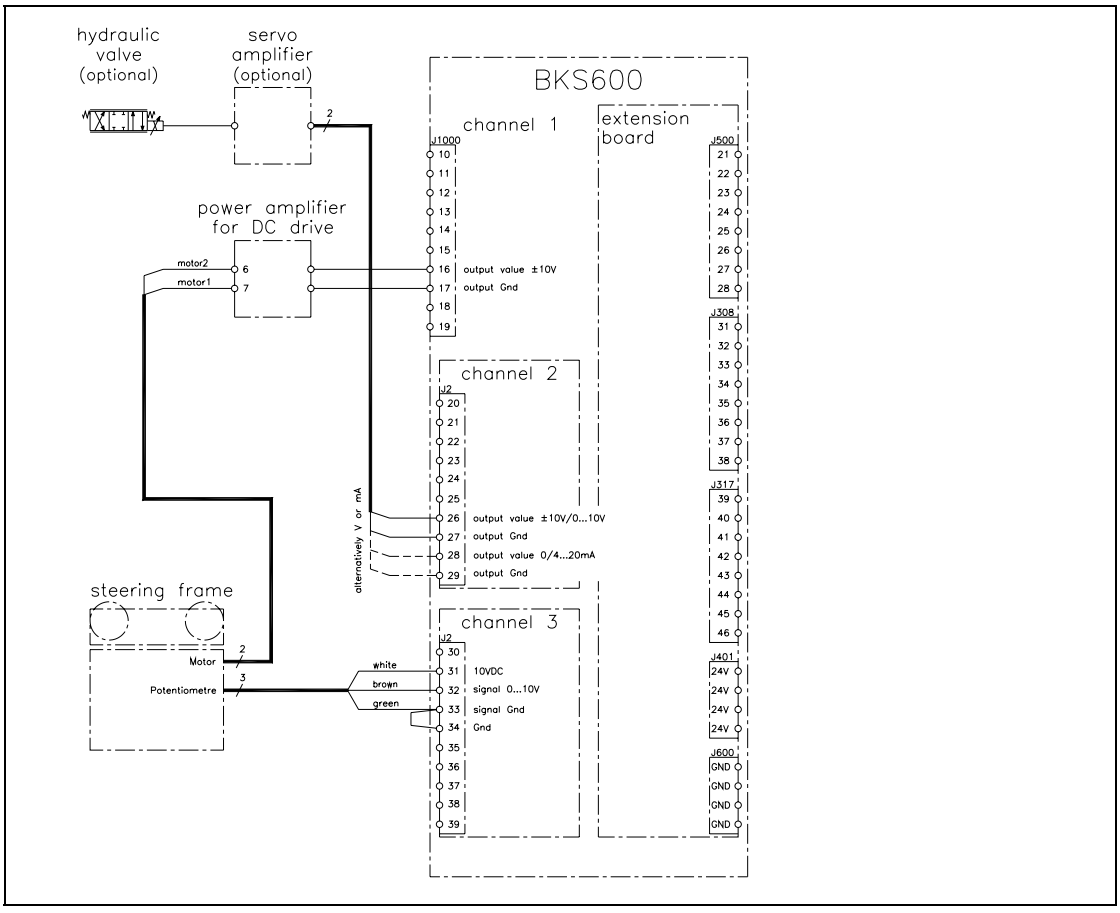

fig. 8: Wiring of steering frame or other steering device K600025e

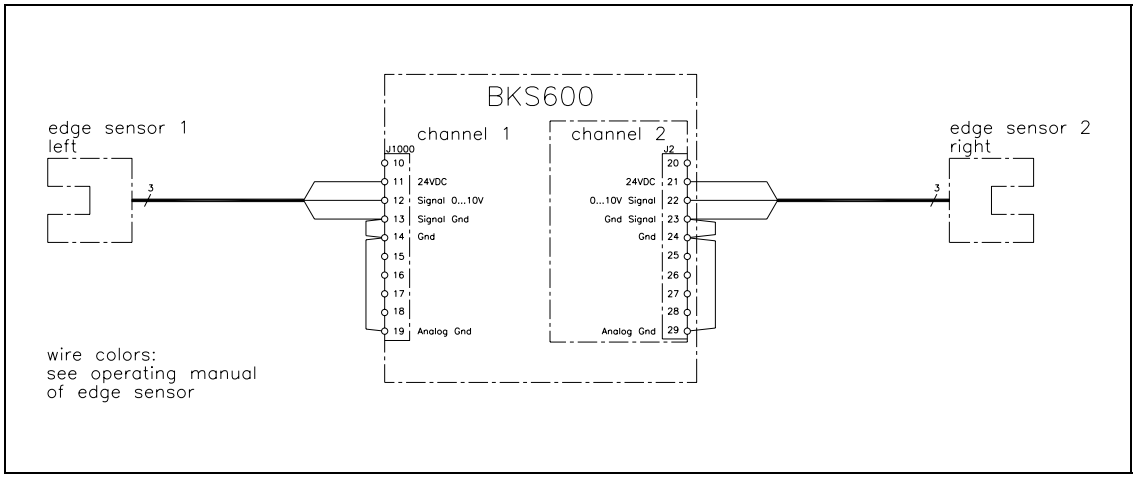

fig. 9: Wiring of the edge sensors K600009e

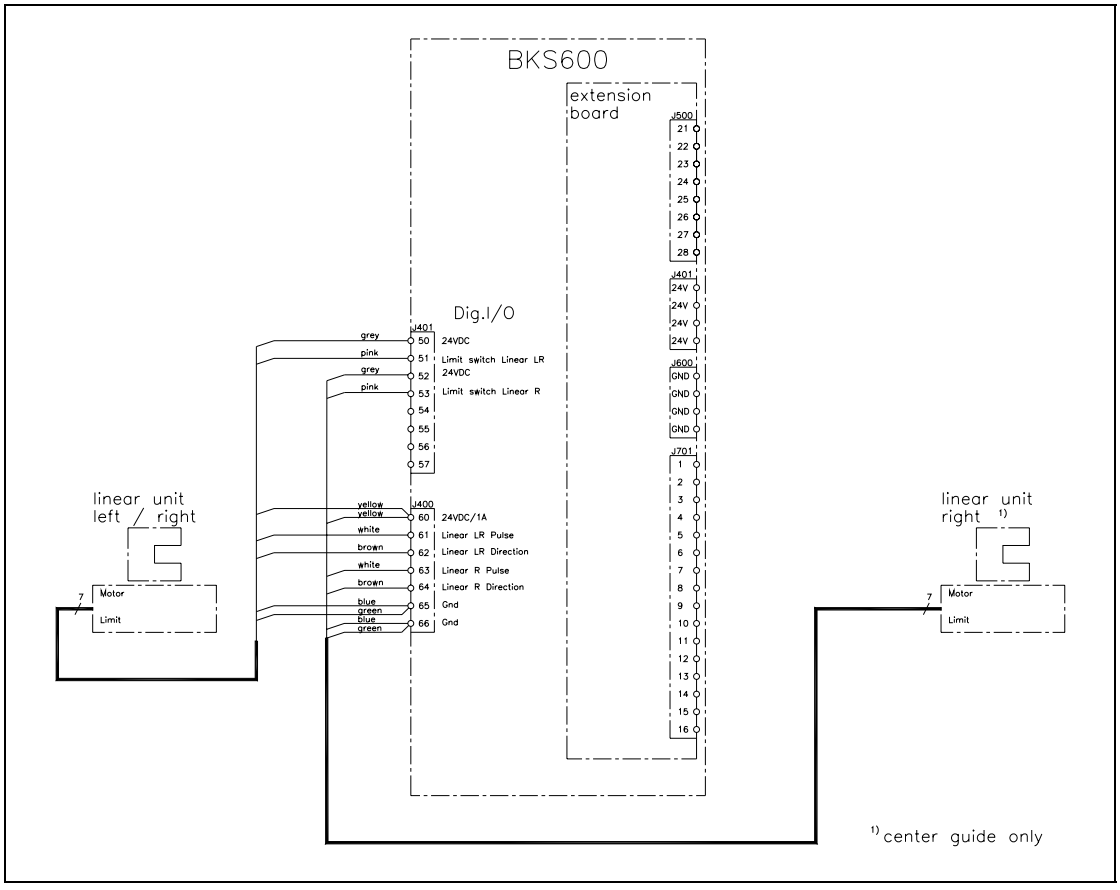

fig. 10: Wiring of the linear units K600026e

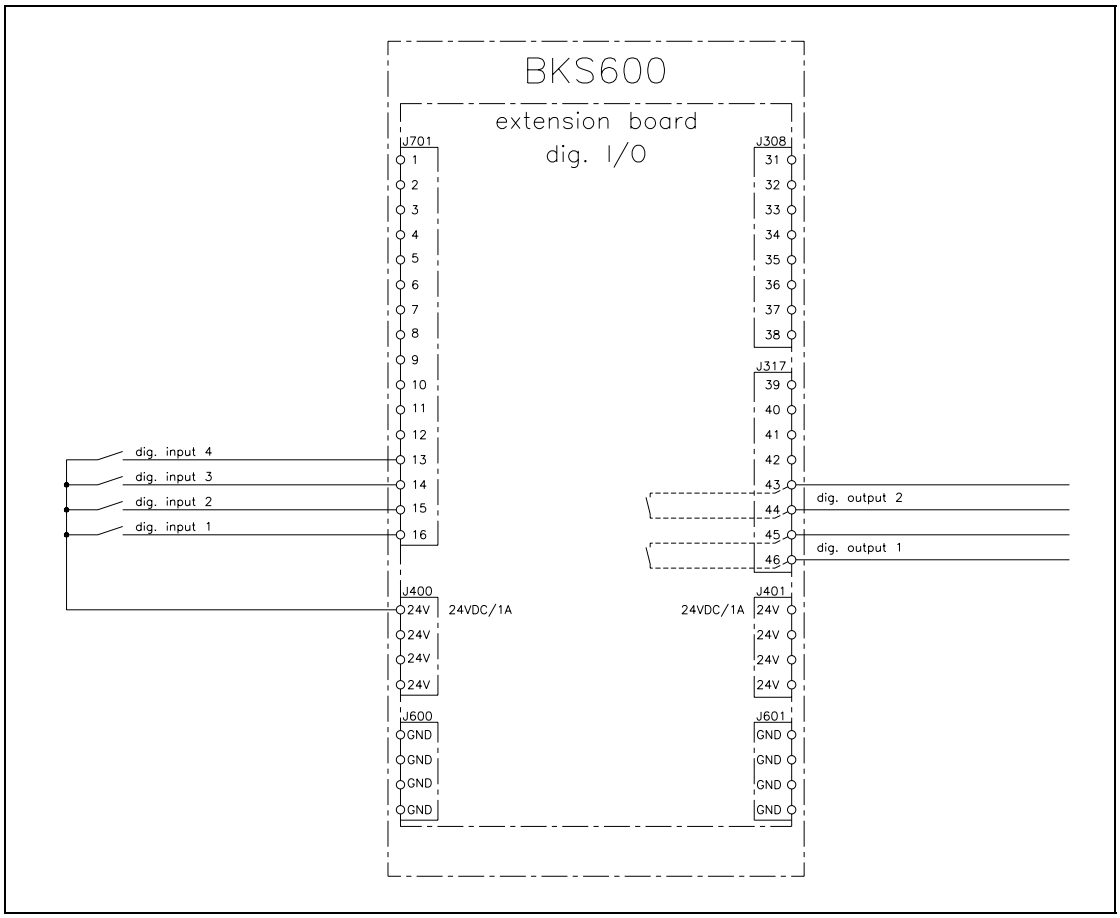

fig. 11: Wiring of the digital inputs and outputs K600011e

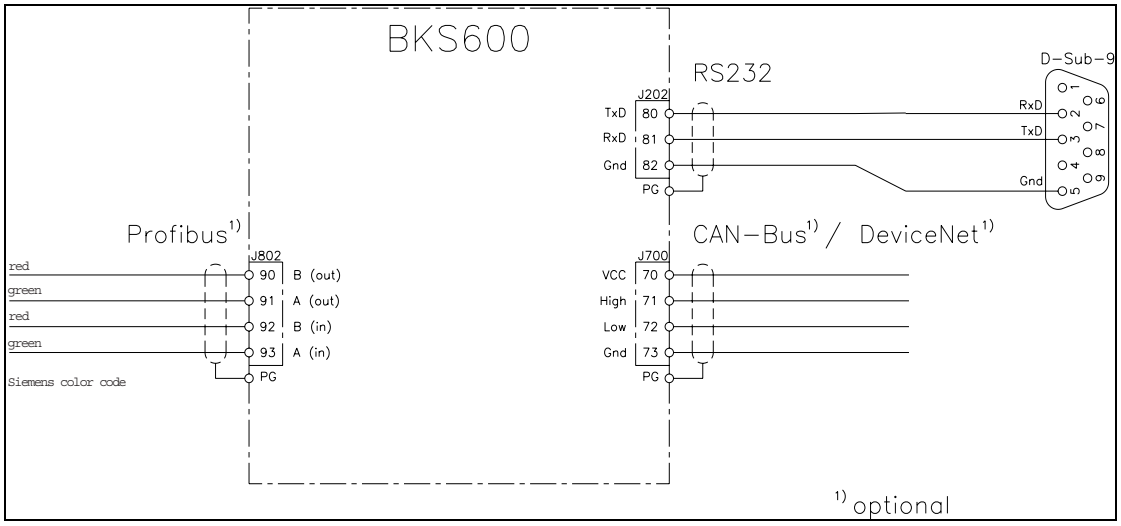

fig. 12: Wiring of the interfaces K600030e

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).

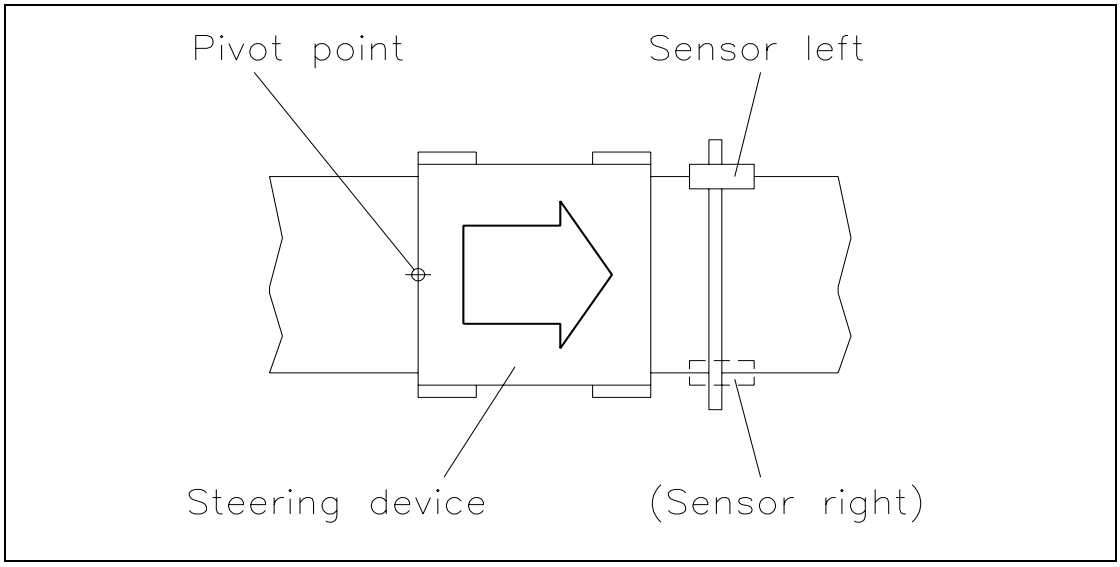

fig. 13: Notice the running direction of the web when mounting the steering device.
K600005e

7.4 Mounting of Manual Sensor Adjustment

The manual sensor adjustment must be installed *after* the steering device regarding running direction (fig. 13). It will be mounted directly to the machine frame.
The sensors can be moved on the location rail. Use the fixing nut to lock the sensor.

Note
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 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.
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.

Note

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.

