Description J

EL

Digital controller RK 4004

en

Software: RK 4004-0003 F_ZL

Explanation of symbols   ➜ = jobs to be performed

‖ = important information and instructions

1. Function

1.1 Purpose

Controller card RK 4004 is used to control a DC actuator with speed and position feedback. For this purpose a current controller, speed controller, position controller and motor output stage are integrated on the card. Appropriate sensors may be attached via a CAN bus for the position controlling of running webs and following-up of tools.

Operation is via a command device with text display and/or a digital input-output card.

1.2 Design

The controller card consists of the following modules:

- a processor with data memory
- several JST plug sockets
- several terminals
- a green LED for "output stage on stand-by"
- a red LED for the "overcurrent" display
- three segment displays
- and three keys (setup, increase value, decrease value)
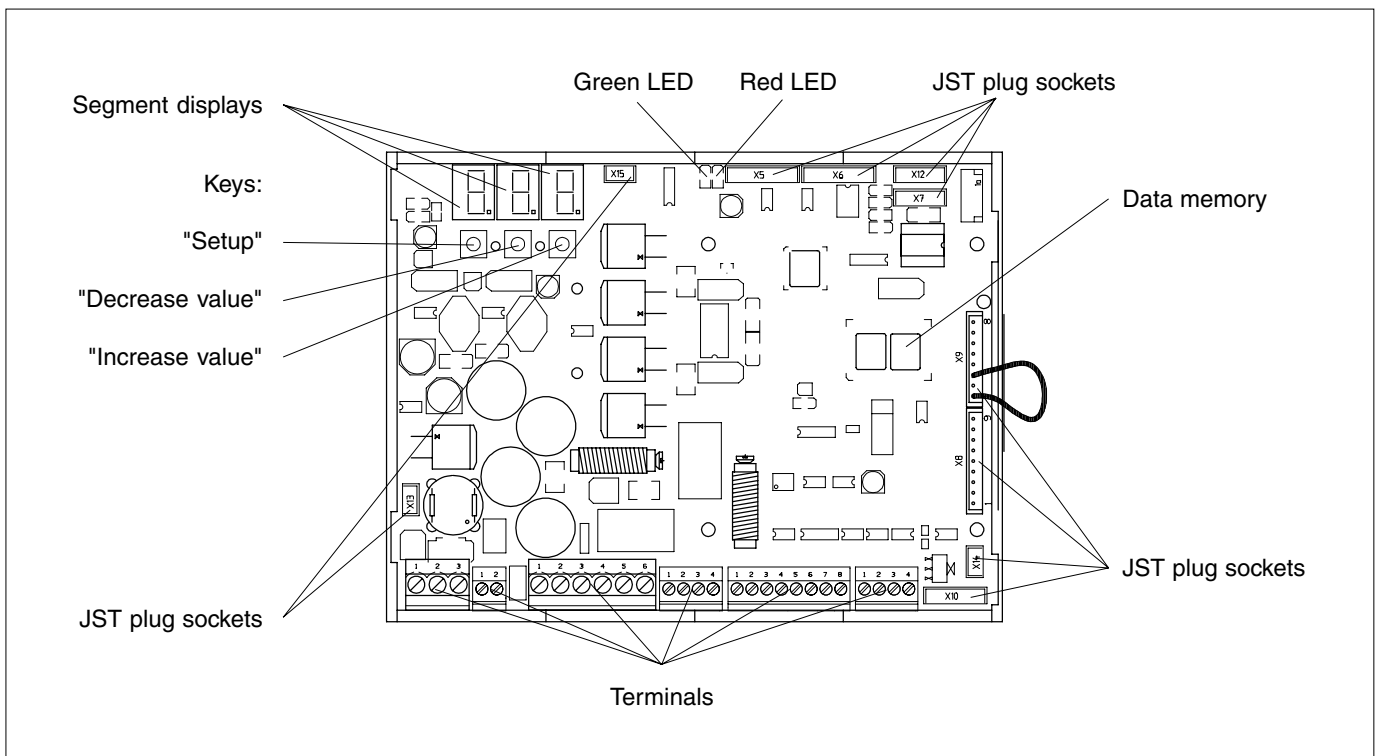
1.3 Operating principle

The operating principle depends on the mode selected. The following operating modes are possible:

Actuator manual:
In manual mode the actuator may moved to the left or right to a required position. The speed may be set in the appropriate parameter.

Actuator center position:
The actuator is positioned at the set center whereby first of all it is moved to the reference switch and the internal position controller is adjusted. The actuator is then moved to the set center position. The reference switch should be mounted so that when the actuator is in its center position the switching point of the reference is crossed thus assuring that the actuator may be center-positioned without any major positioning movement.

Automatic mode:
In automatic mode the web or tool is guided to the set position. Prerequisite to guiding is that guider lock is released.

Guider lock in automatic mode:
Guider inhibiting is only effective in automatic mode and may be activated on controller card RK 4... or via an interface.

Web offset:
A web offset may be set in automatic mode. A web offset means that the set position value may be changed positively or negatively.

In the case of fixed sensors or a single motor support beam with two positioning carriages, web offsetting is limited to 75 % of the sensor measuring range. On the remaining applications with support beams the web offset may be extended to include the entire support beam position range.

Oscillation:
In automatic mode a oscillating set value is additionally added to the set position value. The oscillating mode, period and path may be set in the appropriate parameters or via a command station. In the case of fixed sensors oscillation is only possbile within 75 % of the measuring range.

Park sensor:
When using a support beam the positioning carriage along with the sensor/tool located on it are moved (outwards) to the outer end position.
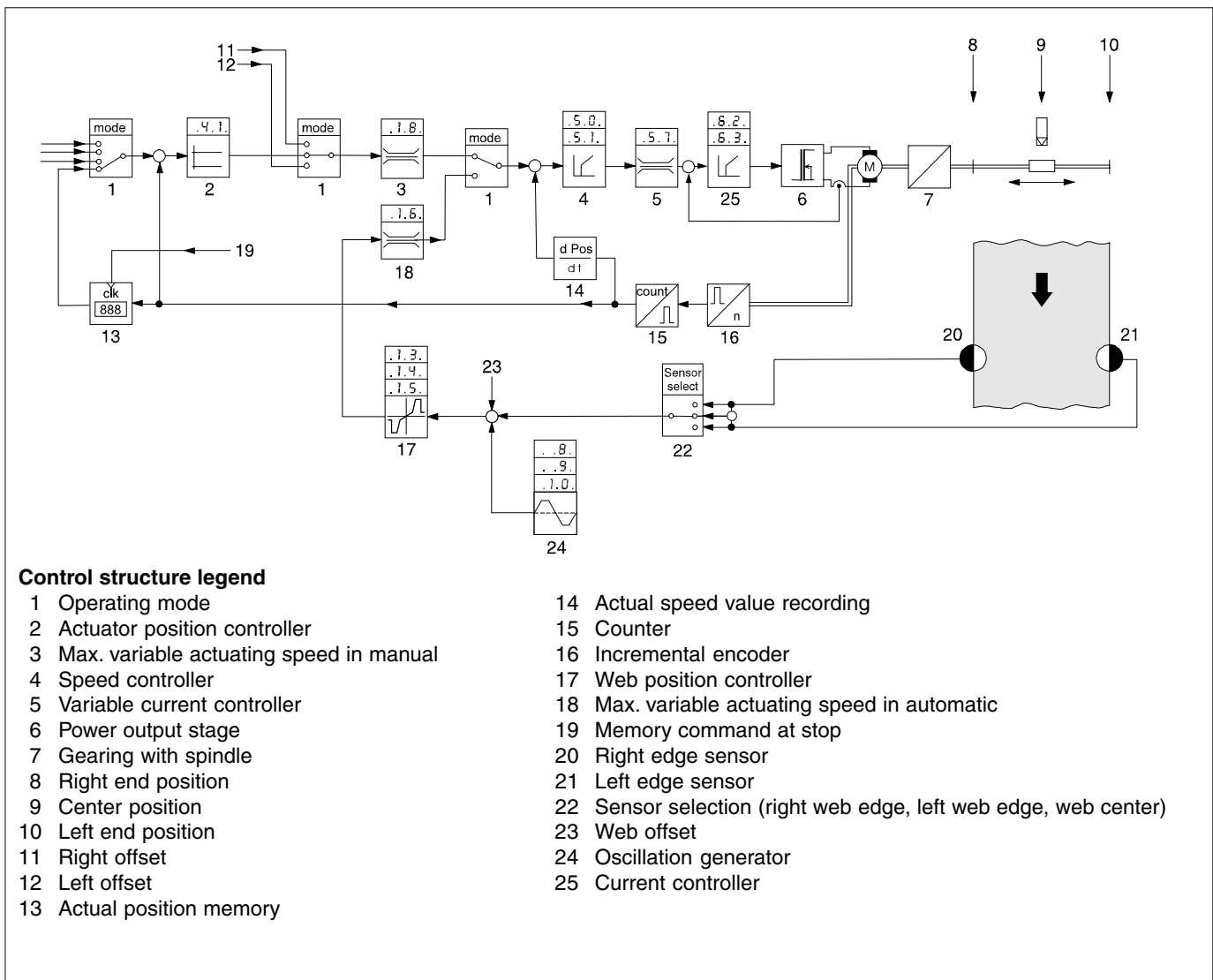
Search for edge:
The sensor searches for and follows the web edge until the operating mode is changed by, e.g. a guider enable.

1.4 Control structure with constant controlling for proportional actuators

In a control structure for proportional actuators the web or tool actual position value is compared with the required set position value and, in the event of a deviation, it is transmitted to a P position controller as a control difference. The resultant set speed value is compared with the actual speed value and transmitted to the PI speed controller. The latter emits a pulse width-modulated signal at the output stage.

The following are available as proportional actuators:
DRS pivoting frame, VWS turning rod, SRS steering roller, WSS winding station, SVS push roller SVS and VSS positioning and follow-up controller.

Control structure legend

1	Operating mode	14	Actual speed value recording
2	Actuator position controller	15	Counter
3	Max. variable actuating speed in manual	16	Incremental encoder
4	Speed controller	17	Web position controller
5	Variable current controller	18	Max. variable actuating speed in automatic
6	Power output stage	19	Memory command at stop
7	Gearing with spindle	20	Right edge sensor
8	Right end position	21	Left edge sensor
9	Center position	22	Sensor selection (right web edge, left web edge, web center)
10	Left end position	23	Web offset
11	Right offset	24	Oscillation generator
12	Left offset	25	Current controller
13	Actual position memory		

1.5 Control structure with constant controlling for support beams

In a control structure for a support beam a set speed value is determined on the basis of the sensor signal via the P position controller that is transmitted to the speed controller. The resulting set speed value is compared to the actual speed value and transmitted to the PI speed controller. The latter emits a pulse width-modulated signal at the output stage. In "search for edge" or "hybrid" modes the sensor is driven to follow-up the web edge.

Available as proportional actuator:
Support beam VSS

Control structure legend

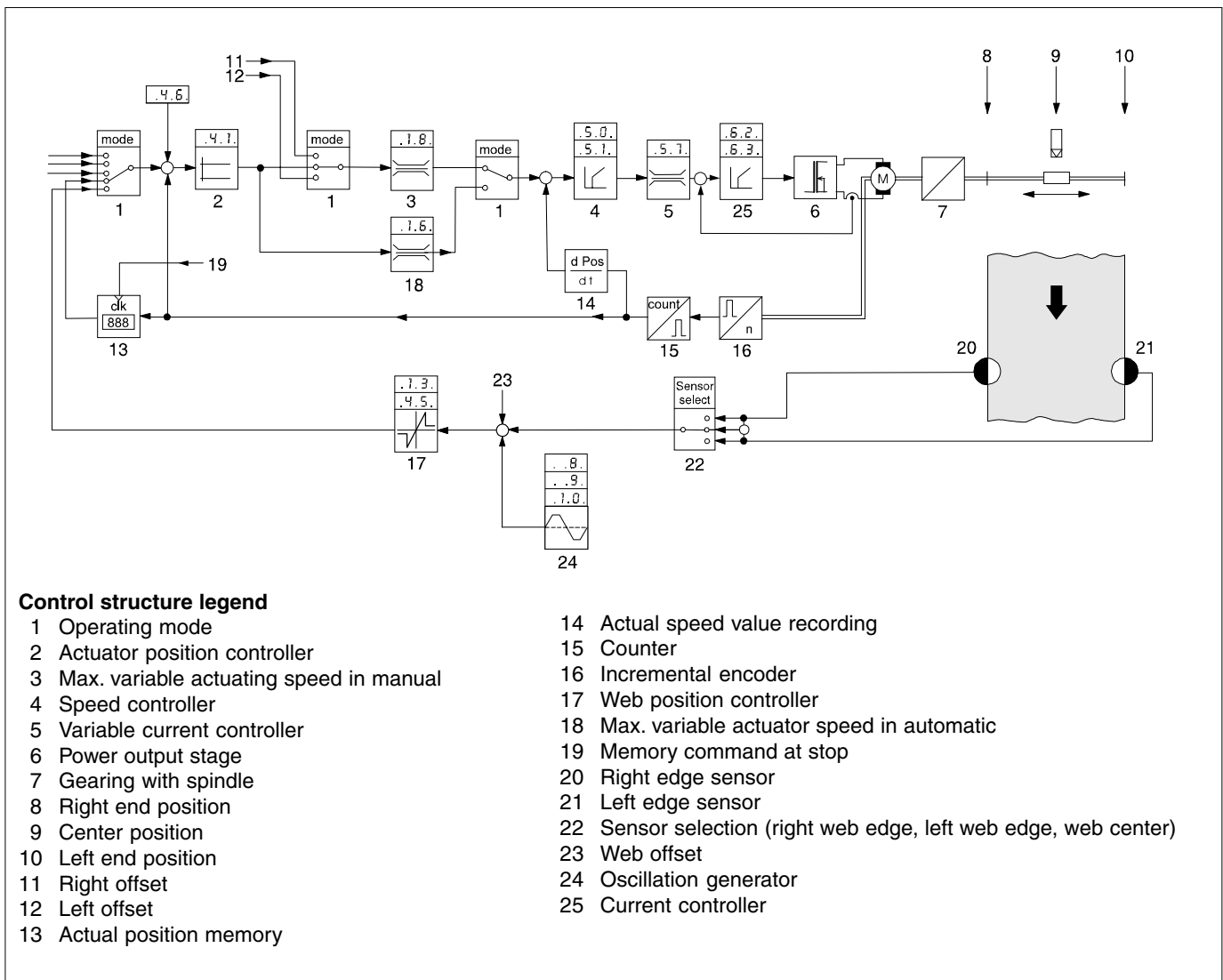|			
1	Operating mode	10	Park position
2	Sensor	11	Support beam position controller
3	Counter	12	Actual speed value recording
4	Web offset	13	Incremental encoder
5	Edge sensor position controller	14	Max. variable actuating speed in search for edge mode
6	Support beam speed controller	15	Variable current controller
7	Power output stage	16	Current controller
8	Sensor zero point detector	17	Variable actuating speed during positioning
9	Memory for edge position	18	Oscillation generator

1.6 Control structure with constant controlling for integral actuators

In the case of a control structure for integral actuators the web actual position value is compared to the required web set position value and, in the event of a deviation, it is transmitted as a control difference to a P position controller. The latter provides the necessary set position value for the actuator. The current actual actuator position value is compared to the required set position value and transmitted as a control difference to the actuator position controller. The latter generates the set speed value which is compared to the actual speed value, the difference being fed to the PI speed controller which emits a pulse width-modulated signal at the output stage.

Available integral actuators:

SWS segmented roller guider, VGA pivoting roller, BCS edge and width spreader

Control structure legend

1 Operating mode
2 Actuator position controller
3 Max. variable actuating speed in manual
4 Speed controller
5 Variable current controller
6 Power output stage
7 Gearing with spindle
8 Right end position
9 Center position
10 Left end position
11 Right offset
12 Left offset
13 Actual position memory
14 Actual speed value recording
15 Counter
16 Incremental encoder
17 Web position controller
18 Max. variable actuator speed in automatic
19 Memory command at stop
20 Right edge sensor
21 Left edge sensor
22 Sensor selection (right web edge, left web edge, web center)
23 Web offset
24 Oscillation generator
25 Current controller

2. Type overview

The following table provides an overview of the most common digital controllers. The individual digital controllers (DC) are listed in the vertical column. The crosses mark the components belonging to them (AK ...., LK ...., etc.).

Type	RK 4004	AK 4002	LK 4203	RT 4019	DO 2000	AK 4014
DC 0310	X	X				
DC 0311	X	X	X			
DC 0340	X					
DC 0341	X		X			
DC 0360	X					X
DC 0361	X		X			X
DC 1310	X	X		X		
DC 1340	X			X		
DC 2340	X				X	
DC 2341	X		X		X	

3. Assembly

Controller card RK 40.. is usually mounted in a sheet steel housing or E+L device.

If the controller card is supplied on its own it should be mounted in a control cabinet away from heavy current-carrying modules.

The maximum distance to the DC actuator must not exceed 10 m.

4. Installation

→ Connect electrical leads according to the attached wiring diagram.

→ Shield and run signal lines away from heavy current-carrying leads.

The DC actuator motor line must be run separately (separate cable) from the incremental encoder line.

