Description J

Digital controller DC 55

en

Software: **ZC 5501-0015 F_ZA**
ZC 5501-8015 F_ZB

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Explanation of symbols

➜ jobs to be performed

Important information and instructions

1. Function

1.1 Purpose

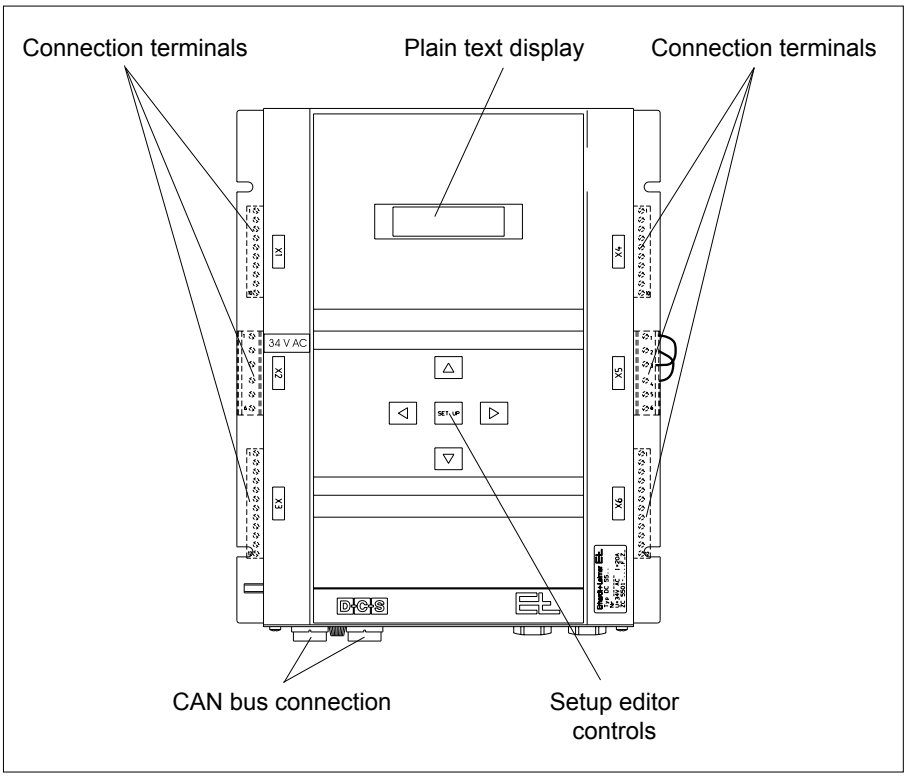
The digital controller DC 55.. is used to operate an actuator with speed and position feedback. For this purpose a current controller, speed controller, position controller and a motor power unit are integrated. Appropriate sensors can be connected for controlling the position of moving webs as well as for the follow-up control of tools.

The controller is operated using a command station with plain text display and/or a digital input/output card.

1.2 Design

The controller comprises the following assemblies:

- A control card (in the housing)
- Several connection terminals
- A CAN bus connection
- A plain text display
- And controls (for the Setup editor).



1.3 Operating principle

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

Actuator manual mode:
In the manual mode the actuator can be positioned in the required position to the left or right. The velocity can be set in the related parameter.

Actuator centering:
The actuator is positioned in the center position set. For this purpose the actuator is first moved to the reference encoder and the internal position counter adjusted. Then the actuator is moved to the center position. The reference encoder is installed in the housing on the actuators AG 57.. and AG 58.. .

Automatic:
In the automatic mode the web or the tool is regulated at the set position. It is a prerequisite for this control that the controller inhibit is removed.

Controller inhibit in automatic operating mode:
The controller inhibit is only effective in the automatic operating mode and can be activated on the control card DC 55.. or via the interface.

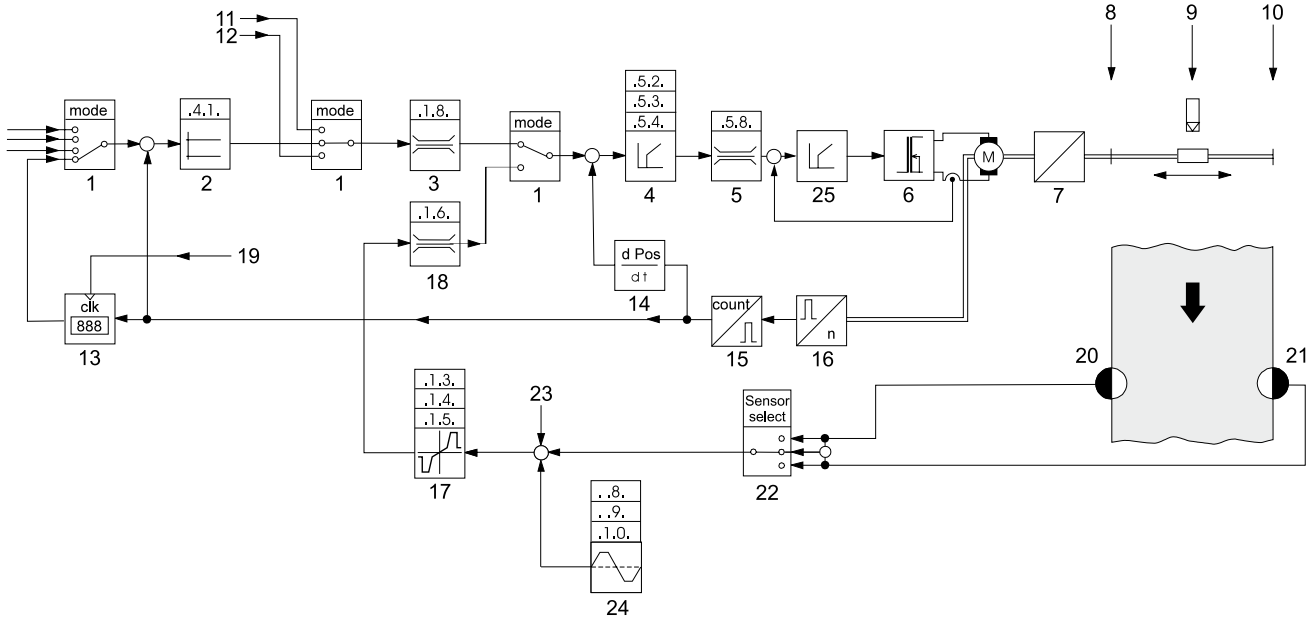
Web offset:
A web offset can be set in the automatic mode. Web offset means that the set position for the web can be changed positively or negatively.

With fixed sensors or a single-motor support beam with two carriages, the web offset is limited to 75 % of the measuring range of the sensor. In other applications with support beams and cameras the web offset can be set over the entire measuring range.

Oscillation:
An oscillating set value is added to the set position value in the automatic mode. The oscillation wave form, the oscillation cycle time and the oscillation path can be set in the related parameters or using a command station. With fixed sensors, oscillation is only possible over 75 % of the measuring range.

1.4 Control structure with continuous controller for proportional actuators

In the case of a control structure for proportional actuators, the actual position value for the web or the tool is compared to the required set position value and, in case of a deviation, fed to a P position controller as an error signal. The resulting set speed value is compared with the actual speed value and fed to the PI speed controller. This controller outputs a pulse-width modulated signal at the power unit.

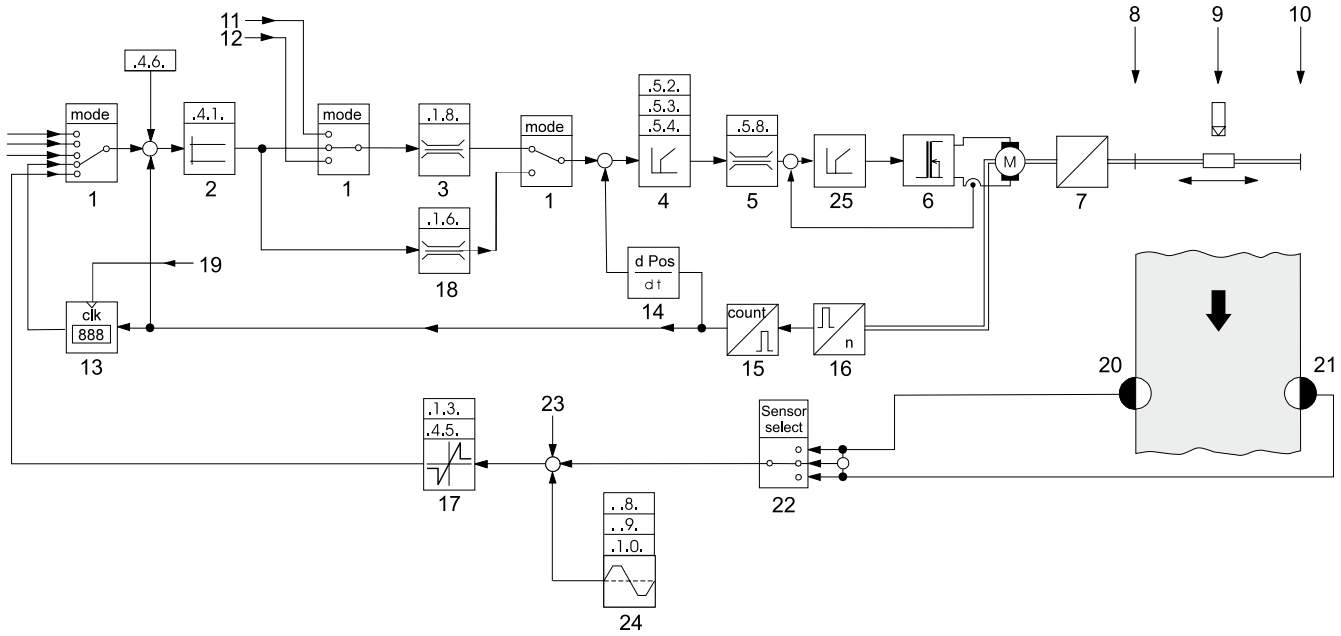


Drawing key, control structure

1 Operating mode
2 Actuator position controller
3 Max. actuating speed that can be set by hand
4 Speed controller
5 Adjustable current limit
6 Power unit
7 Gearbox with spindle
8 Right end position
9 Center position
10 Left end position
11 Adjustment right
12 Adjustment left
13 Actual position memory
14 Actual speed value acquisition
15 Counter
16 Incremental encoder
17 Web position controller
18 Max. actuating speed that be set in automatic mode
19 Memory command on 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

1.5 Control structure with continuous controller for integral actuators

In the case of a control structure for integral actuators, the actual position value for the web or the tool is compared to the required set position value for the web and, in case of a deviation, fed to a P position controller as an error signal. This controller generates the set position value for the actuator. The actual position value for the actuator is compared with the required set position value and fed to the position controller for the actuator as an error signal. This controller generates the set speed value that is compared with the actual speed value and fed to the PI speed controller as a difference. This controller outputs a pulse-modulated signal to the power unit.



Drawing key, control structure

1 Operating mode
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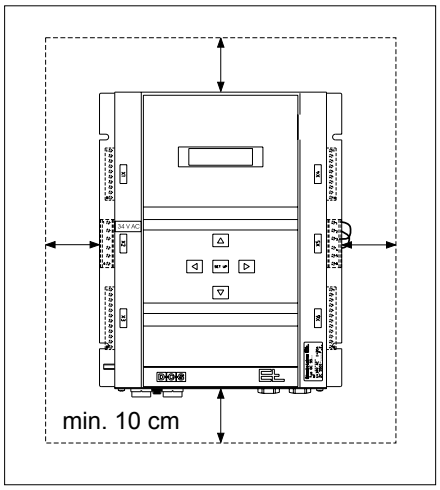
25 Current controller

2. Assembly



The controller is available as a separate device, in the E+L control cabinet or as a switch panel with transformer.

As a separate device it is mounted using 4 screws M 5. The dimensions can be found in the related sheet of dimensions.

The controller must be fitted separated from assemblies carrying high currents.

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

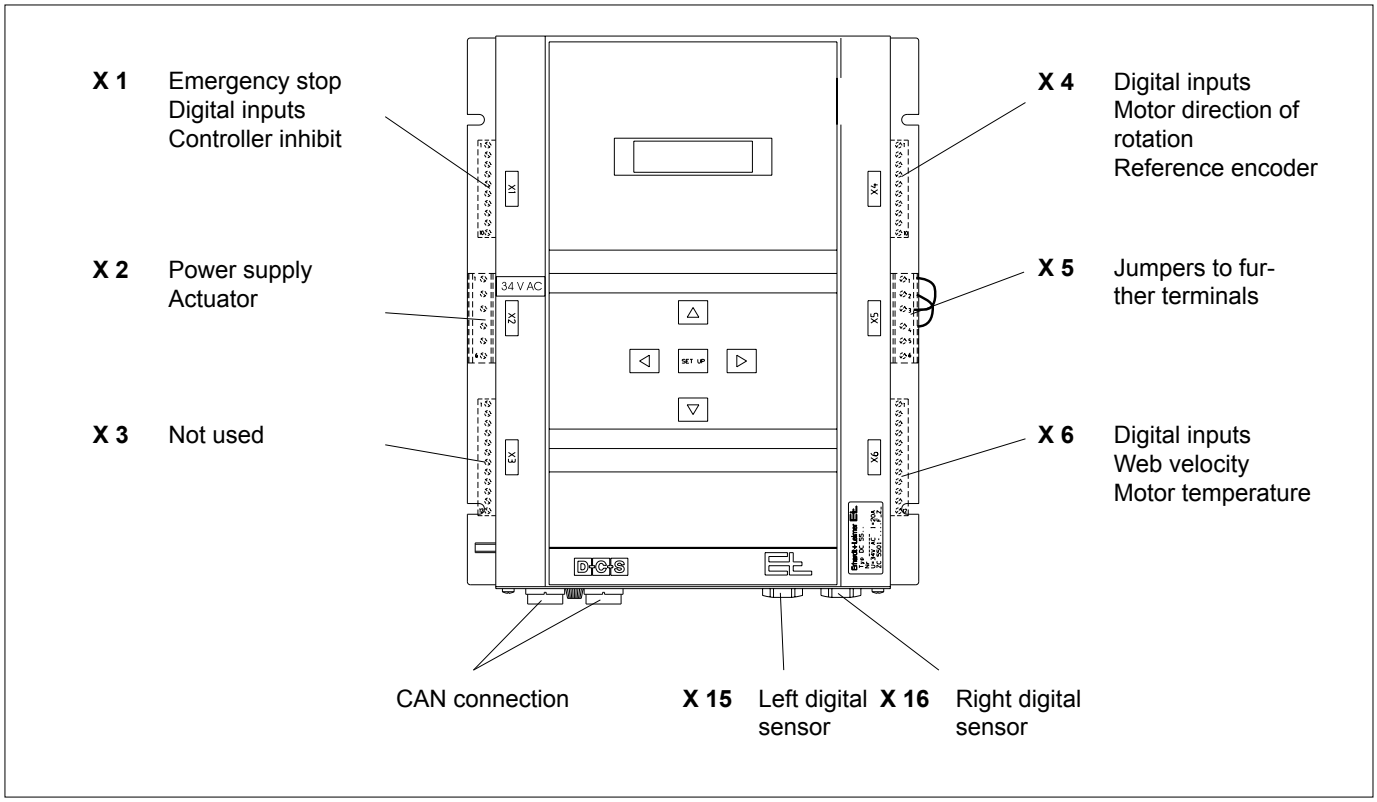
The controller is to be mounted upright to achieve optimal ventilation. A distance of approx. 10 cm to other devices around the controller is to be maintained.

Attention is to be paid to good ventilation of the mounting frame. The ambient temperature must not exceed 60 °C. The internal fans are switched on at a heatsink temperature of 40 °C. The power is reduced from a heatsink temperature of 60 °C.

3. Installation

➜ Connect electrical cables as per the enclosed wiring diagram.

➜ Lay signal cable screened and separated from cables carrying high currents.



The connection cables between controller and actuator can be laid in one cable up to a length of 3 m. At a distance of 3 m to 10 m the motor cable and the cable for the incremental encoder **must** be laid separately.

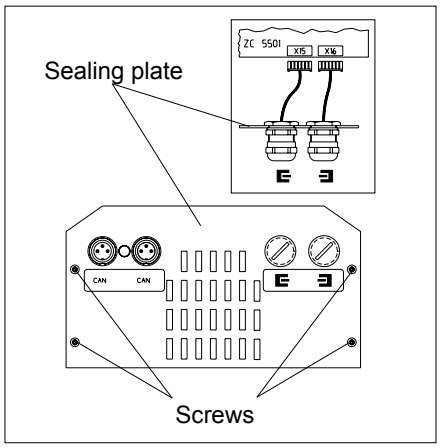
The CAN bus must not exceed a total length of 160 m and the SPI bus a total length of 0.2 m.