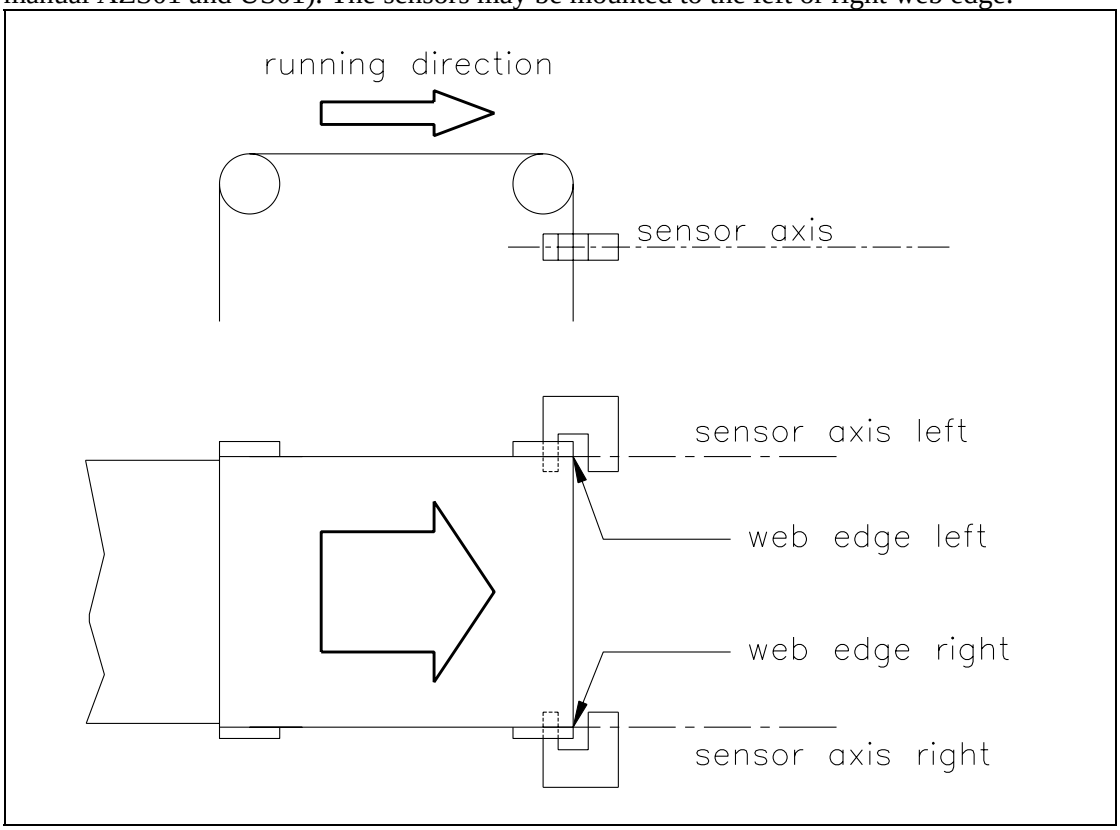

fig. 14: Position of the edge sensors referring to the web. They may be mounted to the left-hand or right-hand side. K400005e

Wiring of the edge sensors to the terminals is done according to wiring diagram (fig. 9).
The FMS sensors provide a signal of 0...10V. If sensors with different signal range are used, this must be parametrized (refer to „8.2 Configuring the Electronic Unit“).

Note

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

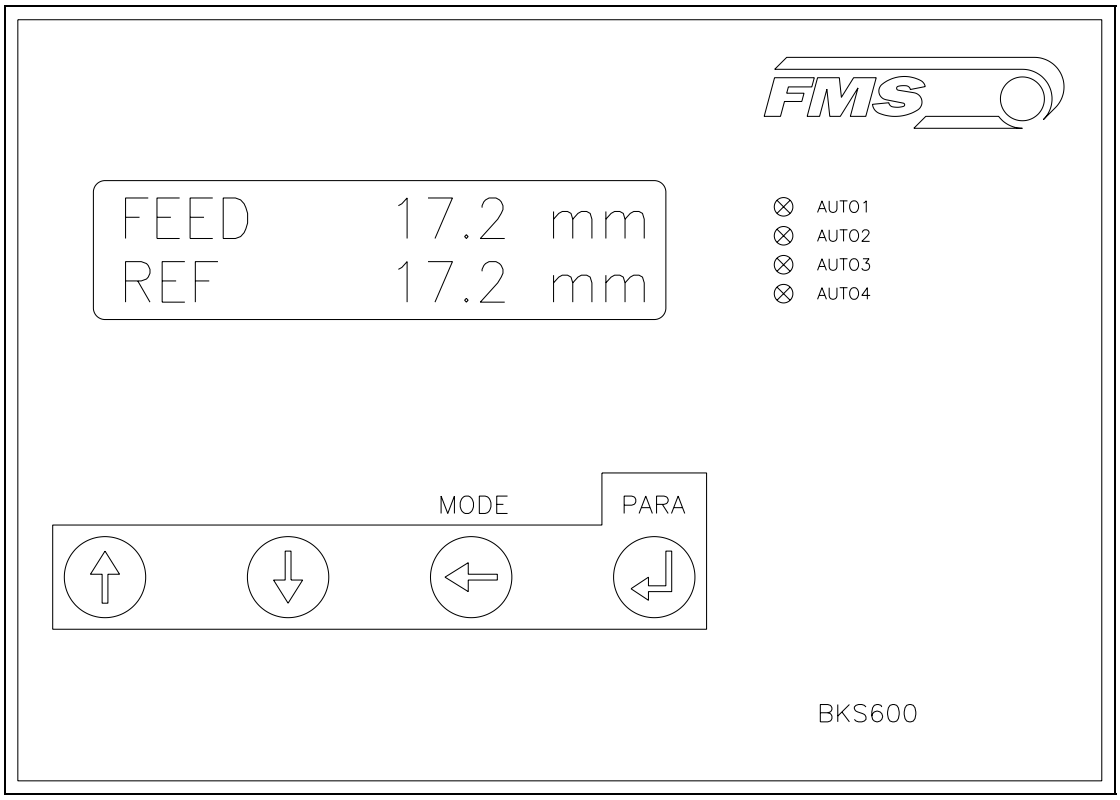

fig. 15: Operating panel BKS600A K600020e

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

Service parameters	
Motor config. [1)]	Standard
Stroke motor [1)]	depending on steering device used
Start pos. motor [1)]	*(will be set with Line-up of the limit positions; ref. to „9.7 Line-up of the limit positions and Offset compensation“)*
Center pos. motor [1)]	
End pos. motor [1)]	
Offset motor [1)]	determine with Offset compensation; ref. to „9.7 Line-up of the limit positions and Offset compensation“
Length of rail left	(only if left rail is used)
Length of rail right	(only if right rail is used)
Sensor covered	depending on sensor used
Sensor uncovered	depending on sensor used
Sensor range	depending on sensor used

[1)] only if no steering frame is used

Parameters BKS600A	
Control mode	According to requirements
Dead band	For the time being set to 0mm
Analog output [2)]	*Controller output*[2)] or *Feedback sensor*
Scale feedback [2)]	According to requirements
Output manual [2)]	According to requirements
Offset output [2)]	For the time being set to 0
Limit output [2)]	For the time being set to 100%
Output config. [2)]	According to requirements
Output direction [2)]	Standard
Base distance left	For the time being set to 0mm
Base distande right	For the time being set to 0mm

