

Efka vario dc

CONTROL

JU60B

INSTRUCTION MANUAL

No. 402055

english

Efka
FRANKL & KIRCHNER
GMBH & CO KG

Efka
EFKA OF AMERICA INC.

Efka
EFKA ELECTRONIC MOTORS
SINGAPORE PTE. LTD.



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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, positioner 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 sewing machines:

Brand	Classes
JUKI lockstitch machines	DDL5550-4-., DLD432-4-., DLD436-4-., DLN5410-4-., DLU450-4-., DLU5490-4-., LH1152-4-..
JUKI chainstitch machines YAMATO chainstitch machines	MH481-4-., MH484-4-..

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 JU60B	
	- Power pack	N152	(optional N153, N155)
	- 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 cpl. Set of hardware Motor foot Bracket 1 and 2, short Documentation	
			1 Set of accessories Z42
			consisting of:
			1 pitman rode cpl.
			1 retention pin and 2 nuts
			1 earth lead
			1 fitting piece for position transmitter
			1 10-pin plug (Mes100)

1 Pulley

3.1 Special Accessories

Solenoid type EM1.. (for e.g. presser foot lifting, etc.)	- available versions see specification solenoids
Extension cable for external actuator, approx. 750 mm long, complete with plug and socket connector	- part no. 1111845
Extension cable for external actuator, approx. 1500 mm long, complete with plug and socket connector	- part no. 1111787
5-pin plug (Mas 5100W) with slide index for the connection of another external actuator	- part no. 0501278
Foot control type FB302 for standing operation with approx. 1400 mm connecting cable and plug	- part no. 4160018
Potential equalization cord 700 mm long, LIY 2.5 mm ² , grey, with forked cable brackets on both sides	- part no. 1100313
Extension cable for position transmitter P4-.. and P5-.., as well as for commutation, approx. 315 mm long, complete with plug and socket connector	- part no. 1111229
Extension cable for position transmitter P4-.. and P5-.., as well as for commutation, approx. 1100 mm long, complete with plug and socket connector	- part no. 1111584
Adapter cord for the connection to JUKI high-speed seamers with index -7 (Molex Minifit)	- part no. 1112368
Extension cable for motor connection, approx. 400 mm long	- part no. 1111858
Extension cable for motor connection, approx. 1500 mm long	- part no. 1111857
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
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)
7-pin-plug with slide index (Mas7100S)	- part no. 0502474
10-pin plug (Hirschmann Mes100)	- part no. 0500357

4. Initial Operation

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

- **The correct mounting of the drive, position transmitter and possible accessories**
- **The correct selection of the type of sewing machine**
- **The correct setting of the direction of rotation of the motor**
- **The setting of the maximum speed**
- **The setting of the positions**
- **Delay times and duration of activation of the outputs for the selected type of sewing machine (e.g. thread trimmer, thread wiper, etc.)**

The setting and/or checking procedure is 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 service flap closed)
- the technician to both levels

5.2 The Operator Level

On this level simple functions which have to be changed frequently during operation can easily be switched on or off and/or modified by the operator, e.g. basic position needle up/down, thread trimmer on/off. The operating elements (switches, potentiometers) for this level are accessible directly outside on the control. Any modification on these operating elements is immediately effective.

