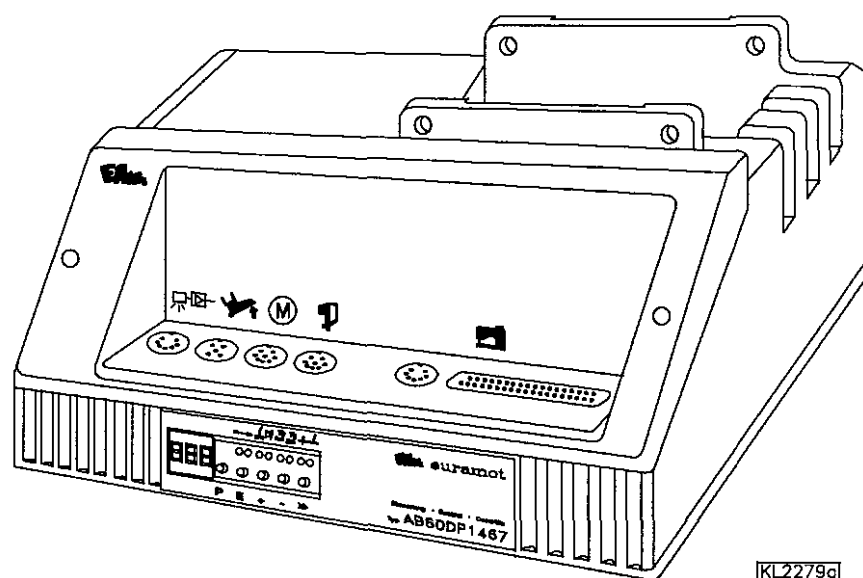




CONTROL

AB60D1467



INSTRUCTION MANUAL

No. 402252

English

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1. Important Safety Instructions

When using an EFKA drive and accompanying devices (e.g. for sewing machines), basic safety precautions should always be followed, including the following:

- Read all instructions thoroughly before using this drive.
- Drive, its accessories and accompanying devices should be mounted and put into operation by qualified personnel in accordance with the guidelines provided in the instruction manual.

To reduce the risk of burns, fire, electric shock, or personal injury:

- Use this drive only for its intended use as described in the instruction manual.
- Use only attachments recommended by the manufacturer or as contained in the instruction manual.
- Do not operate without corresponding protective devices.
- Never operate this drive if one or more parts (e.g. cables, plugs) are damaged, if it is not working properly, if any damages can be identified or are to be suspected (e.g. after it has been dropped). Only qualified personnel are authorized to make adjustments, eliminate faults and complete repair work.
- Never operate the drive with the air openings blocked. Keep ventilation openings of the drive free from the accumulation of lint, dust and loose cloth.
- Never drop or insert any object into any opening.
- Do not use drive outdoors.
- Do not operate where aerosol (spray) products are being used or where oxygen is being administered.
- To disconnect, turn off main switch, then remove plug from outlet.
- Do not unplug by pulling on cord. To unplug, grasp the plug, not the cord.
- Keep fingers away from all moving machine parts. Special care is required e.g. around the sewing machine needle and the V-belt.
- Before mounting and adjusting accompanying devices, i.e. position transmitter, reversing device, light barrier, etc., disconnect drive from mains (turn off main switch, remove mains plug from outlet [DIN VDE 0113 part 301; EN 60204-3-1; IEC 204-3-1]).
- Always switch off (0) machine and remove plug from outlet, when removing covers, mounting accompanying devices, position transmitter especially, light barrier, etc., or any other devices mentioned in the instruction manual.
- Only qualified personnel are authorized to work on the electrical components.
- Work on high voltage circuit areas is forbidden, except as stated in the respective regulations, e.g. DIN VDE 0105 part 1.
- Only specially trained personnel are authorized to complete repair work.
- Cables to be wired must be protected against expectable strain and fastened adequately.

- Cables near moving machine parts (e.g. V-belts) must be wired at a minimum distance of 25 mm (see DIN VDE 0113 part 301; EN 60204-3-1; IEC 204-3-1).
- For safety it is preferred to wire the cables separately from each other.
- Before connecting the mains line make sure that the mains voltage corresponds to the specifications on the motor rating plate and on the nameplate of the power pack.
- Connect this drive to a properly grounded outlet only. See Grounding Instructions.
- Electric accompanying devices and accessories must only be connected to safety low voltage.
- EFKA DC drives are protected according to overvoltage class 2 (DIN VDE 0160 § 5.3.1).
- Observe all safety guidelines before undertaking conversions or modifications.
- For repair and maintenance use only original replacement parts.



Warnings in the instruction manual which point out particular risks of personal injury or risk to the machine are marked with this symbol wherever applicable.



This symbol is a warning on the control and in the instruction manual. It indicates hazardous voltage.

CAUTION - In the case of failure this area can be current-carrying even after having turned the power off (non discharged capacitors).

- The drive is not an independently operating unit, but is designed to be incorporated into other machinery. It must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the EC Directive.

Save these instructions for future reference.

2. Range of Applications

The drive is suitable for lockstitch, chainstitch and overlock machines of various manufacturers.

This drive can be used as a replacement for the following controls, if using adapter cords (adapter cords see Special Accessories):

Machine manufacturer	Replacing	Machine	Class	Thread trimming mode	Adapter cord
Aisin	AB60C	Lockstitch	AD3XX,AD158 3310,EK1	0	1112815
Brother	AB60C	Lockstitch	737-113,737-913	0	1112814
Brother	AB60C	Chainstitch	FD3 B257	5	1112822
Dürkopp Adler	AB60C	Lockstitch	210,270	0	1112845
Global		Chainstitch	CB2803-56	5	1112866
Juki	AB60C	Lockstitch	5550-6	14	1112816
Juki	AB60C	Lockstitch	5550-7	14	1113132
Kansai	AB60C	Chainstitch	RX 9803	5	1113130
Pegasus	AB60C	Chainstitch	W500/UT	5	1112821
Pegasus	AB60C	Backlatch		8	1112827
Pfaff	AB60C	Lockstitch	563,953,1050, 1180	0	1112841
Pfaff		Lockstitch	1425	13	1113072
Rimoldi		Chainstitch	F27	5	1113096
Singer	SN62AV	Lockstitch	211,212,591	1 / 2	1112824
Union Special	US80A	Lockstitch	63900AMZ	10	1112823
Union Special	US80A	Chainstitch	34000, 36200	4	1112865
Union Special	US80A	Chainstitch	CS100/FS100	4	1112905
Yamato	JU60B/AB60C	Chainstitch		5	1112818
Yamato	AB60C	Backlatch	ABT3	9	1112826
Yamato		Backlatch	ABT13	9	1112898

2.1 Use in Accordance with Regulations

The drive is not an independently operating machine, but is designed to be incorporated into other machinery. It must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the EC Directive (Appendix II, paragraph B of the Directive 89/392//392/EEC and supplement 91/368/EEC).

The drive has been developed and manufactured in accordance with the respective EC standards:

EN 60204-3-1: 1990 Electrical equipment of industrial machines:
 Particular requirements for industrial sewing machines,
 sewing units and sewing systems.

The drive can only be operated:

- on thread processing machines
- in dry areas

3. Complete Drive Unit Consisting of

1	Direct current motor	DC....
1	Electronic control	euramot AB60D1467
	- Power pack	N156A (230V), optional N159 (110V)
	- Actuator	EB301, optional EB302 with softer spring
1	Position transmitter	P5-2 standard
		P5-4 Singer cl. 211, 212, 591
1	Mains switch	NS106, optional NS106d/for 230V supply systems
		NS107 and NS107s
1	Set of standard accessories consisting of:	B131 belt guard, complete set of hardware motor mounting foot bracket 1 and 2, short potential equalization cord documentation
1	Set of accessories consisting of:	Z3
1	Pulley	pitman rod, complete

3.1 Special Accessories

Reflection light barrier module LSM001A

Solenoid type EM1..(for e.g. sewing foot lifting, etc.)

- part no. 6100028
- available versions see specification "solenoids"
- part no. 1111845

Extension cable for external actuator, approx. 750 mm long, complete with plug and socket connector

- part no. 1111787

Extension cable for external actuator, approx. 1500 mm long, complete with plug and socket connector

- part no. 0501278

5-pin plug with locking screw for the connection of another external actuator

- part no. 4170013

Foot control type FB301 with one pedal for standing operation with approx. 1400 mm connecting cable and plug

- part no. 4170018

Foot control type FB302 with three pedals for standing operation with approx. 1400 mm connecting cable and plug

- part no. 0300019

Fitting piece for position transmitter

Extension cable for position transmitter P5-..., approx. 1100 mm long, complete with plug and socket connector	- part no. 1111584
Extension cable for position transmitter P5-..., approx. 315 mm long, complete with plug and socket connector	- part no. 1111229
Extension cable for motor connection, approx. 400 mm long	- part no. 1111858
Extension cable for motor connection, approx. 1500 mm long	- part no. 1111857
Knee switch type KN3 (pushbutton) with cord of approx. 950 mm length without plug	- part no. 58.0013
Pulley 40 mm ϕ with special belt intake and slip-off protection (use SPZ belt)	- part no. 1112223
Pulley 50 mm ϕ with special belt intake and slip-off protection (use SPZ belt)	- part no. 1112224
Adapter cord for the connection to BROTHER cl. 737-13, 737-913	- part no. 1112814
Adapter cord for the connection to AISIN high-speed seamer AD3XX, AD158, 3310 and overlock machine EK1	- part no. 1112815
Adapter cord for the connection to JUKI high-speed seamer with index -6	- part no. 1112816
Adapter cord for the connection to YAMATO	- part no. 1112818
Adapter cord for the connection to PEGASUS cl. W500/UT	- part no. 1112821
Adapter cord for the connection to BROTHER chainstitch machine cl. FD3 B257	- part no. 1112822
Adapter cord for the connection to UNION SPECIAL lockstitch machine cl. 63900AMZ (as a replacement for the US80A)	- part no. 1112823
Adapter cord for the connection to SINGER cl. 211, 212U-UTT (magn. thread trimmer) and 591	- part no. 1112824
Adapter cord for the connection to YAMATO backlatch machine ABT3	- part no. 1112826
Adapter cord for the connection to PEGASUS backlatch machine	- part no. 1112827
Adapter cord for the connection to PFAFF cl. 563, 953, 1050, 1180	- part no. 1112841
Adapter cord for the connection to DÜRKOPP ADLER cl. 210; 270	- part no. 1112845
Adapter cord for the connection to UNION SPECIAL cl. 34000 and 36200	- part no. 1112865
Adapter cord for the connection to GLOBAL cl. CB2803-56	- part no. 1112866
Adapter cord for the connection to YAMATO backlatch machine ABT13	- part no. 1112898
Adapter cord for the connection to UNION SPECIAL cl. CS100 and FS100	- part no. 1112905
Adapter cord for the connection to PFAFF cl. 1425	- part no. 1113072
Adapter cord for the connection to RIMOLDI cl. F27	- part no. 1113096
Adapter cord for the connection to KANSAI machines cl. RX 9803	- part no. 1113130
Adapter cord for the connection to JUKI high-speed seamer with index -7	- part no. 1113132
Sewing light transformer	- please indicate line voltage and sewing light voltage (6.3V or 12V)
7-pin plug with locking screw (Mas 7100S)	- part no. 1110805 *)
37-pole SubminD connector cpl.	- part no. 1112900 *)
Single pin for 37 pole SubminD with strand of approx. 5 cm length	- part no. 1112899
Pitman rod	- part no. 1112399 *)

*) These items are available as set of accessories **Z50** !