3.1 Terminal assignments X 1 to X 6

Terminal	No.	Input	Output	Assignment
X 1	1		X	+24 V DC
	2		X	0 V
	3	X		Programmable input (pre-set to "Automatic lock")
	4	X		Programmable input
	5		X	+24 V DC
	6	X		Programmable input
	7		X	+24 V DC
	8	X		Programmable input
	9		X	Emergency stop circuit
	10	X		Emergency stop circuit
X 2	1	X		34 V AC power supply
	2	X		34 V AC power supply
	3			Not used
	4			Not used
	5		X	Actuator drive parallel to X 5.5
	6		X	Actuator drive parallel to X 5.6
X 3	1			Not used
	..			...
	12			Not used
X 4	1		X	+24 V DC
	2		X	0 V
	3	X		Programmable input (pre-set to "Speed - lock")
	4	X		Programmable input (pre-set to "Speed + lock")
	5		X	+24 V DC
	6	X		Programmable input (pre-set to "Reference with speed -")
	7		X	+24 V DC
	8			Not used
	9		X	Ready
	10		X	0 V
X 5	1			Fixed assignment (jumper)
	2			Fixed assignment (jumper)
	3			Fixed assignment (jumper)
	4			Fixed assignment (jumper)
	5		X	Actuator drive parallel to X 2.5
	6		X	Actuator drive parallel to X 2.6
X 6	1		X	+24 V DC
	2	X		Web velocity pulses
	3		X	0 V
	4		X	+24 V DC
	5	X		Track A
	6	X		Track B
	7	X		Motor temperature sensor (PWM signal)
	8		X	0 V
	9		X	+ 24 V DC
	10			Not used
	11			Not used
	12			Not used

The connectors used are documented in the wiring diagram.

3.2 Connecting sensor cables



The sensor cables must be connected inside the control card as follows:

➜ Remove the four screws for the cover plate and carefully hinge out the cover plate from the controller. The cover plate cannot be completely removed, as it is connected to the control card by various cables.

➜ Remove the two blanking fittings and insert the sensor cables as per the assignment (left sensor X 15 / right sensor X 16) in the related holes. Firmly screw the cable gland into the cover plate and secure with nut supplied.

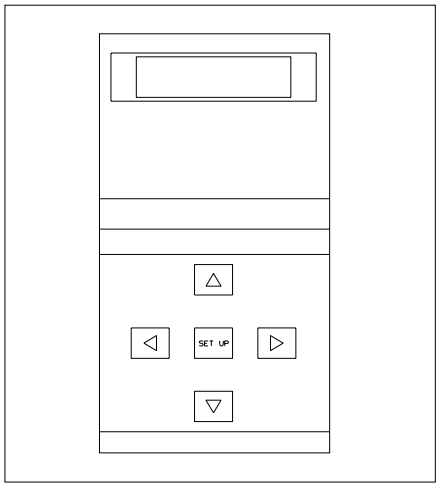
➜ Fit the JST connector for the sensor on the left in the direction of travel to terminal X 15 and for the right sensor to X 16.

➜ Carefully close the cover plate onto the controller and tighten with the four screws. Ensure no cables are trapped during this process.

On the usage of only one sensor, it is only allowed to remove the related blanking fitting.
The sensor cables are normally already fitted in complete systems from E+L.

With certain sensors (e.g. cameras) or on the usage of a support beam, the sensor signal is transferred over the CAN bus. In this case it is not necessary to connect the sensors as described above.

3.3 Setup



The controller has a Setup editor with plain text display. All parameters on the complete CAN network can be displayed and changed using the five keys.

In principle, the following applies:

- By default, the parameter set for the controller is always displayed when the Setup editor is started.
- To display the parameter set for a different device, the CAN address of the required device must be set at the related point. Then the parameters for the required device are displayed until the Setup editor is left or another CAN address is selected.

The exact operation of the Setup editor is described in chapter "4. Setup editor".

3.4 Indication of errors

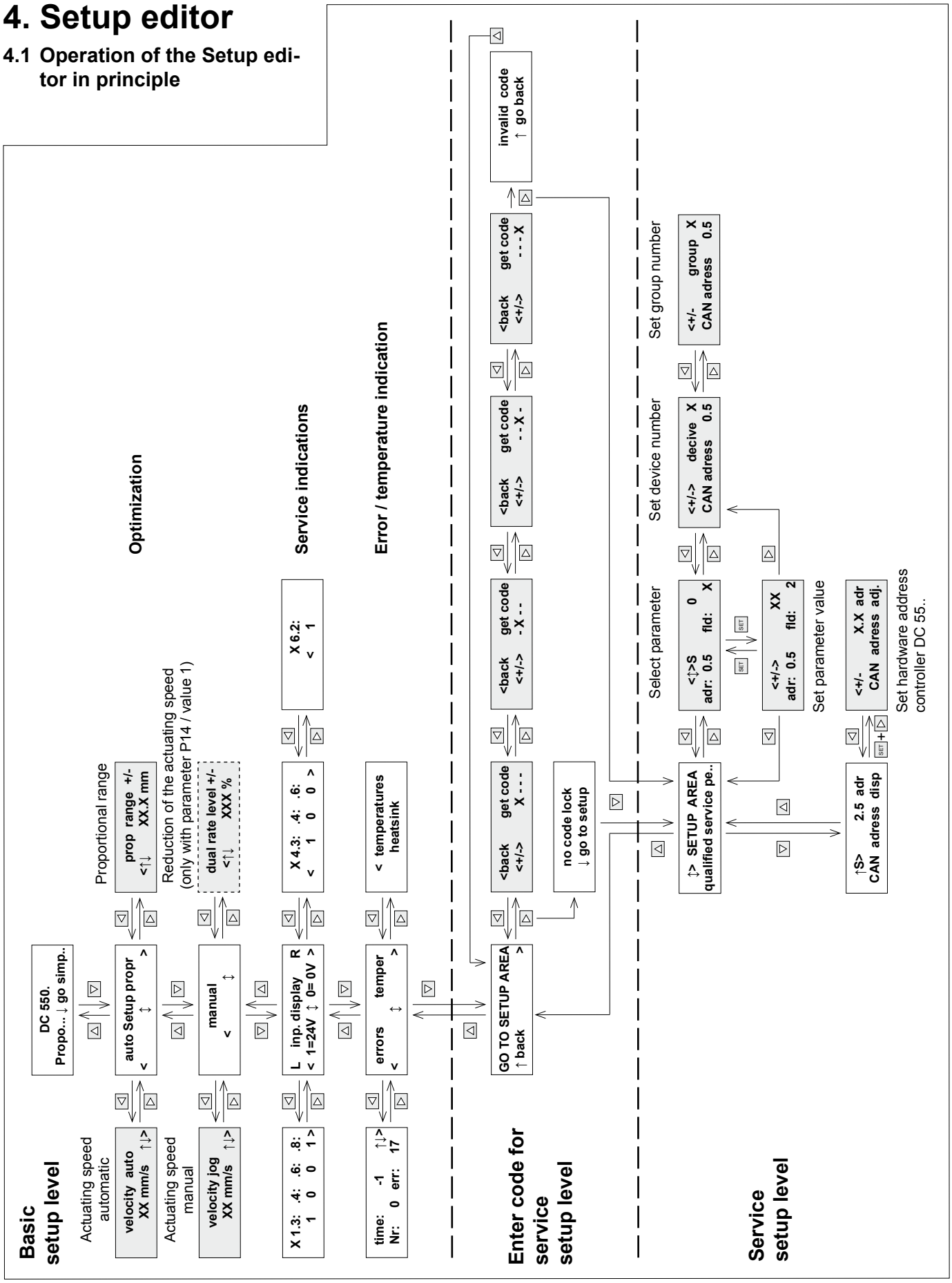
The "Ready" contact (terminal X 4.9 to X 4.10) outputs 24 V if there is no error. If one or more errors occurs, the output is switched to "0".

The following list shows the possible errors:

No.	Error indication in CANMON	Description	Output on terminal X 4.9
1	UAC-power low	Input voltage too low	0
2	UAC-power high	Input voltage too high	0
3	UDC-inter. low	Intermediate circuit voltage too low	0
4	UDC-inter. high	Intermediate circuit voltage too high	0
5	UDC-sec. 1 fault	Internal error	0
6	UDC-sec. 2 fault	Internal error	0
7	24 V extern fault	No external operating voltage 24 V	0
8	24 V intern low	Internal operating voltage 24 V too low	0
9	24 V intern high	Internal operating voltage 24 V too high	0
10	emergencyloop	Emergency circuit interrupted (one of the safety switches on the actuator is open)	0
15	I motor R high	Motor current too high	-
17	Temp case high	Power unit temperature too high	0
18	Temp motor R high	Motor temperature too high	0
20	encoder R fault	No encoder signal A, B, or A+B	0
22	encoder R invers	Encoder signal A and B reversed	0
24	sensor R fault	No right sensor	0
25	sensor L fault	No left sensor	0
26	gearcontant fault	Gear constant outside the permissible range	-
27	power_off	No operating voltage	0
28	Temp motor R fault	No temperature signal from the motor	-
30	Motorline R fault	No motor connected	0
31	Motor R overload	Motor jammed or short-circuited (no rotary movement at maximum motor current)	-

4. Setup editor

4.1 Operation of the Setup editor in principle



4.2 Basic setup level

At the basic setup level the three parameters P16 "velocity auto", P18 "velocity jog" and P13 "prop range± " can be changed.

4.3 Service setup level

At the service setup level, 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 by entering a four-digit numerical code such that only authorized personnel can make settings.

4.4 Explanation of symbols

- You can navigate in the vertical direction using the ▽ △ keys, in the horizontal direction using the ▷ ◁ keys.

↑S> 0.5 adr CAN adress disp

- If there is an "S" in front of an arrow symbol, the SETUP key must be pressed first and also the arrow key to move in the direction indicated.

velocity automatic XX mm/s ↑↓>

- In the fields with a gray background (see figure on page 10) the value marked with X can be changed using the ▽ △ keys.

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

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

access denied ↑ go simpleadj

- If the numerical code is entered incorrectly three times, access to the Service Setup level is inhibited. The indication shown on the left appears.

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

DC 550. Propo..... ↓ go simp..

Start window

‖ Once all the settings have been made, you must always return to the start window.

5. Parameters

Parameters can be displayed and, to some extent, also changed in the setup mode. You can open the setup mode using the Setup editor on the control card DC 55.., a command station DO .... , a command unit RT .... or the CANMON program from E+L.

5.1 Parameter list "standard parameters"

The parameter number is given in the table in the **No.** field, the short identifier in the **Name** field. The **Default** field gives the default settings, **Min** and **Max** are the related limits allowed. The units can be seen in the **Unit** field. The **Description** explains the function of the parameter. If there is a point (•) after the parameter number, the parameter is read-only and cannot be changed.

For improved clarity, as standard only a reduced parameter set is displayed. The **parameters in bold** are in the reduced parameter set. All parameters can be displayed by the following means:

- In P3 "start service" enter the value 42 (expanded setup mode)
- Special key on the command station DO 2000 or in the CANMON program.

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 = restore customer settings 2 = restore internal basic settings
3	**start service**	0	0	199		Start a function 0 = no function 1 = reset controller 2 = save parameter 10 = actuator initialization run (device X.5) 11 = support beam initialization run (device x.6, x.7, x.8, x.9, x.10, x.11) 12 = actuator initialization run, with specification of the gear constants (device x.5) 13 = get guiding set point for the actuator (only with integral controller) 20 = motor current calibration 22 = save the application parameters 23 = save the calibration data DC 55.. 32 = basic setting AG 57.. 33 = basic setting AG 58.. 42 = select expanded setup 44 = save customer settings 55 = delete reset and operating hours counter 56 = delete maximum temperature 57 = set calibration values to default 98 = delete error memory 99 = delete data memory
4 •	**ZC 5501**	1.0	1.0	1.0		Software version
4 •	**ZC 5501**	4.0	4.0	4.0		Software version

No.	Name	De-fault	Min.	Max.	Unit	Description
5 •	webedge offset					Parameter heading
6	weboffset	0.00	-3250.0	3250.0	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 time-dependent = sec/cycle travel-dependent = pulses/cycle
10	osc. wave form	95	5	95	%	Oscillation wave form 5% = square 50% = trapezoid 95% = triangular
11	>osc. trigger-mode	2	0	7		Oscillation operation 0 (4) = operation using keyboard 1 (5) = operation using AUTO key 2 (6) = oscillation OFF 3 (7) = oscillation ON Values in () for travel-dependent oscillation
12 •	webedge controller					Parameter heading
13	**prop range +/-**	10.0	-2000.0	2000.0	mm	Controller proportional range Web offset in mm at which the actuator runs at maximum speed. Reduce value in case of inaccurate control! Increase value in case of uneven control!
14	dual-rate width	30	0	90	%	Window width in % referred to proportional range P13 "prop range ±". The switching point for determining the dual-rate characteristic is defined using this value.
15	dual-rate level	100	0	150	%	Actuating speed reduction The % actuating speed at the switching point is defined with this value.
16	**velocity auto**	20	1	1000	mm/s	Max. actuating speed, automatic mode
17	velocity pos	10	1	1000	mm/s	Actuating speed, positioning mode
18	**velocity jog**	5	1	1000	mm/s	Actuating speed, manual adjustment
19	velocity defect	1	0	1000	mm/s	Actuating speed when the set threshold is exceeded
20 •	derated velocity		0	1000	mm/s	Indication of the speed limited by internal functions
21	reserved 21					Not currently used
22	defect range ±	10.0	0.5	2000.0	mm	Range for the detection of a web defect. If this range is exceeded, the speed is changed to the "velocity defect" speed set
23 •	servo configuration					Parameter heading
24	**motion direction**	0	0	1		Effective direction for actuation 0 = normal 1 = inverted Dependent on the installation position and direction of web travel
25	**motion range total**	0.0	0.0	3270.0	mm	Actual travel of the actuator, the travel must be entered prior to the initialization run
26	**positionrange +**	0.0	0.0	3270.0	mm	Positive positioning range

No.	Name	De-fault	Min.	Max.	Unit	Description
27	**positionrange -**	0.0	-3270.0	0	mm	Negative positioning range
28	alarm limit %	75	0	100	%	End position pre-warning
29	reserved 29					Not currently used
30	reference offset	0.0	-3270.0	3270.0	mm	Reference encoder offset Distance between the switching point for the reference encoder and the center on the actuator drive
31	**center offset**	0.0	-3270.0	3270.0	mm	Centering offset Distance between the center on the actuator drive and the actuator's center position.
32	system offset	0.0	-3270.0	3270.0	mm	System offset Distance between center set on the actuator drive and the reference point (e.g. center of machine).
33 •	total resolution	0.0	0.0	32700	pul/ mm	Motor gear constant
34	**encoder resolution**	8	5	9999	pul/ rev	Encoder resolution Entry for the encoder resolution, pulses/rev (without quadruple evaluation)
35	**rotation gear**	20.0	0.1	2000.0		Actuator gear ratio Entry for the gear ratio
36	**linear gear**	10.0	0.1	2500.0	mm/ rev	Linear gear ratio Entry of the relationship between rotary and linear movement
37	mech. gearfactor	1.00	0.10	5.00	-	Mechanical ratio
38	encoder filter	4	4	8	-	Filtering of the encoder pulses
39 •	pos. controller					Parameter heading
40	death zone ±	0.0	0.0	20.0	mm	Dead zone for position control loop
41	pos prop ±	5.0	0.1	200.0	mm	Position controller proportional range
42 •	act position	0.0	-3270.0	3270.0	mm	Actual position (read only)
43 •	set position	0.0	-3270.0	3270.0	mm	Set position (read only)
44	pos source address	00	00	7F	-	Master address Address from which the master set position is received
45	**prop stroke ±**	100	0	2000.0	mm	Actuator correction travel on a web defect from P13 "prop range ±"
46 •	foto auto offset	0	-2000.0	2000.0	mm	Actuator offset between center set and the set operating point, is set during automatic operation using <SETUP>+<AUTO>. Only possible if function is activated via P100 "operatokey config / [X] foto@AUTO+Setup".
47 •	pos I-part	0	0	1.000		Additional I component for integral actuator, residual guiding deviations are reduced to 0 as a result.
48 •	speed controller					Parameter heading
49	**max. motor speed**	1250	10	4000	rev/ min	Nominal speed Value is required for speed limiting
50 •	act speed				rev/ min	Current actual motor speed (read only)
51 •	set speed				rev/ min	Current set motor speed (read only)
52	speed_P	1.00	0.00	10.00		P component for speed controller
53	speed_I	0.10	0.00	5.00		I component for speed controller
54	speed_D	0.00	0.00	5.00		D component for speed controller

