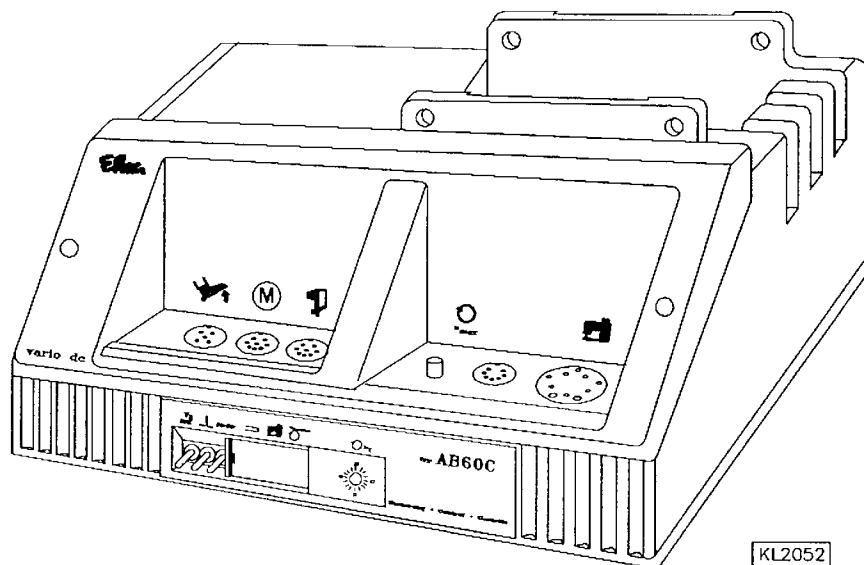


# **Efka** vario dc

**CONTROL**

**AB60C**

Replaces AB60A  
(Differences see next page)



## **INSTRUCTION MANUAL**

**No. 402085**

**english**

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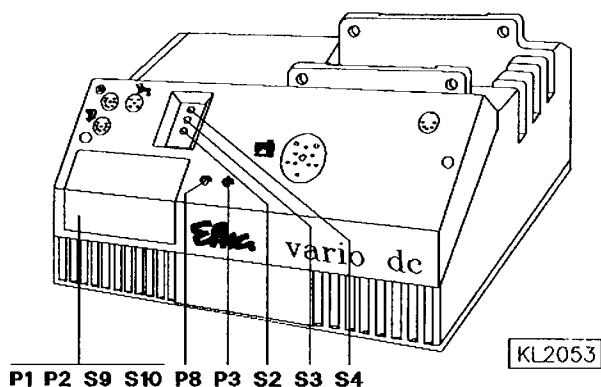
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EFKA ELECTRONIC MOTORS  
SINGAPORE PTE. LTD.

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## Comparison of Operating Elements

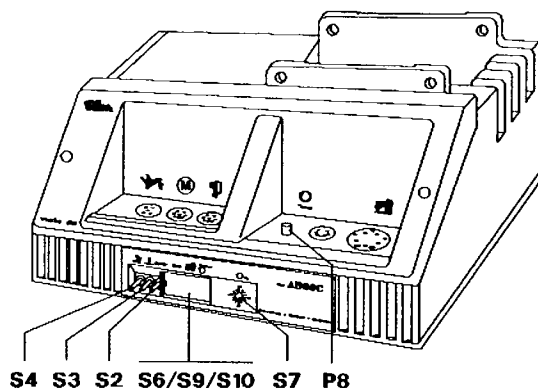
**previously:**

**AB60A**



**new:**

**AB60C**



AB60A	AB60C	Functions
S2	S2	Softstart ON/OFF
S3	S3	Needle position at stop in the seam up/down
S4	S4	Presser foot up at each stop in the seam ON/OFF
P1	S7	Positioning speed
P2		Maximum speed
P8	S6	Maximum speed settings in the programming mode
	P8	Reduction of maximum speed
S9/1	S9/1	Activation of programming mode
S9/2	S9/2	Needle up-down/needle up
S9/3	S9/3	Slow stitch after power on ON/OFF
S9/4	S9/4	Presser foot up at the seam end ON/OFF
S9/5	S9/5	Blocking of machine run activated when connection opened/closed
S9/6	S9/6	Direction of rotation of the motor shaft clockwise/counterclockwise
S9/7	S9/7	Thread trimmer ON/OFF
S9/8		Speed class 9900 RPM/6000 RPM
	S9/8	Activation of maximum speed in the programming mode
S10/1-4	S10	Selection of the type of sewing machine

Further functions in the programming mode see corresponding chapters!

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## 1. Important Safety Instructions

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

- Read all instructions thoroughly before using this drive.
  - Drive and accompanying appliances 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 appliances, i.e. positioner, 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 appliances, 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 appliances 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, as well as for automatic sewing machines and winding machines:

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

DA60A	- DÜRKOPP Lockstitch machines, all series
JU60B	- JUKI Lockstitch machines DDL5550, DLD432, DLD436, DLN5410-10, DLU450, DLU5490, LH1152
	- JUKI Chainstitch machines MH481, MH484
	- YAMATO Overlock machines
PF60A chainstitch)	- PFAFF Industrial sewing machines, all series (lockstitch and
SN62AV	- SINGER Lockstitch machines (without backtacking) <b>without adapter</b> class 591 C200G7/C300G/D200G/D300G, class 211 and 212 U-UTT (magnetic thread trimmer) <b>with adapter</b> class 211 and 212 U-UTT (pneumatic thread trimmer) class 457 U-UTT
4B30A	- Industrial sewing machines of various manufacturers, e.g. SINGER GUTT, PESCHKE GP-AS Type2, BROTHER, ALFA, REFREY
8B30C	- PEGASUS (Mauser) class 9652-186
1F30B	- BROTHER Classes DB2-B705-100, DB2-B715-100, DB2-B757-100
AB62AV/1F62AV	- BROTHER Class 737 and 737-100 (without backtacking)

### 2.1 Use in Accordance with Regulations

The drive is not an independently operative machine, but it is designed for being built into other machines. It can only be put into operation after it has been certified that the machine to which it will be attached meets the specifications of the EC Directive (Appendix II, paragraph B of the Directive 89/392//392/EWG and supplement 91/368/EWG).

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

EN 60204-3-1: 1990 Electric equipment of industrial machines:  
Special 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	Control	vario dc AB60C
	- Power pack	N156
	- External actuator	EB301 (optional EB302, reduced actuating force)
1	Position transmitter	P5-2
1	Mains switch	NS105
1	Set of standard accessories	B131
	consisting of:	belt guard complete set of hardware motor foot bracket 1 and 2, short documentation
1	Pulley	

#### 3.1 Special Accessories

<b>Solenoid</b> type EM1..(for e.g. presser foot lifting, etc.)	- available versions see specification solenoids - part no. 1111845
<b>Extension cable</b> for external actuator, approx. 750 mm long, complete with plug and socket connector	- part no. 1111787
<b>Extension cable</b> for external actuator, approx. 1500 mm long, complete with plug and socket connector	- part no. 0501278
<b>5-pin plug</b> (Mas 5100W) with slide index for the connection of another external actuator	- part no. 4160018
<b>Foot control</b> type FB302 for standing operation with approx. 1400 mm connecting cable and plug	- part no. 1100313
<b>Potential equalization cord</b> 700 mm long, LIY 2.5 mm <sup>2</sup> , grey, with forked cable brackets on both sides	- part no. 0300019
<b>Fitting piece for position transmitter</b>	- part no. 1111229
<b>Extension cable</b> for position transmitter P4-.. and P5-.., as well as for commutation transmitter, approx. 315 mm long, complete with plug and socket connector	- part no. 1111584
<b>Extension cable</b> for position transmitter P4-.. and P5-.., as well as for commutation transmitter, approx. 1100 mm long, complete with plug and socket connector	- part no. 1111858
<b>Extension cable</b> for motor connection, approx. 400 mm long	- part no. 1111857
<b>Extension cable</b> for motor connection, approx. 1500 mm long	- part no. 1112223
<b>Pulley</b> 40 mm $\phi$ with special belt intake and slip-off protection (use SPZ belt)	- part no. 1112224
<b>Pulley</b> 50 mm $\phi$ with special belt intake and slip-off protection (use SPZ belt)	- part no. 1112367
<b>Adapter cord</b> for the connection to JUKI high-speed seamers with index 7 (Molex Minifit)	- part no. 1112390
<b>Adapter cord</b> to use the AB60C as a replacement for the DA60A (restrictions see table overleaf)	- part no. 1112391
<b>Adapter cord</b> to use the AB60C as a replacement for the JU60B (restrictions see table overleaf)	- part no. 1112392
<b>Adapter cord</b> to use the AB60C as a replacement for the PF60A (restrictions see table overleaf)	- part no. 1112397
<b>Adapter cord</b> to use the AB60C as a replacement for the 4B30A (restrictions see table overleaf)	- part no. 1112394
<b>Adapter cord</b> to use the AB60C as a replacement for the SN62AV without adapter (restrictions see table overleaf)	- part no. 1112395
<b>Adapter cord</b> to use the AB60C as a replacement for the SN62AV with adapter (restrictions see table overleaf)	

- Adapter cord** to use the AB60C as a replacement for the 8B30C (restrictions see table below) - part no. 1112396
- Adapter cord** to use the AB60C as a replacement for the 1F30B (restrictions see table below) - part no. 1112393
- Adapter cord** to use the AB60C on Brother class 737 (restrictions see table below) - part no. 1112398
- Knee switch** type KN3 (pushbutton) with cord of approx. 950 mm length without plug - part no. 58.0013
- Sewing light transformer** - please indicate line voltage and sewing light voltage (6.3V or 12V)
- 3-pin-plug** with slide index (Mas 3100) - part no. 0500402
- 7-pin-plug** with slide index (Mas 7100S) - part no. 0502474
- 10-pin plug** (Mes100) - part no. 0500357

**3.2 Differences When Using the AB60C as a Replacement for:**

DA60A	AB60C
Trimming speed select -	- Single stitch by input needle up/down

JU60B	AB60C
"Motor running" in all modes "Motor running" on B3/9 15V d.c. for external application Thread wiper sensing Stitch condensing mode -	"Motor running" only in mode 2 + 3 - 5V d.c. for external application - - Single stitch by input needle up/down

PF60A	AB60C
Presser foot lifting by external pushbutton Thread wiper sensing "Motor running" in the chainstitch mode	- - -

SN62AV (set mode A or C)	AB60C
Backtacking Presser foot lifting unpulsed for presser foot lifting kit Thread wiper sensing -	- - - Single stitch by input needle up/down

4B30A (set mode B)	AB60C
Motor with clutch	d.c. motor

Table continued on the next page



<b>8B30C</b> (set mode D)	AB60C
Motor with clutch	d.c. motor

<b>1F30B</b> (set mode 6 for class 715)	AB60C
Motor with clutch Thread trimmer 1 and thread tension release (thread trimmer 1 + 2) -	d.c. motor Only thread trimmer 1 or thread trimmer 1+ 2 Single stitch by input needle up/down

<b>1F62AV/AB62AV</b> (set mode 6)	AB60C
Motor with clutch (only 1F62AV) Backtacking -	d.c. motor - Single stitch by input needle up/down

#### 4. Operating the Motor

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 appliances, if necessary**
- **The correct adjustment of the direction of rotation of the motor**
- **The setting of the positions**
- **The signal sequence of the trimming operation**

The setting and/or checking procedure will be described in chapter "Functions and Settings on the Technician Level".

## 5. Operation

### 5.1 Access to Programming on Command Input

In order to prevent the unintentional modification of preset functions the input commands are distributed at various levels.

- The following persons have access:
- the operator to the first level (with sliding cover closed)
  - the technician to both levels

### 5.2 The Operator Level

On this level, with sliding cover opened, simple functions which have to be changed frequently during operation can easily be switched on or off and/or modified by the operator:

Switch	Function	up	down
S2	Softstart	on	off
S3	Needle position at stop in the seam	up	down
S4	Presser foot up at each stop in the seam	on	off

Potentiometer	Function	Turn to the left	Turn to the right
S7	Positioning speed	Stage 0 (minimum)	Stage F (maximum)
P8	Reduction of maximum speed	1/4 of the maximum speed	Maximum speed

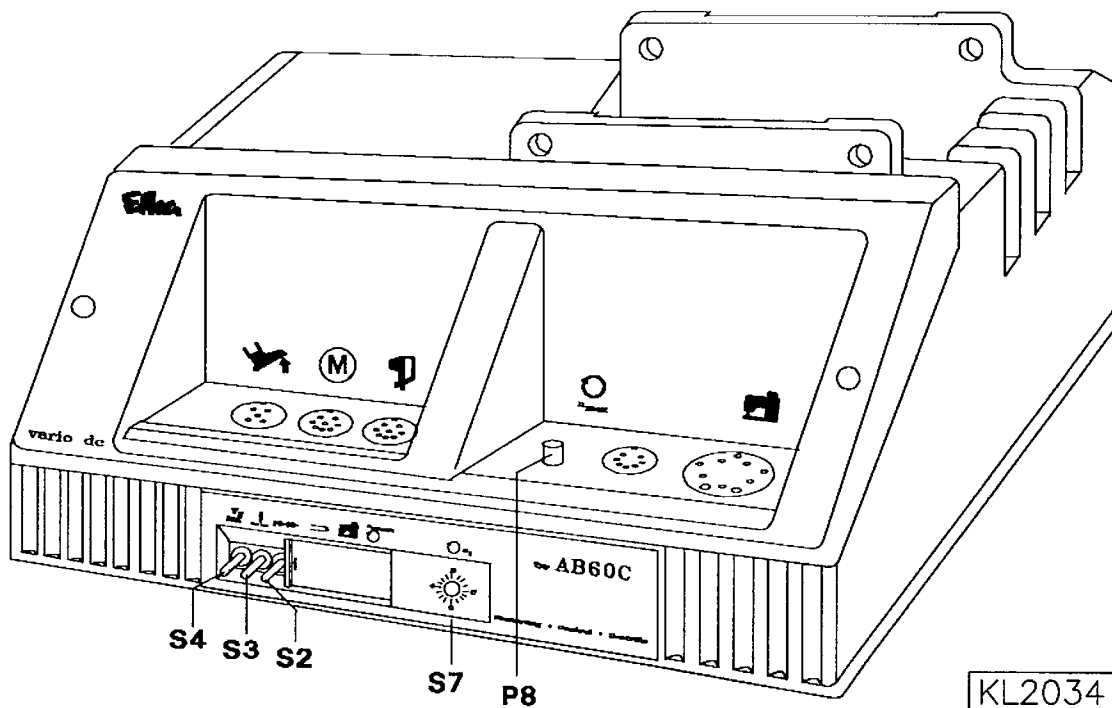


Fig. 1:

### 5.3 The Technician Level

The less frequently used switches needed for the basic setting are located behind the sliding cover:

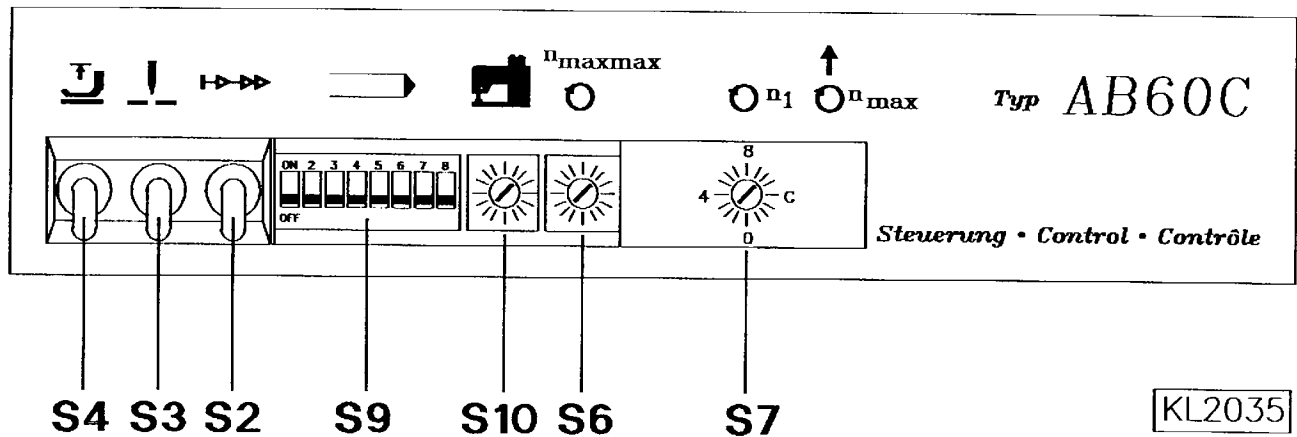


Fig. 2:

Switch/ Potentiometer	Functions in normal operation	Functions when programming mode is active
S6	-----	Setting the reversing delay Delay times of the outputs Setting the braking effect Setting the maximum speed (S9/8 = ON), in conjunction with S10
S7	Setting the positioning speed	-----
S9/1 S9/2 S9/3 S9/4 S9/5	Activation of programming mode Needle up-down / needle up Slow stitch after power on ON/OFF Presser foot up after thread trimming on/off Blocking of machine run activated when connection opened	----- ----- ----- ----- -----
S9/6	-----	closed Direction of rotation of the motor shaft clockwise/counterclockwise
S9/7 S9/8	Thread trimmer on/off Reduction of maximum speed/limited-automatic speed	----- Activation of the maximum speed setting and limited and/or automatic speed
S10	-----	Setting modes 0...F (S9/8 = OFF) Setting the maximum speed (S9/8 = ON), in conjunction with S6
P8	Maximum speed reduction Reduction of limited speed if S9/8 = ON Reduction of automatic speed if S9/8 = ON	Setting the braking power at standstill Setting the reversing angle Operating time of the outputs

See description in the respective chapter!

## 6. Functions and Settings on the Operator Level

### 6.1 Softstart

The function Softstart is set by flip switch S4.

- **S2 = up**      Function Softstart active
- **S2 = down**    Function Softstart not active

If the function Softstart is activated the preset Softstart stitches are executed with speed limitation. If the preset speed is below the Softstart speed the preset pedal speed is performed. The function Softstart can be switched on in all modes.

The values of the speed and the stitches are shown in chapter "Control Settings at Delivery".

### 6.2 Basic Position

The needle position at stop in the seam is set by flip switch S3.

- **S3 = up**      Stop position needle up
- **S3 = down**    Stop position needle down

### 6.3 Presser Foot Lifting in the Seam

Presser foot lifting at stop in the seam is set by flip switch S2.

- **S4 = up**      Presser foot lifting stored at the seam end on
- **S4 = down**    Presser foot lifting stored at the seam end off

### 6.4 Maximum Speed Reduction

The maximum speed (n.maxmax) set by step switches S6 and S10 can be reduced by up to 1/4 by means of potentiometer P8 (n.max). When the potentiometer is turned completely to the right, the maximum speed set by step switches S6 and S10 is performed.

- **Turn P8 to the left**              Speed is reduced
- **Turn P8 to the right**             Speed is increased

### 6.5 Positioning Speed = Thread Trimming Speed

The positioning speed (n.pos) can be set by step switch S7 within the range of 100...320 RPM according to the following table.

Setting the positioning speed by step switch S7	
Step	Speed [RPM]
0	100
1	110
2	120
3	130
4	140
5	150
6	160
7	170
8	180
9	200
A	220
B	240
C	260
D	280
E	300
F	320

Table 1

## 7. Functions and Settings on the Technician Level

**Note:**

Especially for initial operation of the drive it is recommended to follow the sequence of the chapters below.

**Note:**

The operating elements for the settings described in the following are located behind the sliding cover, with the exception of S2...S4, S7 and P8.

**Note:**

Please compare the definitions so that the same description can be used for controls with DIL slide switches and DIL rocker switches:

Switch on (on) - up = push and/or press upwards

Switch off (off) - down = push and/or press downwards.

## 7.1 Switch Programming Mode On and Off

In order to prevent unintentional modifications of important settings they can only be accessed after switching on the programming mode.

The programming mode can only be switched on after power on and/or after a seam has been completed.

- Open the sliding cover
- **S9/1 = up** Programming mode on  
(acoustic signal depending upon the position of flip switches S2...S4)
- **S9/1 = down** Programming mode off  
(no acoustic signal)
- Close the sliding cover

The following functions can only be modified when the programming mode is on:

- **Direction of rotation of the motor**
- **Maximum speed compatible with the machine**
- **Mode selection**
- **Braking power at standstill**
- **Braking effect**
- **Reversion**
- **Limited and/or automatic speed**
- **Delays and times**



### Attention

Switch programming mode on and off only when the drive is at standstill with power on.

### Note:

Potentiometer settings that have to be modified in the programming mode will only be allowed for if the potentiometer is moved by more than  $\pm 5^\circ$  and/or the step switches are moved by one step.

### Note:

If any values have been changed in the active programming mode, they will be saved when the programming mode is off.

## 7.2 Selection of the Functional Sequences

Lockstitch, chainstitch and overlock machines as well as automatic sewing machines and winding machines with different functional sequences can be operated by using this control. The functional sequences can only be selected in the programming mode after power on and/or after a seam has been completed.

- Open the sliding cover
- **S9/1 = up** Switch on programming mode  
(acoustic signal)
- **S9/8 = down** This switch must be at "OFF"
- **S10** Setting the functional sequence according to the table on the next page
- **S9/1 = down** Switch off programming mode  
(no acoustic signal)
- Close the sliding cover

Setting the functional sequence with step switch S10							
Mode and/or step	Designation	Outputs			Inputs		
		M1	M2	M3	S1	S2	S3
0	Chainstitch general	FW	FA	FL	NHT/EST	LSP	ENTK
1	Chainstitch with blow wiper	FW	FA	FL	NHT/EST	LSP	ENTK
2	Overlock 1	MI.	FA	FL	NHT/EST	LSP	ENTK
3	Overlock 2 (TP60)	MI.	FA	FL	NHT/EST	LSP	n.lim
4	Lockstitch e.g. Pfaff (magn. FA)	FW	FA	FL	NHT/EST	LSP	n.lim
5	Lockstitch e.g. Pfaff (pneum. FA)	FW	FA	FL	NHT/EST	LSP	n.lim
6	Lockstitch e.g. Juki, Dürkopp	FW	FA	FL	NHT/EST	LSP	n.lim
7	Lockstitch e.g. Pfaff (magn. FA)	HVR	FA	FL	NHT/EST	LSP	ZVR
8	Lockstitch e.g. Pfaff (pneum. FA)	HVR	FA	FL	NHT/EST	LSP	ZVR
9	Lockstitch e.g. Juki, Dürkopp	HVR	FA	FL	NHT/EST	LSP	ZVR
A	Lockstitch e.g. Singer (6B30)	FW	FA	FL	NHT/EST	LSP	n.lim
B	Lockstitch e.g. Singer, Refrey (4B30A)	F <sup>S</sup> PL	FA	FA pulsed	NHT/EST	LSP	n.lim
C	Lockstitch e.g. Singer cl. 212 UTT	F <sup>S</sup> PL	FA	FL	NHT/EST	LSP	n.lim
D	e.g. Mauser, Pegasus (8B30C)	PED ≤ -1	PED > 1	ML	NHT/EST	LSP	n.auto
E	Reversal of the direction of rotation by pedal in position -2	MI.	PED -2	DR	NHT/EST	LSP	n.pos
F	Reversal of the direction of rotation by pushbutton S1	MI.	PED 0	DR	DR	LSP	n.pos

For abbreviations see chapter "Connection Diagrams"

#### Mode 0 (Chainstitch machines general)

- Thread trimming for a programmable time (t8) after stop in position 2
- Thread wiping for a programmable time (t6) and a delay (t9)
- Presser foot lifting after trimming, delayed after thread wiping by the time (t7) (see chapter "Presser Foot Lifting")
- Function "Unlocking the chain" (see chapter "Unlocking the Chain")

**Mode 1** (Chainstitch machines with blow wiper)

- Thread trimming for a programmable time (t8) after stop in position 2
- Blow wiper for a programmable time (t11) and a delay (t13)
- Presser foot lifting after trimming, delayed after thread wiping by the time (t12) (see chapter "Presser Foot Lifting")
- Function "Unlocking the chain" (see chapter "Unlocking the Chain")

**Mode 2** (Overlock machines with unlocking th chain)

- Thread trimmer for a programmable time (t8)
- Presser foot lifting (see chapter "Presser Foot Lifting")
- Signal "motor running"
- Function "Unlocking the chain" (see chapter "Unlocking the Chain")

**Mode 3** (Overlock machines with limited speed)

- Functions as in mode 2
- Run at limited speed

**Mode 4** (Lockstitch machine with magnetic thread trimmer e.g. Pfaff)

- Thread trimming from leading to trailing slot edge position 1
- Thread wiping for a programmable time (t6)
- Presser foot lifting (see chapter "Presser Foot Lifting")
- Run at limited speed

**Mode 5** (Lockstitch machine with pneumatic thread trimmer e.g. Pfaff)

- Thread trimming from trailing slot edge position 1 to leading slot edge position 2
- Thread wiping for a programmable time (t6)
- Presser foot lifting (see chapter "Presser Foot Lifting")
- Run at limited speed

**Mode 6** (Lockstitch machine with thread trimming system e.g. Juki, Dürkopp)

- Thread trimming from leading slot edge position 1 to leading slot edge position 2
- Thread wiping for a programmable time (t6)
- Presser foot lifting (see chapter "Presser Foot Lifting")
- Run at limited speed

**Mode 7..9** (Lockstitch machine with thread trimmer as in mode 4..6)

- Functions as in mode 4..6, but without thread wiper
- Function intermediate backtack instead of limited speed

**Mode A** (Lockstitch machine with thread trimming system e.g. Singer)

- Thread trimming from trailing slot edge position 1 to leading slot edge position 2
- Drive stops after trimming at the trailing edge of position 2
- Thread wiping for a fixed time (t6)
- Presser foot lifting (see chapter "Presser Foot Lifting")
- Run at limited speed

**Mode B** (Lockstitch machine with thread trimming system e.g. Singer, Refrey...)

- Thread catcher from trailing slot edge position 1 to leading slot edge position 2
- Thread trimmer at full power that works for a programmable time (t6), then pulsed signal
- Thread wiping for a programmable time (t6)
- Run at limited speed



**Mode C** (Lockstitch machine with thread trimming system e.g. Singer cl. 212U-UTT and cl. 457)

- Thread trimming for a programmable time (t15) starting from position 1
- Intermediate stop of the drive during trimming for a programmable time (t14)
- Thread tension release from leading slot edge position 1 to leading slot edge position 2
- Presser foot lifting (see chapter "Presser Foot Lifting")
- Run at limited speed

**Mode D** (General application)

Setting:

S2 = Off / S3 = On / S4 = Off

S9/1...5 = Off

S9/6 = On (clockwise direction of rotation)

S9/7...8 = Off

- Signal pedal > 1
- Signal pedal ≤ -1
- Signal motor running
- Run at automatic speed

**Mode E** (Reversal of the direction of rotation with pedal = -2)

- Signal direction of rotation
- Signal pedal = -2
- Signal motor running
- Function "run at positioning speed"

**Mode F** (Reversal of the direction of rotation by external pushbutton)

- Signal direction of rotation
- Signal pedal = 0
- Signal motor running
- Function "switch direction of rotation"
- Function "run at positioning speed"

See chapter "Timing Diagrams" for the various modes!

### 7.3 Direction of Rotation of the Motor

- Turn power on and/or complete a seam and open the sliding cover
- **S9/1 = up** Switch on programming mode (acoustic signal)
- **S9/6 = up** Clockwise rotation (look at the motor shaft)
- **S9/6 = down** Counterclockwise rotation
- **S9/1 = down** Switch off programming mode (no acoustic signal)
- Close the sliding cover



#### Attention

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

## 7.4 Speed Settings

### 7.4.1 Maximum Speed

The maximum speed of the drive is determined by the selected pulley and by the following settings.

**Note**

Set the speed ratio between sewing machine shaft and motor shaft such that the motor of the sewing machine runs at a maximum speed of approx. 4000 RPM.

The setting range is between 400 and 9900 RPM and is determined by step switches S6 and S10. The maximum speed setting (n.maxmax) can only be modified as follows, when the sliding cover is opened.

- Turn power on and/or complete a seam and open the sliding cover
- **S9/1 = up** Switch on programming mode (acoustic signal)
- **S9/8 = up** Maximum speed setting is activated
- **S10** Maximum speed setting (thousands place)
- **S6** Maximum speed setting (hundreds place)
- **S9/8 = down** Maximum speed setting is deactivated
- **S9/1 = down** Switch off programming mode (no acoustic signal) or continue settings in the programming mode
- Close the sliding cover

**Examples:** Setting of S10 = 0 and S6 = 8 => 800 RPM  
 Setting of S10 = 9 and S6 = 2 => 9200 RPM

### 7.4.2 Limited and/or Automatic Speed

When the input signal on socket B12/2-4 (n.lim and/or n.auto = 0V) is activated, the drive runs at a limited and/or automatic speed (n.lim and/or n.auto) according to the set mode, with the pedal pushed forward. The setting range depends on the actual maximum speed (n.maxmax) compatible with the sewing machine. The speed range is between 1/8 n.maxmax and n.maxmax.

Set as follows.