The connection line between the controller card and DC actuator may be run in one lead up to a length of 3 m. From a distance of 3 m to 10 m the motor and incremental encoder lines **must** be run separately.
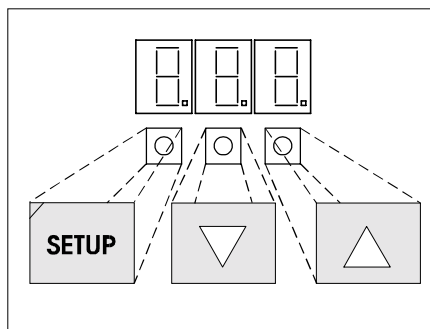

X 5 Right digital sensor

X 6 Left digital sensor

X 15 Fan

X 12 CAN connection without LED display for internal device networking

X 7 CAN connection with LED display for CAN device connector

X 11 SPI bus

X 9 serial bus

X 21 Supply voltage for further E+L modules

X 13 Supply voltage for further E+L modules

X 1 Operating voltage

X 8 Analogue card AK 4002 (only when analogue sensors are used)

X 14 External configuration adapter

X 10 Optical incremental encoder

X 2 DC actuator and incremental encoder

X 3 Command station for web offset RE .... or signal for path-dependent oscillation

X 4 Reference switch, guider lock and end position signal

X 20 End switch

RK 40.. terminal assignments

The wiring diagram indicates which connectors are assigned.

The guider lock is intended for on-site requirements where the actuator is to be stopped in its current position. If the guider lock is closed (make contact) the actuator remains in this position until the contact is open again.

4.1 Terminal assignments X 1 to X 21

Terminal	No.	Input	Output	Assignment
X 1	1	X		+24 V DC supply voltage
	2	X		0 V
	3	X		Ground
X 2	1		X	DC actuator
	2		X	DC actuator
	3	X		Incremental encoder on DC actuator track A
	4	X		Incremental encoder on DC actuator track B
	5		X	+24 V DC
	6		X	0 V
X 3	1		X	+24 V DC
	2	X		Web offset or path-dependent or
				Oscillation signal or
				automatic mode signal (for minimum operation only)
	3		X	0 V
	4		X	Sensor range limit
X 4	1	X		Guider lock
	2	X		0 V potential 0 V for controller lock
	3		X	+24 V DC reference switch
	4	X		Reference switch signal
	5		X	0 V reference switch
	6		X	+24 V DC
	7	X		Actuator end position signal
	8		X	0 V
X 7	1	X	X	CAN High
	2	X	X	CAN Low
	3		X	LED +
	4		X	LED -
X 10	1		X	GND (0 V)
	2	X		(Index) -
	3	X		Track A
	4		X	+5 V
	5	X		Track B
X 12	1	X	X	CAN High
	2	X	X	CAN Low
	3	-	-	free
	4	-	-	free
X 13	1		X	+24 V / I max 1.0 A
	2		X	GND 0 V
X 15	1		X	+12 V
	2		X	Switch output for additional fan
X 20	1		X	+24 V
	2	X		Actuator 2nd end position signal
	3		X	0 V
	4		X	system on stand-by
X 21	1		X	+24 V / I max 1.0 A
	2		X	0 V

4.2 Setup operation

The three keys and the displays are used as the setup control panel. The key assignment (setup, decrease/increase value) is indicated in the illustration opposite. The following applications are possible:

4.2.1 Setting the controller card device address

4.2.2 Current error display

4.2.3 Setting parameters

4.2.1 Set controller card device address

Prior to commissioning the device address of controller card RK 4004 must be checked and changed as necessary.

➜ Press both keys "decrease value" and "increase value" at the same time. The group number is indicated via the "decrease value " key and the device number via the "increase value" key. If both keys are held down for longer than approx. 4 seconds the device address will start to flash.

➜ If the device address deviates from the required address it may be changed via the keys.

If none of the keys are actuated the device address will be saved after approx. 20 seconds have elapsed and a software reset is triggered.

4.2.2 Current error display

In normal circumstances the display on the controller card indicates only three dots. These three dots signal that no errors are present .

A flashing number signals an error. The number indicates the error code. If several errors are present at the same time, the error with the highest priority will be indicated. If this error is no longer present, the display will indicate the next error.

Below is a list of possible errors:

No.	Error display in CANMON	Description	Output at terminal X 20.4
1	UDC-power low	19.5 VDC operating voltage not attained	0
2	UDC-power high	30.5 VDC operating voltage exceeded	0
3	I motor high	set maximum cut-off current exceeded	-
4	temp case high	heat sink over 70 ºC	0
5	encoder fault	incremental encoder motor fault	-
6	encoder invers	incremental encoder motor inverted	-
7	sensor R fault	no message from right sensor	-
8	sensor L fault	no message from left sensor	-
9	gearconstant fault	calculated gear constant produces impermissible value	-
10	motor line fault	motor line interrupted	0
12	power stage defect	motor power stage defective	0
13	motor blocked	motor blocked due to overloading (I = max. & n = 0) **Attention!** output is set after 5 seconds only	0
14	ref. switch error	several reference switch errors detected.	-
15	end switch error	end position proximity switches incorrectly configured	-
16	24Vext. fault	ext. supply voltage overloaded.	0

4.2.3 Output X 20.4

In the case of certain errors (see table) output X 20.4 is switched to "0". The internal switch on the controller card that furnishes a connection to ground is opened.
The following circuit variants are recommended:

Lamp "ON"   =   system on stand-by
Lamp "OFF" =   error

PLC "1"   =   system on stand-by
PLC "0"   =   error
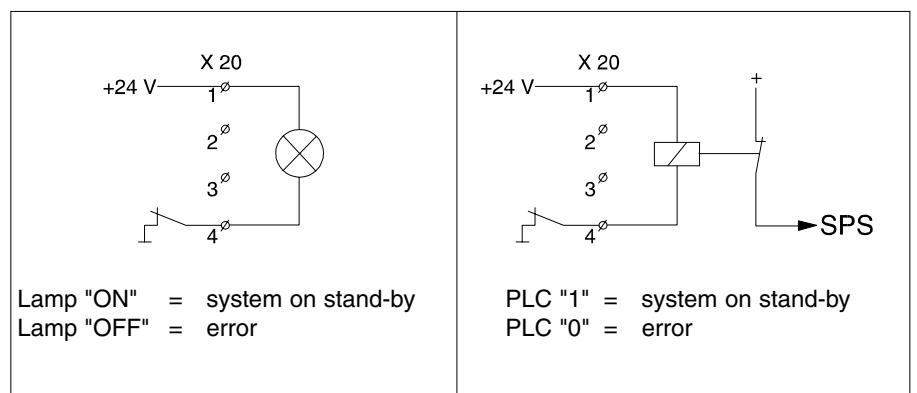
4.2.3 Parameter setting

All parameters in the CAN network may be selected and changed by the three keys. The following flow diagram illustrates basic operation with the setup editor:

Basic operation in setup mode:

Start setup mode: press the setup and **additionally** the increase value key (press the setup key first). The green LED on the setup key will flash .

Enter device number: press and hold down the setup key and select parameter 0 via the increase value key. Release the setup key again and enter the device number via the increase or decrease value keys (device number is specified in the block diagram)

Enter group number: press and hold down the setup key and select parameter 1 via the increase value key. Release the setup key again and enter the group number via the increase or decrease value keys (group number is specified in the block diagram)

Select and change parameters: press and hold down the setup key and select the required parameter via the increase value key. Release the setup key again and enter the required parameter value via the increase or decrease keys.

▌ **Incorrect parameter changes may impair the function of the entire system !**

Select expanded setup mode: select device number X.5, then press and hold down the setup key and select parameter 3 by pressing the increase value key. Release the setup key again and enter parameter value 42 via the increase or decrease value keys.

Quit setup mode: select device number X.5, then press and hold down the setup key and select parameter 3 by pressing the increase value key. Release the setup key again and enter parameter 1 by pressing the increase or decrease value key. Press and hold down the setup key and press the increase value key **once**. Release the setup key again.

X is used as a place retainer

5. Parameters

In setup mode parameters may be displayed and to some extent changed as well. In order to access the controller card setup mode a command station DO .... , a operating panel RT .... or an E+L CANMON program is required.

5.1 Parameter list

The parameter numbers are listed in the **Number** field of the table, in the **Name** field the abbreviation. The **Default** field indicates the standard settings, **Min** and **Max** are the permissible limit values respectively. The unit is indicated in the **Unit** field. The **Description** explains the parameter function. If a dot (•) comes after the parameter number this indicates that it is a display parameter, the value of which cannot be changed.

To make reading easier, standard display is a reduced parameter record only. **The bold faced parameters** are part of this reduced parameter record. The following options are available for displaying all parameters:

- enter value 42 (extended setup mode) into parameter "..3. start service"

- special section on command station DO 2000 resp. in the CANMON-Programm.

No.	Name	Default	Min.	Max.	Unit	Description
..0.	**edit device**	5	1	F	hex	select device number see block diagram for device number
..1.	**edit group**	0	0	7	hex	select group number see block diagram for group number
..2.	**reset settings**	0	0	2		Works settings 0 = no function 1 = perform customer settings 2 = perform internal default setting
..3.	**start service**	0	0	199		Starting a function 0 = no function 1 = reset controller 2 = save parameter 10 = actuator initialisation run (device X.5) 11 = support beam initialisation run (device x.6, x.7, x.8, x.9, x.10, x.11) 12 = actuator initialisation run, with specification of the gear constants (device x.5) 13 = actuator guiding criterion photo (for integral controller only) 22 = saving of application parameters 30 = preset for general web guider parameters 31 = preset for sensor support beam VS 35 parameters 32 = preset for 3-position controller parameters 33 = preset for DR 11.. / DR 12.. parameters 34 = preset for support beam VS 50.. parameters 42 = select expanded setup 44 = save customer settings 98 = delete error memory 99 = delete data memory
..4. •	**RK 4004**	2.1	1.2	2.1	E+L	Software version

Digital controller RK 4004

No.	Name	Default	Min.	Max.	Unit	Description
..5. •	webedge offset					Parameter title
..6.	weboffset	0.00	-325.00	325.00	mm	Web offset
..7.	step width	0.10	0.01	10.00	mm	Step width for web offset
..8.	osc. amplitude	0.0	0.0	500.0	mm	Oscillation amplitude +/-
..9.	osc. cycl. time	20	1	700	sec.	Oscillation cycle time cycle-dependent = sec/ cycle path-dependent = pulse/ cycle
.1.0.	osc. wave form	95	5	95	%	Oscillation progression 5% = square wave 50% = trapezoidal wave 95% = delta wave
.1.1.	>osc. trigger mode	2	0	7		Oscillation operation 0 (4) = operation via keyboard 1 (5) = operation via AUTO key 2 (6) = oscilation OFF 3 (7) = oscilation ON Values in () for path-dependent oscillation
.1.2. •	webedge controller					Parameter title
.1.3.	**prop range +/-**	10.0	-2000.0	2000.0	mm	Guider proportional range Web offset in mm at which the DC actuator runs at maximum speed. Decrease value in case of inaccurate guiding! Increase value in case of uneven guiding!
.1.4.	dual-rate width	30	10	90	%	Window width in % related to proportional range ".1.3." This value is used to establish the switch point for determing the dual rate characteristic curve.
.1.5.	dual-rate level	100	0	150	%	Positioning velocity reduction This value is used to determine % motion speed at the switch-over point.
.1.6.	**velocity auto**	20	0	1000	mm/s	Max. positioning velocity speed in automatic mode
.1.7.	velocity pos	50	0	1000	mm/s	Positioning velocity speed in positioning mode
.1.8.	**velocity jog**	10	1	1000	mm/s	Positioning velocity speed in jog mode
.1.9.	velocity defect	1	1	1000	mm/s	Positioning velocity when exceeding the set threshold
.2.0. •	derated velocity			1000	mm/s	Display of velocity limited by internal functions (only active for selecting in parameter 1.1.8.)
.2.1.	reserved 21					not assigned at present
.2.2.	defect range ±	10.0	0.0	2000.0	mm	range for detecting a web fault if not attained switching to the set "velocity defect" speed will be performed

No.	Name	Default	Min.	Max.	Unit	Description
.2.3. •	servo configuration					Parameter title
.2.4.	**motion direction**	0	0	1		Motion effective direction 0 = normal 1 = inverted Depends on mounting position and web direction of travel
.2.5.	**motion range total**	0.0	0.0	3270.0	mm	Total motor position range on calibration AG positioning path must be entered prior to calibration
.2.6.	**positionrange +**	0.0	0.0	3270.0	mm	Positive motor position range
.2.7.	**positionrange -**	0.0	-3270.0	0	mm	Negative motor position range
.2.8.	alarm limit %	75	0	100	%	Limit value for end position early warning
.2.9.	hybrid offset	0.0	-3270.0	3270.0	mm	Hybrid support beam offset Adjustment of hybrid support beam center to machine. center. Is set in device X.7.
.3.0.	reference offset	0.0	-3270.0	3270.0	mm	Reference switch offset Distance between reference switching point and AG- positioning range center
.3.1.	**center offset**	0.0	-3270.0	3270.0	mm	Centring offset Distance between actuator positioning range center and required actuator 0-position in „center position" mode.
.3.2.	system offset	0.0	-3270.0	3270.0	mm	System offset Distance between set actuator 0-position and the reference point (e.g. machine center).
.3.3. •	total resolution	0.0	0.0	3270.0	p/mm	Motor gear constant display only.
.3.4.	**encoder resolution**	8	8	9999	p/revrev	encoder resolution entry of rev encoder resolution pulse/rev (without 4-fold evaluation)
.3.5.	**rotation gear**	8.0	0.1	100.0		Gear transmission on motor Entry of gear transmission
.3.6.	**linear gear**	4.0	0.1	250.0	mm/rev	Linear gear transmission Entry of transmission ratio from rotational to linear movement
.3.7.	mech. gearfactor	1.00	0.10	5.00	-	Mechanical ratio
.3.8.	encoder filter	4	2	16	-	Filtering of encoder impulses
.3.9.	reserved 39					Not assigned at present
.4.0. •	pos. controller					Parameter title
.4.1.	pos prop +/-	5.0	0.1	200.0	mm	Position controller proportional range
.4.2. •	act position	0.0	-3270.0	3270.0	mm	Actual position (display only)
.4.3. •	set position	0.0	-3270.0	3270.0	mm	Set position (display only)
.4.4.	pos source adress	00	00	7F	-	Master address Address from which the master set position is received

No.	Name	Default	Min.	Max.	Unit	Description
.4.5.	**prop stroke +/-**	100	0	2000.0	mm	Actuator correction path in the event of a web fault of (.1.3. prop range +/-)
.4.6. •	photo auto offset	0	-2000.0	2000.0	mm	Actuator offset between set center and set operating point during automatic mode is set for <SETUP>+<AUTO>. Only if function is activated via „Configuration SYS".
.4.7. •	speed controller					Parameter title
.4.8.	**max. motor speed**	1250	100	4000	rpm	Motor speed characteristic value Value is required for speed limiting
.4.9. •	act. speed				rpm	Current motor speed (display only)
.5.0.	**speed_P**	2.00	0.01	10.00		P component for speed controller
.5.1.	**speed_I**	0.10	0.01	5.00		I component for speed controller
.5.2.	accel. time	0.0	0.1	10.0	sec.	Acceleration time
.5.3. •	I-PWM					Current I-PWM-value (display only)
.5.4.	reserved 54					not assigned at present
.5.5. •	current controller					Parameter title
.5.6.	cut-off current	8.0	0.0	10.0	A	Cut-off current of motor output stage
.5.7.	**motorcurrent**	1.0	0.0	7.0	A	Max. permissible nominal motor current
.5.8.	dyn. currentfactor	150	100	200	%	Dynamic motor current rise Motor is overloaded briefly by the variable factor
.5.9.	therm. timeconst.	60	1	200	sec.	Thermal time constant for brief motor current excess
.6.0. •	limited current	-	-7.00	7.00	A	Current permissible motor current
.6.1. •	act. current	-	-20.00	20.00	A	Actual measured motor current
.6.2.	current_P	2.6	0.0	100.0		P component for current controller
.6.3.	current_I	0.4	0.0	50.0		I component for current controller
.6.4. •	set current					Set motor current display
.6.5.	reserved 65					not assigned at present
.6.6.	current dither	0.00	0.00	1.00	A	Superimposed a.c. component for minimising the breakaway torque
.6.7.	dither cycletime	0	0	200	ms	Dither cycle time The reciprocal value corresponds to the frequency

No.	Name	Default	Min.	Max.	Unit	Description
.6.8. •	diagnostics					Parameter title
.6.9. •	**system error**	xx				Error display 1 = supply voltage < 20 V DC 2 = supply voltage > 30 V DC 3 = cut-off current exceeded 4 = heat sink temperature > 70 °C 5 = incremental encoder defective 6 = incremental encoder inverted 7 = no message from right sensor 8 = no message from left sensor 10 = motor line interrupted 11 = motor blocked 12 = motor output stage defective 13 = motor blocked 14 = reference switch has several switching points 15 = end pos. proximity switches incorrectly configured 16 = external voltage output overloaded
.7.0.	reserved 70					not assigned at present
.7.1.	reserved 71					not assigned at present
.7.2. •	running time meter	x			h	Running time meter
.7.3. •	supplyvoltage 24DC	xx.x			V	Operating voltage
.7.4. •	temperature case	xx			°C	Heat sink temperature
.7.5. •	temp. case max.	xx			°C	Maximal heat sink temperature reached
.7.6.	reserved 76					not assigned at present
.7.7.	reserved 77					not assigned at present
.7.8. •	mainloops/sec.	-	0	32000	Hz	For internal evaluation only
.7.9. •	I/O configuration					Parameter title
.8.0. •	>digi input status	-	00	FF	HEX	Display of current digital inputs
.8.1.	reserved 81					not assigned at present
.8.2.	**>usage input X4.1**	2	-10	10		Use of input X4.1
.8.3.	>usage input X4.4	3	-10	10		Use of input X4.4
.8.4.	>usage input X4.7	4	-10	10		Use of input X4.7
.8.5.	>usage input X20.2	-	-10	10		Use of input X20.2
.8.6.	>usage input X.3.2	-	-10	10		Use of input X3.2
.8.7.	reserved 87					not assigned at present
.8.8.	reserved 88					not assigned at present
.8.9.	reserved 89					not assigned at present
.9.0.	reserved 90					not assigned at present

