Operating Manual

en

Tenter guider infeed KRS with digital controller DC 5501/5506 and actuator KR 47../51../52../56..

Guiding by an edge with manual sensor positioning

ZC 5501-0012F_ZE, ZC 5501-0013F_ZE

Component description:

Sensor	B
Actuator	D
Spreading device (optional)	G
Command devices	H
Digital interface (optional)	I
Electrical components	U
CAN bus, serial bus and setup editor (optional)	V
Spare parts lists	X
Parameter lists	Y
Diagrams	Z

ANL--250939-EN-04

1. Safety instructions

1.1 Documentation

Keep the documentation for the E+L system/device in a safe place and accessible for personnel at all times.

The documentation is part of the scope of delivery and must be read carefully prior to starting assembly, operation or maintenance work.

The documentation for an E+L system essentially comprises the higher level system description (A), the individual descriptions of the components (B, C, ... W), spare part lists (X) and the circuit diagrams (Z).

Proceed in accordance with the instructions in the system description. All important processes are described in the system description. Where necessary, reference is made to the descriptions of the individual components.

Notice

These system description is applicable for tenter guider infeeds KRS 47, KRS 49, KRS 51/KRS 52 and KRS 55/KRS 56.

In the block diagram you will find a schematic illustration of your system. In case of digital devices configured by E+L, the block diagram also contains the address settings.

See the parameter lists for explanations of the individual setup parameters. Procedure for checking/changing setup parameters can be found in section 4 “Setup editor”.

1.2 Intendend use

The tenter guider is only allowed to be used to position the infeed rails for a tenter. It positions the infeed rails at the actual position of the web to ensure correct pick-up of the web on the pins.

The tenter guider is not approved for usage in potentially explosive atmospheres.

The tenter guider is only allowed to be installed in the customer’s ma-chine as defined by E+L.

The tenter guider is not allowed to be modified.

The tenter guider is built to the state-of-the-art.

Nevertheless, during operation
– Hazards to the user’s health or
– Damage to property may occur.

Only use the tenter guider
– when it is in correct working order,
– with due attention to safety and hazards while observing the locally applicable, statutory and customary safety regulations as well as the regulations for the prevention of accidents.

1.3 Safety equipment provided by the customer

Hazardous points as a result of the movement of the infeed rails, e. g. open access to actuator, rack or outer limit switches, must be protected using a cover provided by the customer.

Mechanical end position limiting

Einlaufwangen dürfen sich auf keinen Fall über die Zahnstange oder über die Laufschiene hinaus bewegen. Mechanical limiting features must be provided by the customer to ensure the infeed rails are stopped before they reach that point.

If there are no mechanical limiting features, the infeed rails may fall off the guide rails and may cause injury.

1.4 User groups

Activities	User groups	Qualification
Transport/assembly, commissioning, troubleshooting/repair, maintenance, disassembly	Specialist personnel	Technicians, industrial mechanics, fitters etc.
Installation, disassembly	Specialist personnel	Electrical connection only by electricians
Operation	Specialist personnel, unskilled personnel, trainees	Instruction by the operating organization

1.5 Explanation of symbols

The activities described in this documentation are only allowed to be undertaken by the user groups listed in the following with the stated qualifications:

Danger!

Signifies that death or serious injury will occur immediately if the related safety measure is not taken.

Warning!

Signifies that death or serious injury may occur if the related safety measure is not taken.

Caution!

Signifies that minor injury may occur if the related safety measure is not taken.

Notice

Signifies that a malfunction or damage may occur if the related measure is not taken.

► Jobs to be performed.

2. Function

2.1 Purpose

Tenter guider infeeds are designed to set the infeed rails to the actual position of the web, thus assuring that the web edges are taken up on the chain pins or clips correctly.

2.2 Design

There are four different E+L tenter guider infeed models for various web speeds and performances. See also technical data section.

On tenter guider infeeds with a KR 47 actuator, the adjusting movement is transferred by a trapezoidal ball screw, with KR 51, KR 52 and KR 56 actuators by a rack.

Notice

Actuator KR 52 replaces actuator KR 51 in KRS 51. tenter guider infeeds (new identifier KRS 52).

Actuator KR 56 replaces actuator KR 51 in KRS 55. tenter guider infeeds (new identifier KRS 56).

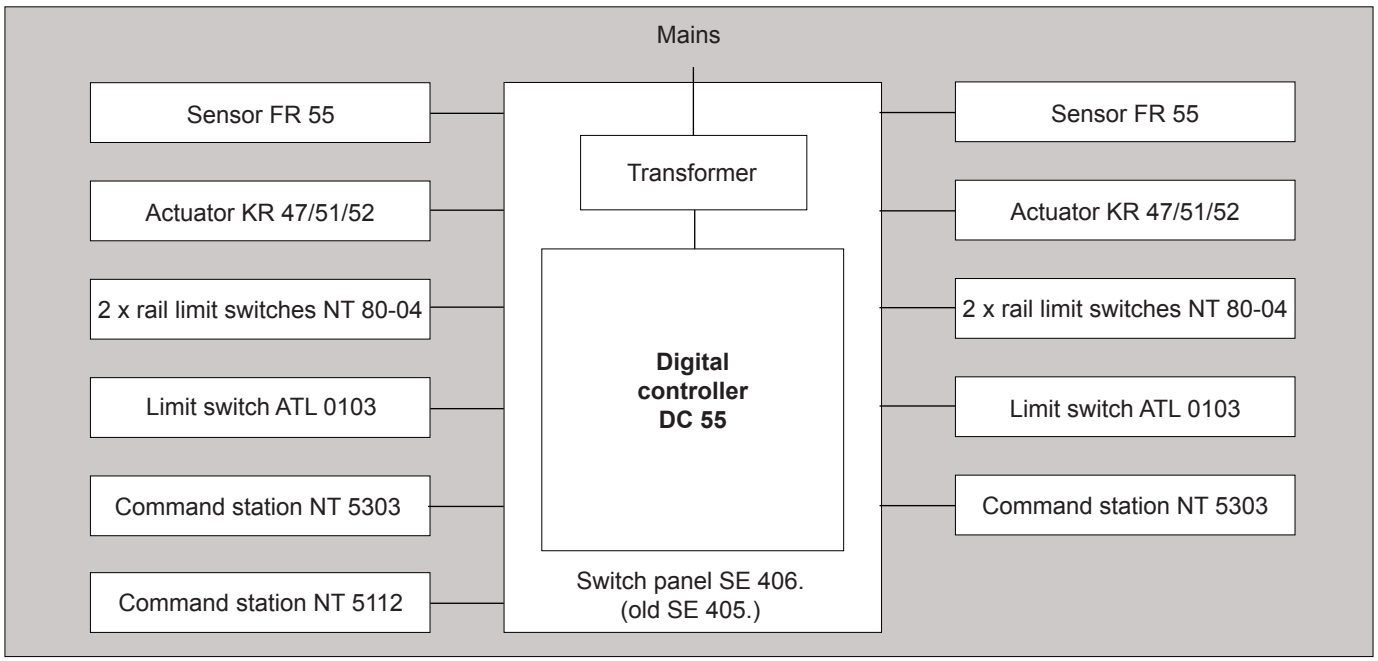
2.2.1 Tenter guider infeed KRS 47

E+L tenter guider infeed **KRS 47** consists of:
- two FR 55 sensors
- two **KR 47** actuators
- two sets of NT 80-04 rail limit switches
- two ATL 0103 limit switches
- **one** digital controller DC 55 with transformer
- command stations NT 5112 (1x) and NT 5303 (2x)

2.2.2 Tenter guider infeed KRS 52 (old KRS 51)

E+L tenter guider infeed **KRS 52 (old KRS 51)** consists of:
- two FR 55 sensors
- two **KR 52 (old KR 51)** actuators
- two racks
- two sets of NT 80-04 rail limit switches
- two ATL 0103 limit switches
- **one** digital controller DC 55 with transformer
- command stations NT 5112 (1x) and NT 5303 (2x)

Design: tenter guider infeed KRS 47, KRS 51 and KRS 52



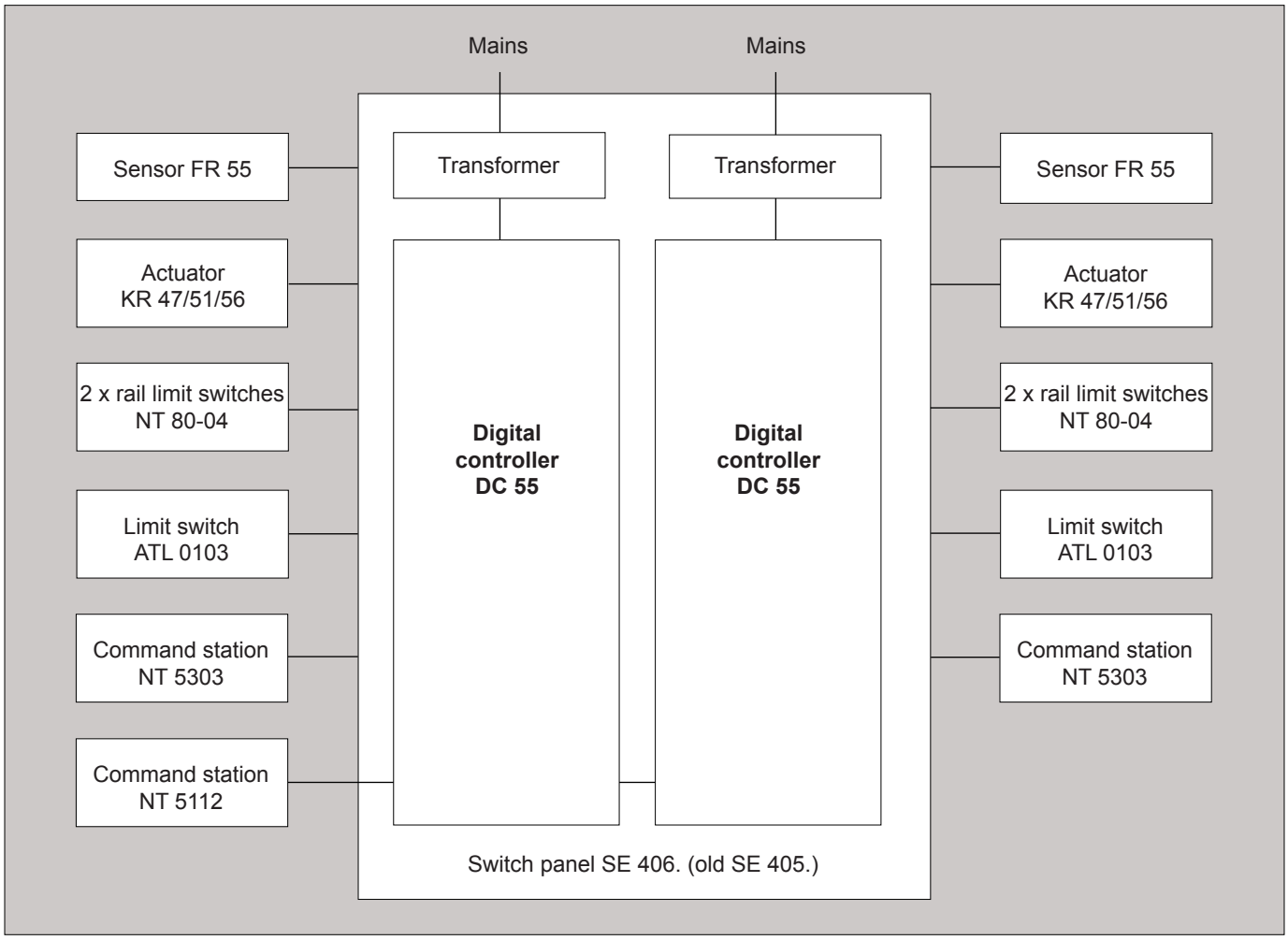
2.2.3 Tenter guider infeed KRS 49

E+L tenter guider infeed **KRS 49** consists of:
- two FR 55 sensors
- two **KR 47** actuators
- two sets of NT 80-04 rail limit switches
- two ATL 0103 limit switches
- **two** digital controller DC 55 with one transformer apiece
- command stations NT 5112 (1x) and NT 5303 (2x)

2.2.4 Tenter guider infeed KRS 56 (old KRS 55)

E+L tenter guider infeed **KRS 56 (old KRS 55)** consists of:
- two FR 55 sensors
- two **KR 56 (old KR 51)** actuators
- two racks
- two sets of NT 80-04 rail limit switches
- two ATL 0103 limit switches
- **two** digital controllers DC 55 with one transformer apiece
- command stations NT 5112 (1x) and NT 5303 (2x)