- Turn power on and/or complete a seam and open the sliding cover
- **S9/1 = up** Switch on programming mode (acoustic signal)
- **S9/8 = up** Limited and/or automatic speed setting with P8 is activated
- **P8** Set limited and/or automatic speed
- **S9/8 = down** Limited and/or automatic speed setting with P8 is deactivated
- **S9/1 = down** Switch off programming mode (no acoustic signal)
- Close the sliding cover

## 7.5 Setting the Positions

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



### Attention!

Turn power off before adjusting the positioning discs.



### Attention!

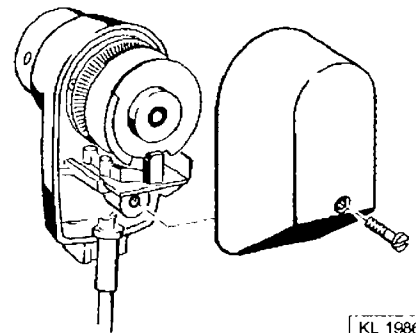
Be very careful when adjusting the positioning discs.

#### Risk of injury.

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

### How to set the positions

- Remove position transmitter cover after loosening the screw
- Push flip switch S3 down, basic position needle down
- Start sewing briefly
- Adjust central disc for position 1 in the desired direction
- Push flip switch S3 up, basic position needle up
- Start sewing briefly
- Adjust outer disc for position 2 in the desired direction
- Repeat procedure if necessary
- Put cover on again and tighten screw



KL 1986A

### 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.

## 7.6 Presser Foot Lifting

This control has a socket for magnetic or pneumatic presser foot lifting. It is pedal operated. The following programming possibilities are available:

- Open the sliding cover
- S9/4 = up Presser foot lifting stored at seam end On
- S9/4 = down Presser foot lifting stored at seam end Off
- Close the sliding cover
- S4 = up Presser foot lifting stored at stop in the seam On
- S4 = down Presser foot lifting stored at stop in the seam Off

### The presser foot is lifted:

- in the seam
  - by heelback (position -1)  
or automatically (S4 = up)
- after thread trimming
  - by heelback (position -1 and/or -2)  
or automatically (S9/4 = on)
  - activation delay after thread trimming (t7)

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).

When pushing the pedal forward from lifted presser foot, the start delay becomes effective. The start delay (t3) from lifted presser foot can be set in the programming mode.

After activation of presser foot lifting the solenoid is fully powered. The on/off ratio is pulsed at 1:1.

### The presser foot lowers:

- from manual presser foot lifting with pedal in position 0 (neutral) (stage  $\geq 0$ )
- from automatic presser foot lifting with pedal forward (stage  $> 0$ )

The start is delayed (t3) until the foot has securely lowered.

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

## 7.7 Activation and Delay Times

The power transistors can be adjusted individually according to the preselected type of sewing machine. Programming can only be done, when the programming mode is on. During this procedure potentiometer P8 and step switch S6 can be set for different functions (see table):

Programming the power transistors						
Mode	Power transistor	S4	S3	S2	Step switch S6	Potentiometer P8
Mode 0 chainstitch	Thread trimming (M2)	down	up	up	No effect	Thread trimmer operating time t8
	Thread wiping (M1)	up	down	up	Delay thr. trimming end -> thread wiping t9	Thread wiper operating time t6
	Presser foot lifting (M3)	up	up	down	Delay after thread wiping t7	Start delay after presser foot lifting t3
Mode 1 chainstitch	Thread trimming (M2)	down	up	up	No effect	Thread trimmer operating time t8
	Blow wiping (M1)	up	down	up	Delay thread trimming start -> blow wiping t13	Blow wiper operating time t11
	Presser foot lifting (M3)	up	up	down	Delay thread trimming start -> presser foot lifting t12	Start delay after presser foot lifting t3
Mode 2, 3 overlock	Thread trimming (M2)	down	up	up	No effect	Thread trimmer operating time t8
	Motor running + Needle cooling (M1)	up	down	up	No effect	No effect
	Presser foot lifting (M3)	up	up	down	Delay after thread trimming t7	Start delay after presser foot lifting t3
Mode 4...6 lockstitch	Thread trimming (M2)	down	up	up	No effect	No effect
	Thread wiping (M1)	up	down	up	No effect	Thread wiper operating time t6
	Presser foot lifting (M3)	up	up	down	Delay after thread wiping t7	Start delay after presser foot lifting t3
Mode 7...9 lockstitch	Thread trimming (M2)	down	up	up	No effect	No effect
	Thread wiping (M1)	up	down	up	No effect	Thread wiper operating time t6
	Presser foot lifting (M3)	up	up	down	Delay after POS.2 t7	Start delay after presser foot lifting t3
Mode A lockstitch	Thread trimming (M2)	down	up	up	No effect	No effect
	Thread wiping (M1)	up	down	up	No effect	Thread wiper operating time t6
	Presser foot lifting (M3)	up	up	down	Delay after thread wiping t7	Start delay after presser foot lifting t3
Mode B lockstitch	Thread catching (M2)	down	up	up	No effect	No effect
	Thread tension release (M1)	up	down	up	No effect	Thread tension release operating time t6
	Presser foot lifting (M3)	up	up	down	No effect	Pulsing for thread trimmer t10
Mode C lockstitch	Thread trimming (M2)	down	up	up	Thread trimmer stop time t14	Thread trimmer operating time t15
	Thread wiping (M1)	up	down	up	No effect	No effect
	Presser foot lifting (M3)	up	up	down	Delay after thread tension release t7	Start delay after presser foot lifting t3
Mode D...F	(M2)	down	up	up	No effect	No effect
	(M1)	up	down	up	No effect	No effect
	(M3)	up	up	down	No effect	No effect
Setting range						
t2 = fixed	t5 = fixed	t8 = 0...510 ms	t11 = 0...2550 ms	t14 = 0...510 ms **		
t3 = 0...510 ms	t6 = 0...510 ms	t9 = 0...510 ms**	t12 = 0...2550 ms *	t15 = 0...510 ms		
t4 = fixed	t7 = 0...510 ms	t10 = 0...100%	t13 = 0...2550 ms *	t15 = fixed		

\* See table 2 (column 2) overleaf

\*\* See table 2 (column 1) overleaf

The programming mode can only be switched on after power on and/or after the completion of a seam.

- Open the sliding cover
- **S9/1 = up** Switch on programming mode (acoustic signal)
- **S9/8 = down** This switch must be set at "OFF"
- **S2...S4** With the help of these switches the power transistor to be programmed is selected according to the above table. The active setting is acoustically indicated (see chapter **Acoustic Signals in the Active Programming Mode**).
- **P8 and/or S6** With the help of the potentiometer and/or step switch (table 2) the desired setting is set.
- The settings can be checked by pushing the pedal in the active programming mode (test operation).
- **S9/1 = down** Switch off the programming mode (no acoustic signal). The set values are permanently saved.
- **P8 and/or S6** The potentiometer and/or the step switch are reset for their initial function and to their initial values.
- **S2...S4** The switches are reset to their initial position.
- Close the sliding cover

Setting the times by step switch S6			
Step	Time [ms]		
Step	Column 1	Column 2	Column 3
0	0	0	0
1	40	200	80
2	60	300	120
3	80	400	160
4	100	500	200
5	120	600	240
6	140	700	280
7	160	800	320
8	180	900	360
9	200	1000	400
A	250	1250	500
B	300	1500	600
C	350	1750	700
D	400	2000	800
E	450	2250	900
F	510	2550	1020

Table 2

## 7.8 One Slow Stitch after Power On

For the protection of the sewing machine, the first stitch after power on is executed at positioning speed independently from the function Softstart (safety function).

- Open the sliding cover
- **S9/3 = up** Slow stitch after power on effective
- **S9/3 = down** Slow stitch after power on not effective
- Close the sliding cover

## 7.9 Braking Power at Standstill and Braking Effect

The braking power at standstill works at stop in the seam and after trimming and prevents unintentional "wandering" of the needle at standstill. The effect can be set by potentiometer P8 and tested by turning the handwheel. Moreover, the braking effect (braking edge) can be modified by step switch S6.

Programming the braking frequency at standstill and the braking edge in the programming mode					
Mode	S4	S3	S2	Potentiometer P8	Step switch S6
All modes	up	up	up	Braking power	Braking effect (braking edge)

The programming mode can only be switched on after power on and/or after the completion of a seam.

- Open the sliding cover
- **S9/1 = up** Switch on programming mode (acoustic signal)
- **S9/8 = down** This switch must be set at "OFF"
- **S2...S4** All switches up. The active setting is acoustically indicated (see chapter **Acoustic Signals in the Active Programming Mode**)
- **P8 = left** Braking power at standstill off
- **P8 = right** Braking power at standstill at maximum
- **S6 = 0** Braking effect (braking edge) low
- **S6 = F** Braking effect (braking edge) high
- **S9/1 = down** Switch off programming mode (no acoustic signal). The set value is saved.
- **P8 and/or S6** The potentiometer and/or the step switch are reset for their initial function and to their initial values.
- **S2...S4** The switches are reset to their initial positions.
- Close the sliding cover

**Note:**

The braking power at standstill does not work after power on!

## 7.10 Reversion

The function reversion is switched off by setting the reversing angle at zero. The start delay for reversion can be set from 0 to 1000 ms and the reversing angle up to 380°. The function reversion (and/or unlocking the chain in mode 0, 1, 2) is possible in all modes except mode E.

Programming reversion in the programming mode					
Mode	S4	S3	S2	Potentiometer P8	Step switch S6
0, 1, 2	down	down	down	Reversing angle (ird)	Delay after stop in pos. 1 (drd)
3...9, B, C, D, F	down	down	down	Reversing angle (ird)	Delay after stop in pos. 2 (drd)
A	down	down	down	Reversing angle (ird)	Delay after stop in

The programming mode can only be switched on after power on and/or after the completion of a seam.

- Open the sliding cover
- **S9/1 = up** Switch on programming mode (acoustic signal)
- **S9/8 = down** This switch must be set at "OFF"
- **S2...S4** With the help of these switches the function to be programmed is selected according to the above table. The active setting is acoustically indicated (see chapter **Acoustic Signals in the Active Programming Mode**).
- **P8 = left** Reversing angle = 0, reversion switched off
- **P8 = right** Reversing angle = maximum
- **S6 = 0** No delay of reversion
- **S6 = F** Maximum delay of reversion
- The settings can be checked by pushing the pedal in the active programming mode (test operation).
- **S9/1 = down** Switch off programming mode (no acoustic signal). The set value is permanently programmed.
- **P8 and/or S6** The potentiometer and/or the step switch are reset for their initial function and to their initial values.
- **S2...S4** The switches are reset to their initial position.
- Close the sliding cover

The values of the reversion delay can be set according to table 2 (column 3) in chapter "Activation and/or Delay times".



### 7.11 Unlocking the Chain (Mode 0...2)

When a pushbutton is connected to socket B12/2-4, the function **unlocking the chain** can be performed in modes 0...2. When pressing the pushbutton the next trimming sequence is suppressed and unlocking the chain is performed. Setting the delay time and the reversing angle see chapter "Reversion". Reversion with chain stitch trimmer is not possible in modes 0...2.

See the function "Unlocking the chain" in chapter "Timing diagrams" !

### 7.12 Reduction of the Maximum Speed

For setting the maximum speed see chapter "Speed Settings".

S9/8 = **up**      Reduction of the maximum speed with P8 is not possible in this switch position

S9/8 = **down**    Reduction of the maximum speed with P8 (nmaxmax up to 1/8 nmaxmax)

### 7.13 Limited Speed (Mode 3...6, A...C)

When pressing the external pushbutton connected to socket B12/2-4 a limited speed is recalled. Below this speed the pedal controlled speed is effective. If the pedal controlled speed is higher the limited speed is performed. For the setting see chapter "Speed Settings".

S9/8 = **up**      Reduction of the speed with P8 (nmaxmax up to 1/8 nmaxmax)

S9/8 = **down**    The limited speed set in the programming mode is performed

See corresponding mode in chapter "Timing Diagrams" !

### 7.14 Automatic Speed (Mode D)

When pressing the external pushbutton connected to socket B12/2-4 an automatic speed is recalled only in mode D. This speed is independent of the pedal position. For the setting see chapter "Speed Settings".

S9/8 = **up**      Reduction of the speed with P8 (nmaxmax up to 1/8 nmaxmax)

S9/8 = **down**    The automatic speed set in the programming mode is performed

See corresponding mode in chapter "Timing Diagrams" !

### 7.15 Positioning Speed (Mode E, F)

When pressing the external pushbutton connected to socket B12/2-4 the positioning speed is effective only in modes E and F. This speed is independent of the pedal position. For the setting see chapter "Speed Settings".

See corresponding mode in chapter "Timing Diagrams" !

### 7.16 Intermediate Backtack (Mode 7...9)

When pressing the external pushbutton connected to socket B12/2-4 an intermediate backtack can only be performed in modes 7...9. The intermediate backtack is only effective during machine run.

See corresponding mode in chapter "Timing Diagrams" !

### 7.17 Reversal of the Direction of Rotation (Mode F)

When pressing the external pushbutton connected to socket B12/2-4 a reversal of the direction of rotation can only be performed in mode F.

See corresponding mode in chapter "Timing Diagrams" !

## 7.18 Needle Up, Needle Up/Down and Single Stitch

When a pushbutton is connected to socket B12/2-3, the function **needle up** and/or **needle up/down** or a **single stitch** can be performed in modes 0...E.

If the pushbutton is pressed at machine standstill in the seam or after trimming with lifted presser foot the presser foot lowers whenever the drive is running.

The functions needle up and/or needle up/down can be selected as follows.

- Turn power on and/or complete a seam and open the sliding cover
- S9/2 = **down** Needle up/down
- S9/2 = **up** Needle up
- Close the sliding cover

### Needle up

When **briefly** pressing the pushbutton the drive runs from position 1 to position 2. If the drive is outside of the slot between the two positions it will not move for safety reasons.

### Needle up/down

When **briefly** 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 slot between the two positions it runs to the selected basic position.

### Single stitch

When pressing the pushbutton **longer** the drive runs from position 1 to position 1, independently of the selected basic position and the setting of step switch S9/2. If the drive is outside of the slot between the two positions it runs to position 1.

## 7.19 Blocking of Machine Run (Safety Switch)

The function blocking of machine run is possible in all modes by a switch connected to socket B12/1-2.



### Caution!

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

- Turn power on and/or complete a seam and open the sliding cover
- S9/5 = **down** Blocking of machine run works with opened switch
- S9/5 = **up** Blocking of machine run works with closed switch
- Close the sliding cover

**Blocking of machine run in the seam:**

The seam is interrupted by activating the blocking of machine run.

- Stop in the basic position
- The started trimming operation is not interrupted
- Needle up is not possible
- Presser foot lifting is possible

**New start after blocking of machine run:**

A new start after deactivating the switch is only possible if the pedal was in position 0 (neutral).

See also timing diagram!