No.	Name	Default	Min.	Max.	Unit	Description
.9.1. •	system config.					Parameter title
.9.2.	**>controller type**	0	0	3		Controller type 0 = Proportional actuators 1 = Integral actuators 2 = Slave drive 3 = 3 position controller
.9.3.	**controller operate**	0	0	99		Control mode
.9.4.	>auto address	1	0	2		Automatic sensor address assignment 0 = display only of sensor addresses 1 = automatic setting of the sensor addresses to x.1/x.2 2 = setting of the sensor addresses to those set in parameters .95. and .96.
.9.5.	CAN connector Right	0.0	0.0	7.F		Address of the sensor at the right slot
.9.6.	CAN connector Left	0.0	0.0	7.F		Address of the sensor at the left slot
.9.7.	**>function config 1**	0801	0000	FFFF		System configuration1 [X] Frame limit check 0x0001 [ ] N~ / M control 0x0002 [ ] Center direct 0x0004 [ ] Ref on power on 0x0008 [ ] Watch webedge R 0x0010 [ ] Watch webedge L 0x0020 [ ] enable Photo 0x0040 [ ] Sens. err. > Center 0x0080 [ ] MCP active 0x0100 [ ] Auto. SensorFree 0x0200 [ ] Support 2 motor 0x0400 [X] Weboffset 1/10 mm 0x0800 [ ] Weboffset inverted 0x1000 [ ] Defect detection 0x2000 [ ] ext. system mode 0x4000 [ ] RE 1721 0x8000
.9.8.	>function config 2	0000	0000	FFFF		System configuration 2 (*) No Controller output 0x0000 ( ) N-target -> CAN 0x0001 ( ) Delta N -> CAN 0x0002 ( ) Pos-target -> CAN 0x0003 ( ) Delta Pos -> CAN 0x0004 ( ) I-target -> CAN 0x0005 [ ] Disable I loop 0x0008 [ ] Send targetpos. 0x0010 [ ] Lock webspeed 0x0020 [ ] Start AUTO slow 0x0040 [ ] AUTO: Clear I-part 0x0080 [ ] Pos-TXD: 50->10ms 0x0100
.9.9.	**>operatorkey config**	0000	0000	FFFF		Operator key [ ] use all sensors 0x0001 [ ] Auto -> take photo 0x0002 [ ] force support free 0x0004 [ ] Cente -> supp. free 0x0008 [ ] unused sup. free 0x0010 [ ] no edge -> sens free 0x0020 [ ] sens sel. direct 0x0040 [ ] emergency sensor L 0x0080 [ ] emergency sensor R 0x0100 (*) lost web: ---- 0x0000 ( ) lost web: Center 0x1000 ( ) lost web: Manual 0x2000

No.	Name	Default	Min.	Max.	Unit	Description
1.0.0.	reserved 100					not assigned at present
1.0.1.	delaytime 1	1.0	0.0	10.0	s	Delay time 1 (for switching to emergency sensor)
1.0.2.	delaytime 2	1.0	0.0	10.0	s	Delay time 2 (for switching to main sensor)
1.0.3.	**subsystem 0 adress**	00	00	7F	hex	Serial bus card 0 address
1.0.4.	**subsystem 1 adress**	00	00	7F	hex	Serial bus card 1address
1.0.5.	subsystem 2 adress	00	00	7F	hex	Serial bus card 2 address
1.0.6.	subsystem 3 adress	00	00	7F	hex	Serial bus card 3 address
1.0.7. •	calibration					Parameter title
1.0.8.	calib. UDC	1.00	0.80	1.20		Operating voltage calibration
1.0.9.	offset. I-act	0	-50	50		Motor current measurement offset
1.1.0.	calib. I-act	1.00	0.80	1.20		Motor current measurement calibration
1.1.1.	reserved 111					not assigned at present
1.1.2. •	webspeed config.					Parameter title
1.1.3.	webspeed constant	10	10	100	I/m	Normalisation of web speed recording Value corresponds to the input pulse figure per running meter of the web
1.1.4.	webspeed max.	0	0	4000	m/min	Maximum web speed
1.1.5.	webspeed limit	0	0	4000	m/min	Web speed limit
1.1.6. •	actual webspeed	0	0	4000	m/min	Current measured web speed
1.1.7. •	adaptive controle					Parameter title
1.1.8.	adaptive function	0	0	3		Selection of the adaptive amplification functions 0 = no intervention in the proportional range 1 = proportional range depends on an external CAN signal 2 = proportional range depends on the web speed 0 = no intervention in the positioning velocity 4 = positioning velocity depends on an external CAN signal 8 = positioning velocity depends on the web speed 0 = no intervention in the positioning path 16 = the positioning path depends on an external CAN signal 32 = the positioning path depends on the web speed
1.1.9. •	adaptive ratio	0	0	409,6	%	Display of the current control loop amplification
1.2.0.	max webspeed ratio	0	0	409,6	%	Adaptive factor in % at maximum web speed
1.2.1.	lim webspeed ratio	0	0	409,6	%	Adaptive factor in % at web speed limit
1.2.2.	reserved 122					not assigned at present
1.2.3.	reserved 123					not assigned at present

No.	Name	Default	Min.	Max.	Unit	Description
1.2.4.	pos. I-part	0.000	0.000	1.000	1/s	Additional I-part for integral actuator
1.2.5. •	!! Service !!					Parameter title
1.2.6.	service off / on	0	0	1		Switching on service mode
1.2.7.	>service mode	0	0	9		Service mode ! for service personnel only ! (*) Square current controller test 2 ( ) Delta current controller test 3 ( ) Speed controller test 4 ( ) Speed controller test 5 ( ) PWM square bridge signal 6 ( ) PWM delta bridge signal 7 ( ) Square position set value 8 ( ) Delta position set value 9
1.2.8.	testvalue 1	0	-100	100	%	Test value 1 for service mode ! for service personnel only!
1.2.9.	testvalue 2	0	-100	100	%	Test value 2 for service mode ! for service personnel only!
1.3.0.	testcycletime	0.01	0.01	10.00	s	Test cycle time for service mode ! for ser. personnel only !


```
 0.3(FE5002)
└Search Range Mode
( )No Restriction
( )Always Restriction
( )Restr. Auto & Time
(*)Restr. during Time
```
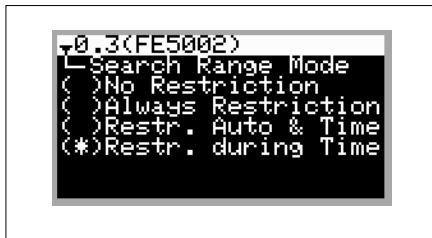
Parameter value list (selection list)

If the following sign ">" is set in front of the parameter it may be edited with the help of a parameter value list (selection list) in CANMON or DO 200. .

Editing with Canmon:
Select the "Value" field and open the parameter list via the enter key. Select the required parameter value with the cursor keys, to mark the parameter value press the space bar .

Editing with command station DO 200.:
Select the required parameter value via the "increase value"/"decrease value" keys, to mark the parameter value press the acknowledge key.

5.2 Explanation of parameters

..0. edit device
..1. edit group

The device address consists of the device and group numbers. Each device with a CAN connection (serial or parallel) possesses its own device address that may only be assigned once in the entire CAN network .

In order for a specific device to be addressed in the control loop the device number must be set in parameter "..0. edit device" and the group number in parameter "..1. edit group". The device and group numbers are specified in the block diagram for each device with a CAN address.

..2. reset settings

In the event of incorrect functioning or parameter entries, the E+L basic settings or default values may be reloaded. The following settings are possible:

1 = perform customer settings. This customer setting is only possible on compact systems set by E+L prior to delivery where all parameter settings were saved in a backup list. The setting values are thus reloaded.

2 = perform basic settings. The default values specified in the parameter list are loaded. The default values are however only loaded for the currently selected device. **No** parameter values are changed on the remaining devices.

..3. start service

Use this parameter to start various processes that are particularly required on commissioning the system. The following functions are possible:

1 = Reset guider
In this reset all parameter values for the selected device are saved and a restart performed. Every time parameter values are changed setup mode should always be quit via 1 to assure that all changed parameter values are saved.

2 = Save parameters
Function 2 is identical to function 1, the only difference is that no restart is performed for the selected device.

10 = Actuator initialisation run (with specification of the motion path)
Prior to the initialisation run the actual positioning path must be established and entered in parameter ".2.5. total motion range". The actuator initialisation run is started by entering the value 10. Prior to starting the actuator should be located in its center position for this start position is saved as the new center position. The latter may also be corrected manually at any time via parameter ".3.1. center offset".

11 = Initialisation run-support beam
By entering value 11 the initialisation run for all support beams featured in this group is performed.

12 = Initialisation run-actuator (with specification of motor and gear data)
In this initialisation run by first entering the motor and gear data (parameter .3.4./.3.5./.3.6. and .3.7.) the maximum positioning path is established and entered in parameter ".2.5. total motion range".

13 = Capture of guiding criterion photo
On follow-up control systems the position of the actuator/tool is controlled according to the detected web position. In order to calibrate the offset, a guiding criterion photo of the actuator must be taken. To this end, the actuator is moved to the required location manually. While the actuator guiding criterion photo is being taken, the offset is calculated on the basis of the current actuator position and the web position and entered in parameter ".4.6. photo auto offset".

22= Save system parameters
The parameter values of certain parameters are additionally stored and not deleted in the case of possible data memory deletion. The following parameters are saved: .8.2. / .8.3. / .8.4. / .8.5. / .8.6. / .9.2. / .9.7. / .9.8. und .9.9. .

30 = general web guider basic parameter setting

31 = VS 35 .. support beam basic parameter setting

32 = 3 position controller basic parameter setting

33= Basic parameter setting for DR 11.. / DR 12..

34 = VS 50.. support beam basic parameter setting
The device-specific parameters are preset for the specified devices by entering the appropriate value.

42 = Expanded setup-mode
In setup mode all existing parameters may be selected and the parameter values viewed. Some of the parameter values may be changed immediately. The protected parameters may only be changed once value 42 has been entered. This entry furnishes access to what is known as "expanded setup-mode". In expanded setup mode all parameters that can be changed, may be changed.

44 = Save customer settings
In this form of saving all parameter settings are stored in a backup list. If necessary, all customer-specific settings may be reloaded using parameter "..2. reset settings" .

98 = Delete error memory
This command should only be used by E+L service personnel. The controller card can store up to 100 errors that have occurred. If the number of errors exceeds the 100 mark, the error messages are pushed out at the back of the error memory and are thus deleted.

99 = Delete data memory
This command should be used by E+L service personnel. The entire data memory of the controller card is deleted. Once the controller card is switched on the default values are automatically loaded.

No commands are performed until a parameter change has been executed!

Parameter value	Software version
1.**0**	A
1.**1**	B
1.**2**	C
1.**3**	D
1.**4**	E
1.**5**	F
etc.	

..4. RK 4004

The current software version of the controller card is displayed.

..5. webedge offset

Parameter block for setting the web offset.

..6. web offset

The web offset permits the displacement of the set web position to the left or right during automatic mode. The offset is set directly in this parameter by a command station or via a digital interface. The step width for web offsetting may be set in parameter ". .7. step width". The offsetting of the set position is displayed on the command station in mm. A set web offset is preserved, even when the operating voltage is switched off, until a new entry is saved, .
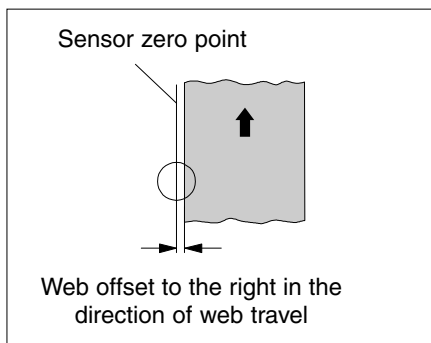
In the case of fixed sensors or a single motor support beam with two positioning carriages the web offset is limited to 75 % of the sensor measuring range. For the remaining applications with support beams and cameras the web offset may be increased to the maximum parameter value .

Sensor zero point

Web offset to the right in the direction of web travel

..7. step width

The step width of the web offset per key push may be be set in $1/_{100}$ mm. The web offset is changed by this set value by pressing a key on the command station.

Oscillation stroke
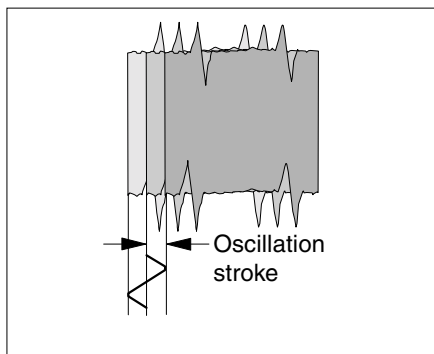
..8. osc. amplitude

During the oscillation stroke it is determined by how far to the left and right the actuator will swing in oscillation mode. The oscillation stroke may be entered directly in this parameter or via a command station with oscillation feature. Entering is performed in $1/_{10}$ mm.

In the case of fixed sensors or a single motor support beam with two positioning carriages the oscillation stroke is limited to 75 % of the sensor measuring range.

..9. osc. cycl. time
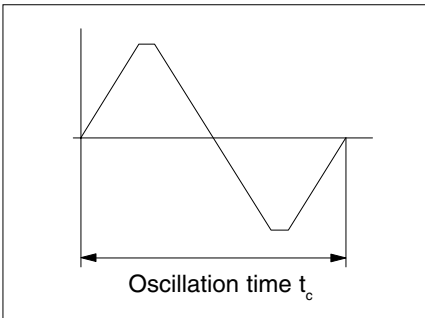
Cycle-dependent:

The cycle time (oscillation time t_c) for an oscillation period is established here. The longer the period, the slower the actuator oscillates. Entry may be directly in the parameter or via a command station with oscillation function.

Oscillation time t_c
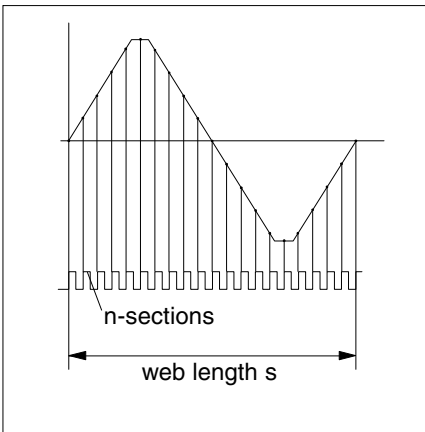
Path-dependent:

In path-dependent oscillation the oscillation period is determined by path-dependent, external pulses. The oscillation period is divided up into n-sections. The maximum number of pulses must not exceed 20 pulses per second.

The number of pulses to be set may be calculated as follows:

1. Establish path length per oscillation period

n-sections
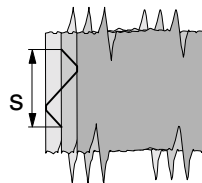
web length s

s = web length per oscillation period

2. Establish maximum oscillation frequency

$$f_{c\,max} = \frac{V_{max}}{s \times 60}$$

$f_{c\,max}$ = maximum oscillation frequency (1/s)
V_{max} = maximum web speed (m/min)
s = web length per oscillation period (m)

3. Establish no. of pulses

The maximum number of pulses per period is limited by the maximum input frequency of $f_{e\,max}$ 20 Hz.

$$n = \frac{f_{e\,max}}{f_{c\,max}}$$

$f_{e\,max}$ = maximum input frequency 20 Hz
$f_{c\,max}$ = oscillation frequency (Hz)
n = no. of pulses per period

The no. of pulses **n** is entered in the parameter.

Dimensioning of the external pulse generator may be determined as follows:

$$f_{a\,max} = \frac{n}{s}$$

$f_{a\,max}$ = maximum pulse generator output frequency (Hz)
s = web length per oscillation period (m)
n = no. of pulses per period

The external pulse generator must emit the calculated no. of pulses $f_{a\,max}$ at maximum web speed.
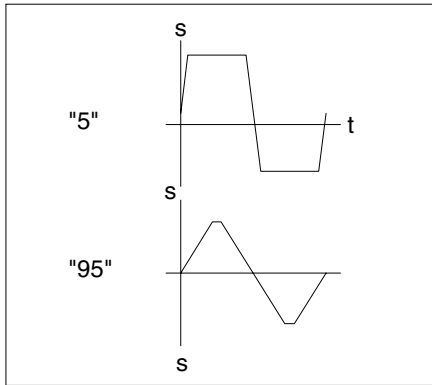
.1.0. osc. wave form

Oscillation mode determines the oscillation course. By entering a value of between 5 and 95 oscillation progression may be changed from square to delta wave.

5 = **Square-wave** (steep rise/drop of the oscillation signal, long dwelling period in the oscillation end position

95 = **Delta-wave** (shallow rise/drop of the oscillation signal, short dwelling period in the oscillation end position

.1.1. >osc. trigger mode

Depending on the command station featured, oscillation may be started in different manners. In addition, the differentiation must be made of whether cycle or path-dependent oscillation is concerned.

In the case of cycle-dependent oscillation the duration of an oscillation cycle depends on the set time and in the case of path-dependent oscillation on the external pulses (see parameter "..9. osc. cycl. time").

> On switching-off oscillation the cycle in progress is continued to the next zero pass. In the case of path-dependent oscillation the corresponding pulses must be supplied up to the zero pass. For path-dependent oscillation the digital input X 3.2 must be programmed to "web speed measuring" (see parameter .8.6.).

The following table illustrated the various setting options:

Parameter value:		Explanation:
Cycle dependent	Path-dependent	
0	4	Oscillation is switched on together with automatic mode or off via a command station with oscillation key or digital interface (command code), independently of the automatic key.
1	5	If no command station with oscillation key is featured, oscillation may in this case be switched on or off via the automatic key. After starting automatic mode, by pressing the automatic key oscillation is started or stopped while the actuator always remains in "automatic" mode.
2	6	Oscillation is generally switched off. Even if an oscillation key is featured, oscillation cannot be started.
3	7	Oscillation is always active. Automatic mode without oscillation is not possible. Oscillation is started together with automatic mode!