No.	Name	De-fault	Min.	Max.	Unit	Description
55	**accel. time**	0.0	0.0	10.0	sec.	Time to accelerate to nominal speed
56 •	current controller					Parameter heading
57	reserved 57					Not currently used
58	**motor current**	1.0	0.0	7.0	A	Max. permissible motor current
59	overload factor	150	100	200	%	Dynamic motor current increase The motor is briefly overloaded with the factor that can be set
60	derating tem-perature	65	40	75	°C	Nominal motor temperature
61 •	limited current	-			A	Current maximum motor current allowed
62 •	act. current	-			A	Current actual motor current
63 •	set. current	-			A	Current set motor current
64	editor settings					Parameter heading
65	code number	0	0	9999		Inhibit code
66	english/chinese	0	0	1		Menu language setting
67	main loops	xx	xx	32000		Program loop execution time
68 •	diagnostics					Parameter heading
69 •	**motorstatus**	xx	00	FF		Motor status (read only) [ ] R_encoder 0-speed [ ] R_encoder fault [ ] R_encoder inverse [ ] R_motorline open [ ] R_motor blocked [ ] R_current limit [ ] R_current max.
70 •	**system error**	xx				Error indication 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 = 24V-external fault 8 = 24V-internal low 9 = 24V-internal high 10 = emergencyloop 15 = I motorR high 17 = Temp case high 18 = Temp motorR high 20 = encoder R fault 22 = encoder R inverse 24 = sensor R fault 25 = sensor L fault 26 = gear constant fault 27 = power_off 28 = Temp motorR fault 30 = Motorline R fault 31 = Motor R overload
71 •	**inputvoltage AC**	xx.x				Input voltage
72 •	**inputvoltage DC**	xx.x				Intermediate circuit voltage
73 •	running time meter	x			h	Operating hours counter
74 •	supplyvoltage 24 DC	xx.x			V	Operating voltage
75 •	temperature case	xx			°C	Heatsink temperature

No.	Name	De-fault	Min.	Max.	Unit	Description
76 •	temp. case max.	xx			°C	Maximum heatsink temperature reached
77 •	**temperature motor**	xx			°C	Motor temperature
78	enc-test off/on	1	0	1		Motor encoder monitoring 0 = OFF 1 = ON with autom. switching to IxR
79	enc-test delay	0.7	0.1	10.0	s	Encoder monitoring delay
80 •	I/O configuration					Parameter heading
81 •	**>digi input status**	-	00	FF	hex	Indication of the current digital inputs
82	>usage input X4.3	6	-16	16		Usage of input X4.3
83	>usage input X4.4	5	-16	16		Usage of input X4.4
84	>usage input X4.6	3	-16	16		Usage of input X4.6
85	>usage input X6.2		-16	16		Usage of input X6.2
86	>usage input X1.3	2	-16	16		Usage of input X1.3
87	>usage input X1.4		-16	16		Usage of input X1.4
88	>usage input X1.6		-16	16		Usage of input X1.6
89	>usage input X1.8		-16	16		Usage of input X1.8
90 •	guide config.					Parameter heading
91	guide target	0.0	-3000.0	3000.0		Indication of the set position for the web
92 •	system config.					Parameter heading
93	**>controller type**	0	0	2		Controller type 0 = proportional actuator 1 = integral actuator 2 = slave drive
94	**controller operate**	0	0	99		Controller operating mode 0 = standard 1 = hybrid
95	>auto address	0	0	2		Automatic sensor address assignment 0 = only indication of the sensor addresses 1 = addresses of the sensors on X15/X16 set automatically 2 = sensor addresses set to the addresses set in P96 and P97
96	sensor addr X 16	0.0	0.0	7.F		Address of the sensor connected on right
97	sensor addr X 15	0.0	0.0	7.F		Address of the sensor connected on left

No.	Name	De-fault	Min.	Max.	Unit	Description
98	**>function con-fig 1**	0801	0000	FFFF		System configuration1 [X] Framelimit Check 0x0001 [ ] Center direct 0x0004 [ ] Ref on Power on 0x0008 [ ] Watch webedge R 0x0010 [ ] Watch webedge L 0x0020 [ ] Enable AG-Foto 0x0040 [ ] Sens. err. > Center 0x0080 [ ] MCP active 0x0100 [ ] Apl. deactive 0x0200 [X] Weboffset _deci 0x0800 [ ] Weboffset invers 0x1000 [ ] Defect detection 0x2000 [ ] ext. system mode 0x4000
99	>function config 2	0040	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 [ ] Pos-TXD: targetpos 0x0010 [ ] Lock webspeedlim 0x0020 [X] AUTO: start slow 0x0040 [ ] AUTO: Clear I-part 0x0080 [ ] Pos-TXD: 50->10ms 0x0100 [ ] AG-Foto with sens. 0x0200 [ ] Deselect all sen. 0x0400 [ ] Pos-CMD: no Foto 0x0800 [ ] Trigger control 0x1000 [ ] High prior Manual 0x2000 [ ] No weboffset limit 0x4000 [ ] List-res 0.1 mm -> 1 mm 0x8000
100	**>operatorkey config**	0408	0000	FFFF		Operatorkey [ ] Auto: sel. all sens 0x0001 [ ] Sel. valid sensor 0x0002 [ ] force support free 0x0004 [X] Center -> sup. free 0x0008 [ ] no edge -> sup. free 0x0020 [ ] sens sel. direct 0x0040 [ ] emergency sensor L 0x0080 [ ] emergency sensor R 0x0100 [ ] foto@AUTO 0x0200 [X] foto@AUTO+Setup 0x0400 [ ] foto@hostcommand 0x0800 [ ] no foto@Centered 0x1000 (*) lost web: --- 0x0000 ( ) lost web: Center 0x4000 ( ) lost web: Manual 0x8000
101	**> fuction con-fig. 3**	0	0	FFFF	hex	System configuration 3 [ ] desel. VS xx to sensor 0x0001
102	delaytime 1	1.0	0.0	25.0	s	Delay 1 (for switching to emergency sensor)
103	delaytime 2	1.0	0.0	25.0	s	Delay 2 (for switching to main sensor)
104 •	calibration					Parameter heading
105	calib. UAC	1.00	0.90	1.10		Scaling of the input voltage
106	calib. UDC	1.00	0.90	1.10		Scaling of the intermediate circuit voltage
107	offset. I-act	0	-100	100		Motor current measurement offset
108	calib. I-act	1.00	0.80	1.20		Motor current measurement scaling
109	offset. I-set	0	-50	50		Motor current output offset
110	calib. I-set	1.00	0.90	1.10		Calibration of the current output

No.	Name	De-fault	Min.	Max.	Unit	Description
111	offset. U-motor	0	-50	50		Motor voltage measurement offset
112	speed constant	80	0	20000	rev/ V	Motor speed constant
113	IxR compensa-tion	500	0	20000	mΩ	Motor internal resistance
114	powerderate limit	60	50	65	°C	Heatsink temperature
115	**act speed IxR**	0	-3500	3500		IxR compensation
116	reserved 116					Not currently used
117	reserved 117					Not currently used
118	reserved 118					Not currently used
119 •	webspeed config.					Parameter heading
120	webspeed con-stant	10	10	100	l/m	Normalization of the web speed measurement Value is the number of input pulses per running meter of web
121	webspeed max.	0	0	4000	m/ min	Maximum web speed
122	webspeed limit	0	0	4000	m/ min	Web speed limit
123 •	actual webspeed	0	0	4000	m/ min	Current web speed measured
124 •	adaptive control					Parameter heading
125	adaptive function	0	0	63		Selection of the adaptive functions (*) no PropRange adapt 0 ( ) PropRang = f(gain) 1 ( ) PropRang = f(web) 2 (*) no VAuto adapt 0 ( ) VAuto = f(gain) 4 ( ) VAuto = f(web) 8 (*) no Stroke adapt 0 ( ) Stroke = f(gain) 16 ( ) Stroke = f(web) 32
126 •	adaptive ratio	0	0	409.6	%	Indication of the current control loop gain
127	max webspeed ratio	0	0	409.6	%	Adaptive factor in % at maximum web speed
128	lim webspeed ratio	0	0	409.6	%	Adaptive factor in % at web speed limit
129	reserved 129					Not currently used
130	reserved 130					Not currently used
131 •	!! Service !!					Parameter heading
132	service off/on	0	0	1		Switch on the service mode
133	>service mode	0	0	7		!Only for service personnel! ( ) motor power units deactivated 1 ( ) current controller test square 2 ( ) current controller test triangular 3 ( ) speed controller test square 4 ( ) speed controller test triangular 5 ( ) set position square 8 ( ) set position triangular 9
134	testvalue 1	0	-100	100	%	Test value 1 for service mode !Only for service personnel!
135	testvalue 2	0	-100	100	%	Test value 2 for service mode !Only for service personnel!
136	testcycletime	0.00	0.00	10.00	s	Test cycle time for service mode !Only for service personnel!
137	hardware settings					Parameter heading

No.	Name	De-fault	Min.	Max.	Unit	Description
138	LCD contrast	45	10	64		Contrast setting LC display
139	LCD backlite	5	0	32		LC display lighting
140	LCD scroll	5	0	32		LC display scroll speed
141	display err off	1	0	1		Error indication on the display 0 = OFF 1 = ON
142	error scroll	3.0	0.5	100.0	s	Display time for the indication of errors
143	enable dual rate	0	0	1		Setting for the dual rate in the simple adjust mode
144	reserved 144					Not currently used
145	reserved 145					Not currently used
146	reserved 146					Not currently used

Parameter value list (selection list)

If in the following character ">" is given in front of the parameter, then the parameter can be edited with the aid of a parameter value list (selection list) in CANMON or DO 200. .

Editing using CANMON:
Select the "Value" field and open the parameter value list using the "Enter" key. Select the required parameter using the "cursor keys", to mark the parameter value press the "space key".

Editing using command station DO 200.:
Using the "Increase value"/"Reduce value" keys, select the required parameter value, to mark the parameter value press the "Acknowledge" key.

5.1 Parameter list "Extended DCS" (only on ZC 5501-8015)

The following parameters can only be edited using the CANMON program.

No.	Name	De-fault	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 = restore customer settings 2 = restore internal basic settings
4 •	Add. DCS Config.	5.2	4.8	5.2		Software version
5	>function config	0000	0000	FFFF	hex	Configuration [ ] check workspace 0x0001 [ ] emergency guide 0x0002
6	mid target limit	0.0	-3250.0	3250.0	mm	Limit for reference variable during lamination
7	auto offset limit	0.0	-3250.0	3250.0	mm	Limit for web offset
8	target change speed	0	0	120	mm/s	Rate of change of reference variable

5.2 Parameter explanation "standard parameters"

P0 edit device
P1 edit group

The CAN address comprises the device number and the group number. Each device with a CAN connection (serial or parallel) has a dedicated CAN address that is only allowed to be assigned once in the entire CAN network.

To be able to communicate with a specific device in the control loop, the device number must be set in P0 "edit device" and the group number in P1 "edit group". The device number and group number is stated in the block diagram for each device with a CAN address.

P2 reset settings

In the event of incorrect function or incorrect parameter entries, the E+L basic settings or default value can be restored. The following settings are possible:

1 = Restore customer settings. This setting is only possible on compact system that have been adjusted by E+L prior to delivery. During this process all parameter settings are saved in a backup list. These settings are restored in this case.

2 = Restore basic settings. The default values given in the parameter list are loaded. However, the default values are only loaded for the device currently selected. **No** parameter values are changed in the remaining devices.

P3 start service

Various processes that are required specially during commissioning of the system can be started here. The following functions are possible:

1 = reset controller
This reset saves all parameter values for the selected device and the device is re-started. The Setup mode should always be left using 1 after changing parameter values to ensure all modified parameter values are saved.

2 = save parameters
Function 2 is identical to function 1, the only difference is that the selected device is not re-started.

10 = actuator initialization run (with specification of the travel)
Prior to the initialization run, the actual travel must be determined and entered in P25 "motion range total". The actuator initialization run is started by entering the value 10. The actuator should be in its center position prior to the start, as this start position is saved as the new center position. This centre position can also be corrected manually at any time using P31 "center offset".

11 = support beam initialization run
The initialization run for all support beams in this group is started by entering the value 11.

12 = actuator initialization run (with specification of the motor and gear data)
During this initialization run, the maximum travel is determined based on the prior entry of the motor and gear data (P34/P35/ P36 and P37) and entered in P25 "motion range total".

13 = get guiding set point for the actuator
In the case of follow-up control systems, the position of the actuator/tool is controlled based on the web position measured. To calibrate the offset, the guiding set point for the actuator must be obtained.
For this purpose the actuator is positioned at the required position in the manual mode. When the guiding set point for the actuator is obtained, the offset is calculated from the current position of the actuator and the web position and displayed in P46 "foto auto offset".

20 = calibrate the zero point for the motor current measurement
The zero point for the motor current measurement is calibrated. The offset value determined during this process is saved in P107 and P109.

22 = save system parameters
The following parameters are saved in a separate data memory:
P82 / P83 / P84 / P85 / P86 / P87 / P88 / P89 / P93 / P98 / P99 P100 and P101 .

23= save the calibration data for the control card DC 55..
The saved values are displayed in P105 to P111.

32 = load basic settings for actuator AG 57..

32 = load basic settings for actuator AG 58..

42 = expanded setup mode
In the setup mode all existing parameters can be selected and the parameter values viewed. Some of the parameter values can be changed immediately. The protected parameters can only be changed after the entry of the value 42. This entry opens the so-called "expanded setup mode". In the expanded setup mode all parameters that can be edited can be changed.

44 = save customer settings
With this type of save, all parameter settings are saved in a backup list. If necessary, all customer-specific settings can then be restored using P2 "reset settings".

55 = delete reset and operating hours counter
The internal counters for reset and operating hours are reset to zero.

56 = delete maximum temperature
The maximum temperature of the heatsink saved is deleted.

57 = set calibration values to default
The calibration values are reset to the default values.

98 = delete error memory
This command should only be used by E+L service personnel. The control card can save up to 100 errors that have occurred. If the number of errors exceeds 100, the error messages in the error memory are shifted and as a result deleted.

99 = delete data memory
This command should only be used by E+L service personnel. The entire data memory on the control card is deleted. The default values are loaded after the control card is switched on.

No commands are only executed until a parameter change has been made!

Number	CAN data protocol
1.X to **3**.X	PR 1
4.X to **6**.X	PR 2
7.X to **9**.X	PR 1 + PR 2

Number	Software version
1.**0**	A
1.**1**	B
etc.	etc.
1.**9**	J
2.**0**	K
2.**1**	L
etc.	etc.

P4 DC 55..

The current CAN data protocol and the software version are displayed.

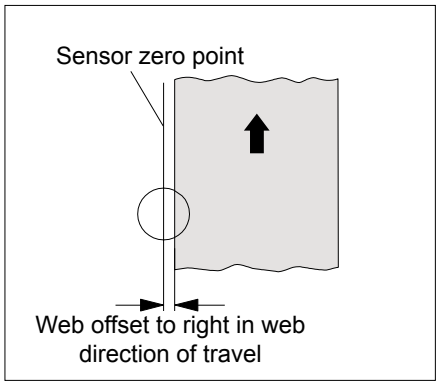
The number in front of the point defines the CAN data protocol used by the software.

The number after the point defines the software version.

P5 webedge offset

Parameter block for setting the web offset.

P6 weboffset



The web offset makes it possible to offset the web in automatic operation to the left or right referred to the set position. The offset is set directly from a command station or via a digital interface in this parameter. In case of a change to the web offset using the web offset keys, the step width per key press can be set in P7 "step width". The offset on the set position is displayed on the command station in mm. A web offset that has been set is retained until a new entry is saved, also if the supply of power is switched off.

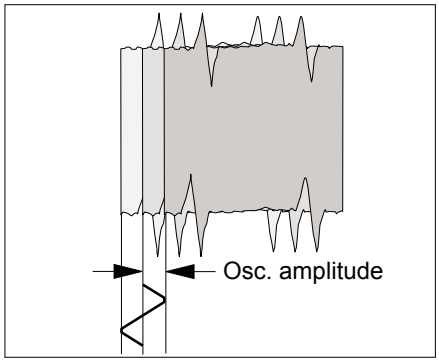
In the "get guiding set point" and "search for edge" operating modes, the web offset is always set to "0".

In the case of fixed sensors or a single-motor support beam with two carriages, the web offset is limited to 75 % of the measuring range of the sensor. For the remaining applications with support beams or cameras, the web offset can be set over the entire measuring range.

P7 step width

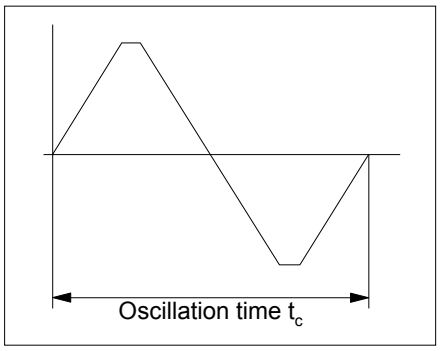
The step width for the web offset per key press can be set in $^{1}/_{100}$ mm. The web offset is changed by this value set each time a key is pressed on the command station.

P8 osc. amplitude



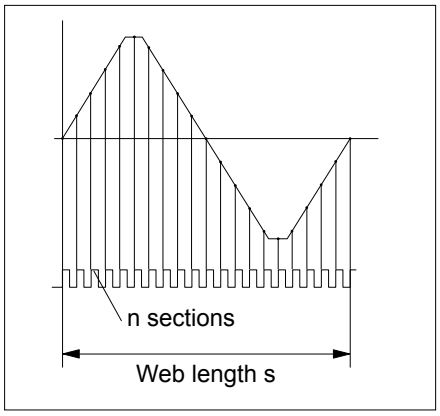
The oscillation amplitude defines how far the actuator moves to the left and right during oscillation. The oscillation amplitude can be entered using a command station with oscillation function or it can be entered directly in this parameter. The entry is made in $^{1}/_{10}$ mm.