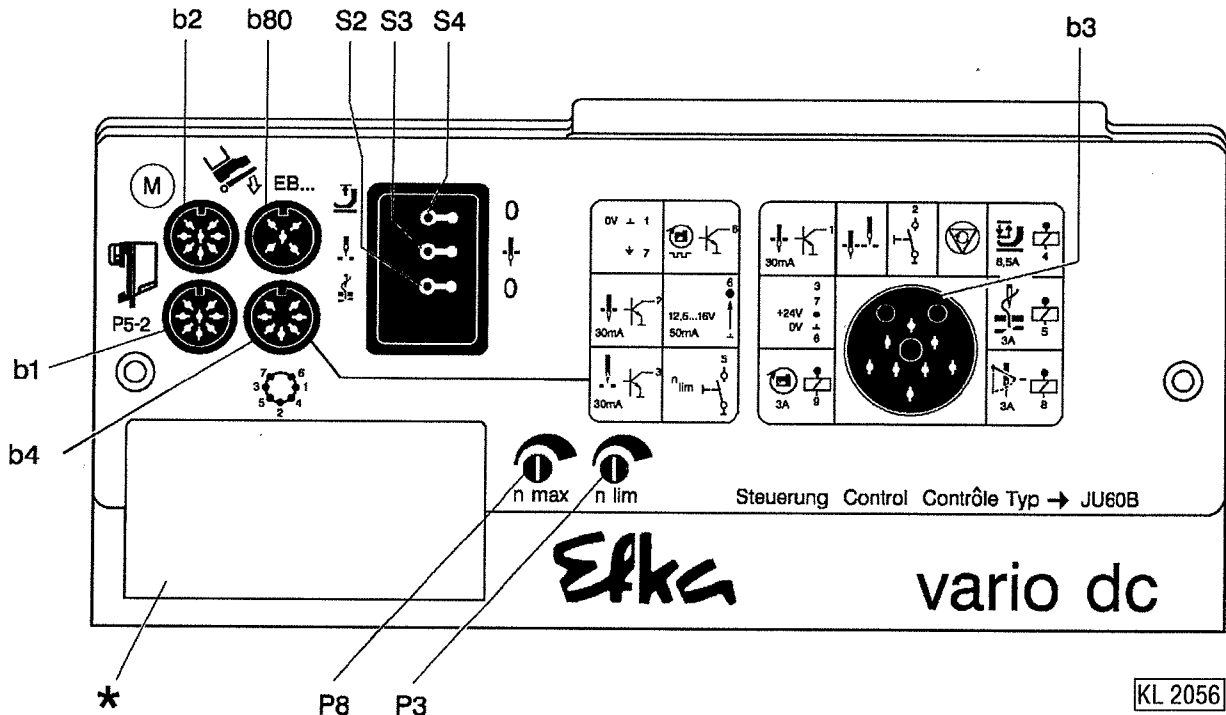


Fig. 1: Operating and connection elements (* = service flap)

Switch	Function	left	right
S2	Thread trimmer	on	off
S3	Basic position	up	down
S4	Presser foot up at each stop in the seam	on	off

Potentiometer	Function	Turn to the left	Turn to the right
P3	Limited speed (n_{lim})	1/8 of the maximum speed	Maximum speed
P8	Maximum speed reduction	1/4 of the maximum speed	Maximum speed

5.3 The Technician Level

The less frequently used switches and potentiometers needed for the basic setting, e.g. Softstart on/off, blocking of machine run make contact [N.O.]/break contact [N.C.], etc., are located behind the service flap. Basic settings for the adaptation to the type of machine are secured by a programming mode.

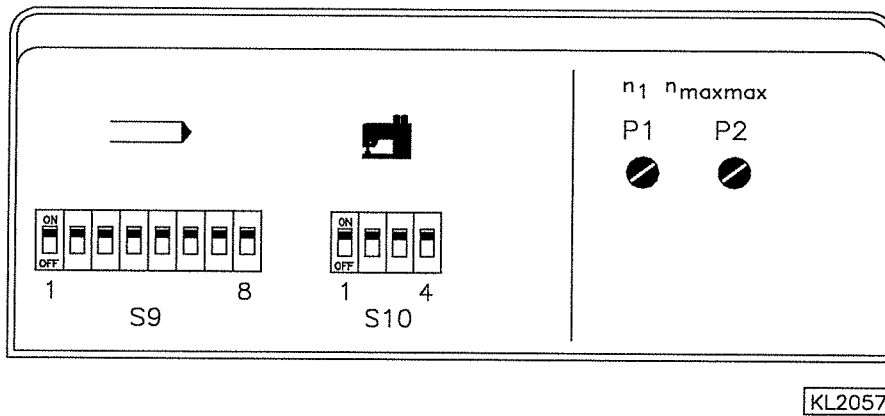


Fig. 2: Operating elements behind the service flap

Switch	Functions in normal operation	Functions when programming mode is active
S9/1	Programming mode on / off	-----
S9/2	Needle up / needle up-down (on/off)	-----
S9/3	Mode of switch "blocking of machine run/ needle up-down (on/off)" connected to B3/2	-----
S9/4	Presser foot lifting at the seam end stored on/off	-----
S9/5	Blocking of machine run make contact [N.O.]/ break contact [N.C.] (on/off)	-----
S9/6	-----	Direction of rotation of the motor shaft clockwise/counterclockwise
S9/7	Softstart on/off	-----
S9/8	-----	Speed class 10000 RPM / 5000 RPM
S10/1	no function	-----
S10/2	-----	Selection type of sewing machine LSB
S10/3	-----	Selection type of sewing machine
S10/4	-----	Selection type of sewing machine MSB