Design: tenter guider infeed KRS 49, KRS 55 and KRS 56

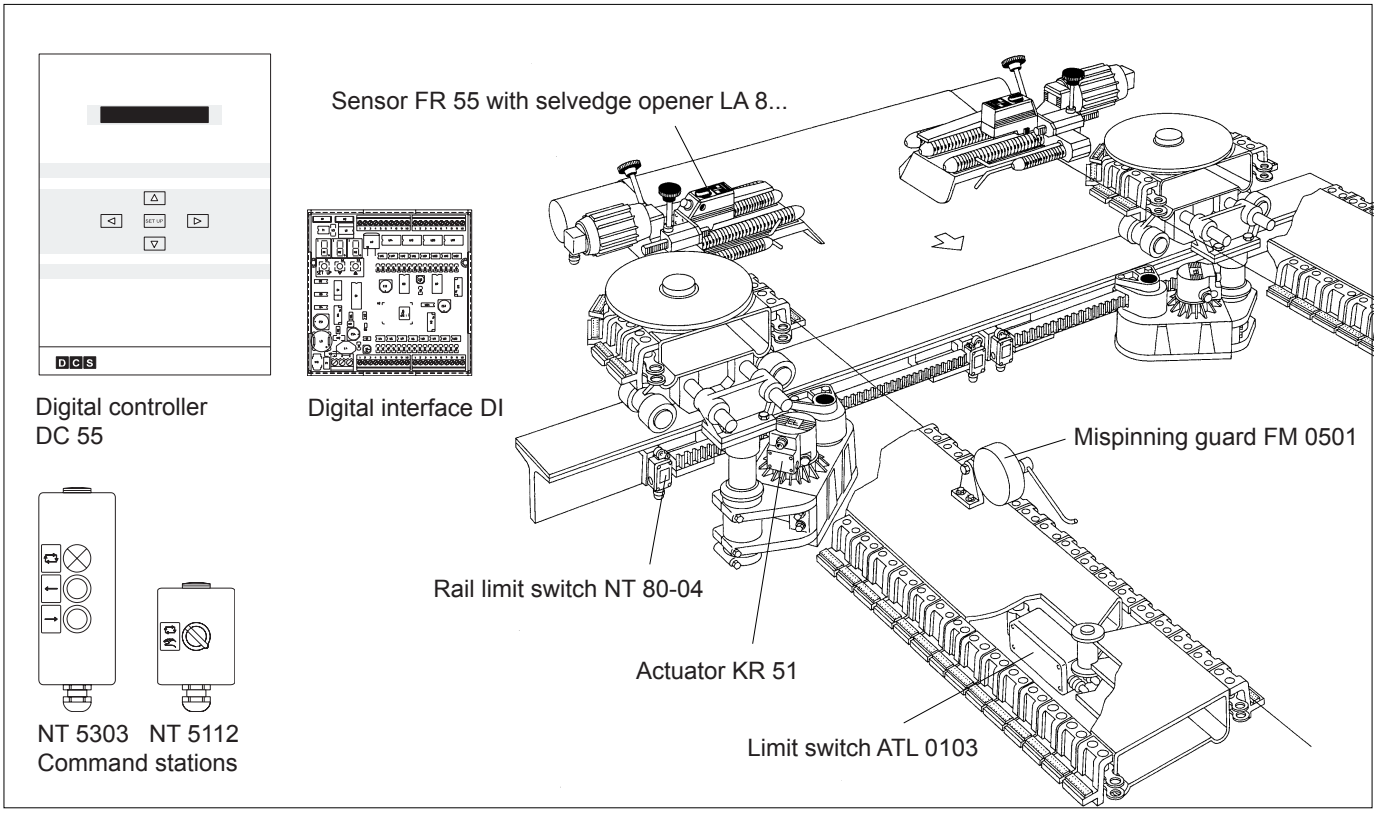


2.2.5 Accessories

Each of the tenter guider infeeds may be equipped with the following accessories:

- selvedge opener - mechanical LS 11, electrical LA 8 or pneumatic LP 03
- mispinning guard FM 0501
- digital interface DI ..

2.3 Operating principle



Example:
Tenter guider infeed KRS 51 with actuator KR 51

Selvedge openers uncurl the rolled edges of webs to assure that these may be detected and taken up by the pins optimally.

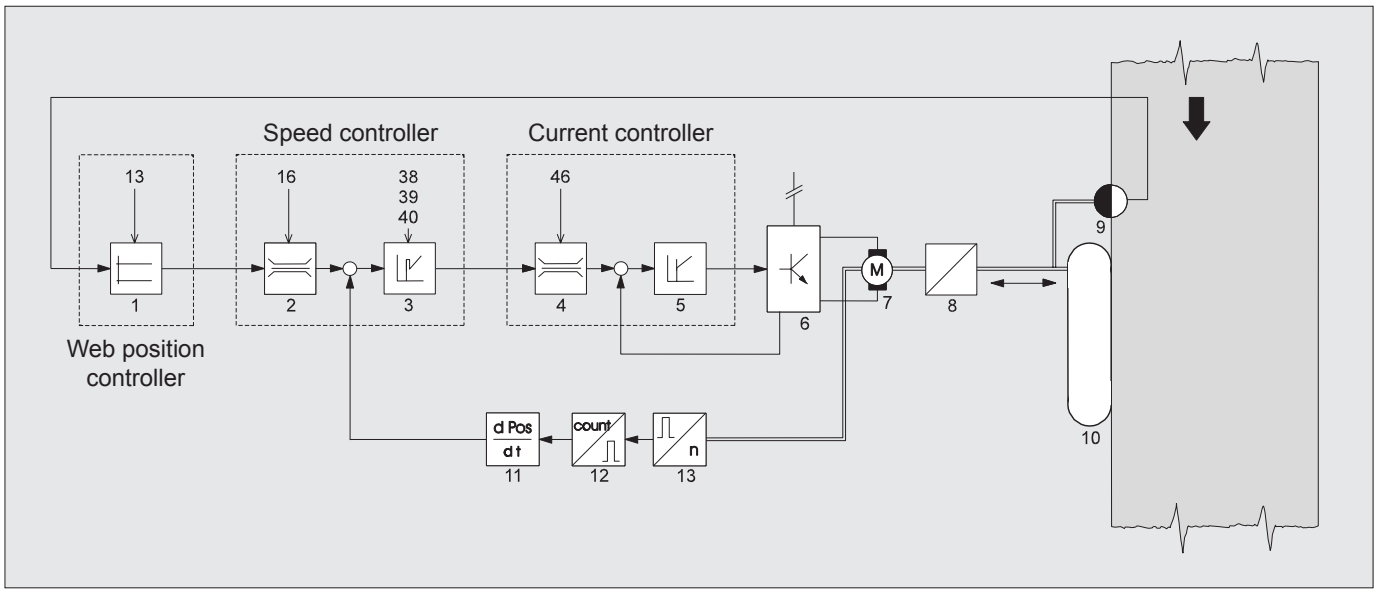
The sensors are mounted on the infeed rails and scan the web edges. If the infeed rail actual position value deviates from the set position value (sensor center), the appropriate sensor sends the magnitude and direction of the deviation to the digital controller for evaluation. The latter sends an appropriate correction signal to the actuator. The actuator corrects the position of the infeed rail and thus assures correct web take-up.

The actuator and digital controller are equipped with a temperature monitor. This prevents the components overheating via a temperature-dependent reduction of power (max. motor current/max. actuating speed). The safety device is only activated in the event of an overload.

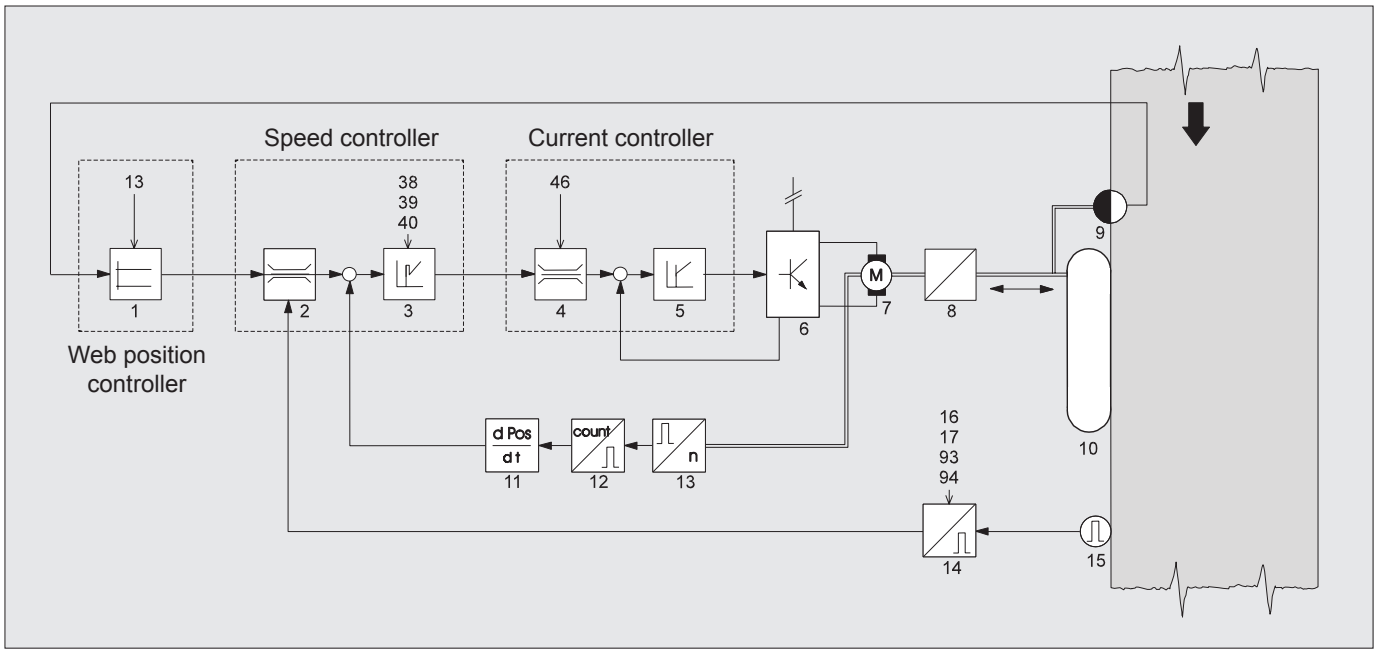
The mispinning guard monitors pinning or clipping at the tenter infeed.

CAN error messages can be output as digital signals using the optional interface DI.

2.3.1 Control diagram KRS .. with DC 5501



2.3.2 Control diagram KRS .. with DC 5506



The DC 5506 digital controller additionally features a pulse input (14) for recording the web speed which permits the maximum infeed rail actuating speed to be limited according to the current web speed in automatic mode. The infeed rail actuating speed is thus changed according to the web speed.

Control diagram legend		
1 Web position controller	6 Power unit with mains power reclamation	11 Actual speed detection
2 Actuating speed limit $V_{max.}$	7 Actuator	12 Counter
3 Speed controller	8 Gearing with rack/screw	13 Incremental encoder
4 Variable current limiter $I_{max.}$	9 Edge sensor	14 Web speed-dependent speed limiter
5 Current controller	10 Infeed rail	15 Pulse generator

3. Transport

Warning!

Falling parts!

Falling parts can cause injuries.

► Never stand under suspended loads.

4. Assembly

4.1 Sensor

► See sensor description and dimensioned drawing. See also actuator description, application instructions section.

4.2 Selvedge opener (optional)

► See selvedge opener description and dimensioned drawing. See also actuator description, application instructions section.

4.3 Mispinning guard (optional)

► See mispinning guard description.

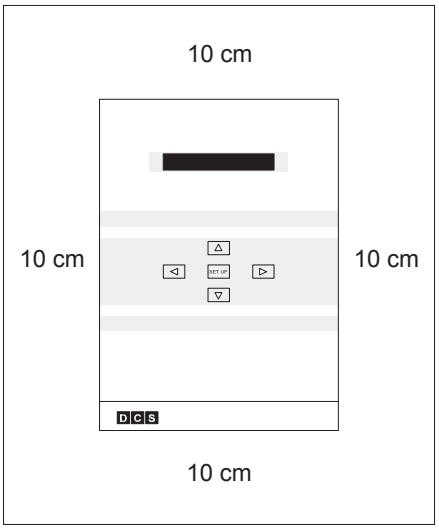
4.4 Actuator, rack and rail limit switch NT 80-04

► See actuator description.

4.5 Limit switch ATL 0103

► See limit switch description.

4.6 Digital controller DC 55



Digital controller DC 55.. can be supplied separately, in an E+L control cabinet or as an E+L switch panel with transformer.

► Mount the digital controller upright to achieve optimum ventilation. A distance of approx. 10 cm between the controller and other devices should at the same time be observed, see illustration.

Notice

Please ensure that the place of installation is well ventilated. The ambient temperature may not exceed 60 °C. The internal fan is switched on from a heat sink temperature of 40 °C. Power reduction begins from a heat sink temperature of 60 °C.

The length of the connection lines between the digital controller and the sensor and the digital controller and actuator must not exceed a maximum of 25 m. Longer lines may only be implemented subject to prior consultation with E+L.

4.7 External pulse generator (on DC 5506 only)

► See pulse generator description.

4.8 Command stations

► Mount the command stations at a location where a good view of the infeed rails is assured.

4.9 Digital interface (optional)

► See digital interface description.

4.10 Safety equipment provided by the customer

Warning!

Risk of crushing!

Hazardous points that result from the movement of the infeed rails, e. g. open access to actuator, rack or outer limit switches, must be protected using a cover provided by the customer.

► Mount safety equipment.

Warning!

Risk of crushing!

Infeed rails must under no circumstances move beyond the end of the rack or the rail. Mechanical limiting features must be provided by the customer to ensure the infeed rails are stopped before they reach that point.

If they are no mechanical limiting features, the infeed rails may fall off the guide rails.

► Fit mechanical limiting features for the infeed rails.

5. Installation

Warning!

Electric shock!

Live parts can cause an electric shock.

► Never touch live parts.

► Connect electrical cables as per the circuit diagram, during this task pay attention to the information on cross-section and screening.

Notice

Leads not supplied by E+L must conform to E+L cables, i.e. also protected so that all connections may be carried out as indicated in the wiring diagrams.