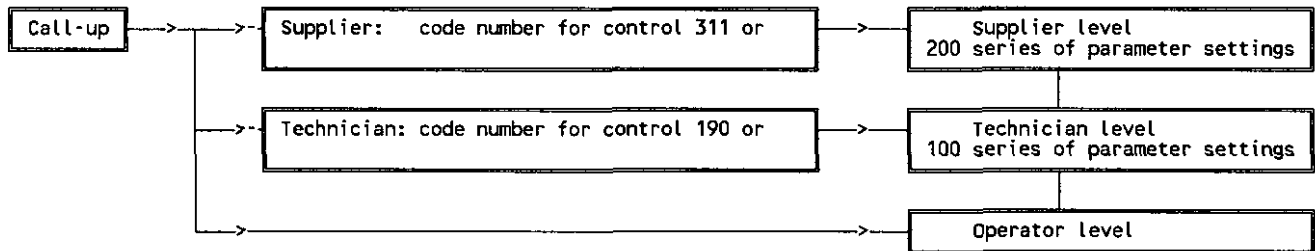
4. Operating the Control without Variocontrol

4.1 Access to Programming on Command Input

In order to prevent the unintentional modification of preset functions the input commands are distributed at various levels, as shown in the following diagram.

The following persons have access:

- the supplier to the highest and all subordinate levels by a code number
- the technician to the next lower and all subordinate levels by a code number
- the operator to the lowest level without code number

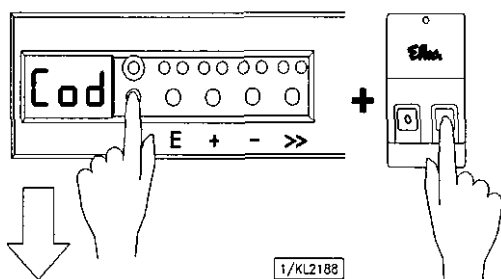


4.2 Programming the Code Number

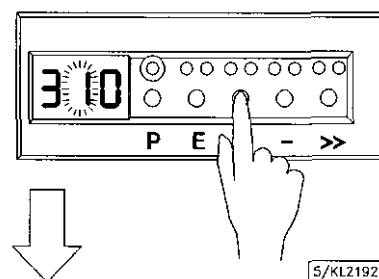
Note

The parameter numbers in the illustrations below serve as examples and may not be available in all program versions. In this case, the display shows the next higher parameter number. See Parameter List.

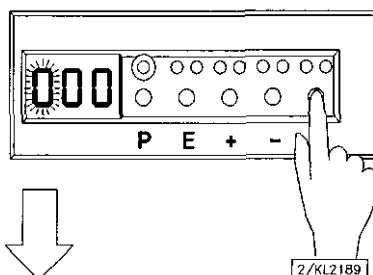
1. Press pushbutton **P** and turn power on



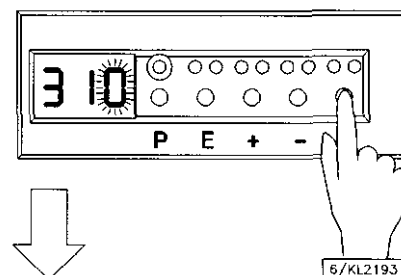
5. Press pushbutton **+** and/or **-** to select the second digit



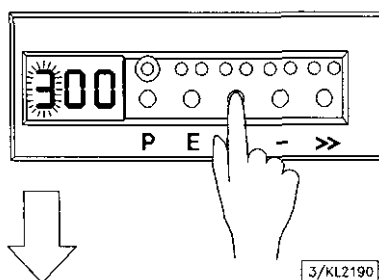
2. Press pushbutton **>>** (first digit blinks)



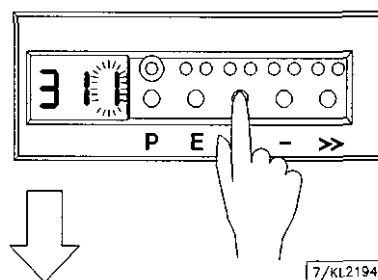
6. Press pushbutton **>>** (third digit blinks)



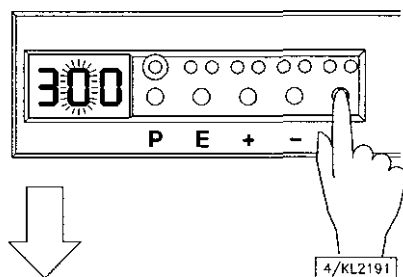
3. Press pushbutton + and/or - to select the first digit
 Technician level ==> Code no. 190
 Supplier level ==> Code no. 311



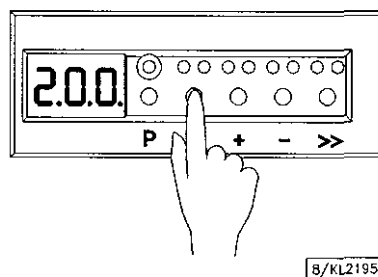
7. Press pushbutton + and/or - to select the third digit



4. Press pushbutton >> (second digit blinks)



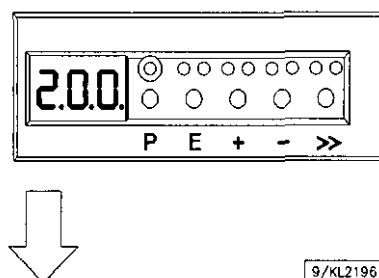
8. Press pushbutton E; the parameter number is displayed, which is indicated by points between the digits.



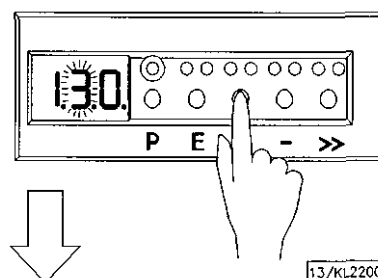
4.3 Selection of the Parameters

4.3.1 Direct Selection

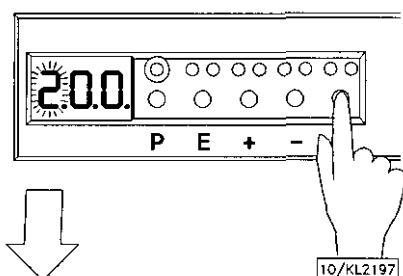
1. After inputting the code number on the programming level



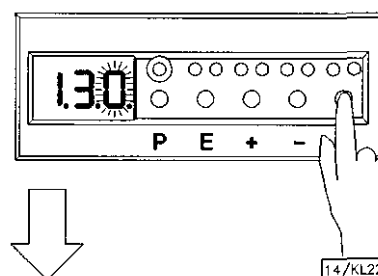
5. Press pushbutton + and/or - to select the second digit



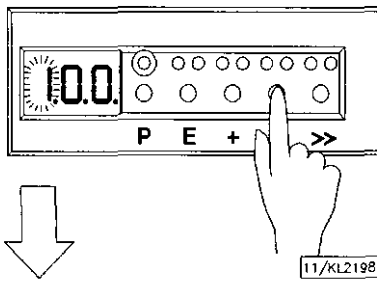
2. Press pushbutton >> (first digit blinks)



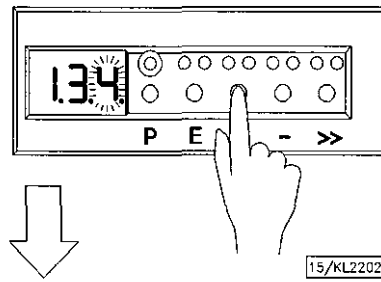
6. Press pushbutton >> (third digit blinks)



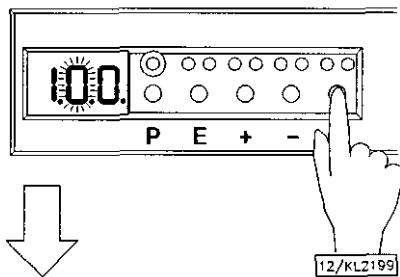
3. Press pushbutton + and/or - to select the first digit



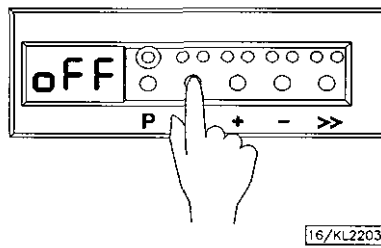
7. Press pushbutton + and/or - to select the third digit



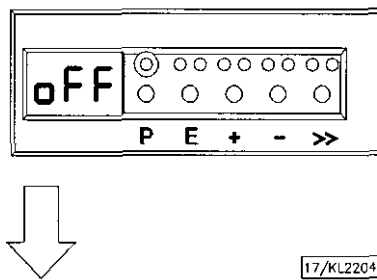
4. Press pushbutton >> (second digit blinks)



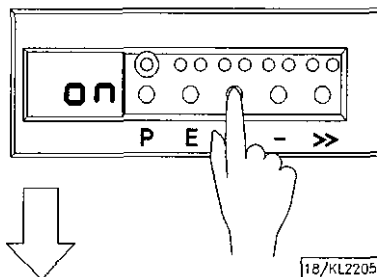
8. Press pushbutton E; parameter value is displayed. There are no points between the digits.



4.3.2 Changing Parameter Values



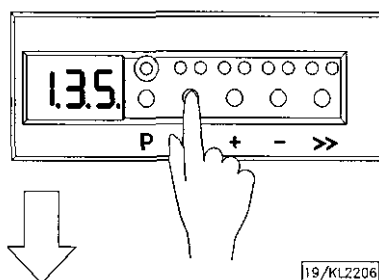
Display after selecting the parameter value



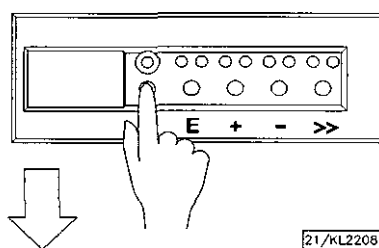
Change parameter value by pressing pushbutton + and/or -

Possibility n° 1:

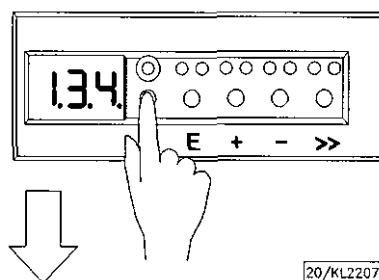
Press pushbutton **E**. The next parameter number is displayed.



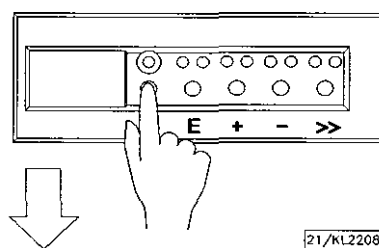
Press pushbutton **P**. Exit programming. The changed parameter values will only be saved by starting to sew again!

**Possibility n° 2:**

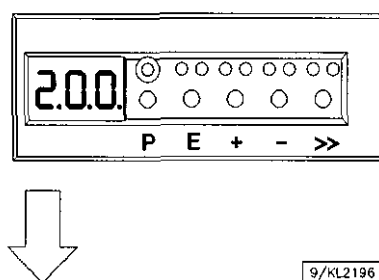
Press pushbutton **P**. The same parameter number is displayed.



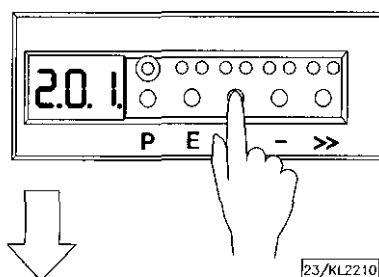
Press pushbutton **P**. Exit programming. The changed parameter values will only be saved by starting to sew again!