Potentiometer	Functions in normal operation	Functions when programming mode is active
P1 P2	Positioning speed Maximum speed of the sewing machine	----- -----
P3	Limited speed (n_{lim})	Setting the reversing angle Setting the braking power at standstill Various activation times and start delay from lifted foot in the different modes depending on the switch positions S2, S3, S4
P8	Maximum speed limitation	Setting the reversing delay Various activation times and start delay from lifted foot in the different modes depending on the switch positions S2, S3, S4

6. Functions and Settings on the Operator Level

6.1 Thread Trimmer

The thread trimmer can be switched on or off by flip switch S2.

- S2 = left Thread trimmer on
- S2 = right Thread trimmer off

6.2 Presser Foot Lifting

The automatic presser foot lifting at stop in the seam can be switched on or off by S4.

- S4 = left, Presser foot is automatically lifted
- S4 = right, Presser foot is not automatically lifted

Further settings are possible behind the service flap. They are described in chapter "Functions and Settings on the Technician Level".

6.3 Basic Position

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

- S3 = left Stop position needle up
- S3 = right Stop position needle down

6.4 Maximum Speed Limitation

The maximum speed compatible with the sewing machine set by P2 can be limited to the level specific of the application ($1/4 n_{max}$). The 12 available speed stages of the external actuator are distributed over the setting range.

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

6.5 Limited Speed

By using a switch connected to B4/5 the speed can be limited. The value preset by the pedal position must be below the set limit. This function is useful in difficult seam sections (e.g. several fabric layers, corners).

The limited speed can be set with potentiometer P3 (n_{lim}).

In mode 2 this function can also be activated by a pushbutton (knee switch) connected to socket B4.

- Turn P3 to the left Speed is reduced
- Turn P3 to the right Speed is increased

6.6 Needle Up/Down

By pressing the pushbutton for needle up/down connected to B3/2 the drive performs a change of positions depending on the position of switch S9/2.

The switch is located behind the service flap.

- Needle up ($S9/2 = \text{on}$), the drive runs from the lower to the upper position. If the drive is outside of position 1 it does not move for safety reasons.
- Needle up/down ($S9/2 = \text{off}$), the drive runs from the lower to the upper and/or from the upper to the lower position. If the drive is outside of position 1 or 2 it runs to the set basic position.

Note:

This function is only available if the mode for the switch connected to B3/2 is set to needle up/down by S9/3.

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 service flap, with the exception of P3 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.

- S9/1 = up Programming mode on
(acoustic signal depending upon the position of flip switches S1...S4)
- S9/1 = down Programming mode off
(no acoustic signal)

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

- Selection of the type of sewing machine
- Direction of rotation of the motor
- Speed class
- Braking power at standstill
- Reversion
- Delay and activation times of the outputs



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 $\pm 5^\circ$.



Attention!

If the settings of P3 or P8 are modified when the programming mode is on switch off the programming mode and reset the corner seam speed (P3) and the limitation of the maximum speed (P8).

7.2 Selection of the Type of Sewing Machine

The control is suitable for operating different types of sewing machines. Before putting the control into operation the mode corresponding to the type of sewing machine must be programmed according to the table on the next page.



Attention!

When starting, the mode corresponding to the machine class must be programmed.