►Signal lines should be shielded and run apart from heavy current-carrying leads.

► All E+L components (command parts, controller, switch panels, actuators and sensors must be connected to the same frame potential as the whole machine. See enclosed EMC info sheet.

5.1 Digital controller DC 55

Notice

The entire electrical wiring for the E+L DC 55 digital controller is to be performed on site by the customer. Please thereby observe the instructions regarding the mounting location for the devices: on the right or left, as seen from the direction of web travel.

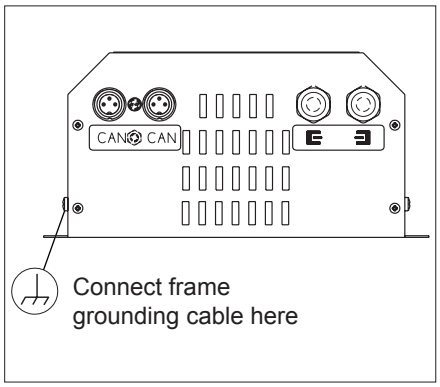
The length of the connection lines between the digital controller and the sensor and the digital controller and actuator must not exceed a maximum of 25 m. Longer lines may only be implemented subject to prior consultation with E+L.

One transformer per digital controller DC 55 must be used for the voltage supply. The secondary winding of the transformer must not be grounded (no connection to protective conductor PE).

► Adapt the primary terminal of the multi-range transformer supplied by E+L to the existing power system. The multi-range transformer may be adjusted in 10 V increments.

If an over-voltage of more than 10% above the nominal voltage is anticipated, the transformer should be set to the higher voltage value. In the event of over-voltage, the tolerance values on the secondary side will also be exceeded with the result that error messages may arise.

If, for instance, the nominal voltage is 400 V and the actual voltage available 420 V, the multi-range transformer should be set to 420 V.



► The primary terminal of the multi-range transformer supplied by E+L should be protected on-site.

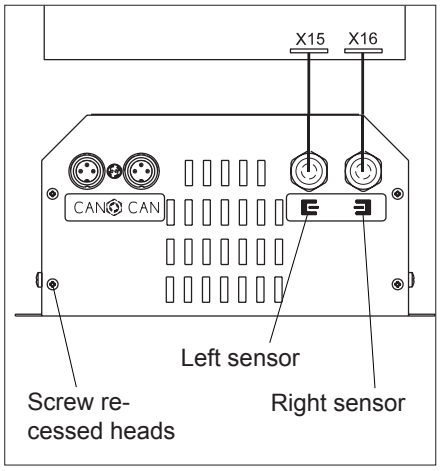
► Check the secondary and ground connections of the wire screen on the multi-range transformer supplied by E+L.

Notice

If the multi-range transformer supplied by E+L is not mounted in an E+L switch panel, a fuse must be switched by the customer between the secondary connection and the controller input, see switching recommendation in the wiring diagram. The secondary side must be ungrounded.

► Connect the digital controller housing to the machine frame. The frame grounding cable cross-section must be at least 4 mm^2.

5.2 Sensors



► Remove the side panel on the digital controller, see illustration opposite. The side panel is secured by 4 screw recessed heads.

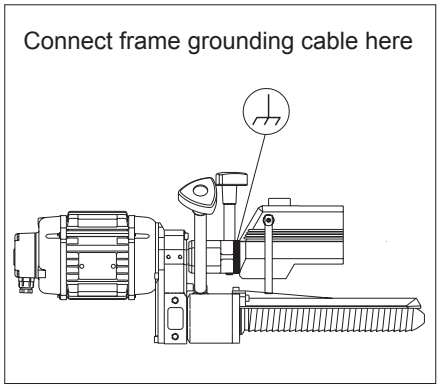
► Connect the sensor cable on the digital controller.

- On tenter guider infeeds with **a** digital controller (KRS 47/51/52), connect the sensor mounted on the right in the direction of web travel to connector X16 and the sensor mounted on the left in the direction of web travel to connector X15. Observe sign on the back of the side panel.

Notice

The digital controller assigns the sensor on connector X16 address 0.1 (right sensor) and the sensor on connector X15 address 0.2 (left sensor) (parameter P73, default value 1).

- On tenter guider infeeds with **two** digital controllers (KRS 49/55/56), one sensor per controller should be connected to connector X16, see wiring diagram.



► Resecure side panel.

► Protect and run the sensor cable away from heavy current carrying leads. Secure the sensor cable with a strain relief device.

► Tighten the coupling ring on the sensor cable connector. The coupling ring provides a conductive connection between the sensor housing and the sensor cable shield.

► Connect the sensor housing to the machine frame, see figure opposite. The grounding cable cross-section must be at least 4 mm^2.

5.3 Actuators

► See actuator description.

- On tenter guider infeeds with **one** digital controller (KRS 47/51/52) connect the actuator mounted on the right in the direction of travel to terminal strip X5, and the actuator mounted on the left in the direction of travel to terminal strip X2.
- On tenter guider infeeds with **two** digital controllers (KRS 49/55/56), connect one actuator per controller to terminal strip X5, see wiring diagram. Furthermore, bridge the motor connections of terminal strips X 2 and X 5 (close in parallel), see wiring diagram.

5.4 Limit switch ATL 0103

► See ATL limit switch description.

5.5 External pulse generator (on DC 5506 only)

► Connect external pulse generator (10 - 100 pulses per meter, 24 VDC) to the controller DC 5506.

5.6 Selvedge opener (optional)

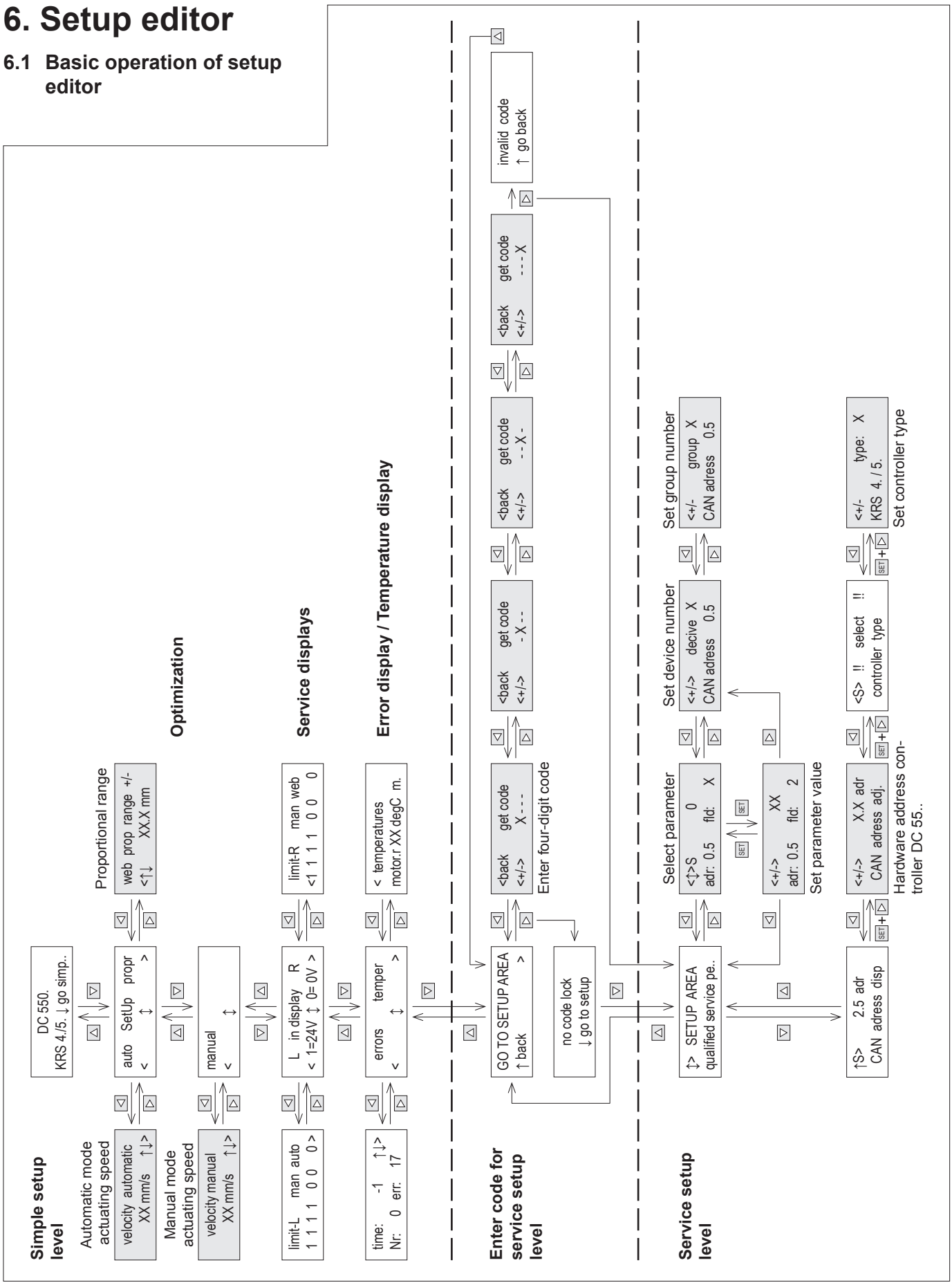
► See selvedge opener description.

5.7 Digital interface (optional)

► See digital interface description.

6. Setup editor

6.1 Basic operation of setup editor



The setup editor is used to set the parameters on digital controller DC 55. Use the cursor keys to enter setup mode.

6.2 Simple setup level

Using the simple setup level the three parameters “Automatic actuating speed”, “Manual actuating speed” and “Proportional range” can be changed.

6.3 Service setup level

Using the service setup level, intended for qualified service personnel, all parameters in the CAN network can be displayed and to some extent changed. Access to the service setup level can be protected using a four-digit numeric code such that only authorized personnel can make settings.

See section 6.10 “Enter code for service setup level”.

6.4 Explanations of symbols

Use the ▽ △ keys to navigate vertically, use the ▷ ◁ keys to navigate horizontally.

↑S> 0.5 adr CAN adress disp

If an “S” appears in front of an arrow symbol, the SETUP key must be pressed first as well as the arrow key to move in the direction shown.

velocity automatic XX mm/s ↑↓>

In fields with a gray background the values marked with X can be changed using the ▽ △ keys.

<+/-> decive -X CAN adress 0.X

If a minus sign appears in front of the value during the entry of a CAN address, there is no device with this address.

access denied ↑ go simpleadj

If the numeric code is entered incorrectly three times, access to the service setup level is disabled. The indication shown on the left is displayed.

Access is re-enabled as soon as the digital controller DC 55.. is electrically isolated.

DC 550. KRS 4./5. ↓ go simp..

Start window

Notice

Once you have finished making settings, you must always return to the start window.

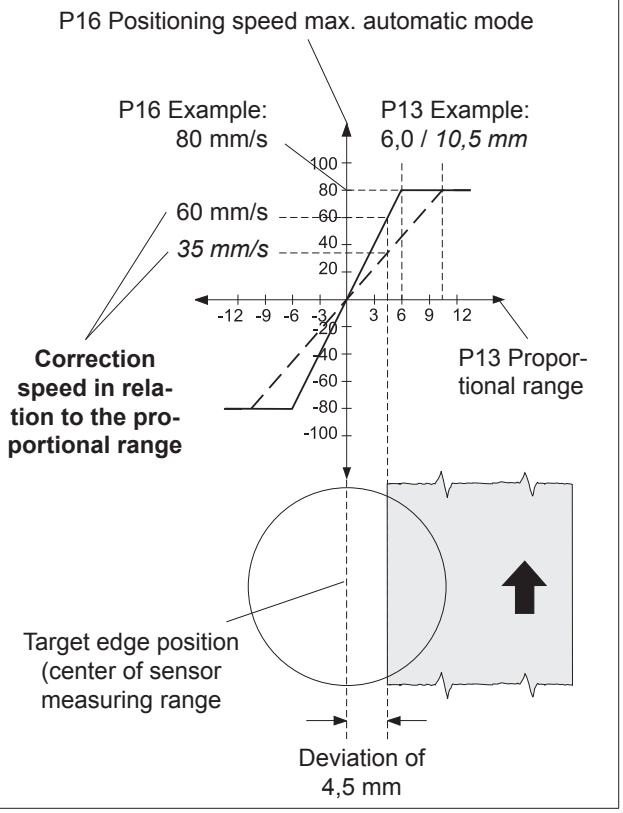
6.5 Parameter list

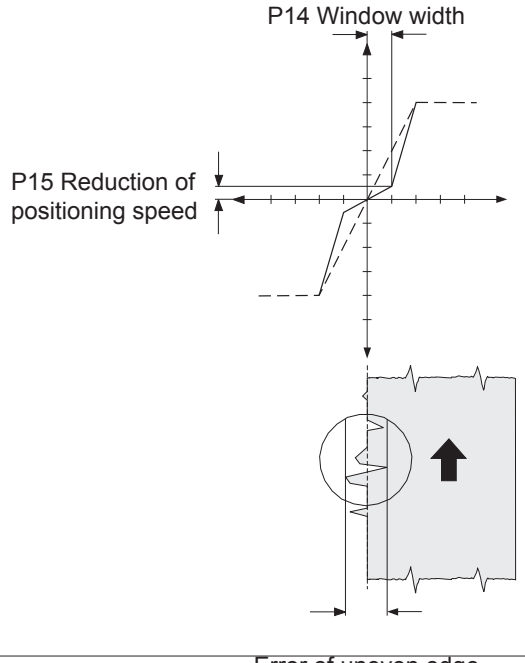
The parameter number is specified in the **Number** field of the table, in the **Name** field the abbreviation. The **Default** field indicates the standard settings, **Min** and **Max** are the respective permissible limit values**.** The unit is indicated in the **Unit** field. The **Description**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

Parameters marked with an asterisk (*) occur only with digital controllers DC 55 featuring the capture of the web speed (Software ZC 5501-**0013F**_Z.).