**4.3.3 Selection by Using the +/- Pushbuttons**

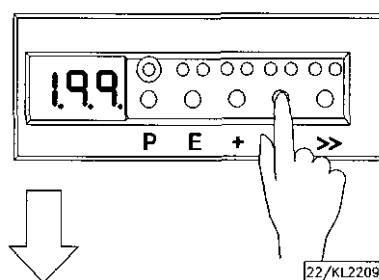
1. After inputting the code number on the programming level



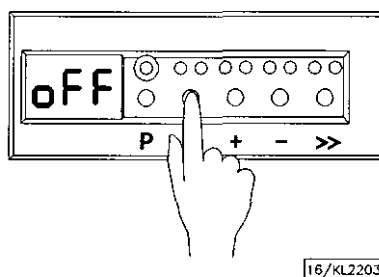
2. Select the next parameter by pressing the + pushbutton



3. Select previous parameter by pressing the - pushbutton



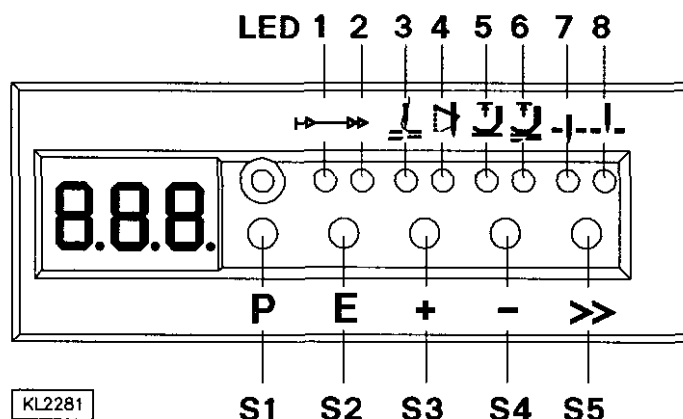
4. After pressing pushbutton E, the parameter value is displayed



4.4 Changing All Parameter Values of the Operator Level

All parameter values of the operator level (see Parameter List) can be changed without inputting a code number.

- Press pushbutton P => First parameter number will be displayed.
- Press pushbutton E => Parameter value will be displayed.
- Press pushbuttons +/- => Parameter value will be changed.
- Press pushbutton E => Next parameter will be displayed.
- Press pushbutton E => Parameter value will be displayed.
- Press pushbuttons +/- => Parameter value will be changed.
- etc.
- Press pushbutton P 2x => Exit programming on the operator level.



4.5 Switchable Functions

Switchable functions can be changed by pressing a pushbutton. The switching state is indicated by light emitting diodes (LED). See above illustration!

Table: Allocation of functions for pushbuttons and LEDs

Function	Pushbutton	LED number	
Softstart On	E (S2)	1 = on	2 = off
Softstart Off	E (S2)	1 = off	2 = on
Thread trimmer On (in all modes except mode 7, 11 and 12)	+ (S3)	3 = on	4 = off
Thread wiper On	+ (S3)	3 = off	4 = on
Thread trimmer and thread wiper On	+ (S3)	3 = on	4 = on
Thread trimmer and thread wiper Off	+ (S3)	3 = off	4 = off
Tape cutter at the start of the seam On (mode 7)	+ (S3)	3 = on	4 = off
Tape cutter at the seam end On	+ (S3)	3 = off	4 = on
Tape cutter at the start of the seam and at the seam end On	+ (S3)	3 = on	4 = on
Tape cutter at the start of the seam and at the seam end Off	+ (S3)	3 = off	4 = off
Sewing foot lifting at stop in the seam (automatic)	- (S4)	5 = on	6 = off
Sewing foot lifting at the seam end (automatic)	- (S4)	5 = off	6 = on
Sewing foot lifting at stop in the seam and at the seam end (automatic)	- (S4)	5 = on	6 = on
Sewing foot lifting (automatic) off	- (S4)	5 = off	6 = off
Basic position down (position 1)	>> (S5)	7 = on	8 = off
Basic position up (position 2)	>> (S5)	7 = off	8 = on

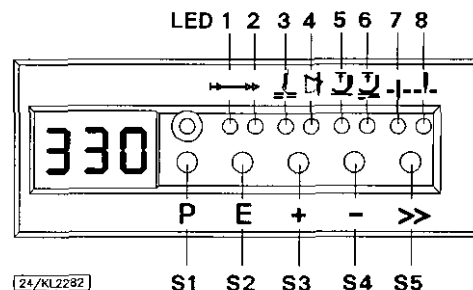
4.6 Direct Input of Maximum Speed Limitation (DED)

The maximum speed of the machine can be limited to the specific level according to the application directly by using pushbuttons +/- on the Variocontrol during machine run or during intermediate stop.

This function is blocked at the start of the seam and/or after the seam end. The actual value is shown on the display and must be multiplied by 10.

Example:

The value 330 on the control display corresponds to a speed of 3300 RPM



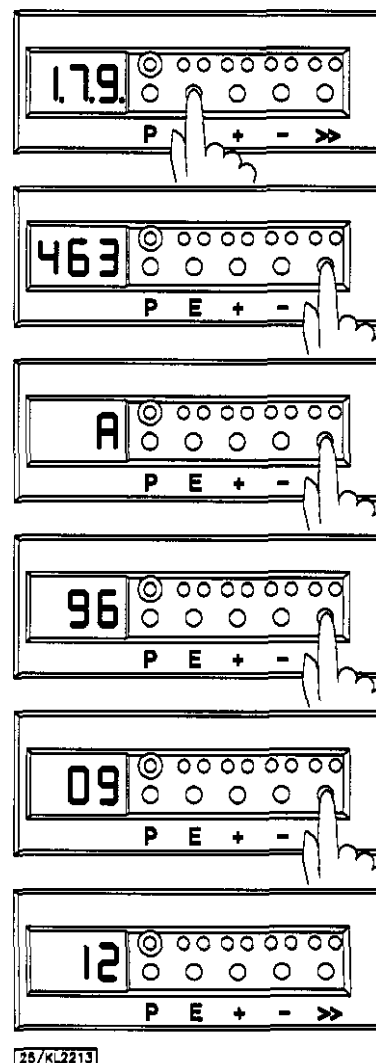
4.7 Program Identification on the Control

Function	Parameter
Display of program number, modification index and identification number	179

After having selected parameter 179, the display shows the following information in succession:

Example:

- Select parameter 179 and press pushbutton E!
- On the display the program number (1463) is shortened by one digit! Continue by pressing pushbutton >> !
- The display shows the modification index (A) of the program! Continue by pressing pushbutton >> !
- Identification number digit 1 and 2! Continue by pressing pushbutton >> !
- Identification number digit 3 and 4! Continue by pressing pushbutton >> !
- Identification number digit 5 and 6!



The routine is exited by pressing pushbutton P twice. The drive is again ready for sewing. By pressing pushbutton E, the routine is as well exited, and the next parameter number is displayed.

5. Starting Service

Before putting the control into operation, the following must be ensured, checked and/or adjusted:

- The correct installation of the drive, the position transmitter and accompanying devices, if necessary
- The correct adjustment of the direction of rotation of the motor with parameter 161
- The correct selection of the trimming operation with parameter 290
- The correct selection of the functions of the pushbuttons (inputs) with parameter 240/242/243
- The correct positioning speed with parameter 110
- The correct maximum speed compatible with the sewing machine with parameter 111
- The setting of the positions
- The setting of the remaining relevant parameters
- Start sewing in order to save the set values

6. Setting the Basic Functions

6.1 Direction of Rotation of the Motor

Functions	Parameter
Direction of rotation of the motor	161

161 = 0: Clockwise rotation of the motor (look at the motor shaft)
 161 = 1: Counterclockwise rotation of the motor



Attention

If the motor is mounted differently, e.g at a different angle or with gear, make sure that the value set with parameter 161 corresponds to the direction of rotation.

6.2 Selection of the Functional Sequences (Thread Trimming Operations)

Lockstitch, chainstitch and overlock machines with different functional sequences can be operated by using this control. The functional sequences can be selected by parameter 290.



Attention

Before switching the functional sequences disconnect cables from the inputs and outputs! Please ensure that the machine installed provides the set functional sequence! Set parameter 290 only after power On!

Setting the functional sequence by using Parameter 290

Mode	Designation	Adapter	Outputs					Inputs		
	Power transistors == >		FL ST2/35	M1 ST2/37	M2 ST2/28	M3 ST2/27	ML ST2/32	in1 ST2/7	in3 ST2/6	in4 ST2/8
0	Lockstitch; e.g. Brother (737-113, 737-913) Aisin (AD3XX, AD158, 3310, EK1) Pfaff (563, 953, 1050, 1180) Dürkopp Adler (210, 270)	1112814 1112815 1112841 1112845	FL FL FL FL	FA1 + FA1 + FA1 FA1 +	FA2 FA2 FA2 FA2	FW FW FW FW	 ML	- - - NHT	NHT NHT - NHT	- - FLEX EST
1	Lockstitch; e.g. Singer (591, 211U, 212U)	1112824	FL	-	FA2	FW		NHT	-	-
2	Lockstitch; e.g. Singer (212 UTT)	1112824	FL	-	FA	FSPL		NHT	-	-
3	Lockstitch; e.g. Dürkopp-Adler (467)		FL	FA	FSPL	FW	ML	NHT	-	-
4	Chainstitch; Union Special (34000 and 36200 »replacement for US80A«) (CS100 und FS100)	1112865 1112905	FL FL	- -	FA-V FA-V	FW FW	ML ML	LSP LSP	LSP LSP	ENTK -
5	Chainstitch; parallel sequence Yamato Kansai (RX 9803) Pegasus (W500/UT) Brother (FD3 B257) Global (CB2803-56) Rimoldi (F27)	1112818 1112819 1112821 1112822 1112866 1113096	FL FL FL FL FL FL	FA FA FA FA - FW	- - FA FA - FAO	FW FW FW FW FA FAU	 ML ML ML	LSP LSP LSP LSP LSP -	- - - ENTK - -	- - - - - -
6	Chainstitch; tape cutter / fast scissors		FL	M1	AH1	AH2	ML	-	-	-
7	Overlock;		FL	M1	M2	AH	ML	-	-	-
8	Backlatch; Pegasus	1112827	-	PD ≤ -1	PD ≥ 1	-		LSP	N.AUTO	-
9	Backlatch; Yamato (ABT3)	1112826	-	PD ≤ -1	PD ≥ 1	-		LSP	N.AUTO	-
	Backlatch; Yamato (ABT13)	1112898	-	PD ≤ -1	PD ≥ 1	-		LSP	N.AUTO	-
10	Lockstitch; e.g. Union Special (63900AMZ »replacement for US80A«)	1112823	FL	-	FA-V	FW	ML	-	-	-
11	Reversal of the direction of rotation with pedal in pos. -2		FL	DR-UK	PD=-2	ML	ML	N.POS	-	-
12	Reversal of the direction of rotation with input in3		FL	DR-UK	PD=0	ML	ML	N.POS	DR-UK	-
13	Lockstitch; Pfaff (1425)	1113072	FL	FA	FSPL	FW	ML	NH	POS2	DB
14	Lockstitch; e.g. Juki (5550-6) Juki (5550-7)	1112816 1112817	FL FL	FA1 + 2 FA1 + 2	 FZ	FW FW	 	- -	- -	- -

Outputs:

FL	= Sewing foot lifting
FA1	= Thread trimmer pos 1...1A
FA2	= Thread trimmer pos. 1A...2
FA1 + 2	= Thread trimmer pos. 1...2
FSPL	= Thread tension release
FA-R/FA-V	= Thread trimmer backward/forward
ML	= Machine running
FW	= Thread wiper
AH/AH1/AH2	= Tape cutter/tape cutter 1/tape cutter 2
DR-UK	= Reversal of the direction of rotation
PD=0	= Pedal in position 0 (neutral)
FAO	= Needle thread trimmer
FAU	= Bobbin thread trimmer
FZ	= Thread puller
PD=-2	= Pedal step -2
PD ≥ 1	= Pedal steps 1...12
PD ≤ -1	= Pedal steps -1 / -2