In the case of fixed sensors or a single-motor support beam with two carriages, the web offset is limited to 75 % of the measuring range of the sensor.



P9 osz. cycl. time

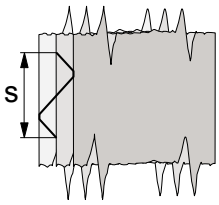
Time-dependent:
The duration (oscillation time t_c) of an oscillation period is defined here. The longer the time, the slower the actuator oscillates. The entry can be made direct in the parameter, or it can be entered using a command station with oscillation function.



Travel-dependent:
During travel-dependent oscillation, the oscillation period is defined by travel-dependent, external pulses. The oscillation period is divided into n sections. The maximum number of pulses must not exceed 20 pulses per second.

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

1. Determine travel per oscillation period



s = Web length per oscillation period

2. Determine 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. Determine number 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 = number of pulses per period

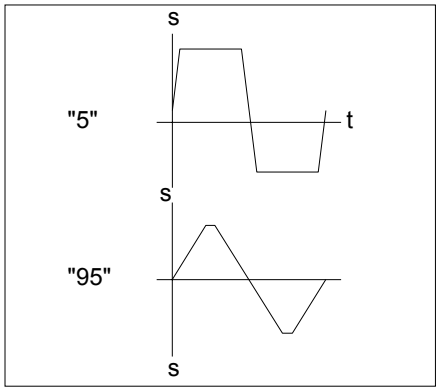
The number of pulses **n** is entered in P9 "osz. cycl. time".

The sizing for the external pulse generator can be determined as follows:

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

$f_{a\,max}$ = max. pulse generator output frequency (Hz)
s = web length per oscillation period (m)
n = number of pulses per period

At maximum web speed, the external pulse generator must output the number of pulses calculated $f_{a\,max}$.



P10 osc. wave form

The oscillation mode defines the oscillation wave form. By entering a value between 5 and 95 the oscillation wave form can be changed from square to triangular.

5 = **Square** (steep rising edge/falling edge on the oscillation signal, long duration at the oscillation end position)

95 = **Triangular** (gentle rising edge/falling edge on the oscillation signal, short duration at the oscillation end position)

P11 >osc. triggermode

The oscillation can, depending on the command station used, be started in different ways. It must also be decided whether the oscillation is time-dependent or travel-dependent.

In the case of time-dependent oscillation, the duration of the oscillation cycle is dependent on the time set and the travel-dependent oscillation is dependent on the external pulses (see P9 "osc. cycl. time").

> When oscillation is switched off, the oscillation cycle already started is continued to the next zero crossing. In the case of travel-dependent oscillation, a corresponding number of pulses to reach the zero crossing must be available. In the case of travel-dependent oscillation the digital input X 6.2 must be programmed to "web speed measurement" (see P85 "usage input X 6.2).

The following table shows the various possible settings:

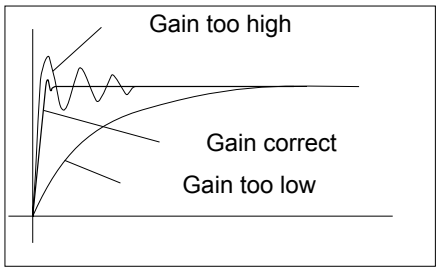
Parameter value:		**Explanation**
Time-dependent	Travel-dependent	
0	4	The oscillation is switched on and off using a command station with oscillation key or a digital interface (command code) in automatic mode, independent of the automatic key.
1	5	If a command station or digital interface is not available, in this case the oscillation can be switched on or off using the automatic key. After the automatic mode is started, oscillation is started or stopped by pressing the automatic key again, while the actuator always remains in the "Automatic" operating mode.
2	6	Oscillation is generally switched off. Oscillation can also not be started even if there is an oscillation key.
3	7	Oscillation is always active. Automatic mode without oscillation is not possible. Oscillation starts with the automatic mode!

P12 webedge controller

Parameter block for setting the web guiding control unit.

P13 prop range +/-

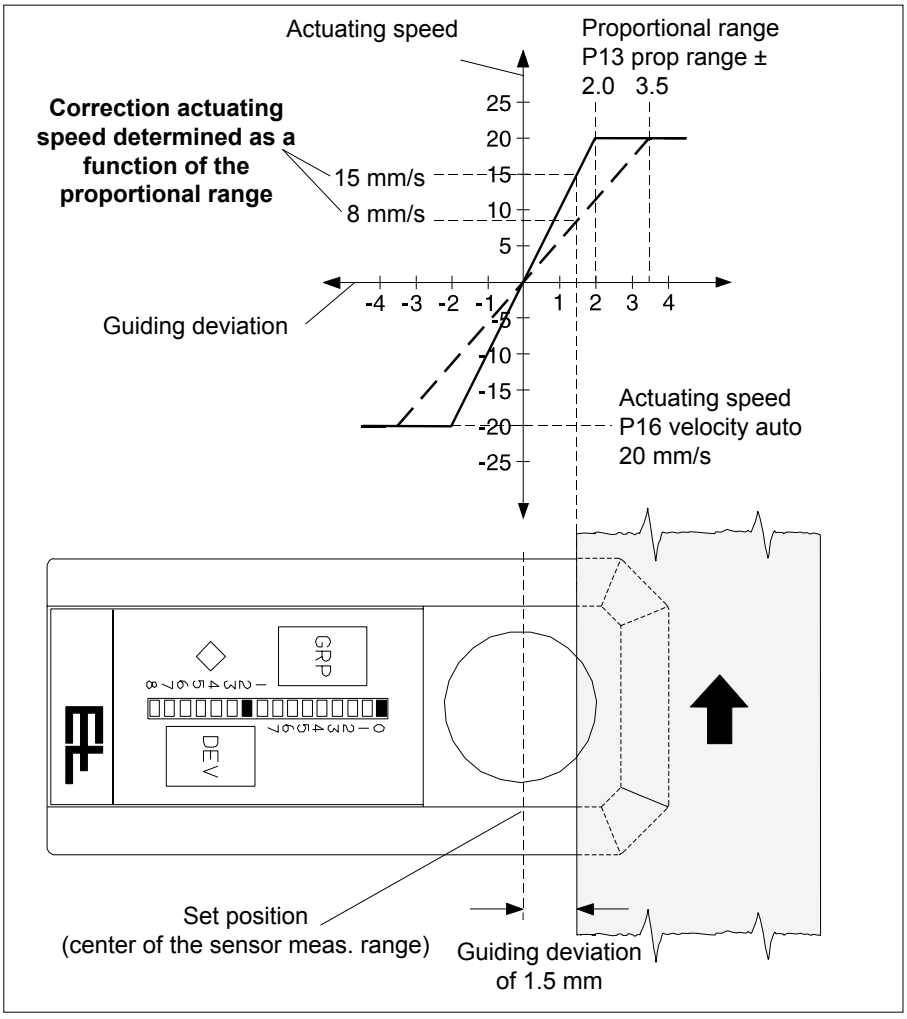
The gain of the position controller is set using the two parameters P13 "Prop range ±" and P16 "velocity auto" for **proportional** actuators.
The gain is set using the two parameters P13 "Prop range ±" and P45 "prop stroke" for **integral** actuators.
In the considerations below it must always be taken into account that a change to one of the two parameters will always have an effect on the gain.



The gain is correctly set if after a step change in the set position, the error is corrected with a short overshoot. It the position controller is set too sensitive, the controller will oscillate. If the gain is too low the control loop is too sluggish. The optimal gain can be determined using a plotter. In practice the gain can also be determined by trial-and-error.

Proportional actuator:

The smaller the proportional range (P16 "velocity auto") is set at constant maximum actuating speed, the larger the gain of the web guiding control unit.



A negative proportional range results in a negative gain, as a result the effective direction in the automatic mode is inverted.

If the proportional range is reduced, the characteristic becomes steeper (see figure). The steeper the characteristic, the larger the correction actuating speed in case of a guiding deviation and, as a result, the system will be more sensitive. The correction actuating speed for the actuator can be found from the characteristic as a function of the guiding deviation.

In this example a proportional range of 2 mm or 3.5 mm is assumed, at an actuating speed of 20 mm/s.

The following values are marked on the diagram:

Guiding deviation:	*1.5 mm*
P13 "prop range ±":	*2.0 mm (example 1)*
P13 "prop range ±":	*3.5 mm (example 2)*
P16 "velocity auto":	*20 mm/s*

This guiding deviation yields the following correction actuating speed:

Correction actuating speed:	***15 mm/s (example 1)***
Correction actuating speed:	***8 mm/s (example 2)***

The values can also be determined mathematically:

Gain (G) = P16 / P13

*Correction speed (VK) = guiding deviation * gain (G)*

Example 1:	*Example 2:*
G = 20/2 = 10 $^{1}/_{s}$	*G = 20/3,5 = 5.71 $^{1}/_{s}$*
*VK = 1.5 mm * 10 $^{1}/_{s}$*	*VK = 1.5 mm * 5.71 $^{1}/_{s}$*
VK = 15 mm/s	***VK = 8.6 mm/s***

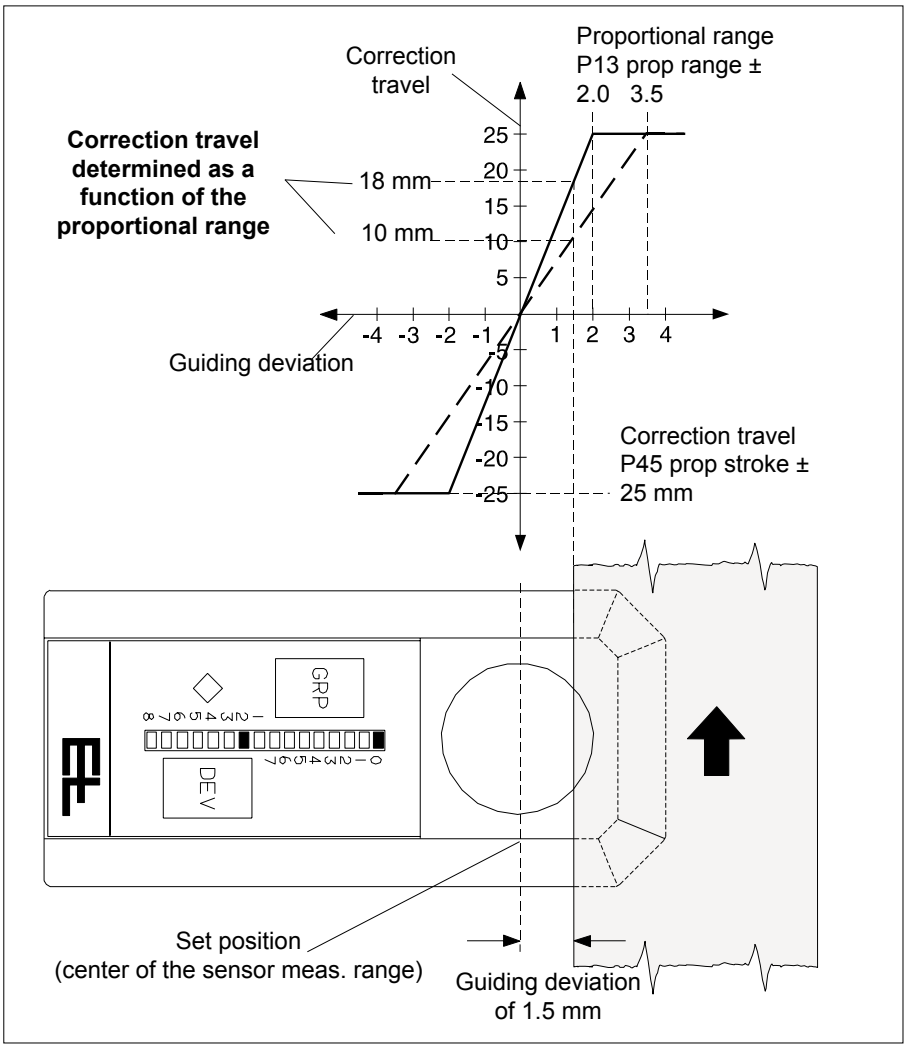
Optimization of a proportional actuator:

Only reduce the proportional range in small steps. After each change to the parameter value, the web should be deflected in the automatic mode so that oscillation can be detected immediately.

Reduce the proportional range until the controller starts to oscillate. Then increase the proportional range again until no oscillation is to be seen.

Integral actuator:

The smaller the proportional range (P45 "prop stroke ±") is set at maximum correction travel of the actuator, the larger the gain of the web guiding control unit.



A negative proportional range results in a negative gain, as a result the effective direction in the automatic mode is inverted.

If the proportional range is reduced, the characteristic becomes steeper (see figure). The steeper the characteristic, the larger the correction travel in case of a guiding deviation and, as a result, the system will be more sensitive. The correction travel for the actuator can be found from the characteristic as a function of the guiding deviation.

In this example a proportional range of 2 mm or 3.5 mm is assumed, with a correction travel of 25 mm.

The following values are marked on the diagram:

Guiding deviation: *1.5 mm*

P13 "prop range ±": *2.0 mm (example 1)*

P13 "prop range ±": *3.5 mm (example 2)*

P45 "prop stroke ±": *25 mm*

This guiding deviation yields the following correction travel:

Correction travel: ***18 mm (example 1)***

Correction travel: ***10 mm (example 2)***

The values can also be determined mathematically:

Gain (G) = P45 / P13

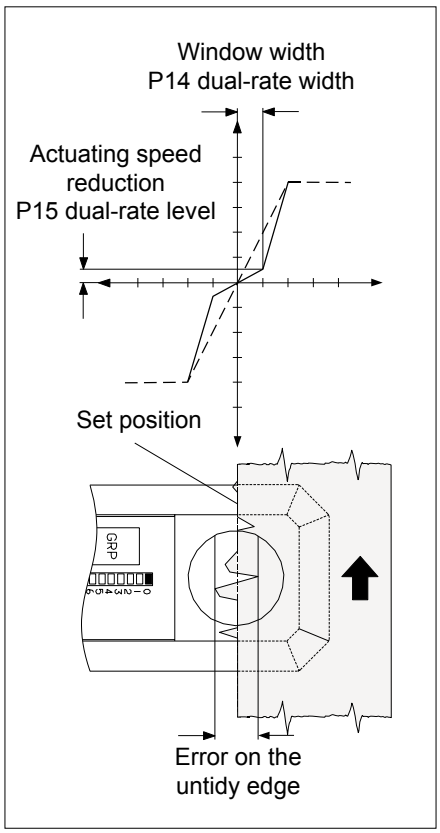
*Correction travel (SK) = guiding deviation * gain (G)*

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***

Optimization of the integral actuator:

Only reduce the proportional range in small steps. After each change to the parameter value, the web should be deflected in the automatic mode so that oscillation can be detected immediately.

Reduce the proportional range until the controller starts to oscillate. Then increase the proportional range again until no oscillation is to be seen.



P14 dual-rate width

P15 dual-rate level

If the web edge is subject to a certain amount of fluctuation (untidy edge), using these two parameters a range can be defined in which in the event of a deviation from the set position, the correction speed of the actuator is reduced in the case of proportional controllers.

In the case of a web edge as shown in the illustration on the left, normally the actuator would attempt to correct the deviation as per the dotted line. The actuator would only oscillate and the result of the control would be unsatisfactory. The dotted line represents the gain of the controller (P13 / P16).

Within the window width P14 "dual-rate width" the actuating speed is reduced in the event of a guiding deviation. The magnitude of the actuating speed reduction is set in P15 "dual-rate level". Possible oscillation due to edge errors can be reduced in this manner. If the error on the edge exceeds the window width set, the actuating speed is raised (see figure on left).

Both parameter values are % entries and refer to the values set in P13 "prop range ±" and P16 "velocity auto".

Example:

The following values are set in the parameters.