**7.20 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

**7.21 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

**7.22 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

### 7.23 External Actuator EB301 and EB302

With the help of the external actuator connected with the pedal the commands for the sewing operation are inputted. Instead of the external actuator connected to the socket connector B80 (see chapter Socket Connectors) another external controller can be connected.

The external actuator EB302 has softer springs than EB301. This means that a lower actuating force is needed.

**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. presser foot lifting)
0	H	H	H	H	Pedal in position 0 (neutral)	
$\frac{1}{2}$	H	H	L	H	Pedal slightly forward	(e.g. presser foot lowering)
1	H	L	L	H	Speed stage 1	( $n_{pos}$ )
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	Speed stage 12 (Pedal fully forward)	( $n_{max}$ )

L = switch contact closed, H = switch contact open

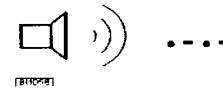
## 8. Acoustic Signals

### 8.1 Acoustic Error Signals

**Note:**

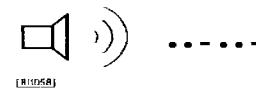
Whenever an error signal is emitted, the drive is made to stop. The error signal can be heard until the drive is turned off.

#### ERROR 1: Position transmitter error



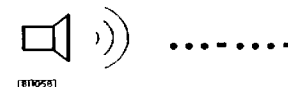
- Position transmitter defective or not connected
- Connections for position transmitter and commutation transmitter were changed by mistake
- Position transmitter not mounted on the sewing machine shaft
- Commutation transmitter not connected

#### ERROR 2: Blocking control



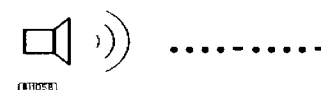
- Sewing machine shaft does not move despite motor activation
- Set speed is not reached

#### ERROR 3: Commutation transmitter error



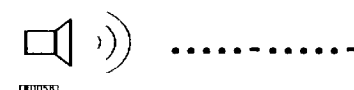
- Commutation transmitter defective during operation

#### ERROR 4: Processor breakdown (illegal opcode)



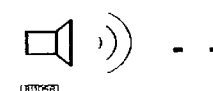
- Microprocessor does not work properly
  - Disturbances from outside (e.g. sewing machine head not grounded, line voltage disturbed)
  - Hardware malfunction on the computer printed circuit board

#### ERROR 5: Blocking of machine run



- Blocking of machine run is activated

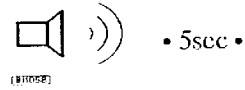
#### ERROR 88: Mains interruption



- Brief interruption of the mains supply (up to approx. 2 sec.)
- Loading relay is not switched

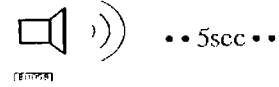
## 8.2 Acoustic Signals in the Active Programming Mode

### Braking power at standstill



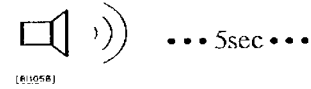
- S9/1 = on
- Set braking power at standstill with P8
- Set braking effect with S6

### Reversion



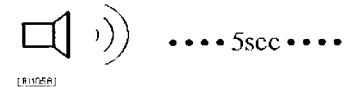
- S9/1 = on
- Set reversing angle with P8
- Set delay until reversion with S6

### Power transistor M2



- S9/1 = on
- Set delay until M2 with S6
- Set operating time M2 with P8

### Power transistor M1



- S9/1 = on
- Set delay until M1 with S6
- Set operating time M1 with P8

### Power transistor M3



- S4/1 = on
- Set delay until M3 with S6
- Set operating time M3 with P8

## 9. Control Settings at Delivery

Switches accessible from outside		
Switch/Potentiometer	Position	Signification
S2	down	Softstart <b>off</b>
S3	down	Needle position at stop in the seam needle <b>down</b>
S4	down	Presser foot lifting at stop in the seam <b>off</b>
S7	8	Positioning speed (n.pos) <b>180 RPM</b>
P8	right	Maximum speed reduction (n.max) <b>100%</b>

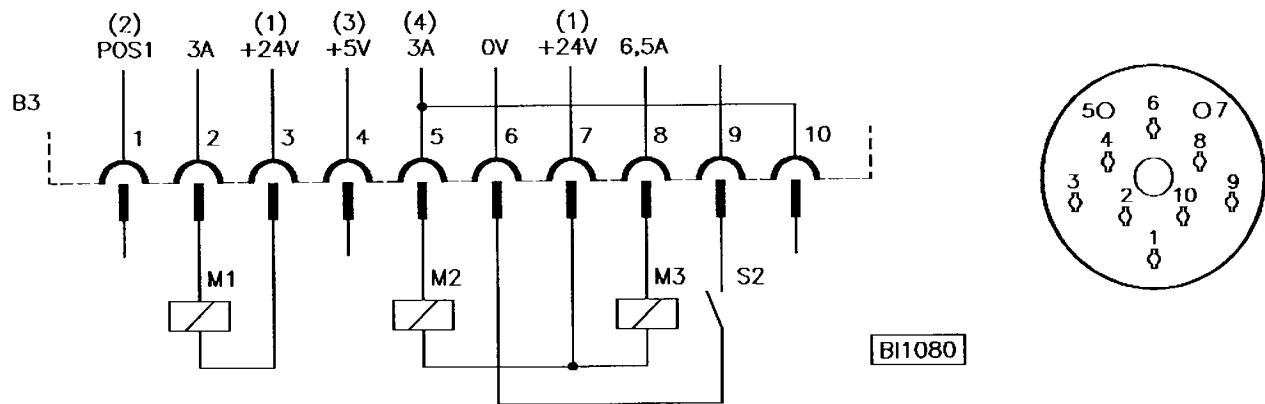
Switches accessible behind the sliding cover		
Switch	Position	Signification
S9/1	down	Programming mode <b>inactive</b>
S9/2	up	Needle <b>up</b>
S9/3	down	After power on slow stitch <b>off</b>
S9/4	down	Presser foot <b>lowered</b> after thread trimming
S9/5	up	Blocking of machine run works with <b>closed</b> switch
S9/6	down	<b>Counterclockwise</b> direction of rotation of the motor shaft
S9/7	down	Thread trimmer <b>off</b>
S9/8	down	Speed setting <b>inactive</b>
S10	0	Mode 0 for chainstitch machine

Other values preset in the programming mode			
Abbreviation	Values	Signification	Mode
n.maxmax	3000 RPM	Maximum speed	
n.lim	1500 RPM	Limited/automatic speed	
	0	Braking power at standstill	
	F	Strong braking effect	All modes
drd	0 ms	Reversion delay	Mode 0-D, F
ird	0°	Reversing angle	Mode 0-D, F
t3	80 ms	Start delay from lifted presser foot	All modes
t6	120 ms	Operating time thread wiper	Mode 0, 4-6, A
t7	80 ms	Delay after thread wiping	Mode 0, 4-6, A
		Delay after thread trimming	Mode 2
		Delay after thread tension release	Mode C
t8	120 ms	Operating time thread trimmer	Mode 0-3
t9	80 ms	Delay end of thread trimmer until thread wiper	Mode 0
t10	approx. 3:1	Clock ratio of thread trimmer	Mode B
	15 kHz	Clock frequency of thread trimmer	
t11	1000 ms	Operating time blow wiper	Mode 1
t12	400 ms	Delay thread trimmer start until presser foot	Mode 1
t13	400 ms	Delay thread trimmer start until blow wiper	Mode 1
t14	80 ms	Stop time thread trimmer	Mode C
t15	80 ms	Activation time thread trimmer	Mode C
	( +/-10 ms)	Tolerance for all times	

Other preset values (which cannot be changed)		
Abbreviation	Values	Signification
t2	120 ms	Presser foot delay with pedal -1
t4	400 ms	Full power of presser foot lifting
t5	1:1	Clock ratio of presser foot lifting
	15 kHz	Clock frequency of presser foot lifting
	0	Braking power at standstill
t16	300 ms	Start delay after thread trimming
	500 RPM	Softstart speed
	2	Softstart stitches
	( +/-10 ms)	Tolerance for all times



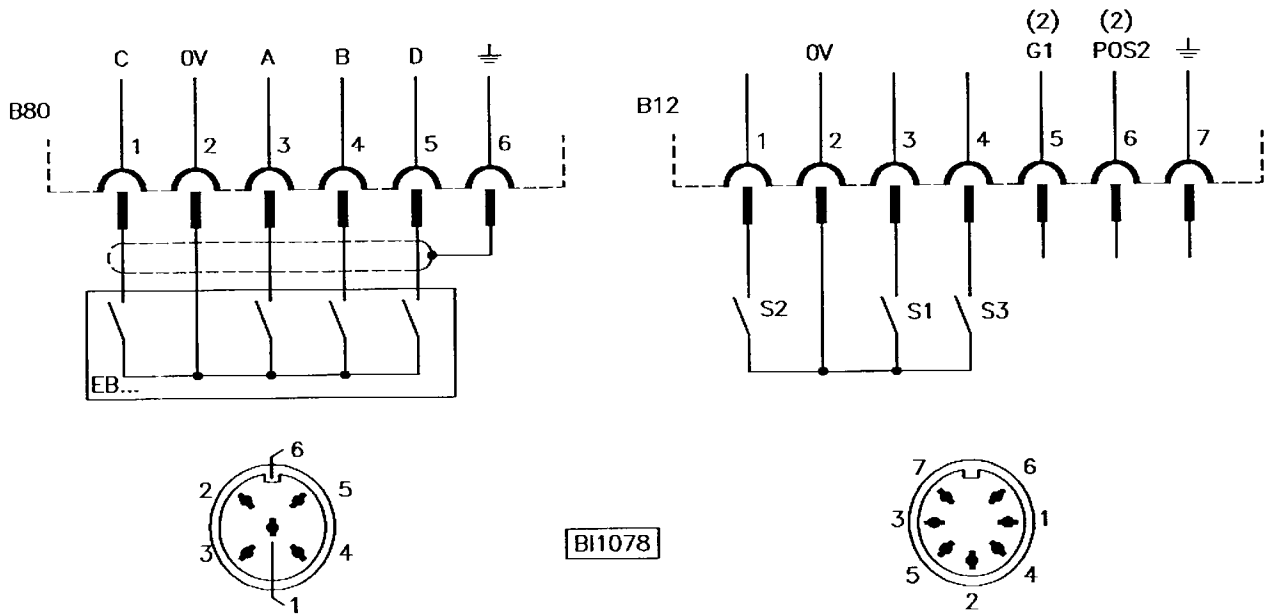
## 10. Connection Diagrams



Output	Mode	Designation	
POS1		Signal position 1	POS.1
M1	0, 1, 4, 5, 6, A 2, 3, E, F 7, 8, 9 B, C D	Thread wiper Motor running Intermediate backtack Thread tension release Signal pedal ≤ -1	FW ML VR FSPL
M2	0 - A, C B D E F	Thread trimmer Thread catcher Signal pedal > 1 Signal pedal = -2 Signal pedal = 0	FA FFÄ
M3	0 - A, C B D E, F	Presser foot lifting Thread trimmer pulsed Motor running Signal direction of rotation	FL FA ML

Input	Mode	Designation	
S2 on B3/6-9 and/or B12/1-2	0 - F	Blocking of machine run	LSP

- 1) Nominal voltage 24V, no-load voltage max. 36V
- 2) Transistor output with open collector (max. 40V, 30mA)
- 3) Nominal voltage +5V,  $I_{\max} = 200\text{mA}$
- 4) Output M2 in all modes except lockstitch modes (modes 4...C) only for a maximum load of 500 mA



EB... Actuator

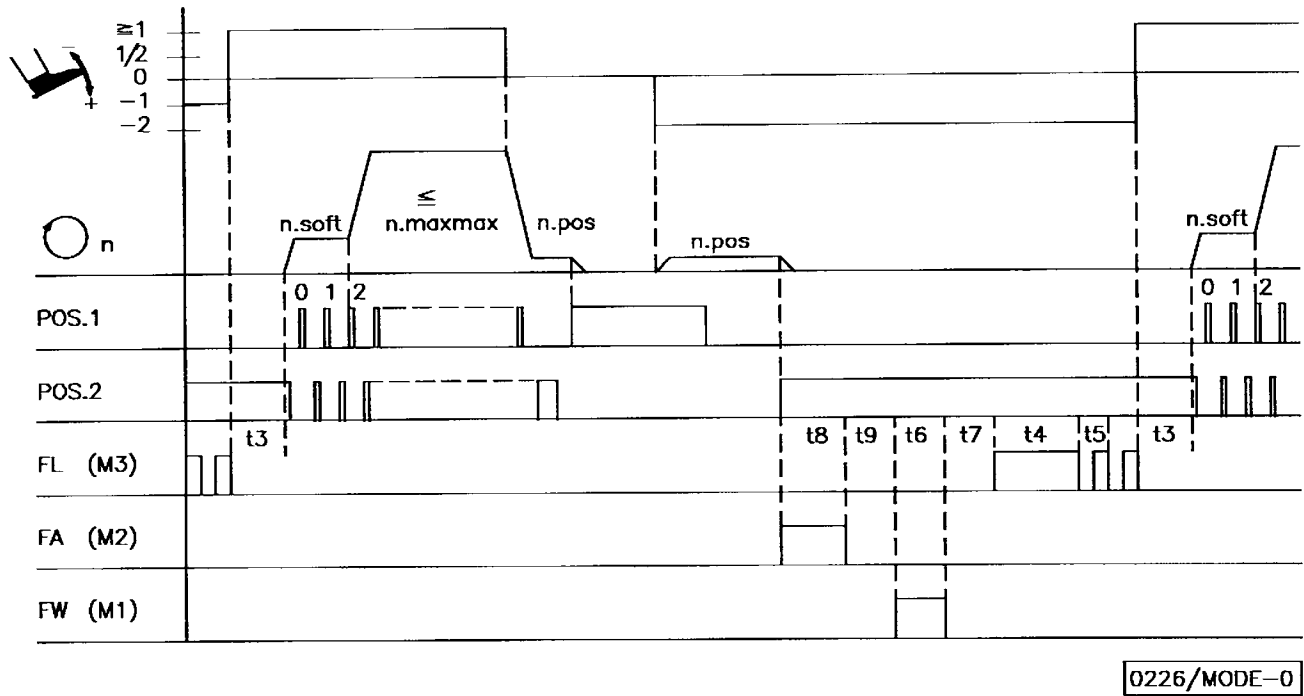
Input	Mode	Designation
S1 on B12/2-3	0 - E F	Needle up/down, single stitch Reversal of the direction of rotation NHT, EST
S2 on B3/6-9 and/or B12/1-2	0 - F	Blocking of machine run LSP
S3 on B12/2-4	0 - 2 7 - 9 3 - 6, A - C D E, F	Unlocking the chain Intermediate backtack Limited speed Automatic speed Positioning speed ENTK ZVR n.lim n.auto n.pos