Inputs:

NHT	= Needle up/down
EST	= Single stitch
FLEX	= External sewing foot lift
N.POS	= Positioning speed
N.AUTO	= Automatic speed
LSP	= Machine run blockage (safety switch)
DR-UK	= Reversal of the direction of rotation
NH	= Needle up
POS2	= Run to position 2
DB	= Speed limitation n12
ENTK	= Unlock the chain

Mode 0 Lockstitch machines

- Thread trimming from leading to trailing slot edge position 1
- Thread trimming from trailing slot edge position 1 to leading slot edge position 2
- Thread wiping for a programmable time (t6)
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")

Mode 1 Lockstitch machines (Singer 591, 211U, 212U)

- Thread trimming from trailing slot edge position 1 to leading slot edge position 2
- Drive stops at the trailing edge of position 2
- Thread wiping for a programmable time (t6)
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")

Mode 2 Lockstitch machines (Singer 212 UTT)

- Thread trimming for a programmable time (kt2) after intermediate stop in position 1
- Thread tension release from leading slot edge position 1 to stop after leading slot edge position 2
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")

Mode 3 Lockstitch machines with thread trimming system (e.g. Dürkopp-Adler)

- Thread trimming for a programmable time (tFA) and programmable increments (iFA) after intermediate stop in position 1
- Thread tension release from start in position 1 after delay (FSE) for the operating time (FSA)
- Thread wiping for a programmable time (t6)
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")

Mode 4 Chainstitch machines (Union Special)

- Thread trimmer forward after stop in position 2 after delay (kd2) for the operating time (kt2)
- Thread trimmer backward after stop in position 2 after delay (kd1) for the operating time (kt1)
- Thread wiper after stop in position 2 after delay (kd3) for the operating time (kt3)
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")

Mode 5 Chainstitch machines in general

- Signal "machine running"
- 196=0** Signal M1 after stop in position 2 after delay (kd1) for the operating time (kt1)
- Signal M2 after stop in position 2 after delay (kd2) for the operating time (kt2)
- Signal M3 after stop in position 2 after delay (kd3) for the operating time (kt3)
- Sewing foot lifting after stop in position 2 with the time delay (kdF)
- 196=1** Signal M1 after stop in position 2 after delay (kd1) for the operating time (kt1)
- Signal M2 after stop in position 2 after delay (kd2) for the operating time (kt2)
- Signal M3 On after stop in position 2 after delay (kd3) for the operating time (kt3) and one more machine rotation. After that signal M3 turns off (see timing diagram!)
- Sewing foot lifting with time delay (t7) after the last signal has turned off
- 273=ON** Signal M1 after stop in position 2 after delay (kd1) for the operating time (kt1)
- Signal M2 at the start of the seam after delay (Ad2) for the operating time (At2) and after stop in position 2 after delay (kd2) for the operating time (kt2)
- Signal M3 at the start of the seam after delay (Ad1) for the operating time (At1)
- Signal M5 (ML) at the start of the seam after delay (Ad3) for the operating time (At3). No signal "machine running" (see timing diagram!).
- Sewing foot lifting after stop in position 2 with the time delay (kdF)

Mode 6 Chainstitch machines with tape cutter or fast scissors

- Signal M1 after stop in position 2 after delay (kd1) for the operating time (kt1)
- Signal M2 after stop in position 2 and after delay (kd2) for the operating time (kt2) or if parameter 232 = ON as **fast scissors** alternating with M3
- Signal M3 after stop in position 2 and after delay (kd3) for the operating time (kt3) or with parameter 232 = ON, **fast scissors** alternating with M2
- Fast scissors M3 after delay (kd3) for the operating time (kt3) alternating with M2
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")

Mode 7 Overlock machines

- Signal M1 after stop in position 2 and after delay (kd1) for the operating time (kt1)
- Signal M2 after stop in position 2 and after delay (kd2) for the operating time (kt2) or with parameter 232 = ON, fast scissors alternating with M3 (set parameter 282 = 0)
- Tape cutter at the start of the seam after stitch counting (c3) and at the seam end after stitch counting (c4)
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")

Mode 8 Backlatch machine (Pegasus)

- Signal M1 with pedal in position -1 and -2
- Signal M2 with pedal in positions 1-12
- Inverted signal M3 with pedal in positions 1-12
- Sewing foot lifting (see chapter "Sewing Foot Lifting")
- Signal "machine running"
- Machine run blockage effective with open contact (input in1 / parameter 240 = 6)
»Automatic speed has priority over machine run blockage«
- Pushbutton for machine run at automatic speed (input in3 / parameter 242 = 10)

Mode 9 Backlatch machine (Yamato)

- Signal M1 with pedal in position -1 and -2
- Signal M2 with pedal in positions 1-12
- Inverted signal M3 with pedal in positions 1-12
- Sewing foot lifting (see chapter "Sewing Foot Lifting")
- Signal "machine running"
- Machine run blockage effective with open contact (input in1 / parameter 240 = 6)
»Machine run blockage has priority over automatic speed«
- Pushbutton for machine run at automatic speed (input in3 / parameter 242 = 10)
»the function 'automatic speed' is inverted«

Mode 10 Lockstitch machine

- Thread trimmer forward from trailing slot edge position 1 to leading slot edge position 2
- Thread trimmer backward with full power for the time (kt1), after that pulsed signal
- Thread wiper after stop in position 2 after delay (kd3) for the operating time (kt3)
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")

Mode 11 Reversal of the direction of rotation with pedal = -2

- Signal M1 direction of rotation
- Signal M2 pedal = -2
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")
- Pushbutton for machine run at positioning speed (input in1 / parameter 240 = 20)

Mode 12 Reversal of the direction of rotation with input in3

- Signal M1 direction of rotation
- Signal M2 pedal 0 (neutral)
- Signal "machine running"
- Sewing foot lifting (see chapter "Sewing Foot Lifting")
- Pushbutton for machine run at positioning speed (input in1 / parameter 240 = 20)
- Pushbutton for reversal of the direction of rotation (input in3 / parameter 242 = 21)

Mode 13 Lockstitch machines with thread trimming system (Pfaff 1425)

- Thread trimming for programmable increments (iFA) from leading slot edge position 1
- Thread tension release from leading slot edge position 1 after delay (FSE) for the operating time (FSA)
- Thread wiping for a programmable time (t6)
- Sewing foot lifting (see chapter "Sewing Foot Lifting")
- Signal "machine running"
- Pushbutton for function "needle up" (input in1 / parameter 240 = 2)
- Pushbutton for run to position 2 (input in3 / parameter 242 = 24)
- Pushbutton for reversal of the direction of rotation (n12) (input in4 / parameter 243 = 11)

Mode 14 Lockstitch machine

- Thread trimming from leading slot edge position 1 to leading slot edge position 2
- Signal M2 after stop in position 2 after delay (kd4) for the operating time (kt4)
- Thread wiping M3 for a programmable time (t6)
- Sewing foot lifting (see chapter "Sewing Foot Lifting")

See chapter "Timing Diagrams" in the parameter list for the various modes!

6.3 Functions of the Pushbuttons Inputs in1, in3 and in4

Functions	Parameter
Input 1 in1	240
Input 3 in3	242
Input 4 in4	243

See Parameter List for possible input functions of the pushbuttons.

6.4 Positioning Speed

Functions	Parameter
Positioning speed n1	110

The positioning speed can be set with parameter 110 on the control within a range of 70...390 RPM.

6.5 Maximum Speed Compatible with the Sewing Machine

The maximum speed of the machine is determined by the pulley selected and by the following settings:

- Set the maximum speed with parameter 111 (n2).
- Set the maximum speed limitation to the specific level according to the application as described in chapter "Direct Input of the Maximum Speed Limitation (DED)"

6.6 Maximum Speed

Functions	Parameter
Maximum Speed n2	111

Note:

For the maximum speed of the sewing machine see instruction manual of the sewing machine manufacturer.

Note:

Select the pulley such that the motor runs at approx. 4000 RPM with max. stitch number.

When programming 3-digit and/or 4-digit parameter values in the control, the 2-digit and/or -digit values displayed must be multiplied by 10.

6.7 Positions

Before setting the position transmitter ensure that the direction of rotation of the motor shaft is correctly set !



Attention!

If the motor is mounted differently, e.g at a different angle or with gear, make sure that the parameter value is assigned correctly to the direction of rotation.



Attention!

Turn power off before adjusting the positioning discs.



Attention!

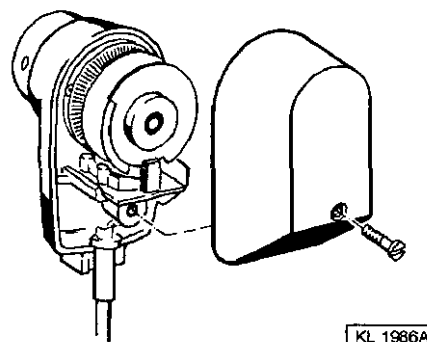
Be very careful when adjusting the positioning discs.

Risk of injury.

Please ensure that positioning discs and generator disc (inner disc) are not damaged.

The positions are set as follows:

- Remove position transmitter cover after loosening the screw.
- Select basic position **needle down** (LED 7 on the control lights up) by pushbutton S5.
- Adjust central disc for position 1 in the desired direction.
- Push pedal briefly forward.
- Check stop position.
- Push pedal backward (trimming).
- Select basic position **needle up** (LED 8 on the control lights up) by pushbutton S5.
- Adjust outer disc for position 2 in the desired direction.
- Push pedal briefly forward.
- Check stop position.
- Repeat procedure if necessary.
- Select the desired basic position by pushbutton S5.
- Put cover on again and tighten screw.



Note:

For functional sequences that are controlled by the slot width, set slot width if necessary according to the above. The desired functional sequence is to be activated in order to check the setting. The opening angle of position transmitters with adjustable slot width must not be below 20°.

Note:

To ensure a correct trimming operation, the positions 1 and 2 must not overlap.

6.8 Display of the Signal and Stop Positions

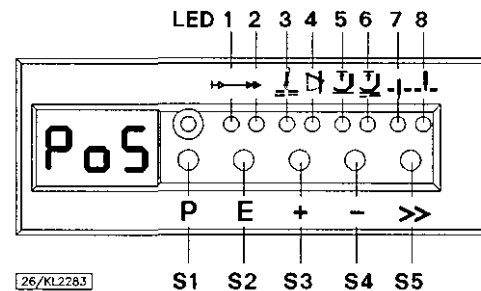
Functions	Parameter
Display of positions 1 and 2	172

The setting of the positions can easily be tested by parameter 172.

- Address parameter 172
- "PoS" appears on the control display
- Turn handwheel corresponding to the direction of rotation of the motor

Control display

- LED 7 on corresponds to position 1
- LED 7 turns off corresponds to position 1A
- LED 8 on corresponds to position 2
- LED 8 turns off corresponds to position 2A



6.9 Braking Behavior

Functions	Parameter
Braking effect when modifying the preset value ≤ 4 stages	207
Braking effect when modifying the preset value ≥ 5 stages	208

- The braking effect for the stop is influenced by parameter 207
- The braking effect between the speed stages is controlled by parameter 208

The following applies to all setting values:

The higher the value the stronger the braking reaction!

6.10 Braking Power at Standstill

Functions	Parameter
Braking power at standstill	153

This function prevents unintentional "wandering" of the needle at standstill.
The effect can be tested by turning the handwheel.