P13 "prop range ±" : ±20.0 mm
P16 "velocity auto" : 20.0 mm/s

P14 "dual-rate width" : 50 %
P15 "dual-rate level" : 70 %

Window width for the error:

*20 mm * 50 %* ***= 10 mm***

Reduced actuating speed:

*20 mm/s * 50 % * 70 %* ***= 7 mm/s***

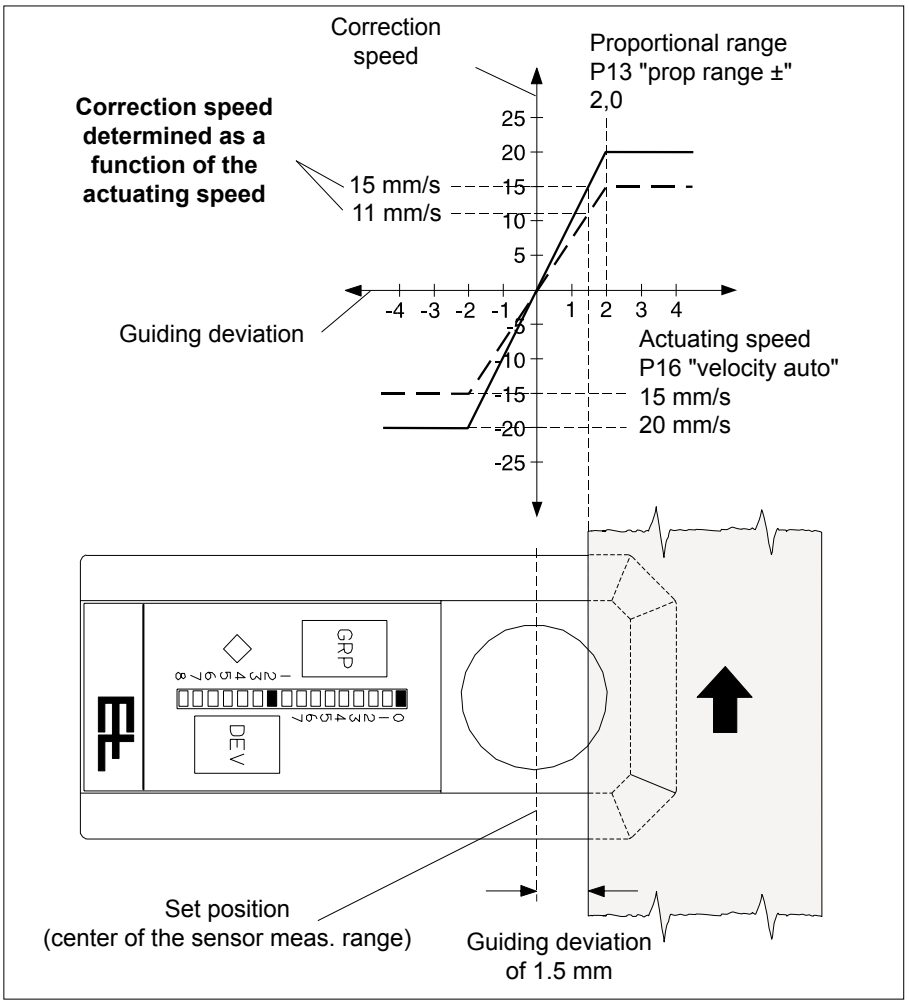
Within ±10 mm around the set position of the web a web error is corrected with a maximum actuating speed of 7 mm/s.

This function is deactivated if the value "100" is set in P15 "dual-rate level".

P16 velocity auto

Integral actuator (controller typ 1):
The positioning speed is set in P16 "velocity auto".

Proportional actuator (controller typ 0):
The larger the maximum actuating speed (P13 "prop range ±") is set with a constant proportional range, the larger the gain of the web guiding control unit in the automatic mode.



If the maximum actuating speed is increased, the characteristic becomes steeper (see figure). The steeper the characteristic, the larger the correction actuating speed in case of a guiding deviation and, as a result, the system will be more sensitive. The correction actuating speed can be found from the characteristic as a function of the guiding deviation.

In this example an actuating speed of 15 mm/s or 20 mm/s is assumed, with a proportional range of 2 mm.

The following values are marked on the diagram:

Guiding deviation:	*1.5 mm*
P16 "velocity auto":	*15 mm/s (example 1)*
P16 "velocity auto":	*20 mm/s (example 2)*
P13 "prop range ±":	*2 mm*

This guiding deviation yields the following correction actuating speed:

Correction actuating speed:	***11 mm/s (example 1)***
Correction actuating speed:	***15 mm/s (example 2)***

The values can also be determined mathematically:

Gain (G) = P16 / P13

*Correction speed (VK) = guiding deviation * gain (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 actuating speed is too high, the web guiding control unit will start to oscillate.

The maximum actuating speed must be set larger than the maximum error speed, however it must not exceed the actuator's nominal actuating speed.

P17 velocity pos

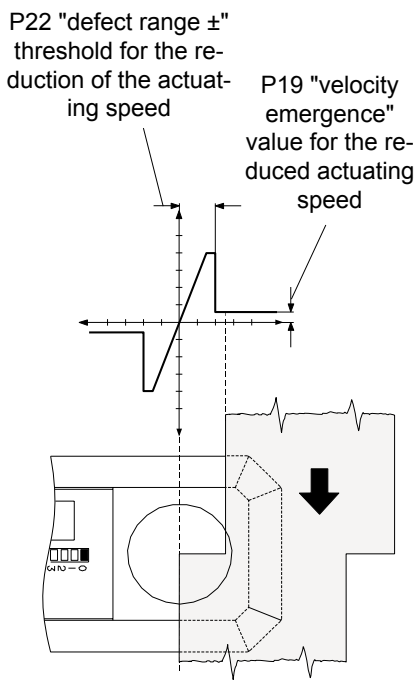
The actuating speed is defined for the following operating modes in this parameter:

- "Centering" actuator
- "Positioning commands" actuator

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

P18 velocity jog

The actuating speed with which the actuator is positioned in the "manual" operating mode can be set in this parameter using a step width of 1 mm/s.



P19 velocity defect

So that in the "automatic" operating mode the actuator does not follow at maximum actuating speed in the case of an offset on the web edge (e.g. bead of adhesive), the actuating speed can be reduced to the value required for this case.

The magnitude of the guiding deviation (web offset) from which the reduction is activated must be set in P22 "defect range ±".

This parameter is only active if in P98 "defect detection" is selected.

P20 derated velocity

The actuating velocity currently allowed at this time is displayed. The actuating speed allowed is reduced by parameter settings that reduce the actuating speed.

P21 reserved 21

Not currently used.

P22 defect range ±

If the value set is exceeded, the actuating velocity is reduced to the value set in P19 "velocity defect". In this way in the event of a sudden web offset (bead of adhesive), the actuator is prevented from following at the maximum actuating speed, an action which could result in tearing of the web.

This parameter is only active if in P98 "defect detection" is selected.

P23 servo configuration

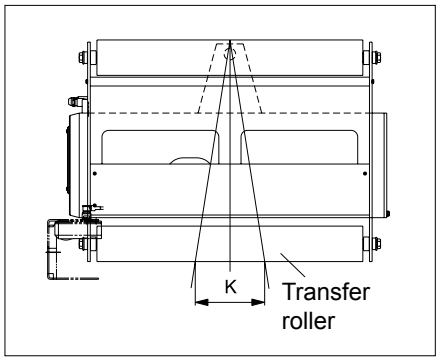
Parameter block for setting the motor data for the actuator.

P24 motion direction

The direction of actuation of the actuator can be inverted using this parameter.

After inverting the direction of actuation, an initialization run must be performed.

P25 motion range total



The actual travel (dimension K) of the actuator on the outfeed (transfer roller) must be entered in this parameter. As with certain actuators (e. g. pivoting frames) the travel of the actuator is not identical to the travel of the actuator drive, the exact value must be entered.

During the initialization run this setting is used to determine the mechanical ratio (P37 "mech. gearfactor") and the motor gear constant calculated. This motor gear constant normalizes the actuating speed and travel.

P26 positionrange +

P27 positionrange -

Using the positioning range limits you can prevent the actuator drive mechanically moving against its mechanical spindle stop or the actuator.

On compact systems, the actual travel (see P25 "motion range total") of the actuator is reduced from the factory by approx. 2 mm using these two parameters.

If the actuator drive is installed at the customer, the positioning range limits must be set at the customer.

It must be noted the actuator does not stop immediately, particularly with large moved masses. For this reason the positioning range limits must be reduced.

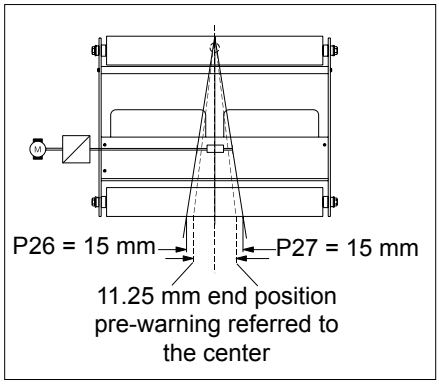
The values set always refer to the center set.

The travel for both sides (right/left) from the center position must be set in P26 and P27.

This positioning range limit is not allowed to be used for the protection of people or equipment. To protect people or equipment the end position limiting must be realized using additional limit switches.

P28 alarm limit %

If necessary, a range can be defined that if exceeded will result in the output of an end position pre-warning. The value is entered in % and refers to the two parameters P26 "positionrange +" and P27 "positionrange -". If the actuator exceeds this calculated value, the message "End position pre-warning" is output. The message "Endlage überschritten" "(End position reached) is only output at the two end positions. The limit for "end position pre-warning" always refers to the center of the positioning range set. The warning is output for both sides (positive and negative).

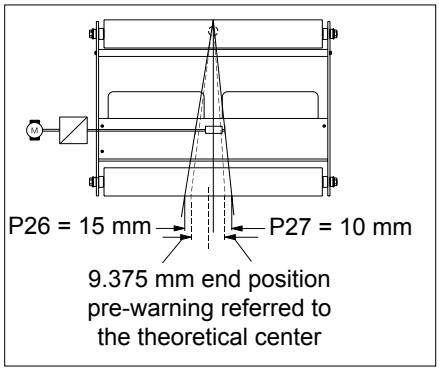


Example:

Value entered in P28	=	*75 %*
Value entered in P26 / P27	=	*15 mm*

*15 mm * 75 / 100 = 11.25 mm*

*If the positioning range of 11.25 mm is exceeded, the end position pre-warning message is output. If the positioning range of 15 mm is reached, the message "*End position reached*" is output.*



If the values in the parameters P26 / P27 are different, a theoretical center is determined from the two values. The end position pre-warning refers to this center.

Example:

Value entered in P28	=	*75 %*
Value entered in P26	=	*15 mm*
Value entered in P27	=	*10 mm*

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

P29 reserved 29

Not currently used.

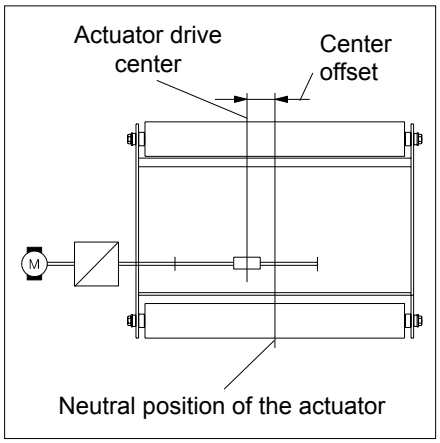
P30 reference offset

The distance between the switching point for the reference encoder and the center of the actuator drive is set in this parameter.

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

To ensure the actuating movement in the "centering" operating mode is as small as possible, the switching point for the reference encoder must match the center position (neutral position).

This parameter is determined automatically during the actuator's initialization run and entered.



P31 center offset

The "center offset" is the difference between the center of the actuator drive and the actuator's neutral position.

If the actuator's neutral position varies from the center of the actuator drive, this neutral position can be changed by the entry P31 "center offset". The neutral position on a pivoting frame means that the actuating roller is parallel to the guide roller.

If the controller is in the "centering" operating mode while the "center offset" is changed, the change in the parameter value is immediately executed by the actuator drive. It is possible to check the actuator's neutral position immediately.

P32 system offset

If the actuator drive is in the middle of its positioning range, the actual position value "0" is broadcast on the CAN bus. For special applications an offset can be entered in this parameter; this offset is added to the actual position value broadcast.

P33 total resolution

The total resolution of the motor is indicated in this parameter in I/mm. It is calculated internally from the following four parameters: P34 "encoder resolution", P35 "rotation gear", P36 "linear gear", P37 "mech. gearfactor";

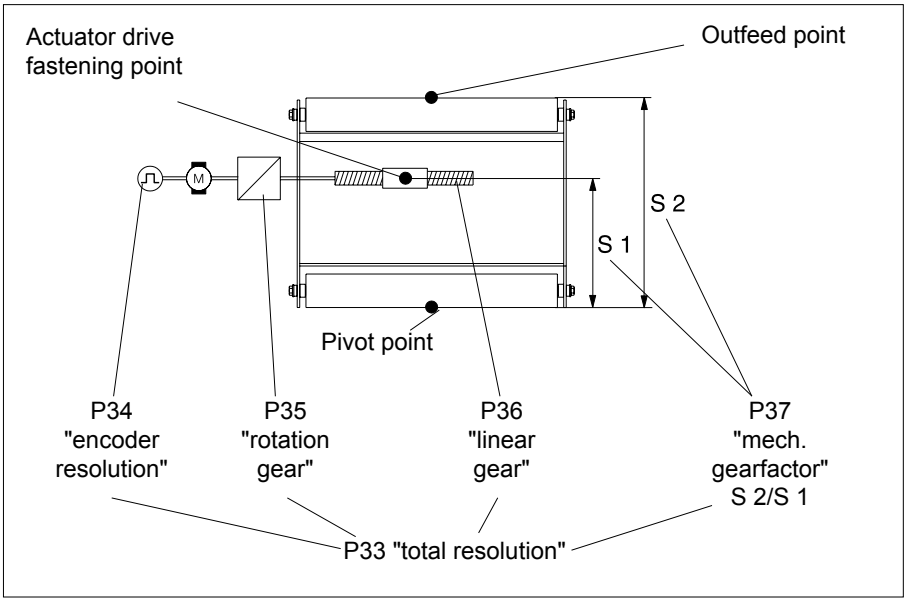
P34 encoder resolution

P35 rotation gear

P36 linear gear

P37 mech. gearfactor

The motor gear constant is calculated using these parameters.



The values for the three parameters P34, P35, P36 must be determined from the table in chapter 6.

The mechanical ratio is entered in P37 "mech. gearfactor".

The ratio can be determined as follows:

Measure distance S 1 between pivot point and fastening point for the actuator drive. Also measure the distance S 2 between pivot point and outfeed point. A ratio is formed from these two values and the value calculated yields the mechanical ratio (P37 "mech. gearfactor).

Example:

Distance measured S 1	*450 mm*
Distance measured S 2	*850 mm*

850 mm / 450 mm = 1.89

The entry in P37 "mech. gearfactor" is this example is 1.89.

During the initialization run P3 "start service" / value 10, P37 "mech. gearfactor" is determined automatically.

P38 encoder filter

For dynamic speed control the encoder pulses from the actuator drive must be filtered as little as possible. An excessively small filter value will result in an uneven motor speed.

P39 pos controller

Parameter block for setting the position control loop.

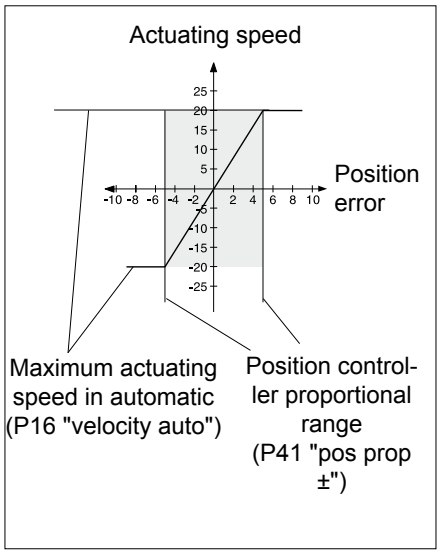
P40 death zone ±

Adjustable dead zone for the position controller. If the position error is inside the dead zone, positioning is stopped, the actuator drive remains stationary.

P41 pos prop ±

If the position error is greater than the "position controller proportional range" set, the speed of adjustment is the same as the maximum actuating speed. If the position error is within the "position controller proportional range" the actuating speed is lower as per the characteristic.

Using this parameter, the P component for the actuator drive position controller is set indirectly.



Example:

Due to a web-set position deviation of 1 mm, the values set (P13 and P 45) result in an actuator set position of 15 mm.
The actuator drive covers the first 10 mm at maximum actuating speed, as these values are outside the gray range.
After passing the 10 mm, there still remain 5 mm. These 5 mm are inside the gray range and therefore the speed is reduced linearly down to 0 until the 15 mm travel are reached.

In the case of untidy edges (textiles), this parameter can be increased to dampen the actuator drive's position controller. The static accuracy of the web guiding control unit is retained.

The value P41 "pos prop ±" should be maximum half the sensor field of view.

P42 act position

The actual position of the actuator referred to the mechanical center of the travel is displayed.

P43 set position

The set position for the actuator referred to the mechanical center of the travel is displayed.

P44 pos source adress

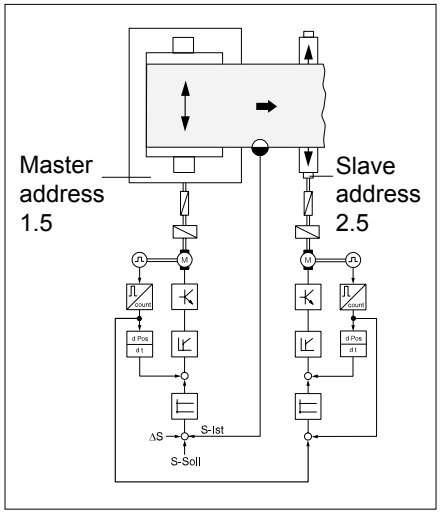
This parameter is only relevant for a follow-up controller.

A follow-up controller comprises two control loops.

Controller 1 (master) operates like a normal web guiding control unit, with sensor, actuator, controller and command station (optional).

Controller 2 (slave) is positioned in the "automatic" operating mode following the actual position of controller 1. It comprises the actuator and the controller.

If the controller is used as a follow-up controller (slave), the CAN address for controller 1 (master) must be set here.



