Operating Manual BKS309.MS

Digital Web Guide Controller
with Master-Slave Function

Version	2.40 08/2018 NS
Firmware Version	V2.43

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1 Safety Instructions

1.1 Description Conditions

a) 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.*

b) Risk of damage of machines

> ### Caution
> *This symbol refers to information, that, if ignored, could cause heavy mechanical damage. This warning has to be followed absolutely.*

c) 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

Some contacts on the power supply board are under 230V tension! Mortal danger! Disconnect power supply before open the housing!

Proper function of the FMS web guide is only guaranteed with the recommended application of the components. In case of other arrangement, heavy malfunction can be the result.

Local installation regulations are to preserve safety of electric equipment. They are not taken into consideration by 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 control unit! It is vital to ensure that proper earth connection is done.

The processor board is mounted directly behind the operation panel. Improper handling of the electronic boards may cause damage to the fragile equipment! Don't use rough tools such as screwdrivers or pliers! Operators handling the electronic boards must wear a well earthed bracelet in order to discharge static electricity

2 System Description

2.1 Functional Description Standard Web Guide Controller

Figure 1 shows a typical web guiding system with its basic components.

The sensors measure the position of the web edge and send this information as an analogue signal to the web guide controller BKS309. This electronics compares the position feedback signal with the reference. If the difference of these two values is higher then the stored dead band value, the steering frame will be adjusted.
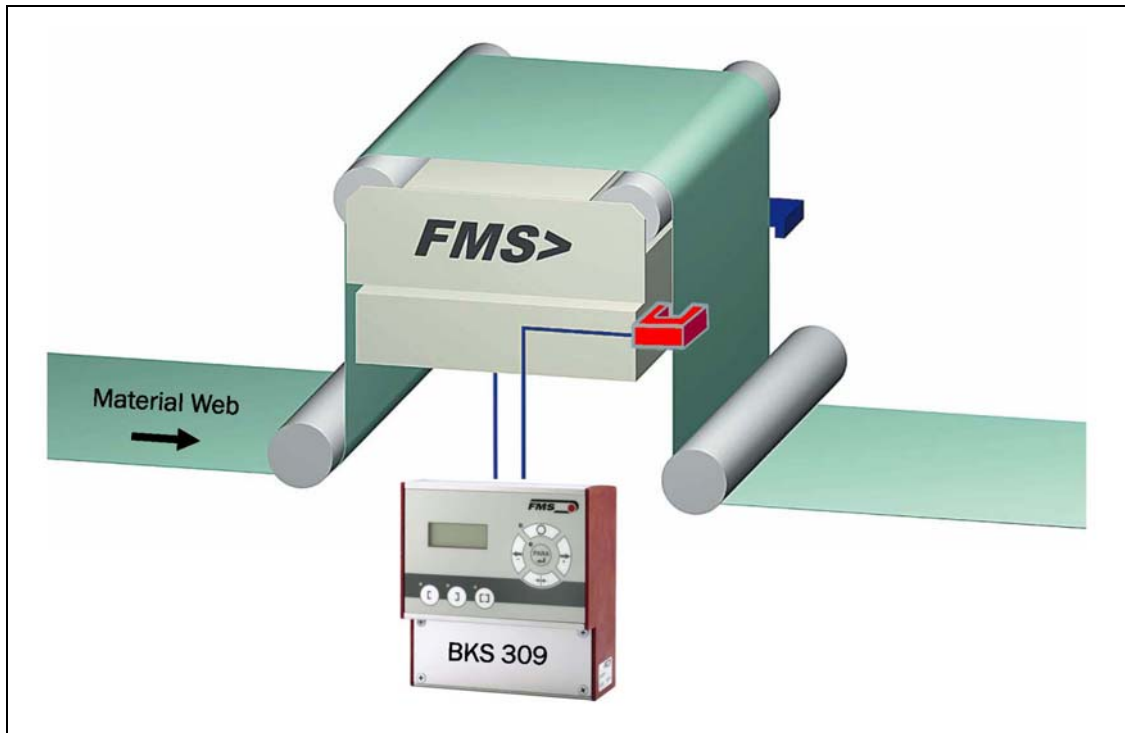
Fig. 1: Basic system arrangement with BKS309 web guide controller   K309003e

2.2 Web Guide Controller with Master-Slave Functionality

For the lamination of two webs Chase & Follow Control Systems are often used. This control system enables the exact positioning of two webs one above the other. The **BKS309.MS** web guide controller with Master-Slave functionality measures the position of a first web (Master) and guide a second web (Slave) so that both webs exactly match each other. Chase & Follow guiding requires at least one steering frame (or actuator) and two material sensors.

The material sensors are mounted on the same side of the corresponding webs. Either both on the left, or both on the right hand side.
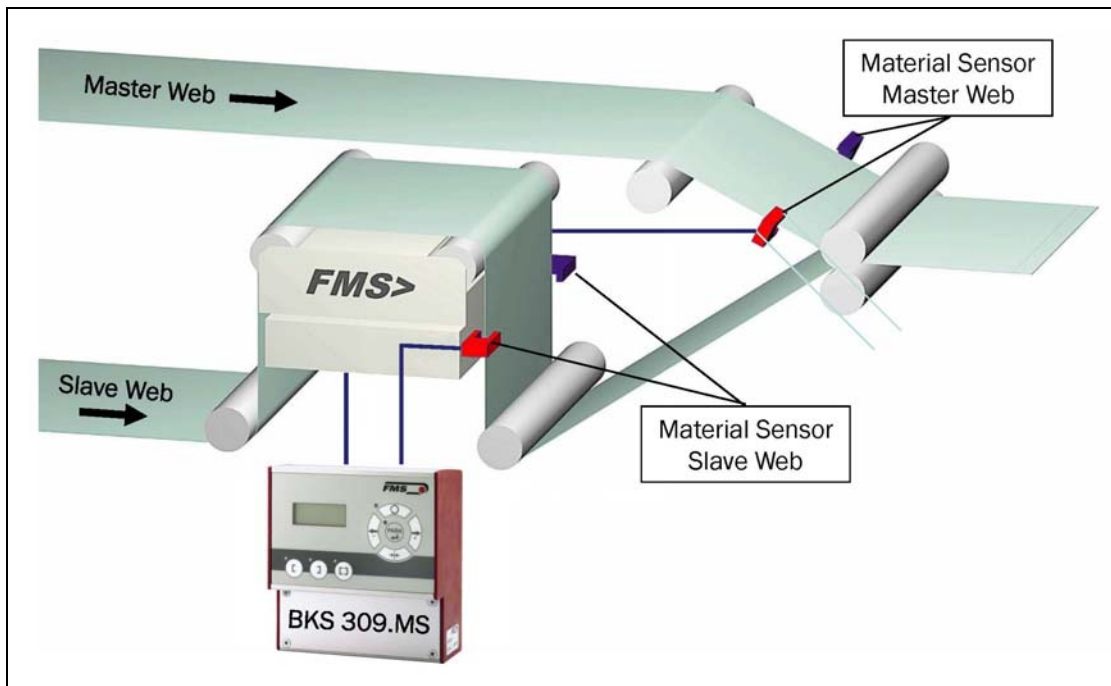
Fig. 2: System with Master-Slave Functionality (BKS309.MS)   K309003e

2.3 Steering Frame or Actuator

The steering frame consists of a fixed lower and a moveable upper frame that supports the rollers. The upper frame is activated by a stepper motor. The rollers are manufactured and balanced according to customer specification. End positions are controlled via a linear potentiometer. A location rail for easy sensor attachment is integrated to the steering frame. For rewind und unwind stands a stepper motor based drive acts as **actuator**.

2.4 Electronic Control Unit

The micro-processor based electronic control unit handles all calculations and communications. Three buttons and a five key wind-rose serve as the man-machine interface. Parameter setting can be performed via the front panel keys or via a web interface. The BKS309 controller series works in combination with FMS steering frames of the series **webMASTER BKS020, BKS040, webDIRECTOR BKS041/42**, and actuators of the **winderGLIDE BKS.D.3** and **winderGLIDE BKS.D.6** series.

2.5 Sensors

Optical sensors (**AZS01/04**), ultrasonic sensors (**US01/4B**) and a digital line sensor (**DLS**) are available from FMS. These sensors provide a signal of 0...10V. With them, edge, center and line guiding applications can be covered.

3 Quick Installation Guide

The installation and set-up instructions in this operation manual refer to the **BKS309.MS** controller with Master-Slave functionality.

3.1 Preparations for Set-up

- Read the Operation Manual of your web guide or actuator system.
- Check your system requirements such as:
  - Operation with steering frame or with actuator
  - Unit system (metric, imperial)
  - Relay or digital input requirements of your set-up
- Draw the wiring diagram for your configuration (ref. to **chapters 5.1** to **5.6**)
- If required, determine special parameters (ref. to **8** "Parameter Setting over the Front Panel")

3.2 Installation Procedure

1. Mount and ajust your material sensors to the Slave Web (steering frame) and Master Web (ref. to **chapter 4.3**)
2. Mount the steering frame or actator to the machine
3. Wire the sensors to the electronic unit (ref. to **chapter 5**)
4. Wire the steering frame to the electronic unit (ref. to **chapters 5.1** to **5.6**)
5. If using an external web guide controller, mount the electronics on a place where it can be easily reached by the operator
6. Make sure the power supply voltage is in the range 18 to 30V DC (Vnom= 24V)
7. Power your system on and check if the electronics starts up (LCD turn on)
8. Install your webs in the machine and align the edge sensors to the material (ref. **3.3** "Adjustment of the Sensors").
9. If necessary, continue with the configuration of your system (ref. to **chapter 6**)

3.3 Adjustment 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 (ref. to **Fig. 3**).
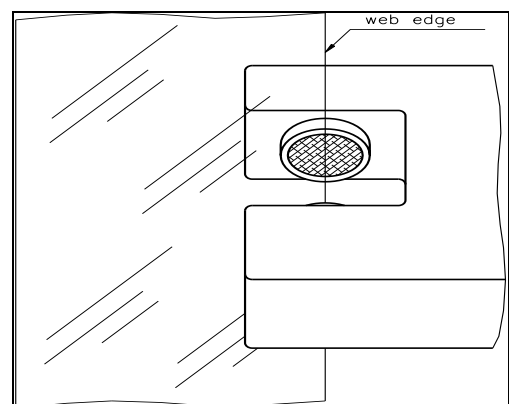

Fig 3: Alignment of the sensor axis to the web edge   K100004e

4 Installation

> ⚠ *Caution*
>
> *Proper function of the FMS web guides and actuators is only guaranteed with the recommended application of the components. Other arrangements, can cause heavy malfunctions. Therefore, the installation instructions on the following pages must strictly be followed.*
>
> ⚠ *Caution*
>
> *Local installation regulations are to preserve safety of electric equipment. They are not taken into consideration by this operating manual. However, they have to be followed strictly.*

4.1 Mounting the Steering Frame

The mounting orientation of the steering frame (indicated by an arrow), must correspond with the web running direction. The lower frame is mounted with four M8 screws to the machine frame. The machine must be prepared to accept the M8 mounting screws.

4.2 Mounting the Actuator to your Unwind or Rewind Station

The static part of the winderGLIDE actuator must be mounted to the machine frame e.g. to the spherical rod end on the gearbox. The moving rod end is mounted to the winding stand. For other assembly forms consult the operation manual of the BKS.D.3 respectively BKS.D.6. The BKS.D.3 / D.6 are designed for horizontal mounting positions. The machine frame must be prepared to accept the mounting devices of the winderGLIDE.

4.3 Mounting the Sensors

The sensors will be mounted with brackets to the rail of the steering frame or to the sensor arrangement of the Master Web (refer to operation manual AZS01, US01 or DLS). The sensors have to be installed after the steering frame if seen in running direction of the web. They have to be mounted so that the narrow side is closer to the steering frame (see **Fig. 4**).

> ⚠ *Caution*
>
> *The material sensors for the Master Web and for the Slave Web must both be mounted on the same side (either left or right side).*

Definition of Left and Right:
Left and right are always seen in direction of the running web (see **Fig. 4**).
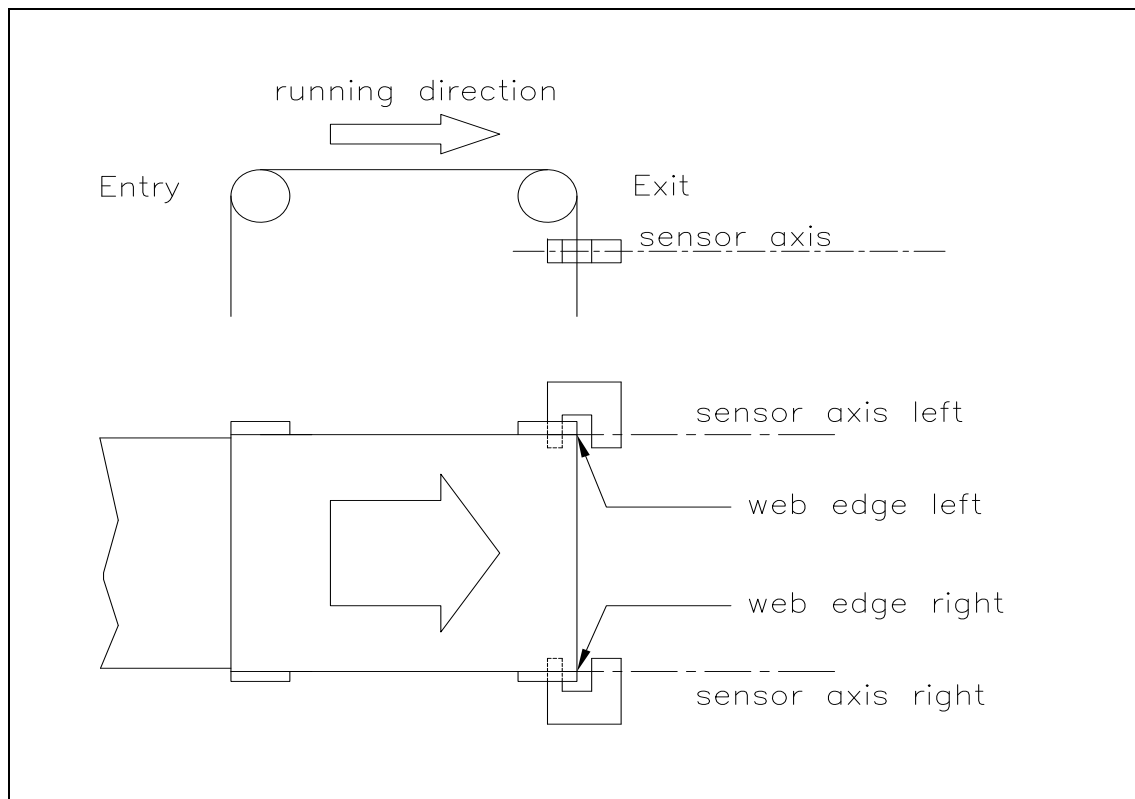
Fig. 4: Position of the sensors according to the web   K400005e

👉 *Note*

Make sure that the sensors are connected properly to the electronic unit by means of the delivered cables. For left / right orientation please refer to Fig. 4. If the connections are crossed over, malfunction can be the result.

👉 *Note*

For optimum control results, the sensors have to be placed next to the exit roller of the steering frame. If the sensors are placed far from the steering frame, control dynamics will deteriorate.

4.4 Mounting the Electronic Control Unit

The BKS309.MS series is available in four different housing options:
1. Rail mount housing (electrical connections via screw terminals)
2. Rail mount housing (electrical connections via connectors)
3. Wall mount housing
4. Panel mount housing

The mechanical dimensions can be seen in **chapter 10** "Mechanical Dimensions".