- The braking power works at standstill
 - at stop in the seam
 - after the seam end
- The effect can be set
- The higher the set value, the higher the braking power

6.11 Start Behavior

Functions	Parameter
Starting edge	220

The drive accelerating dynamics can be adapted to the characteristic of the sewing machine (light, heavy).

- High setting value = high acceleration

With a high starting edge setting and, in addition, possibly high braking parameter values on a light machine, the behavior may appear coarse. In this case, one should try to optimize the settings.

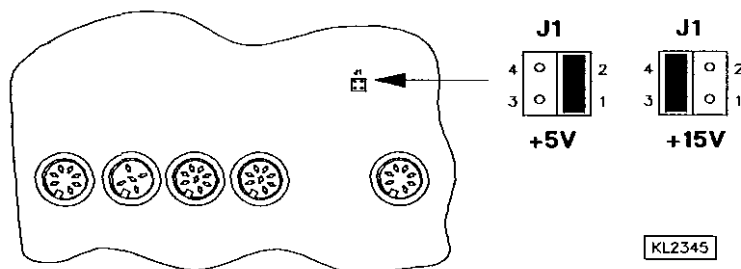
6.12 Supply Voltage 5V and/or 15V

**Attention!**

Turn power off before opening the control box!

For external devices there is a supply voltage of +5V on socket B18/6. After opening the cover, this voltage can be changed to +15V by moving a multipole connector J1 on the printed circuit board to a different position.

- +5V = Connect pins 1 and 2 right with jumper (factory setting)
+15V = Connect pins 3 and 4 left with jumper



7. Functions

7.1 First Stitch After Power On

Functions	Parameter
1 stitch at positioning speed after POWER ON	231

For the protection of the sewing machine and when parameter 231 is on, the first stitch after power on will be performed at positioning speed, independently of the pedal position and the function Softstart.

7.2 Softstart

Functions	Parameter
Softstart on/off	134

Function:

- after power on
- at the beginning of a new seam
- speed pedal controlled and limited to (n6)
- lower speed of a function running parallel predominates (e.g. start backtack, stitch counting)
- stitch counting synchronized to position 1
- interruption with pedal in position 0 (neutral)
- cessation by full heelback (position -2)

7.2.1 Softstart Speed

Functions	Parameter
Softstart speed	115

When programming 3-digit and/or 4-digit parameter values in the control, the 2-digit and/or 3-digit values displayed must be multiplied by 10.

7.2.2 Softstart Stitches

Functions	Parameter
Softstart stitches SSc	100

If the function "slow stitch after power on" has been selected by parameter 231, the first stitch after power on will be performed at positioning speed, independently of the softstart setting.

7.3 Sewing Foot Lifting

Functions	Pushbutton on the control
Automatic in the seam	Pushbutton S4
Automatic after thread trimmming	Pushbutton S4

Functions	Parameter
Automatic sewing foot with pedal forward at the seam end, if light barrier or stitch counting is switched on	023
Activation delay when pedal is in position -1, half heelback	t2
Start delay after switching off the sewing foot lift signal	t3
Time of full power	t4
Operating time with pulsing	t5
Delay after thread wiping until sewing foot lifting	t7
Delay after thread trimming without thread wiper until sewing foot lifting	tFL

Sewing foot is lifted:

- in the seam
 - by heeling the pedal back (position -1)
 - or automatically (with pushbutton S4 on the control, left LED lights up)
- after thread trimming
 - by pressing a pushbutton depending on the preselection of parameter 240/242/243
 - by heeling the pedal back (position -1 or -2)
 - or automatically (with pushbutton S4 on the control, right LED lights up)
 - by pressing a pushbutton depending on the preselection of parameter 240/242/243
 - by light barrier, automatically, with pedal forward according to the setting of param. 023
 - by stitch counting, automatically, with pedal forward according to the setting of param. 023
 - start delay after thread wiping (t7)
 - start delay without thread wiping (tFL)

Unintentional foot lifting before thread trimming, when changing from pedal position 0 (neutral) to position -2, can be prevented by setting an activation delay (t2) with parameter 201.

Holding power of the lifted foot:

The sewing is lifted by full power. Then the solenoid is switched to partial power in order to reduce the load for the control and for the connected solenoid.

The duration of full power is set with parameter 203, the holding power at partial power with parameter 204.

Stage	Operating time	Effect
1	12.5 %	low holding power
2	25 %	
3	37.5 %	
4	50 %	
5	62.5 %	high holding power
6	75 %	
7	87.5 %	
0	100%	



Caution!

If the holding power is set too high the solenoid and the control may be permanently damaged. Please observe the allowed operating time of the solenoid and set the appropriate value according to the above table.

Foot lowers:

- Press pedal to position 0 (neutral)
- Press pedal to position 1/2 (slightly forward)
- Release pushbutton for manual sewing foot lift

When pressing the pedal forward from lifted sewing foot, the start delay (t3) that can be set with parameter 202 becomes effective. See also chapter "Timing Diagrams"!

7.4 Intermediate Backtack

Functions	Parameter
Signal "backtacking" on output M1, M2 or M3 On/Off	148

- 148 = 0 Signal "backtacking" Off
- 148 = 1 Signal "backtacking" effective on output M1.
- 148 = 2 Signal "backtacking" effective on output M2.
- 148 = 3 Signal "backtacking" effective on output M3. If parameter 148 is set to "3", parameter 297 is automatically set to "0". If this setting is changed to "1...4", parameter 148 is also automatically set to "0". The function of the parameter that was last changed is taken into account.

A backtacking signal can be programmed to one of the three outputs M1, M2 or M3 with parameter 148. A pushbutton can be allocated according to the selection of parameter 240/242/243. By pressing this pushbutton the backtacking signal can be switched on anywhere in the seam or at standstill.

If parameter 148 is set to "0" the respective output is reset to the function provided by the selected mode. See chapter "Connection Diagram" in the Parameter List!

**Attention!**

Before changing this parameter, please ensure that the machine installed provides the set function! Otherwise the machine may be permanently damaged!

7.5 Signal "Machine Running"

Functions	Parameter
Signal machine running on output M1, M2 or M3 On/Off	147
Mode "machine running"	155
Switch-off delay for signal "machine running"	156

- 147 = 0 Signal "machine running" Off
- 147 = 1 Signal "machine running" effective on output M1.
- 147 = 2 Signal "machine running" effective on output M2.
- 147 = 3 Signal "machine running" effective on output M3. If parameter 147 is set at "3", parameter 297 is automatically set at "0". If this setting is changed to "1...4", parameter 147 is also automatically set at "0". The function of the parameter that was last changed is taken into account.

A signal "machine running" can be programmed to one of the three outputs M1, M2 or M3 with parameter 147. the initial function of this output is suppressed

If parameter 147 is set to "0" the respective output is reset to the function provided by the selected mode.

Moreover, the signal **machine running** is always active on socket ST2/32 (except with setting 290 = 5 and 273 = ON).

- 155 = 0 Signal "machine running" Off
- 155 = 1 Signal "machine running" will always be emitted, when the drive is running
- 155 = 2 Signal "machine running" will always be emitted, when the speed is higher than 3000 RPM
- 155 = 3 Signal "machine running" will always be emitted, when the pedal is not in position 0 (neutral)

The switch-off time of the signal can be delayed with parameter 156.

See chapter "Connection Diagram" in the Parameter List!



Attention!

Before changing this parameter, please ensure that the machine installed provides the set function! Otherwise the machine may be permanently damaged!

7.6 Reversion

Functions		Parameter
Positioning speed	n1	110
Number of reversion increments	lrd	180
Activation delay of reversion	drd	181
Reversion On/Off		182

The function "reversion" is performed after trimming.

When the stop position is reached, the drive stops for the time of the activation delay of reversion (parameter 182).

Then it reverses at positioning speed for an adjustable number of increments.

1 increment corresponds to approx. 0.7°.

7.7 Unlocking the Chain (Mode 4/5/6/7)

When unlocking the chain at the seam end, the functions **trimming operation** and/or **tape cutter/fast scissors** are automatically suppressed. The drive stops in position 1 if parameter 180 = >0. If parameter 180 = 0, the drive stops in the selected basic position. With this setting (only mode 7), reversion is blocked and the function **tape cutter/fast scissors** is possible, if parameter 190 is set at "3". Moreover, the run-out stitches (parameter 184) and the function "blow fabric onto stack" are performed on output M1.

Functions		Parameter
Number of run-out stitches when unlocking the chain	c6	184
(only effective if parameter 190 = 3)		
Function "unlock the chain" in modes 4, 5, 6 and 7		190

Settings necessary for the function of unlocking the chain:

- Set "unlocking the chain" with parameter 190 = 1 / 2 / 3 (190 = 0 "unlocking the chain switched off)
- Switch on reversion with parameter 182
- Set **activation delay** with parameter 181 and **reversing angle** with parameter 180
- Set one of the parameters 240, 242 or 243 at "18". This determines the **function "unlock the chain" for a pushbutton**

190 = 1: Sequence with pedal in position -2 from machine run or from position 2:

- Press pushbutton "unlock the chain"
- Run to position 1 at positioning speed
- Start delay according to the setting of parameter 181
- Sequence of the reversing angle at positioning speed according to the setting of parameter 180

190 = 1: Sequence with pedal in position -2 from standstill in position 1:

- Press pushbutton "unlock the chain"
- Start delay according to the setting of parameter 181
- Sequence of the reversing angle at positioning speed according to the setting of parameter 180

190 = 2: Automatic sequence with light barrier at the seam end without cutting/ pedal in position -2 according to the setting of parameter 019:

- Press pushbutton "unlocking the chain"
- After light barrier sensing, run to position 1
- Sequence of the reversing angle at positioning speed after an activation delay that can be set

190 = 3: Automatic sequence with light barrier at the seam end with cutting and run-out stitches (only possible in mode 7) / pedal in position -2 according to the setting of parameter 019:

- Press pushbutton "unlocking the chain"
- After light barrier sensing, execution of compensating stitches and end counting until cutting
- Run-out stitches until unlocking the chain, can be set with parameter 184
- After the stop the machine will not run in reverse direction, but will emit the signal M1 "blow fabric onto stack", unless parameters 146, 147, 148 have not been set differently.

Moreover, one of the parameters 240, 242 or 243 can be set at "26". This way, the function "unlock the chain" can be performed whenever the external pushbutton is pressed.

The functioning of the control during operation is shown in the timing diagrams in the parameter list.

7.8 Machine Run Blockage (Safety Switch)



Attention!

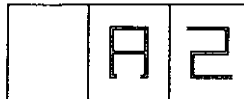
This is not a safety function.
The line voltage must still be switched off during maintenance and repair work.

The function "machine run blockage" is possible by connecting a switch to socket ST2 and/or B4, depending on the preselection of parameter 240/242/243.

Display after the activation of the machine run blockage:

Display on the control !

==>



Machine run blockage in the free seam, in the seam with stitch counting and in the light barrier seam:

By opening and/or closing the switch the seam is interrupted

- Stop in the basic position
- Needle up is not possible
- Sewing foot lifting is possible

New start after machine run blockage

Functions	Parameter
New start after machine run blockage	234

Parameter 234 determines how a new start is possible after closing and/or opening the switch.

234 = OFF New start after the deactivation of the machine run blockage without influence by the pedal.
This setting is, for example, applicable to automats.

234 = ON New start after the deactivation of the machine run blockage only if the pedal had been put to position 0 (neutral)

7.9 High Lift For Walking Foot / Flip-Flop 1

Functions	Parameter
High lift for walking foot On/Off	137
Signal "high lift for walking foot" inverted/not inverted	263

7.9.1 Signal "High Lift for Walking Foot"

Function	Parameter
Signal high lift for walking foot on output M1, M2 or M3 On/Off	146

- 146 = 0** Signal "high lift for walking foot" Off
146 = 1 Signal "high lift for walking foot" effective on output M1.
146 = 2 Signal "high lift for walking foot" effective on output M2.
146 = 3 Signal "high lift for walking foot" effective on output M3. If parameter 146 is set at "3", parameter 297 is automatically set at "0". If this setting is changed to "1...4", parameter 146 is also automatically set at "0". The function of the parameter that was last changed is taken into account.