.1.2. webedge guider

Parameter block for setting the web guider.

.1.3. prop range +/-

On **proportional** actuators the amplification of the position controller is set via the two parameters ".1.3. Prop range ±" and ".1.6. velocity auto". On **integral** actuators amplification is set via the two parameters ".1.3. Prop range ±" and ".4.5. prop stroke".
With regard to the following considerations please always take into account that a change to one of the two parameters will always influence amplification.
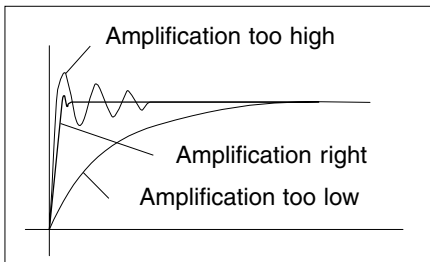
Amplification is correctly set if, after brief overshooting the error is corrected. If the position controller is set with too great a degree of sensitivity, the guider will overshoot as well. In the case of too little amplification the control loop will be too slow. Optimum amplification may be determined with a characteristic curve tracer. In practice, amplification may also be determined by trial and error.

Amplification too high

Amplification right

Amplification too low

Proportional actuator:

The smaller the set proportional range at a constant maximum positioning velocity (Parameter ".1.6. velocity auto") is, the greater the amplification of the web guider will be.

A negative proportional range causes negative amplification, the effective direction is thus inverted in automatic mode.

Velocity correction

Proportional range
.1.3. prop range ±
2,0 3,5

established correction positioning velocity depending on proportional range

25
20
15 mm/s ---- 15
8 mm/s ---- 10
5

-4 -3 -2 -1 1 2 3 4

Control deviation

-5
-10
-15
-20
-25

Positioning velocity
.1.6. velocity auto
20 mm/s

GRP

DEV

Set position
(sensor measuring range center)

Control deviation of
1.5 mm
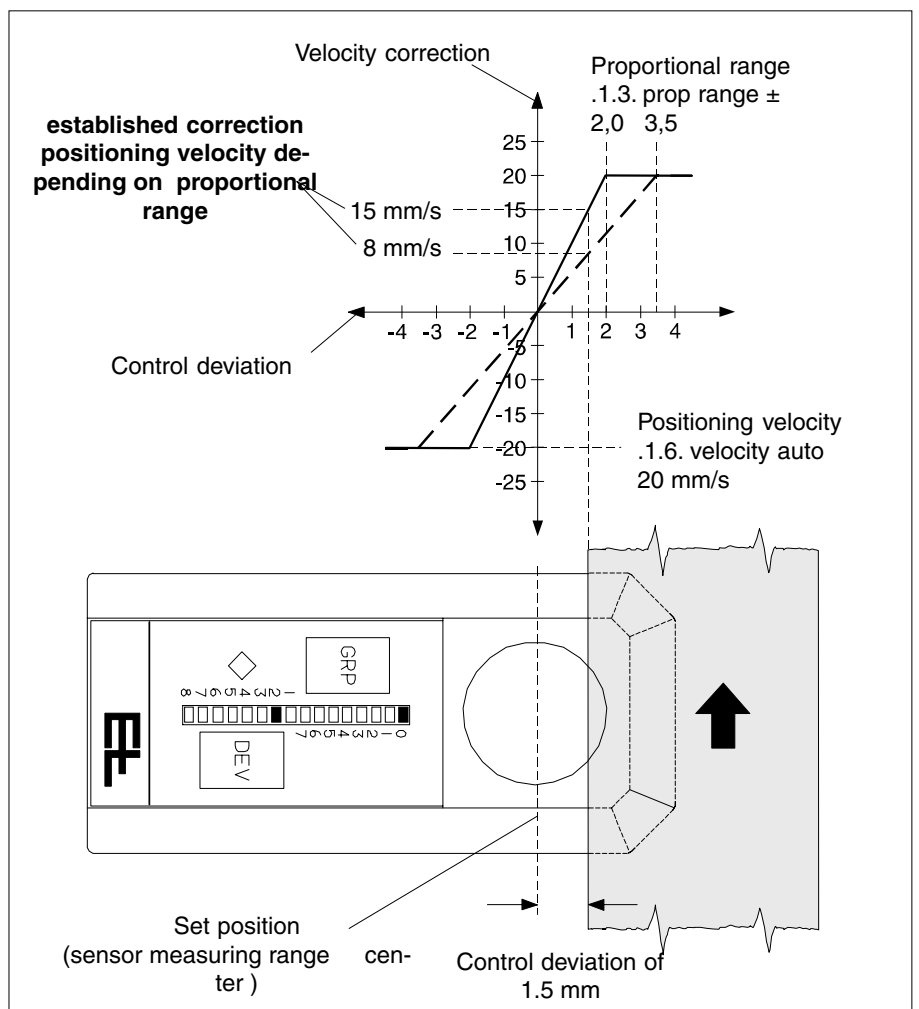
By reducing the proportional range the characteristic curve (see fig.) will become steeper. The steeper the characteristic curve the greater the positioning velocity will be in the case of a control deviation and the system thus more sensitive. The positioning velocity of the actuator may be determined on the basis of the characteristic curve regardless of the control deviation.

In this example a proportional range of 2 mm or 3.5 mm has been assumed at a maximum motion speed of 20 mm/s.

Given a control deviation of 1.5 mm the positioning velocity is **15 mm/s** for a proportional range of 2 mm and **8.0 mm/s** for a proportional range of 3.5 mm.

The values may also be calculated arithmetically:

Amplification (G) = parameter .1.6. / Parameter .1.3.

Correction velocity (VK) = control deviation * amplification (G)

Example 1:	Example 2:
$G = 20/2 = 10 \; ^1/_s$	$G = 20/3.5 = 5.71 \; ^1/_s$
$VK = 1.5 \text{ mm} * 10 \; ^1/_s$	$VK = 1.5 \text{ mm} * 5.71 \; ^1/_s$
VK = 15 mm/s	**VK = 8.6 mm/s**

Proportional actuator optimisation:

Reduce the proportional range by small steps only. Following each change of the parameter value a web deviation should be produced manually in automatic mode so that oscillation may be detected immediately.

Reduce the proportional range until the guider starts to oscillate. The increase the proportional range again until no more oscillation may be observed.

Integral actuator:

The smaller the set proportional range is for the maximum correction path of the actuator (parameter ".4.5. prop stroke ±"), the greater the amplification of the web guider.

A negative proportional range causes negative amplification, the effective direction in automatic mode is thus inverted.
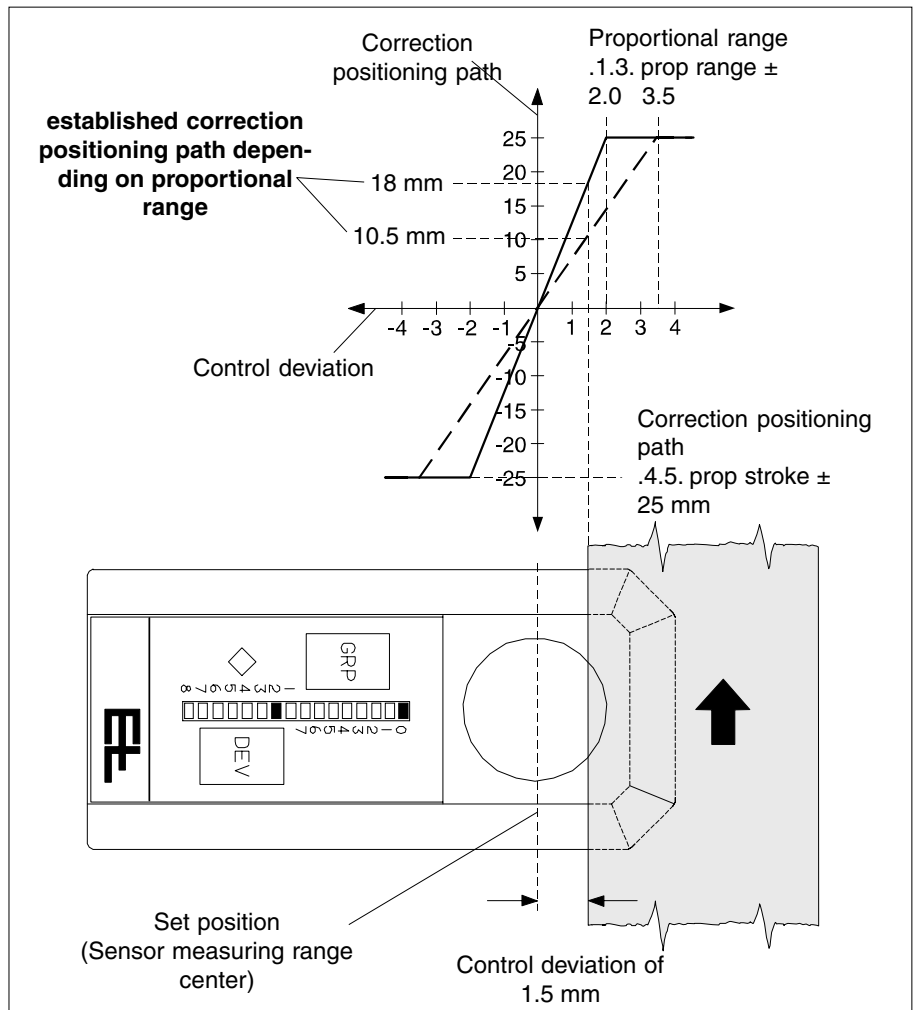
By reducing the proportional range the characteristic curve (see fig.) becomes steeper. The steeper the characteristic curve the greater the positioning path of the actuator given a control deviation and the more sensitive the system becomes. The correction positioning path of the actuator may be established on the basis of the characteristic curve independently of the control deviation.

In this example a proportional range of 2 mm or 3.5 mm has been assumed with a correction positioning path of 25 mm.

Given a control deviation of 1.5 mm the correction positioning path amounts to approx. **18 mm** with a proportional range of 2 mm and with a proportional range of 3.5 mm approx. **10.5 mm** .

The values may also be calculated arithmetically:

Amplification (G) = parameter .4.5. / parameter .1.3.

Correction positioning path (SK) = control deviation * amplication (G)

Example 1:	Example 2:
G = 25/2 = 12.5	G = 25/3.5 = 7.14
SK = 1.5 mm * 12.5	SK = 1.5 mm * 7.14
VK = 18.75 mm	**VK = 10.71 mm**

Integral actuator optimisation:

Reduce the proportional range by small steps only. Following each change of the parameter value the a web deviation should be produced manually in automatic mode so that oscillation may be detected immediately.

Reduce the proportional range until the guider starts to oscillate. The increase the proportional range again until no more oscillation may be observed.

.1.4. dual rate width

.1.5. dual rate level
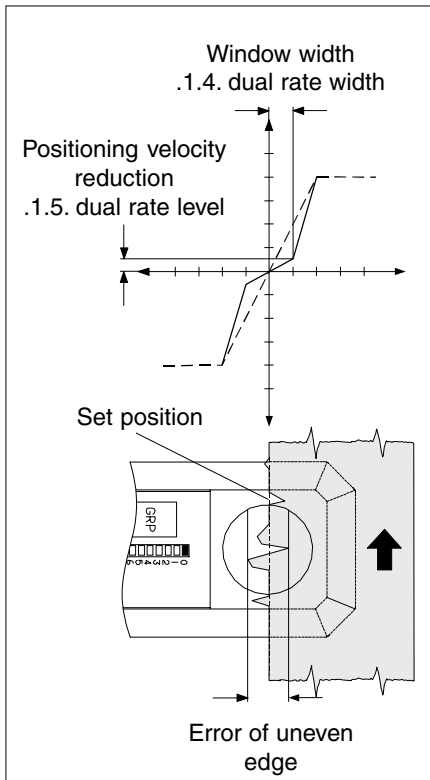
If the web edge is subject to certain fluctuations (uneven edges) these two parameters may be used to determine a range in which, given a deviation from the set position, the correction velocity of the actuator is reduced in the case of proportional guiders.

Given a web edge progression as illustrated opposite, the actuator would normally try to correct the deviation according to the broken line. The actuator would only oscillate and the control result would not be satisfactory. The broken line represents the controller amplification (parameter .1.3. / .1.6.).

Within the set window width ".1.4. dual rate width" the positioning velocity is reduced in the case of a control deviation. The positioning velocity reduction is set in parameter ".1.5. dual rate level". Potential oscillation due to edge errors may thus be reduced. If the edge error exceeds the set window width range the positioning velocity is increased (see fig. on left).

Both parameter values are % entries and are related to the set values of parameter ".1.3. prop range ±" and ".1.6. velocity auto"

Example:

The following values are set in the parameters.

.1.3. prop range ±   :   10.0 mm
.1.6. velocity auto   :   20 mm/s

Window width
.1.4. dual rate width

Positioning velocity reduction
.1.5. dual rate level

Set position

Error of uneven edge

.1.4. dual-rate width   :   50 %
.1.5. dual-rate level   :   70 %

Window width = 10.0 mm * 50 % / 100   **= 5 mm**

Reduced pos. velocity = 20 mm/s * 70 % / 100   **= 14 mm/s**

Within ±5 mm of the set web position a web error is corrected at a maximum motion speed of 14 mm/s.

| This function is being deactivated when value "100" is entered into parameter ".1.5. dual-rate level".

.1.6. velocity auto

The greater the set maximum positioning velocity is given a constant proportional range (parameter ".1.3. prop range ±"), the greater the amplification of the web guider will be in automatic mode.
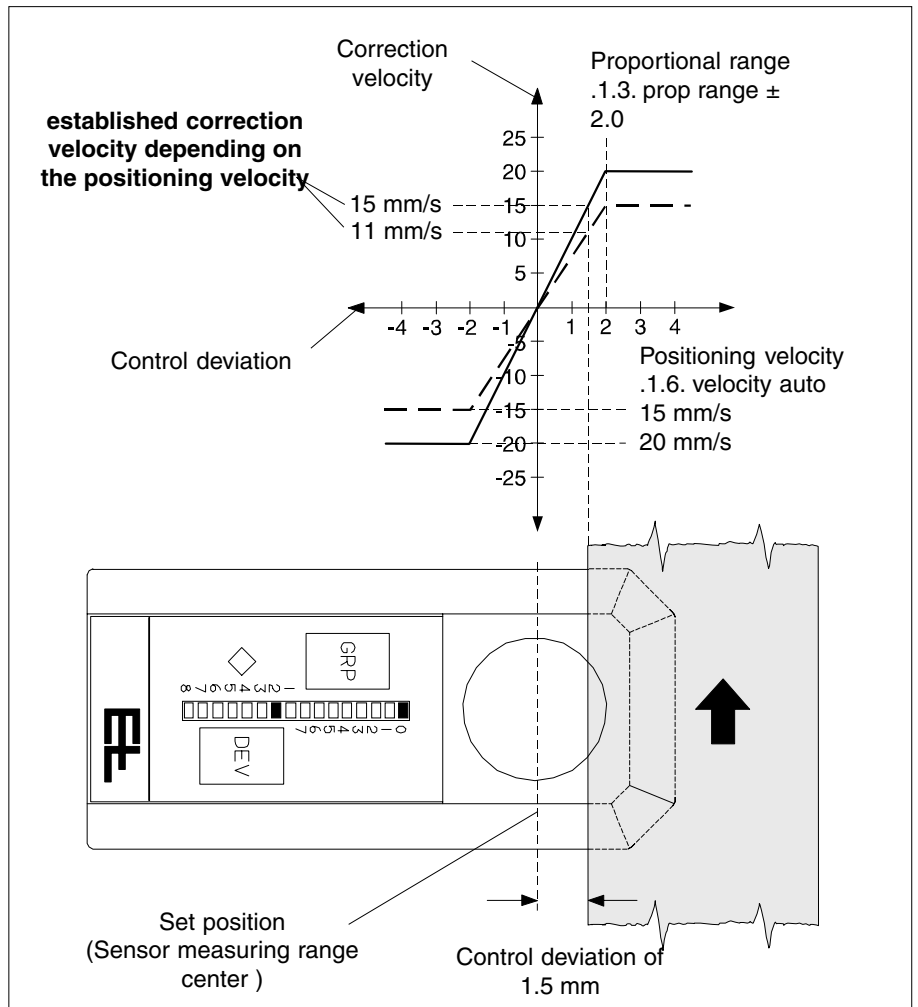
By increasing the maximum positioning velocity the characteristic curve becomes steeper (see fig.). The steeper the characteristic curve the greater the positioning velocity will be given a control deviation and the more sensitive the system will become. The positioning velocity with which the actuator tries to correct the error may be deduced from the characteristic curve.

In this example a maximum positioning velocity of 15 mm/s or 20 mm/s has been assumed with a proportional range of 2 mm.

Given a maximum positioning velocity of 15 mm/s the positioning velocity amounts to approx. 11 mm/s with a control deviation of 1.5 mm and approx. 15 mm/s with a maximum positioning velocity of 20 mm/s.

The values may also be calculated arithmetically:

Amplification (G) = parameter .1.6. / parameter .1.3.

Correction velocity (VK) = control deviation * amplification (G)

Example 1:	Example 2:
$G = 15/2 = 7.5 \, ^1/_s$	$G = 20/2 = 10.0 \, ^1/_s$
$VK = 1.5 \, mm * 7.5 \, ^1/_s$	$VK = 1.5 \, mm * 10.0 \, ^1/_s$
VK = 11.25 mm/s	**VK = 15.0 mm/s**

If the positioning velocity is too high the web guider will begin to oscillate.

> The maximum positioning velocity must be set higher than the maximum error velocity, yet must not exceed the nominal positioning velocity the DC actuator.

.1.7. velocity pos

The positioning velocity is determined in this parameter for the following operating modes:

- actuator "center position"
- support beam "park sensor"
- support beam "search for edge"

The step width of the speed setting is 1 mm/s.