The following parameter list indicates the parameters of digital controller DC 55. Only the parameters for the related controller type, DC 5501 or DC 5506, are indicated on the display.

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 customers settings 2 = perform internal default settings
3	start service	0	0	199		Starting a function 0 = no function 1 = reset controller 2 = save parameter 20 = calibration motor right !!!! 21 = calibration motor left !!!! 22 = save calibration values !!!! 42 = select expanded setup 44 = save customer settings 55 = delete reset counter and counter of operational hours 56 = delete max. temperature 57 = set calibration values to default !!!! 98 = delete error memory 99 = delete data memory
4 •	DC 550.	__	1.0	1.X	E+L	Software version 1.0 = version .._ZA 1.1 = version .._ZB u.s.w.
5 •	webedge offset					
6	reserved 6					
7	reserved 7					
8	reserved 8					
9	reserved 9					
10	reserved 10					
11	reserved 11					

No.	Name	Default	Min.	Max.	Unit	Description
12 •	webedge controller					Configure edge controller
13	web prop range +/-	10.0	-2000.0	2000.0	mm	Proportional range of controller The two parameters P13 and P16 are used to set the amplification for the controller. The smaller the preset proportional range P13 at constant positioning speed P16 the larger the amplification. Reduce the proportional range if the control is not accurate. Increase the proportional range if the control is not smooth. Example 1: P13 = 6,0 mm, P16 = 80 mm/s, Deviation from target position = 4,5 mm, Correction speed = 60 mm/s Example 2: P13 = 10,5 mm, P16 = 80 mm/s, Deviation from target position = 4,5 mm, Correction speed = 35 mm/s 

No.	Name	Default	Min.	Max.	Unit	Description
14	dual-rate width	30	10	100	%	Window width in % related to proportional range P13 “web prop range” If the edge position is subject to fluctuations, for example because of an irregular edge, parameter P14 may be used to specify a range within which the positioning speed is reduced when there are deviations from the target position. The reduced speed is set in P15. System hunting due to irregular edges is thus reduced. In case the edge defect exceeds the set window width the positioning speed is again increased. Example: P13 = 10.0 mm, P14 = 30 % = 3 mm With edge defects up to ±3 mm the positining speed will be reduced to the value set in P15. If the edge defect exceeds ±3 mm, the positioning speed will be increased to the value set in P16. 
15	dual-rate level	50	10	100	%	Reduction of positioning speed If the edge position is subject to fluctuations caused, for example, by irregular edges, parameter P14 “dual rate width” may be used to specify a range within which the positioning speed is reduced when there are deviations from the target position. The reduced positioning speed is set in P15 “dual rate level”. For example: P16 = 80 mm/s, P15 = 50 % = 40 mm/s For edge defects which are within the window width set in parameter P13 the positioning speed will be reduced to 40 mm/s. If the edge defect exceeds the window width the positioning speed will be increased to the speed of P16.

No.	Name	Default	Min.	Max.	Unit	Description
16	velocity automatic	80	0	180	mm/s	Positioning speed max. automatic mode KRS 47/51/52: 120 mm/s KRS 49/55/56: 180 mm/s
*17	velocity automatic min	50	0	180	mm/s	Minimum positioning speed in automatic mode when web speed is being acquired see parameter P93 and P94
18	velocity manual	50	0	180	mm/s	Positioning speed max. manual mode KRS 47/51/52: 50 mm/s KRS 49/55/56: 180 mm/s
19	velocity endposition	10	1	40	mm/s	Follow-up speed back from limit switch
20 •	derated velocity R	__	0	180	mm/s	Actual positioning speed max. motor right
21 •	derated velocity L	__	0	180	mm/s	Actual positioning speed max. motor left Only for controller type 0 and 2
22	reserved 22					
23	reserved 23					
24 •	servo configuration					Configure motor
25	motion direction	0	0	1		Motor direction Depends on mounting location and direction of web travel 0 = normal 1 = invers
26	reserved 26					
27	reserved 27					
28 •	motor gear constant	__	1.00	99.99	Imp/mm	Gear constant Calculated from encoder resolution P29 and gear transmission P30 for display only
29	encoder resolution	....	8	9999	Imp/U	Encoder resolution Input of actual impulses/U (without 4-times evaluation) Default value for actuator KR 47/51: 50 KR 52: 25 KR 56: 25
30	rotation gear	....	0.01	320.00	mm	Gear transmission of motor KR 47: 7.25 x enter ratio for chain drive Default value for actuator KR 51: 30 KR 52: 40 KR 56: 40
31	linear gear	188.00	0.01	320.00	mm/U	Linear gear transmission Ratio of transmission from rotational to linear movement KR 47: Enter spindle pitch Default value for actuator KR 51: 188.0 KR 52: 188.0 KR 56: 188.0
32	reserved 32					
33	reserved 33					

No.	Name	Default	Min.	Max.	Unit	Description
34	reserved 34					
35	position_P	0.100	0.001	1.000		P-share for position controller
36 •	speed controller					Configure speed controller
37	max.rot.speed	....	100	3000	U/min	Characteristics motor r.p.m. Value is required for limitation of motor speed. The max. motor speed is: Pmax = max. rot. speed * current maximum Default value for actuator KR 47/51: 1250 KR 52/56: 1600
38	speed_P	....	0	10.00		P-share for speed controller Default value for actuator KR 47/51: 2.00 KR 52/56: 0.75
39	speed_I	....	0	5.00		I-share for speed controller Default value for actuator KR 47/51: 0.05 KR 52/56: 0.04
40	speed_D	0	0	5.00		D-share for speed controller
41 •	act. speed R	__	-3500	3500	U/min	Actual motor r.p.m. Right hand measured via encoder
42 •	act. speed L	__	-3500	3500	U/min	Actual motor r.p.m. Left hand measured via encoder
43 •	IxR act. speed R	__	-3500	3500	U/min	Actual motor r.p.m. Right hand measurement via motor voltage In normal operation it must just about correspond to the encoder r.p.m.
44 •	IxR act. speed L	__	-3500	3500	U/min	Actual motor r.p.m. Left hand measurement via motor voltage In normal operation it must just about correspond to the encoder r.p.m.
45 •	current controller					Configure motor current
46	current maximum	....	0.0	16.0	A	Max. motor rated current Default value for tenter guider infeed KRS 47/51: 8.0 A KRS 52: 8.0 A KRS 49/55: 16.0 A KRS 56: 12.0 A
47 •	limited current R	__	0.0	16.0	A	Actual max. motor current Right hand Limitation of motor current depends on motor temperature
48 •	limited current L	__	0.0	16.0	A	Actual max. motor current Left hand Limitation of motor current depends on motor temperature Only for controller type 0 and 2
49	overdrive factor.	1.50	1.00	2.00		Factor motor current overdrive The motor current is increased by the preset factor. It is limited, however, to max. power.
50	derating temp.	65	40	75	°C	Motor nominal temperature From this temperature onwards the motor current is reduced. The actually acceptable motor current is shown in parameter “limited current R/L” (P47 and P48).
51 •	act. current R	__	-51,2	51,2	A	Measured motor current right
52 •	act. current L	__	-51,2	51,2	A	Measured motor current left Only for controller type 0 and 2

No.	Name	Default	Min.	Max.	Unit	Description
53	reserved 53					
54	reserved 54					
55 •	diagnostics					Diagnostics parameters
56 •	system error	__				Error display (see error table in section 9.2) 1 = UAC power low 2 = UAC power high 3 = UDC inter. low 4 = UDC inter. high 5 = UDC sec.1 fault 6 = UDC sec. 2 fault 7 = 24 V extern fault 8 = 24 V intern low 9 = 24 V intern high 10 = emergency loop 11 = I inter. fault 12 = READY out fault 13 = AUTO out fault 14 = FAN out fault 15 = I motor R high 16 = I motor L high 17 = Temp case high 18 = Temp motor R high 19 = Temp motor L high 20 = encoder R fault 21 = encoder L fault 22 = encoder R invers 23 = encoder L invers 24 = sensor R fault 25 = sensor L fault 26 = gear constant fault 27 = power off 28 = Temp motor R fault 29 = Temp motor L fault 30 = Motorline R fault 31 = Motorline L fault 32 = motor R overload 33 = motor L overload

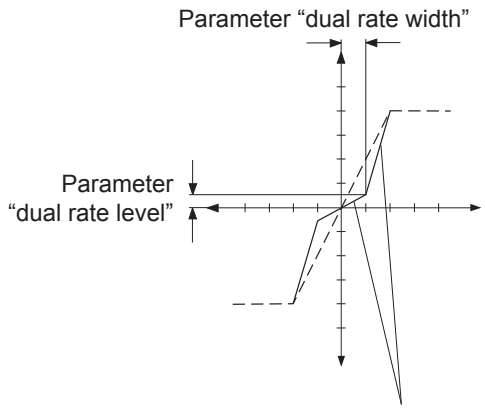
No.	Name	Default	Min.	Max.	Unit	Description
57 •	motor status	__				Internal indication of the motor operating states: Only for E+L service personnel! [ ] R_encoder 0-speed [ ] R_encoder fault [ ] R_encoder invers [ ] R_motor line open [ ] R_motor blocked [ ] R_current limit [ ] R_current max. [ ] R_voltage max. [ ] L_encoder 0-speed [ ] L_encoder fault [ ] L_encoder invers [ ] L_motor line open [ ] L_motor blocked [ ] L_current limit [ ] L_current max. [ ] L_voltage max. encoder 0-speed: Standstill monitoring encoder fault: Motor standstill + motor is operated + IxR signal > 0 encoder invers: Encoder speed inverted for IxR speed motor line open: Motor cable break motor blocked: Motor standstill + 90% motor nominal current current limit: 90% motor nominal current current max.: End stage overloaded voltage max.: PWM signal at 100% limit
58 •	Reset counter	__	0	9999		Reset counter
59 •	running time meter	__	0	32000	h	Time counter
60 •	input voltage AC	__	0.0	999.9	V	Display input voltage
61 •	input voltage DC	__	0.0	999.9	V	Display voltage intermediate circuit
62 •	supply voltage 24 VDC	__	0.0	999.9	V	Display 24V-supply voltage
63	temperature case	__	0	100	°C	Display temperature heat sink T > 40 °C fan ON T > 80 °C defect, final stage switches off
64 •	temp. case max.	__	0	100	°C	Display of max. temperature reached by heat sink
65 •	temperature motor R	__	0	500	°C	Display motor temperature right T > 85 °C defect, final stage switches off
66 •	temperature motor L	__	0	500	°C	Display motor temperature left T > 85 °C defect, final stage switches off Only for controller type 0 and 2
67	enc-test off/ on/ IR	1	0	2		Motor encoder monitoring 0 = OFF 1 = ON, with autom. switching to IxR 2 = OFF, r.p.m. control with IxR compensation
68	enc-test delay	1.2	0.1	3.0	s	Encoder monitoring delay
69	main loops	__		32000		Program execution time in 1/sec

No.	Name	Default	Min.	Max.	Unit	Description
70 •	configuration					Configure digital fabric tension controller DC 55
71 •	controller type	__	0	3		Type of controller 0 = KRS 47/51 1 = KRS 46/55 2 = KRS 52 3 = KRS 56 Setting performed via keyboard on controller DC 55..
72	code number	0	0	9999		Password Password for service setup level 0 = no password >0 = password (four-digit numeric code)
73	auto address	1	0	2		Automatic address assignment for sensor 0 = Display only for sensor addresses 1 = automatic setting of sensor addresses to x.1/x.2 2 = setting the sensor addresses to the addresses defined in parameter P74 and P75
74	connector Right	x.x	0.0	7.F		Sensor address, plug location right
75	connector Left	x.x	0.0	7.F		Sensor address, plug location left
76	rel switch on time	0.2	0.1	1.5	sec	Intermediate circuit relay switching delay
77	endswitch invert	0.0	0.0	F.F		Inversion of limit switch inputs
78•	calibration					Calibrate digital fabric tension controller DC 55 Only for E+L service personnel!
79	calib. UAC	1.00	0.90	1.10		Calibration of input voltage
80	calib. UDC	1.00	0.90	1.10		Calibration of voltage intermediate circuit
81	calib. I-set R	1.00	0.90	1.10		Calibration of current meter r.h. motor
82	calib. I-set L	1.00	0.90	1.10		Calibration of current meter l.h. motor Only for controller type 0 and 2
83	offset I-act R	0	-50	50		Offset current measurement motor right
84	offset I-act L	0	-50	50		Offset current measurement motor left Only for controller type 0 and 2
85	offset I-set R	0	-50	50		Offset current output motor right
86	offset I-set L	0	-50	50		Offset current output motor left Only for controller type 0 and 2
87	offset U-motor-R	0	-50	50		Offset voltage measurement motor right
88	offset U-motor-L	0	-50	50		Offset voltage measurement motor left Only for controller type 0 and 2
89	speed constant	....	0	20000	U/V	Motor speed constant value is required for computing the motor speed via the IxR compensation Default value for actuator KR 47/51: 47 KR 52/56: 68
90	IxR compensation	500	0	20000	mOhm	Motor internal resistance value is required for controlling the motor speed via the IxR compensation
91	powerderate limit	60	50	65	°C	Temperature heat sink from this temperature performance is limited