[2)] only if analog controller output is used

Note

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

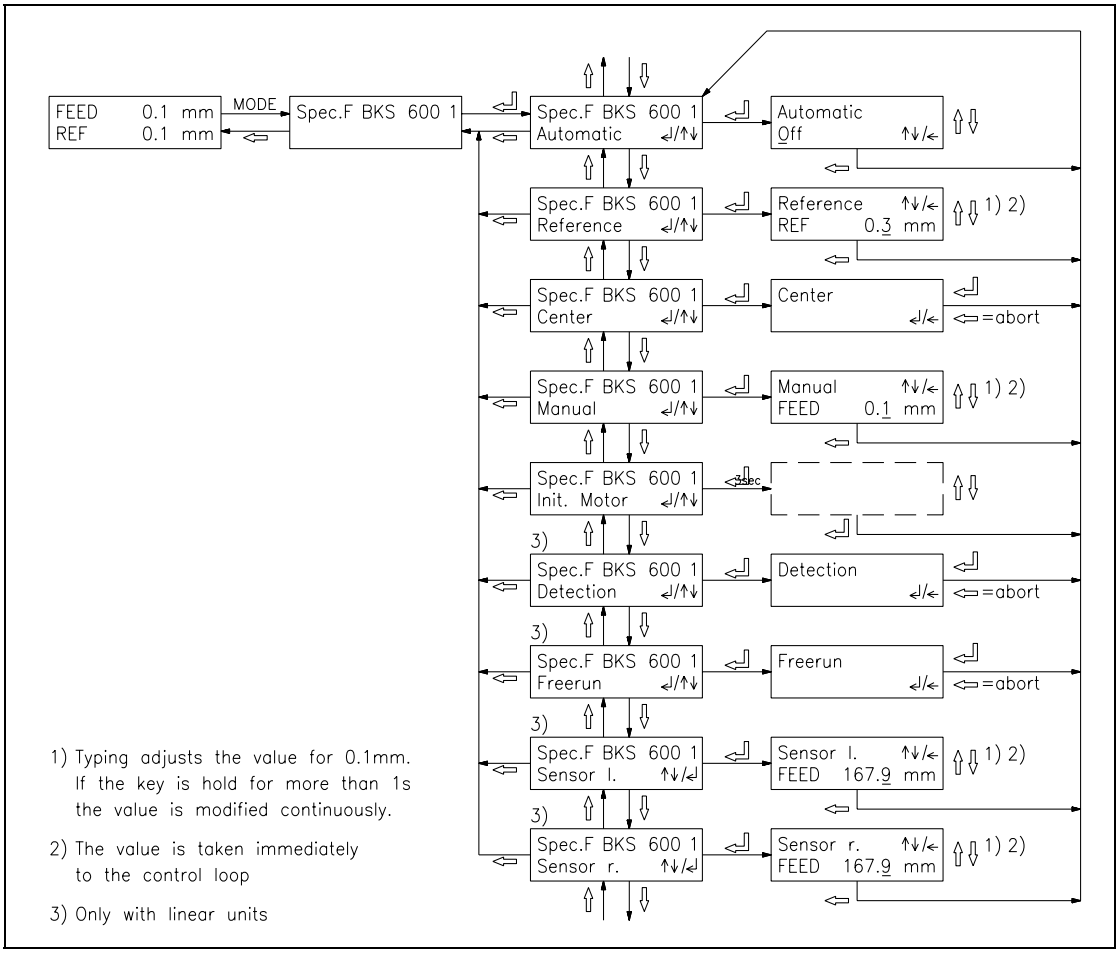

fig. 16: Main operating menu BKS600A K600018e

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 Positions and Offset compensation“)
Detection [3)]	↵ = proceed for edge detection ← = (abort)
Freerun [3)]	↵ = proceed for sensor freerun ← = (abort)
Sensor l. [3)]	↑ ↓ = move left sensor [1) 2)] ← = quit input mode
Sensor r. [3)]	↑ ↓ = move right sensor [1) 2)] ← = quit input mode

[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.

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).

Automatic Operation

- Start automatic mode with special function *Automatic* (fig. 16) or digital input. The control LED *Auto* lights up. Reference position is taken from the middle of the sensor detection band (fig. 18). Using center guide, reference position is in the middle between the 2 sensor axis. The controller starts to guide the web to reference position and to hold this guide point.
- The reference 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.

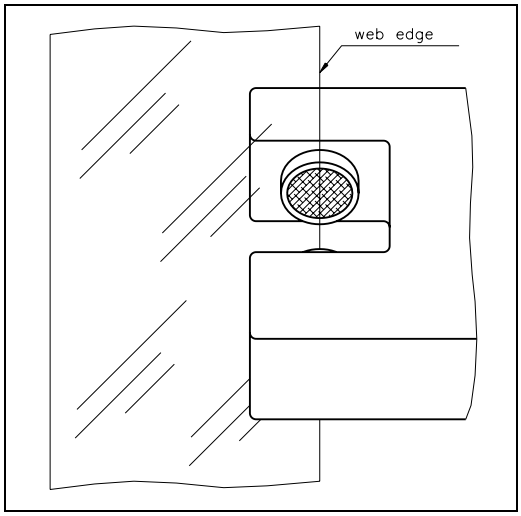

fig. 17: Aligning of the sensor axis to the web edge K100004e

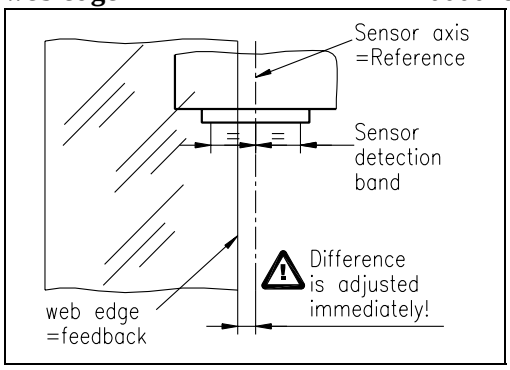

fig. 18: Calculation of reference position during automatic start K100005e

Note

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

Note

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 linear units then search for the edge.
- 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 (without reference point on the machine frame)

- Start automatic operation with special function *Automatic* (ref. to fig. 16) or digital input. The control LED *Auto* lights up. Reference position is taken from the actual web position (fig. 19). The controller starts to guide the web to reference position and to hold this guide point.
- The reference 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.

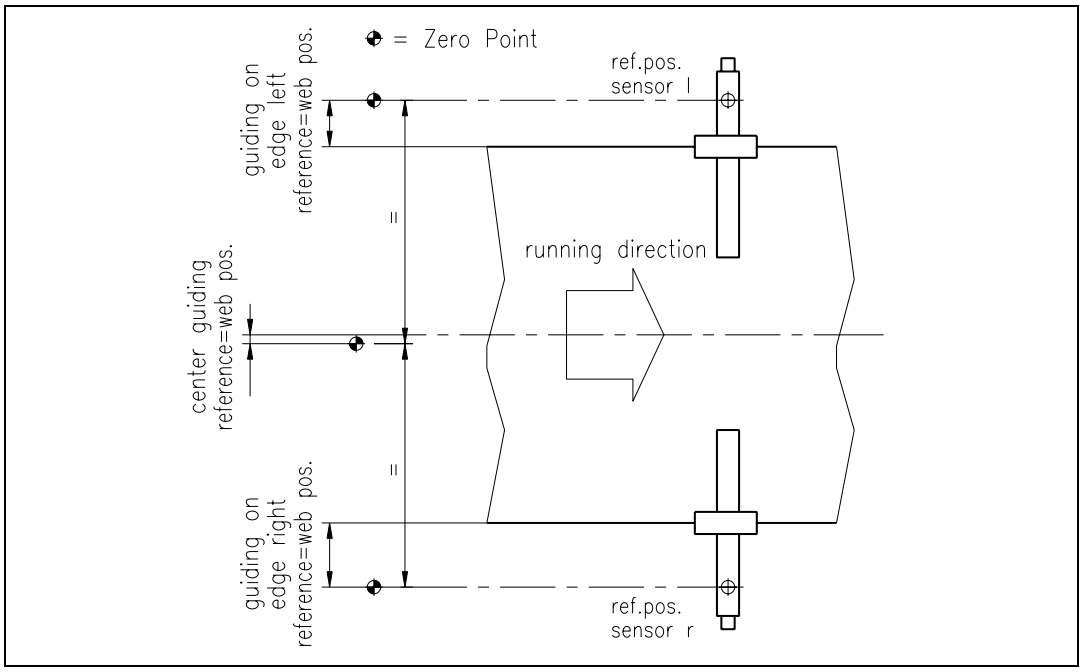

fig. 19: Calculation of the reference value during automatic start by using linear units (without reference point on the machine frame) K601009e

Automatic operation (with reference point on the machine frame)

If a reference point on the machine frame was taken (ref. to „8.7 Measuring from a Reference Point on the Machine Frame“), the position reference is calculated slightly different as without reference on the machine frame. Thus automatic operation works as follows:

- Start automatic operation with special function *Automatic* (ref. to fig. 16) or digital input. The control LED *Auto* lights up. Reference position is taken from the actual web position; when center guiding, reference is taken from the center between the reference points of the linear units (fig. 20). The controller starts to guide the web to reference position and to hold this guide point.
- The reference 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.

Note

Using center guide and 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!

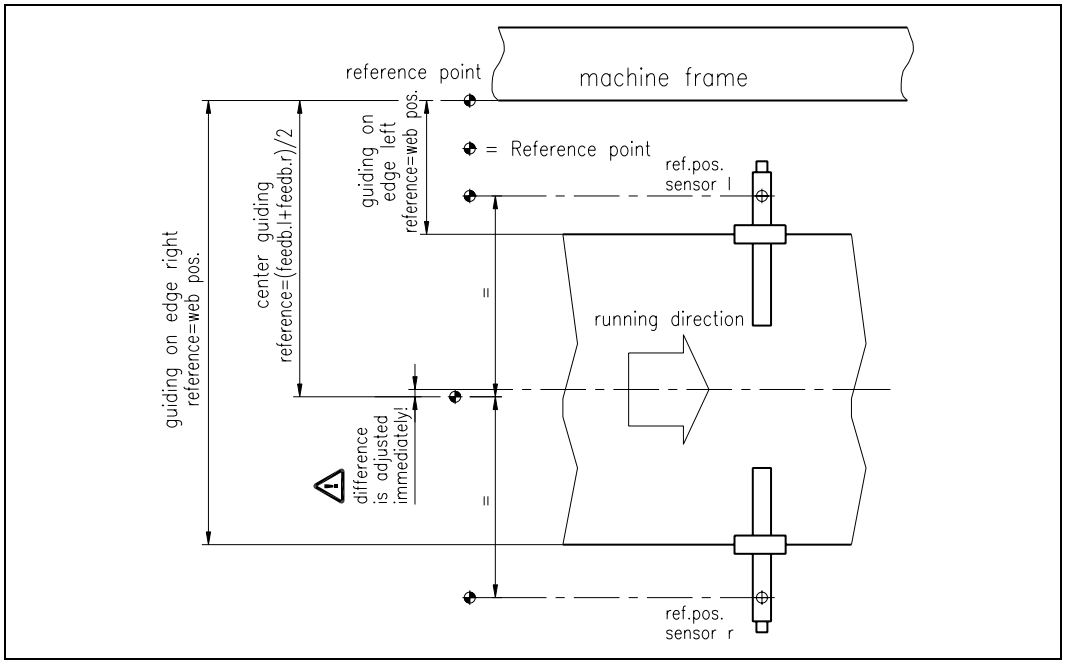

fig. 20: Calculation of the reference value during automatic start by using linear units (with reference point on the machine frame) K601010e

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. 21).