Output	Mode	Designation
POS2 G1		Signal position 2 Signal 120 impulses/rotation POS.2

Transistor output with open collector (max. 40V, 30mA)

## 11. Timing Diagrams

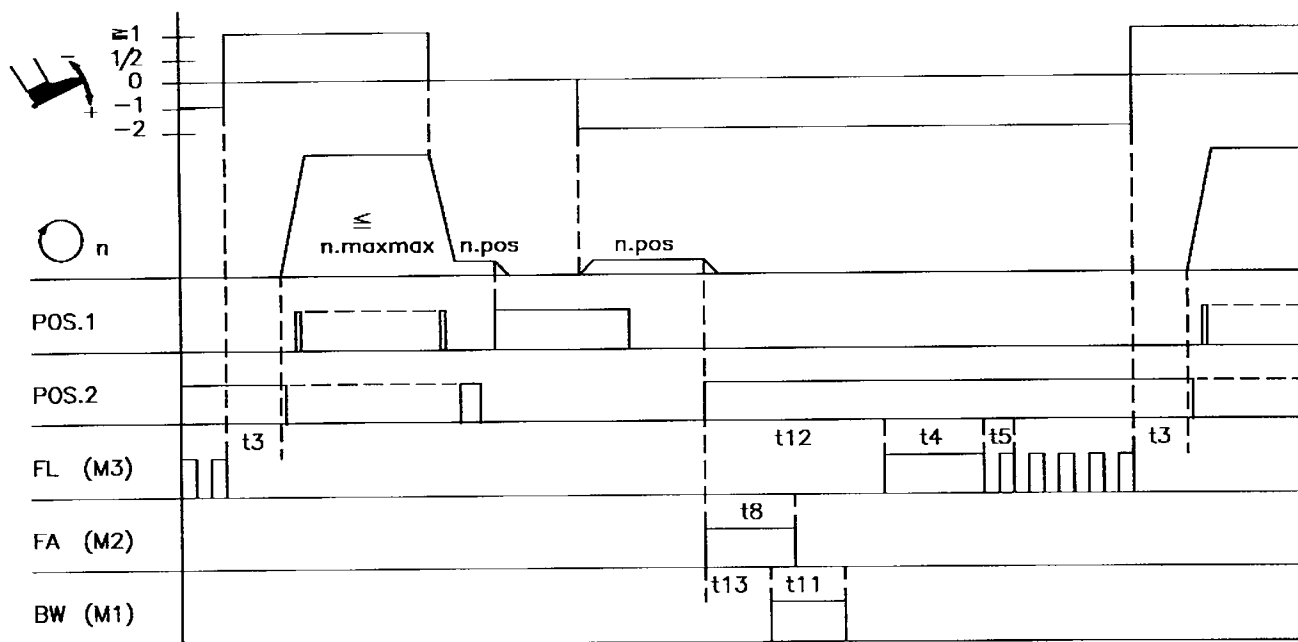
### Mode 0 (chainstitch general)



Abbreviation	Function	Switch / Potentiometer
	Softstart	on S2
M1 = FW M2 = FA M3 = FL	Thread wiper (max. 3A) Thread trimmer (max. 0.5A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.maxmax n.soft	Positioning speed Maximum speed Softstart speed	S7 S6 / S10 *) fixed
t3 t4 t5 t6 t7 t8 t9	Start delay from lifted presser foot Full power of presser foot lifting Clock of presser foot lifting Operating time thread wiper Presser foot delay after thread wiper Operating time thread trimmer Delay end thread trimmer until thread wiper	

\*) See description in the corresponding chapter !

Mode 1 (chainstitch with blow wiper)

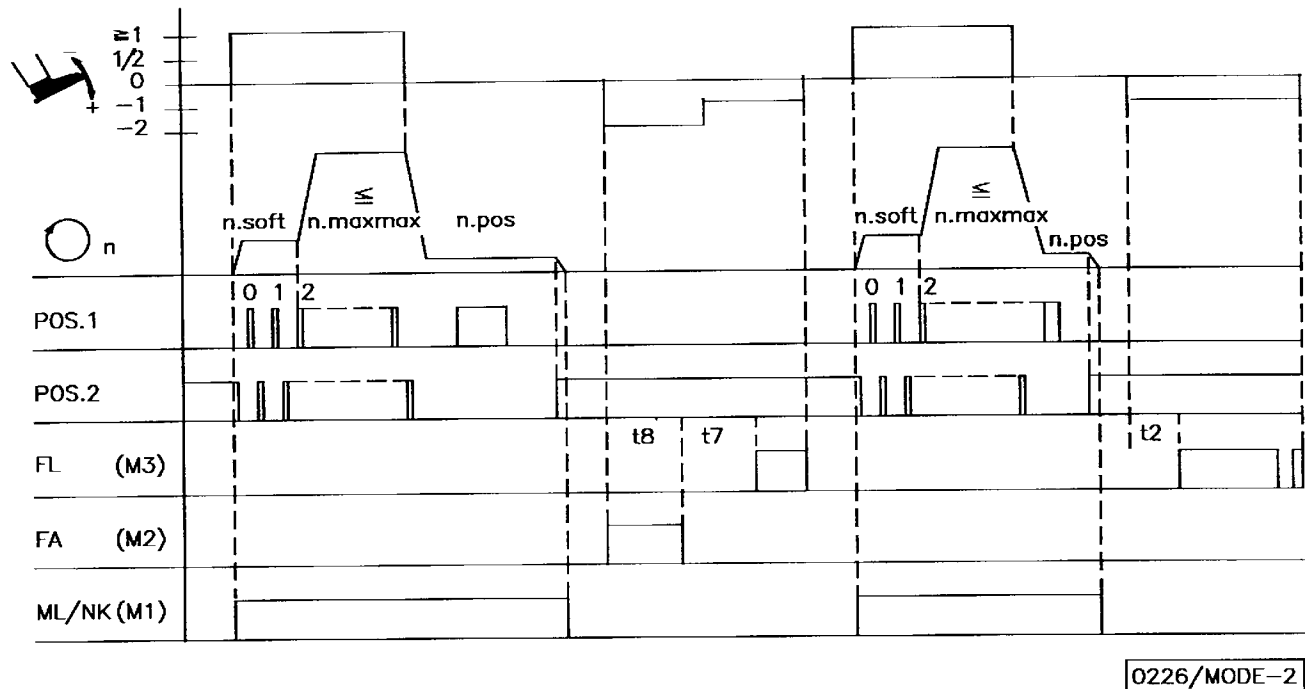


0226/MODE-1

Abbreviation	Function	Switch / Potentiometer
	Softstart	off S2
M1 = BW M2 = FA M3 = FL	Blow wiper (max. 3A) Thread trimmer (max. 0.5A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.maxmax	Positioning speed Maximum speed	S7 S6 / S10 *)
t3 t4 t5 t8 t11 t12 t13	Start delay from lifted presser foot Full power of presser foot lifting Clock of presser foot lifting Operating time thread trimmer Operating time blow wiper Delay of presser foot after thread trimmer start Delay of blow wiper after thread trimmer start	

\*) See description in the corresponding chapter !

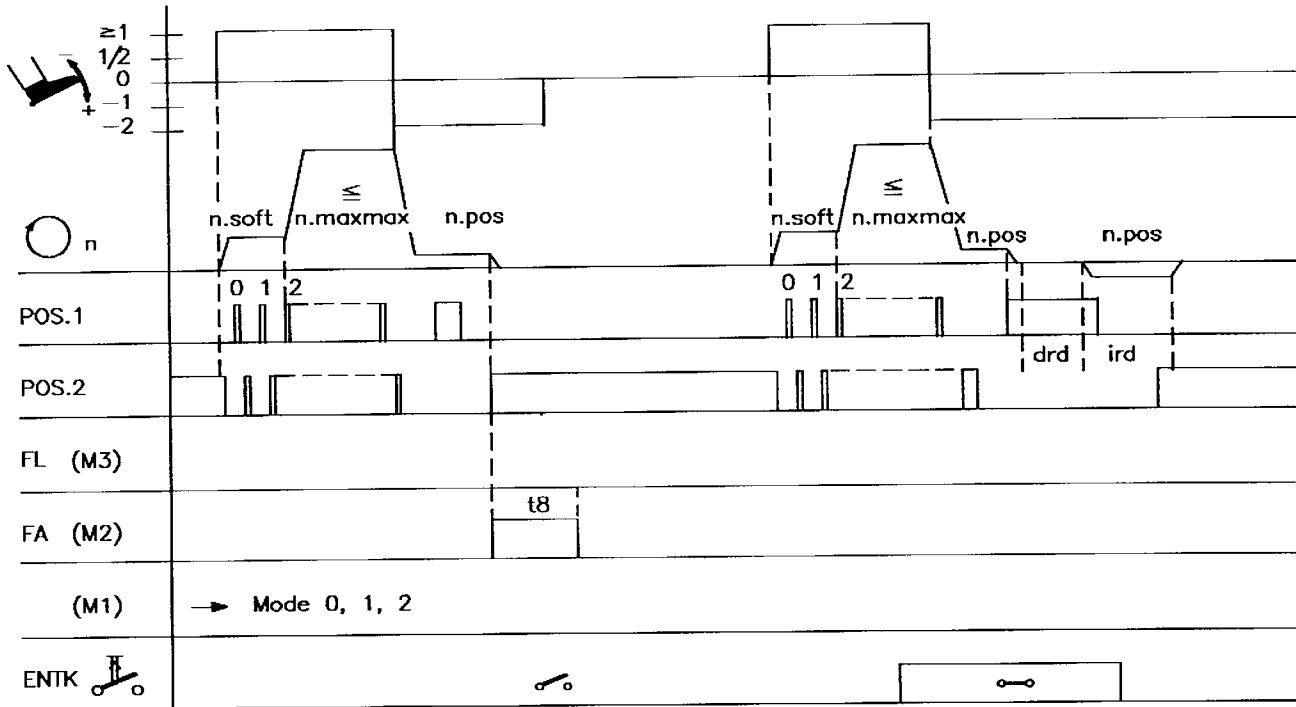
## Mode 2 (overlock 1)



Abbreviation	Function	Switch / Potentiometer
	Softstart on	S2
M1 = ML/NK M2 = FA M3 = FL	Motor running / needle cooling (max. 3A) Thread trimmer (max. 0.5A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.maxmax n.soft	Positioning speed Maximum speed Softstart speed	S7 S6 / S10 *) fixed
t2 t7 t8	Presser foot delay with pedal -1 Presser foot delay after thread trimmer Activation time thread trimmer	

\*) See description in the corresponding chapter !

Mode 0, 1, 2 (function "unlocking the chain")

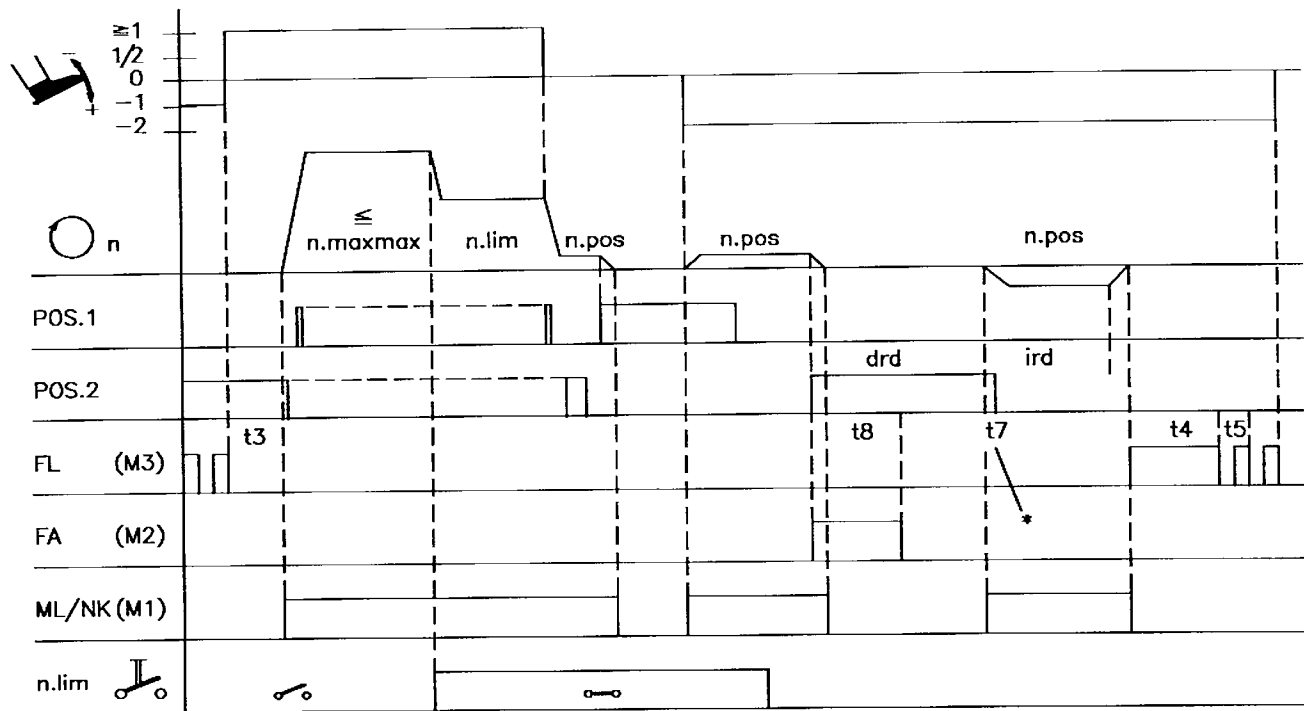


0226/MODE-012

Abbreviation	Function	Switch / Potentiometer
ENTK	Softstart Unlock the chain with pushbutton S3 on socket B12/4	off S2
M1 = FW (mode 0) M1 = BW (mode 1) M1 = ML (mode 2) M2 = FA M3 = FL	Thread wiper (max. 3A) Blow wiper (max. 3A) Motor running (max. 3A) Thread trimmer (max. 0.5A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/2 B3/2 B3/5 or B3/10 B3/8
n.pos n.maxmax n.soft	Positioning speed Maximum speed Softstart speed	S7 S6 / S10 *) fixed
t8 drd ird	Activation time thread trimmer Reversion delay Reversing angle	

\*) See description in the corresponding chapter !