No.	Name	Default	Min.	Max.	Unit	Description
*92 •	webspeed config.					Configure web speed measurement (only for DC 5506)
*93	webspeed constant	10	10	100	l/m	No. of pulses per meter of web
*94	webspeed max.	0	0	1000	m/min	Maximum web speed
*95 •	actual webspeed	__	0	1000	m/min	Display of actually measured web speed
96 •	!! SERVICE !!					Service settings Only for E+L service personnel!
97	service off / on	0	0	1		Switch on service mode Reset to 0 after “Reset”
98	IC control on/off	0	0	1		Switch off intermediate circuit controller Reset to 0 after “Reset”
99	service mode	0	0	7		Service mode 1 = motor stages deactivated 2 = test current controller square 3 = test current controller delta 4 = test speed controller square 5 = test speed controller delta 6 = sensor signal square 7 = sensor signal delta
100	test value 1	0	-100	100	%	Test value 1 for service mode
101	test value 2	0	-100	100	%	Test value 2 for service mode
102	test cycle time	0.00	0.00	10.00	s	Test cycle time for service mode
103 •	set language					Set operator language
104	engl./chinese	0	0	1		0 = English 1 = Chinese
105 •	output setting					Configure digital outputs (only for interface DI A02.)
106	can adress 01	0.0	0.1	F.F		CAN address 01 CAN address for the 1st module LK 4203 in the interface DI A02.
107	01 usage out 0	0	0	50		Function output DA0 (1st module LK 4203) Error message for output DA0. 0 = no usage Sensor right status: 1 = no right sensor 2 = sensor signal out of range (right or left) 3 = sensor signal right 4 = sensor signal left 5 = sensor signal invalid Sensor left status: 6 = no left sensor 7 = sensor signal out of range (right or left) 8 = sensor signal right 9 = sensor signal left 10 = sensor signal invalid Motor right: 11 = motor error (1 of 5) 12 = error 30 = motor line R fault 13 = error 32 = motor R overload 14 = error 15 = I motor R high 15 = error 18 = temp motor R high 16 = error 28 = temp motor R fault

No.	Name	Default	Min.	Max.	Unit	Description
107						Motor left: 17 = motor error (1 of 5) 18 = error 31 = motor line L fault 19 = error 33 = motor L overload 20 = error 16 = I motor L high 21 = error 19 = temp motor L high 22 = error 29 = temp motor L fault Encoder right: 23 = encoder error (1 of 2) 24 = error 20 = encoder right fault 25 = error 22 = encoder right invers Encoder left: 26 = encoder error (1 of 2) 27 = error 21 = encoder left fault 28 = error 23 = encoder left invers Power supply UAC: 30 = power supply fault (1 of 2) 31 = error 1 = UAC power low 32 = error 2 = UAC power high Power supply 24 VDC: 33 = UDC intern fault (1 of 2) 34 = error 8/9 = UDC intern fault 35 = error 7 = UDC extern low Temperature case: 38 = error 17 = temp case high Emergency loop: 39 = error 10 = emergency loop open Limit switches right: 40 = limit switch open (1 of 4) 41 = ATL right in open 42 = ATL right out open 43 = limit switch right in open 44 = limit switch right out open Limit switches left: 45 = limit switch open (1 of 4) 46 = ATL left in open 47 = ATL left out open 48 = limit switch left in open 49 = limit switch left out open
108	01 usage out 1	0	0	50		Function output DA1 (1st module LK 4203) See parameter P107, output DA0
109	01 usage out 2	0	0	50		Function output DA2 (1st module LK 4203) See parameter P107, output DA0
110	01 usage out 3	0	0	50		Function output DA3 (1st module LK 4203) See parameter P107, output DA0
111	01 usage out 4	0	0	50		Function output DA4 (1st module LK 4203) See parameter P107, output DA0
112	01 usage out 5	0	0	50		Function output DA5 (1st module LK 4203) See parameter P107, output DA0
113	01 usage out 6	0	0	50		Function output DA6 (1st module LK 4203) See parameter P107, output DA0
114	01 usage out 7	0	0	50		Function output DA7 (1st module LK 4203) See parameter P107, output DA0

No.	Name	Default	Min.	Max.	Unit	Description
115	can adress 02	0.0	0.1	F.F		CAN address 02 CAN address for the 2nd module LK 4203 in the interface DI A02.
116	02 usage out 0	0	0	50		Function output DA0 (2nd module LK 4203) See parameter P107, output DA0
117	02 usage out 1	0	0	50		Function output DA1 (2nd module LK 4203) See parameter P107, output DA0
118	02 usage out 2	0	0	50		Function output DA2 (2nd module LK 4203) See parameter P107, output DA0
119	02 usage out 3	0	0	50		Function output DA3 (2nd module LK 4203) See parameter P107, output DA0
120	02 usage out 4	0	0	50		Function output DA4 (2nd module LK 4203) See parameter P107, output DA0
121	02 usage out 5	0	0	50		Function output DA5 (2nd module LK 4203) See parameter P107, output DA0
122	02 usage out 6	0	0	50		Function output DA6 (2nd module LK 4203) See parameter P107, output DA0
123	02 usage out 7	0	0	50		Function output DA7 (2nd module LK 4203) See parameter P107, output DA0
124	hardware setting					Hardware settings Only for E+L service personnel!
125	LCD contrast	45	10	64		Contrast LCD module (type-dependent) High value = low contrast Low value = high contrast
126	LCD back light	5	0	32		Brightness LCD module High value = brighter Low value = darker
127	LCD scroll	5	5	32		Text scroll LCD module High value = slow scrolling Low value = fast scrolling
128	display err off	1	0	1		Indicate error code in the LCD module 0 = off 1= on
129	error display time	3	0.5	100.0	s	Display time error code If several errors are present at the same time, the errors are displayed alternately, each for X.X seconds.
130	enable dual rate width	0	0	1		Indicate and set parameter “dual rate with” P14 in the simple setup level. 0 = off 1 = on

No.	Name	Default	Min.	Max.	Unit	Description
131	Extern selectable dual rate slope					Selectable characteristic (on outside of edge ensor FR 5502)
132	dual rate 1 width	40	10	75	%	Window width 1 See explanation P14 “dual rate width”
133	dual rate 1 level	45	10	100	%	Speed reduction 1 See explanation P15 “dual rate level”
134	dual rate 2 width	45	10	75	%	Window width 2 See explanation P14 “dual rate width”
135	dual rate 2 level	40	10	100	%	Speed reduction 2 See explanation P15 “dual rate level”
136	dual rate 3 width	50	10	75	%	Window width 3 See explanation P14 “dual rate width”
137	dual rate 3 level	35	10	100	%	Speed reduction 3 See explanation P15 “dual rate level”
138	dual rate 4 width	60	10	75	%	Window width 4 See explanation P14 “dual rate width”
139	dual rate 4 level	30	10	100	%	Speed reduction 4 See explanation P15 “dual rate level”
140	dual rate selector	0	0	4		Select controller characteristic (only with P141 = 1) 0 = controller characteristic P14/P15 1 = controller characteristic P132/P133 2 = controller characteristic P134/P135 3 = controller characteristic P136/P137 4 = controller characteristic P138/P139
141	switch on selector	0	0	1		Selection controller characteristic ON/IOFF 0 = dual rate selector OFF, P140 = 0 1 = dual rate selector ON, select controller characteristic either on edge sensor FR 5502 or in P140.
142	gain sw. over del	0	0	2000	ms	Time delay to switch from reduced speed within the window width “dual rate width” to speed outside of the window width “dual rate width”. Active only when the edge sensor is covered up (web available), that is when the sensor signal changes from within the “dual rate width” towards sensor covered (outside “dual rate width”).  P142 Time delay between the positioning speed within and without the “dual rate width”

7. Commissioning

Warning!

Risk of crushing!

Moving parts may cause crushing.

Hazardous points that result from the movement of the infeed rails, e. g. open access to actuator, rack or outer limit switches, must be protected using a cover provided by the customer.

► Never reach with your hand or with a tool between rack and output gear, or between actuator and customer's machine.

Warning!

Risk of entanglement!

There is a risk of entanglement at rotating parts.

During commissioning or work on the infeed rails and the edge sensors, the motors for the edge spreading devices must be switched off.

► Never touch or reach onto or into moving parts.

Notice

During commissioning or operation no-one must remain in the danger area around the tenter machine.

Commission the tenter guider infeed without a web.

The commissioning steps must be performed for the right and left side of the tenter guider.

7.1 Safety measures prior to switching on the power supply

► Check that the individual leads have been wired correctly.

► **Actuator KR 47:**
Decouple the screw from the gearing to prevent the infeed rails moving during the electrical function test.

► **Actuator KR 51/52/56:**
Remove the rack lock from the rack and swivel the pinion out of the rack to prevent the infeed rails moving during the electrical function test.

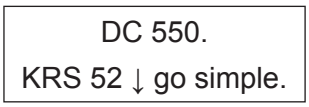
► Set the infeed rails approx. in the center to prevent the rail limit switches and limit switch ATL 0103 being triggered inadvertently.

► Set the mode selector manual - automatic mode to "manual".

7.2 System test

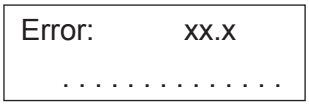
► Switch on the power.

Once switched on, the controller runs a system test. It checks the internal and external supply voltages, operating temperature and whether the motor, incremental encoder and sensor are connected.



Example: controller type display

- If controller DC 55 is operational, the first menu window with the controller type appears on the LCD display. See figure opposite. Commissioning may be continued from step 6.3 “Check controller type”.
- If no display appears, check the operating voltage, it may be too high (max. 34 V AC +10 %, -15 %), preventing the controller from switching on. If necessary, check the emergency OFF circuit.

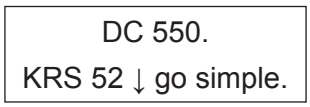


Error message

- If the error message opposite is displayed, a fault has been detected during the system test. The error code is indicated in the first line of the display, in the second line a short error description is flashed across the display.
- If several errors are present at the same time, the errors are displayed alternately.

Errors must be cleared before commissioning may be continued from step 6.3. See section 9.1 “error messages”.

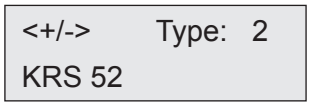
7.3 Checking the controller type



► If the displayed controller type does not match the system, set the controller type.

See “setup editor” section, “type” menu.

Example:



0 = KRS 47/51
1 = KRS 49/55
2 = KRS 52
3 = KRS 56

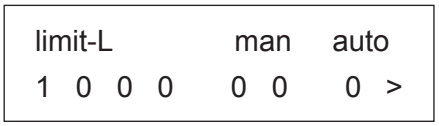
Notice

The selection of a specific controller type also pre-configures various motor characteristics.

7.4 Check function of limit switches, control push buttons and external pulse generator

LCD displays on controller DC 55

Left infeed rail in direction of web travel



Limit switches and control push buttons

1 X1.4 Outer limit switch ATL 0103
2 X1.8 Outer rail limit switch NT 80-04
3 X1.6 Inner rail limit switch NT 80-04
4 X1.3 Inner limit switch ATL 0103
5 X3.12 Manual inner
6 X3.11 Manual outer
7 X3.2 Automatic ON

► Open “limit-L” menu.

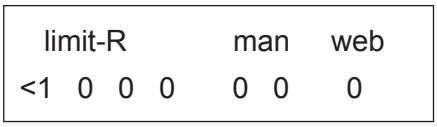
► Actuate limit switches on the left slide rail in order. During this process check function using the LCD display, see figure above. A closed circuit is indicated with a “1”, an open circuit with a “0”.

► Then check button for manual operation on the left slide rail and button for automatic operation.

► Open “limit-R” menu.

LCD displays on controller DC 55

Right infeed rail in direction of web travel



Limit switches, control push buttons and external pulse generator

1 X4.4 Inner limit switch ATL 0103
2 X4.8 Inner rail limit switch NT 80-04
3 X4.6 Outer rail limit switch NT 80-04
4 X4.3 Outer limit switch ATL 0103
5 X6.12 Manual inner
6 X6.11 Manual outer
7 X6.2 external pulse generator (on DC 5506 only)

► Actuate limit switches on the right slide rail in order. During this process check function using the LCD display, see figure above. A closed circuit is indicated with a “1”, an open circuit with a “0”.

► Then check button for manual operation on the right slide rail.

► If necessary, check external pulse generator. Due to the slow response of the display only static signals are displayed.

7.5 Check CAN bus

► Check the CAN bus connections. The CAN bus connection LEDs on the digital controller and sensors should light up green, i.e. operational. If a LED lights up red, there is a malfunction on the CAN connection in question. Check the device and CAN cable.

7.6 Checking automatic mode

7.6.1 Motor direction of rotation

Notice

In order to check the motors, the sensors must be correctly connected.

The rail limit switches and limit switches ATL must be off, i.e. not actuated.

► Set the mode selector to “automatic” mode.

► Check the motor direction of travel.