.1.8. velocity jog

The positioning velocity with which the actuator or support beam is positioned in "manual" mode may be set in this parameter with a step width of 1 mm/s.

".2.2. defect range ±"
Switching threshold for reducing the positioning velocity

".1.9. velocity emergence"
Value of the reduced positioning velocity

Web edge progression in the sensor
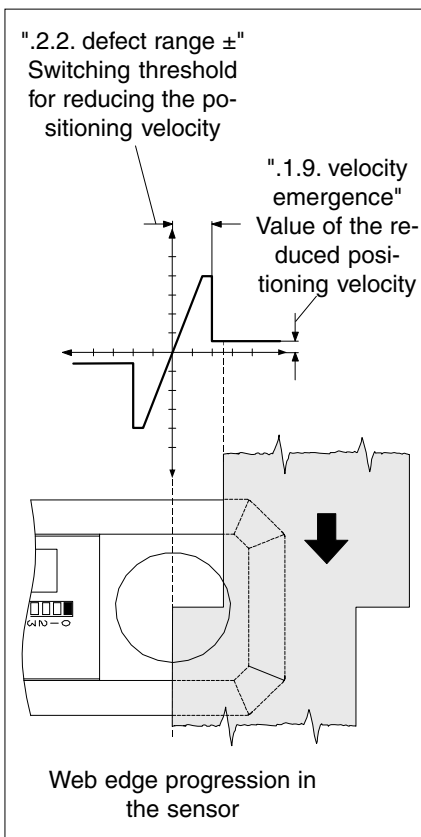
.1.9. velocity defect

So that, in the event of a web displacement (e.g. seam joint) the actuator no longer follows up at maximum positioning velocity in "automatic" mode, the positioning velocity may be reduced to a required value.

From which degree of control deviation (web offset) onwards the reduction is activated, must be set in parameter ".2.2. defect range ±" .

In the case of a support beam this velocity setting is determined in "search for edge" mode.

This parameter is only active if "defect detection" is selected in parameter .9.7..

.2.0. derated velocity

Not assigned at present.

.2.1. reseved 21

Not assigned at present.

.2.2. defect range ±

If the set value is exceeded, the positioning velocity will be reduced to the value set in parameter ".1.9. velocity defect". In the event of a sudden web displacement (seam joint) this prevents the actuator following up at maximum positioning velocity which might lead to a web tear.

This parameter is only active if "defect detection" is selected in parameter .9.7. .

.2.3. servo configuration

Parameter block for setting the motor data.

.2.4. motion direction

The positioning direction of the DC actuator drive may be inverted via this parameter.

Following inversion of the positioning direction an initialisation run must be performed.

.2.5. motion range total

The actual positioning path (dimension K) covered by the actuator at the outfeed (transfer roller) must be entered in this parameter. As on certain actuators (e.g. pivoting frames) the actuator positioning path is not identical to that of the DC actuator drive, the exact value must be entered.

The mechanical ratio (".3.7. mech. gear factor") is determined via this setting during the initialisation run and the motor gear constant calculated. The latter effects the normalisation of the positioning speed and path.

K   Transfer rol-
     ler
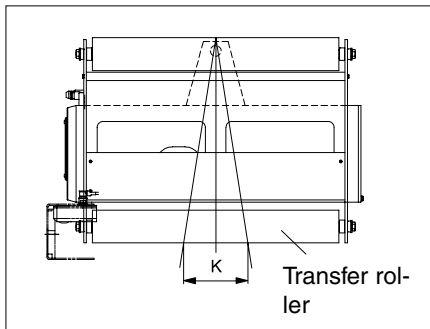
.2.6. positonrange +

.2.7. positionrange -

Via the position range limit the DC actuator drive is prevented from reaching its mechanical spindle stop or the actuator its mechanical stop.

On compact systems the maximum actuator positioning path (see parameter ".2.5. total motion range") is shortened at the factory by approx. 2 mm. In the case of on-site mounting of the DC actuator drive the position range limit must be set by the customer.

Especially in the case of large moved masses, please ensure that the actuator does not come to a standstill at once. The positioning range must be reduced accordingly.

The set values are always in relation to the set center.

The positioning path must entered for both sides (right/left) of the center position in parameter .2.6. and .2.7. of the positioning range.

These position range limits must not be used as safeguards for persons or appliances. For the safety of persons or appliances the end position limits must be fitted with additional limit switches or a suitable mechanical stop.

.2.8. alarm limit %

If necessary a range may be defined that, once exceeded, triggers the output of a limit alarm. The value is entered in % and is in relation to the two parameters ".2.6. positionrange +" and ".2.7. positionrange -". If the actuator exceeds this calculated value the "end position exceeded" message is output. The end position early warning is always in relation to the center of the positioning range. The warning is output for both sides (positive and negative).
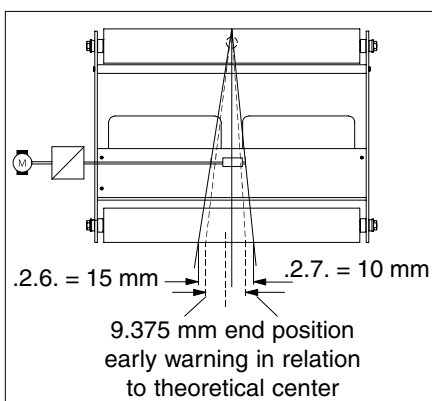
.2.6. = 15 mm   .2.7. = 15 mm

11.25 mm end position
early warning in relation
to theoretical center
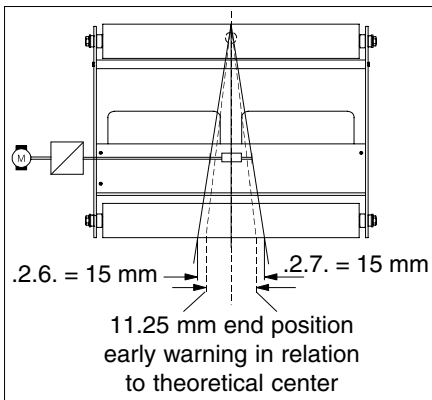
Example:

Entered value in parameter .2.8.   =   *75 %*

Entered value in parameter .2.6. / .2.7.   =   *15 mm*

*15 mm * 75 / 100 = 11.25 mm*

If the positioning range of 11.25 mm is exceeded the end position exceeded message will be output.

.2.6. = 15 mm   .2.7. = 10 mm

9.375 mm end position
early warning in relation
to theoretical center

If the values differ in parameters .2.6. / .2.7. a theoretical center will be deduced from the sum of the two values. The end position early warning is in relation to this center.

Example:

Entered value in parameter .2.8.   =   *75 %*

Entered value in parameter .2.6.   =   *15 mm*

Entered value in parameter .2.7.   =   *10 mm*

*(15 mm + 10 mm) / 2 * 75 / 100 = 9.375 mm*

.2.9. hybrid offset

If a support beam is operated with two drives in what is termed hybird mode the two positioning carriages move symmetrically to the support beam center. This support beam center (center of the guided web) should match the machine center. The support beam center may be matched to the machine center via this parameter (.2.9. hybrid offset).

In the case of mechanically coupled support beams (one drive, two positioning carriages) this offset is not possible.

.3.0. reference offset

In this parameter the distance between the reference switch switching point and the center of the DC actuator drive is set.

To calibrate the internal position counter the actuator moves first to the reference switch, then center position (neutral position) in "center position" operating mode .

To assure that the positioning movement is as slight as possible in "center position" mode the reference switch switching point should be the same as neutral position.

| This parameter is automatically determined and entered during the actuator initialisation run.

DC actuator drive center

Center offset

Actuator neutral position
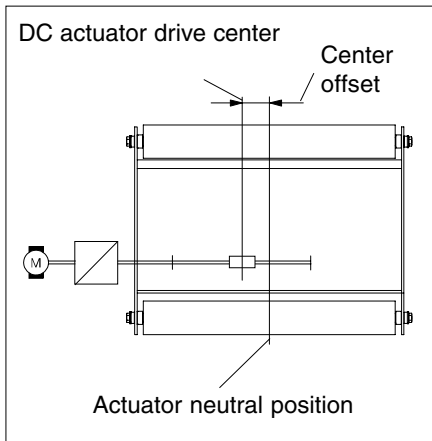
.3.1. center offset

What is termed the "center offset" is the difference between the DC actuator drive center and the actuator neutral position. If this neutral position deviates from the positioning path center the former may be changed by entering the "center offset". In the case of a pivoting frame, neutral position means that the positioning roller is parallel to the guide roller.

If the guider is in "center position" mode while the "center offset" is changed, the change of parameter value will be performed immediately by the DC actuator drive. Checking of the actuator neutral position is possible at once.

.3.2. system offset

If the DC actuator is located in the center of its positioning range the actual position value "0" will be transmitted via the CAN bus. For special applications an offset value may be set in this parameter which is added to the transmitted actual position value.

.3.3. total resolution

The motor gear constant is displayed in this parameter. It is calculated on the basis of the following four parameters:
.3.4. encoder resolution, .3.5. rotation gear, .3.6. linear gear, .3.7. mech. gear factor;

.3.4. encoder resolution

.3.5. rotation gear

.3.6. linear gear

.3.7. mech. gear factor

The motor gear constant is calculated via these parameters.

DC actuator drive securing point

Outfeed point

S 2

S 1

Center of rotation

.3.4. encoder resolution

.3.5. rotation gear

.3.6. linear gear

.3.7. mech. gear factor S 2/S 1

.3.3. total resolution
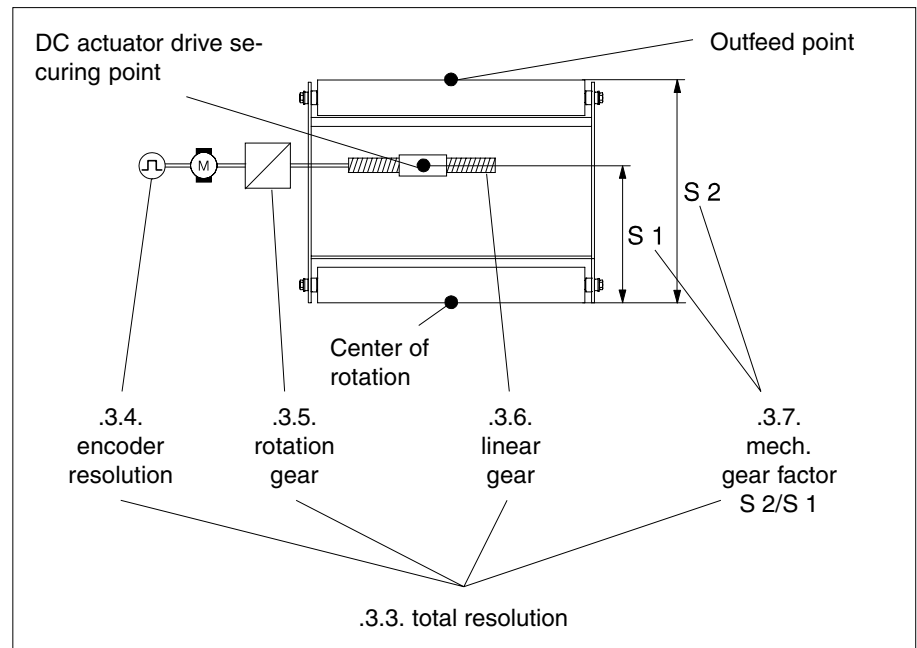
The values for the three parameters .3.4./.3.5./.3.6. must be determined using the table in chapter 6.

The mechanical ratio is specified in parameter ".3.7. mech. gear factor".

The ratio may be established as follows:

Measure distance S 1 between the center of rotation and DC actuator drive securing point. Equally, measure distance S 2 between the center of rotation and the outfeed point. These two values are set in relation to one another and the value calculated produces the mechanical ratio (parameter .3.7.).

Example:

measured distance S 1   *450 mm*

measured distance S 2   *850 mm*

850 mm / 450 mm = 1.89

In this example the entry in parameter .3.7. is 1.89.

During the initialisation run (parameter ..3. / Wert 10) parameter ".3.7. mech. gearfactor" is established automatically.

.3.8. encoder filter

For a dynamic speed control the encoder impulses should be filtered as little as possible. Too small a filter value will cause an unsteady motor speed.

.3.9. reserved 39

Not assigned at present.

.4.0. pos. controlling

Parameter block for setting the positioning control loop.

.4.1. pos prop ±

If the position error is greater than the set "position controller proportional range" the correction velocity will thus correspond to the maximum positioning velocity. If the position error is within the set "position controller proportional range" a lesser positioning velocity according to the one of the characteristic curves is produced.

Via this parameter the P component of the actuator drive position controller is indirectly set.

Positioning velocity

Position error

Maximum positioning velocity in automatic (parameter .1.6.)

Position controller proportional range (Parameter .4.1.)
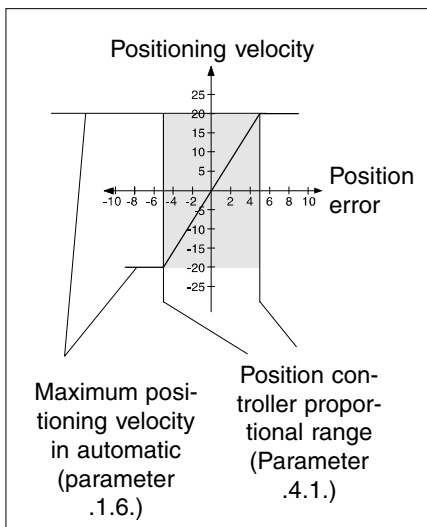
Example:

A web set position deviation of 1 mm produces an actuator set position of 15 mm based on the set values (parameter .1.3. und .4.5.).
The DC actuator drive covers the first 10 mm at maximum positioning velocity as these values are outwith the grey range. Once the 10 mm are passed, only 5 mm remain. These 5 mm lie within the grey range and the velocity is thus reduced linearly to 0 until the 15 mm position range is reached.

> In the case of uneven edges (textile) this parameter may be increased to dampen the DC actuator drive position controller. The static precision of the web guider is hereby preserved.
>
> The value of parameter .4.1. should amount at most to half of the sensor scanning range.

.4.2. act position

The actual position of the actuator at the outfeed, in relation to the set center, is displayed.

.4.3. set position

The set position of the actuator at the outfeed, in relation to the set center, is displayed.

Master address 1.5
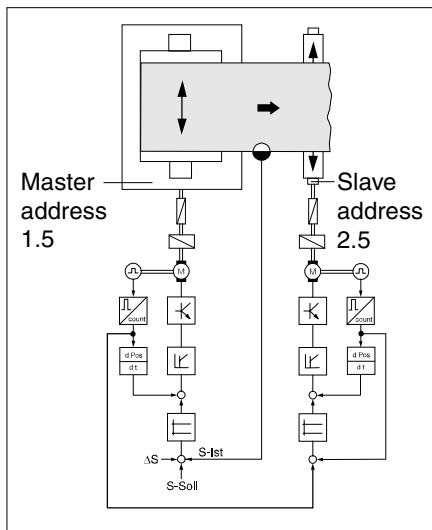
Slave address 2.5

.4.4. pos source adress

In the case of follow-up controlling (master/slave) a second actuator (slave) without sensor scanning precisely follows up a freely selectable actuator (master). The device address of the master's guider must be entered on the controller card of the second actuator (slave).

Example:

The master's address is   1.5

The slave's address is   2.5

Value 15 (address 1.5) must be entered in parameter .4.4. of the slave controller card (address 2.5).

.4.5. prop stroke ±

In the case of integral actuators the correction path is set in relation to the set proportional range (parameter ".1.3. prop range ±").

This parameter has no function for proportional actuators.

The greater the set correction path is for a constant proportional range (parameter ".1.3. prop range ±"), the greater the amplification (steep characteristic curve) of the web guider in automatic mode.

The steeper the characteristic curve the longer the correction path in the event of a control deviation and thus the more sensitive the system will become. The correction path used by the actuator to try to correct an error may be seen in the characteristic curve.
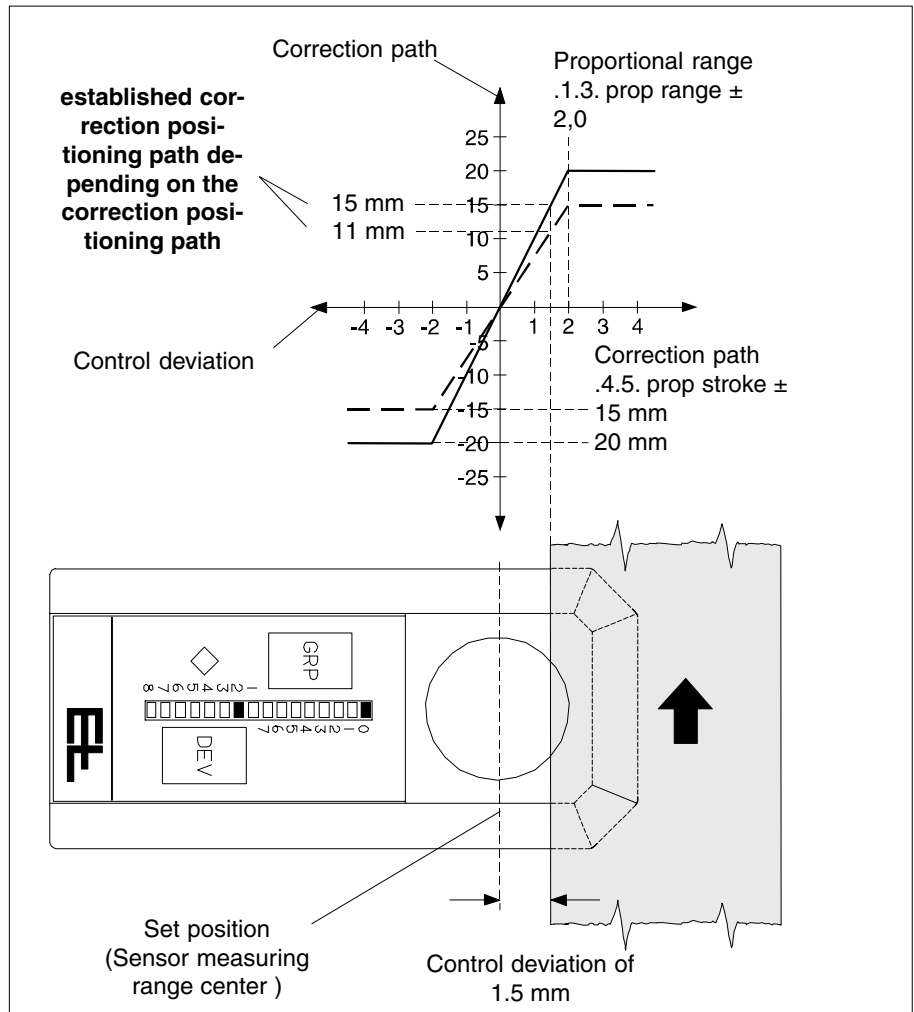
In this example a maximum correction path of 15 mm or 20 mm was set with a proportional range of 2 mm.