## Mode 3 (overlock 2)



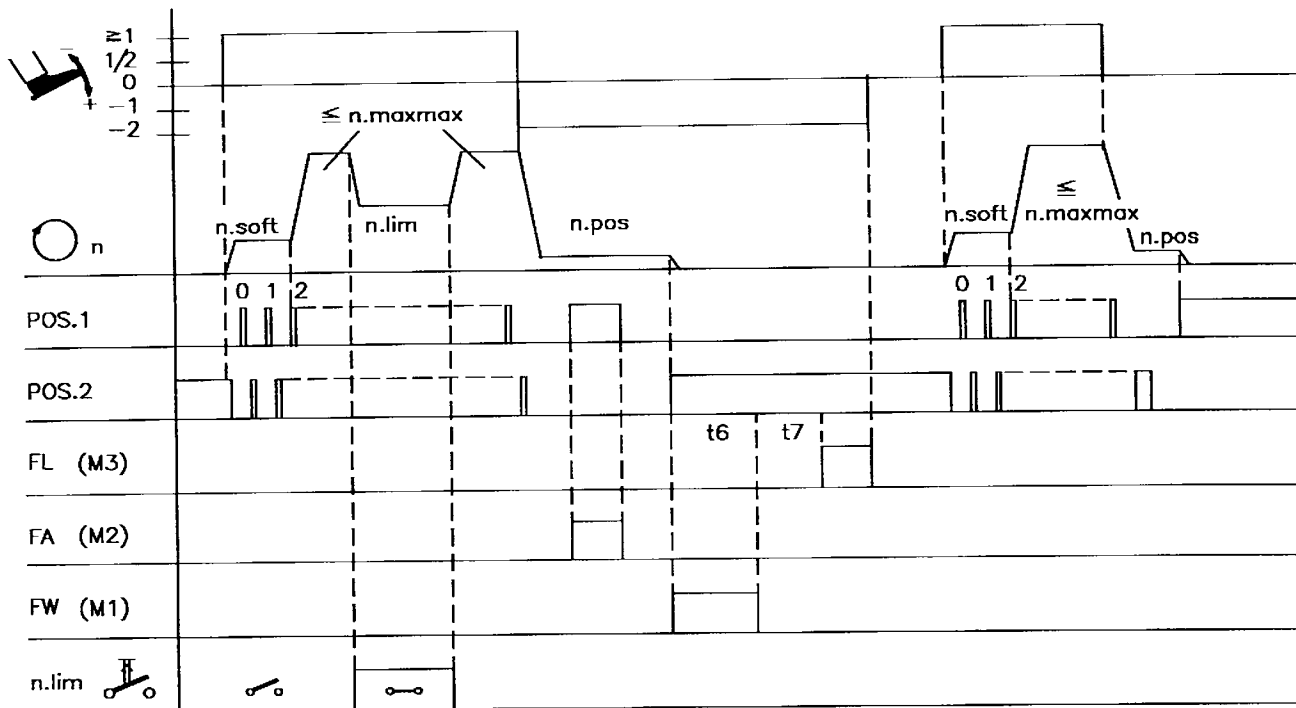
0226/MODE-3

\*) = When the function reversion is on, the presser foot will be lifted only after the reversion has been completed !

Abbreviation	Function	Switch / Potentiometer
n.lim	Softstart Limited speed with pushbutton S3 on socket B12/4	off S2
M1 = ML/NK M2 = FA M3 = FL	Motor running / needle cooling (max. 3A) Thread trimmer (max. 0.5A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.lim n.maxmax	Positioning speed Limited speed Maximum speed	S7 P8 *) S6 / S10 *)
t3 t4 t5 t7 t8 drd ird	Start delay from lifted presser foot Full power of presser foot lifting Clock of presser foot lifting Presser foot delay after thread wiper Activation time thread trimmer Reversion delay Reversing angle	

\*) See description in the corresponding chapter !

Mode 4 (lockstitch 1)



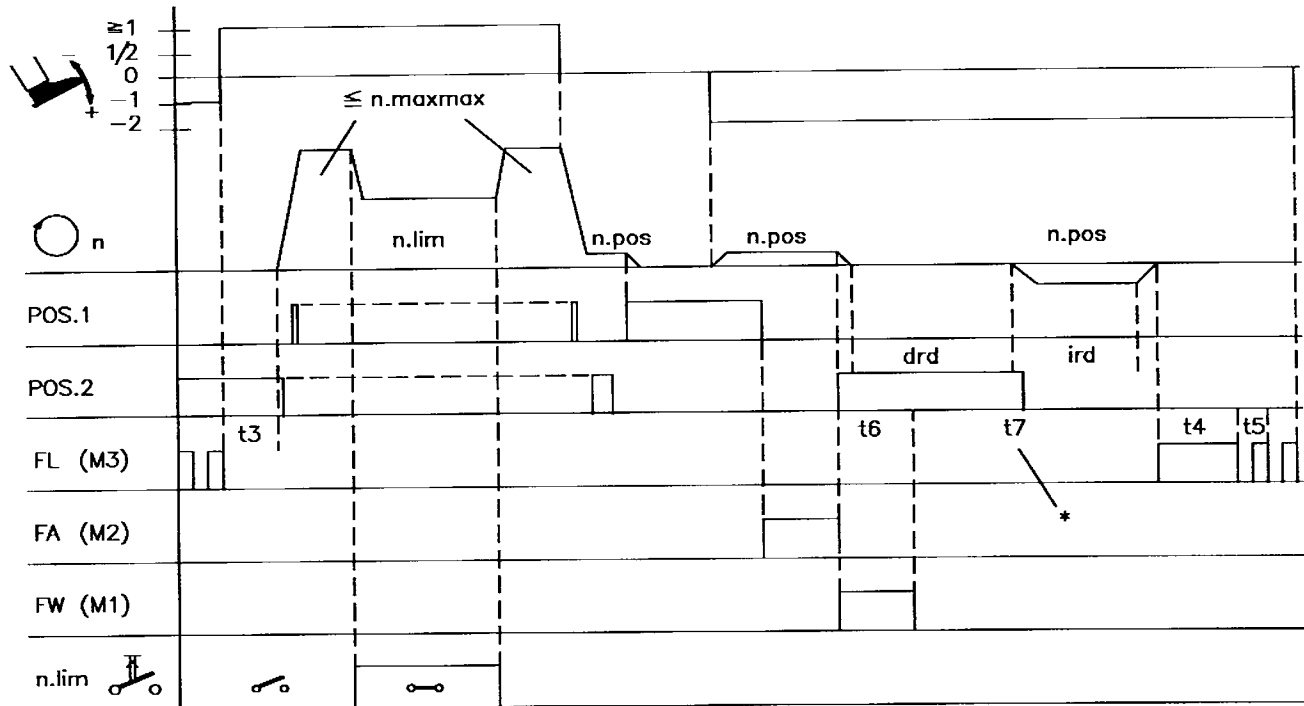
0226/MODE-4

Abbreviation	Function	Switch / Potentiometer
n.lim	Softstart Limited speed with pushbutton S3 on socket B12/4	on S2
M1 = FW M2 = FA M3 = FL	Thread wiper (max. 3A) Thread trimmer (max. 3A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.lim n.maxmax n.soft	Positioning speed Limited speed Maximum speed Softstart speed	S7 P8 *) S6 /S10 *) fixed
t6 t7	Operating time thread wiper Presser foot delay after thread wiper	

\*) See description in the corresponding chapter !



## Mode 5 (lockstitch 2)



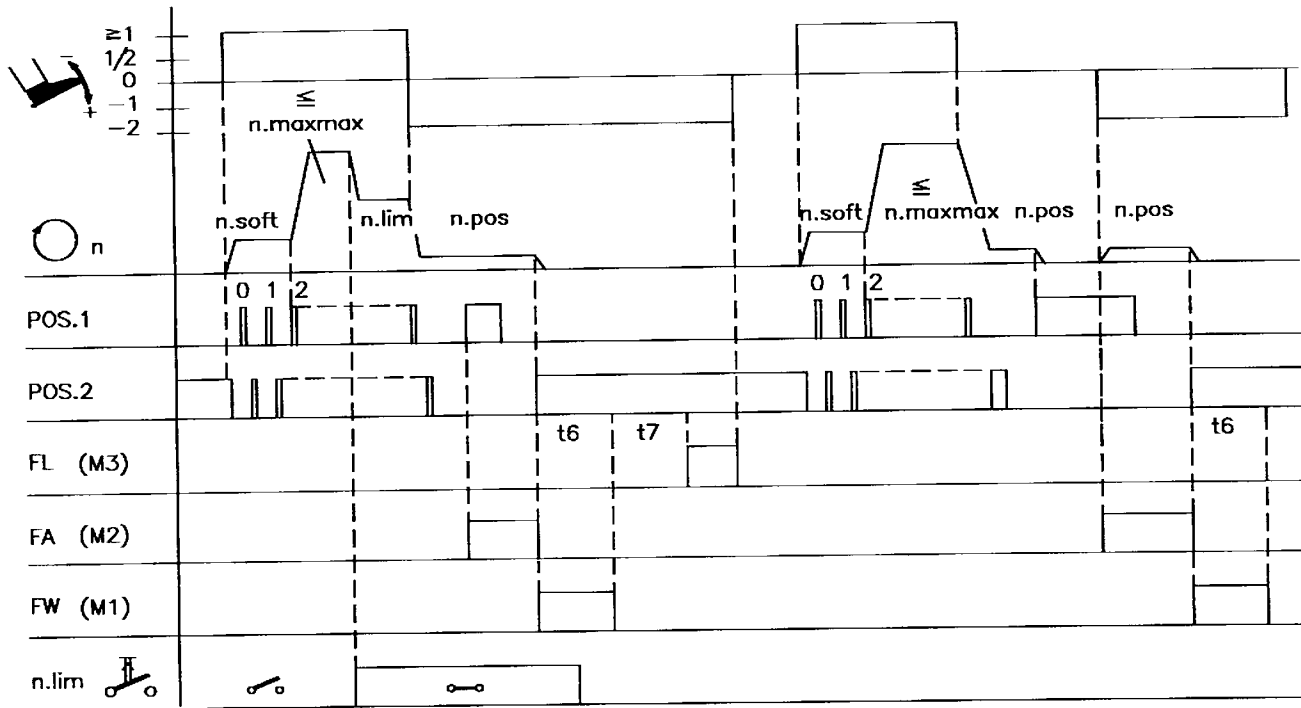
0226/MODE-5

\*) = When the function reversion is on, the presser foot will be lifted only after the reversion has been completed !

Abbreviation	Function	Switch / Potentiometer
n.lim	Softstart Limited speed with pushbutton S3 on socket B12/4	off S2
M1 = FW M2 = FA M3 = FL	Thread wiper (max. 3A) Thread trimmer (max. 3A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.lim n.maxmax	Positioning speed Limited speed Maximum speed	S7 P8 *) S6 / S10 *)
t3 t4 t5 t6 t7 drd ird	Start delay from lifted presser foot Full power of presser foot lifting Clock of presser foot lifting Operating time thread wiper Presser foot delay after thread wiper Reversion delay Reversing angle	

\*) See description in the corresponding chapter !

Mode 6 (lockstitch 3)

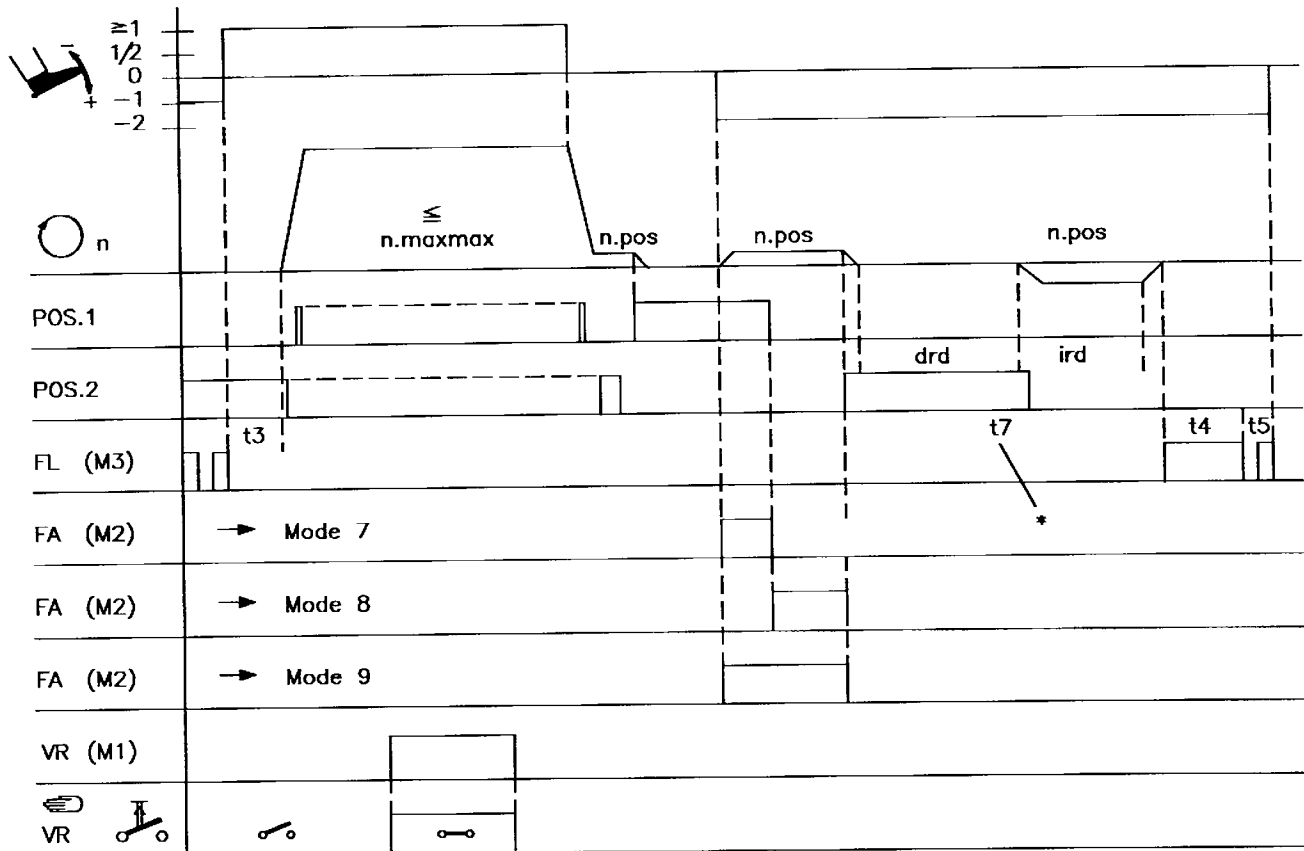


0226/MODE-6

Abbreviation	Function	Switch / Potentiometer
n.lim	Softstart Limited speed with pushbutton S3 on socket B12/4	on S2
M1 = FW M2 = FA M3 = FL	Thread wiper (max. 3A) Thread trimmer (max. 3A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.lim n.maxmax n.soft	Positioning speed Limited speed Maximum speed Softstart speed	S7 P8 *) S6 / S10 *) fixed
t6 t7	Operating time thread wiper Presser foot delay after thread wiper	

\*) See description in the corresponding chapter !