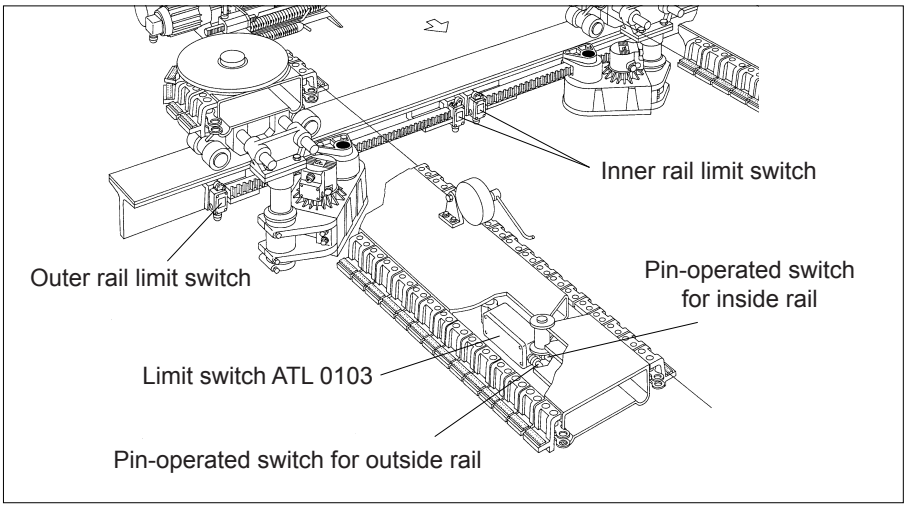
Sensor uncovered	Infeed rail moves to inside
Sensor covered	Infeed rail moves to outside

- If the actuating movement is in the wrong direction but the speed right (KRS 47: approx. 100 min^{-1}, KRS 51/52: pinion approx. 27 min^{-1} and KRS 55/56: pinion approx. 43 min^{-1}) check the mounting location of the actuators, see actuator description. If necessary, reverse the motor effective direction in parameter P25 “Mounting location”.

► Do not turn the motors:

- Check parameter P46 “Motor current”. Value possibly wrongly set.
- Check parameter P51 and P52 “act. motor current”. If the motor current is > I max, check the motor output for a short circuit.

7.6.2 Rail limit switches NT 80-04



► Check the function of the rail limit switches.

- When the sensor is uncovered, actuate the inner rail limit switch on the rack. The motor is switched off.
- When the sensor is covered, actuate the outer rail limit switch. The motor is switched off.

If necessary, swap the rail limit switch connections. See also menu “Limit”, section 6.4.

7.6.3 Limit switch ATL 0103

► Check the limit switch, also see diagram. The limit switches have two pin-operated switches with three switch settings each.

1. When the sensor is uncovered, actuate the pin device on the inside of the rail until the **first** setting position is reached. The motor effective direction is reversed, the rail moves to the outside at the speed set in parameter P19 until the pin device is released again.
2. Actuate the pin device on the inside of the rail until the **second** setting position is reached. The operating voltage for controller is switched off via the emergency OFF circuit until the pin device is released again.
3. Actuate the pin device on the inside of the rail until the **third** setting is reached. The tenter width adjustment is switched off provided the contact is connected on-site.
4. When the sensor is covered, actuate the pin device on the inside of the rail until the **first** setting is reached. The effective direction of the motor is reversed, the rail moves to the inside at the speed set in parameter P19 until the pin device is released again.

5. Actuate the pin device on the inside of the rail until the **second** setting is reached. The operating voltage is switched off in controller DC 55 via the emergency OFF circuit until the pin device is released again.
6. Actuate the pin device on the inside of the rail until the **third** setting is reached. The tenter width adjustment is switched off provided the contact is connected on-site.

7.7 Checking manual mode

► Set the mode selector to “manual”.

► Check manual functions.

Manual to inside Infeed rail moves to inside
Manual to outside Infeed rail moves to outside

Swap push button connections if necessary.

7.8 Establishing total gear constant (for KRS 47/49 only)

Notice

The total gear constant, parameter P28 “gear constant”, of a tenter guider infeed may be calculated on the basis of parameter P29 “encoder resolution”, parameter P30 “rotation gear” and parameter P31 “linear gear”.

On tenter guider infeeds KRS 47/49 the parameter values must be established on-site.

► Parameter P29 “encoder resolution” (pulses per revolution of the encoder on the actuator) retains its default value: 50 pulses per revolution.

► Enter the gear transmission ratio between the spindle and motor in parameter P30 “rotation gear”.

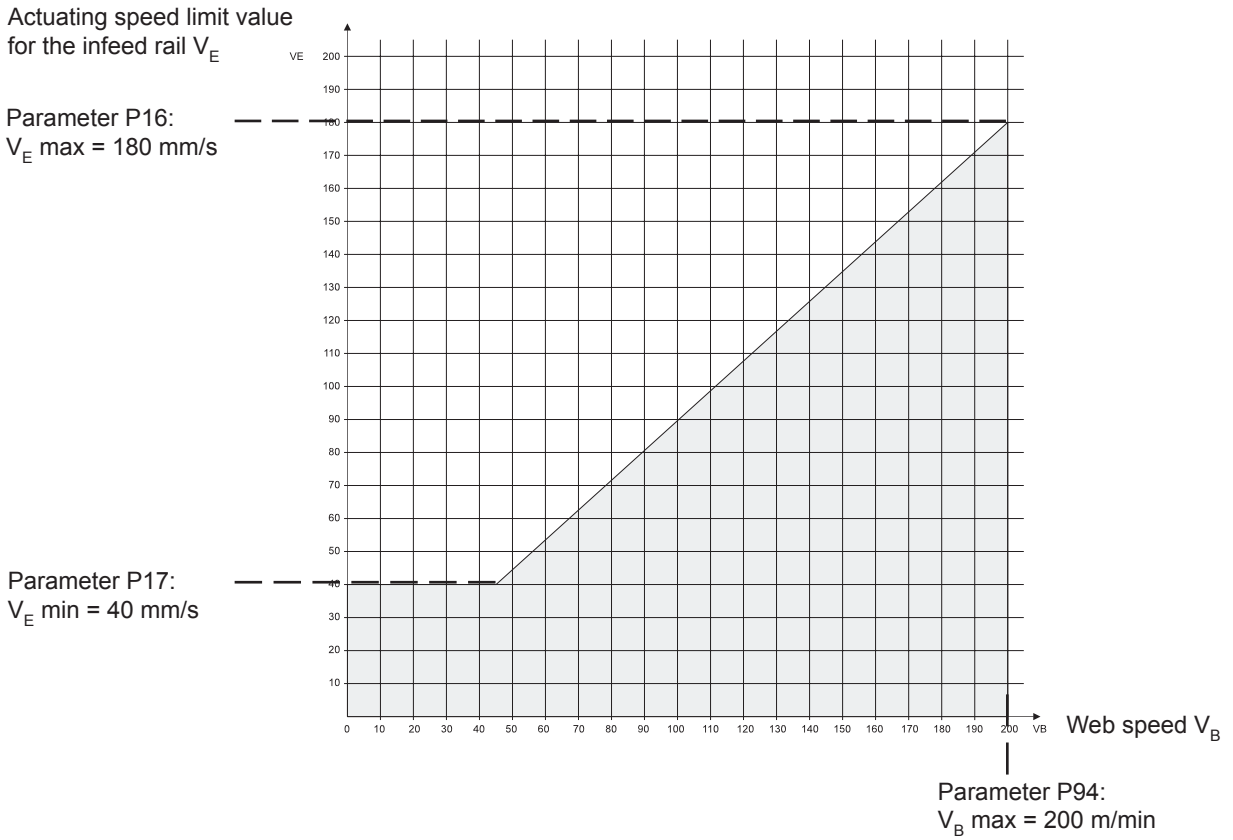
- If the E+L actuator is directly mounted on the spindle, enter the gear transmission ratio of the E+L actuator.
- If, for instance, the E+L actuator is linked to the spindle via a chain drive, calculate and enter the gear ratio as follows:
  i = E+L actuator gear ratio x chain drive ratio

► Enter the spindle pitch in millimeters per revolution in parameter P31 “linear gear”.

7.9 Adjust infeed rail actuating speed to web speed (for DC 5506 only)

Notice

The digital controller DC 5506 additionally features a pulse input (14) for recording the web speed with which it is possible to limit the maximum infeed rail actuating speed according to the current web speed in automatic mode. The infeed rail actuating speed is thus changed according to the web speed.



Example

- ► Enter the no. of pulses per meter of web (10 - 100) of the external pulse generator in parameter P93.
- ► In parameter P94 enter the maximum web speed V_B max in m/min at which the maximum infeed rail actuating speed is to be reached.
- ► In parameter P16 enter the maximum required infeed rail actuating speed V_E max.
- ► In parameter P17 enter the minimum required infeed rail actuating speed V_E min.

7.10 Enter code for service setup level

Service setup level settings are only allowed to be made by qualified service personnel.

Access to the service setup level can be protected by entering a four-digit numeric code such that only authorized personnel can make settings.

► Enter four-digit code in parameter P72 “code number”

The service setup level can now only be opened by entering the four-digit numeric code.

access denied
↑ go simpleadj

If the numeric code is entered incorrectly three times, access to the service setup level is disabled. The indication shown on the left is displayed.

Access to the service setup level is enabled again as soon as the digital controller DC 55.. is electrically isolated.

► Once you have finished making all the settings in the setup editor, return to the start window.

DC 550.
KRS 4./5. ↓ go simp..

► Switch off the power.

► Set the infeed rails to approx. the center position.

► KR 47: connect screw and gearing.

► KR 51/52/56: connect gearing and rack and set eccentric lock without any play.

Commissioning is thus complete.

Notice

The tenter guider infeed is now operational.

Digital controller DC 55 is set and tested by E+L. In the majority of cases, this setting obtains good results. Should this not be the case, various settings may be optimized, see section “Optimization”.

8. Operation

Warning!

Risk of crushing!

Moving parts may cause crushing.

Hazardous points that result from the movement of the infeed rails, e. g. open access to actuator, rack or outer limit switches, must be protected using a cover provided by the customer.

► Never reach with your hand or with a tool between rack and output gear, or between actuator and customer's machine.

Warning!

Risk of entanglement!

There is a risk of entanglement at rotating parts.

During commissioning or work on the infeed rails and the edge sensors, the motors for the edge spreading devices must be switched off.

► Never touch or reach onto or into moving parts..

Warning!

Cuts!

Edges of moving webs can cause cuts.

► Never touch the edges of running webs.

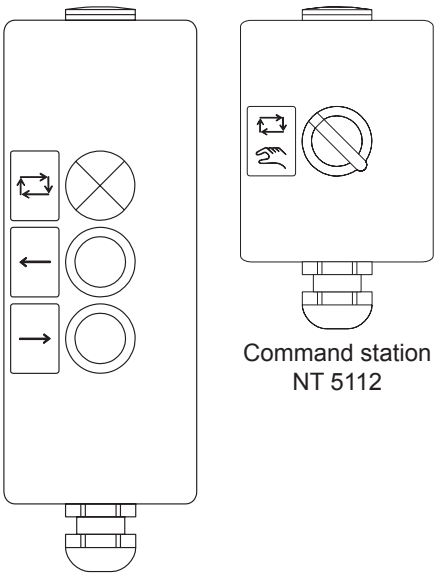
Notice

During operation there must not be anybody in the tenter's danger area.

In the **automatic mode** the infeed rail and therefore the pinning device for the web follow the sensor. It is a prerequisite for the automatic operating mode that there is a web in the field of view of the sensor. This means the web is already inserted in the infeed rail and pinned.

Manual operation is not suitable for continuous operation.

8.1 Command stations



Command station NT 5112

Command station NT 5303

The tenter guider infeed is operated by command stations NT 5112 and NT 5303 (see illustration on left).

Use command station NT 5112 to choose between “automatic” and “manual” modes”.

Use command stations NT 5303 to move the infeed rails to the right or left in automatic or manual mode. The “Automatic” display lights up when automatic mode is switched on. If the display flashes, a warning is being signalled, see error table in section 9.2.

8.2 Operating sequence

Insert web:

Notice

Only insert the web when the tenter machine is switched off.

- ► Switch off the tenter.
- ► Switch off motors for the edge spreading devices..
- ► Select manual mode on command station NT 5112 and set the rail to the web width.
- ► Swivel out the overfeed roller from the chain (do not do so for clips).
- ► Enable the infeed roller drive.
- ► Insert the web in the spreading and overfeed, close overfeed roller.

Switch on automatic mode:

- ► Select automatic mode on command station NT 5112.
- ► Enable automatic mode.
- ► Enable tenter guider and overfeed drive, enable mispinning guard if necessary.
- ► Switch on motors for the edge spreading devices..
- ► Check and set pinning if necessary.

9. Optimization

Notice

Digital controller DC 55 has been set and tested by E+L. In most cases good results are obtained with this setting. If this is not the case, various settings may be optimized.

9.1 Premises for optimization

The aim of optimization is to minimise the controlling difference (difference between the set and actual values) as far as possible.

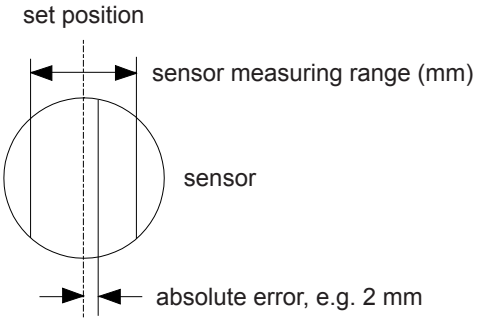
The tenter guider infeed is optimally set if the infeed rail adjusts to the set position value (equivalent in value) in the shortest possible time in automatic mode. The time depends on the proportional range (parameter P13) and the actuating speed (parameter P16). Use these two parameters to determine the sensitivity and also specify the gain factor G or proportional amplification. See following illustration.