5 Wiring Diagrams

Use the original FMS cables to connect the steering frame respectively the actuator to the BKS309.MS controller. The connector end of the cable is connected either to a steering frame or a BKS.D.3 / D.6 actuator. The open ends of the cables must be wired to the cable terminals in the controller according to the wiring diagrams below (ref. also to **Fig. 5** or **Fig. 7**)

5.1 Wiring a Steering Frame with BKS309.R / .S or .W Controller
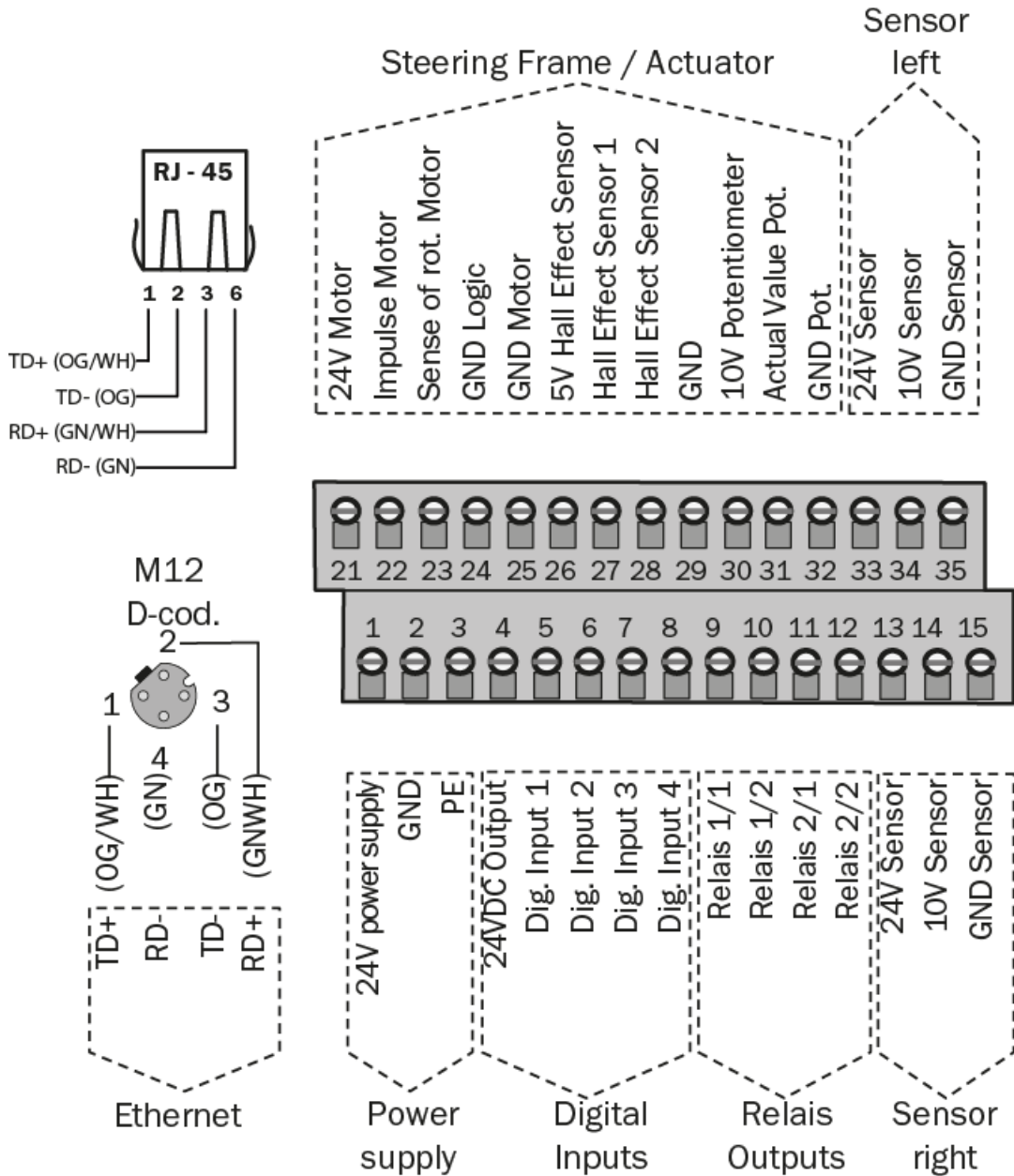
Sensor right = Master sensor
Sensor left = Slave sensor
Please note that both sensors must be installed either on the right or the left side of the webs.
Fig. 5: Connection terminals BKS309.MSBKS309.ai

5.2 Connecting webMASTERs BKS015 or BKS020
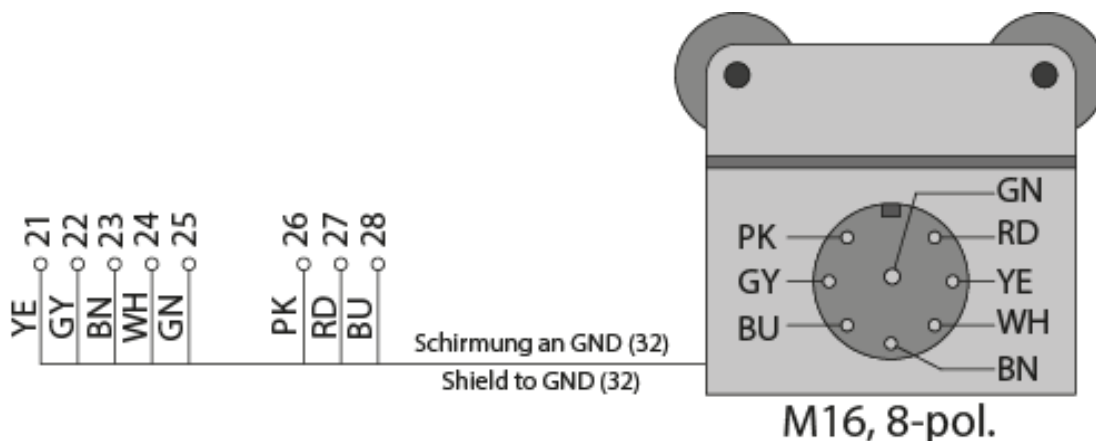
5.3 Connecting a winderGLIDE BKS.D.3 or a webMASTER BKS030
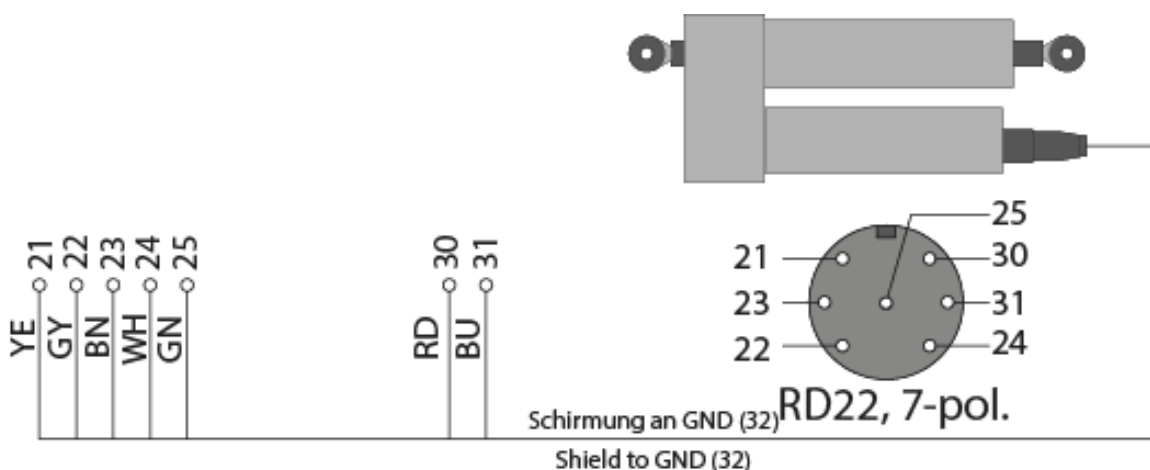
The illustration show a BKS.D.3 as sample. A BKS030 is equally wired.

5.4 Connecting a winderGLIDE BKS.D.6
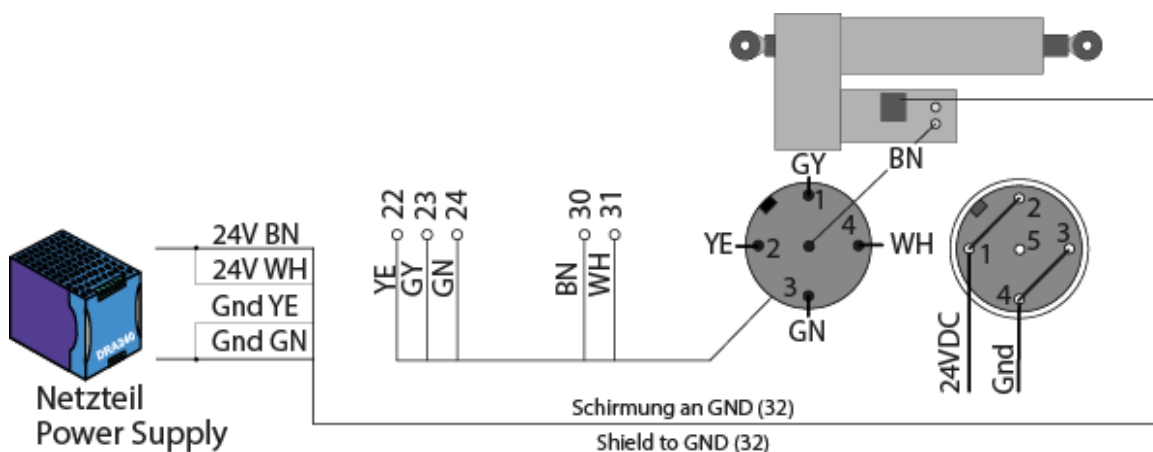
⚠ *Caution*
Bad earth connections may cause electric shocks to persons, malfunction of the

total system or damage of the control unit! It is vital to ensure that the earth connection is properly done.

6 Configuring the System

After having mounted and wired the web guiding equipment on the machine, the system can now be configured to the specific requirements of the application.

6.1 Power up the BKS 309.MS

1. Make sure the power supply voltage is in the range 18...30 VDC (Vnom= 24V)
2. Check, if the web is in the detection range of the sensors.
3. Switch-on your power supply
4. The web guide controller starts-up in Manual Operating Mode.
5. A web guiding system using **BKS309.MS** is pre-set to control a chase & follow application with the master web being connected to the left sensor input (see wiring diagrams **Fig. 5** to **7**). If required by the application the asignment of the master web sensor can be changed by the parameter **[MastrInp]** (ref. to **8.2** "Setting of Operation Parameters", **Fig 15**)
6. If required re-configure the programmable relay outputs (see **chapter 6.2**)
7. If required re-configure the digital inputs (see **chapter 6.3**)

6.2 Relays Outputs

The BKS309 controller provides 2 programmable relay outputs. The outputs are software controlled. Electrically they are potential-free. Each relay output can be configured individually and can perform an assign special function. The outputs are configured in the Parameter Setting Mode. Following functions can be assigned to each output:

- Indicate centre position of web edge
- Indicated if web edge is detected
- Indicate if web edge is detected and Automatic Mode on
- Indicate if no web edge is detected and Automatic Mode on
- Indicate if Automatic Mode was chosen
- Indicate if steering frame or actuator is centred

For more details about the functions refer to **chapter 7.4** "Description Operation Parameter".

Hardware access via screw terminals (see **Fig. 3**)

Signal Name	Terminal #
Relay 1/1	9
Relay 1/2	10
Relay 2/1	11
Relay 2/2	12

6.3 Digital Inputs

The BKS309 controller provides 4 digital inputs for special functions.
The digital inputs are edge or level triggered. An impulse of 100ms or longer activates the event. Each digital input can be configured individually and can perform an assign special function. The digital inputs are configured in the Parameter Setting Mode. Following function can be assign to each digital input:

- Toggle between Manual and Automatic mode (edge triggered)
- Toggle between Manual and Automatic mode (level triggered)
- Go to centre position
- Decrease reference value in 0.1mm steps in (deactivated for BKS309.MS)
- Move actuator in 0.1mm steps to the left
- Increase reference value in 0.1mm steps (deactivated for BKS309.MS)
- Move actuator in 0.1mm steps to the right
- Lock steering device (steering frame or actuator)
- Reset reference value (deactivated for BKS309.MS)

For more details about the functions refer to **chapter 8.4** "Description Operation Parameter".

> ## ⚠️ *Caution*
>
> *If the function "Toggle between Manual and Automatic mode" is controlled via the digital inputs, the corresponding key 〈Q〉 on the operation panel will be deactivated.*

Hardware access via screw terminals (see **Fig. 9**)

Signal Name	Terminal #
Dig.In 1	5
Dig.In 2	6
Dig.In 3	7
Dig.In 4	8

.

6.4 Differences between Standard and Master-Slave Electronics

Due to its use in the special field of chase & follow applications the **BKS309.MS** Master-Slave unit has a slightly different parameter set if compared with the standard web guide controller BKS309. Several functions aren't any more available with the BKS309.MS. Parameters connect to these functions are displayed and can be modified without having any influence in the application. Following function are not available in the BKS309.MS unit:

- Reset of the frame reference position via digital inputs or the keys 〈◁〉 and 〈▷〉 on the operation panel.
- Setting the Reference Value over the parameter **[Ref Pos]**
- Determination of the Reference Position is deactivated and thus the parameter **[Ref Mod]** has no impact. **The Reference Position is always defined by the Master Web Position.**
- A change of the Reference Position in automatic operation via the digital inputs or via the web interface is not possible.
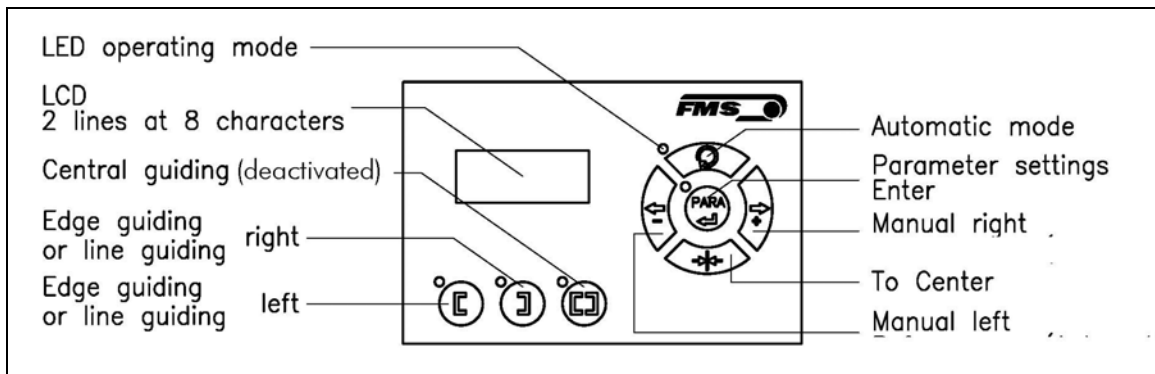
7 Operation

7.1 Operation Panel

Fig. 11: View of the Operation Panel   K309039e

7.2 Operating the Web Guiding System via the Front Panel

Key	Key function during operation
[C]	The sensor is mounted on the left side of the frame and controls the material on the left edge or on the line, if a line sensor is used. One sensor is necessary. The LED indicates the left edge guiding mode.
[J]	The sensor is mounted on the right side of the frame and controls the material on right edge or on the line, if a line sensor is used. One sensor is necessary. The LED indicates the right edge guiding mode.
[CJ]	Centre guiding mode is deactivated for BKS309.MS
PARA	To enter the Parameter Setting Mode, hold the key for longer then 3 sec. The LED will light and the first parameter will appear on the LCD display indicating that you entered the mode. A second press on the PARA key will cause the parameter to flash. Now it can be changed (ref. to 6 "Parameter Setting over the Front Panel")
(Q)	Automatic, Manual. With this key you can select between automatic and manual mode. The LED indicates the automatic mode.
(✛)	Drive to center position. The frame moves to the center Position. Function is only available in manual mode.