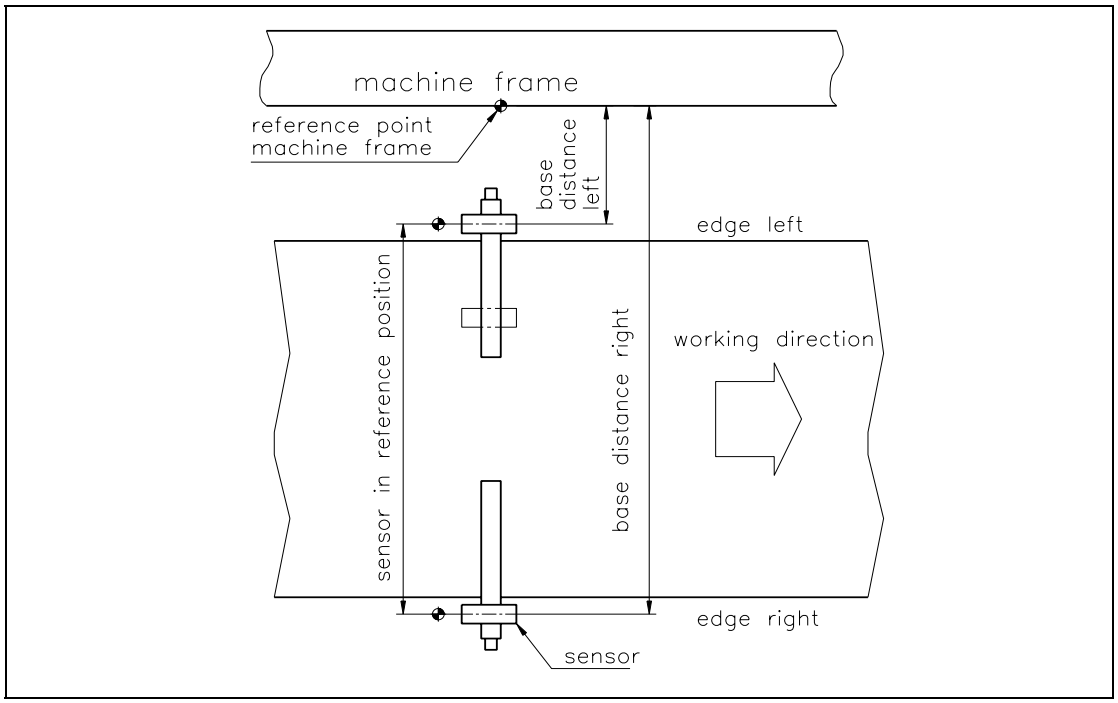

fig. 21: Base distances and reference point when using linear units K400007e

If measuring from a reference point should be activated, the parameters *base distance left* and *base distance 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 left* set the distance between reference point (i.e. machine frame) and axis of left sensor (fig. 21).
- In parameter *Base distance right* set the distance between reference point (i.e. machine frame) and axis of right sensor (fig. 21).

Note

The reference point must always have a greater distance to the web edge than the sensor has (fig. 21).
Using center guide, the same reference point is taken for left and right; it is incidental if the reference point ist left-side or right-side of the web.

If measuring from a reference point is not needed, the parameters *base distance left* and *base distance 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. 21).

9 Parametrization

9.1 Schematic Diagram of Parametrization

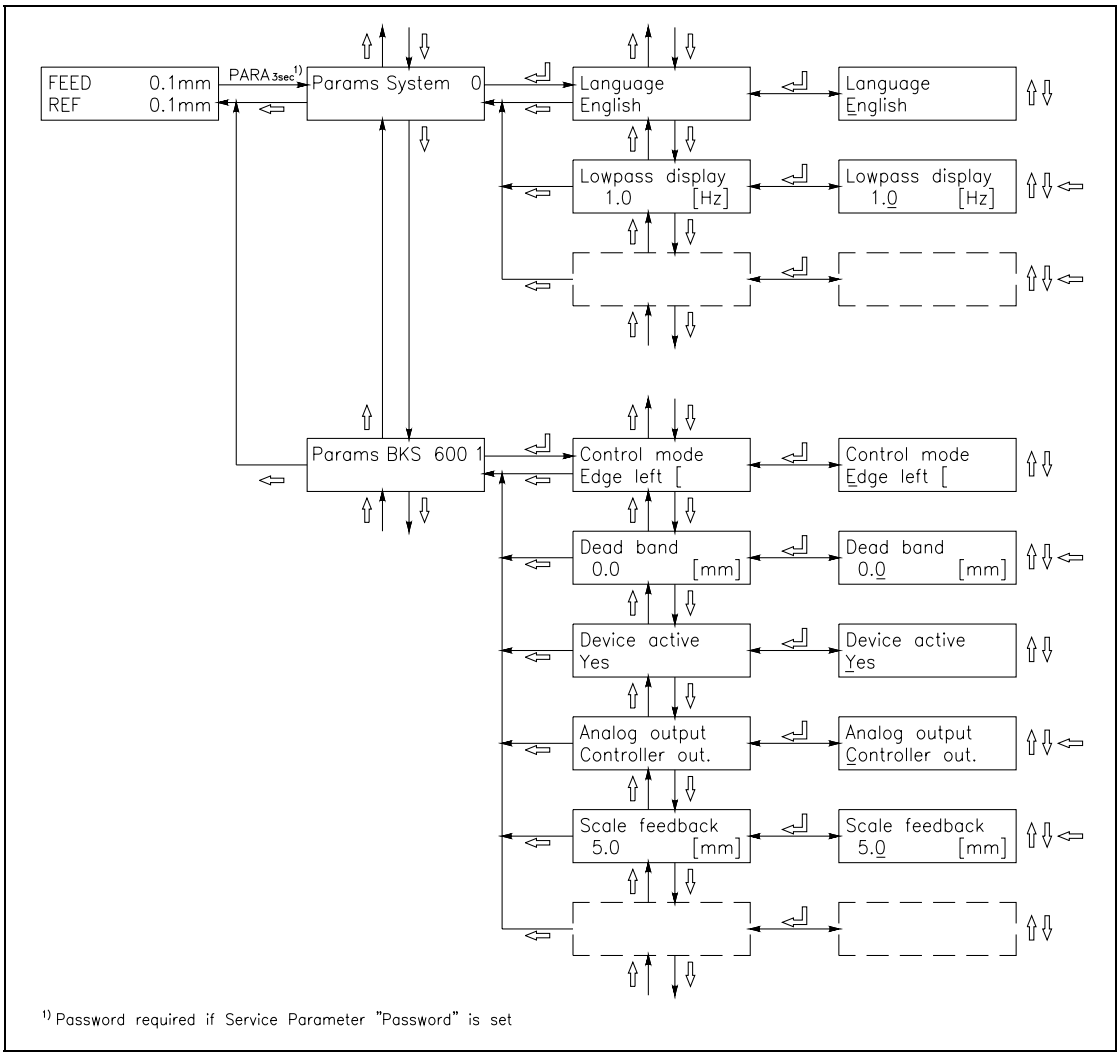

fig. 22: Parametrization BKS600A K600012e

The parameters are split into the modules *system parameters* and parameters *BKS 600 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. 22). 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				
Measuring System	Metric, US standard			Metric	
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 BKS600A

Parameter	Unit	Min	Max	Default	Selected
Control mode	Edge left, Edge right, Center				
Dead band	[mm]	0.0	5.0	0.0	
Device active	Yes, No			Yes	
Analog output	Feedback sensor, Controller out			Feedb.sens.	
Scale feedback	[mm]	0.1	3200.0	5.0	
Output manual	[%]	–100.0	100.0	5.0	
Offset output	[Digit]	–200	200	0	
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.	0...10V and 0...20mA, 0...10V and 4...20mA, ±10V				
Output direction	Standard, Inverted			Standard	
Base distance left	[mm]	0.0	3200.0	0.0	
Base distance right	[mm]	0.0	3200.0	0.0	
Digital input 1	Automatic, Center pos, Reference –, Reference +,Manual left, Manual right, Start detection, Sensor freerun			Automatic	
Digital input 2	*(same as digital input 1)*			Center pos	
Digital input 3	*(same as digital input 1)*			Reference –	
Digital input 4	*(same as digital input 1)*			Reference +	
Digital output 1	Automatic ok, Edge missing, Detection ok			Auto ok	
Digital output 2	*(same as digital output 1)*			Edge miss.	