Example:
Absolute error 2 mm
max. actuating speed 100 mm/sec.
Proportional range 10 mm

Sensitivity or gain factor G (1/sec)

$$G = \frac{\text{max. actuating speed (mm/sec.) y}}{\text{proportional range (mm) } X_P}$$

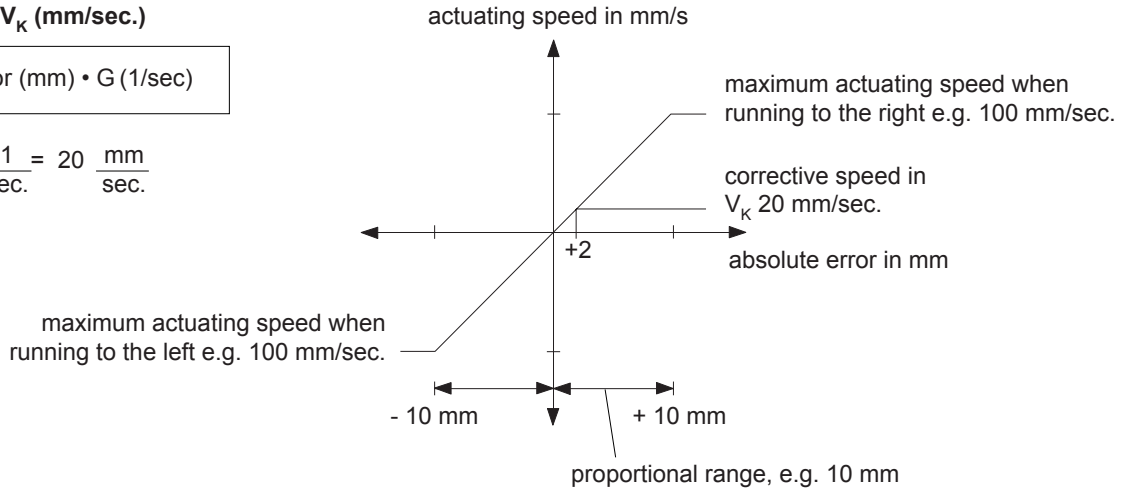
$$G = \frac{100\ (\text{mm/sec.})}{10\ (\text{mm})} = 10\ \frac{1}{\text{sec.}}$$



Corrective speed V_K (mm/sec.)

$$V_K = \text{absolute error (mm)} \bullet G\ (1/\text{sec})$$

$$V_K = 2\ \text{mm} \bullet 10\ \frac{1}{\text{sec.}} = 20\ \frac{\text{mm}}{\text{sec.}}$$



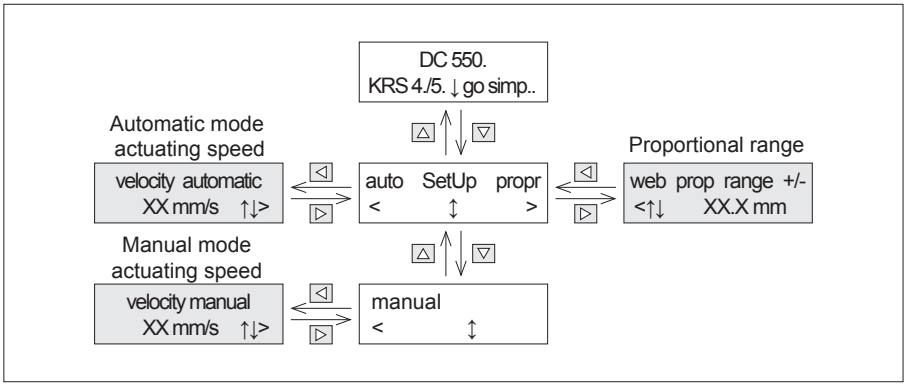
Example: controller proportional range and actuating speed

9.2 Optimize tenter guider infeed

Notice

The tenter guider is to be optimized with the web running. A typical web with a stable, regular edge should be used.

The proportional range and the actuating speed can be changed directly in the automatic and manual mode using the simple setup level menu items “web prop range ±”, “velocity automatic” and “velocity manual”. Every change is effective immediately.



Simple menu level for optimizing the tenter guider infeed

► Select automatic mode.

► Set recommended values for the proportional range and the actuating speed listed in table below. The values are related to the maximum web speed run.

Notice

The max. positioning speed values shown in the automatic mode for the entry rails apply only to optical scanning and presuppose a good and regular web edge.

In the case of mechanical scanning with a feeler and a poor or uneven web edge, the system may start to oscillate at a speed of 80 mm/sec.

		Parameter P13 velocity automatic	**Parameter P16 web prop range**
Tenter guider infeed	Maximum web speed	Proportional range	Actuating speed in automatic mode
KRS 47/49/51/52/55/56	40 m/min	+/- 5 mm	60 mm/s
KRS 47/49/51/52/55/56	80 m/min	+/- 6 mm	80 mm/s
KRS 51/52/55/56	120 m/min	+/- 8 mm	100 mm/s
KRS 55/56	180 m/min	+/- 10 mm	150 mm/s

Suggested optimization values

► Optimize the controller by changing the values for the proportional range and the actuating speed in small steps.

- **Web prop range (**parameter P13)

  Use the proportional range parameter to indirectly determine amplification and in turn, sensitivity. The smaller the set proportional range, the greater the controller sensitivity will be.

  We recommend that you decrease the proportional range in small steps. Decrease it until the web begins to oscillate, then increase it again until no overshooting may be detected.

  Given a large degree of overshooting or unsatisfactory results, the actuating speed must also be changed.

- **Velocity automatic** (parameter P16)

  Use this parameter to set the maximum actuator speed in automatic mode. The actuating speed may be set within a range of 1 mm/sec to 130 mm/sec (controller type 0, 2) or 1 mm/sec to 180 mm/sec (controller 1, 3).

Notice

If the actuating speed is too high or the controller proportional range set too small, the controller will start to oscillate.

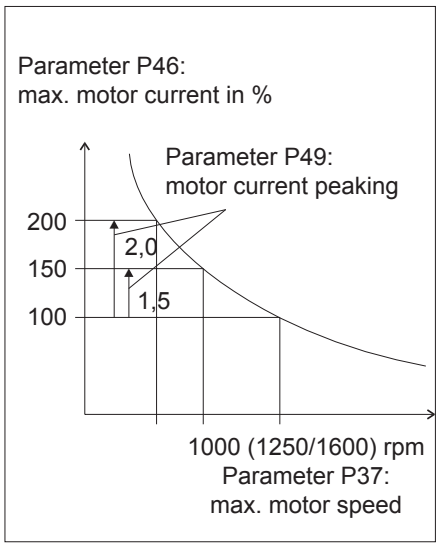
Controller DC 5506: See section 6.9 “Adjust infeed rail actuating speed to web speed”.

► Select manual mode.

- **Velocity manual** (parameter P18)

  Check the actuating speed in manual mode and set if necessary. The actuating speed in manual mode is independent of the actuating speed in automatic mode.

9.3 Optimize motor current (actuator dynamics and actuating force)



Via parameter P49 “overdrive factor” a motor current and thus actuator dynamics increase may be set. The maximum motor current may be raised by factor 1 to 2, at the most however to 12 A per motor output.

Basic setting: 1.5.

If the dynamics seem to high the value may be reduced.

Notice

So as not to exceed the permissible input power in controller DC 5501, this action may only be performed in the lower and medium speed range.

Parameter P37 “max. rot. speed” is used to limit the output power and thus the input power.

Default setting**:**
1250 rpm for controller type 0 and 1
1600 rpm for controller type 2 and 3

If a lesser actuating speed is selected than the possible V_E max (< 60% V_E max), the value of parameter P37 may be increased. As such the motor current and thus the actuating force in the lower speed range may be increased **more steeply**.

If a too high setting of parameters P37 causes the intermediate circuit control to switch off due to over current (error 11), especially when reversing the actuators, the value of parameter P37 must be reduced.

9.4 Calibrate the current symmetry on the motor outputs

The current symmetry is works calibrated.

Unbalanced motor currents may lead to an overload in the intermediate circuit control and thus to its switching off during power peaks (error 11).

► If error 11 occurs, check the current on both motors with an amperemeter or similar for symmetry.

For this purpose the motors must not be taxed (no web).

► If there is a deviation of >15 % between right/left-running in manual mode, recalibrate the current symmetry.

Notice

Call up the appropriate function in parameter P3 “start service” to calibrate the current symmetry whereby the system must be set to “Automatic OFF” (manual mode). Both motors must be at a standstill and untaxed.

► Select parameter P3. Set parameter value to 20 and change parameter to P2 or P4. The motor mounted on the right in the web direction of travel is calibrated.

► Select parameter P3. Set parameter value to 21 and change parameter to P2 or P4. The motor mounted on the left in the web direction of travel is calibrated.

► Select parameter P3. Set parameter value to 22 and change parameter to P2 or P4. The calibration data are saved.

9.5 Optical scanning / controller characteristics

Notice

The following settings can be realized only if an edge sensor FR 55.. with material number 343546 is used together with the software version ZC 3402-0002F_ZD or higher.

The digital controller uses a factory set and preconfigured controller characteristic (P14 “dual rate width” and P15 “dual rate level”). This characteristic defines the sensitivity of the entry rails to changes in the web edge position. This setting is adequate for a consistent edge.

If different types of web are processed on the same tenter and if these webs have slightly irregular edges, another four different characteristics can be activated. These four controller characteristics are configured with parameters P132 to P139.

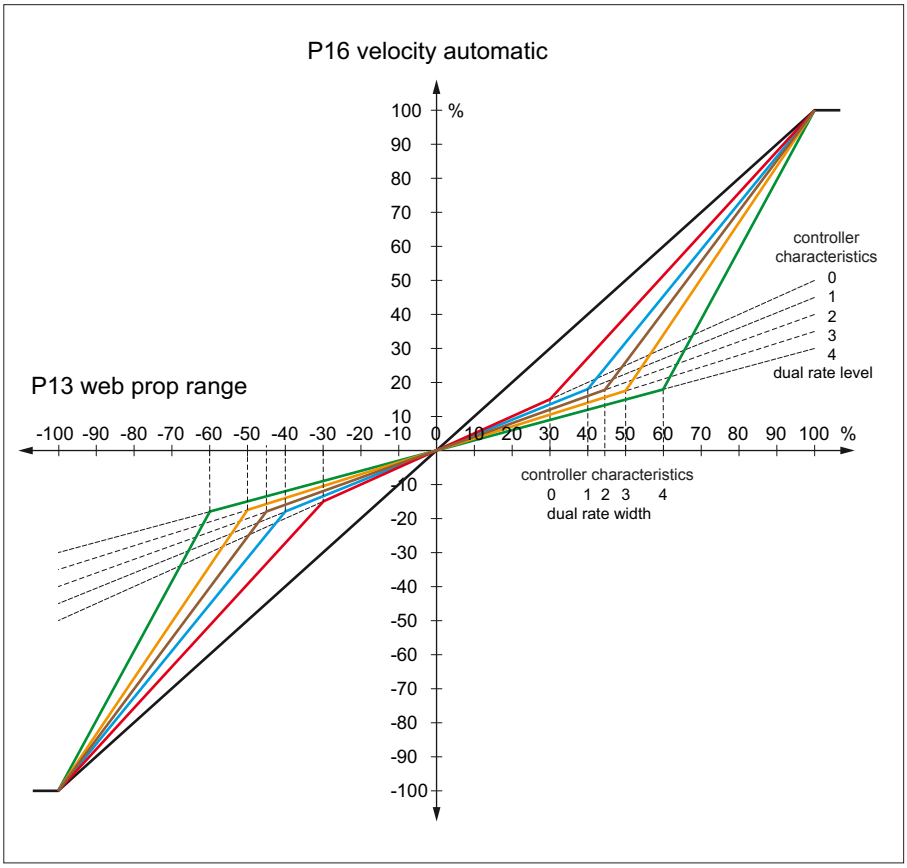
Altogether this makes 5 different controller characteristics for 5 different levels of sensitivity. The controller characteristics are selected on edge sensor FR 55.

9.5.1 Activation of controller characteristics

► Set parameter P141 “switch on selector” to value 1.

9.5.2 Selection of controller characteristics

► See manual Edge Sensor FR 55.



9.5.3 Optimization of controller characteristics

The controller characteristics can be adapted to the individual customer needs. However, we suggest to make only minor changes on the pre-configured values.

If the edge defect is very big, as might be the case on webs with jagged edges or protruding weft threads for example, the position of the web edge must be detected mechanically. Webs made of badly reflecting material must also be scanned mechanically.

► Optimizing controller characteristics with parameters “dual rate width” and “dual rate level”.
See parameter P14/P15 and parameter P132 to P139.

controller characteristics 0 (P14/P15)
controller characteristics 1 (P132/P133)
controller characteristics 2 (P134/P135)
controller characteristics 3 (P136/P137)
controller characteristics 4 (P138/P139)

10. Troubleshooting / repair

Warning!

Malfunctions must be remedied with the machine switched off.

All repairs must be undertaken with the machine switched off.

► Switch off machine.

► Secure machine against switching back on.

10.1 Error messages

Error:	24
Sensor right fault	

Error message: example error 24

Current system errors are indicated on the digital controller LCD display by an error code and brief description. The error message is displayed until the system error is cleared.