(left arrow button icon)	**In manual mode** the frame will move to the left in 0.1mm steps by pressing the button once. By pressing the button longer than 1 sec. it will continuously move the frame to the left. **In automatic mode**: Adjust Reference Position (left) is deactivated for BKS309.MS. **In Setup-Position** and independent if the device is in manual or automatic mode, pressing the button increases continuously the parameter value.
(right arrow button icon)	**In manual mode** the frame will move to the right in 0.1mm steps by pressing the button once. By pressing the button longer than 1 sec. it will continuously move the frame to the right. **In automatic mode**: Adjust Reference Position (right) is deactivated for BKS309.MS **In Setup-Position** and independent if the device is in manual or automatic mode, pressing the button increases continuously the parameter value.

👉 *Note*

If DLS (digital line sensors) are used, it may happen that the web guide controller blocks the steering frame. This protective function is activated when the line is interrupted and impossible to detect the line anymore. The LED above the
(eye key icon) .key will start blinking and indicate to operator that the line quality is bad.

7.3 Automatic Operation

- Start automatic mode with (eye key icon) key or digital input. Reference position is taken from the middle of the sensor detection band (**Fig. 12**). 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 by using the

- (arrow keys icons) keys or using digital inputs (step width 0.1 mm). Using the (key icon) key, the web moves out of the sensor; using the (key icon) key, the web moves in Using center guide, this description refers to the right sensor.

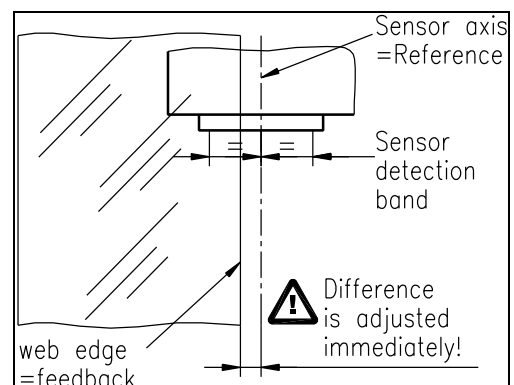- Terminate the automatic mode by using the (eye key icon) key again.

Fig. 12: Position at automatic start K 100005e

👉 *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.*

7.4 Manual Operation

In manual mode, possibilities as follows are available:

- *Center position* ⬡ *:* The steering frame will return to center position.

- *Frame position* ⬡ and ⬡ *:* The steering frame can be adjusted in 0.1mm steps. If key is held, steering frame is moving continuously. These functions can also be carried out via the digital inputs (see 4.7 "Digital Inputs").

7.5 Saving the Travel Limits

There are two possibilities to alter the limits for the Home Position, Middle Position and Maximum Positions of the actuator. Either you modify the parameters [**Home Pos**], [**Mid Pos**] and [**Max Pos**] in the parameter changing mode or you drive manually to the desired position and save it. The procedure for is then as follows:

1. Enable the change of the travel limits by pressing the two keys ⬡ ⬡ at the same time. The LED above the (PARA) key will light.

2. Travel with the actuator to the desired position with the keys ⬡ ⬡ .

3. Press the (PARA) key. The LED above the key starts to flash and expects the definition of the setting.

4. The definition is done with ⬡ for the Home Position, ⬡ for the Maximal Position and ⬡ for the Middle Position

5. On the displayed following comments will report completion.
   Display first line: [Save Pos]
   Display second line: [Done] or [Invalid]
   In the case of [Invalid] the display flashes. The position couldn't be found e.g. because the "home" or "maximum" position was set over the middle position.

8 Parameter Setting over the Front Panel

8.1 Basic Instructions for Parameter Setting

The web guide controller has three operator modes:
- Operation mode
- Parameter Setting mode (parameter selection)
- Change mode (set or change chosen parameters)

The parameter setting can be performed via the keys on the front panel or via a web browser. When using the front panel, the user can toggle between these modes by pressing a key or a combination of keys. The keys have the following functions:

Key	Key function during parameter setting
(PARA)	Enter
◁ ▷	Change the selections or increase / decrease the values

8.2 Setting of Operation Parameters

To enter the Parameter Setting Mode the web guide controller must be in the Manual Mode. In the Automatic Mode only the reference value can be changed.

Press the (PARA) key for longer then 3 sec. The LED will light and the first parameter

will appear on the LCD display. With the ◁ ▷ .keys the parameter list can be

scrolled up and down. By pressing the (PARA) key again you will enter the parameter setting mode. The select parameter on the display flashes indicating that it can be changed.

The following state diagrams will help you to navigate through the Parameter Setting menu.

Notes for the following state diagrams:

[1] Permanent pressing of the ◁ ▷ keys expedites the changing speed.
[2] The display shows the unit of measure that was previously selected.
[3] Parameter only used in winderGLIDE (actuator) applications
[4] This parameter change requires a restart of the web guide controller.
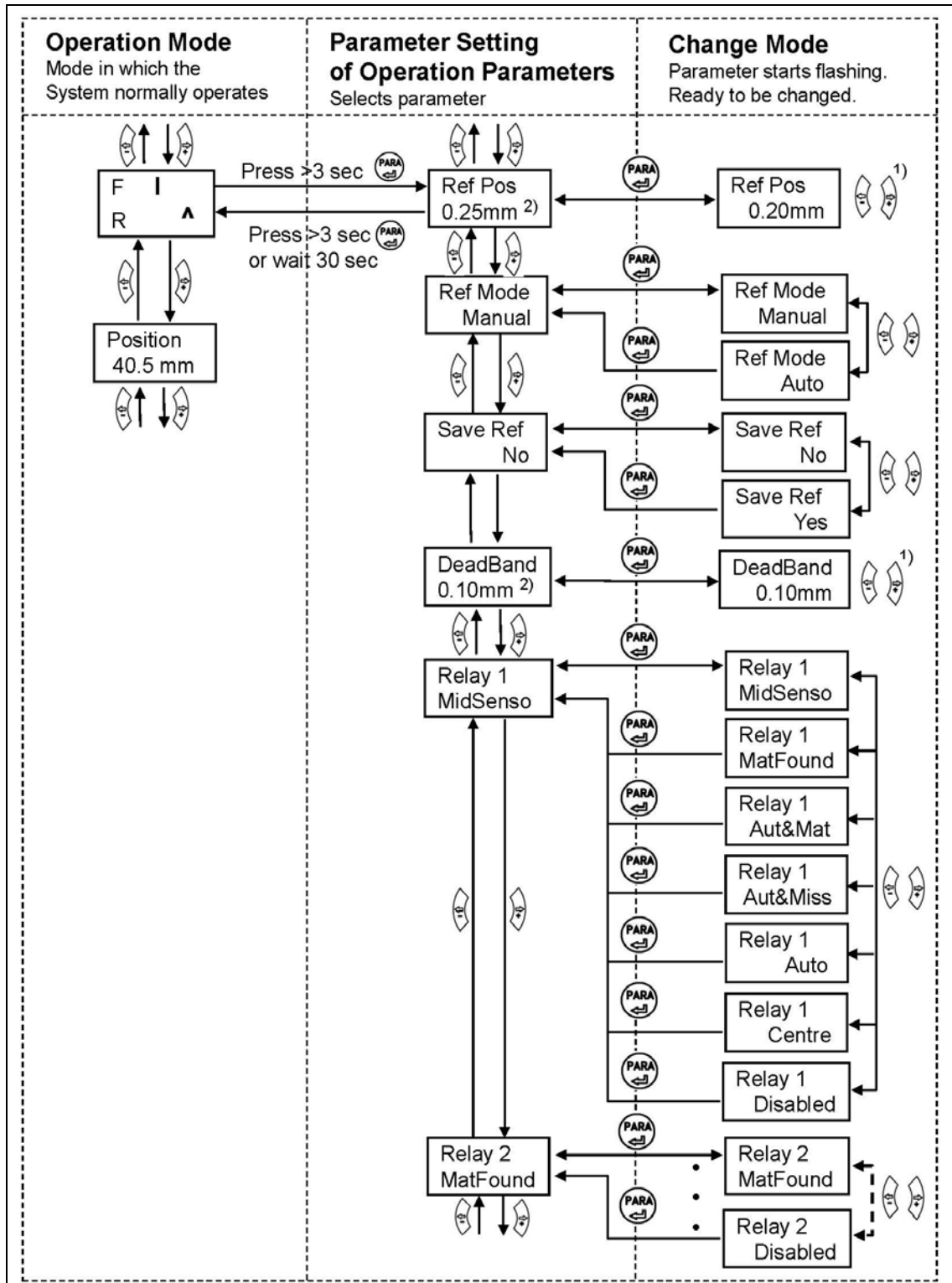
Fig. 13: State Diagram Operation Parameters (1)   K309009e
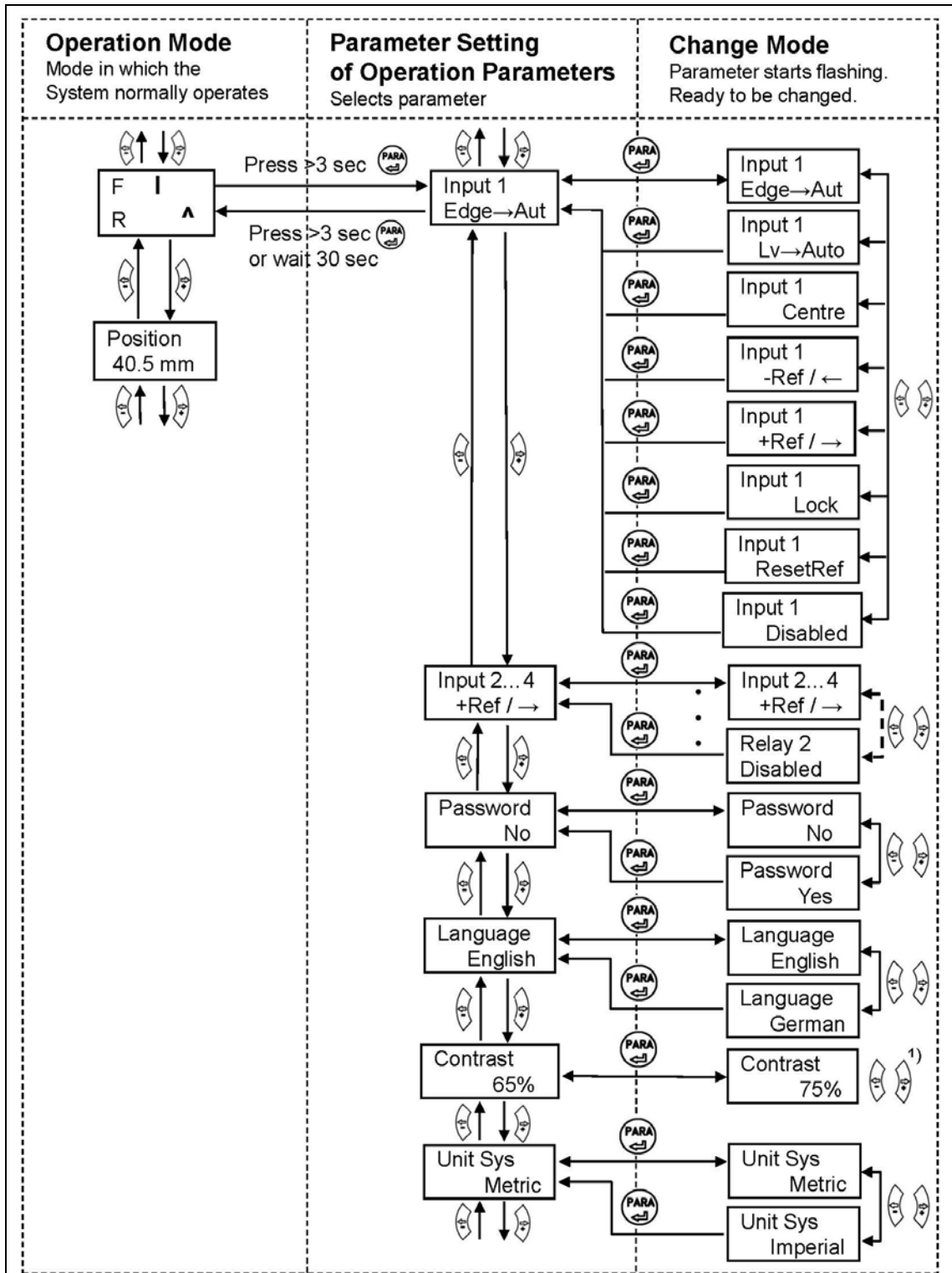
Fig. 14: State Diagram Operation Parameters (2)   K309010e
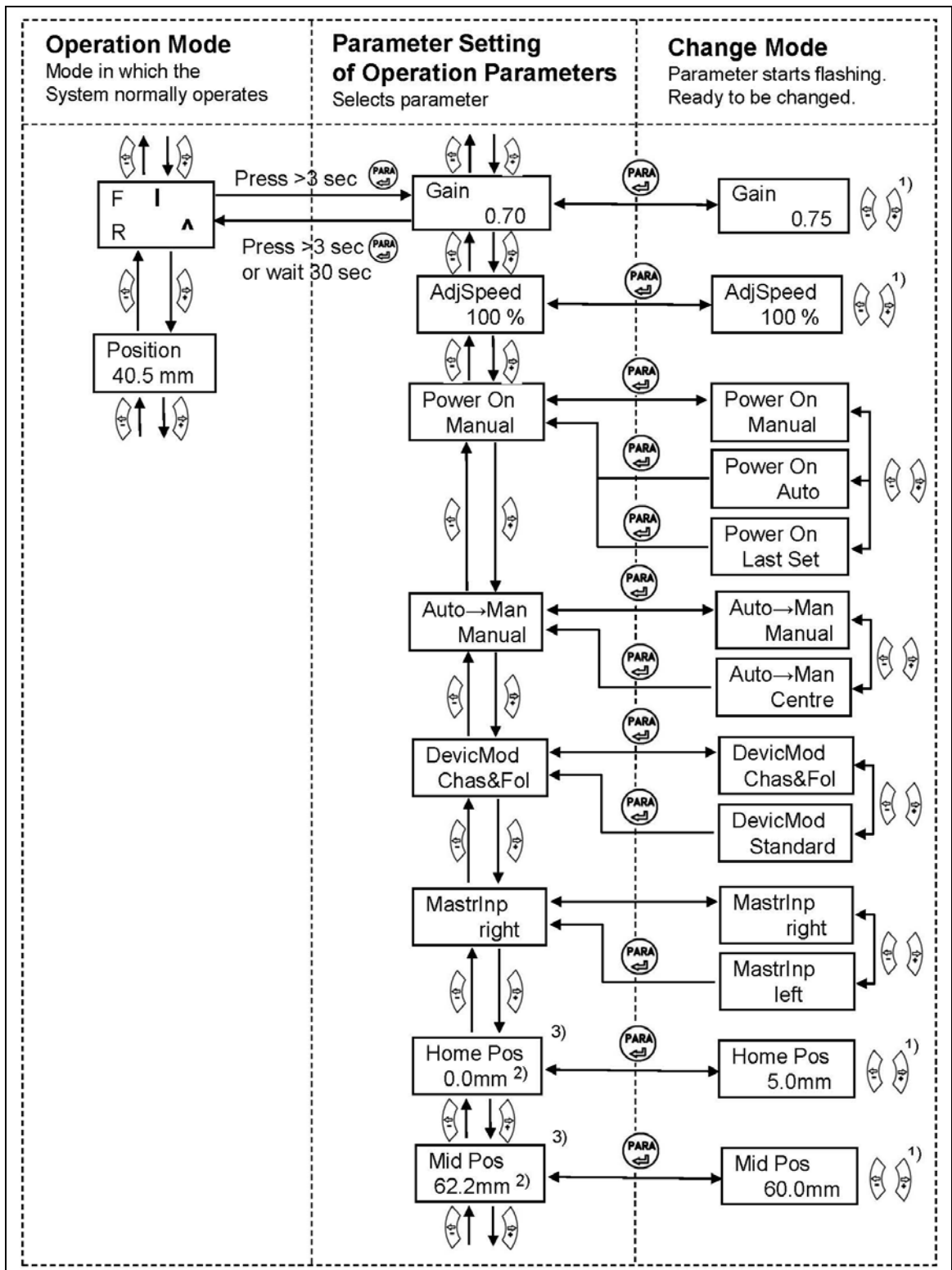
Fig. 15: State Diagram Operation Parameters (3)   K309011e_MS
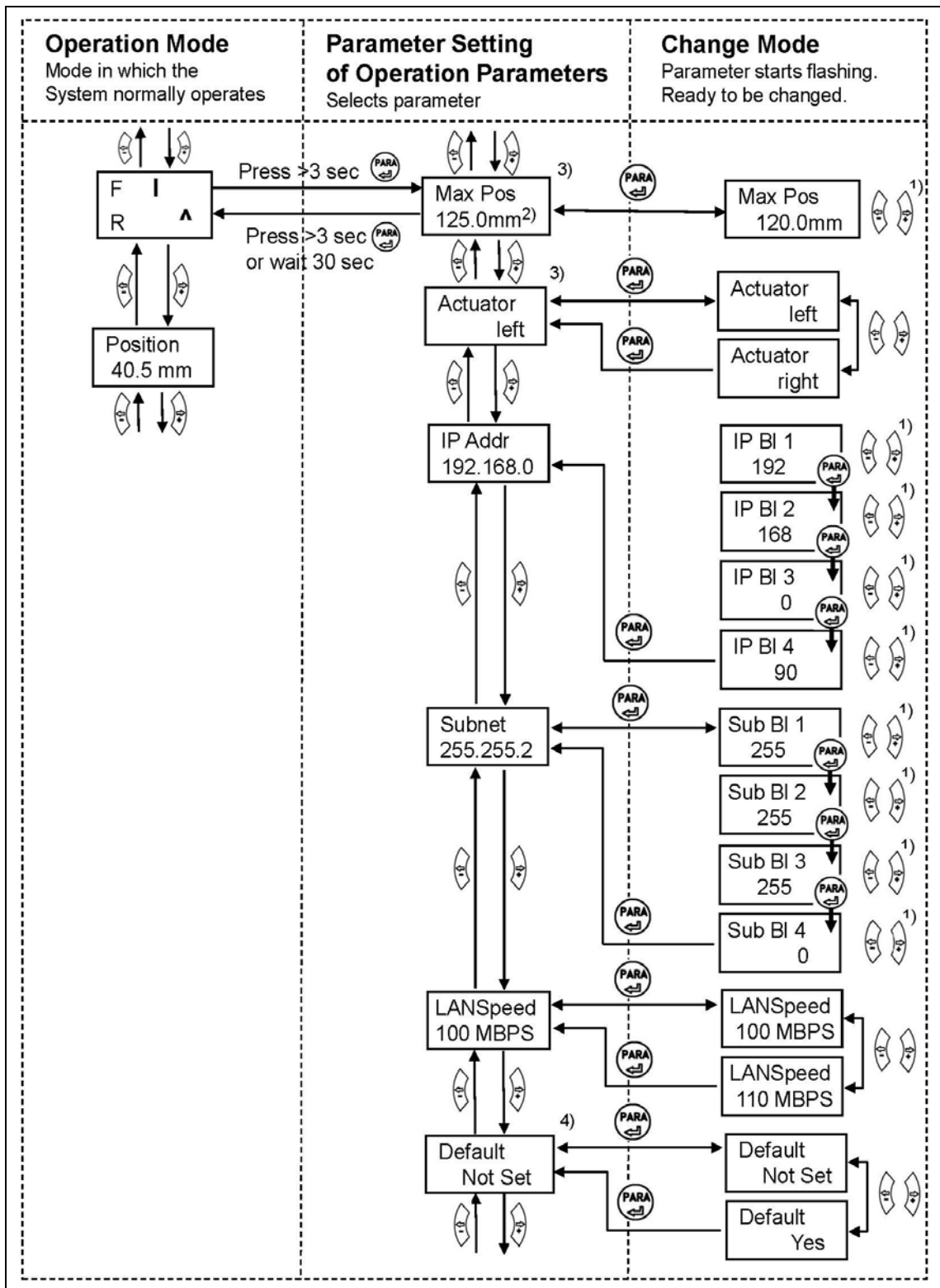
Fig. 16: State Diagram Operation Parameters (4)   K309014e_MS