P93 = controller typ 1

Example 1:

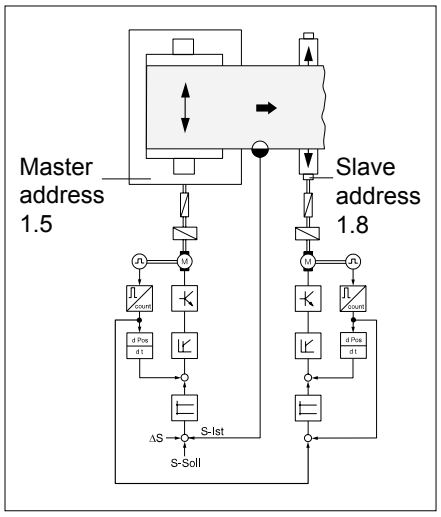
The master has the address 1.5

The slave has the address 2.5

In P44 on the control card for the slave (address 2.5) the value 15 (address 1.5) must be entered.

In P93 "controller typ" the value 1 (integral) must be entered.

The slave controller can be operated independently (different operating mode) of the master controller using a command station DO .... or DI .... . If the slave controller is in the "automatic" operating mode, the position is set to the position of the master controller.



P93 = controller typ 2

Example 2:

The master has the address 1.5

The slave has the address 1.8

In P44 on the control card for the slave (address 1.8) the value 15 (address 1.5) must be entered.

In P93 "controller typ" the value 2 (master-slave) must be set.

The slave controller is operated together (same operating mode) with the master controller. Separate operation is not possible.

For 1:1 master-slave following, the values below must be set in the related parameters:

P13 "prop range ±" = -10.0

P45 "prop stroke ±" = +10.0

The gear data must be set exactly.

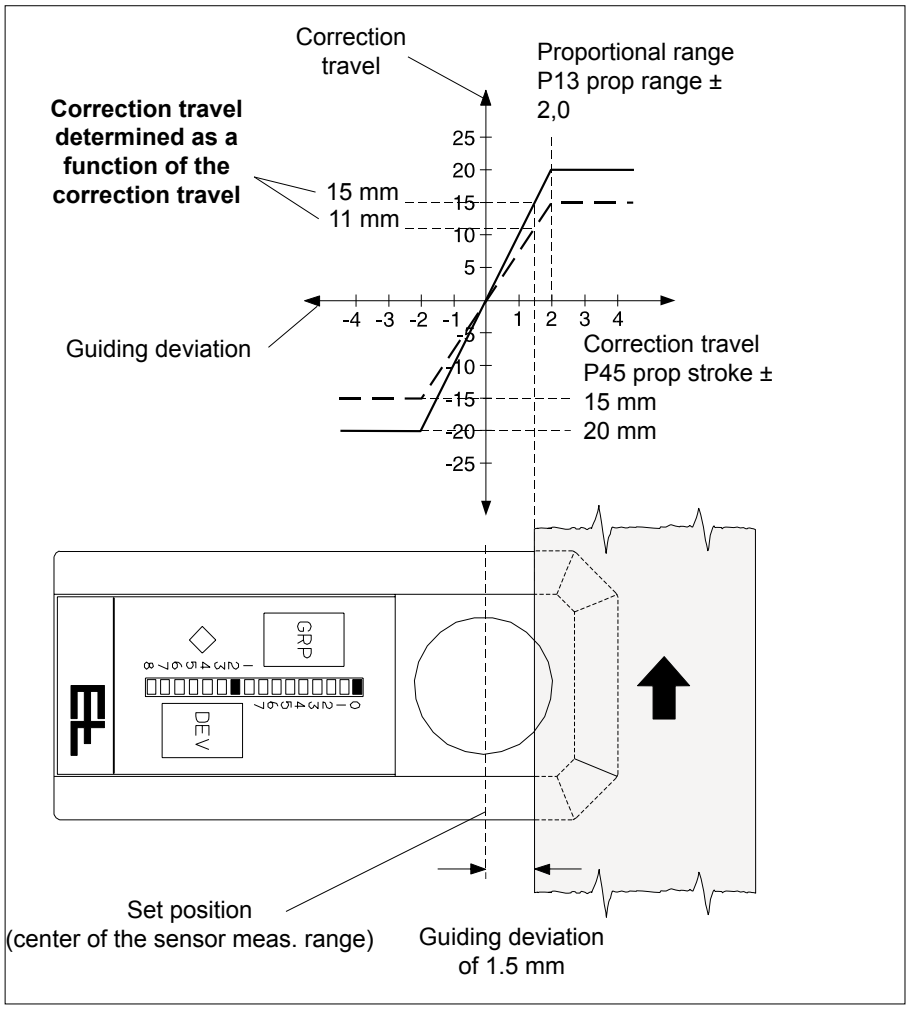
P45 prop stroke ±

For integral actuators the correction travel is set referred to the proportional range set (P13 "prop range ±").

This parameter has no function for proportional actuators.

The larger the correction travel (P13 "prop range ±") is set with a constant proportional range, the larger the gain (steeper characteristic) of the web guiding control unit in the automatic mode.

The steeper the characteristic, the larger the correction travel in case of a guiding deviation and, as a result, the system will be more sensitive. From the characteristic you can see the correction travel the actuator uses to attempt to correct an error.



In this example a maximum correction travel of 15 mm or 20 mm is assumed, with a proportional range of 2 mm.

The following values are marked on the diagram::

Guiding deviation:	*1.5 mm*
P44 "prop stroke":	*15 mm (example 1)*
P44 "prop stroke":	*20 mm (example 2)*
P13 "prop range ±":	*2 mm*

This guiding deviation yields the following correction travel:

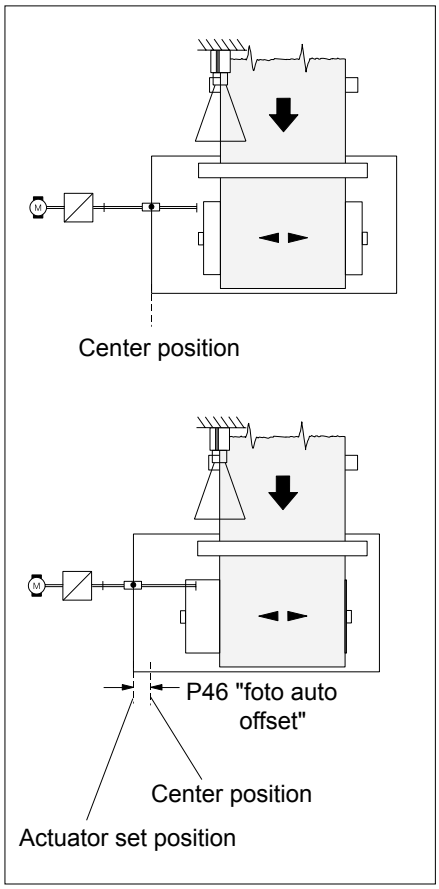
Correction travel:	***11 mm/s (example 1)***
Correction travel:	***15 mm/s (example 2)***

The values can also be determined mathematically:

Gain (G) = P44 / P13

*Correction speed (VK) = guiding deviation * gain (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***



Example: Winder with camera

P46 foto auto offset

In the case of a follow-up control system/tool control system the actuator is always guided proportional to the actual web position.

To define the required set position (operating point) for the winding/ tool, the offset between the "center" position and the required set position must be entered.

During the actuator's initialization run the offset is set to zero.

Manual definition of P46 "foto auto offset":
The offset is entered in 1/10 mm. Depending on the sign of the entry, the set position of the actuator is defined to the left (negative) or right (positive) of the center position.

Automatic definition of P46 "foto auto offset":
Set the actuator to the required set position in the "manual" operating mode. The web must be in the field of view of the sensor at the set position. When get guiding set point is triggered, the actuator position is saved in P46 "foto auto offset" and the position of the web in the sensor in P91 "guide target".

The trigger for get guiding set point must be set in P100 "operatorkey config" and can be undertaken in the following ways:

- "Automatic" key
- "Automatic" and "Setup" key simultaneously
- "Host command"

P47 pos I-part

If in the case of integral actuators (e.g. segmented roller guiders), controller type 1 (P93 controller type) is used, there is a lasting guiding deviation for reasons related to the controller. To reduce or avoid this guiding deviation, the automatic offset of the operating point can be set using P125 "adaptive function". The larger P47 "pos I-part", the faster the guiding deviation is corrected. An excessively large value will result in the oscillation of the control loop.

So that on the selection of the automatic operating mode, the operating point is reset to "0", the option "AUTO clear I-part" must be selected in P98 "function config 2".

P48 speed controller

Parameter block for setting the speed controller.

P49 max. motor speed

The speed of the motor at maximum terminal voltage (47 V) is set here. The speed value must be taken from the table in chapter 6.

P50 act. speed

The actual motor speed is displayed.

P51 set speed

The set motor speed is displayed.

P52 speed_P

P53 speed_I

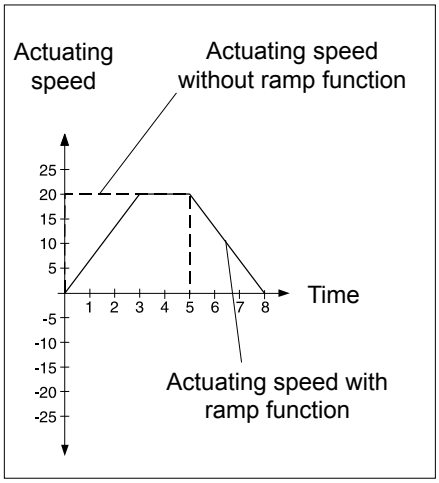
P54 speed_D

The P, I and D component for the different device types can be found in the table in chapter 6.

The values are not allowed to be changed. The values are already optimized in the factory.

A change in these 3 parameters will degrade the optimal function of the controller. A change to these parameters can, starting with a degradation of the control, result in the system no longer functioning.

P55 accel. time



This function can only be used with the "manual adjustment" operating mode.

In the manual mode the actuator is positioned at the actuating speed set in P18 "velocity jog".

Using this ramp function P55 "accel. time", an acceleration time from 0 to maximum motor speed can be entered. The actuator drive then only reaches its maximum speed after the time set. The motor speed is increased linearly. The actuator drive also stops using the same ramp function.

In the illustration on the left the actuating speed curve with a ramp function of 3 seconds set is shown. The key for the manual adjustment was pressed for 5 seconds in this example. The dotted line shows the actuating speed curve without ramp function.

P56 current controller

Parameter block for setting the current controller.

P57 reserved 57

Not currently used.

P58 current maximum

The motor nominal current given on the actuator drive's rating plate is to be set here. A motor current set excessively high can overload the actuator drive, or even irreparably damage it. The value for the current can also be determined from the table in chapter 6.

P59 overload factor

For the improved dynamic performance of the actuator drive, a motor current increase can be set. The motor nominal current is increased by the factor set. The motor current increase is dependent on the motor temperature. As long as the motor temperature remains below the temperature set, the motor current increase is active. When the maximum temperature is reached, the motor current increase is removed in steps.

From the factory a motor current increase with a factor of 1.5 is set.

> On the usage of an actuator drive without a sensor for the motor temperature, the parameter value must be set to 100 (factor 1). Otherwise the motor will be irreparably damaged.
>
> The current limit is limited upwards by the maximum power unit current (see Technical data).

P60 derating temperature

Setting for the nominal limit temperature. For the actuator drives AG 57/58 the limit temperature must be set to 65 °C. This setting is imperative for motor current increase in P59 "overload factor".

P61 limited current

The motor current actually allowed is displayed. This value is dependent on the motor temperature and the motor speed.

P62 act. current

The current actual motor current is displayed.

P63 set. current

The actual set motor current is displayed.

P64 editor settings

Parameter block for setting the system parameters.

P65 code number

The Setup editor can be inhibited using a numerical code with up to four digits. Setup settings are then only possible after the entry of the numerical code. A prompt for the numerical code is displayed when the Setup editor is opened. If a numerical code has not been entered (parameter value "0"), a prompt is not displayed.

The number in this parameter defines the numerical code.

If the numerical code is entered incorrectly three times, the Setup editor is inhibited. The inhibit is removed when the controller is switched off.

P66 english/chinese

The menu prompts in the Setup editor as well as the values displayed are displayed in English.

If necessary the language can be changed to Chinese using the value 1.

P67 main loops

Only for internal evaluations.

P68 diagnostics

Parameter block for the indication of the system status.

P69 motorstatus

The following motor states are displayed:

R-encoder 0-speed	Motor stopped
R_encoder fault	One or both encoder tracks are missing
R_encoder invers	Encoder track A/B reversed
R_motorline open	Motor cable open circuit
R_motor blocked	Motor jammed
R_current limit	Current limit reached
R-current max.	Current limit reached, motor stopped

P70 system error

The following error messages are possible:

1	UAC-power low	The supply voltage is too low
2	UAC-power high	The supply voltage is too high
3	UDC-inter.low	The internal 24 V supply voltage is too low
4	UDC-inter.high	The internal 24 V supply voltage is too high
5	UDC-sec.1 fault	No 1st secondary voltage
6	UDC-sec.2 fault	No 2nd secondary voltage
7	24V-extern fault	No external 24 V voltage
8	24V-intern low	The external 24 V voltage is too low
9	24V-intern high	The external 24 V voltage is too high
10	emergencyloop	Emergency stop circuit open (one of the safety switches on the actuator drive is open)
15	I motor R high	The motor current is too high
16	nicht belegt	Not used
17	Temp case high	The power unit temperature (heatsink) is too high
18	Temp motor R high	The motor temperature is too high
20	encoder R fault	No encoder signal A, B, or A + B
22	encoder R invers	The encoder signal A and B is reversed
24	sensor R fault	No sensor signal from the right sensor
25	sensor L fault	No sensor signal from the left sensor
26	gearcontant fault	No gear constant it is outside the range allowed
27	power_off	No supply voltage for the controller
28	Temp motor R fault	No temperature signal for the motor
30	Motorline R fault	No motor is connected
31	Moto R overload	The motor is jammed or short circuited (no rotary movement at maximum motor current)

If an error message is present, the "Ready" output is set (see also chapter 3.4).

P71 inputvoltage AC

Indication of the input voltage.

P72 inputvoltage DC

Indication of the internal supply voltage.

P73 running time meter

Indication of the operating hours.

P74 supplyvoltage 24 DC

Indication of the supply voltage.

P75 temperature case

Indication of the actual temperature of the heatsink on the control card.

If the temperature exceeds 40 °C the fan is switched on automatically. If the temperature exceeds 80 °C, an error is output and the motor power unit switched off.

P76 temp. case max.

The control card saves the highest heatsink temperature measured. This saved temperature is indicated.

P77 temperature motor

The actual motor temperature is displayed. In the case of a temperature above 85 °C an error message is output and the motor power unit is switched off.

P78 enc-test off/on

Monitoring of the encoder signal for the motor speed.

0 Monitoring OFF

1 Monitoring ON, in the case of the failure of the encoder signal, the internal IxR compensation (emergency operation) is used.

P79 enc-test delay

Delay for the encoder monitoring. If encoder monitoring is activated (P78 "enc-test off/on / value 1") after the time set, the IxR compensation (emergency operation) is used until the encoder signal is available again.

P80 I/O configuration

Parameter block for programming the digital inputs.

Input	Value
X 4.3	1
X 4.4	2
X 4.6	4
X 6.2	8
X 1.3	10
X 1.4	20
X 1.6	40
X 1.8	80

P81 >digi input status

The actual state of the digital inputs on the control card is displayed. The number indicates which input is set.

If several inputs are set, the total of the values for the individual inputs is displayed.

P82 >usage input X 4.3

P83 >usage input X 4.4

P84 >usage input X 4.6

P85 >usage input X 6.2

P86 >usage input X 1.3

P87 >usage input X 1.4

P88 >usage input X 1.6

P89 >usage input X 1.8

The digital inputs (see circuit diagram) can be used for functions as required. If there is a signal on the related input, the selected function is run.

Each function can only be assigned once.