Given a correction path of 15 mm (20 mm) the correction path is approx. 11 mm (15 mm) given a control deviation of 1.5 mm.

The values may also be calculated arithmetically:

Amplification (G) = parameter .4.5. / parameter .1.3.

Correction path = control deviation * amplification (G)

Example 1:	Example 2:
G = 15/2 = 7.5	G = 20/2 = 10.0
VK = 1.5 mm * 7.5	VK = 1.5 mm * 10.0
VK = 11.25 mm	**VK = 15.0 mm**

Center position

.4.6. photo auto offset

Center position

Actuator set position
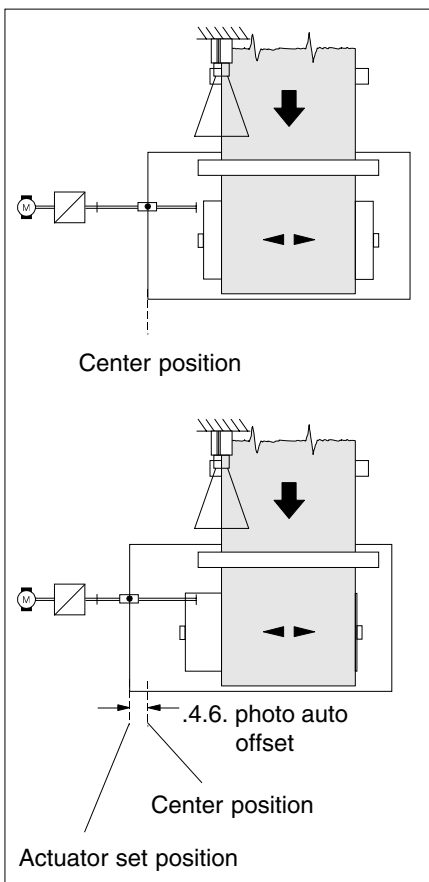
.4.6. photo auto offset

With a follow-up control/tool control the actuator follows up the actual web position proportionally.

To specify the required set postion of the unwinder/tool the offset between the "center" position and the required set position must be entered.

❙ During the actuator initialisation run the offset is set to zero.

Manual offset specification:
The entry of the offset value is in 1/10 mm. Depending on the pre-sign of the entry the set position of the actuator will be displaced to the right or left of the center position.

Automatic offset specification:
In the case of automatic specification the web must be located in the sensor scanning range and the actuator manually moved to the required set position. The offset is calculated and saved via the "setup" and "automatic" key combination.

.4.7. speed controller

Parameter block for setting the speed controller.

.4.8. max. motor speed

The motor speed at maximum terminal voltage (22 V) is set here. The speed value may be found in the table in chapter 6. The speed value is set at 22 V motor voltage.

.4.9. act. speed

The actual motor speed of the DC actuator at that moment is displayed .

.5.0. speed_P; .5.1. speed_I

Please refer to the table in chapter 6 for the P and I components of the various device types.

The values must not be changed. They have already been optimised at the factory.

❙ A change to these 2 parameters impairs the optimum function of the guider. A change to these values may range from guiding impairment to the system ceasing to function.
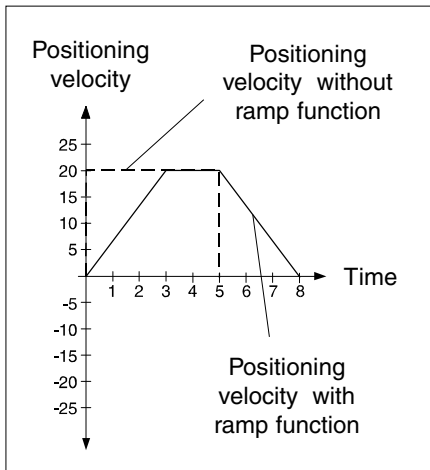
.5.2. accel. time

❚ This function is only possible in "manual offset" mode.

In manual mode the actuator is positioned with the positioning velocity set in parameter ".1.8. velocity jog".

With this ramp function ".5.2. accel. time" an acceleration time of 0 to the maximum motor speed may be entered. The actuator drive thus reaches its maximum motor speed after a set time. The motor speed is increased linearly. Equally, the actuator comes to a standstill after the same ramp function.

In the fig. opposite the motion speed progression of an actuator is displayed with a set ramp function of 3 seconds. The key for the manual offset has been pressed for 5 seconds in this example. The broken line progression indicates the positioning velocity progression without ramp function.

.5.3. I-PWM

The actual I-PWM value (pulse-width-modulated) is displayed. The display is only of significance for internal tests.

.5.4. reserved 54

Not assigned at present.

.5.5. current controller

Parameter block for setting the current controller.

.5.6. cut-off current

Once the set value is exceeded the motor output stage is switched off. This value should be twice as much as the motor nominal current (parameter ".5.7. motor current").

Error display 3 is output as error in parameter ".6.9. system error".

If the current fails to reach the set value the motor output stage will be re-enabled.
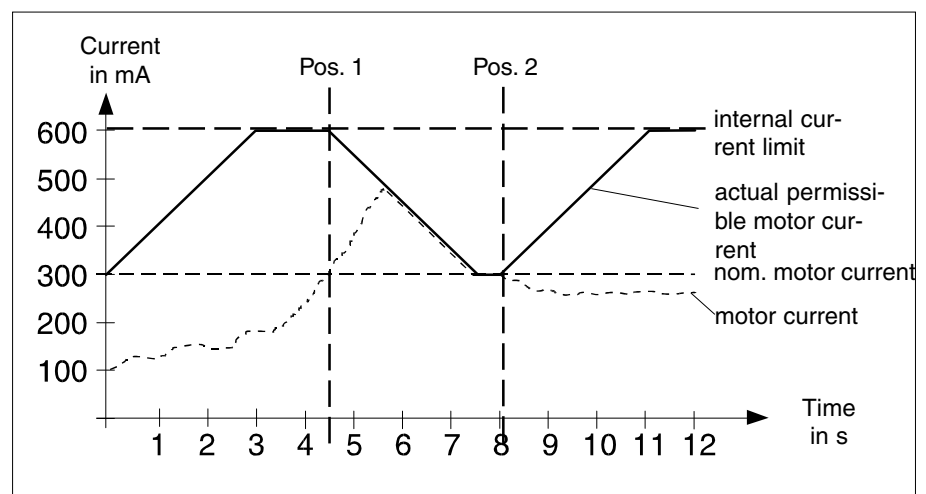
.5.7. motor current

The motor nominal current specified on the DC actuator drive type plate should be set here. If set too high the motor current may overload or even destroy the DC actuator drive. Please also refer to the table in chapter 6 in order to establish the current value.

.5.8. dyn. currentfactor

.5.9. term. timeconst.

.6.0. limited current

This time-limited excess current is used to increase the dynamics of the DC actuator drive (shorter acceleration time)

For a short time a DC actuator drive may be operated with a higher motor current. The factor is determined here. The internal current limit is calculated on the basis of the nominal motor current in parameter ".5.7. motorcurrent" and the factor from parameter ".5.8. dyn. currentfactor". The duration of the excess current is set in parameter ".5.9. therm. timeconst.".

Excess current functions according to the following principle:

If the motor current input is less than the nominal motor current the permissible motor current will be increased within the set time (.5.9. term. timeconst.) to the internal current limit. This actual permissible motor current is displayed in parameter ".6.0. limited current".

If the motor current input (pos. 1) is greater than the nominal motor current (.5.7. motor current) the permissible motor current will then be reduced again within the set time (.5.9. term. timeconst.) to the nominal motor current. As soon as the motor current is again drops below the nominal motor current (pos. 2) increasing of the current limit is resumed.

> Once the operating voltage is supplied the permissible motor current begins at the nominal motor current.
>
> The current limit is upwardly limited by the maximum output stage current (see technical data).

.6.1. act. current

The actual motor current of the DC actuator drive is displayed.

.6.2. current_P; .6.3. current_I

The P and I components of the current controller may be found in the table in chapter 6.

The values may not be changed. The values are already optimised at the factory.

> Changing these 2 parameters impairs optimum guider operation. Changing these values may result in guiding impairment to loss of system function.

.6.4. set current

The current internal set current is displayed. Only of significance for E+L service personnel.

.6.5. reserved 65

Not assigned at present.
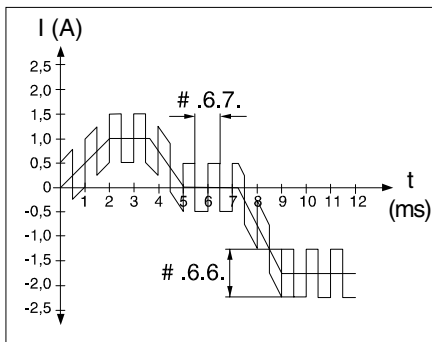
.6.6. current dither

An a.c. component may be superimposed on the motor current. The motor breakaway torque is thus reduced and the actuator responds with greater sensitivity. Guiding in the lower speed range is improved.

.6.7. dither cycletime

Entry of the cycle time for the a.c. component.

.6.8. diagnostics

Parameter block for displaying the system status.

.6.9. system error

The following error messages are possible:

1 = supply voltage under 20 V DC
2 = supply voltage over 30 V DC
3 = the guider cut-off current has been exceeded
4 = the heat sink temperature is over 70°
5 = the incremental encoder is defective
6 = the incremental encoder is inverted (signal lines confused)
7 = no message from the right sensor
8 = no message from the left sensor
10 = the motor line is interrupted
12 = the motor output stage is defective
13 = the motor is blocked at maximum motor current
14 = several reference switch switching points
15 = the end position proximity switches are confused
16 = the external voltage supply of the control card is overloaded for further attached devices.

.7.0. reserved 70

Not assigned at present.

.7.1. reserved 71

Not assigned at present.

.7.2. running time meter

The operating hours of the control card are displayed here.

.7.3. supplyvoltage 24 DC

The current supply voltage of the controllercard is displayed.

.7.4. temperature case

The current temperature of the controller card case is displayed here.

.7.5. temp. case max.

The controller card stores the highest measured temperature of the heat sink. This stored temperature is displayed.

.7.6. reserved 76

Not assigned at present.

.7.7. reserved 77

Not assigned at present.

.7.8. mainloops/sec.

For internal evaluations only.

.7.9. I/O confugiration

Parameter block for programming the digital inputs.

.8.0. digi input status

The current status of the digital controller card inputs is displayed here.

.8.1. reserved 81

Not assigned at present.

.8.2. usage input X 4.1

.8.3. usage input X 4.4

.8.4. usage input X 4.7

**.8.5. usage input X20.2**

.8.6. usage input X 3.2

The digital inputs (see wiring diagram) may be assigned functions.

❚ Each function may only be assigned once.

The following table illustrates the possible function options:

| Value	Application	Signal at active input
0	no usage	no function of this input
1	Motor lock	motor is stopped in each operating mode
-1	Motor unlock	motor is enabled in each operating mode
2	Automatic lock	motor is only stopped in automatic mode
-2	Automatik unlock	motor is only enabled in automatic mode
3	Reference with speed-	reference switch switches at negative motor direction of rotation (see example 1)
-3	Reference with speed+	reference switch switches at positive motor direction of rotation (see example 1)
4	Speed ± lock	at signal 1 the motor direction of rotation is blocked. Which direction of rotation is inhibited is only determined in conjunction with the reference switch. (see example 1)
-4	Speed ± unlock	at signal 0 the motor direction of rotation is blocked. Which direction of rotation is inhibited is only determined in conjunction with the reference switch. (see example 1)
5	Speed + lock	at signal 1 the positive motor direction of rotation is stopped (see example 2)
-5	Speed + unlock	at signal 0 the positive motor direction of rotation is stopped (see example 2)
6	Speed - lock	at signal 1 the negative motor direction of rotation is stopped (see example 2)
-6	Speed - unlock	at signal 0 the negative motor direction of rotation is stopped (see example 2)
7	Auto <-> Center	switching-over between automatic and centering
-7	Center <-> Auto	switching-over between centering and automatic
8	Oscillation ON	oscillation ON
-8	Oscillation Off	oscillation OFF
9	Weboffset Remote	external web offset RE 1721 (only possible on terminal X 3.2!)
9-	-	not assigned
10	Webspeed Measure	web speed measuring (only possible on terminal X 3.2!)
-10	-	not assigned
11	Manual Key	"Manual" key
12	Right Key	"Right" key
13	Left Key	"Left" key
14	Auto Key	"Auto" key
15	Center Key	"Center" key
16	Latch weberror	The current web position deviation is saved at signal "1" and an appropriate correction position added to the current AG position at signal "0". This guiding mode is required if the web position is only available at certain times as a valid value (e.g. label scanning, broken lines etc.).
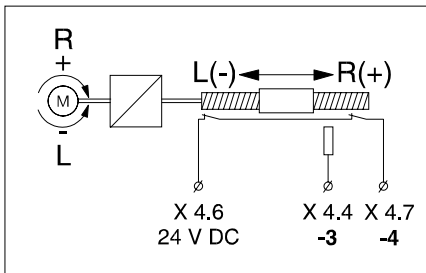
Example 1:

The positioning range is to be limited by two series-connected break contacts.

The inputs X 4.4 (reference switch) and X 4.7 (end positions) should be assigned as follows:

Input X 4.4 is assigned the value -3. The switching point is reached via the positive motor direction of rotation.

Input X 4.7 is assigned the value -4 (break contact).
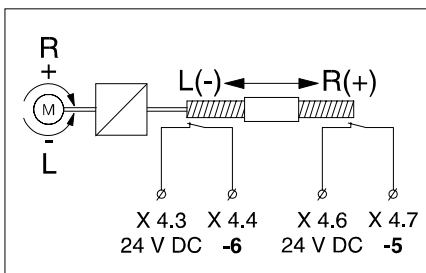
Example 2:

The positioning range is to be limited by two separate break contacts.

The inputs X 4.4 and X 4.7 should be assigned as follows:

Input X 4.4 is assigned the value -6. At signal 0 the negative motor direction of rotation is stopped.

Input X 4.7 is assigned the value -5. At signal 0 the positive motor direction of rotation is stopped.

If the circuit is set up with make contacts, value 5 or 6 must be set.

.8.7. reserved 87

Not assigned at present.

.8.8. reserved 88

Not assigned at present.

.8.9. reserved 89

Not assigned at present.

.9.0. reserved 90

Not assigned at present.

.9.1. system config.

Parameter block for application adaptation.

.9.2. guider type

This parameter is used to determine which type of guider will be used.

Proportional actuator	Integral actuator	Master-Slave mode	Three-level mode
Pivoting frame Steering roller Turn rod Winding station Push roller	Pivoting roller Segmented guide rollers Edge spreading device Spreading device Positioning control Follow-up control		

n = speed
n_{act} = actual speed
n_{set} = set speed
S = web set position
ΔS = web deviation
S_{act} = actual position
S_{set} = set position

n_{act} = actual speed
n_{set} = set speed
$S_{set\ actuator}$ = actuator set position
$S_{act\ actuatr}$ = actuator actual position
ΔS = web deviation
$S_{act\ web}$ = actual web position
$S_{set\ web}$ = set web position

ΔS = web deviation
S_{ist} = actual position
S_{soll} = set position

ΔS = web deviation
S_{ist} = actual position
S_{soll} = set position

0= on a proportional guider a specific motion speed is output to correct the guiding difference in the event of a deviation of the actual position from the set position.

1= on an integral actuator a specific actuator position is output to correct the guiding difference.

2= in master slave mode a DC actuator (slave) exactly follows up another DC actuator (master). This value 2 may only be set in the control card for the slave.

3= for applications with an actuator with three-level action (e.g. reversing contactor).

.9.3. controller operate

In the case of web center guiding systems with motor-driven sensor following-up (hybrid) value 1 must be set.

.9.4. auto address

The controller card features automatic sensor addressing.

> Sensor addressing is only performed after a reset and is only possible for sensors that are directly connected to the controller card at connectors X 5/X 6. Furthermore, the sensors must feature the appropriate software for automatic sensor addressing.

The following sensor addressing options are possible.

0 = The sensor address/es is/are only displayed in parameters "connector X5" and "connector X6". The address is manually set on the sensor or via the command device.

1 = Device number 1 is automatically assigned to the sensor at terminal X5 and device number 2 to the sensor at terminal X6. The sensor device group is identical with the controller card group. Address setting according to the sensor description is thus unnecessary.

2 = The sensor at terminal X5 (X6) is assigned the address set in the "connector X5" ("connector X6) parameter. In the event of sensor replacement (defective sensor) the new sensor is automatically assigned the right address.

.9.5. CAN connector Right

.9.6. CAN connector Left

The address setting of the sensor at terminal X5 (X6) is displayed.

.9.7. >function config 1

Certain functions may be activated or deactivated.