8.3 Setting of System Parameters

To enter the Parameter Setting Mode the web guide controller must be in the Manual Mode. Press the (PARA) and key together for longer than 3 sec to enter the System Parameter List. The LED will light and the first parameter will appear on the LCD display. Proceed like in **chapter 8.2** for changing parameters.
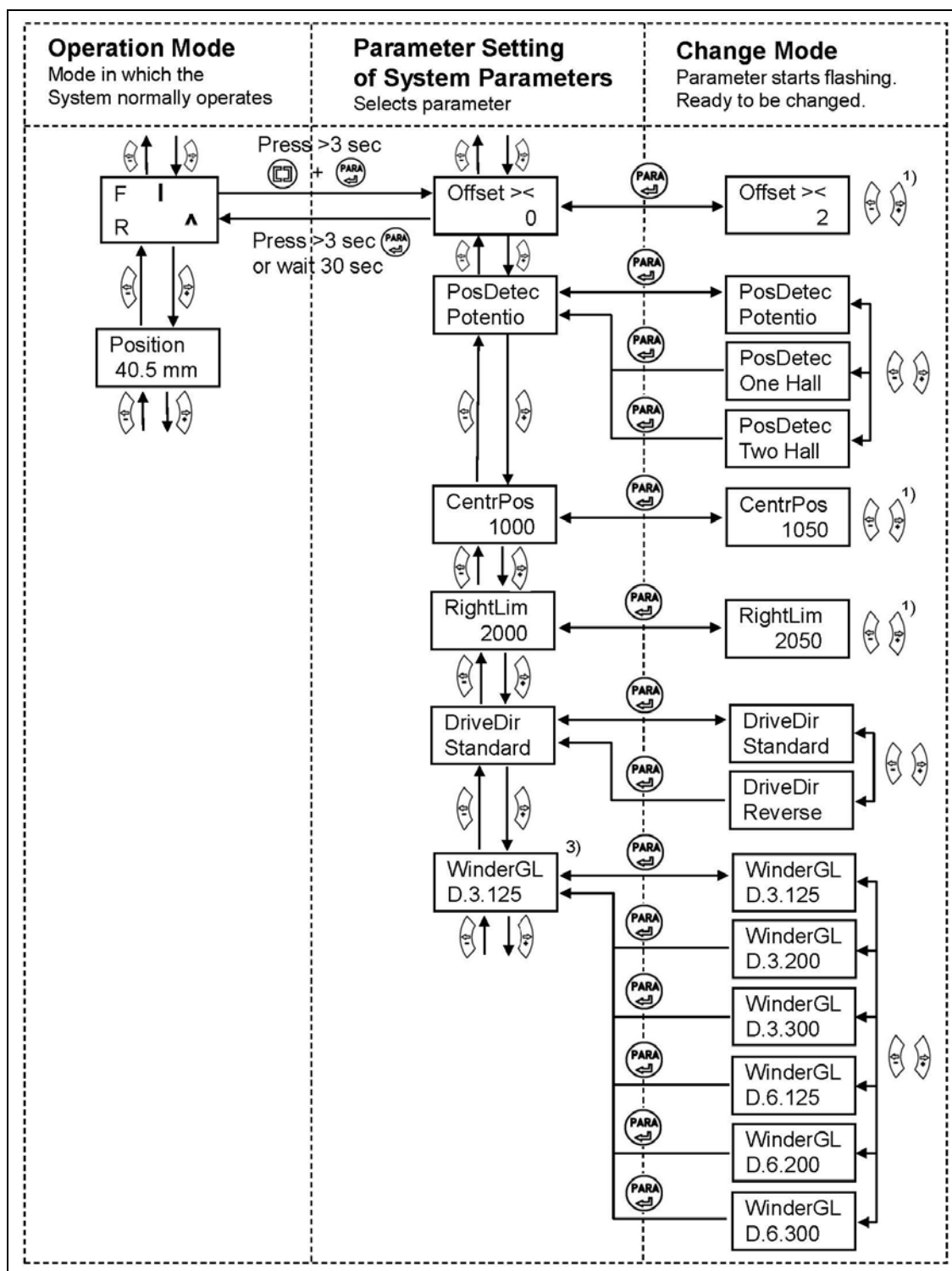
Fig. 17: State Diagram System Parameters   K309018e

8.4 List of Operation Parameters

Parameter	LCD	Unit	Min	Max	Selection	Default
Adjust Reference Position	Ref Pos	mm	-5.00	+5.00	-	0.00
Set Reference Mode	Ref Mode	-	-	-	Manual Auto	Manual
Save the Reference Position	SaveRef	-	-	-	No Yes	No
Dead band	DeadBand	mm	0.0	2.0	-	0.1
Relay 1 or Relay 2 setting	Relay 1 Relay 2	-	-	-	MidSenso MatFound Auto&Mat Aut&Miss Auto Centre Disabled	R1= MidSenso R2= MatFound
Digital Input 1, 2, 3 or 4 Modes	Input 1 Input 2 Input 3 Input 4	-	-	-	Edge→Aut Lv→Auto Centre - Ref/← +Ref/→ Centre Lock ResetRef Disabled	I1= Edge→Aut I2=Center I3= -Ref/← I4= +Ref/→
DLS Sensor	DLS	-	-	-	none left right	none
Language	Language	-	-	-	English German	English
Password	Password	-	-	-	No Yes	No
LCD-Contrast	Contrast	%	1	100	-	65
Unit System	Unit Sys	-	-	-	Metric Imperial	Metric
Gain Setting	Gain	-	0.02	2.00	-	0.2
Adjust Correction Speed	AdjSpeed	%	1	100	-	100
Power Modes	Power ON	-	-	-	Manual Auto Last Set	Manual

| Behaviour when leaving Automatic Mode | Auto→Man | - | - | - | Manual Centre | Manual |

8.5 List of System Parameters

Parameter	LCD	Unit	Min	Max	Selection	Default
Device Mode	DevicMod	-	-	-	Chas&Fol Standard	Chas&Fol
Master Input	MastrInp	-	-	-	right left	right
Home Position [3]	Home Pos	mm	0.0	300.0	-	0.0 [3]
Middle Position[3]	Mid Pos	mm	0.0	300.0	-	62.5 [5]
Maximal Position[3]	Max Pos	mm	0.0	300.0	-	125.0 [5]
Actuator	Actuator	-	-	-	Left Right	Left
IP Address	IP Addr	-	0	125	-	192.168.0.090
Subnet	Subnet		0	255	-	255.255.255.0
LAN Speed	LANSpeed	MBPS	-	-	10 100	
Factory Settings [4]	Default	-	-	-	Not set Yes	Not Set

[3] Parameter only used in winderGLIDE (actuator) applications

[4] This parameter change requires a restart of the web guide controller.

[5] The default value is dependent on the actuator used.

8.6 Description Operation Parameter

| Adjust Reference Position [Ref Pos] |
|---|

Purpose:	The reference position can be adjusted using this parameter.		
Range:	-5.00 to +5.00	**Default:**	0.00
Increment:	0.01	**Unit:**	[mm]

Set Reference Mode [Ref Mode]

Purpose:	This parameter determinates how the reference position is defined. This can either be the position that is defined with parameter **[Ref Pos]** or the actual material position within the sensor when the controller is switched to automatic operation.
	Two settings are possible:

Setting:	[Manual]
Purpose:	If **[Manual]** is chosen, the Reference Position is taken from the parameter [RefPos].

Setting:	Automatic [Auto]
Purpose:	If **[Auto]** behaviour is chosen, the Reference Position is determinate by taking the actual material position within the sensor when the controller is switched to automatic operation.

Save the Reference Position [SaveRef]

Purpose:	The parameter saves the last Reference Position change. It sets after re-booting the Reference Position to the last used value or to 0 (zero).
	Two settings are possible:

Setting:	[No]
Purpose:	If **[No]** behaviour is chosen, the Reference Position is set to 0 after rebooting (default setting).

Setting:	[Yes]
Purpose:	If **[Yes]** behaviour is chosen, after rebooting the Reference Position is set to the last used value.

Dead band [DeadBand]

Purpose:	This parameter defines the dead band tolerance. Dead band is a free programmable range, in which the web may move freely without the steering readjusting the frame. Keep in mind that: A **[DeadBand]** of e.g. 0.3mm" results in a tolerance band of ±0.3mm. If the deviation is higher than the tolerance, the web will be readjusted into the range of the dead band.

Range:	0.0	to	2.0	Default:	0.1
Increment:	0.1			Unit:	[mm]

Relay 1 or Relay 2 setting [Relay 1 or 2] (two Parameters one for each relay)

Purpose:	This parameter determines the relay behaviour.
	The user can choose between seven settings.

Setting: Middle Position [MidSenso]

Purpose:	If [**MidSenso**] is chosen then the relay goes on when the material edge is at the sensor's middle position. (Default setting for Relay 1)

Setting: Material Found [MatFound]

Purpose:	If [**MatFound**] is chosen then the relay goes on when material edge is detected. (Default setting for Relay 2)

Setting: Automatic Mode and Material Found [Auto&Mat]

Purpose:	If [**Auto&Mat**] is chosen then the relay goes on when material edge is detected and the controller is in Automatic Operation.

Setting: Automatic Mode and Material Missing [Aut&Miss]

Purpose:	If [**Aut&Miss**] is chosen then the relay goes on when no material edge is detected and the controller is in Automatic Operation.

Setting: Automatic Operation [Auto]

Purpose:	If [**Auto**] is chosen then the relay goes on when the controller is in Automatic Operation.

Setting: [Centre]

Purpose:	If [**Centre**] is chosen then the relay goes on as soon as the motor drive stands still after a centre run.

Setting: [Disabled]

Purpose:	If [**Disabled**] is chosen then the relay function is disabled. The relay will never go on.

Digital Input 1, 2, 3 or 4 Modes [Input 1...4]
These are actually fore parameters one for each digital input

Purpose: This parameter determines the functions of the digital inputs.

The user can choose between seven settings.

Setting: Edge Triggered Automatic Mode [Edge→Aut]

Purpose: The controller switches either to automatic or manual operation depending in which mode the controller currently is. The switching is taking place when a **rising edge** is detected on the digital input. (Default setting for dig. input 1)

Setting: Level Controlled Automatic Mode [Lv→Auto]

Purpose: The controller switches either to automatic or manual operation depending on the voltage level at the digital input. If the voltage is high then the controller switches to Automatic otherwise to Manual Operation.

Setting: Drive to Center Position [Centre]

Purpose: If [**Centre**] is chosen then the motor drive moves to the centre position. The event is edge triggered. (Default setting for dig. input 2)

Setting: Move Frame to the Left [-Ref/←]

Purpose: In manual operation the motor drive moves to the left respectively to the retracted position (default setting for dig. input 3).