The following table shows the selection of the possible functions:

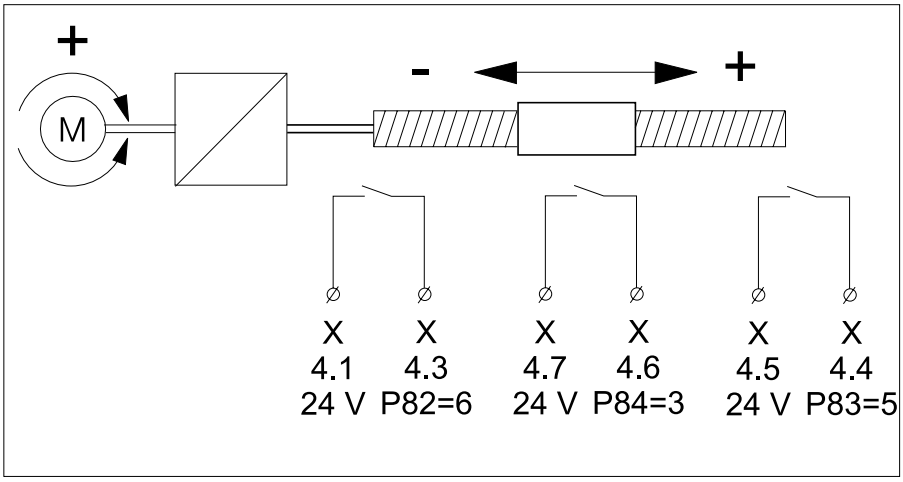
Value	Application	Signal with active input
0	no usage	This input has no function
1	Motor lock	Motor is stopped in any operating mode
-1	Motor unlock	Motor is enabled in any operating mode
2	Automatic lock	Motor is stopped only in automatic operating mode
-2	Automatic unlock	Motor is enabled only in automatic operating mode
3	Reference with speed-	Reference encoder switches with negative motor direction of rotation
-3	Reference with speed+	Reference encoder switches with positive motor direction of rotation
4	Speed ± lock	With 1 signal the motor direction of rotation is locked. It is defined which direction of rotation is inhibited only in conjunction with reference encoder.
-4	Speed ± unlock	With 0 signal the motor direction of rotation is locked. It is defined which direction of rotation is inhibited only in conjunction with reference encoder.
5	Speed + lock	With 1 signal the positive motor direction of rotation stops (see example 1)
-5	Speed + unlock	With 0 signal the positive motor direction of rotation stops
6	Speed - lock	With 1 signal the negative motor direction of rotation stops (see example 1)
-6	Speed - unlock	With 0 signal the negative motor direction of rotation stops
7	Auto <-> Center	Switch between automatic and centering
-7	Center <-> Auto	Switch between centering and automatic
8	Oscilation ON	Oscillation ON
-8	Oscilation Off	Oscillation OFF
9	-	Not used
9-	-	Not used
10	Webspeed Measure	Web speed measurement (only possible on terminal X 6.2!)
-10	-	No used
11	Manual Key	"Manual" key
12	Right Key	"Right" key
13	Left Key	"Left" key
14	Auto Key	"Automatic" key
15	Center Key	"Center" key
16	Latch weberror	With 1 signal the actual web position deviation is saved and with "0" signal a corresponding correction position is added to the actual position of the actuator drive. The type of control is needed if the web position is only available as a value at certain times (e.g. label scanning, broken lines, etc.).

17	ATL switch R	With 1 signal the positive actuating movement is suppressed and the opposite negative actuating movement used instead. The actuating speed for the negative actuating movement is set in P19 "velocity defect".
18	ATL switch L	With 1 signal the negative actuating movement is suppressed and the opposite positive actuating movement used instead. The actuating speed for the positive actuating movement is set in P19 "velocity defect".
19	Edge Search key	"Search for edge" key
20	Sensor Free key	"Move clear sensor" key
21	Foto key	With 1 signal a get guiding set point is triggered
22	Foto zero key	With 1 signal the set value is deleted

Motor direction of rotation **clockwise**	**+** Positive motor direction of rotation	c.w. clockwise
Motor direction of rotation **counter-clockwise**	**-** Negative motor direction of rotation	c.c.w. counter clockwise

Example 1:

With the actuator drives AG 57.. / AG 58.. the proximity switches must be connected as shown below.



Input X 4.4 is used for the value 6. With 1 signal the negative motor direction of rotation stops.

Input X 4.3 is used for the value 5. With 1 signal the positive motor direction of rotation stops.

Input X 4.6 is used with the value 3. Reference encoder switches with negative motor direction of rotation, from center of travel.

P90 guide config.

Parameter block for the external definition of the guiding.

P91 guide target

The set position of the web is displayed.

P92 system config.

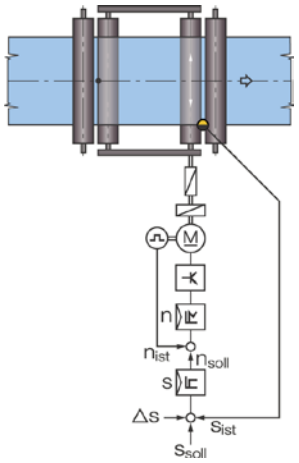
Parameter block for adaptation to the application.

P93 >controller type

With this parameter the type of controller is defined for the controller.

Proportional actuator

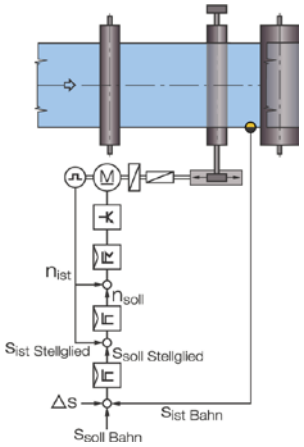
pivoting frame
steering roller
turn rod
reel station
lateral displacement roller



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

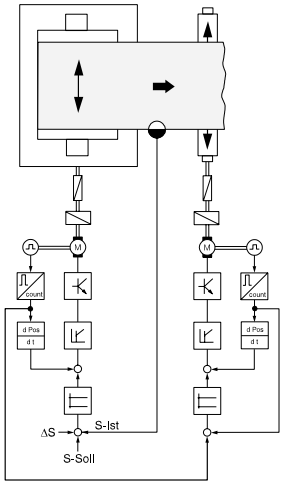
Integral actuator

pivoting roller
segmented roller guider
edge spreading device
spreading device
positioning controller
follow-up controller



n_{ist} = actual speed
n_{soll} = set speed
$S_{soll\ Stellglied}$ = set position actuator
$S_{ist\ Stellglied}$ = actual position actuator
ΔS = web deviation
$S_{ist\ Bahn}$ = actual position web
$S_{soll\ Bahn}$ = set position web

Master-Slave operation



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

0= With a proportional controller in the case of a deviation of the actual position from the set position, a specific actuating speed is output to correct the error signal.

1= With an integral actuator a specific actuator position is output to correct the error signal.

2= In case of master-slave operation one actuator drive (slave) follows another actuator drive (master) exactly. See P44 "pos source adress".

P94 controller operate

In case of machine center guiding with motorized sensor following (hybrid) the value must be set to 1. In this way it is ensured the set value is set to "0" (machine center).

P95 >auto adress

The control card has an automatic sensor addressing feature.

> The sensor addressing is undertaken only after a reset and is only possible for sensors that are directly connected to the control card at connectors X 15/X 16. In addition, the sensor software must be compatible with automatic sensor addressing.

There exist the following possible methods of sensor addressing.

0 = The sensor address/es are only displayed in P96 "sensor adr X16" and P97 "sensor adr X15". The address is set manually on the sensor or from the command station.

1 = The sensor on terminal X16 is automatically assigned the device number 1 and the sensor on terminal X15 is assigned the device number 2. The device group for the sensor is identical to the group for the control card. It is therefore not necessary to set the address as per the sensor description.

2 = The sensor on terminal X15 (X16) is assigned the address set in P96 "sensor adr X16" (P97 "sensor adr X15"). If a sensor is replaced (faulty sensor) the new sensor is automatically assigned the correct address.

P96 sensor adr X16

P97 sensor adr X15

The address set for the sensor on terminal X16 (X15) is displayed.

P98 >function config 1

Certain functions can be activated and deactivated.

The following table shows the possible functions:

Function	Value	Description
[X] Framelimit Check	0001_h	Monitoring of the two positioning range limits. In the case of actuator drives without end positions (e.g. tube slitter) this function must be disabled!
[ ] Center direct	0004_h	In the "centering" operating mode, the center position is adopted without additional calibration of the position counter.
[ ] Ref on Power on	0008_h	After the application of the supply voltage, the reference encoder is moved to first to calibrate the position counter. Then the operating mode is selected that was selected prior to switching off the supply voltage.
[ ] Watch webedge R	0010_h	During the motorized positioning of fork sensors, the right web edge is monitored. If the field of view of the sensor is completely covered (Sensor Status = Right Side), motorized positioning in this direction is interrupted. As a result damage to the web edge by the fork sensor is prevented.
[ ] Watch webedge L	0020_h	During the motorized positioning of fork sensors, the left web edge is monitored. If the field of view of the sensor is completely covered (Sensor Status = Left Side), motorized positioning in this direction is interrupted. As a result damage to the web edge by the fork sensor is prevented.
[ ] Enable AG-Foto	0040_h	The current actuator position is saved as the set position for the automatic mode. The setting is displayed in P46 "foto auto offset". This function is only possible with controller type 1 (integral actuator), see also P3/value 13.
[ ] Sens. err.> Center	0080_h	In the case of an invalid sensor signal from selected sensors, the actuator is positioned at the center position saved. Without the activation of this function, the actuator is only inhibited in the event of an invalid sensor signal. Only possible in "automatic" operating mode.
[ ] MCP active	0100_h	Activation of the MCP (MasterControlProcessor). If there is no control card in a group with the address x.5 (master), this function must be set.
[ ] Apl. deactive	0200_h	Disable all web guiding control unit applications.
[X] Weboffset_deci	0800_h	This function is set from the factory. The resolution for the web offset is set to 1/10 mm. If necessary the resolution can be changed to 1/100 mm. This function must be disabled in this case.
[ ] Weboffset invers	1000_h	The effective direction of the web offset is inverted. This inversion is only possible if the signal for the web offset is received over an interface (e.g. Profi-Bus, Interbus-S etc.).
[ ] Defect detection	2000_h	If the edge error exceeds the proportional range set (e.g. due to a web offset, bead of adhesive, wear tear etc.) the actuating speed is reduced to the actuating speed set in "P19 velocity defect".
[ ] ext. system mode	4000_h	For future applications the system mode will be extended. With the modified command stations it will then be possible to run various operating modes at the same time.

The functions can be selected directly using a CANMON program or the command station DO 200..

If these two options are not available, the "value" for the individual functions must be added together and the resulting total entered in this parameter. The total must be formed in the hexadecimal system.

Example 1:

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

Total = 0010_h + 0020_h = 0030_h

Parameter value = 30

Example 2:
*The "*enable AG-Foto*" and "*Sens. err.> Center*" functions are required.*
Total = 0040_h + 0080_h = $00C0_h$
Parameter value = C0

P99 >function config 2

Certain functions can be activated and deactivated. The following table shows the functions:

‖ Only one function is possible in the case of the curved brackets ().

Function	Value	Description
(*) no controller output	0000_h	None of the following 5 values is output via the CAN channel (CoController Output)
( ) N-target -> CAN	0001_h	Output of the set speed on the CAN
( ) Delta N -> CAN	0002_h	Output of the speed difference on the CAN
( ) Pos-target -> CAN	0003_h	Output of the set position on the CAN
( ) Delta Pos -> CAN	0004_h	Output of the position difference on the CAN
( ) I-target -> CAN	0005_h	Output of the set current on the CAN
[ ] POS-TXD: targetpos	0010_h	Instead of the actual position of the actuator drive, the set position is sent as a CAN message. In this way the tracking losses on a follow-up controller are reduced.
[ ] lock webspeedlim	0020_h	If the actual web speed (P123 "actual web speed") drops below the limit set for the web speed in P122 "webspeed limit", the automatic mode is inhibited.
[X] AUTO: start slow	0040_h	If, on the selection of the "automatic" operating mode, the web is outside the proportional range, the adjusting speed is reduced to the manual mode adjusting speed. This reduction is only performed once after the selection of the "automatic" operating mode.
[ ] AUTO: Clear I-part	0080_h	After selecting the "automatic" operating mode the I component set for the position controller is reset to 0. Only with controller type 1 (integral)
[ ] Pos-TXD: 50->10ms	0100_h	The transmission cycle time for the actual position on the CAN bus can be reduced from 50 ms to 10 ms. In this way the tracking losses on a follow-up controller are reduced.
[ ] AG-Foto with sens.	0200_h	The actual actuator position is saved as the set position for the automatic mode. The sensor value is also saved in addition to the set position.
[ ] Deselect all sens.	0400_h	The automatic mode does not take into account the sensor signals (e.g. oscillation without sensor). The sensor selection is set to "No Sensor".
[ ] Pos-CMD: no Foto	0800_h	In the event of a positioning command over an interface, get set guiding point is not tripped (foto).
[ ] Trigger control	1000_h	On each reception of a new actual position for the web, the actual web position is saved and a corresponding correction position added to the actual position for the actuator. The type of control is required if the actual position of the web is sent with t > 5 ms. Attention! The "Latch weberror" function must not be selected for the programmable inputs.
[ ] High prior Manual	2000_h	In the "automatic" operating mode the actuator is switched to the "manual" operating mode with the "Web offset" keys and positioned correspondingly. After the Web offset" keys are released, the "automatic" operating mode is automatically selected again. The "web offset" function is not possible.
[ ] No weboffset limit	4000_h	The limitation of the web offset to the sensor measuring range is removed.
[ ] List-res 0.1 mm -> 1 mm	8000_h	Change in the parameter resolution. In the case of positioning ranges greater than 3200.0 mm the values can no longer be displayed or edited in the related parameters. For this reason the resolution must be changed from $^1/_{10}$ mm to 1 mm. **Attention!** Then a reset **and** a rescan **must** be performed.

The functions can be selected directly using a CANMON program or the command station DO 200..
If these two options are not available, the "value" for the individual functions must be added together and the resulting total entered in this parameter. The total must be formed in the hexadecimal system.

Example :

The "I-target-> CAN" and "Auto: Clear I-part" functions are required.

Total = 0005_h + 0080_h = 0085_h

Parameter value = 0085

P100 >operatorkey config

Using this parameter certain functions can be activated and deactivated. The following table shows the functions:

Only one function is possible in the case of the curved brackets ().

Function	Value	Description
[ ] AUTO: sel. all sens	0001_h	In the "automatic" operating mode all existing sensors in this group are selected.
[ ] Sel. valid sensor	0002_h	It is only possible to select sensors with a valid sensor signal (sensor status "gültig/valid") via a corresponding command station. This setting is of significance in the case of a camera or color line sensor, as these sensors support the status "gültig/valid" or "ungültig/invalid".
[ ] force support free	0004_h	If the "Move sensor clear" key is pressed or the signal is present on the input of the same name on a digital interface, the sensors are positioned outwards and the operating mode set to "*SystemLocked*". Other commands are not accepted. Only when the "Move sensor clear" key is released or the signal removed from the digital interface is the system enabled again.
[X] Center -> sup. free	0008_h	In the "centering" operating mode, the carriages/sensors are positioned outwards. In the "automatic" operating mode the carriages/sensors are positioned at the original position or, in the "hybrid" operating mode symmetrical to the machine center.
[ ] no edge -> sup. free	0020_h	if, in the "search for edge" operating mode, the inner end position of the carriage is reached, the "move sensor clear" operating mode is selected automatically. This value must be set in the control card X.5 (master). If there is no control card with the address X.5, the function must be set on the control card with activated MCP (MasterControlProcessor) (see P98 "function config 1" / value 0100).
[ ] Sens sel. direct	0040_h	Without this setting, on the selection of a sensor the "manual" operating mode is always selected. If this function is set, the operating mode selected is retained on the selection of a sensor.
[ ] emergency sensor L	0080_h	Emergency guiding with left sensor
[ ] emergency sensor R	0100_h	Emergency guiding with right sensor
[ ] Foto @ AUTO	0200_h	Get set guiding point is performed using the "Automatic" key (only on ZC 5501-8015 F_..)
[X] Foto @ AUTO + Setup	0400_h	Get set guiding point is performed using the "Automatic" and "Setup" keys (only with ZC 5501-8015 F_..)
[ ] Foto @ hostcommand	0800_h	Get set guiding point is performed using a host command (only with ZC 5501-8015 F_..)
[ ] No Foto @ CENTERED	1000_h	In "centering" operating mode, get set guiding point is not triggered
(*) lost web ----	0000_h	The operating mode is not changed on the loss of the web edge.
( ) lost web: Center	4000_h	The "centring" operating mode is selected on the loss of the web edge.
( ) lost web: Manual	8000_h	The "manual" operating mode is selected on the loss of the web edge.

The functions can be selected directly using a CANMON program or the command station DO 200..
If these two options are not available, the "value" for the individual functions must be added together and the resulting total entered in this parameter. The total must be formed in the hexadecimal system.