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. 22).

Language

Use: This parameter stores the display language.

Range: English, French, Italian, German

Measuring system

Use: This parameter indicates the measuring system to be used.

Range: Metric, US standard **Default:** Metric

Note: *(not used from the BKS600A)*

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 BKS600A

The parameter changing mode is activated by pressing the PARA ↵ key for 3 seconds. The module *Params BKS 600 1* is then searched with the ↑ ↓ keys and selected with the PARA ↵ key (ref. also to fig. 22).

Control mode

Use: This parameter defines on which side of the material web the sensors are used. 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 web position will be. The web position is adjusted only when the difference between reference and feedback position 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]

Device active

Use: If multiple web guiding control loops are operated with a single electronic unit, it may be helpful for trouble shooting to disable a web guiding control loop. This is done with this parameter.

Range: Yes, No **Default:** Yes

Analog output

Use: This parameter defines what signal is provided at the analog output. If set to *Controller output* an actuator with analog signal can be operated instead of an FMS steering frame (i.e. hydraulic valve; ref. to parameter *Output config.*). If set to *Feedback sensor* the actual web position is provided at the output in the automatic mode.

Range: Feedback sensor, Controller output **Default:** Feedb. sens.

Scale feedback

Use: If parameter *Analog output* is set to *Feedback sensor*, this parameter defines the mm value the full signal range (±10V / 0...10 V / 0...20mA / 4...20mA; ref. to parameter *Output config.*) is referring to.

Range: 0.1 to 3200.0 **Default:** 5.0

Increment: 0.1 **Unit:** [mm]

Output manual

Use: If parameter *Analog output* is set to *Controller output*, this parameter defines the signal 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 the full signal range (±10V / 0...10 V / 0...20mA / 4...20mA; ref. to parameter *Output config.*)

Range:	-100.0	to	+100.0	**Default:**	+5.0
Increment:	0.1			**Unit:**	[%]

Offset output

Use: If parameter *Analog output* is set to *Controller output* and the actuator is moving although the control unit 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:	–200	to	200	**Default:**	0
Increment:	1			**Unit:**	[Digit]

Limit output

Use: If parameter *Analog output* is set to *Controller output*, this parameter defines the maximum output signal. „80%“ means to 80% of the full signal range (±10V / 0...10 V / 0...20mA / 4...20mA; ref. to parameter *Output config.*)
This parameter can be adjusted also while automatic mode is active.

Range:	1	to	100	**Default:**	100
Increment:	1			**Unit:**	[%]

P value output

Use: If parameter *Analog output* is set to *Controller 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: If parameter *Analog output* is set to *Controller 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 output (controller output) this parameter defines the output signal range.

Range: 0...10V and 0...20mA, 0...10V and 4...20mA,
Default: 0...10V and ±10V 0...20mA

Note: The jumper for the tension output must match the settings of this parameter. (ref. to „14.3 Jumper for the Analog Inputs / Outputs“)

Output direction

Use: For the analog output (controller output) 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 left

Use: This parameter stores the distance from the reference point on the machine frame to the reference point of the left linear unit.

Range: 0.0 to 5000.0
Default: 0.0
Increment: 0.1
Unit: [mm]

Base distance right

Use: This parameter stores the distance from the reference point on the machine frame to the reference point of the right linear unit.

Range: 0.0 to 5000.0
Default: 0.0
Increment: 0.1
Unit: [mm]

Digital input 1

Use: This parameter defines which event is performed by the digital input 1. Applying 24VDC to the input terminal for at least 100ms corresponds to pressing the key on the operation panel.
The functions of the possible settings are equal to the special functions of the web guide (ref. to „8.3 Main Operating Menu and Special Functions“).
Note: If the digital input is set to „Automatic“, the web guide will be in automatic mode as long as the digital input signal is on (permanent signal).

Range: Automatic, Center Position, Reference –, Reference +, Manual left, Manual right, Start detection, Sensor freerun

Digital input 2

Use: Identical with *Digital input 1* but the parameter acts to the digital input 2.

Digital input 3

Use: Identical with *Digital input 1* but the parameter acts to the digital input 3.

Digital input 4

Use: Identical with *Digital input 1* but the parameter acts to the digital input 4.

Relay output 1

Use: This parameter defines on which event the relay output 1 will be activated.

Range: Automatic ok, Edge missing, Detection ok

Definition:

Automatic ok	Controller is active; edge is read
Edge missing	No edge found during detection
Detection ok	The detection was ok; an edge is found.

Relay output 2

Use: Identical with *Relay output 1* but the parameter acts to the relay output 2.

9.6 Service Mode

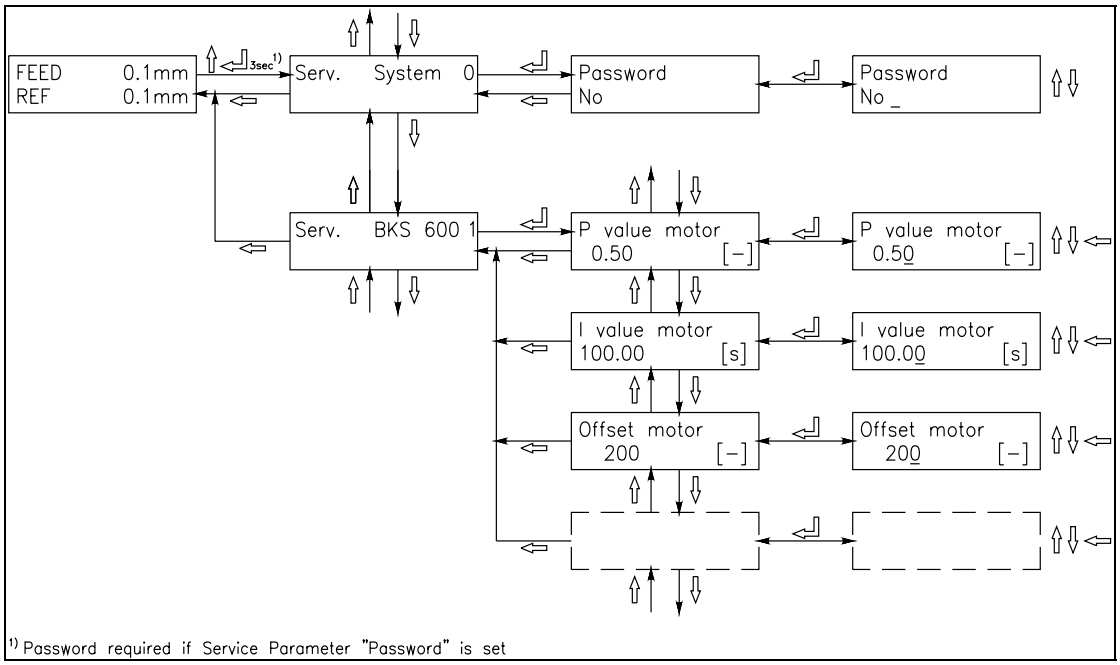

fig. 23: Service Mode Overview K600013e

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.

Note

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.

Password

Use: This parameter defines if a password is required to access the parameters and several special functions. This allows enhanced security against modifications. The password is „3231“.

Range: No, Yes **Default:** No

P value motor

Use:	This parameter defines the P value of the steering frame position controller.			
Range:	0.01	to 320.00	**Default:**	3.00
Increment:	0.01		**Unit:**	[-]

I value motor

Use:	This parameter defines the I value of the steering frame position controller.			
Range:	0.01	to 320.00	**Default:**	50.00
Increment:	0.01		**Unit:**	[s]

Offset Motor

Use:	This parameter stores the hysteresis of the DC motor when changing the rotation direction. See „9.7 Line-up of the limit positions and Offset compensation“ for details. Thereby the dynamics of the DC motor can be adjusted for optimal results in both automatic and manual operation.			
Range:	0	to 2047	**Default:**	500
Increment:	1		**Unit:**	[Digit]

Motor config.