If several errors are present at the same time, the errors are displayed alternately.

In the event of serious errors on tenter guider infeeds with **one** digital controller DC 55.. (KRS 47/51/52) both actuators are blocked. On tenter infeeds with **two** DC 55 digital controllers (KRS 49/55/56) only the actuator with the defective digital controller is blocked. See error table in section 9.2.

Notice

The actuators remain blocked until the system error is cleared, afterwards they are enabled automatically. The “operational” digital output is also deactivated during this period (high resistance).

10.2 Error table

Ready out:	the “Ready” output (X4.9) is de-energized
Controller power off:	the power relay in the controller remains switched off. The LCD display is in operation. Errors are displayed.
Motor output off:	the power relay is switched on, the motor switched off.
Controller blocked:	the power relay is switched on, the motor blocked (with static torque).
Warning:	a warning is output. The “Automatic” display in command station NT 5112 flashes.

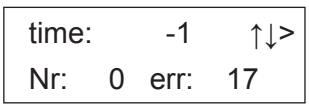
Error code	Error type	Ready out	Controller Power off	Motor output off	Controller blocked	Warning	Error description Tips on clearing error
1	UAC power low	X	X				Input voltage on DC 55 too low --> Check mains voltage and if necessary adjust at the input side. --> Check supply lead from transformer, transformer controller connection lead.
2	UAC power high	X	X				Input voltage on DC 55 too high --> Check mains voltage and if necessary adjust transformer at the input side.
3	UDC intern low	X	X				Intermediate circuit voltage in DC 55 too low --> Check mains voltage and if necessary adjust transformer at the input side. --> Check supply lead from transformer, transformer controller connection lead.
4	UDC intern high	X	X				Intermediate circuit voltage in DC 55 too high --> Check mains voltage and if necessary adjust transformer at the input side. Braking power demanded too high.
5	UDC sec1 fault	X	X				Internal error --> Replace device.
6	UDC sec2 fault	X	X				Internal error --> Replace device.
7	24 V extern fault Voltage on terminal X5.3 against X5.4	X		X			External operating voltage 24 V too low Overload or short circuit in 24 V mains system. --> Pinpoint cause, to do so measure voltage on terminal X5.3 against X5.4 and disconnect all 24 V terminals: X1.1-5-7 ; X3.1-4-9-10 ; X4.1-5-7 ; X6.1-4-9-10. Replace all connections one after the other and thus pinpoint cause.
8	24 V intern low Voltage on terminal X5.1 against X5.2	X	X				Operating voltage 24 V too low Overload or short circuit in 24 V mains system. --> Pinpoint cause, to do so disconnect all 24 V terminals: X1.1-5-7 ; X3.1-4-9-10 ; X4.1-5-7 ; X6.1-4-9-10. Unplug sensor cable on X15 and X16. Replace all connections one after the other and thus pinpoint cause.
9	24 V intern high	X	X				Internal error --> Replace device.
10	Emergency loop open	X	X				--> Check emergency OFF circuit (power circuit X1.9 – X1.10) X1.9 24 V output, X1.10 input, relay current approx. 50 mA.
11	I – intern fault	X		X			AC input current on terminals X2.1- X2.2 too high. - Input voltage too low. --> Check transformer voltage - Output power too high. --> Poss. reduce parameter P37. See also section 8.4 “Calibrate the current symmetry on the motor outputs”. --> Motor current peaking Reduce parameter P49 overdrive factor. --> Reduce motor current parameter P46 current maximum.
12	Ready out fault	X					Short circuit on output terminal X4.9
13	Auto out fault	X	X				Short circuit on output terminal X3.10 or X6.10

Error code	Error type	Ready out	Controller Power off	Motor output off	Controller blocked	Warning	Error description Tips on clearing error
14	Fan out fault	X	X				Short circuit on output terminal X 19. --> Check fan plug, replace fan.
15	I motor right high	X		X			- Motor current at right motor output too high. --> Check controller type, correct as necessary - Short circuit on motor output. --> Check leads to motor. - Ground fault on motor output. --> Check leads to motor. --> Check motor for ground fault.
16	I motor left high	X		X			- Motor current at left motor output too high. --> As in 15.
17	Temp case high	X		X		X	Heat sink temperature too high (>85 °C). Heat sink temperature too high due to an overload or increased ambient temperature. --> Check ambient temperature.
18	Temp motor right	X		X		X	Motor temperature too high (>85 °C). Motor temperature too high due to an overload. --> Check control circuit - sensors - guider - motor for vibrations. --> Increase proportional range and/or reduce actuating speed (see parameter list). --> Check motors - gear - rack for smooth action and play.
19	Temp motor left	X		X		X	Motor temperature too high (>85 °C). --> As in 18.
20	Encoder right fault					X	No signal from encoder on right motor. The guider automatically switches over to armature voltage control. Speed controlling is preserved with some impairment to accuracy (speed loss when taxed) - Encoder cable not connected or defective. -> Check cable and connection according to wiring diagram.
21	Encoder left fault					X	No signal from encoder on left motor. --> As in 20.
22	Encoder right invers					X	Right motor encoder signals mixed up. Guider automatically switches over to armature voltage control. Speed controlling is preserved with some impairment to accuracy (speed loss when taxed) - Encoder signals do not match motor direction of rotation. --> Check cable and connection according to wiring diagram.
23	Encoder left invers					X	Left motor encoder signals mixed up. --> As in 22.
24	Sensor right fault				X	X	Right sensor not logged in. - Sensor incorrectly addressed. --> Check sensor address - group - device - Sensor or sensor cable defective --> Check sensor and sensor cable
25	Sensor left fault				X	X	Left sensor not logged in. --> As in 24.

Error code	Error type	Ready out	Controller Power off	Motor output off	Controller blocked	Warning	Error description Tips on clearing error
26	Gearconstant fault				X	X	Gear constant outwith permissible range. Actuating speed does not match setting (parameter P28). - Parameter P29, P30 or P31 incorrect. --> Check and correct parameter. Set default values on KR 51/52/56 (see parameter list). On KR 47 determine and set gear constant (parameter P30), set spindle pitch (parameter P31) and set the default value in parameter P29.
27	Power off	X	X				Error code serves for internal saving of data. Is not displayed and saved
28	Temp motor right fault					X	Temperature signal from left motor or voltage supply for encoder missing. - Encoder - guider line interrupted. --> Check cable and connection according to wiring diagram. --> Check 24 V on terminal X6.9 (see error 7).
29	Temp motor left fault					X	Temperature signal from left motor or voltage supply for encoder missing. - Encoder - guider line interrupted. --> Check cable and connection according to wiring diagram. --> Check 24 V on terminal X3.9 (see error 7).
30	Motorline right fault	X					No current flow on right motor output: - Line to motor interrupted. --> Check line to motor according to wiring diagram - Brushes in motor defective. --> Check brushes
31	Motorline left fault	X					No current flow on left motor output. --> As in 30.
32	Motor right overload					X	Right motor jammed or motor output short-circuited
33	Motor left overload					X	Left motor jammed or motor output short-circuited

10.3 Error memory

The last 100 system errors in each case are stored together with the operating time. They may be retrieved at any time.



Error display: example error 17

► Open error display “time, Nr., err.” using the simple setup level.

Page through the error list using the △ ▽ arrow keys. The most recent error to arise is assigned number 0, the penultimate the number 1 etc., the oldest error the number 99. In the “time” field the difference to the actual operating time is displayed, i.e. how many hours ago the error occurred. The error code is indicated in the “err.” field, see section 9.2 “error table” for explanations.

10.4 Replacing actuator KR 51/52/56

Actuator **KR 52** replaces actuator KR 51 in KRS 51 tenter guider infeeds with digital controller DC 55. **KR 52 actuators may only be implemented and replaced in pairs.**

Actuator **KR 56** replaces actuator KR 51 in KRS 55 tenter guider infeeds with two digital controllers DC 55. The actuators KR 56 can be fitted and replaced individually.

Notice

Important: As off 2007 the actuators KR 52/56 are delivered to the customer with the choke DK 3502 being separate. The choke is no longer installed on the actuator.

Therefore, if actuators of the order generation which have the choke included are exchanged it now becomes necessary to always order a choke DK 3502 with the new actuator. The choke must then be connected to the available switch panel / controller, see wiring diagram.

O**nly exception:** if the actuators KR 52.. are connected to a digital controller DC 5501/5506 no choke is required.

► Replace actuators as per the enclosed description “Actuator KR 52/KR 56”.

► Connect chokes DK 3502 as per circuit diagram.

After actuator replacement the following settings must be performed:

► Please observe safety measures, see section 6.1.

► Set controller type, see section 6.3.

► Check parameters, see table.

No.	Name	Default	Min.	Max.	Unit	Description
16	velocity automatic	80	0	180	mm/s	**Positioning speed max. automatic mode** KRS 47/51/52: 120 mm/s KRS 49/55/56: 180 mm/s
18	velocity manual	50	0	180	mm/s	**Positioning speed max. manual mode** KRS 47/51/52: 50 mm/s KRS 49/55/56: 180 mm/s
29	encoder resolution	....	8	9999	Imp/U	**Encoder resolution** KR 47/51: 50 KR 52/56: 25
30	rotation gear	....	0.01	320.00	mm	**Gear transmission of motor** KR 47: 7.25 x enter ratio for chain drive KR 51: 30 KR 52/56: 40
31	linear gear	188.00	0.01	320.00	mm/U	**Linear gear transmission** KR 47: Enter spindle pitch KR 51/52/56: 188.0
37	max.rot.speed	....	100	3000	U/min	**Characteristics motor r.p.m.** KR 47/51: 1250 KR 52/56: 1600
38	speed_P	....	0	10.00		**P-share for speed controller** KR 47/51: 2.00 KR 52/56: 0.75
39	speed_I	....	0	5.00		**I-share for speed controller** KR 47/51: 0.05 KR 52/56: 0.04

No.	Name	Default	Min.	Max.	Unit	Description
46	current maximum	....	0.0	16.0	A	**Max. motor rated current** KRS 47/51/52: 8.0 A KRS 49/55: 16.0 A KRS 56: 12.0 A
89	speed constant	....	0	20000	U/V	**Motor speed constant** KR 47/51: 47 KR 52/56: 68

► Check positioning direction of motors, see section 6.6.1.

10.5 Replacing controller DC 5500/5505 and controller DC 5501/5506

Notice

Digital controller DC 5501/5506 replaces digital controller DC 5500/5505.

Digital controllers must be replaced completely, including side cover with connections for sensors and CAN bus.

Following replacement the tenter guider infeed must be recommissioned.

► See commissioning section.

11. Maintenance

Warning!

Maintenance work is only allowed to be undertaken with the machine switched off.

► Switch off machine.

► Secure machine against switching back on.

Maintenance for the actuator, spreading device and sensor etc. is specified in the relevant component descriptions.

12. Technical data

The technical data for the actuator, sensor, selvedge opener etc. are specified in the relevant component descriptions.

12.1 Tenter guider infeed KRS 47/51/52

Power unit/Transformer	
Supply voltage	110 to 600 V AC
Nominal rating	680 VA
Nominal voltage	34 V AC
Output current	20 A AC

Controller/Amplifier DC 55..	
Supply voltage	34 V AC
Power input	550 VA
Power output (*T_U < 45 °C)	2 x 225 W
Output current	2 x 8 A
Permissible ambient temperature	60 °C
Protection class Controller DC 55.. Switch panel SE 40.. Controller DC 55.. in E+L control cabinet	 IP 20 IP 20 IP 54

Actuator KR 47 with DC 55..	
Permissible ambient temperature	65 °C
Protection class KR 47	IP 54
Nominal speed	160 ^{1}/min
Nominal torque	8.5 Nm
Gear transmission ratio i	7.25

Actuator KR 51 with DC 55..	
Permissible ambient temperature	65 °C
Protection class KR 51	IP 54
Nominal adjustment speed	120 mm/sec
Nominal actuating force	1120 N

Actuator KR 52 with DC 55..	
Permissible ambient temperature	65 °C
Protection class KR 51	IP 54
Nominal adjustment speed	120 mm/sec
Nominal actuating force	1230 N

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12.2 Tenter guider infeed KRS 49/55/56

Power unit/Transformer	
Supply voltage	110 to 600 V AC
Nominal rating	680 VA
Nominal voltage	34 V AC
Output current	20 A AC

Controller/Amplifier DC 55..	
Supply voltage	34 V AC
Power input	640 VA
Power output (*T_U < 45 °C)	520 W
Output current	12 A (max. 16 A)
Permissible ambient temperature	60 °C
Protection class	
Controller DC 55..	IP 20
Switch panel SE 40..	IP 20
Controller DC 55.. in E+L control cabinet	IP 54

Actuator KR 47 with DC 55..	
Permissible ambient temperature	65 °C
Protection class KR 47	IP 54
Nominal speed	240 ^{1}/min
Nominal torque (*T_U 40 °C)	13 Nm
Gear transmission ratio i	7.25

Actuator KR 51 with DC 55..	
Permissible ambient temperature	65 °C
Protection class KR 51	IP 54
Nominal adjustment speed	180 mm/sec
Nominal actuating force (*T_U 40 °C)	1700 N

Actuator KR 56 with DC 55..	
Permissible ambient temperature	65 °C
Protection class KR 51	IP 54
Nominal adjustment speed	180 mm/sec
Nominal actuating force (*T_U 40 °C)	1870 N

Technical data subject to modification without notice

*T_U = ambient temperature