Factory condition = Mode 4 = lockstitch mode 1

- S9/1 = on Programming mode on
(acoustic signal depending upon the position of flip switches S2...S4)
- Set the desired mode by S10/2...S10/4
- S9/1 = off Switch off programming mode or continue settings in the programming mode
(no acoustic signal)

S10/2	S10/3	S10/4	Mode No.	Type of Sewing Machine
OFF	OFF	OFF	1	Chainstitch mode 1
ON	OFF	OFF	2	Chainstitch mode 2
OFF	ON	OFF	3	Overlock mode
ON	ON	OFF	4	Lockstitch mode 1
OFF	OFF	ON	5	Lockstitch mode 2
ON	OFF	ON	6	Lockstitch mode 2
OFF	ON	ON	7	Lockstitch mode 2
ON	ON	ON	8	Stitch condensing mode

Modes 6 and 7 are identical with mode 5

7.2.1 Chainstitch Mode 1

The thread trimmer is switched on when entering the upper stop position (POS2). The activation times of the outputs can be programmed (see chapter Programming the Outputs). Overlapping of the activation times of thread trimmer, thread wiper and presser foot lifting is impossible.

7.2.2 Chainstitch Mode 2

The thread trimmer is switched on when entering the upper stop position (POS2). The activation times of the outputs can be programmed (see chapter Programming the Outputs). Overlapping of the activation times of thread trimmer, blow wiper and presser foot lifting is possible.

7.2.3 Overlock Mode

The thread trimmer is switched on and the needle cooling and/or "motor running" is switched off when entering the stop position (POS2). The operating time of the thread trimmer can be programmed.

7.2.4 Lockstitch Mode 1

The thread trimmer is switched on when entering position 1 and switched off when entering the upper stop position (POS2). The operating time of the thread wiper can be programmed.

7.2.5 Lockstitch Mode 2

The seam end process is as in lockstitch mode 1. An additional output needle cooling and/or "motor running" is available.

7.2.6 Stitch Condensing Mode

Activation delay and operating time of the stitch condensing can be programmed. The stitch condensing is only effective at the start of the seam.

The thread trimmer is switched on when entering the upper stop position (POS2). The operating time can be programmed. Overlapping of thread trimmer and presser foot lifting is possible.

7.3 Direction of Rotation of the Motor

- S9/1 = on Switch on programming mode
(acoustic signal depending upon the position of flip switches S2-S4)
- S9/6 = on Clockwise rotation (look at the motor shaft)
- S9/6 = off Counterclockwise rotation
- S9/1 = off Switch off programming mode or continue settings in the programming mode
(no acoustic signal)



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

The speed settings can be modified directly or in the programming mode depending on whether they are specific of the machine or of the application.

7.4.1 Speed Class

The speed class determines the maximum speed of the sewing machine.
2 speed classes are available:

- Speed class 1 = = > up to 5000 RPM (sewing machine speed)
- Speed class 2 = = > up to 10000 RPM (sewing machine speed)

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.

In order to protect the machine from speeds that are too high and in order to optimize the setting range of the speed potentiometers, the desired speed class must be switched as follows, with sliding cover opened.

- S9/1 = on Switch on programming mode
(acoustic signal depending upon the position of flip switches S2-S4)
- S9/8 = off Maximum speed 5000 RPM
- S9/8 = on Maximum speed 10000 RPM
- S9/1 = off Switch off programming mode or continue settings in the programming mode
(no acoustic signal)

7.4.2 Maximum Speed

The setting range for potentiometer P2 (n.maxmax) is:

- 625 - 5000 RPM for speed class up to 5000 RPM
- 4000 - 10000 RPM for speed class up to 10000 RPM

Setting the maximum speed

- Turn P2 completely to the left
- Turn P8 completely to the right (no limitation of the maximum speed)
- Turn P2 to the right until the desired speed is reached, while the drive is running and the pedal is pushed forward

The limitation of the maximum speed to the level specific of the application is possible on the operator level.

7.4.3 Positioning Speed

The positioning speed and/or thread trimming speed can be set by potentiometer P1 (n.pos) within a range of approx. 60-440 RPM.

The drive should be running with the pedal pushed forward (position 1).

7.5 Setting the Positions



Attention!

Turn power off before adjusting the positioning discs.



Attention!

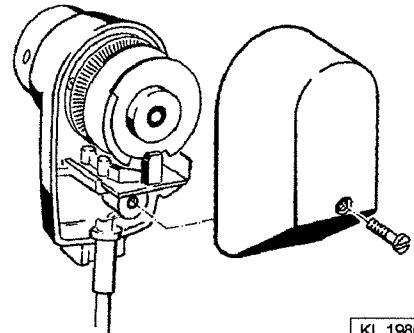
Be very careful when adjusting the positioning discs.