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

Stroke motor

Use:	This parameter stores the usable length of stroke of the steering frame or unwinding roller. „±15mm“ means a usable stroke of 30mm.			
Range:	10.0	to 1000.0	**Default:**	20.0
Increment:	0.1		**Unit:**	[mm]

Start pos. motor

Use:	Value of the position feedback potentiometer when the steering frame is in the first end position. Value determined with special function *Init. Motor*.			
Range:	0	to 8191	**Default:**	1500
Increment:	1		**Unit:**	[-]

Center pos. motor

Use:	Value of the position feedback potentiometer when the steering frame is in center position. Value determined with special function *Init. Motor*.			
Range:	0	to 8191	**Default:**	1600
Increment:	1		**Unit:**	[-]

End pos. motor

Use: Value of the position feedback potentiometer when the steering frame is in the second end position. Value determined with special function *Init. Motor*.

Range: 0 to 8191 **Default:** 1700

Increment: 1 **Unit:** [-]

Reference auto.

Use: This parameter defines which position will be taken by the steering frame during automatic start.

Range: Center of sensor, Feedback sensor **Default:** Center

Length of rail left

Use: This parameter defines the length of stroke of the left linear unit. 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 right

Use: This parameter defines the length of stroke of the right linear unit. 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]

Pitch of rail

Use: This parameter stores the spindle pitch of the linear units. The value is used to calculate the current position of the sensors. The parameter is used for both left and right linear units.

Range: 5.0 to 20.0 **Default:** 5.0

Increment: 0.1 **Unit:** [mm]

Rail auto-follow

Use: This parameter allows to set if the sensors should follow the web edge automatically during center guide automatic mode. If the parameter is set to *On* and the web edge is more than ±2mm out of the sensor center, the sensors are moved and the sensor center is readjusted to the web edge.

Range: Off, On **Default:** Off

Speed auto-follow

Use:	This parameter stores the speed used to readjust the sensors to the web edge. This parameter is only active if parameter *Rail auto-follow* is set to *On*.		
Range:	1 (slow) to 4(fast)	**Default:**	4
Increment:	1	**Unit:**	[-]

Sensor covered

Use:	The parameters *Sensor covered*, *Sensor uncovered* and *Sensor range* allow free scaling of any sensor signal. Here the signal of the covered sensor is input.		
Range:	0.000 to 10.000	**Default:**	0.175
Increment:	0.001	**Unit:**	[V]

Sensor uncovered

Use:	The parameters *Sensor covered*, *Sensor uncovered* and *Sensor range* allow free scaling of any sensor signal. Here the signal of the uncovered sensor is input.		
Range:	0.000 to 10.000	**Default:**	10.000
Increment:	0.001	**Unit:**	[V]

Sensor range

Use:	The parameters *Sensor covered*, *Sensor uncovered* and *Sensor range* allow free scaling of any sensor signal. Here the sensor detection range is input.		
Range:	0.00 to 320.00	**Default:**	10.00
Increment:	0.01	**Unit:**	[mm]

9.7 Line-up of the limit positions and Offset Compensation

Note

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

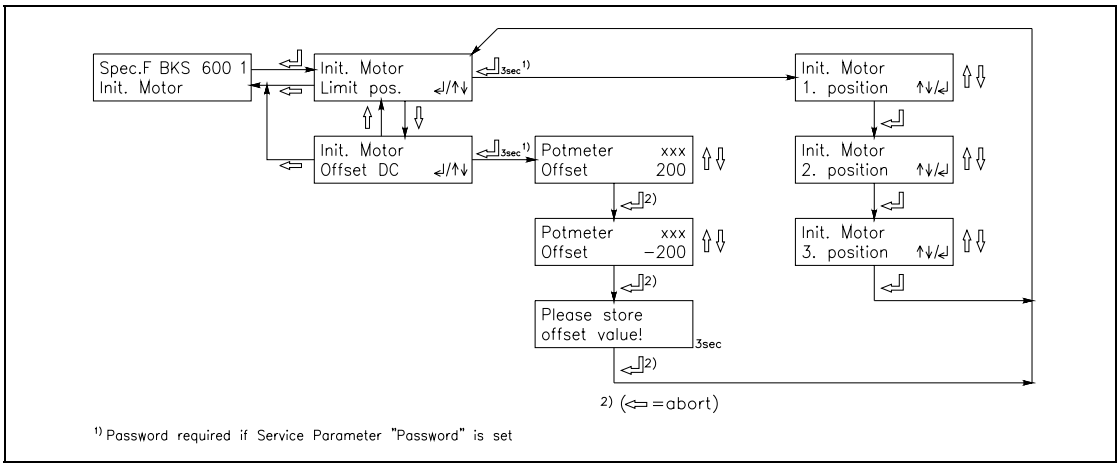

fig. 24: program flow „Init. Motor“ K600014e

However if adjustment is necessary, proceed as follows:

Line-up of limit positions

- Call special function *Init. Motor Limit pos.* with MODE ↑ ↓ ↵ keys and confirm by pressing the ↵ key for 3 seconds (fig. 24).
- With ↑ ↓ keys set steering frame to the first limit position and save it with ↵ key.
- With ↑ ↓ keys set steering frame to the center position and save it with ↵ key.
- With ↑ ↓ keys set steering frame to the second limit position and save it with ↵ key. The display returns to the start screen of the special function.

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!

Offset compensation

- Call special function *Init. Motor Offset DC* with MODE ↑ ↓ ↵ keys and confirm by pressing the ↵ key for 3 seconds (fig. 24).
- Adjust offset value with ↑ (↓) key until the potentiometer value changes (that means the steering frame is now moving). Note offset value and press ↵ key.
- Adjust offset value with ↓ (↑) key until the potentiometer value changes (that means the steering frame is now moving). Note offset value and press ↵ key. The display returns to the start screen of the special function.
- Calculate mean offset value:
  Mean_Offset = (Offset_1 + Offset_2) / 2 – 10 = _____ [Digit]
- Save mean offset value under service parameter *Offset DC-Motor* (ref. to „8.4 Service Mode“).