A signal "high lift for walking foot" can be programmed to one of the three outputs M1, M2 or M3 with parameter 146. A pushbutton can be allocated according to the selection of parameter 240/242/243. By pressing this pushbutton the signal "high lift for walking foot" can be switched on anywhere in the seam. If parameter 146 is set to "0" the respective output is reset to the function provided by the selected mode.

See chapter "Connection Diagram" in the Parameter List!



Attention!

Before changing the parameter, please ensure that the machine installed provides the set function! Otherwise the machine may be permanently damaged!

7.9.2 High Lift Walking Speed

Functions	Parameter
High lift walking speed n10	117

7.9.3 High Lift Walking Speed Run-Out Time

Functions	Parameter
High lift walking speed run-out time thP	152

7.9.4 High Lift Walking Stitches

Functions with or without Variocontrol	Parameter
Number of high lift walking stitches chP	185

By pressing the external pushbutton "high lift for walking foot", depending on the setting of parameter 240/242/243, the speed is limited to high lift walking speed. The solenoid for high lift for walking foot is switched on if the speed $\leq$ high lift walking speed. It is possible to program run-out stitches by parameter 185. The high lift for walking foot remains on until stitch counting is completed. The speed limitation remains effective during the run-out time after disengaging of the solenoid for high lift for walking foot.

7.9.5 High Lift for Walking Foot Operational Mode Not Stored (Parameter 240/242/243 = 13)

The following function will be performed if "0" for run-out stitches is programmed with parameter 185:

- Press pushbutton "high lift for walking foot" at drive standstill; signal "high lift for walking foot" is On.
- Release pushbutton "high lift for walking foot" at drive standstill; signal "high lift for walking foot" is Off.

The following function will be performed if ">0" for run-out stitches is programmed with parameter 185:

- 1. Press pushbutton "high lift for walking foot" at drive standstill; signal "high lift for walking foot" is On and remains On after releasing the pushbutton.
- 2. Press pushbutton "high lift for walking foot" at drive standstill; signal "high lift for walking foot" remains On and will be switched off after releasing the pushbutton.

If the signal "high lift for walking foot" is On at the start of the drive, the speed is limited. After the run-out stitches, the signal is switched off and the speed limitation is released after the run-out time (parameter 152).

While the drive is running if " ≥ 0 " for run-out stitches is programmed with parameter 185:

- Press pushbutton "high lift for walking foot" while the drive is running; signals "high lift for walking foot" and "high lift walking speed" are On.
- Release pushbutton "high lift for walking foot" while the drive is running; signal "high lift for walking foot" is switched off after the run-out stitches. The speed limitation is released after the run-out time (parameter 152).

7.9.6 High Lift for Walking Foot Operational Mode Stored/Flip-Flop 1 (Parameter 240/242/243 = 14)

- 1. Press pushbutton "high lift for walking foot" while the drive is running; signals "high lift for walking foot" and "high lift walking speed" are On.
- 2. Press pushbutton "high lift for walking foot" while the drive is running; signal "high lift for walking foot" is switched off after the run-out stitches. The speed limitation is released after the run-out time (parameter 152).

Functions	Parameter
Switching off flip-flop 1 at the seam end On/Off	183

Parameter 183 determines whether or not the signal "high lift for walking foot" is to be switched off at the seam end. If 183 = 0, the signal is switched off by pressing the pushbutton.

183 = 0Signal "high lift for walking foot" (flip-flop 1) is not switched off at the seam end.

183 = 1Signal "high lift for walking foot" (flip-flop 1) is switched off at the seam end.

7.10 Speed Limitation n9

Functions	Parameter
Speed limitation n9	122

By pressing an external pushbutton depending on the preselection of parameters 240, 242 or 243 = 23, a speed limitation n9 can be switched on.

7.11 Bobbin Thread Monitor

Functions	Parameter
Bobbin thread monitor without stop = 2 / with stop = 1 / Off = 0	030
Number of stitches for bobbin thread monitor	031

For operating the bobbin thread monitor, a number of stitches is preset with parameter 031, depending on the length of the bobbin thread. After these stitches have been executed, the drive stops and a message appears on the display, which signals that the bobbin thread will run out. When pushing the pedal again, the seam can be completed or the thread can be trimmed. After inserting a full bobbin and pushing the enter button, a new sewing operation can be started.

Activate bobbin thread monitor:

- Set parameter 030 at "1" and/or "2"
- Input the desired maximum number of stitches with parameter 031 (inputted value x 100 = number of stitches, e.g. 180 x 100 = 18000)
- Determine an input for the function of the pushbutton "start counter" (parameter 240/242/243)
- Start the sewing operation

Bobbin thread monitor is On:

- The drive stops when the stitch counter has run out
- Message "A3" appears on the control
- When the pedal is in position 0 (neutral) and is actuated again, the sewing operation can be continued and/or completed. All sewing functions are maintained.
- Message "A3" remains on the control

Making the bobbin thread monitor ready for operation:

- Insert a full bobbin
- Press the selected external pushbutton
- Set counting with parameter 031 and start counting
- Message "A3" on the control disappears
- If the bobbin is changed before a message the appropriate pushbutton must be pressed for at least 1 second in order to set the stitch counter to the default value.

7.12 Thread Trimming Operation

Functions	Parameter
Thread trimmer On/Off	013
Thread wiper On/Off	014

The trimming operation can be switched on and off separately with parameters 013 and 014. When thread trimming is switched off, the drive stops in position 2 at the seam end.

7.12.1 Lockstitch Thread Trimmer (Modes 0...3, 10, 13 and 14)

Functions	Parameter
Switch signal M1 thread trimmer pos. 1...pos. 2/pos. 1...pos. 1A (only mode 0)	145
Thread wiper time t6	205
Activation angle of thread trimmer iFA	250
Switch-off delay of thread tension release FSA	251
Activation delay of thread tension release FSE	252
Stop time for thread trimmer tFA	253
Holding power output M1 of the thread trimmer backward tAM	254

The thread trimming with lockstitch machines (modes 0...3, 10, 13 and 14) is performed at trimming speed.

The drive stops in position 2 at the seam end, when thread trimming is off.

The operating time t6 with lockstitch machines is set with parameter 205. The return time t7 that can be set with parameter 206, prevents sewing foot lifting before the thread wiper is in its basic position. If a thread wiper is not connected there will be a time lag tFL after thread trimming until the sewing foot is lifted.

The thread trimming signal M1 (only in mode 0) can be altered with parameter 145.

145 = OFF Thread trimming signal M1 from position 1 to position 1A

145 = ON Thread trimming signal M1 from position 1 to position 2

7.12.1.1 Trimming Speed

Functions	Parameter
Trimming speed n7	116

7.12.2 Chainstitch Thread Trimmer (Modes 4, 5 and 6)

Functions	Parameter
Delay time output M1 kd1	280
Activation time output M1 kt1	281
Delay time output M2 kd2	282
Activation time output M2 kt2	283
Delay time output M3 kd3	284
Activation time output M3 kt3	285
Delay time output M4 kd4	286
Activation time output M4 kt4	287
Delay time until sewing foot On kdF	288

Thread trimming with chainstitch machines (modes 4, 5 and 6) is performed at machine standstill in position 2.

The drive stops in position 2 at the seam end, when thread trimming is off.

The signal sequence of M1...M4 and of the sewing foot can be set to either parallel or sequential with parameters 280...285 and 288.

The functioning of the control during operation is shown in the timing diagrams in the Parameter List. See also chapter "Selection of the Functional Sequences (Thread Trimming Operations)".

7.12.2.1 Chainstitch for Pegasus (Mode 5)

Functions	Parameter
Selection chainstitch trimmer only in mode 5 "general/Pegasus"	196

196 = 0 Chainstitch trimmer general (mode 5)

196 = 1 Chainstitch trimmer Pegasus

If parameter 290 = 5 and 196 = 1, the chainstitch trimmer for Pegasus machines will be activated. When pressing the pedal after stop in position -2, signal M3 will be activated for the time kt3 after delay time kd3. Then the drive performs one rotation from position 2 to position 2 with signal M3 On. When position 2 is reached, signal M3 is switched off and signals M1 and/or M2 are switched on after the delay times kd1 and/or kd2. After the times kt1 and/or kt2 have elapsed, the two signals will be switched off and the sewing foot can be lifted with time delay t7.

If the pedal is pressed to position -2 after stop in position 1, the drive runs to position 2 first and then the functional sequence described above will be performed.

See chapter "Timing Diagrams" in the Parameter List!

7.12.2.2 Trimming Function at the Start of the Seam (Mode 5)

Functions	Parameter
Trimming function at the start of the seam (only if parameter 290 = 5) On/Off	273
Delay time for signal M3 at the start of the seam Ad1	274
Activation time for signal M3 at the start of the seam At1	275
Delay time for signal M2 at the start of the seam Ad2	276
Activation time for signal M2 at the start of the seam At2	277
Delay time for signal M5 at the start of the seam Ad3	278
Activation time for signal M5 at the start of the seam At3	279

Signals M2, M3 and M5 at the start of the seam are generated if parameter 290 = 5 (mode 5). Parameter 273 must be set at "ON". There is no "machine running" signal at this setting.

See chapter "Timing Diagrams" in the Parameter List!

7.13 Functions for Overlock Machines (Mode 7)

7.13.1 Signal Chain Suction

Functions	Parameter
Sequence overlock mode (mode 7) with or without stop	018
Signal chain suction at the seam end until end of counting c2 or pedal in pos. 0	022
Speed during stitch counting at the start of the seam	143
Speed during stitch counting at the seam end	144
Signal chain suction on output M1 (only possible in mode 7)	148 = 1
Switch on signal chain suction at the seam end	193

The following settings are possible in the overlock mode (mode 7) with the following parameters:

018 = OFF Sequence with stop.

018 = ON Sequence without stop. Parameter 022 must be set at ON.

022 = OFF The signal chain suction at the seam end is switched off after counting c2.

022 = ON The signal chain suction at the seam end remains On until the pedal is in pos. = (neutral).

The "chain suction" signal is emitted only if parameter 148 is set at "1"!

With the following parameters it is possible to select the speed function during stitch counting at the start of the seam and at the seam end:

143 = 0 Fixed speed n3 (parameter 112) at the start of the seam.

143 = 1 Limited pedal controlled speed n3 at the start of the seam.

144 = 0 Fixed speed n4 (parameter 113) at the seam end.

144 = 1 Limited pedal controlled speed n3 at the seam end.

193 = OFF Chain suction after the light barrier compensating stitches.

193 = ON Chain suction from light barrier uncovered onwards.

7.13.2 Start and End Countings

Functions	Parameter
End counting (c2) at limited speed n4 until stop	c2 000
Start counting (c1) at limited speed n3 for chain suction	c1 001
Counting (c3) tape cutter at the start of the seam	c3 002
End counting (c4) for tape cutter at the seam end	c4 003
Seam end in mode 7 through end counting (c2) or (c4)	191
Stitch counting speed at the start of the seam	n3 112
Stitch counting speed at the seam end	n4 113

With parameter 191, the following settings are possible for determining the seam end:

191 = 0 Seam end after counting c4 (tape cutter)

191 = 1 Seam end after counting c2 (chain suction)

Functions	Parameter
Sequence overlock mode (mode 7) with or without stop	018
Speed n3 during stitch counting at the start of the seam	143
Speed n4 during stitch counting at the seam end	144

The following settings are possible in the overlock mode (mode 7) with the following parameters:

018 = OFF Sequence with stop.