Setting: Move Frame to the Right [+Ref/→]

Purpose: In manual operation the motor drive moves to the right respectively to the extended position (default setting for dig. input 4).

| Setting: | Lock Guide [Lock] |

| Purpose: | The motor drive is immediately locked when this parameter is chosen and the digital input voltage is high.
Dig. Input *Lock,* Operation State *Automatic and* Parameter [Auto→Man] work in a combinative manner. Their interdependency is described in the following table: |

Dig. In. Lock	Op. State Automatic	Parameter Auto→Man	Function
0	inactive	Centre	Move to middle position
0	active	irrelevant	Automatic operation
1	inactive	Manual	Stop at actual position
1	inactive	Centre	Move to middle position
1	active	irrelevant	Stop at actual position

| Setting: | Reset of Reference Value [ResetRef] |

| Purpose: | This function resets the reference value to 0, if a positive signal edge is applied to the digital input. |

| Setting: | Disabled |

| Purpose: | With [Disabled] parameter the digital input is disabled. |

| DLS |

| Purpose: | If you use a DLS2 sensor, you have to set the correct installation direction. You can only connect one DLS2 sensor. |

The user can choose between three settings.

| Setting: | [none] |

| Purpose: | There is no DLS2 sensor connected |

| Setting: | [left] |

| Purpose: | The DLS2 sensor is installed on the left-hand side (in direction of the moving web) |

| Setting: | [right] |

| Purpose: | The DLS2 sensor is installed on the right-hand side (in direction of the moving web) |

Password

| Purpose: | The web guide controller can be protected from unauthorised access by means of password. If *Password Yes* is chosen, the system will request the password to change parameters and other setting. The password itself can't be changed. It is always **3231**

The user can choose between two settings |

| Language: | [No] |

| Purpose: | The Password protection is deactivated (default setting) |

| Language: | [Yes] |

| Purpose: | The Password protection is activated |

Language

Purpose:	This parameter determines the displayed language.
	The user can choose between two languages.

Language:	[English]
Purpose:	If [**English**] is chosen, the display shows all texts in English. The web browser is always in English.

Language:	[German]
Purpose:	If [**German**] is chosen, the display shows all texts in German.

LCD-Contrast [Contrast]

Purpose:	The parameter [**Contrast**] changes the contrast of the LCD to achieve optimal readability.			
Range:	1 to	100	Default:	65
Increment:	1		Unit:	[%]

Unit System [Unit Sys]

Purpose:	This parameter determines the unit system used.
	The user can choose between two settings.

Setting:	[Metric]
Purpose:	If [**Metric**] is chosen, the controller displays all data in metric units.

Setting:	[Imperial]
Purpose:	If [**Imperial**] is chosen, the controller shows all data in imperial units.

Gain Setting [Gain]

Purpose:	This parameter defines the gain of the feed back value.			
Range:	0.02 to	2.00	Default:	0.20
Increment:	0.01		Unit:	[-]

Adjust Correction Speed [AdjSpeed]

Purpose:	This parameter determines the maximum used speed.		

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

Power Modes [Power ON]

Purpose: This parameter determines the operation mode after power on.
The user can choose between three behaviours.

Setting:	[Manual]

Purpose: The controller goes to Manual Operation Mode after power on.

Setting:	Automatic [Auto]

Purpose: The controller goes to Automatic Operation Mode after power on.

Setting:	Last Setting Used [Last Set]

Purpose: The controller restores the operation mode that was previously chosen before power off.

Behaviour when leaving Automatic Mode [Auto→Man]

Purpose: This parameter determines the behaviour of the controller leaving the automatic mode.

The user can choose between two behaviours.

Setting:	[Manual]

Purpose: The controller stops guiding. The motor drive is locked at the current position (Manual Mode).

Setting:	[Centre]

Purpose: The controller stops guiding. Afterwards the motor drive moves to the centre.

Device Mode [DevicMod]

Purpose:	This parameter determines whether the web controller controls a standard steering frame or a Chase & Follow application.

The user can choose between the two settings.

Setting:	[Chas&Fol]

Purpose:	Control of a Chase & Follow application (default setting)

Setting:	[Standard]

Purpose:	Control of a standard FMS steering frame

.

Master Sensor Input [Mastrinp]

Purpose:	This parameter determines in a Chase & Follow application the sensor input connector for the master web.

The user can choose between two settings.

Setting:	[right]

Purpose:	The right sensor input is used for the master web (default setting).

Setting:	[left]

Purpose:	The left sensor input is used for the master web.

Home Position [Home Pos]

Purpose:	This parameter determines the position of the actuator spindle in its retracted position. In Automatic Mode the actuator stops at this position and moves no further backwards. In Manual Operation this parameter has no meaning.

Range:	0.0 to 300.0	Default:	0.0
Increment:	0.1	Unit:	[mm]

Condition:	**This parameter appears on the display only if an actuator / winderGLIDE is connected to the controller.**

Middle Position [Mid Pos]

Purpose:	The [**Mid Pos**] parameter determines the centre position of the actuator spindle. An actuator stops at this position, if you press the centre key ⬦. In Automatic Operation this parameter has no meaning.

Range:	0.0 to 300.0	**Default:**	62.5 [5]
Increment:	0.1	**Unit:**	[mm]

[5] The default value is dependent on the used actuator

Condition:	This parameter appears on the display only if an actuator / winderGLIDE is connected to the controller.

Maximal Position [Max Pos]

Purpose:	This parameter determines the limit for the extended position. In Automatic Mode the actuator stops at this position and moves no further forward. In Manual Operation this parameter has no meaning.

Range:	0.0 to 300.0	**Default:**	125.0 [5]
Increment:	0.1	**Unit:**	[mm]

[5] The default value is dependent on the used actuator

Condition:	This parameter appears on the display only if an actuator / winderGLIDE is connected to the controller.

Actuator [Actuator]

Purpose:	The parameter [Actuator] determines the control logic of the web guide controller BKS309.
Condition:	**This parameter appears on the display only if an actuator / winderGLIDE is connected to the controller.**
	The user can choose between two control directions.

Action:	[Left]
Purpose:	[Left] is the control direction when the actuator is mounted on the left side of the unwind/rewind station seen in direction of the running web (see **Fig. 2**)

Action:	[Right]
Purpose:	[Right] is the control direction when the actuator is mounted on the right side of the unwind/rewind station seen in direction of the running web (see **Fig. 2**)

[IP Addr]

Purpose:	The parameter assigns an IP address to the controller. This enables the user to communicate via a web browser with the controller that is imbedded in a network. The IP address must be entered in 4 separate blocks (IP Bl. 1; IP Bl. 2; IP Bl. 3; and IP Bl. 4)

Range:	0	to	255	Default:	192.168.0.090
Increment:	1			Unit:	[-]

[Subnet]

Purpose:	The parameter assigns the Subnet Mask of the controller in the Ethernet network. This enables the user to communicate via a web browser with the controller. The Subnet Mask must be entered in 4 separate blocks (Sub. Bl 1; Sub. Bl 2; Sub. Bl 3; and Sub. Bl 4).

Range:	0	to	255	Default:	255.255.255.0
Increment:	1			Unit:	[-]

[LANSpeed]

Purpose:	[**LANSpeed**] determines the data speed of the web guide controller to communicate the receiver (Switch, Hub or PC). **The user can choose between two data speeds.**

Action:	[100 MBPS]

Purpose:	[**100 MBPS**].means 100 M bit per second

Action:	[10 MBPS]

Purpose:	[**10 MBPS**].means 10 M bit per second

Factory Settings [Default]

Purpose:	This menu point is a command. It resets the parameters to the factory settings. **The user can choose between two actions.**

Action:	[Not Set]

Purpose:	If [**Not Set**] is chosen, all parameters stay as set by the user.

Action:	[Yes]

Purpose:	If [**Yes**] is chosen, the default parameters are loaded.

> ☞ *Note*
>
> *The operation parameters [Home Pos], [Mid Pos], [Max Pos], as well as all system parameters are not reset with the factory setting command [Default].*

8.7 Setting of System Parameters

⚠️ *Caution*

System parameters are factory settings and should not be changed without contacting the service department of FMS. An unauthorised change can cause malfunctions in the system or damage in the machine.

To enter the System Parameter Setting Mode hold the two 🔘 + 🔘 keys for longer then 3 sec. The LED will light and the first parameter will appear on the LCD display

Offset Centre [Offset><]

Purpose:	This parameter adjusts the position of a steering frame exactly to the centre.

Position Detection [PosDetec]

Purpose:	This parameter determines what devices that are used to detect the limit positions.
	The user can choose between three types.

Type:	**[Potentio]**
Purpose:	A potentiometer is used to detect the Home position, Middle Position and Maximum Position. It is automatically set, if an actuator / winderGLIDE of the type BKS.D.3 is used.

Type:	**[One Hall]**
Purpose:	One hall sensor is used to detect the Home position, Middle Position and Maximum Position.

Type:	**[Two Hall]**
Purpose:	Two hall sensors are used to detect the Home position, Middle Position and Maximum Position.

Centre Position [CentrPos]

Purpose:	The [**CentrPos**] parameter is only used with the position detection system based on hall sensors. For all other position detection system this parameter is not used and hence not displayed. The parameter determines the centre position of the actuator spindle in motor steps (measured from the left reference position). The actuator stops at this position, if you press the centre key . In Automatic Operation this parameter has no meaning.

Right Limit [RightLim]

Purpose:	The [**RightLim**] parameter is only used with the position detection system based on hall sensors. For all other position detection system this parameter is not used and hence not displayed. The parameter limits the maximum travel to the right side of the actuator spindle in motor steps (measured from the left reference position). In the operation or in manual mode this limit will never be exceeded

Drive Direction [DriveDir]

Purpose:	This parameter determines the guiding orientation of the controller.
	This parameter *should not be changed without contacting the service department of FMS.*

Setting:	[Standard]
Purpose:	[**Standard**] For standard motors and standard frames of FMS (default setting).

Setting:	[Invers]
Purpose:	[**Invers**] The controller sets the drive direction automatically, if FMS products are use.

Actuator Type [winderGL]

Purpose:	This parameter determines the used actuator type. The product name of FMS actuators is winderGLIDE.
	The user can choose between three types.

Type:	[D.3.125] or [D.6.125]
Purpose:	If type [D.3.125] or [D.6.125] is chosen, the maximum travel of the spindle will be 125mm (4.92in). It is the maximum travel position.

Type:	[D.3.200] or [D.6.200]
Purpose:	If type [D.3.200] or [D.6.200] is chosen, the maximum travel of the spindle will be 200mm (7.87in). It is the maximum travel position.

Type:	[D.3.300] or [D.6.300]
Purpose:	If type [D.3.300] or [D.6.300] is chosen, the maximum travel of the spindle will be 300mm (11.81in). It is the maximum travel position.

8.8 Reset to Default Parameter Set

Factory settings of your BKS309 web guide controller can be re-established either over the parameter setting menu (see 7.2 "Setting of Operation Parameters", parameter [Default]) or by:

Holding the two keys (C) + (J) while powering –up the controller.

☞ *Note*

The operation parameters [Home Pos], [Mid Pos], [Max Pos], as well as all system parameters are not reset with the factory setting command [Default].

---

9 Parameter Setting via a PC

The BKSZ309 web guide controller can be embedded in an Ethernet network and the parameter setting can be done over this network by means of a web browser (Internet Explorer 7). The devices have a static IP-address that can be set over the user interface. The IP-address is not automatically received over DHCP.
The parameter setting can also be carried out with a desktop- or laptop computer via a peer-to-peer connection (see paragraph 9.2)
Fig. 18 shows the BKS309 configuration in a LAN (Local Area Network).
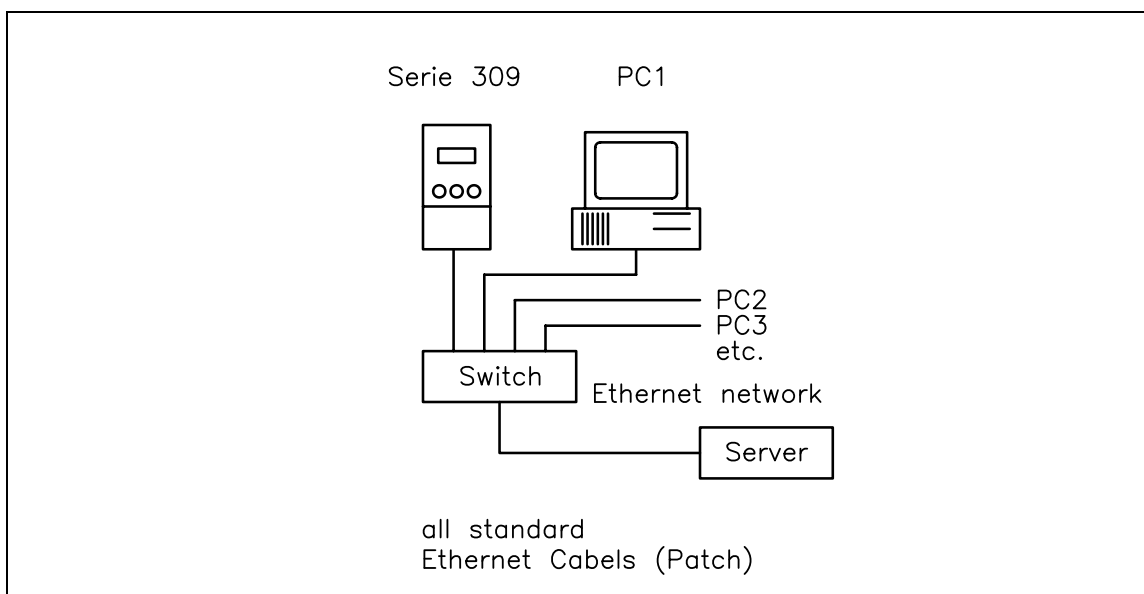
Fig. 18: BKS309 embedded in a LAN   EMGZ309001e

☞ *Note*

Fig. 19 and 20 show the peer-to-peer connection between PC und BKS309. Please be aware that for this configuration a cross-over-cable needs to be used.
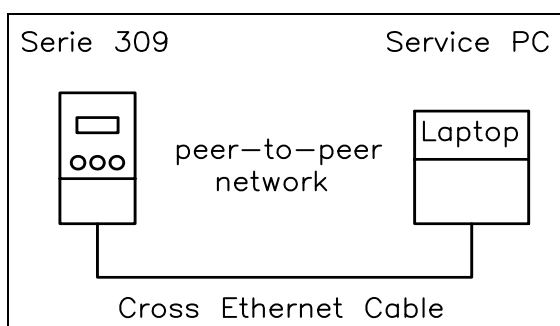
Fig. 19: Correct connection with cross-over-cable.   E309002e
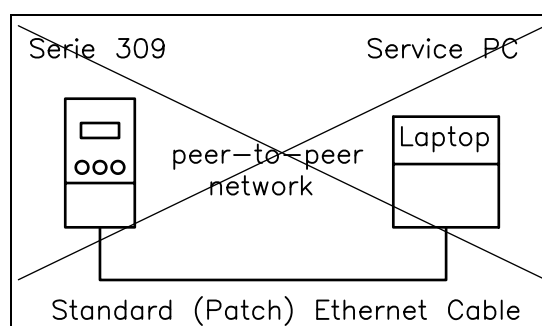
Fig 20: Connection with wrong cable   E309003e

9.1 Parameterization in a Network via Web Browser

Before the parameterization of the BKS309 it must be certain that the BKS309 uses an IP address in a static block. For the integration of a BKS309 web guide controller in your Ethernet network please contact your IT system administrator.
Once the BKS309 was integrated in the network you can address the device e.g. with http://192.168.000.090 . After establishing the link, the screen **Fig. 21** will open up.