Risk of injury.

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

How to set the positions

- Remove positioner 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
- Set flip switch S3 to the left, 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 positioners with adjustable slot width must not be below 20°.

7.8 Softstart

When the function "Softstart" is on, 2 stitches are performed at the start of the seam at m will be performed at pedal controlled speed, limited to 500 RPM.

- S9/7 = off Softstart is not working
- S9/7 = on Softstart is working

7.9 First Slow Stitch after Power On

For the protection of the machine, the first stitch after power on is executed at positioning speed.

Note

This function is not disengageable.

7.10 Thread Trimmer, Thread Wiper

The sequence of signals for thread trimmer and thread wiper depends on the type of sewing machine selected. When switching off the thread trimmer by S2, the thread wiper is switched off as well.

If a thread wiper is not connected the operating time is set at zero, and the start delay of the presser foot is modified.

The activation delay and the operating time can be programmed depending on the type of sewing machine selected.

7.11 Programming the Outputs

The outputs are programmed in the active programming mode. For setting times potentiometers P3 and P8 assume other functions during programming.

The switch positions required for the setting in the various modes and the allocation of P3 and P8 are shown in the table overleaf.

- S9/1 = on Switch on programming mode
(acoustic signal depending upon the position of flip switches S2-S4)
- Select the desired output by S2-S4
- Set times by P3 and P8
- Repeat process until all outputs are set
- S9/1 = off Switch off programming mode or continue settings in the programming mode
(no acoustic signal)
- Reset S2 - S4 to the desired position

Programming table for outputs							
Mode	Output	S4	S3	S2	Potentiometer P8	Potentiometer P3	
1 Chainstitch mode 1	FA	R	L	L	---	Operating time FA	t8
	FW	L	R	L	Delay FA until FW	Operating time FW	t6
	FL	L	L	R	Delay FW until FL	Start delay after FL	t3
2 Chainstitch mode 2	FA	R	L	L	---	Operating time FA	t8
	BW	L	R	L	Delay FA until BW	Operating time BW	t6
	FL	L	L	R	Delay FA until FL	Start delay after FL	t3
3 Overlock mode	FA	R	L	L	---	Operating time FA	t8
	ML+NK	L	R	L	---	---	---
	FL	L	L	L	Delay FA until FL	Start delay after FL	t3
4 Lockstitch mode 1	FA	R	L	L	---	---	---
	FW	L	R	L	---	Operating time FW	t6
	FL	L	L	R	Delay FW until FL	Start delay after FL	t3
5, 6, 7 Lockstitch mode 2	FA	R	L	L	---	---	---
	FW	L	R	L	---	---	---
	FL	L	L	R	Delay FW until FL	Start delay after FL	t3
8 Stitch con- densing mode	FA	R	L	L	---	Operating time FA	t8
	STV	L	R	L	Activation delay STV	Operating time STV	t6
	FL	L	L	R	Delay FA until FL	Anlaufverzögerung nach FL	t3

L = left
R = right
BW = Blow wiper
FA = Thread trimmer
FL = Presser foot lifting

FW = Thread wiper
ML+NK = Motor running/needle cooling
STV = Stitch condensing
--- = No effect



Attention!

If the settings of P3 or P8 are modified when the programming mode is on switch off the programming mode and reset the limited speed (P3) and the limitation of the maximum speed (P8).

7.12 Motor Running and Needle Cooling

The output "motor running" (needle cooling) is switched on in all modes during sewing. In the overlock mode this signal is also available on B3/8.

7.13 Switching Blocking of Machine Run/Needle Up/Down

For a switch connected to B3/2 the function can be determined by S9/3.

- S9/3 = off Needle up/down
- S9/3 = on Blocking of machine run

7.14 Blocking of Machine Run



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

The function blocking of machine run can be activated by a switch connected to B3/2.
The activation by a make contact [N.O.] or a break contact [N.C.] can be switched by S9/5.

When the blocking of machine run is on, an acoustic signal is emitted 5 sec

- S9/5 = off Blocking of machine run activated when switch is closed
- S9/5 = on Blocking of machine run activated when switch is opened

By activating the blocking of machine run the drive is made to stop in the selected basic position.