Example 1:

*The "*Sel. valid sensor*" and "*Center -> sup. free*" functions are required.*

Total = 0002_h + 0008_h = $000A_h$

Parameter value = A

Example 2:

*The "*force support free*", "*emergency sensor L*" and "emergency sensor R" functions are required.*

Total = 0040_h + 0080_h + 0100_h = $01C0_h$

Parameter value = 1C0

P101 >function config 3

The following functions are possible:

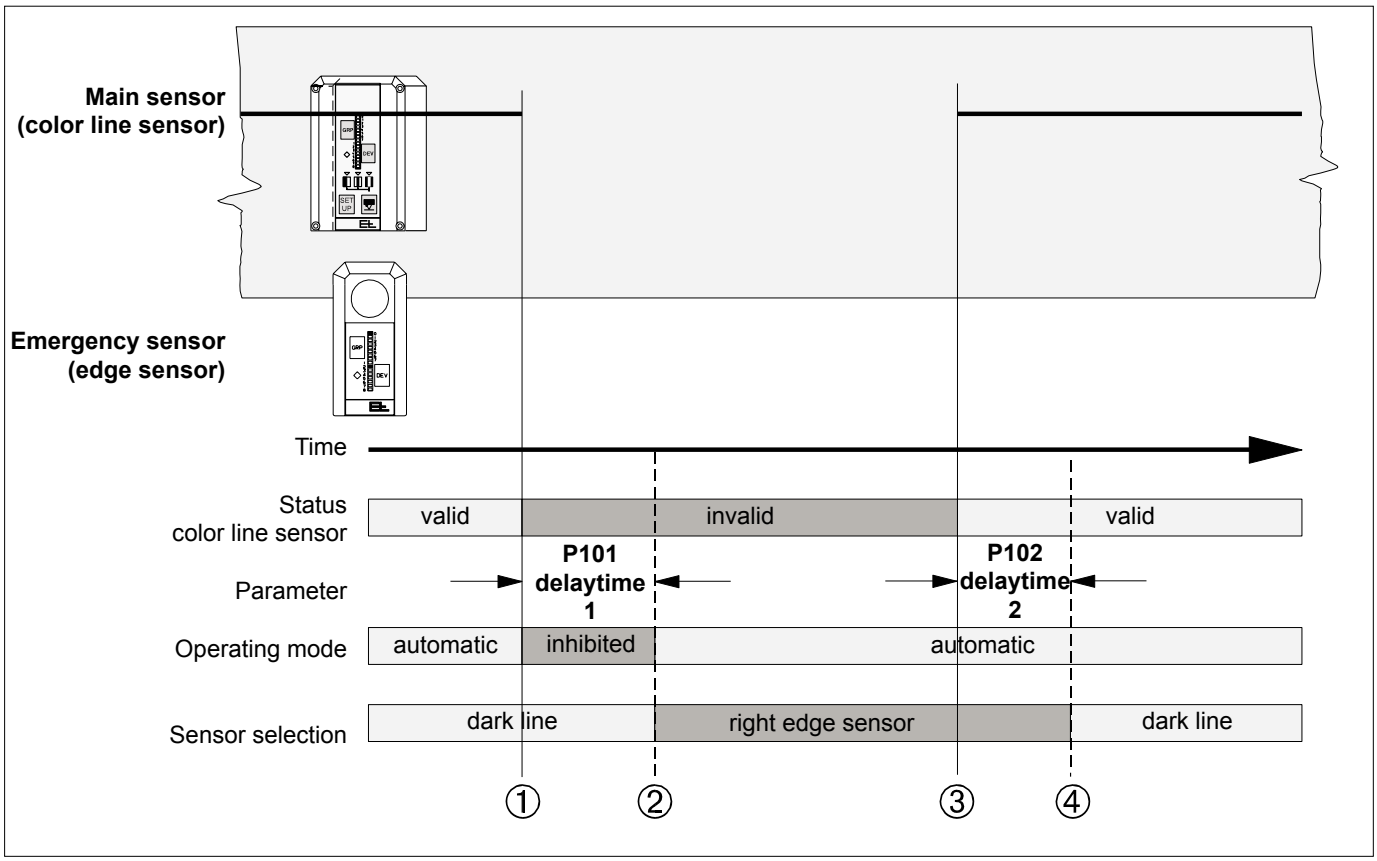
Function	Value	Description
[ ] desel. VS XX to sensor	0001_h	If a color line sensor is used in conjunction with a motorized support beam, the "Search for edge", "Web offset using support beam" etc. functions are not possible. On the selection of the color line sensor, the selection of all support beams in this device group is cleared automatically. The support beam can only be positioned using corresponding commands from an interface.

P102 delaytime 1

P103 delaytime 2

On the usage of a color line sensor, it is possible to change to an emergency sensor in the case of an invalid guiding criterion. The emergency guiding is activated in P100 ">operaterkey config". The times that must elapse before switching are set in the two "delaytime 1 / 2" parameters.

The switching is performed using the following principle:



① At this point the color line sensor loses its guiding criterion. The web guiding control unit is inhibited and the delay set P102 "delaytime 1" started.

② After the time elapsed has elapsed, the emergency sensor is selected and the web guiding control unit enabled. The automatic mode continues. At the same time the control card adopts the current actual position of the web as the set position for the emergency sensor.

③ The guiding criterion is available again and the delay in P103 "delaytime 2" started. The emergency sensor continues to be used for guiding.

④ After the time set has elapsed, the color line sensor is selected again.

P104 calibration

Parameter block for the calibration of the control card.

The following parameters in this parameter block are only relevant for E+L service.

P105 calib. UAC

Scaling of the input voltage measurement and display.

P106 calib. UDC

Scaling of the operating voltage measurement and display.

P107 offset. I-act

Motor current measurement offset.

P108 calib. I-act

Scaling of the motor current measurement and display.

P109 offset. I-set

Current output offset for the motor.

P110 calib. I-set

Motor current measurement offset.

P111 offset. U-motor

Motor voltage measurement offset.

P112 speed constant

Entry of the motor revolutions per Volt. The value must be left at the default value.

P113 IxR compensation

Indication of the motor internal resistance including the cable resistance.

P114 powerderate limit

The actual temperature of the heatsink is displayed.

P115 act speed IxR

Indication of the motor speed that is calculated using the IxR compensation. If this calculated motor speed varies from motor speed in P50 "act speed", the "No encoder signal" error is output. The error is only output from a difference of 1000 rev/min.

P116 reserved 116

P117 reserved 117

P118 reserved 118

Not currently used.

P119 webspeed config.

Parameter block for setting the web speed measurement.

P120 webspeed constant

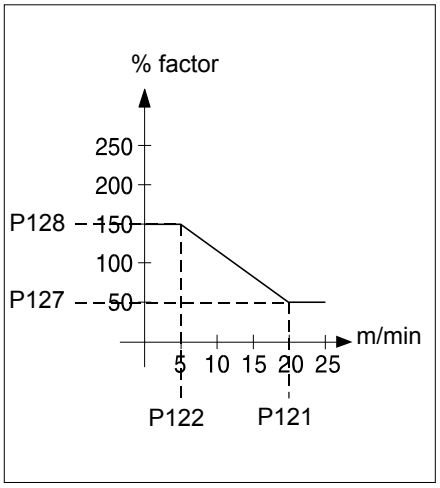
To calibrate the web speed measurement in the control card, the number of pulses generated per running meter of web must be entered here.

P121 webspeed max.

P122 webspeed limit

P127 max webspeed ratio

P128 lim webspeed ratio



These parameters are only of significance if one of the functions is active in P125 "adaptive function".

The following parameters can be modified as a function of the web speed:

P13 "prop range ±"

P16 "velocity auto"

P45 " prop stroke ±"

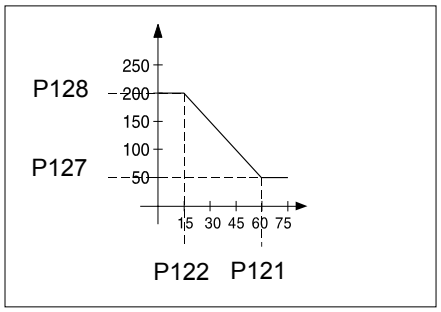
The two corner points for the characteristic are defined with the following parameters. The corresponding percentage factor with which the selected parameter is modified is then given from the characteristic by the current web speed.

P121 = Entry for the maximum web speed

P127 = Entry for the related percentage

P122 = Entry for the minimum web speed

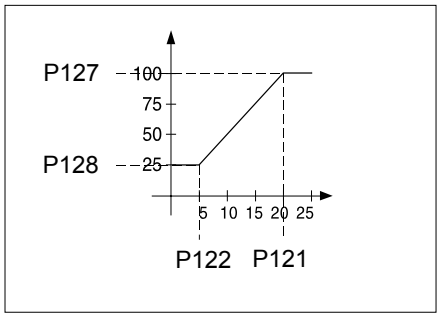
P128 = Entry for the related percentage



Example 1:

The proportional range set (P13) must be 200 % at minimum web speed and 50 % at maximum web speed. The minimum web speed is 15 m/min, the maximum 60 m/min.

The related percentage factor for the proportional range at a specific web speed is given by the characteristic on the left.



Example 2:

The maximum actuating speed (P16) must be 25 % at minimum web speed and 100 % at maximum web speed. The minimum web speed is 5 m/min, the maximum 20 m/min.

The related percentage factor for the actuating speed at a specific web speed is given by the characteristic on the left.

The reduction in the actuating speed has an effect on the sensitivity of the control loop.

P123 actual webspeed

Indication of the current web speed (V actual).

P124 adaptive control

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

P125 adaptive function

To adapt the web guiding control unit to changing process variables (e.g. web speed), adaptive controller adjustment is possible. Which controller setting is to be affected by which process variable must be set in the following values.

0 = No adaptive control.

1 = The controller proportional range (P13) is adjusted as a function of an external CAN signal.

2 = The controller proportional range (P13) is adjusted as a function of the web speed.

4 = The actuating speed in automatic mode (P16) is adjusted as a function of an external CAN signal.

8 = The actuating speed in automatic mode (P16) is adjusted as a function of the web speed.

16 = The correction travel (P45) is adjusted as a function of an external CAN signal.

32 = The correction travel (P45) is adjusted as a function of the web speed.

P126 adaptive ratio

Indication of the current control loop gain.

P127 max webspeed ratio

See P121.

P128 lim webspeed ratio

See P122.

P129 reserved 129

P130 reserved 130

Not currently used.

P131 !! Service !!

Parameter block for setting service functions.

The service functions are only relevant for E+L service!

P132 service off/on

Only for E+L service personnel.

The service mode is started with the value "1". After a reset the value is automatically reset to "0".

P133 >service mode

Only for E+L service personnel.

1 = Deactivate motor units
2 = Simulation of square set current
3 = Simulation of triangular set current
4 = Simulation of square speed
5 = Simulation of triangular speed
8 = Simulation of square set position
9 = Simulation of triangular set position

P134 testvalue 1

Only for E+L service personnel.

P135 testvalue 2

Only for E+L service personnel.

P136 testcycletime

Only for E+L service personnel.

P137 hardware settings

Parameter block for setting the display.

P138 LCD contrast

The display's contrast can be changed in 64 steps. The smaller the value set, the greater the contrast.

P139 LCD backlite

The display's brightness can be changed in 32 steps. The smaller the value set, the more attenuated the lighting.

P140 LCD scroll

Values indicated with more digits than available on the display are displayed in the form of a running display. The larger the parameter value, the "slower" the indication runs across the display.

P141 display err off

To activate the indication of errors, indication must be activated with this parameter.

P142 error scroll

If there is more than one error, the indication switches to the next error after a set time has elapsed. The time is set here.

P143 enable dual rate

Enable the indication of P14 "dual-rate width" in the optimization level in the Setup editor.

Along with the three parameters displayed by default

- P16 "velocity auto"
- P13 "prop range ±"
- P18 "velocity jog"

it is also possible to display

- P14 "dual-rate width"

in the optimization level.

P144 reserved 144

P145 reserved 145

P146 reserved 146

Not currently used.

5.3 Parameter explanation "Extended DCS" (only with ZC 5501-8015)

P0 edit device

P1 edit group

P2 reset settings

P4 Add. DCS Config.

See "Standard parameters" parameter explanation

P5 >function config

The following functions are possible:

Function	Value	Description
[ ] check workspace	0001_h	If in the "web center" control type the web leaves the field of view of a camera (sensor status "ungültig/invalid"), the "automatic" operating mode in a standard control system is interrupted and the controller inhibited. If this function is selected, the controller is not inhibited in the situation stated above. The set position of the web is changed via the controller such that the web is brought back into the field of view of the camera. When the web is back in the field of view of both cameras, the original set position for the web is adopted.
[ ] emergency guide	0002_h	If in the "web center" control type a camera loses its guiding criterion (sensor status "ungültig/invalid"), the "web edge" control type is selected and the existing guiding criterion used for control. The position of the existing guiding criterion at this moment is cached as the set position until the lost guiding criterion is available again.

P6 mid target limit

Limit for the set position of the web, for the slave controller.

In the case of lamination, the set position of the web for the slave controller is defined by the master web. In some circumstances this set position can vary to such a large amount that the slave controller can no longer mechanically follow this position.

Using this parameter the set position for the slave controller is limited to the value set.

- With P6 = "0" the limit is deactivated.

P7 auto offset limit

The web offset is limited to this value set.

- With P7 = "0" the limit is deactivated.

P8 target change speed

If a new set position for the web is defined via an interface, a step change may result in a web tear.

To prevent this situation, a web set point ramp can be set using P8.

- With P8 = "0" the ramp is deactivated.

6. Settings

Type	Mat. no.	Pulses per rev	Trans. ratio	Spindle pitch	Watt	Travel	Cur-rent	Nom. speed	Speed P	Speed I	Speed D
		P34	P35	P36			P58	P49	P52	P53	P54
AG 2751	354974	8	4:1	5	250	700	7,00	3000	1,0	0,1	0,0
AG 5791	228435	8	20 : 1	10	500	100	7,00	3000	1,0	0,1	0,0
AG 5791	228436	8	20 : 1	10	500	200	7,00	3000	1,0	0,1	0,0
AG 5791	228437	8	20 : 1	10	500	300	7,00	3000	1,0	0,1	0,0
AG 5791	228438	8	20 : 1	10	500	400	7,00	3000	1,0	0,1	0,0
AG 5791	228439	8	20 : 1	10	500	600	7,00	3000	1,0	0,1	0,0
AG 5791	228611	8	20 : 1	10	500	1000	7,00	3000	1,0	0,1	0,0
AG 5791	300853	8	20 : 1	10	500	100	7,00	3000	1,0	0,1	0,0
AG 5791	300854	8	20 : 1	10	500	200	7,00	3000	1,0	0,1	0,0
AG 5791	300855	8	20 : 1	10	500	300	7,00	3000	1,0	0,1	0,0
AG 5791	300856	8	20 : 1	10	500	400	7,00	3000	1,0	0,1	0,0
AG 5791	300857	8	20 : 1	10	500	600	7,00	3000	1,0	0,1	0,0
AG 5791	301347	8	20 : 1	10	500	200	7,00	3000	1,0	0,1	0,0
AG 5791	307938	8	20 : 1	10	500	200	7,00	3000	1,0	0,1	0,0
AG 5891	228207	8	40 : 1	10	500	200	7,00	3000	1,0	0,1	0,0
AG 5891	228259	8	40 : 1	10	500	400	7,00	3000	1,0	0,1	0,0
AG 5891	300050	8	40 : 1	10	500	200	7,00	3000	1,0	0,1	0,0
AG 5891	300849	8	40 : 1	10	500	300	7,00	3000	1,0	0,1	0,0
AG 5891	300850	8	40 : 1	10	500	400	7,00	3000	1,0	0,1	0,0
AG 5891	300851	8	40 : 1	10	500	600	7,00	3000	1,0	0,1	0,0
AG 5891	300852	8	40 : 1	10	500	1000	7,00	3000	1,0	0,1	0,0
AG 5891	308996	8	40 : 1	10	500	100	7,00	3000	1,0	0,1	0,0
AG 5891	312133	8	40 : 1	10	500	300	7,00	3000	1,0	0,1	0,0
AG 5891	315782	8	40 : 1	10	500	600	7,00	3000	1,0	0,1	0,0
AG 5791	347455	8	23,2 : 1	10	500	100	7,00	3000	1,0	0,1	0,0
AG 5791	347456	8	23,2 : 1	10	500	200	7,00	3000	1,0	0,1	0,0
AG 5791	347459	8	23,2 : 1	10	500	300	7,00	3000	1,0	0,1	0,0
AG 5791	347460	8	23,2 : 1	10	500	400	7,00	3000	1,0	0,1	0,0
AG 5791	347461	8	23,2 : 1	10	500	600	7,00	3000	1,0	0,1	0,0
AG 5891	347462	8	53,2 : 1	10	500	600	7,00	3000	1,0	0,1	0,0
AG 5891	347463	8	53,2 : 1	10	500	1000	7,00	3000	1,0	0,1	0,0
AG 5891	348858	8	53,2 : 1	10	500	300	7,00	3000	1,0	0,1	0,0
AG 5891	351312	8	53,2 : 1	10	500	200	7,00	3000	1,0	0,1	0,0

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7. Technical data

Power supply/transformer	
Supply voltage	110 to 600 V AC
Nominal power	680 VA
Nominal voltage	34 V AC
Output current	20 A AC

Digital controller DC 55..	
Nominal operating voltage	34 V DC
Power consumption	550 W
Current consumption	16 A
Output voltage at motor terminal	±47 V (PWM) (PWM = Pulse Width Modulation)
Ambient temperature	Maximum 60 °C
Protection class Controller DC 55.. Switch panel SE 405. Controller DC 55.. in E+L switch cabinet	 IP 20 IP 20 IP 54

CAN bus	
CAN bus level	+ 5 V (floating)
CAN baudrate	250 KBaud

Digital input switching levels **Terminal X 4.3 / 4.4 / 4.6 / 6.2 / 1.3 / 1.4 / 1.6 / 1.8**	
Low "0"	0 to 3 V DC
High "I"	10 to 30 V DC
Incremental encoder frequency	Maximum 5 kHz

Digital output terminal X 4.9	
Output current PNP	Maximum 0.1 A

Sensor connector X 5/X 6	
Output voltage	24 V DC
Output current	Maximum 0.5 A

Subject to technical change without notice