This page intentionally left blank

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

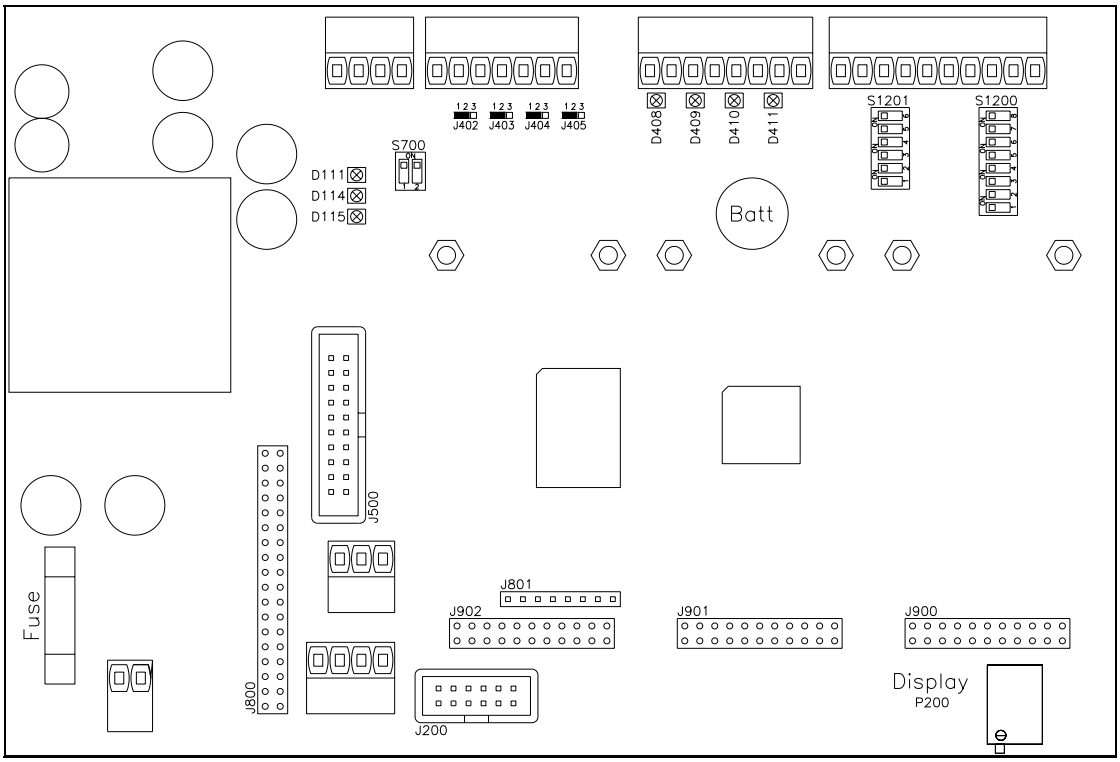

fig. 25 K600028e

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

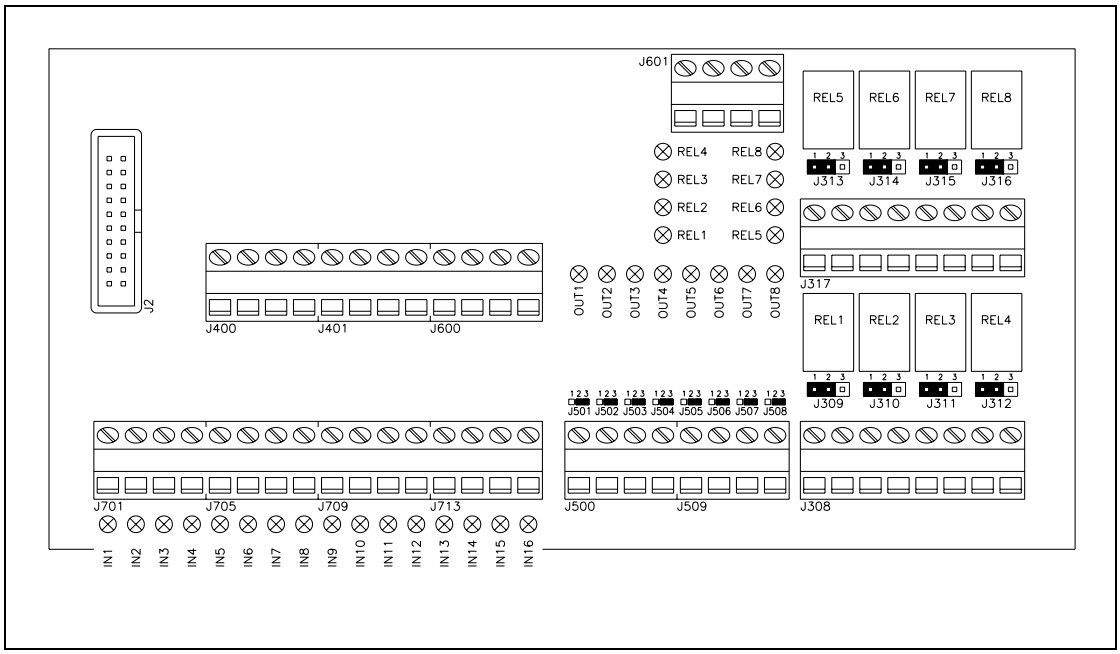

fig. 26 K600002

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

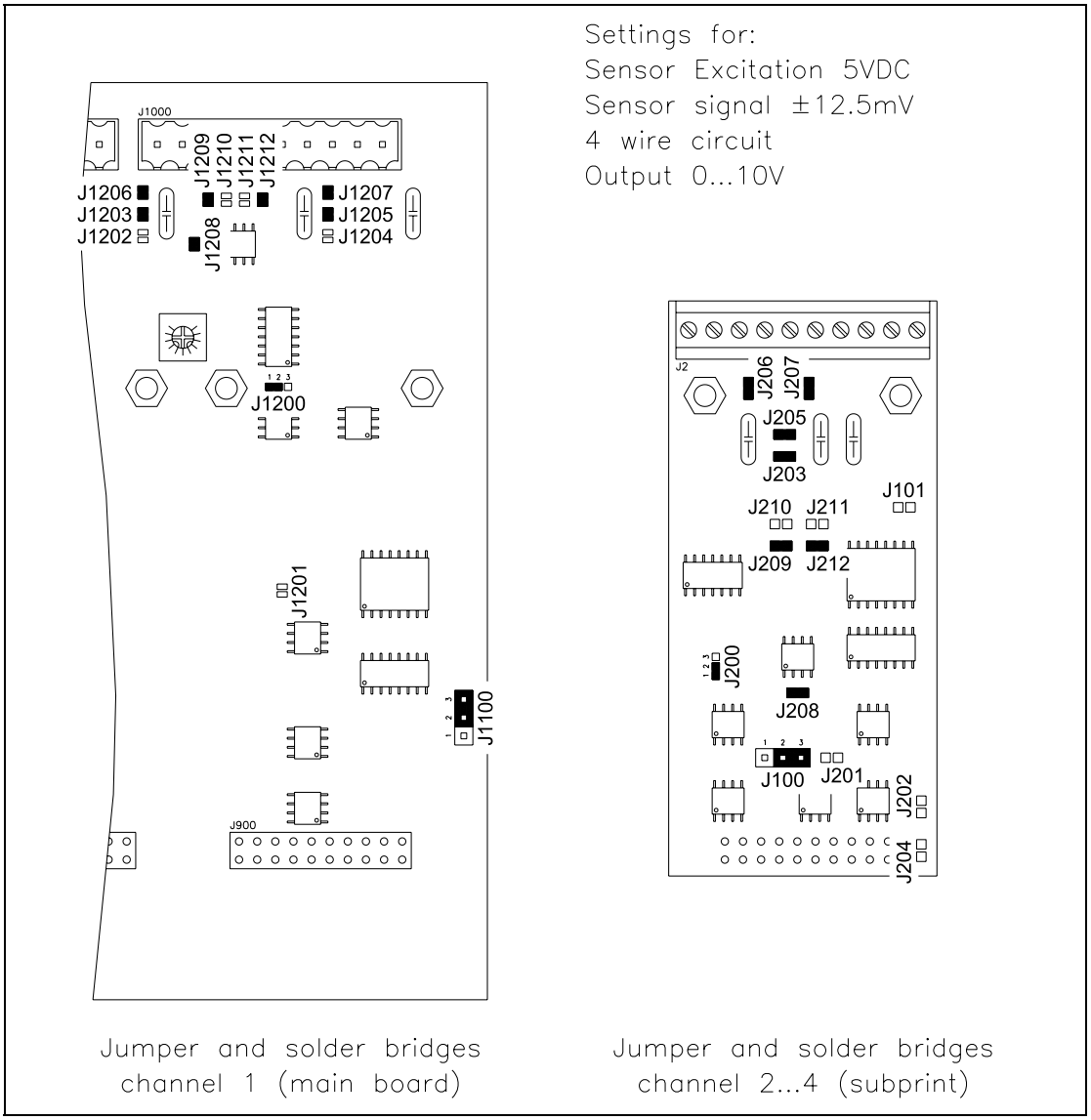

fig. 27 E600005e

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!

Note

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)	Sensor excitation 10VDC
J1200	J200	**2-3**	**2-3**
J1201	J201	**closed**	**closed**
J1202	J202	**closed**	open
J1203	J203	open	**closed**
J1204	J204	**closed**	open
J1205	J205	open	**closed**

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**	

Note

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

14.4 Technical Data

Function	Web guide
Number of actuators (steering frames)	1
Drive of the actuator	FMS steering frames with integrated DC drive or actuator with input signal ±10V / 0...10V / 0...20mA / 4...20mA (i.e. hydraulic valve)
Position reference	in steps of 0.1mm
Dead band	±5mm, adjustable in steps of 0.1mm
Edge signal	0...10V (freely programmable)
Number of edge sensors	1...2
Resolution A/D converter	±8192 Digit (14 Bit)
Measuring error	<0.05% FS
Motorized sensor adjustment	For up to 2 sensors, with stepper motor
Cycle time	2ms
Operation	4 keys, 4 LED's, LCD display 2x16 characters (8mm height)
Digital inputs	4 inputs; signal 24VDC must be on for at least 100ms (freely programmable)
Digital outputs	2 relay outputs 24V / 1A (freely programmable)
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)

This page intentionally left blank

15 Trouble Shooting

Error	Cause	Corrective action
Controller guides web edge immediately out of the sensor	Control mode wrong parametrized	Set parameter *Control mode* according to the sensor position
	Parameter *Output config.* is set wrong	Change parameter *Output config.*
	Sensor signal wrong parametrized	Set servcie parameters *Sensor covered, Sensor uncovered, Sensor range* correct
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	Service parameter *Motor config.* is set wrong	Change service parameter *motor config.*
	Sensor signal wrong parametrized	Set servcie parameters *Sensor covered, Sensor uncovered, Sensor range* correct
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

FMS Force Measuring Systems AG
Aspstrasse 6
8154 Oberglatt (Switzerland)
Tel. +41 44 852 80 80
Fax +41 44 850 60 06
info@fms-technology.com
www.fms-technology.com

FMS Italy
Via Baranzate 67
I-20026 Novate Milanese
Tel: +39 02 39487035
Fax: +39 02 39487035
fmsit@fms-technology.com

FMS USA, Inc.
2155 Stonington Ave. Suite 119
Hoffman Estates, IL 60169 USA
Tel. +1 847 519 4400
Fax +1 847 519 4401
fmsusa@fms-technology.com

FMS UK
Highfield, Atch Lench Road
Church Lench
Evesham WR11 4UG, Great Britain
Tel. +44 1386 871023
Fax +44 1386 871021
fmsuk@fms-technology.com