Fig. 21: Serial number and device information   Home.jpg

With the menu on the left side of the screen you can navigate through the web page.
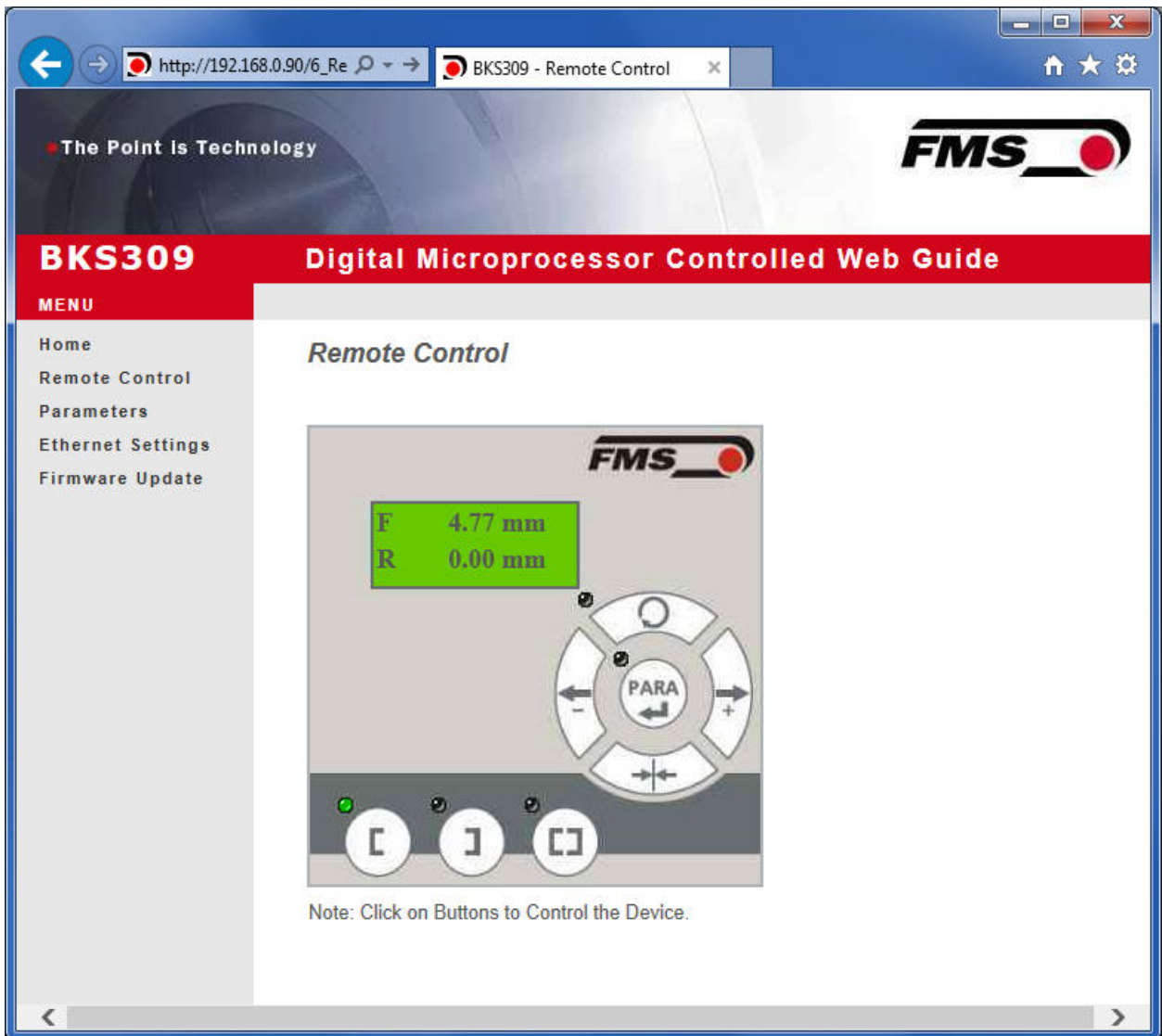
Fig. 22: Parameter setting and   Remote Control Remote Control
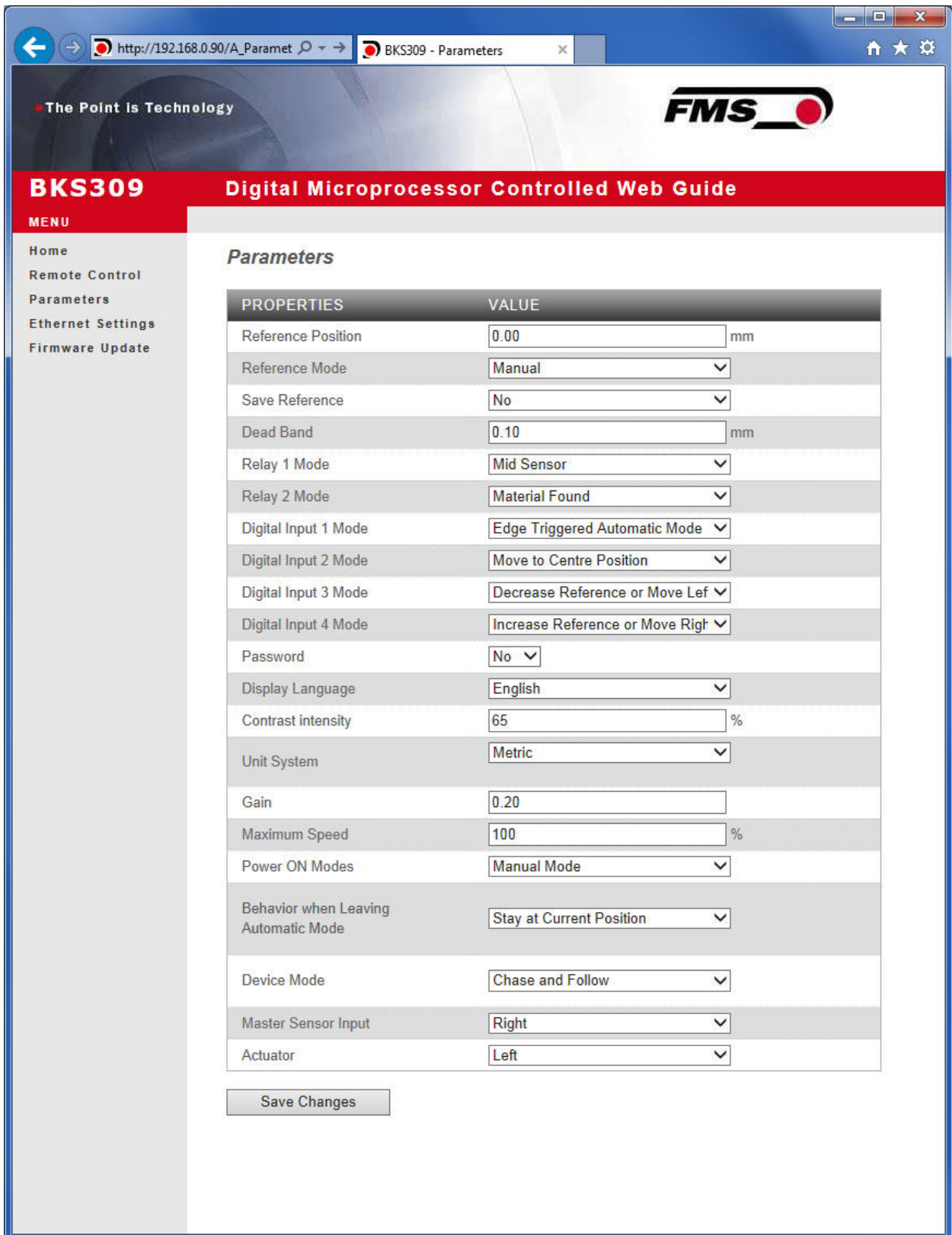
Fig. 23: Parameter list webMASTER Steering Frames   wMASTER.jpg
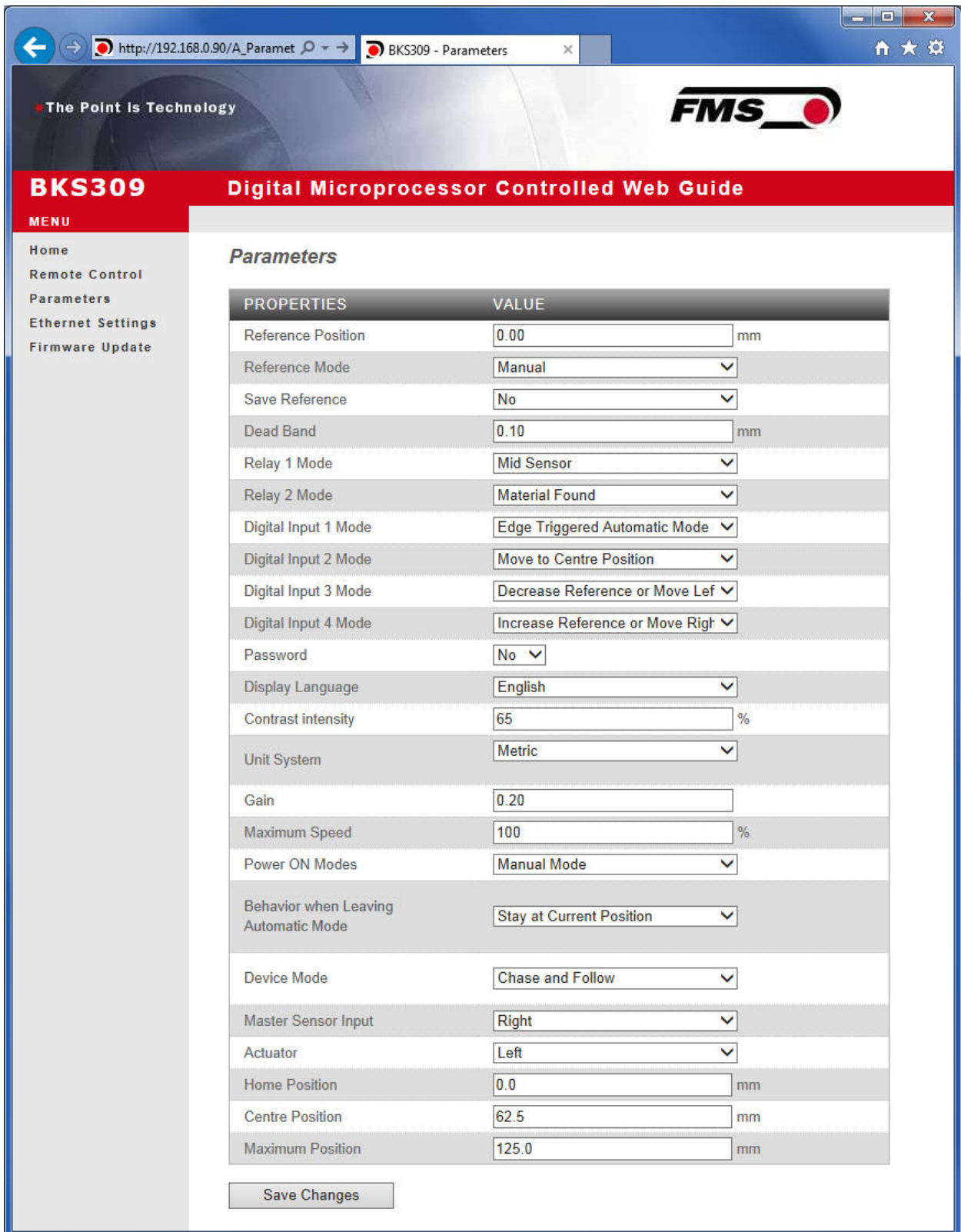
Fig. 24: Parameter list winderGLIDE Actuators wGLIDE.jpg
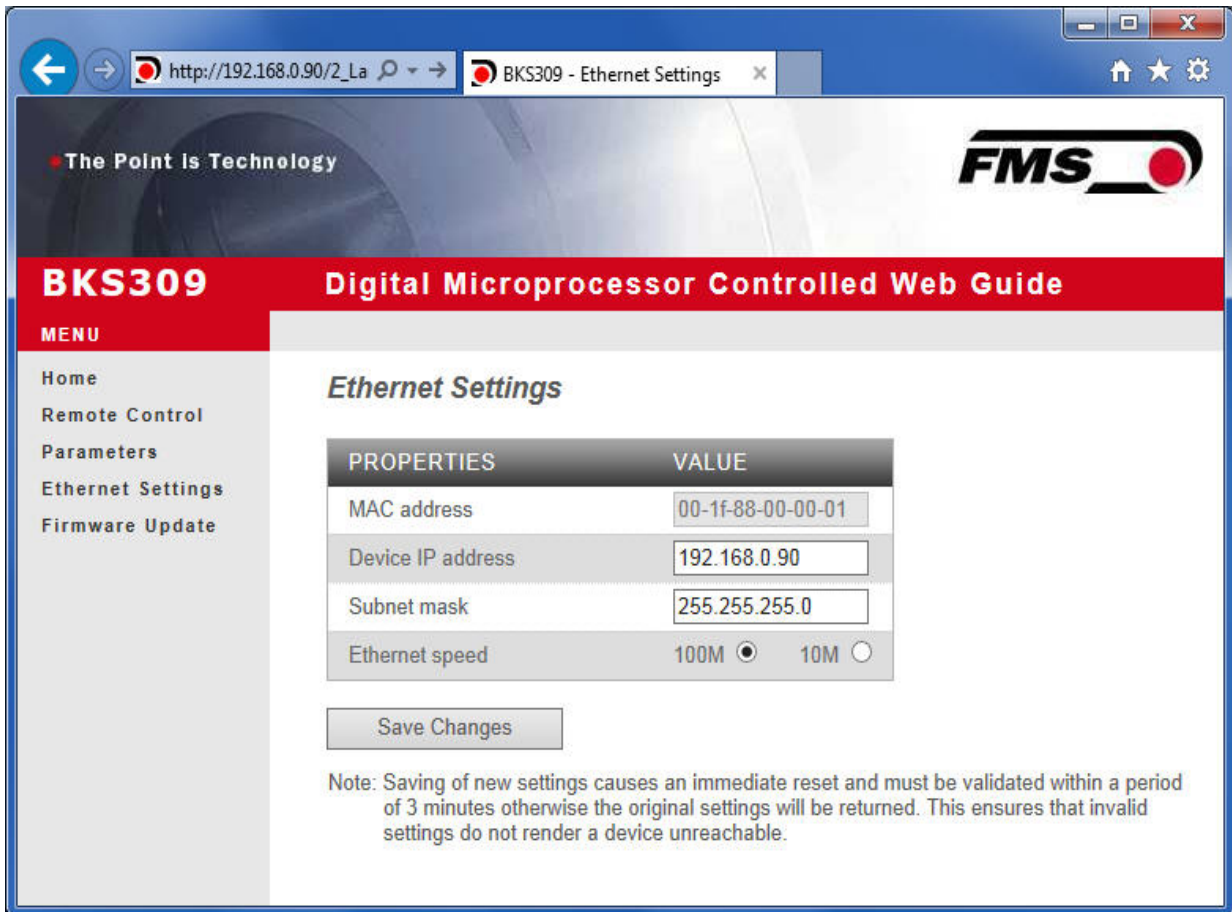
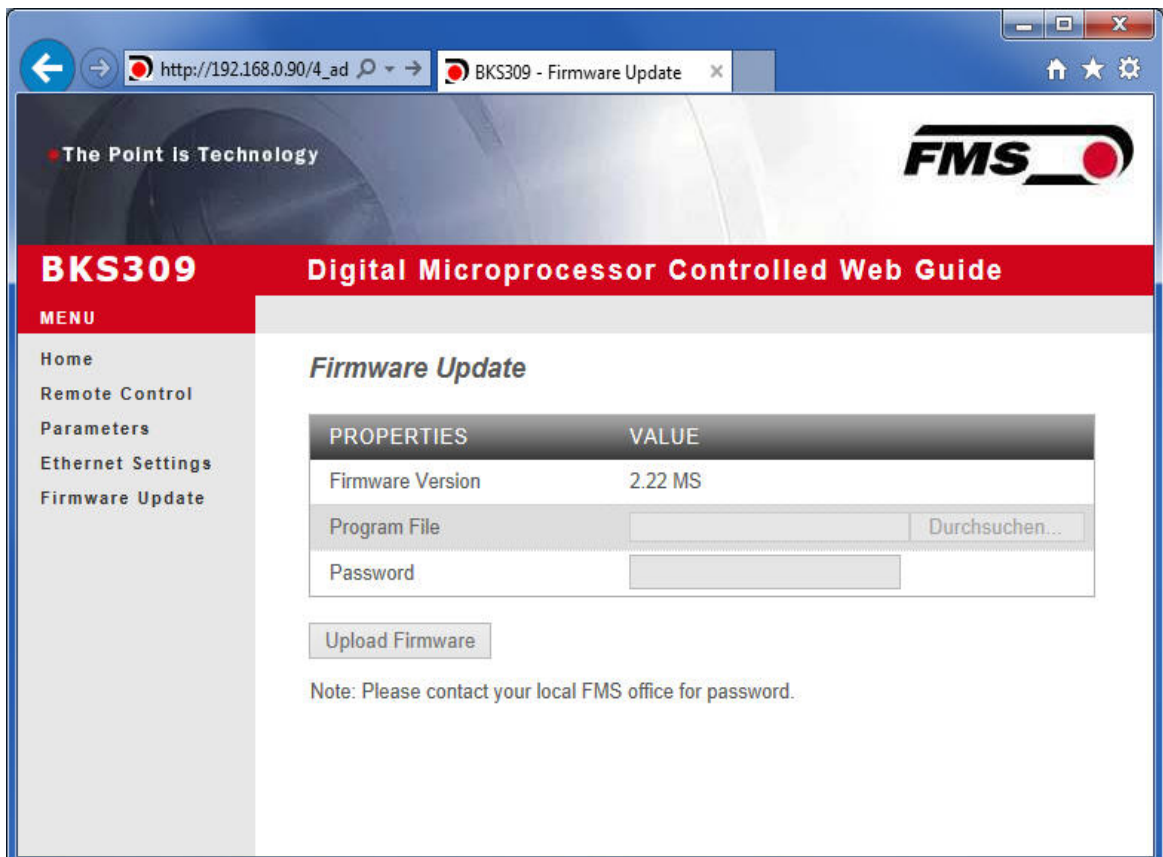**Fig. 25:** Ethernet settings and device addresses   Ethernet Settings