The following table indicates the possible functions:

Function	Value	Description
[X] Framelimit Check	0001_h	Monitors both position range limits. This function must be switched of on actuators without end positions (e.g. tube slitters)!
[ ] N~ / M control	0002_h	No function at present
[ ] Center direct	0004_h	In this case moving to center position is performed without additional calibration of the position counter in "center position" operating mode.
[ ] Ref on PowerOn	0008_h	Once operating voltage is supplied the reference switch is first of all approached in order to calibrate the position counter. Then the operating mode is selected that was set before the operating voltage was switched off.
[ ] Watch webedge R	0010_h	In the motor-driven positioning of fork-type sensors the right web edge is monitored. If the sensor scanning range is fully covered, motor-driven positioning is interrupted. Damaging of the web edge by the fork-type sensor is thus prevented.
[ ] Watch webedge L	0020_h	In the motor-driven positioning of fork-type sensors the left web edge is monitored. If the sensor scanning range is fully covered, motor-driven positioning is interrupted. Damaging of the web edge by the fork-type sensor is thus prevented.
[ ] Enable Photo	0040_h	The actual motor position is saved as the set position for automatic mode. Displaying is in parameter ".4.6. photo auto offset". (see also parameter ..3. / value 13
[ ] Sens. err.> Center	0080_h	In the case of an invalid sensor signal the actuator is moved to the stored center position. If this function is not activated the actuator will only be blocked in the event of an invalid sensor signal.
[ ] MCP active	0100_h	Activation of the MCP (MasterControleProcessor). If no controller card is featured in a group with the address x.5 (master) this function must therefore be set.
[ ] Auto. SensorFree	0200_h	Switching-off of all web guider applications.
[ ] Support 2 motor	0400_h	If on one support beam, two positioning carriages are featured that are to be moved independently of one another, this function must be selected for the purpose of collision monitoring. This function is automatically set during support beam initialisation.
[X] Weboffset 1/10 mm	0800_h	On predecessor controller cards the web offset is always tranmitted in 1/10 mm. Controller card RK 4004 transmits in 1/100 mm. To assure that controller card RK 4004 is compatible to older models this function must be set .
[ ] Weboffset invers	1000_h	The effective direction of the web offset is inverted
[ ] Defect detection	2000_h	If the edge error exceeds the set proportional range (e.g. due to web displacement, adhesive point, web tear etc) the motion speed is reduced to the set motion speed in parameter ".1.9. velocity emergence".
[ ] ext. system mode	4000_h	The system mode is expanded for future applications. Various operating modes may then be performed simultaneously with the modified command stations.
[ ] RE 1721 invert	8000_h	Turning the potentiometer in a clockwise direction (to the right) must also effect a web offset to the right. If the web offset is in the opposite direction (to the left) this function is used to invert the effective direction of the command station.

The functions may be directly selected with a CANMON program or command station DO 200..

If these two options are not available the sum of the required functions must be formed and this sum value entered in this parameter. Sum formation must be performed in the hexa-decimal system.

Example 1:

The "Watch webedge R" and "Watch webedge L" functions are required.

Sum value = 0010_h + 0020_h = 0030_h

Parameter value = 30

Example 2:

The "enable Photo" and "Sens. err.> Center" functions are required.

Sum value = 0040_h + 0080_h = $00A0_h$

Parameter value = A0

.9.8. function config 2

Certain functions may be activated or deactivated. The following table illustrates the functions:

> In the case of the curved brackets () only one function may be selected.

(*) no controller output	0000_h	None of the following 5 values is output via the CAN channel
( ) N-target -> CAN	0001_h	Output of the set speed value
( ) Delta N -> CAN	0002_h	Output of the speed difference
( ) Pos-target -> CAN	0003_h	Output of the set position value
( ) Delta Pos -> CAN	0004_h	Output of the position difference
( ) I-target -> CAN	0005_h	Output of the set current value
[ ] Disable I-Loop	0008_h	If no motor is connected to the controller card, this setting must be used to switch off the current circuit.
[ ] Send targetpos.	0010_h	Instead of the DC actuator drive actual position the set position of the DC actuator drive is transmitted as a CAN message. The following losses with a follow-up controlling system are thus reduced.
[ ] lock webspeedlim	0020_h	If the set web speed fails to be reached (parameter 1.1.5.) automatic mode is blocked.
[ ] Start AUTO slow	0040_h	If the web is outside of the proportional range when the operating mode "automatic" is selected, the positioning speed will be reduced to the positioning speed set for the manual mode. This reduction will be made only once and it will be made after the "automatic" mode has been selected.
[ ] AUTO: Clear I-part	0080_h	On selecting "Automatic" mode the set I-part of parameter "1.2.4. position I-part" is reset to 0.
[ ] Pos-TXD: 50->10ms	0100_h	The cycle time for transmitting the actual position to the CAN-bus may be reduced from 50 ms to10 ms . This minimizes the lag error for the chasing system.

The functions may be directly selected with a CANMON program or command station DO 200. .

If these two options are not available the sum of the required functions must be formed and this sum value entered in this parameter.

Example :

The "I target-> CAN" and "Disable I Loop" functions are required.

Sum value = 0005_h + 0008_h = $000D_h$

Parameter value = 000D

.9.9. operatorkey config

This parameter is used to activate or deactivate certain functions. The table below lists the functions:

Function	Value	Description
[ ] Auto: use all sens	0001_h	In "automatic" mode all edge sensors featured in this group are selected.
[ ] Auto: take photo	0002_h	On selecting "automatic" mode a guiding photo (take photo) is triggered.
[ ] force support free	0004_h	When the "park sensor" key is pressed or signal supplied to the input of the same name on a digital interface the sensors are moved to their outer position and main mode set to "*SystemLocked*". The system is only enabled once the "park sensor" key is released or signal no longer supplied to the input of the same name on a digital interface.
[ ] Center: sup. free	0008_h	In "center position" mode the positioning carriages/sensors are moved to their outer position. In "automatic" mode the positioning carriages/sensors move to their origin position or in "hybrid" mode so that they are symmetrical to the machine center.
[ ] unused sup. free	0010_h	In "automatic" mode non-selected sensors mounted on a motor-driven positioning carriage, are moved to their outer position. (not active at present)
[ ] Auto. SensorFree	0020_h	If, during "search for edge" mode the inner end position of the positioning carriage is reached, "park sensor" mode is automatically switched to. This value must be set in the controller card X.5 (Master). If no controller card with address X.5 is featured, the function must be set on the controller card with activated MCP (MasterControlProcessor) (see parameter .9.7. function config 1 / Wert 0100).
[ ] Sens sel. direct	0040_h	Without this setting "manual" mode will always be switched to when a sensor is selected. If this function is set the selected operating mode is retained when a sensor is selected.
[ ] emergency sensor L	0080_h	Emergency guiding with left sensor
[ ] emergency sensor R	0100_h	Emergency guiding with right sensor
(*) lost web ----	0000_h	On the loss of the web edge no change to the operating mode is performed.
( ) lost web: Center	1000_h	On the loss of the web edge "center position" mode is switched.
( ) lost web: Manual	2000_h	On the loss of the web edge "manual" mode is switched.

The functions may be selected directly with a CANMON program or command station DO 200..

If these two options are not available the sum of the required functions must be formed and this sum value entered in this parameter.

Example 1:

The "Auto: use all sens" and "force support free" functions are required.

Sum value = 0001_h + 0004_h = 0005_h

Parameter value = 5

Example 2:

The "Sens sel. direct", "emergency sensor L" and "emergency sensor R" functions are required.

Sum value = 0040_h + 0080_h + 0100_h = $01A0_h$

Parameter value = 1A0

### 1.0.0. reserved 100

Not assigned at present.

1.0.1. delaytime 1

1.0.2. delaytime 2

On the loss of the guiding criterion when a color line sensor an option is available of switching to what is termed an emergency sensor. Emergency guiding is activated in parameter ".9.9. operatorkey config". The periods after which switching-over takes place are set via the two "delaytime" parameters.

Switching-over is performed according to the following principle:
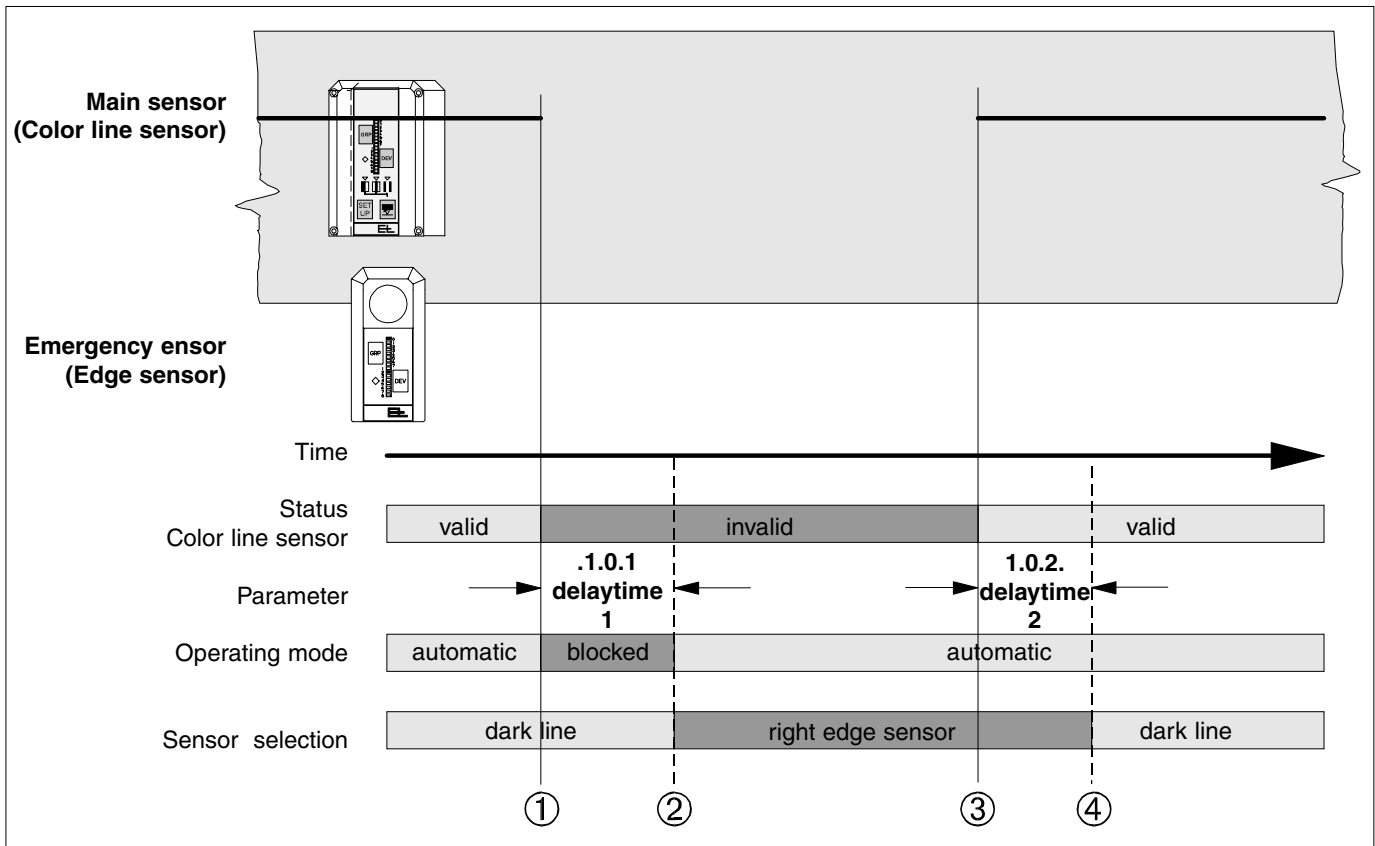
① At this point the color line sensor loses its guiding criterion. The web guider is blocked and the delay time set in parameter "1.0.1. delaytime 1" started.

② On expiry of the set time switching to the emergency sensor takes place and the web guider is enabled. Automatic mode is continued. At the same time the controller card adopts the current actual web position as the set position for the emergency sensor.

③ The guiding criterion is available again and the delay time in parameter "1.0.2. delaytime 2" starts. Guiding is still performed by emergency sensor.

④ Once the set time has elapsed the system switches back to the color line sensor.

1.0.3. subsystem 0 address

1.0.4. subsystem 1 address

1.0.5. subsystem 2 address

1.0.6. subsystem 3 address

Controller card RK 40.. features a serial bus connection. Up to 4 modules (e.g. a command station, several logic cards etc.) may be serially connected via this serial bus. The addresses of the serial devices are entered automatically in ascending order beginning in parameter 1.0.3., (1st slot = address in parameter 1.0.3., 2nd slot = address in parameter 1.0.4. etc). In the event of double addressing, the address

must be changed in the appropriate parameter. The place in front of the dot specifies the group number and the place after the dot the device number.

Example:

Device number:	A	9	F	C
Group number:	0	0	3	7
Entry in parameter	0.A	0.9	3.F	7.C

1.0.7. calibration

Parameter block for calibrating the controller card.

1.0.8. calib. UDC

Scaling of operating voltage measuring and display. This parameter is automatically set during the test run at E+L.

1.0.9. offset. I-act

Motor current offset measuring. This parameter is automatically set during the test run at E+L.

1.1.0. calib. I-act

Scaling of motor current measuring and display. This parameter is automaticallly set during the test run at E+L.

1.1.1. reserved 111

Not assigned at present.

1.1.2. webspeed config.

Parameter block for setting web speed measuring.

1.1.3. webspeed constant

In order to calibrate the web speed measuring function in the controller card the no. of pulses that are generated per running meter of the web must be entered here.
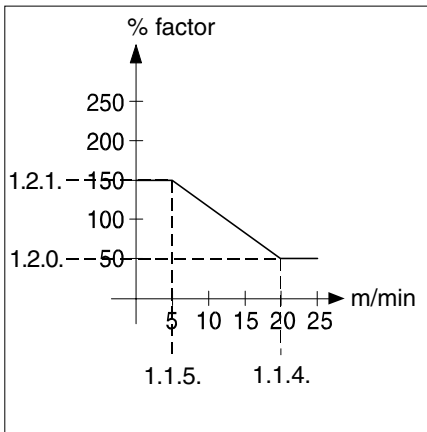
1.1.4. webspeed max.

1.1.5. webspeed limit

1.2.0. max webspeed ratio

1.2.1. lim webspeed ratio

These parameters are only significant if one of the four functions is activated in parameter "1.1.8. adaptive function".

The guider proportional range or actuator speed may be influenced depending on the web speed.

The two vertexes for the characteristic curve are determined via the following parameters. Depending on the current web speed, a per cent factor is produced on the basis of the characteristic curve with which the proportional range or motion speed may be influenced.

1.1.4. =   Entry of the maximum web speed

1.2.0. =   Entry of the accompanying per cent value

1.1.5. =   Entry of the minimum web speed

1.2.1. =   Entry of the accompanying per cent value
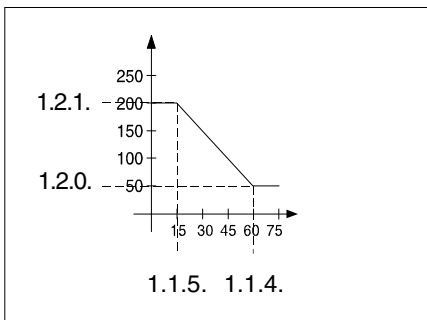
Example 1:

The set proportional range (.1.3.) should be 200% at minimum web speed and 50% at maximum web speed. The minimum web speed is 15 m/min, the maximum web speed 60 m/min.

The corresponding per cent factor for the proportional range at a specific web speed may be deduced from the characteristic curve opposite.
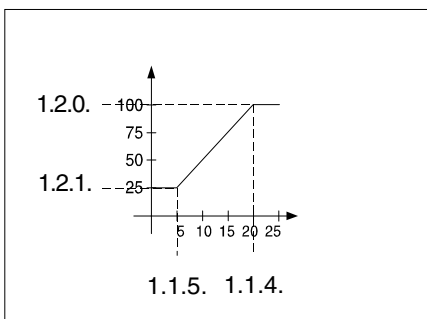
Example 2:

The maximum positioning velocity in "automatic" mode (.1.6.) should be 25% at minimum web speed and 100% at maximum web speed. The minimum web speed is 5 m/min, the maximum web speed 20 m/min.

The corresponding per cent factor for the positioning velocity at a specific web speed may be deduced from the characteristic curve opposite .

The reduction of the positioning velocity does not have any effect on the sensitivity of the control loop.

1.1.6. actual webspeed

The actual web speed is displayed in m/min.

1.1.7. adaptive controle

Parameter block for process-dependent setting of the control parameters.

1.1.8. adaptive function

An adaptive guider setting is available for adapting the web guider control loop to changing process variables (e.g. web speed). Which guider setting is to be influenced by which process variable must be set with one of the following values.

0 = Adaptive controlling without function.

1 = The guider proportional range (.1.3.) is influenced depending on an external CAN signal.

2 = The guider proportional range (.1.3.) is influenced depending on the web speed.

4 = The motion speed in automatic mode (.1.6.) is influenced depending on an external CAN signal.

8 = The motion speed in automatic mode (.1.6.) is influenced by the web speed.

16 = The positioning path (.4.5.) is influenced by an external CAN signal.

32 = The positioning path (.4.5.) is influenced by the web speed.

1.1.9. adaptive ratio

Display of the current control loop amplification.

1.2.0. max webspeed ratio

See parameter 1.1.4. .

1.2.1. lim webspeed ratio

See parameter 1.1.5. .

1.2.1. reserved 121

Not assigned at present.

1.2.2. reserved 122

Not assigned at present.

1.2.3. reserved 123

Not assigned at present.

1.2.4. position I-part

If, in the case of integral actuators (e.g. segmented guider roller) controller type 1 (parameter .9.2.) is used, a permanent guiding deviation results due to technical guiding reasons. To reduce or avoid this guiding deviation an automatic offset of the operating point may be set via parameter "1.2.4. position I-part". The larger the value set, the faster the guiding deviation will be compensated. There is however a danger that the actuator may begin to oscillate. In this case the value must be reduced.