### Mode 7, 8, 9 (lockstitch 4...6 with intermediate backtack)



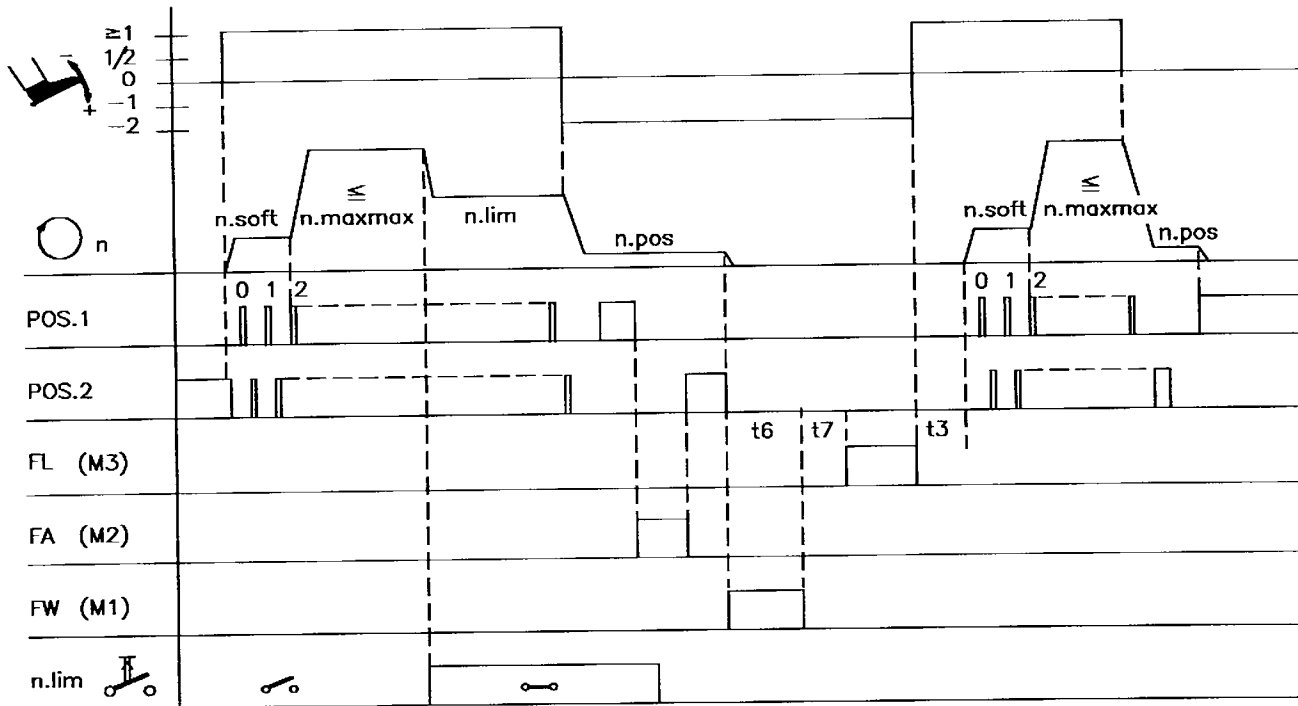
0226/MODE-789

\*) = When the function reversion is on, the presser foot will be lifted only after the reversion has been completed !

Abbreviation	Function	Switch / Potentiometer
ZVR	Softstart Intermediate backtack with pushbutton S3 on socket B12/4	off S2
M1 = VR M2 = FA M3 = FL	Intermediate backtack (max. 3A) Thread trimmer (max. 3A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.maxmax	Positioning speed Maximum speed	S7 S6 / S10 *)
t3 t4 t5 t7 drd ird	Start delay from lifted presser foot Full power of presser foot lifting Clock of presser foot lifting Presser foot delay after thread trimmer 2 Reversion delay Reversing angle	

\*) See description in the corresponding chapter !

Mode A (lockstitch e.g. for Singer)

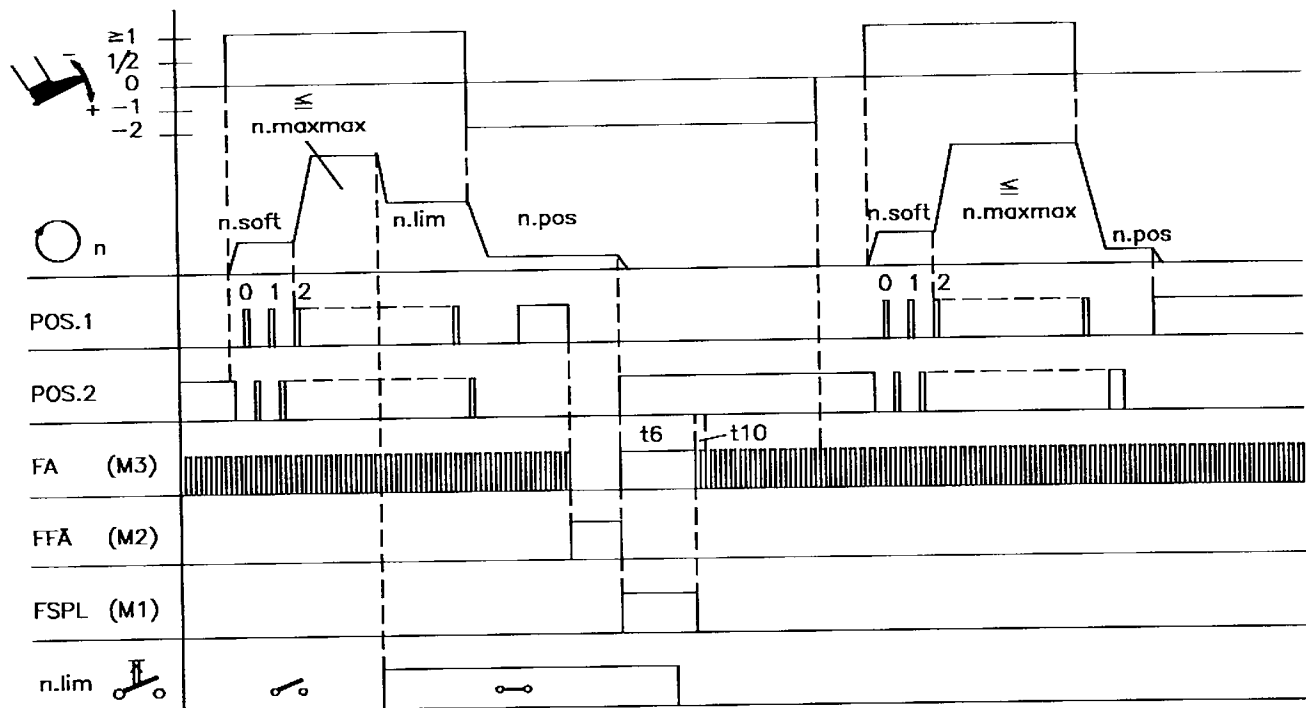


0226/MODE-A

Abbreviation	Function	Switch / Potentiometer
n.lim	Softstart Limited speed with pushbutton S3 on socket B12/4	on S2
M1 = FW M2 = FA M3 = FL	Thread wiper (max. 3A) Thread trimmer (max. 3A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.lim n.maxmax n.soft	Positioning speed Limited speed Maximum speed Softstart speed	S7 P8 *) S6 / S10 *) fixed
t3 t6 t7	Start delay from lifted presser foot Operating time thread wiper Presser foot delay after thread wiper	

\*) See description in the corresponding chapter !

## Mode B (lockstitch with Refrey trimmer)

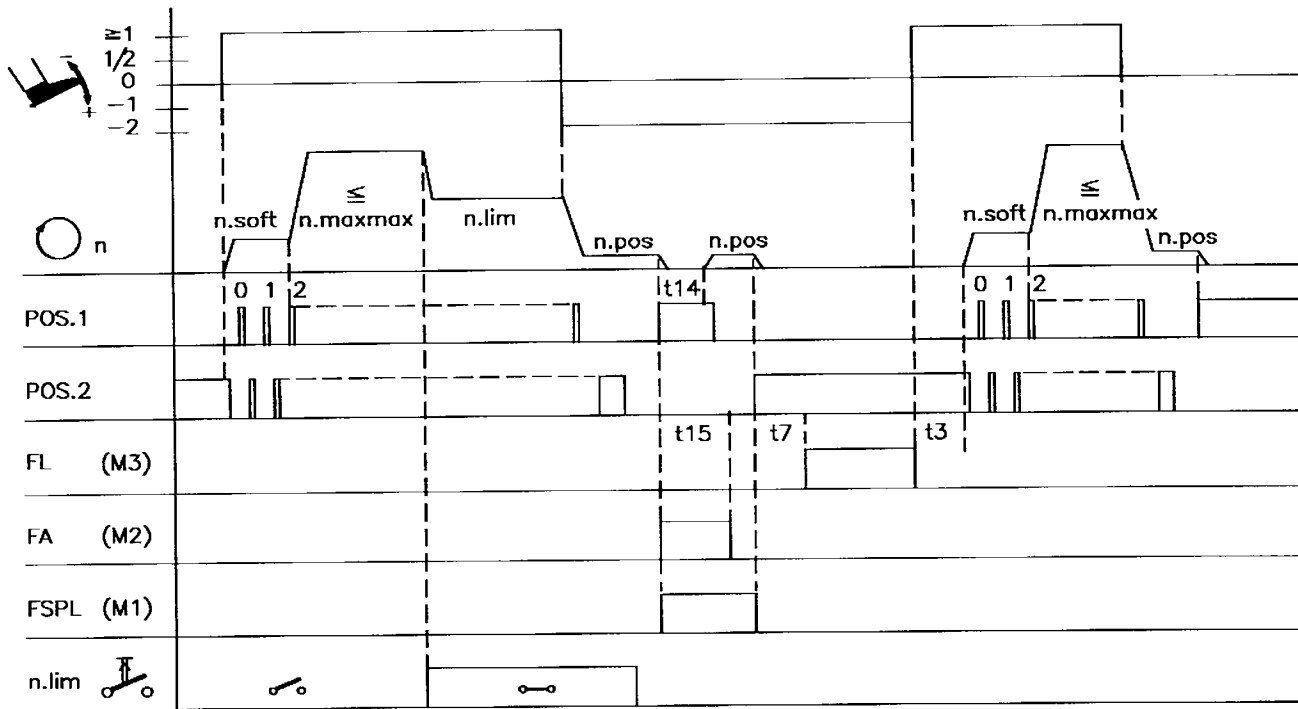


0226/MODE-B

Abbreviation	Function	Switch / Potentiometer
n.lim	Softstart Limited speed with pushbutton S3 on socket B12/4	on S2
M1 = FSPL M2 = FFÄ M3 = FA	Thread tension release (max. 3A) Thread catcher (max. 3A) Thread trimmer (max. 6.5A/3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.lim n.maxmax n. soft	Positioning speed Limited speed Maximum speed Softstart speed	S7 P8 *) S6 / S10 *) fixed
t6 t10	Operating time thread wiper Clock thread trimmer	

\*) See description in the corresponding chapter !

Mode C (lockstitch e.g. for Singer class 212 UTT)



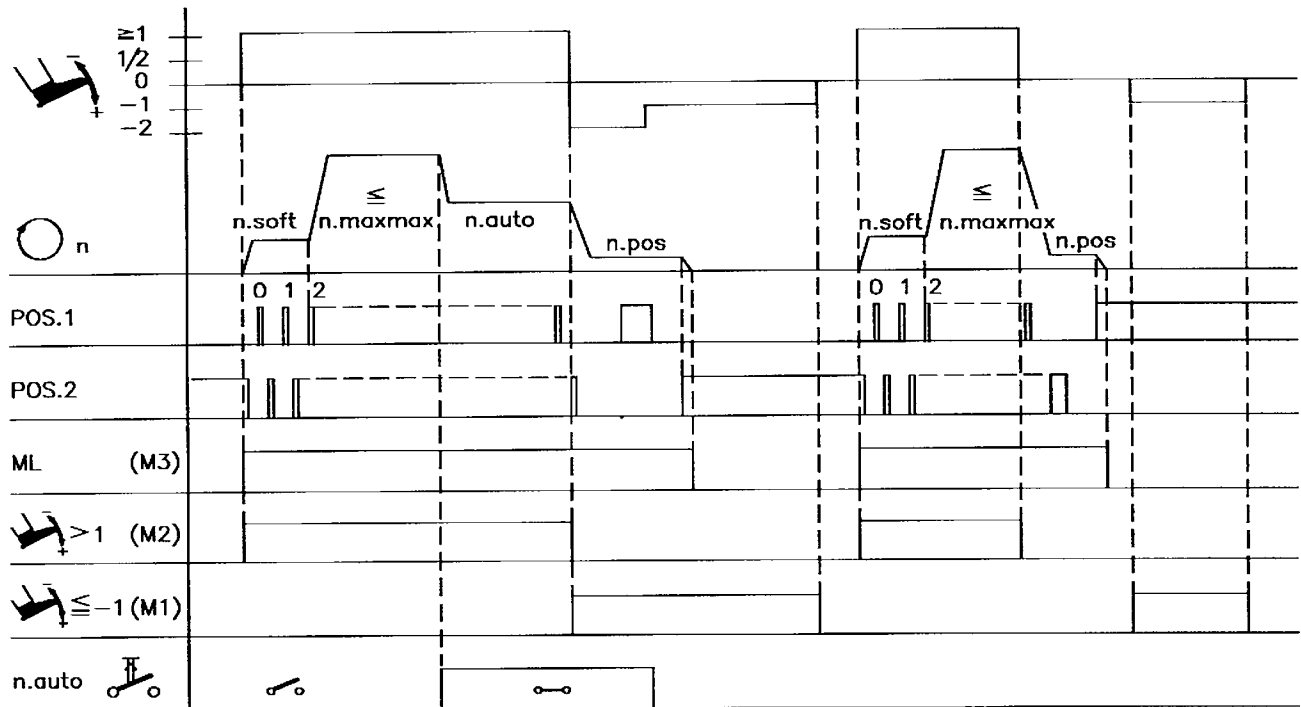
0226/MODE-C

\*) = When the function reversion is on, the presser foot will be lifted only after the reversion has been completed !

Abbreviation	Function	Switch / Potentiometer
n.lim	Softstart Limited speed with pushbutton S3 on socket B12/4	on S2
M1 = FSPL M2 = FA M3 = FL	Thread tension release (max. 3A) Thread trimmer (max. 0.5A) Presser foot lifting (max. 6.5A/3A)	B3/2 B3/5 / B3/10 B3/8
n.pos n.lim n.maxmax n.soft	Positioning speed Limited speed Maximum speed Softstart speed	S7 P8 *) S6 / S10 *) fixed
t3 t7 t14 t15	Start delay from lifted presser foot Presser foot delay after thread tension release Stop time thread trimmer Operating time thread trimmer	

\*) See description in the corresponding chapter !