Fig. 26: Firmware update   Firware Updates

9.2 Parameterization via a PC (peer-to-peer connection)

This paragraph describes the procedure for setting up a desktop or laptop computer to communicate with FMS BKS309 web guide controller.
Before connecting the FMS BKS309 controller with a "cross-over-cable" directly to a PC, the computer must be configured with a "static" IP address. If the BKS309 controller is connected to a network by using e.g. a switch, the following procedure is not necessary. To establish the connection between your PC and the BKS309 follow the steps below

Setup in Microsoft Windows XP:

1. Click on the Start button (lower left-hand corner of the screen)
2. Click on Control Panel
3. Double click on Local Area Network
4. Right click on the network adapter that is used for the connection.
5. Click on Properties on the pop up menu, the following dialog box "Local Area Connection Properties" will appear.
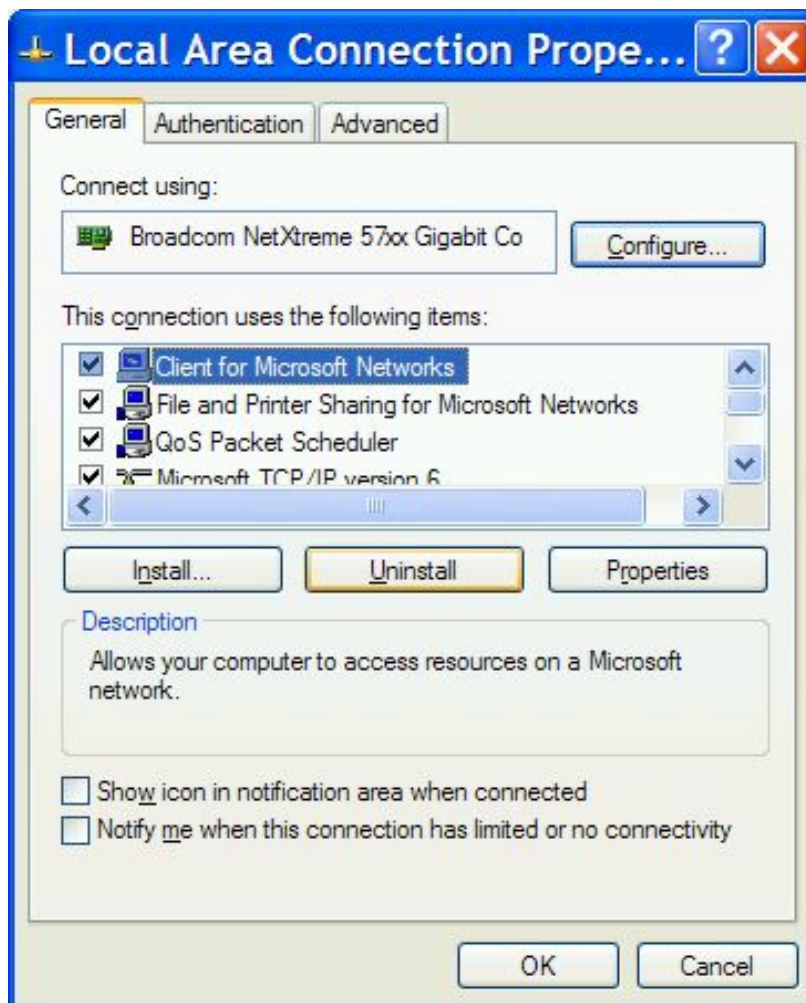
In the list box "This connection uses the following items:", scroll down to "Internet Protocol (TCP/IP). Select the "Internet Protocol (TCP/IP) and click "Properties" button.
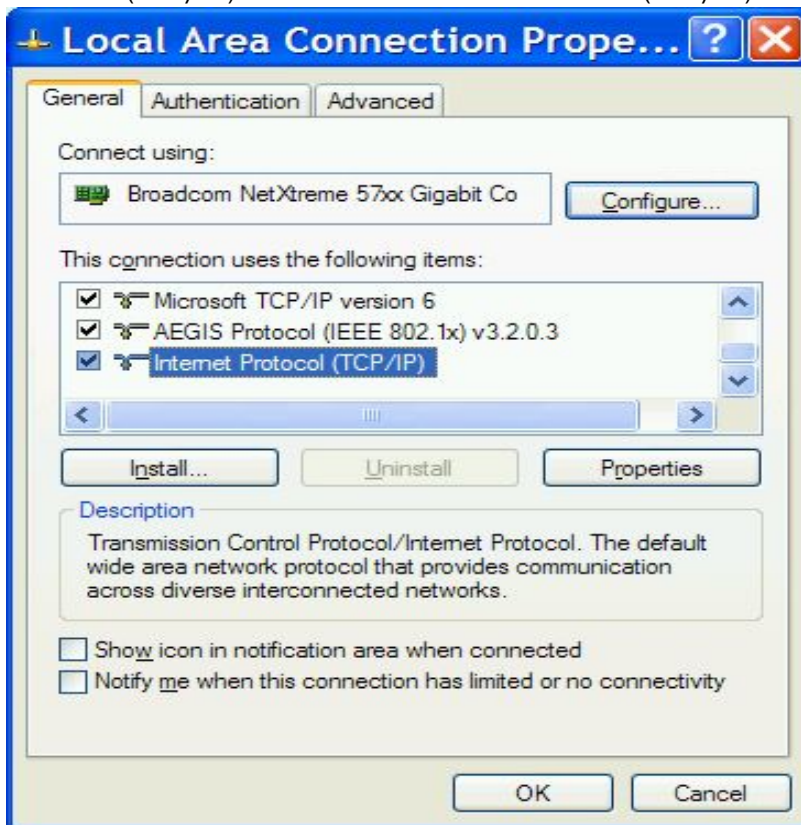
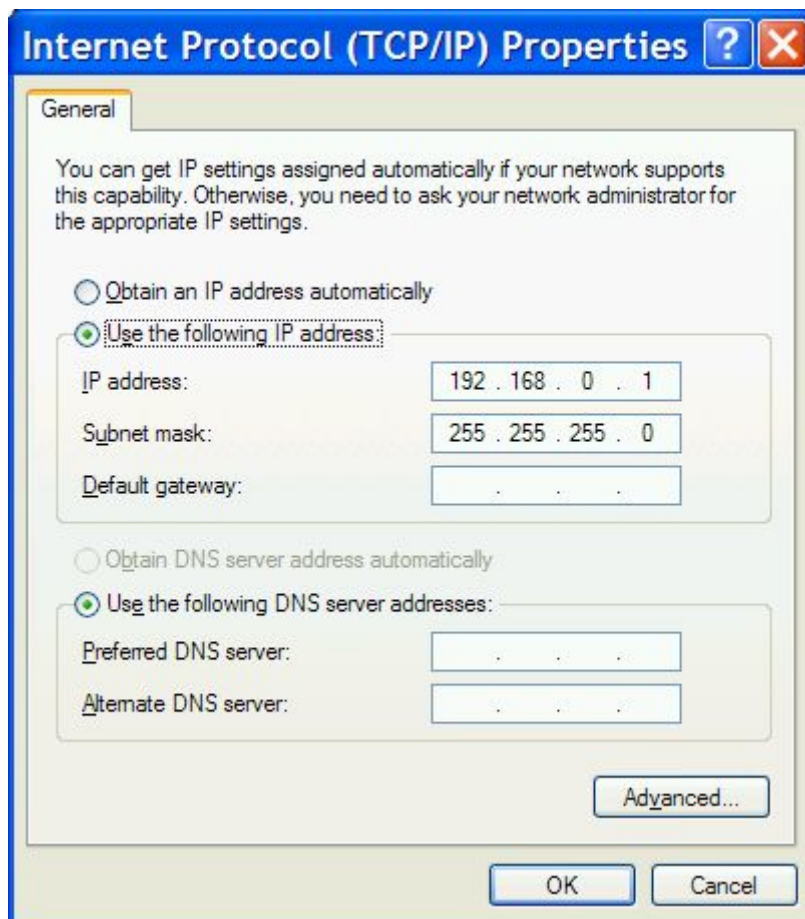The following dialog box will appear. Make sure the "General" tab is selected.
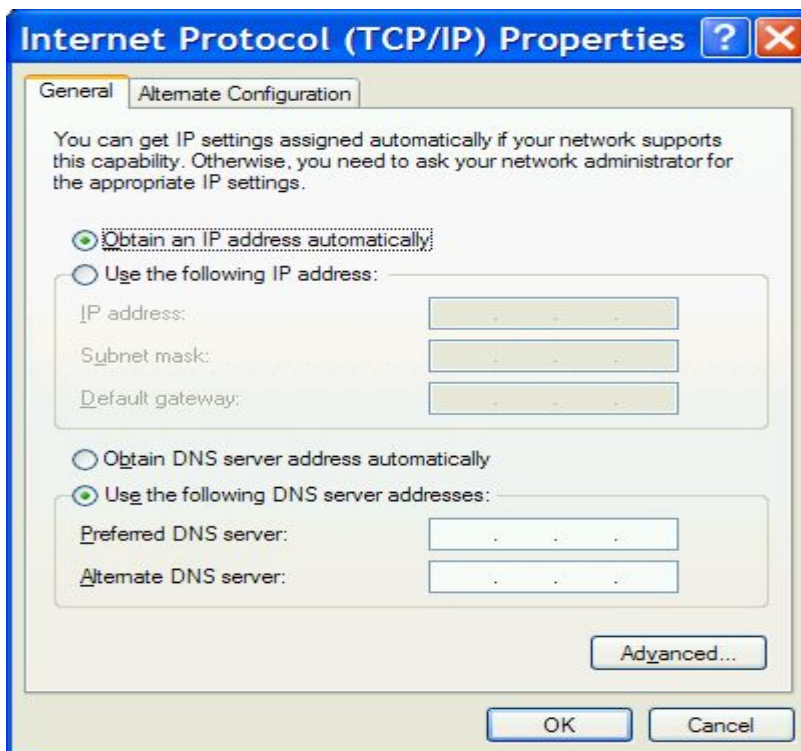
Select the radio button "Use the following IP address:"

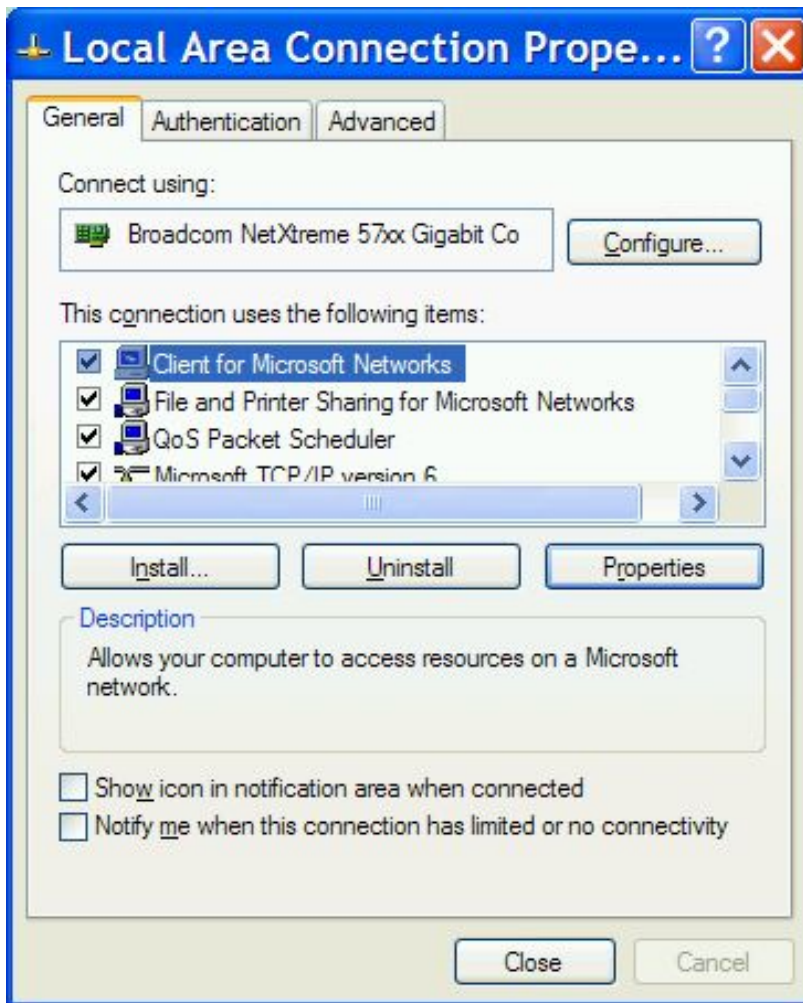In the IP address box enter the IP address for the computer that could be 192.168.0.1.
In the Subnet mask, enter 255 255 255 000, as shown below.
Notice that the "000" in both boxes will change automatically to "0".

The dialog box will change to look like the following:

Click the "OK" button. The following dialog box will appear again:

Click on the "Close" button.
Close the "Network Connection" window
Close "Control Panel"

The computer is now ready to communicate with the BKS309 controller:

1. Connect the "cross over cable" to both the BKS309 and to the appropriate port on the desktop or laptop computer.
2. Open Microsoft Internet Explorer or Mizilla Firefox.
3. The default IP address for the BKS309 is 192.168.000.090 as long as it was not changed over the operating penal. Enter the IP address in the address bar and hit the Enter key. If a different IP address and subnet mask is configured at the BKS309 make sure that the computer is setup appropriate.
4. The screen **Fig. 21** will open up. Continue then with the procedure described in 9.1 "Parametrization in a Network via a Web Browser".