018 = ON Sequence without stop.

With the following parameters the speed function at the start of the seam and at the seam end can be determined:

143 = 0 Fixed speed n3 (parameter 112) at the start of the seam.

143 = 1 Pedal controlled speed at the start of the seam.

144 = 0 Fixed speed n4 (parameter 113) at the seam end.

144 = 1 Pedal controlled speed at the seam end.

7.14 Function of the Output Signal M3

Functions	Parameter
Functions of signal M3	297

The following settings are possible with parameter 297:

297 = 0 Function according to setting of parameter 290

297 = 1 Signal M3 is switched on whenever the light barrier is uncovered

297 = 2 Signal M3 is switched on whenever the light barrier is covered

297 = 3 Signal M3 is switched on only after light barrier uncovered and/or covered until seam end

297 = 4 Signal M3 is switched on as with setting 3. Signal ML (machine running), however, is switched off while signal M3 is emitted.

If one of the parameters 146, 147, 148 is set at "3", parameter 297 is automatically set at "0". If this setting is changed to "1...4", parameters 146, 147, 148 are reset at "0". The function of the parameter that was last changed is carried out.

7.15 Tape Cutter (Mode 6/7)

The signal **tape cutter** can be preselected for the start and end counting, with pushbutton S3 on the control.

Functions	Control
Tape cutter at the start of the seam On	LED 3 on
Tape cutter at the end of the seam On	LED 4 on
	Pushbutton S3

7.15.1 Functions Tape Cutter

The signal **tape cutter** can be influenced with parameter 020 to the effect that the signal remains On at the seam end and will be switched off after some run-out stitches, which can be set with parameter 021, when starting to sew again. This action serves as clamp.

Functions	Parameter
Clamp at the seam end (output ST2/27) On/Off (mode 7) kLM	020
Run-out stitches (ckL) of the clamp at the start of the seam (mode 7) ckL	021

7.15.2 Times for Tape Cutter/Fast Scissors

Functions	Parameter
Activation time for fast scissors AH1 (mode 6) kt2	283
Activation time for fast scissors AH2 (mode 6) kt3	285

Functions	Parameter
Selection tape cutter or fast scissors Parameter 232 = OFF	232
Activation time for tape cutter AH (mode 7) kt3	285
Parameter 232 = ON	
Activation time for fast scissors AH1 (mode 7) kt2	283
Activation time for fast scissors AH2 (mode 7) kt3	285

When selecting the function "fast scissors" parameter 232 = ON, the delay time must also be set at "0" with parameter 282!

7.16 Manual Tape Cutter/Fast Scissors

By pressing an external pushbutton depending on the preselection of parameter 240, 242 or 243, the **tape cutter** and/or **fast scissors** can be switched anywhere in the seam and at standstill.

See chapter "Connection Diagram" in the **Parameter List**!

7.17 Functions for Backlatch Machines (Mode 8/9)

See the timing diagrams in the parameter list for the functions for backlatch machines in the two modes.

An additional function is provided especially for mode 9 (parameter 290 = 9).

Whether or not a light barrier is connected or whether any changes have occurred at the light barrier input, is automatically sensed after power on or switching on mode 9. During sewing, input in3 is prepared by briefly pressing the pushbutton for switching the automatic speed (n-auto) on after sensing the light barrier and for making the machine stop with the safety switch. If the machine is restarted, it runs at pedal controlled speed. The light barrier is reactivated only by briefly pressing the pushbutton on input in3.

7.18 Seam with Stitch Counting

Functions	Parameter
Stitch counting On/Off	015

Functions	Parameter
Number of stitches for a seam with stitch counting Stc	007

7.18.2 Stitch Counting Speed

Functions	Parameter
Stitch counting speed n12	118
Speed mode for a seam with stitch counting	141

The sewing speed is reduced in each stitch depending on the actual speed (max. 11 stitches before the end of stitch counting) in order to be able to stop exactly at the end of stitch counting. When the light barrier is switched on, free sewing will be performed after stitch counting.

Functions	Parameter
Light barrier On/Off	009
Stitch counting On/Off	015

7.19 Free Seam and Seam with Light Barrier

Functions	Parameter
Positioning speed n1	110
Upper limit of the maximum speed n2	111
Limited speed according to setting of parameter 142 n12	118
Lower limit of the maximum speed	121
Speed mode Free seam	142

142 = 0: Execution at pedal controlled speed from n1 to n2.
142 = 1: Execution at fixed speed n12, when pedal is forward (position >= 1).
142 = 2: Execution at limited speed n12, when pedal is forward (position >= 1)
142 = 3: Only for the seam with light barrier:
 - Automatic execution at fixed speed as soon as the pedal has been pushed once.
 - The seam end is initiated by the light barrier.
 - Interruption by heelback (-2) is possible.
 - If the light barrier is not on, speed as with parameter setting 142 = 0.

7.20 Light Barrier

Functions	Parameter/Pushbutton
Light barrier On/Off on the control	009
Light barrier function on the input of socket B18/5 activated only if parameter 239 = 0	239

7.20.1 Speed after Light Barrier Sensing

Functions	Parameter
Speed after light barrier sensing n5	114

7.20.2 General Light Barrier Functions

Functions	Parameter
Light barrier compensating stitches LS	004
Number of light barrier seams	006
Light barrier sensing uncovered	131
Sewing start blocked with light barrier uncovered	132
Light barrier seam end with thread trimming	133

- After sensing the seam end, counting of the compensating stitches at light barrier speed is performed.
- Parameter 192 = ON (speed pedal controlled)
Parameter 192 = OFF (speed n5 after light barrier sensing)
- Interruption with pedal in position 0. Cessation with pedal in position -2.
- Disabling of the thread trimming operation by parameter 133, independently of the setting by pushbutton S3 on the control. Stop in the basic position.
- Programming of up to 15 light barrier seams, according to the setting of parameter 006, with stop in the basic position. After the last light barrier seam, a thread trimming operation will be performed.
- Light barrier sensing uncovered or covered at the seam end can be selected by parameter 131.
- Machine start blockage, when light barrier is uncovered, can be programmed by parameter 132.
- The light barrier compensating stitches can be programmed and varied with parameter 004 directly in the control.

7.20.3 Reflection Light Barrier LSM001A

Sensitivity Adjustment:

Depending on the distance of the light barrier to the reflection area, adjust sensitivity to a minimum.
(Turn potentiometer as far as possible to the left).

- Potentiometer directly on the light barrier module

Mechanical Adjustment:

The orientation is facilitated through a visible light spot on the reflection area.

7.20.4 Light Barrier Control

Functions	Parameter / Pushbutton
Stitches for light barrier control	195

In order to check the optical and electrical function it is possible to select a number of stitches with parameter 195. While these stitches are performed, the light barrier must be activated at least once. When counting is completed and the light barrier has not been activated, the drive stops and the message A6 appears. The number of stitches must be greater than that required for the seam. If the number of stitches = 0, the function is switched off.

7.20.5 Automatic Start by Light Barrier

Functions	Parameter
Delay of automatic start	128
Automatic start on/off	129
Light barrier sensing uncovered	131
Sewing start blocked with light barrier uncovered	132

The function allows the automatic start of sewing as soon as the light barrier has sensed the insertion of fabric.

The following conditions must be met:

- Parameter 132 = ON (no sewing start, when light barrier uncovered).
- Parameter 131 = ON (light barrier sensing uncovered).
- Parameter 129 = ON (automatic start on).
- Light barrier switched on.
- The pedal must remain pushed forward at the seam end.

For safety reasons, this function becomes active only after a normal sewing start in the first seam. The light barrier must be covered, when the pedal is in neutral position; then the pedal can be pushed forward.

This safety function is reset, when the pedal does not remain pushed forward after the end of the seam.

7.20.6 Light Barrier Filter for Knitted Fabrics

Functions	Parameter
Number of stitches of the light barrier filter	005
Light barrier filter On/Off	130
Light barrier sensing uncovered and/or covered	131

The filter prevents premature triggering of the light barrier function, when sewing knitted fabrics.

- The filter can be switched on or off by parameter 130
- The filter is not active if parameter 005 = 0
- By changing the number of filter stitches the mesh will be adapted
- Knitted fabric sensing will only be activated if the light barrier senses covered -> uncovered, if parameter 131 = ON
- Knitted fabric sensing will only be activated if the light barrier senses uncovered -> covered, if parameter 131 = OFF

7.20.7 Functional Variations of the Light Barrier Input

Functions	Parameter
Selection of the input function on socket B18/5	239

If the light barrier function is not used, the input on socket B18/5 can be set with a switching function, analogous with inputs in1, in3 and in4.

The following input functions are possible with parameter 239:

- 239 = 0 **Light barrier function:** The input is prepared for a light barrier function.
 239 = 1...28 **All other input functions are identical with those described for parameter 240.**

7.21 Switching Functions of the Inputs in1, in3 and in4

Function	Parameter
Selection of the input function	in1/in3/in4 240/242/243

Various functions of the pushbuttons can be selected for each input on sockets ST2 and B4.

The following input functions are possible with parameters 240, 242 and 243:

- 240 = 0 **Input function blocked**
 240 = 1 **Needle up/down:** By pressing the pushbutton the drive runs from position 1 to position 2 and/or from position 2 to position 1. If the drive is outside of the stop position it runs to the next position possible.
 240 = 2 **Needle up:** By pressing the pushbutton the drive runs from position 1 to position 2.
 240 = 3 **Single stitch (basting stitch):** By pressing the pushbutton the drive performs one rotation from position 1 to position 1. If the drive is in position 2, it runs to position 1 upon pressing the pushbutton and from position 1 to position 1 each time when the pushbutton is pressed again.
 240 = 4 **Full stitch:** By pressing the pushbutton the drive performs one entire rotation depending upon the stop position.
 240 = 5 **Needle to position 2:** If the drive is outside of position 2 it runs to position 2 upon pressing the pushbutton.
 240 = 6 **Machine run blockage effective with open contact:** When opening the switch the drive stops in the preselected basic position.
 240 = 7 **Machine run blockage effective with closed contact:** When closing the switch the drive stops in the preselected basic position.
 240 = 8 **Machine run blockage effective with open contact (unpositioned):** When opening the switch the drive stops immediately unpositioned
 240 = 9 **Machine run blockage effective with closed contact (unpositioned):** When closing the switch the drive stops immediately unpositioned
 240 = 10 **Run at automatic speed (n12):** By pressing the pushbutton the drive runs at automatic speed. The pedal is not used.
 266 = 0 Activation of the function n-auto (speed n12) is not inverted (n-auto if switch is closed)
 266 = 1 Activation of the function n-auto (speed n12) is inverted (n-auto if switch is open)
 240 = 11 **Run at limited speed (n12):** By pressing the pushbutton, the drive runs at limited speed. The pedal must be pressed forward.
 240 = 12 **Sewing foot lifting with pedal in position 0 (neutral)**
 240 = 13 **High lift for walking foot operation mode not stored:** While the pushbutton is pressed down, the signal "high lift for walking foot" is emitted and the drive runs with speed limitation (n10).
 240 = 14 **High lift for walking foot operation mode stored/flip-flop:** When the pushbutton is pressed, the signal "high lift for walking foot" is emitted and the drive runs with speed limitation (n10). When the pushbutton is pressed again, the process is switched off.
 240 = 15 **Tape cutter and/or fast scissors (mode 6/7):** By pressing the pushbutton, the tape cutter is switched on over a preset time.
 240 = 16 **Intermediate backtack/intermediate stitch condensing:** By pressing the pushbutton, the backtack and/or the stitch condensing is switched on anywhere in the seam and at standstill of the drive.
 240 = 17 No function
 240 = 18 **Unlocking the chain:** By pressing the pushbutton, reversion is performed at the seam end. Moreover, the thread trimmer will be suppressed.
 240 = 19 **Bobbin thread monitor:** After inserting a full bobbin, the stitch counter is set by parameter 031 by pressing the pushbutton.
 240 = 20 **Machine run at positioning speed (n1):** By pressing the pushbutton, the drive runs at positioning speed. The pedal is not used.
 240 = 21 **Reversal of the direction of rotation:** The direction of rotation of the motor is reversed upon pressing the pushbutton in mode 12.
 240 = 22 No function.
 240 = 23 **Speed limitation n9:** As long as the pushbutton remains pressed down in the seam, the speed limitation n9 remains activated.