To assure that the operating point is reset to "0" on selecting automatic mode, the "AUTO clear I-part" must be selected in parameter ".9.8. function config 2".

1.2.5. !! Service !!

This parameter serves only as a parameter title for the following parameters that are grouped together due to their function. The parameter itself has no function.

1.2.6. service off/on

For E+L service personnel only.

Service mode is started via value "1". Following a reset the value is automatically reset to "0".

1.2.7. >service mode

For E+L service personnel only.

2 = Square wave current controller test

3 = Delta wave current controller test

4 = Square wave speed controller test

5 = Delta wave speed controller

6 = Square wave PWM bridge signal

7 = Delta wave PWM bridge signal

8 = Square wave set position value

9 = Delta wave set position value

1.2.8. testvalue 1

For E+L service personnel only.

1.2.9. testvalue 2

For E+L service personnel only.

1.3.0. testcycletime

For E+L service personnel only.

5.3 "Three position controller" upgrade

For control card applications as a three position controller the value 32 must be entered in parameter "..3. start service" during control card commissioning. This loads the three position controller parameter record. The three position controller parameters that differ from the norm are described below.

No.	Name	Default	Min.	Max.	Unit	Description
.1.3.	puls range ±	2.0	0.0	2000.0	mm	Switching threshold for transition Stop at pulse output
.1.4.	slow range ±	4.0	0.0	2000.0	mm	Switching threshold for transition Pulse output to permanent signal
.1.5.	fast range ±	6.0	0.0	2000.0	mm	Switching threshold for transition Permanent signal to fast signal
.1.6.	hysteresis	1.0	0.0	2000.0	mm	Hysteresis of the individual switching thresholds
.1.7.	pulse ON-time	1.0	0.0	10.0	sec	Switch-on time of pulse signal
.1.8.	pulse OFF-time	1.0	0.0	10.0	sec	Switch-off time of pulse signal
.1.9.	jog with fast	0	0	1		Jog mode with fast signal
.2.0.	dig. I/O adress	0	0	7.F	hex	Address of digit. output card for the positioning signals
.2.1. •	act. control out					Display of the current positioning signal
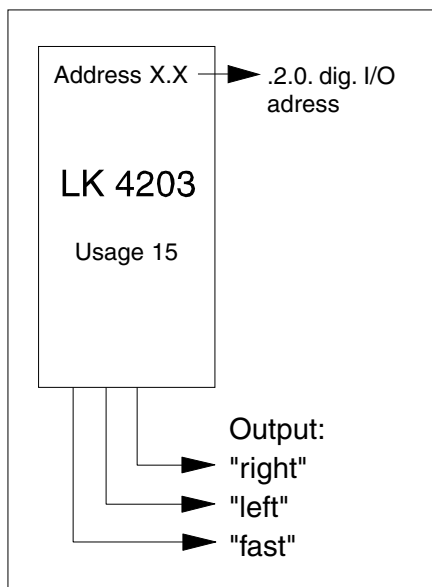
.1.3. puls range ± (switching threshold 1)

.1.4. slow range ± (switching threshold 2)

.1.5. fast range ± (switching threshold 3)

The three position controller software features 3 switching thresholds.

Switching threshold 1 pulsed "Right" or "Left" output

Switching threshold 2 "Right" or "Left" output duration

Switching threshold 3 "Fast" output duration

The "Fast" output is switched to threshold 2.

The switching thresholds should be entered in the appropriate parameters. The entered value corresponds to the unit mm .

If a switching point is not required, the value "0" must be set in the appropriate parameter.

No hysteresis set:
on and off switching point at
0.4 mm
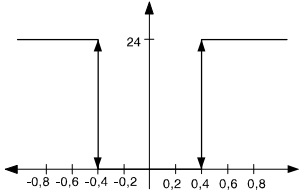
Hysteresis of 0.1 set:
Switch-on point at 0.4 mm and
switch-off point at 0.3 mm
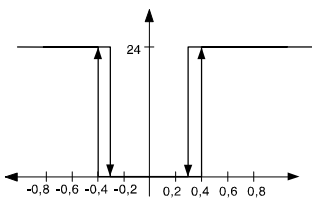
.1.6. hysteresis

A hysteresis may be set for the three existing switching thresholds (pulsed, continuous and fastl). The hysteresis allows the switching-off point to lie below the switching-on point by the amount of the hysteresis.

The set value is applicable to all three switching thresholds.

> The hysteresis must not be set higher than the smallest distance between two switching thresholds or from one switching threshold to "0".

.1.7. pulse ON-time

.1.8. pulse OFF-time

The switch-on and off duration may be set separately for switching threshold 1 (parameter ".1.3. pulse range ±"). The switch-on duration is entered in parameter .1.7. and the switch-off duration in parameter .1.8. .

Switch-on duration
parameter .1.7.

24 V DC

t (s)

Switch-off duration
parameter .1.8.
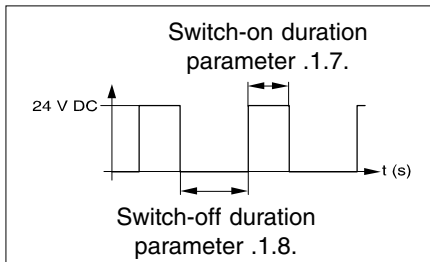
.1.9. jog with fast

In jogging mode the fast ouput may be additionally switched to the left or right output. The value "1" must be entered in order to activate the fast output.

.2.0. dig. I/O address

The device address of logic card LK 4203 must be entered here to the output signals "Left", "Right" and "Fast". The address is specified in the block diagram.

> In logic card LK 4203 the value 15 (3 position controller) must be set in parameter "..5. >IO card usage".

.2.1. act. control out

The current positioning signal is displayed for internal purposes.

6. Setting values

Type	Mat. No.	Pulse per rev	Trans-mission	Spindle pitch	Watts	Pos. path	Current	Nominal speed at 22 V	Speed P	Speed I	Current P	Current I
		.3.4.	.3.5.	.3.6.			.5.7.	.4.8.	.5.0.	.5.1.	.6.2.	.6.3.
AG 2491	201444	8	8:1	4	20	12	0,86	3300	0,5	0,02	2,6	0,4
AG 2491	204474	8	8:1	4	20	25	0,86	3300	0,5	0,02	2,6	0,4
AG 2491	210667	8	8:1	4	20	50	0,86	3300	0,5	0,02	2,6	0,4
AG 2571	311963	8	8:1	5	40	25	2,9	2750	2,0	0,10	2,6	0,4
AG 2571	311941	8	20,25:1	5	40	25	2,9	2750	2,0	0,10	2,6	0,4
AG 2571	311964	8	8:1	5	40	50	2,9	2750	2,0	0,10	2,6	0,4
AG 2571	311942	8	20,25:1	5	40	50	2,9	2750	2,0	0,10	2,6	0,4
AG 2571	311965	8	8:1	5	40	75	2,9	2750	2,0	0,10	2,6	0,4
AG 2571	311966	8	20,25:1	5	40	75	2,9	2750	2,0	0,10	2,6	0,4
AG 2571	311804	8	8:1	5	40	100	2,9	2750	2,0	0,10	2,6	0,4
AG 2571	311943	8	20,25:1	5	40	100	2,9	2750	2,0	0,10	2,6	0,4
AG 2591	229159	8	8:1	5	40	15	2,9	2750	1,0	0,02	2,6	0,4
AG 2591	210896	8	8:1	5	40	25	2,9	2750	1,0	0,02	2,6	0,4
AG 2591	210897	8	8:1	5	40	50	2,9	2750	1,0	0,02	2,6	0,4
AG 2591	217908	8	20,25:1	5	40	50	2,9	2750	2,0	0,10	2,6	0,4
AG 2591	210898	8	8:1	5	40	75	2,9	2750	1,0	0,02	2,6	0,4
AG 2591	227057	8	20,25:1	5	40	75	2,9	2750	2,0	0,10	2,6	0,4
AG 2591	230119	8	20,25:1	5	40	100	2,9	2750	2,0	0,10	2,6	0,4
AG 2591	219860	8	8:1	5	40	100	2,9	2750	1,0	0,02	2,6	0,4
AG 2593	230661	8	1:1	4	120	12	2	1228	2,0	0,10	2,6	0,4
AG 2593	234536	8	1:1	4	120	50	2	1228	2,0	0,10	2,6	0,4
AG 2593	310696	8	1:1	5	120	75	2	1228	2,0	0,10	2,6	0,4
AG 2595	226921	8	8:1	5	40	75	2,9	2750	2,0	0,10	2,6	0,4
AG 2596	227183	8	8:1	5	40	40	2,9	2750	2,0	0,10	2,6	0,4
AG 2671	311967	8	16:1	5	80	25	4,9	3070	2,0	0,10	2,6	0,4
AG 2671	311946	8	28:1	5	80	25	4,9	3070	2,0	0,10	2,6	0,4
AG 2671	311944	8	16.1	5	80	50	4,9	3070	2,0	0,10	2,6	0,4
AG 2671	311947	8	28:1	5	80	50	4,9	3070	2,0	0,10	2,6	0,4
AG 2671	310208	8	16:1	5	80	75	4,9	3070	2,0	0,10	2,6	0,4
AG 2671	311948	8	28:1	5	80	75	4,9	3070	2,0	0,10	2,6	0,4
AG 2671	311945	8	16:1	5	80	100	4,9	3070	2,0	0,10	2,6	0,4
AG 2671	311949	8	28:1	5	80	100	4,9	3070	2,0	0,10	2,6	0,4
AG 2671	311807	8	16:1	5	80	150	4,9	3070	2,0	0,10	2,6	0,4
AG 2671	311950	8	28:1	5	80	150	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	224526	8	4:1	5	80	50	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	212610	8	16:1	5	80	50	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	229098	8	28:1	5	80	50	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	212609	8	16:1	5	80	75	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	228765	8	28:1	5	80	75	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	312204	8	34,5:1	5	80	100	7,5	2750	2,0	0,10	2,6	0,4
AG 2691	217808	8	16:1	5	80	100	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	212325	8	28:1	5	80	100	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	234946	8	4:1	5	80	175	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	228283	8	28:1	5	80	175	4,9	3070	2,0	0,10	2,6	0,4
AG 2691	214554	8	16:1	5	80	175	4,9	3070	2,0	0,10	2,6	0,4
AG 4081	208615	8	6,25:1	2,5	9,5	25	0,71	2778	0,4	0,01	2,6	0,4
AG 4081	208616	8	6,25:1	2,5	9,5	6	0,71	2778	0,4	0,01	2,6	0,4
AG 4081	226862	8	6,25:1	2,5	9,5	50	0,71	2778	0,4	0,01	2,6	0,4
AG 4091	209822	8	6,25:1	2,5	9,5	6	0,71	2778	0,4	0,01	2,6	0,4
AG 4451	322010	500	1:1	2,5	9	12	0,9	1746	1,0	0,02	2,6	0,4
AG 4451	322011	500	1:1	2,5	20	30	0,9	1746	1,0	0,02	2,6	0,4
AG 4571	311968	8	8:1	5	40	25	2,9	2750	2,0	0,10	2,6	0,4
AG 4571	311952	8	20,25:1	5	40	25	2,9	2750	2,0	0,10	2,6	0,4

Type	Mat. No.	Pulse per rev	Trans- mission	Spindle pitch	Watts	Pos. path	Current	Nominal speed at 22 V	Speed P	Speed I	Current P	Current I
		.3.4.	.3.5.	.3.6.			.5.7.	.4.8.	.5.0.	.5.1.	.6.2.	.6.3.
AG 4571	311805	8	8:1	5	40	50	2,9	2750	2,0	0,10	2,6	0,4
AG 4571	311953	8	20,25:1	5	40	50	2,9	2750	2,0	0,10	2,6	0,4
AG 4571	311951	8	8:1	5	40	75	2,9	2750	2,0	0,10	2,6	0,4
AG 4571	311954	8	20,25:1	5	40	75	2,9	2750	2,0	0,10	2,6	0,4
AG 4571	311806	8	8.1	5	40	100	2,9	2750	2,0	0,10	2,6	0,4
AG 4571	311955	8	20,25:1	5	40	100	2,9	2750	2,0	0,10	2,6	0,4
AG 4591	230566	8	8:1	5	40	25	2,9	2750	2,0	0,10	2,6	0,4
AG 4591	232466	8	20,25:1	5	40	25	2,9	2750	2,0	0,10	2,6	0,4
AG 4591	307757	8	20,25:1	5	40	50	2,9	2750	2,0	0,10	2,6	0,4
AG 4591	230657	8	8:1	5	40	50	2,9	2750	2,0	0,10	2,6	0,4
AG 4591	230568	8	8:1	5	40	75	2,9	2750	2,0	0,10	2,6	0,4
AG 4591	229330	8	20,25:1	5	40	75	2,9	2750	2,0	0,10	2,6	0,4
AG 4591	229329	8	8:1	5	40	100	2,9	2750	2,0	0,10	2,6	0,4
AG 4591	230136	8	20,25:1	5	40	100	2,9	2750	2,0	0,10	2,6	0,4
AG 4671	311969	8	11:1	5	80	25	4,9	3070	2,0	0,10	2,6	0,4
AG 4671	311958	8	25,14:1	5	80	25	4,9	3070	2,0	0,10	2,6	0,4
AG 4671	311956	8	11:1	5	80	50	4,9	3070	2,0	0,10	2,6	0,4
AG 4671	311959	8	25,14:1	5	80	50	4,9	3070	2,0	0,10	2,6	0,4
AG 4671	311808	8	11:1	5	80	75	4,9	3070	2,0	0,10	2,6	0,4
AG 4671	311960	8	25,14:1	5	80	75	4,9	3070	2,0	0,10	2,6	0,4
AG 4671	311957	8	11:1	5	80	100	4,9	3070	2,0	0,10	2,6	0,4
AG 4671	311961	8	25,14:1	5	80	100	4,9	3070	2,0	0,10	2,6	0,4
AG 4671	311809	8	11:1	5	80	150	4,9	3070	2,0	0,10	2,6	0,4
AG 4671	311962	8	25,14:1	5	80	150	4,9	3070	2,0	0,10	2,6	0,4
AG 4691	230562	8	11:1	5	80	25	4,9	3070	2,0	0,10	2,6	0,4
AG 4691	230563	8	11:1	5	80	50	4,9	3070	2,0	0,10	2,6	0,4
AG 4691	230564	8	11:1	5	80	75	4,9	3070	2,0	0,10	2,6	0,4
AG 4691	230565	8	11:1	5	80	100	4,9	3070	2,0	0,10	2,6	0,4
AG 4691	230135	8	25,14:1	5	80	100	4,9	3070	2,0	0,10	2,6	0,4
AG 4699	309000	8	11:1	6	80	-	4,9	3070	2,0	0,10	2,6	0,4
DR 1111		500	1:1	2,5	20	10	0,9	1746	1,0	0,02	2,6	0,4
DR 1272		500	1:1	2,5	20	10	0,9	1746	1,0	0,02	2,6	0,4
DR 2472		500	1:1	2	80	10	3,3	3475	2,0	0,10	2,6	0,4
DR 2472		500	1:1	2	80	15	3,3	3475	2,0	0,10	2,6	0,4
DR 2472		500	1:1	2	80	20	3,3	3475	2,0	0,10	2,6	0,4
VE 5016		8	8:1	5	40	350	2,9	2750	2,0	0,10	2,6	0,4
VE 5016		8	8:1	5	40	350	2,9	2750	2,0	0,10	2,6	0,4
VG 18		8	64:1	4	80	55	2,95	1897	2,0	0,10	2,6	0,4
DR 52		8	8:1	5	40	17-25	2,9	2750	2,0	0,10	2,6	0,4
VS 50		8	64:1	125	35	ohne	2,7	3300	2,0	0,10	2,6	0,4
VS 60		8	288:1	300	30	ohne	2,7	3300	2,0	0,10	2,6	0,4
VS 35		10	48,2:1	77	20	ohne	0,8	2750	0,5	0,02	2,6	0,4
VS 36		10	48,2:1	77	20	ohne	0,8	2750	0,5	0,02	2,6	0,4
VS 45		10	49,9:1	78	6	ohne	0,71	2778	2,0	0,10	7,0	0,1
VS 90		8	16:1	5	80	ohne	4,9	3070	2,0	0,10	2,6	0,4
BC 1103		8	8:1	5	40	19	2,9	2750	2,0	0,10	2,6	0,4
BT 25		8	16:1	100,0	80	ohne	4,9	3070	2,0	0,10	2,6	0,4
DR 2272		500	1:1	2,5	20	10	0,9	1746	1,0	0,02	2,6	0,4
DR 2275		500	1:1	2,5	20	10	0,9	1746	1,0	0,02	2,6	0,4

7. Technical data

Operating voltage	
Nominal value	24 V DC
Nominal range (including ripple)	20 - 30 V DC

Power input	
without motor/sensors	4,8 W
with motor (maximum)	180 W

Current input	
without motor/sensors	0,2 A
with motor (maximum)	7.2 A

Output voltage	
at motor terminal	±22 V (PWM) (PWM=pulse width-modulated)

Maximum output current	
without additional fan	5 A
with additional fan	7 A

Ambient temperature	maximum 50 °C

Protection class	IP 00

CAN bus

CAN bus level	+ 5 V (potential-free)
CAN baud rate	250 KBaud

Sound level digital inputs
terminal X 4.1 / 4.4 / 4.7 / 20.2 / 3.2

Low "0"	0 to 3 V DC
High"I"	10 to 30 V DC
Incremental encoder frequency	maximum 5 kHz

Digital output terminal X 20.4

Output current PNP	maximum 0.1 A

Sensor connector X 5/X 6

Output voltage	24 V DC
Output current	maximum 0.5 A

Technical data subject to modification without notice