10 Mechanical Dimensions

The BKS309 series is available in three different housing options. The mechanical dimensions can be seen in the following pages.
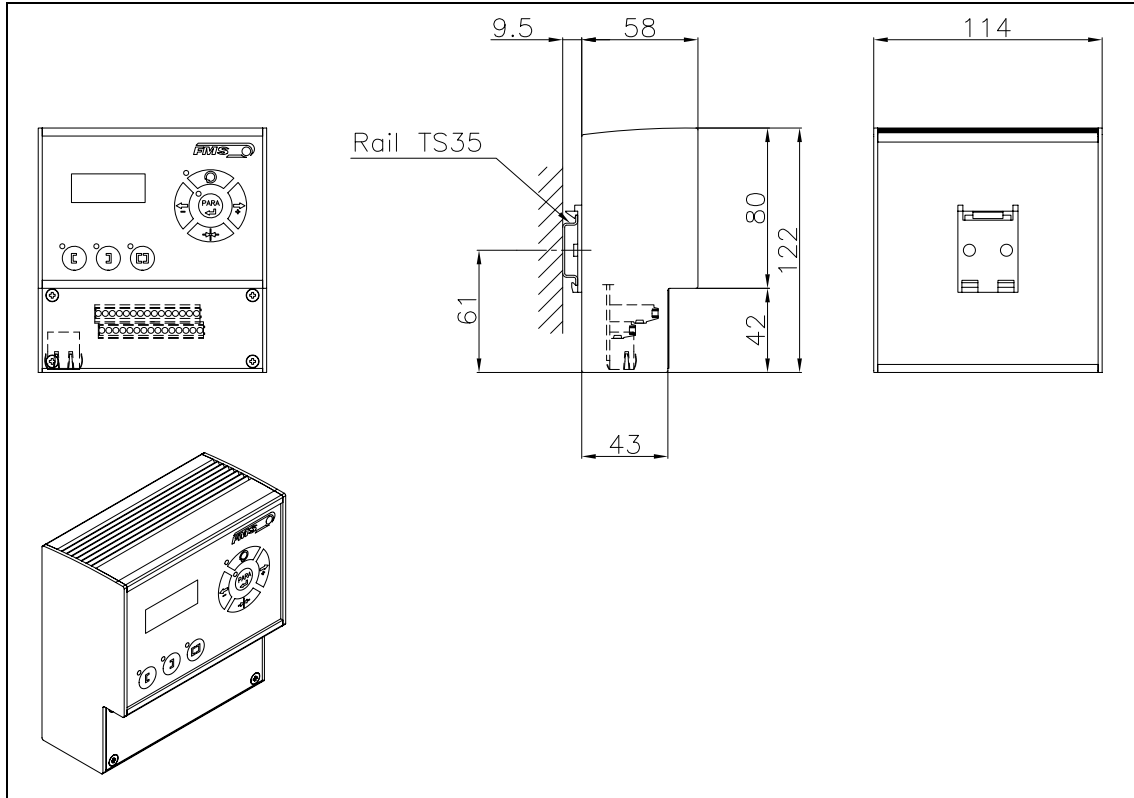

Fig. 27: Outline Drawing BKS309.R rail mount housing   K309006e
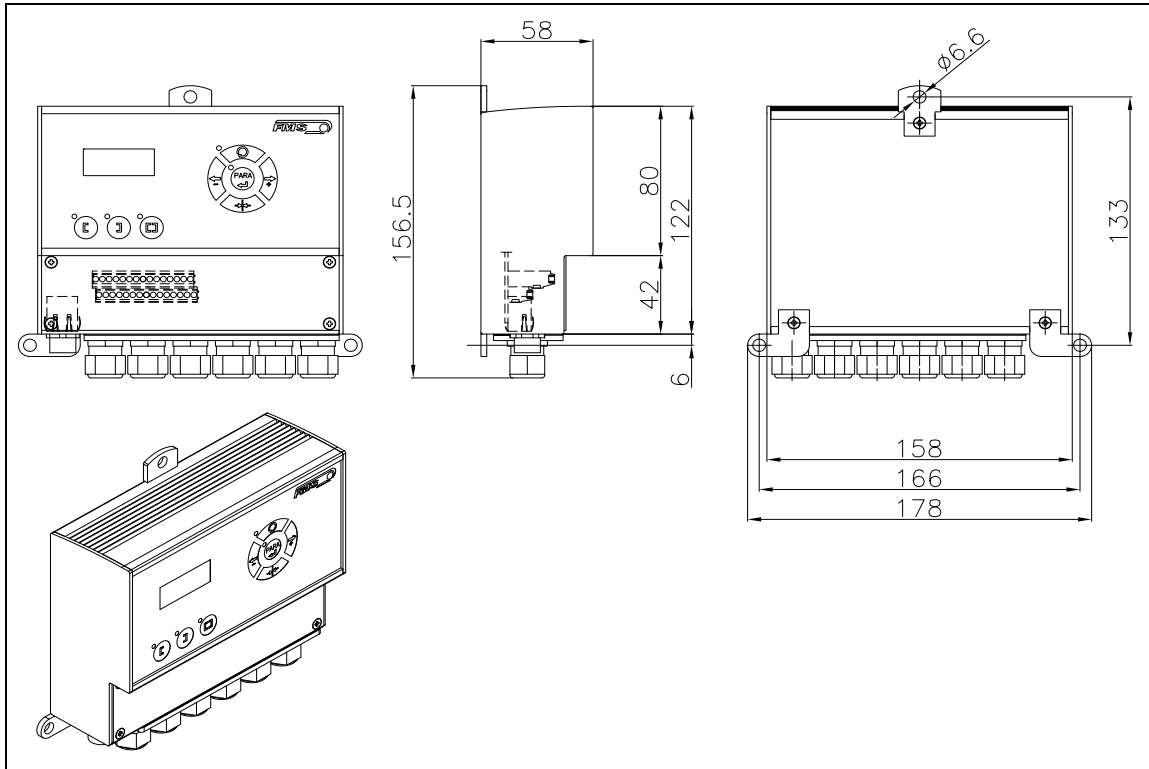
Fig. 28: Outline Drawing BKS309.W wall mount housing   K309008e
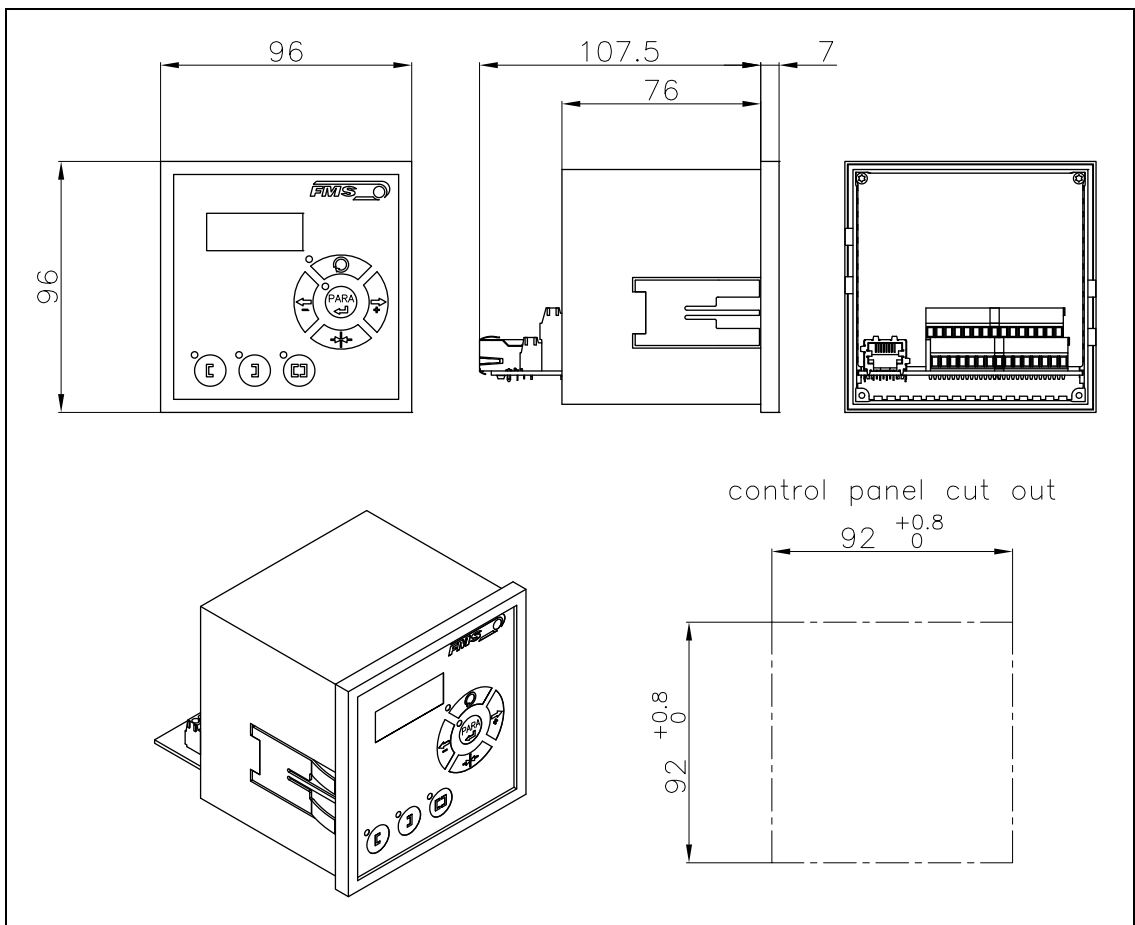
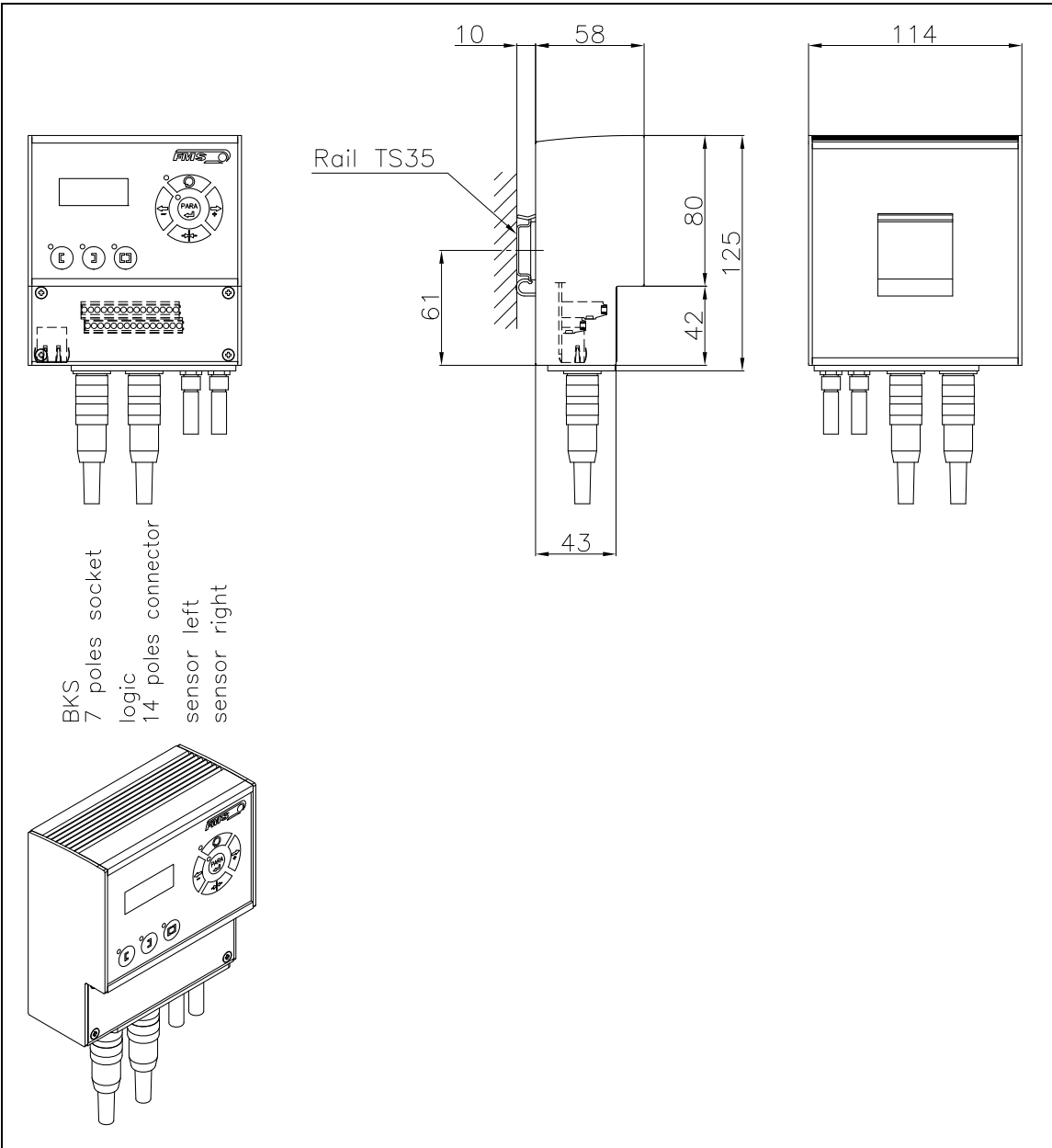**Fig. 29:** Outline Drawing BKS309.S panel mount housing   K309007e

Fig. 30: Outline Drawing BKS309.R.C for DIN real mounting with connectorsK309016e

11 Trouble Shooting

Error	Cause	Corrective action
Edge outside detection band	Edge has moved outside the sensor detection band	Adjust sensor more accurately to the web edge; Adjust reference position less during automatic operation
BKS guides web edge immediately out of the sensor	Sensor is mounted on the wrong side	Mount sensor to the correct side (right sensor for „Edge right", etc.)
	Sensor is connected to the wrong socket	Connect sensor plug to the correct socket (left plug to left socket, etc.)
Steering frame does not move	No signal; sensor not correctly connected	Connect sensor correctly according to screw terminal arrangement and installation guide
	No signal; cable interruption	Replace cable or send sensor to FMS
	No signal; sensor defect	Send sensor to FMS; use other sensor
No response of the interface	Wiring not correct	Check wiring
Display shows nothing, frame doesn't react	Fuse blown	Replace Fuse on power supply board
	Power supply defect	Check or correct power supply installation
	Electronic control unit defect	Contact FMS customer service
Frame moves abrupt to one of the end positions	Stepper motor driver defective	Exchange actuator of the frame. Contact FMS service department for spare parts and installation guide.

12 Technical Specification

Cycle time processor	1ms
Drive of steering frame	Stepper motor. Power amplifier 24V integrated in housing
Dead band	0...2mm, adjustable in 0.1mm steps
Position reference	±5mm, adjustable in 0.1mm steps
Control modes	edge left / edge right / center guiding / line guiding
Interface	Web browser Ethernet Explorer 7 or higher
Operation	3 keys and 5–key wind rose pad
Analogue inputs	2 inputs 0...10V (for sensors)
Digital inputs	4 dig. inputs 24VDC galvanic insulated
Relay outputs	2 relay outputs. DC: 220V/2A/60W; AC:250V/2/62.3VA
Supply voltage	18...30 VDC (Vnom.= 24 VDC), version .ACV 85...264 VACV / 80W
Temperature range	-10 ... 60°C (14...140°F)
Protection class	IP 30 (Standard) / IP65 (.W), IP00 (.S)