- 240 = 24** **Needle moves from position 1 to position 2 (flip-flop):** By pressing the pushbutton, the sewing foot is immediately lifted and the needle moves from position 1 to position 2. The machine run blockage is also activated, but will be deactivated when the pushbutton is pressed again. If the needle is outside of position 1, machine start is blocked for safety reasons and the sewing foot is immediately lifted.
- 240 = 25** **Speed limitation with external potentiometer:** By pressing the pushbutton, the external speed limitation becomes effective. Parameter 126 must be set at 2.
- 240 = 26** **No function.**
- 240 = 26** **Unlocking the chain:** By pressing the pushbutton, the function "unlock the chain" will be performed without using the pedal.
- 240 = 27** **External light barrier:** In this mode it is possible to initiate the seam end by pressing a pushbutton, not with light barrier. But the light barrier function must be On.

The input functions of parameters 242 and 243 are identical with those described for parameter 240.

7.22 Speed Limitation with External Potentiometer

Functions	Parameter
Speed limitation with external potentiometer (maximum value)	124
Speed limitation with external potentiometer (minimum value)	125
Function speed limitation with external potentiometer	126

A speed limitation can be set with parameters 124 and 125 using the external potentiometer which can be connected to sockets ST2/2, ST2/3 and ST2/4.

Parameter 124: Maximum value for speed limitation with external potentiometer

Parameter 125: Minimum value for speed limitation with external potentiometer

Parameter 126: Function for speed limitation with external potentiometer

- 0 = Function external potentiometer Off.
- 1 = The external potentiometer is active whenever the pedal is pressed forward. The drive always runs with the set speed limitation.
- 2 = The external potentiometer is only active if an input has been set at "25" with parameters 240, 242 and/or 243. If the selected input is switched on and the pedal pressed forward, the drive runs at limited speed. The speed limitation can be switched on and off with the pushbutton anywhere in the seam.

7.23 Function Error Message A1 On/Off

Functions	Parameter
Error message A1 On/Off	233

Error message A1 can be switched off with parameter 233, if the pedal is not in position 0 (neutral) when switching the machine on.

233 = OFF Error message A1 is displayed. No function is possible.

233 = ON Error message A1 is suppressed. After that, normal function (e. g. with automats).

7.24 Signal Output Position 1

- Transistor output with open collector
- Switches whenever the needle is in the slot between position 1 and 1A
- Independent of sewing, thus also when turning the handwheel manually
- Suitable e.g. for the connection of a counter
- An inverted signal is emitted on socket ST2/20

7.25 Signal Output Position 2

- Transistor output with open collector
- Switches whenever the needle is in the slot between position 2 and 2A
- Independent of sewing, thus also when turning the handwheel manually
- Suitable e.g. for the connection of a counter
- An inverted signal is emitted on socket ST2/21

7.26 Signal Output - 120 Impulses/Rotation

- Transistor output with open collector
- Switches whenever a generator slot of the position transmitter is sensed
- 120 impulses per rotation of the handwheel
- Independent of sewing, thus also when turning the handwheel manually
- Suitable e.g. for the connection of a counter
- An inverted signal is emitted on socket ST2/22

7.27 Actuator

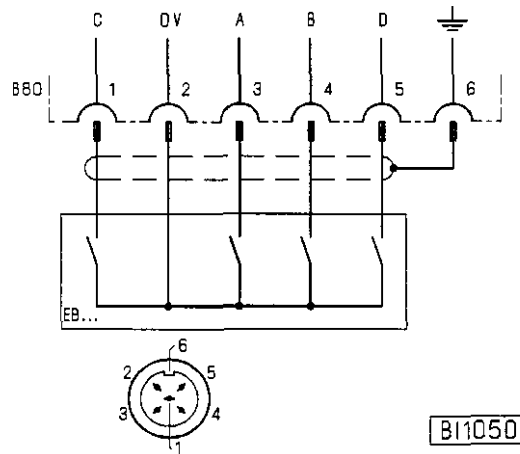
With the help of the actuator connected with the pedal the commands for the sewing operation are inputted. Instead of the built-in actuator another external actuator can be connected to socket B80.

Table: Coding of the pedal steps

Pedal step:	D	C	B	A	
-2	H	H	L	L	Full heelback (e. g. initiating the seam end)
-1	H	H	H	L	Slight heelback (e. g. sewing foot lifting)
0	H	H	H	H	Pedal in pos. 0 (neutral)
½	H	H	L	H	Pedal slightly forward (e. g. sewing foot lowering)
1	H	L	L	H	Speed stage 1 (n1)
2	H	L	L	L	.
3	H	L	H	L	.
4	H	L	H	H	.
5	L	L	H	H	.
6	L	L	H	L	.
7	L	L	L	L	.
8	L	L	L	H	.
9	L	H	L	H	.
10	L	H	L	L	.
11	L	H	H	L	.
12	L	H	H	H	Pedal fully forward / speed stage 12 (n2)

Functions	Parameter
Selectable pedal functions	019

- 019 = 0** Pedal in pos. -1 blocked in the seam. With pedal in pos. -2, however, sewing foot lifting in the seam is possible. (This function is possible only if "light barrier On".)
- 019 = 1** With pedal in pos. -1, sewing foot lifting in the seam is blocked
- 019 = 2** With pedal in pos. -2, thread trimming is blocked.
(This function is possible only if "light barrier On".)
- 019 = 3** With pedal in pos. -1 and -2, all functions are activated



EB... - Actuator

Functions	Parameter
Speed stage graduation	119

The characteristic curves of the pedal (speed change from stage to stage) can be adjusted by this parameter.

- Possible characteristic curves:**
- linear
 - progressive
 - highly progressive

7.28 Master Reset

Recovery of factory settings.

- Press pushbutton "P" and turn power on
- Input code number "190"
- Press pushbutton "E"
- Parameter 100 is shown on the display
- Press pushbutton "E"
- The parameter value is shown on the display
- Set at "170" with pushbutton "+"
- Press pushbutton "P" twice
- Turn power off
- Turn power on. All parameters are reset to their factory settings.

8. Signal Test

Functions	Parameter
Test of inputs and outputs	173

Function test of the external inputs and the transistor power outputs with the actuators connected to them (e.g. solenoids and solenoid valves).

8.1 Signal Test Using the Incorporated Control Panel

Output test:

- Address parameter 173
- Select the desired output by the +/- pushbuttons
- Actuate the selected output by **pushbutton > >** on the incorporated control panel

Pushbutton	Output
ON/OFF	Input test
01	Free on socket ST2/34
02	Sewing foot lifting on socket ST2/35
03	Output M1 on socket ST2/37
04	Output M3 on socket ST2/27
05	Output M2 on socket ST2/28
06	Free
07	Output ML and/or M5 on socket ST2/32

Input test:

- Press the (-) pushbutton several times until "OFF" or "ON" appears on the control display.
- Actuation of the external switches or pushbuttons will be indicated by alternating the switching state (ON/OFF) on the display.
- Several switches must not be closed at the same time.

9. Error Messages

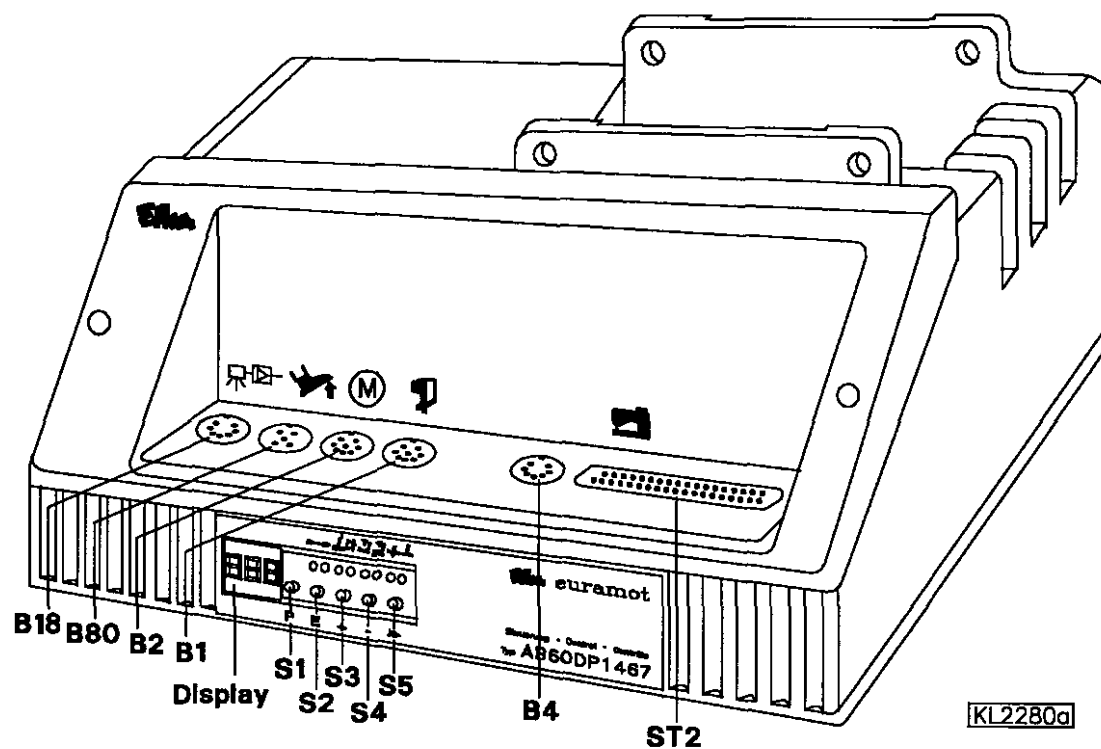
General Information	
On the control	Signification
A1	Pedal not in neutral position, when switching the machine on (according to setting of parameter 233)
A2	Machine run blockage (safety switch)
A3	Bobbin thread monitor
A6	Light barrier control

Programming Functions and Values (Parameters)	
On the control	Signification
Returns to the first digit	Wrong code number or parameter number input

Serious Situation	
On the control	Signification
E1	After power On, position transmitter or commutation transmitter defective or connecting cables have been changed by mistake. During machine run or after a sewing operation, only position transmitter defects can be identified.
E2	Line voltage too low, or time between power off and power on too short
E3	Machine locks or does not reach the desired speed
E4	Control disturbed by deficient grounding or loose contact

Hardware Disturbance	
On the control	Signification
H1	Commutation transmitter cord or frequency converter disturbed
H2	Processor disturbed

10. Operating Elements and Socket Connectors on the Control



- B1 - Position transmitter
- B2 - Commutation transmitter for d.c. motor
- B4 - Inputs for pushbuttons
- B18 - Light barrier module
- B80 - Actuator
- ST2 - Inputs and outputs for solenoids / solenoid valves / displays / pushbuttons and switches
- S1..S5 - Pushbuttons for programming and selection of functions
- Display - 3 digits

For your notes:



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