## Mode D (automatic sewing machines)

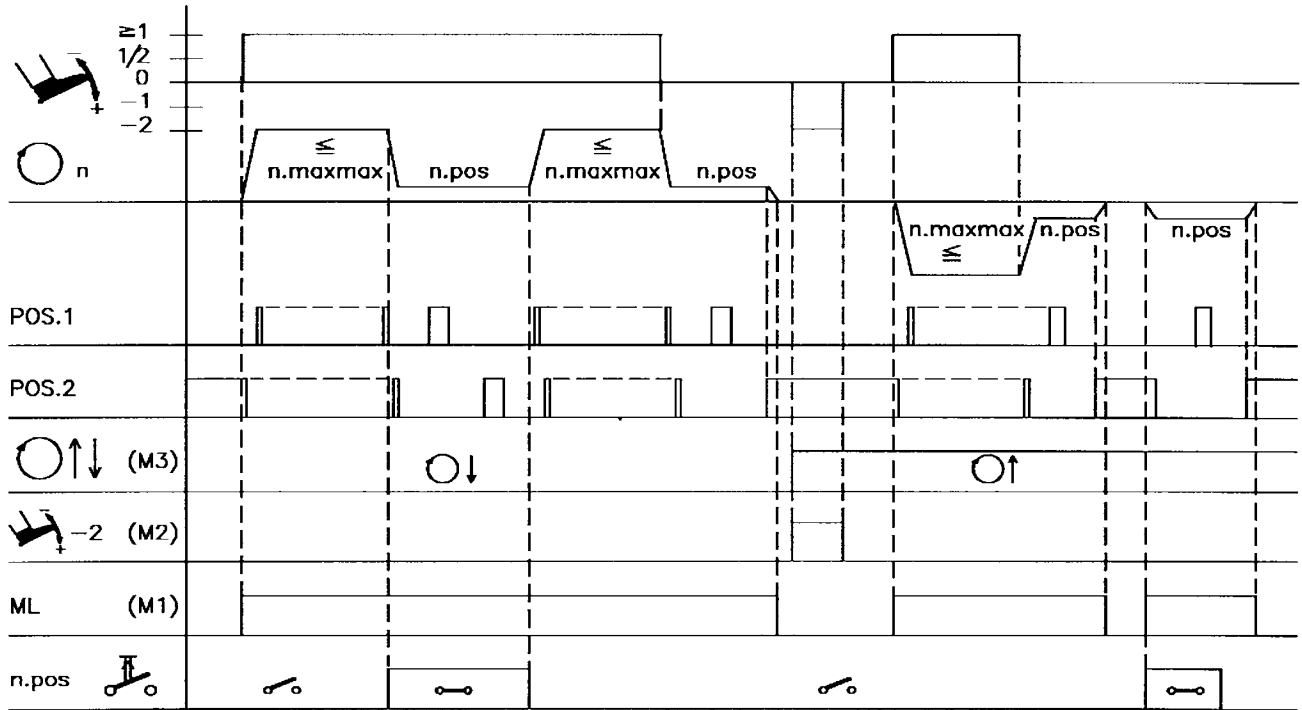


0226/MODE-D

Abbreviation	Function	Switch / Potentiometer
n.auto	Softstart Automatic speed with pushbutton S3 on socket B12/4	on S2
M1 = PED > 1 M2 = PED ≤ -1 M3 = ML	Signal pedal >1 (max. 3A) Signal pedal ≤ -1 (max. 0.5A) Motor running (max. 3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.auto n.maxmax n. soft	Positioning speed Automatic speed Maximum speed Softstart speed	S7 P8 *) S6 / S10 *) fixed

\*) See description in the corresponding chapter !

Mode E (sequence with reversal of the direction of rotation by pedal -2)

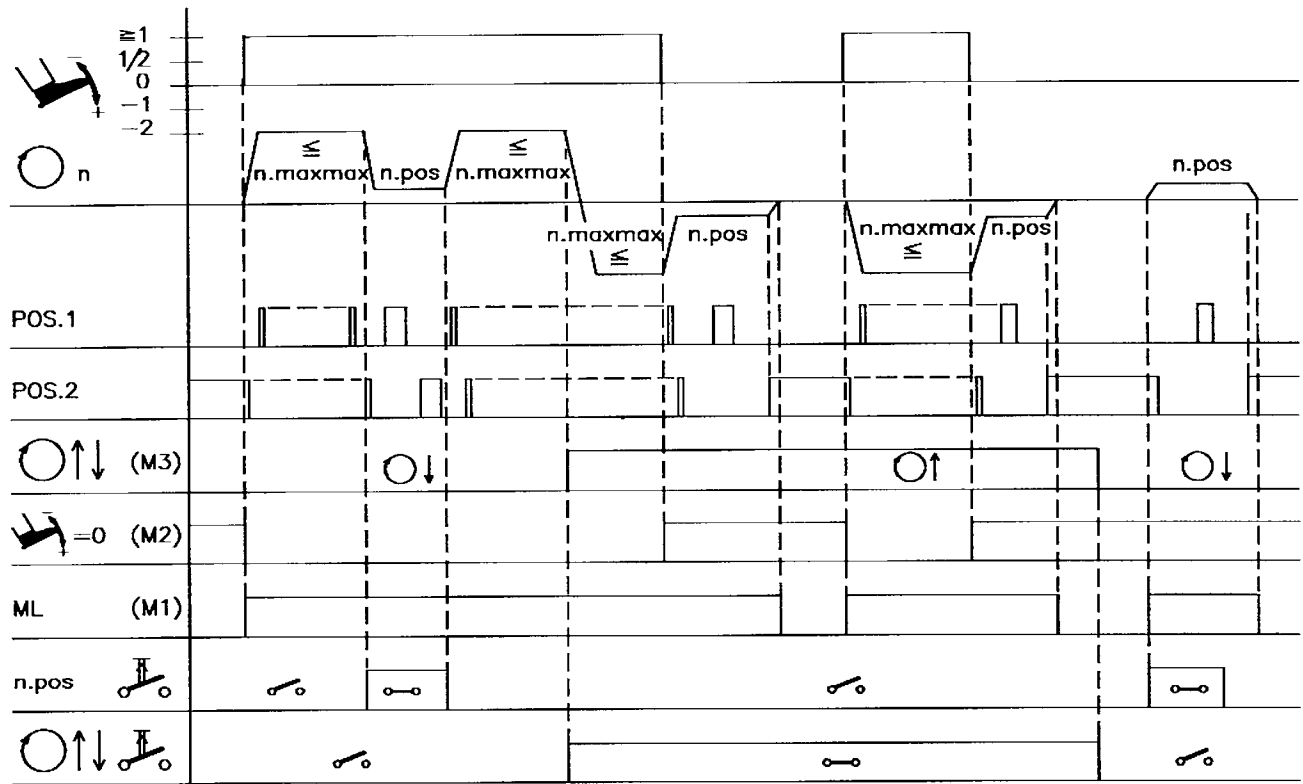


0226/MODE-E

Abbreviation	Function	Switch / Potentiometer
n.pos	Positioning speed with pushbutton S3 on socket B12/4	
M1 = ML M2 = PED-2 M3 = DR	Motor running (max. 3A) Signal pedal -2 (max. 0.5A) Signal direction of rotation (max. 3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.maxmax	Positioning speed Maximum speed	S7 S6 / S10 *)

\*) See description in the corresponding chapter !



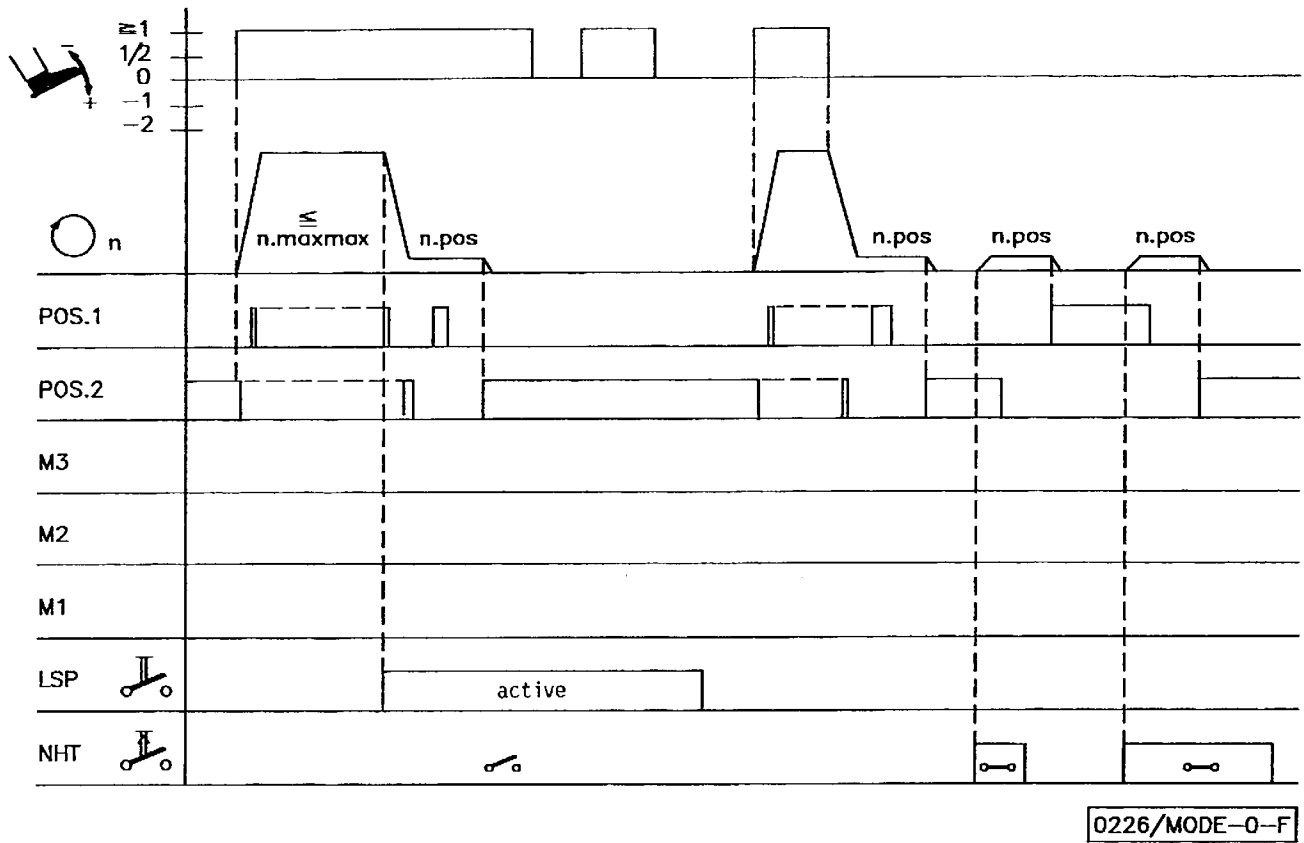
**Mode F (sequence for reversal of the direction of rotation with pushbutton S1)**


0226/MODE-F

Abbreviation	Function	Switch / Potentiometer
DR	Reversal of the direction of rotation with pushbutton S1 on socket B12/3	
n.pos	Positioning speed with pushbutton S3 on socket B12/4	
M1 = ML M2 = PED 0 M3 = DR	Motor running (max. 3A) Signal pedal 0 (max. 0.5A) Signal reversal of the direction of rotation (max. 3A)	B3/2 B3/5 or B3/10 B3/8
n.pos n.maxmax	Positioning speed Maximum speed	S7 S6 / S10 *)

\*) See description in the corresponding chapter !

Mode 0...F (blocking of machine run for all sequences)



Abbreviation	Function	Switch / Potentiometer
NHT	Needle up/down and/or single stitch with pushbutton S1 on socket B12/3	
LSP	Blocking of machine run with switch S2 on socket B12/1	
n.pos n.maxmax	Positioning speed Maximum speed	S7 S6 / S10 *)

\*) See description in the corresponding chapter !

## 12. Operating Elements and Socket Connectors

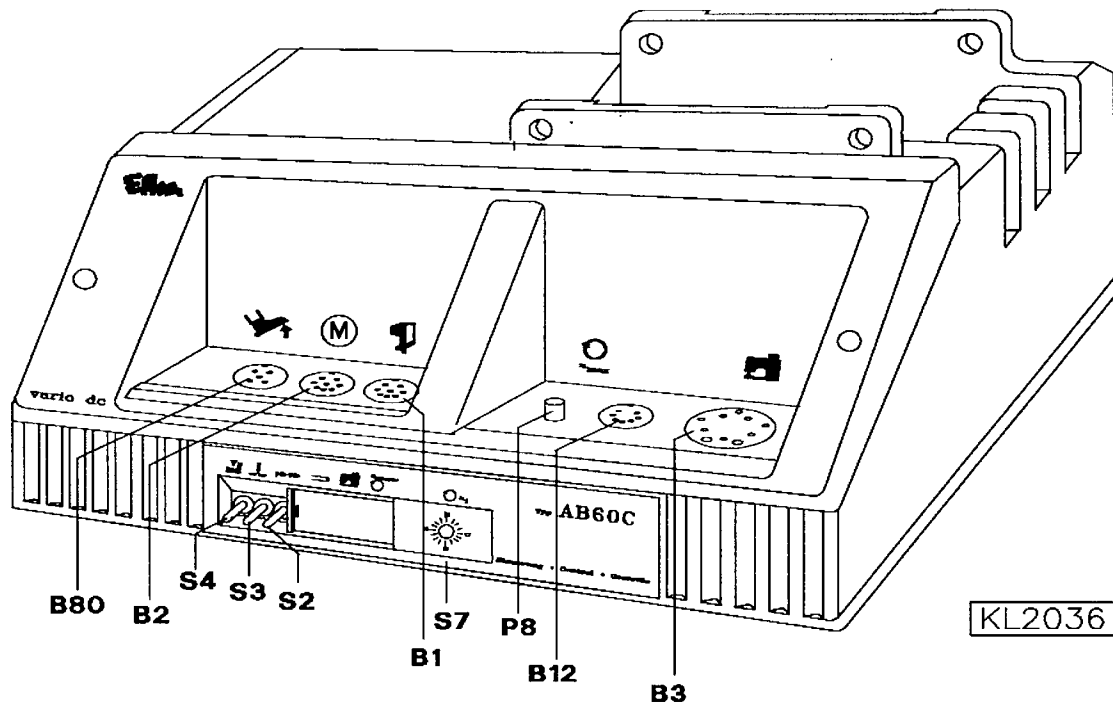


Fig. 3:

- S4 - Presser foot up at each stop in the seam
- S3 - Needle position at stop in the seam
- S2 - Softstart
- S7 - Positioning speed
  
- P8 - Reduction of maximum speed
  
- B1 - Position transmitter
- B2 - Commutation transmitter for DC motor
- B3 - Outputs and inputs for solenoids/solenoid valves/switches
- B12 - Inputs for pushbuttons/switches
- B80 - External actuator

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