- Presser foot lifting is possible

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

7.15 Presser Foot Lifting

The automatic presser foot lifting at the seam end can be switched on or off by S9/4 behind the service flap.

- S9/4 = off Presser foot is not lifted
- S9/4 = on Presser foot is lifted



Attention!
If the function "automatic presser foot lifting at the seam end" is on (S9/4 = on) the presser foot is also automatically lifted after power on.

The start delay time (t3) from lifted presser foot can be modified by potentiometer P3, the activation delay by potentiometer P8, in the active programming mode.

The switch positions required for programming the start delay and activation delay are shown in the programming table in chapter "Programming the Outputs".

In order to prevent overloading of the presser foot solenoid and to reduce the load for the control the output signal is pulsed after presser foot lifting. The operating time is then 50 %.

7.16 Signal Output Position 1

- Transistor output with open collector
- Suitable e.g. for the connection of a counter
- Switching state changes when reaching/leaving position 1
- Independent of sewing, thus also when turning the handwheel manually

7.17 Signal Output Position 2

- Transistor output with open collector
- Suitable e.g. for the connection of a counter
- Switching state changes when reaching/leaving position 2
- Independent of sewing, thus also when turning the handwheel manually

7.18 Signal Output Speedometer Impulses

- Transistor output with open collector
- 120 impulses per rotation of the handwheel
- Suitable e.g. for the connection of a counter, speed synchronization
- Switches whenever a slot of the generator disc of the position transmitter is sensed
- Independent of sewing, thus also when turning the handwheel manually

7.19 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

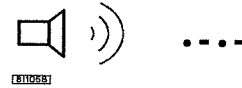
8. Acoustic Signals

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, with the exception of error 5.

ERROR 1: Positioner error



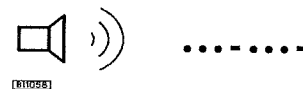
- Positioner defective or not connected
- Connections for positioner and commutation transmitter were changed by mistake
- Positioner not mounted on the sewing machine shaft

ERROR 2: Blocking control



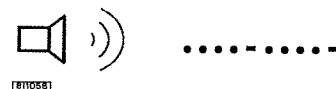
- Sewing machine shaft does not move despite motor activation
- Set speed is not reached

ERROR 3: Commutation transmitter error



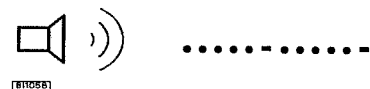
- Commutation transmitter defective or not connected

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 is activated



- 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

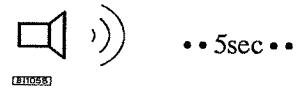
8.2 Acoustic Signals for Settings

Braking power at standstill



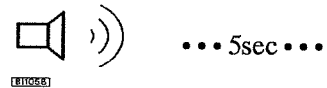
- S9/1 = on
- Set braking power at standstill by P8

Reversion



- S9/1 = on
- Set reversing angle by P3
- Set delay until reversion by P8

Output thread trimmer



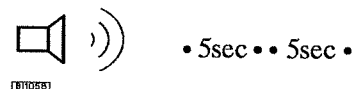
- S9/1 = on
- Set thread trimmer operating time by P3
- Set by P8

Output thread wiper, blow wiper, stitch condensing



- S9/1 = on
- Set operating time by P3
- Set activation delay by P8


Presser foot lifting



- S9/7 = on
- Set start delay from lifted presser foot by P3
- Set activation delay by P8

9. Control Factory Settings

Programming the running behavior		
Switch	Position	Signification
S9/1	off	Programming mode off
S9/2	off	Needle up/down
S9/3	off	Switch on B3/2 for needle up/down
S9/4	off	Presser foot lifting at the seam end not automatic
S9/5	on	Blocking of machine run make contact [N.O.]
S9/6	off	Counterclockwise direction of rotation of the motor shaft
S9/7	off	Softstart off
S9/8	off	Speed class 5000 RPM

Programming the type of sewing machine		
Switch	Position	Signification
S10/1	---	no function
S10/2	on	 lockstitch mode 1
S10/3	on	
S10/4	off	

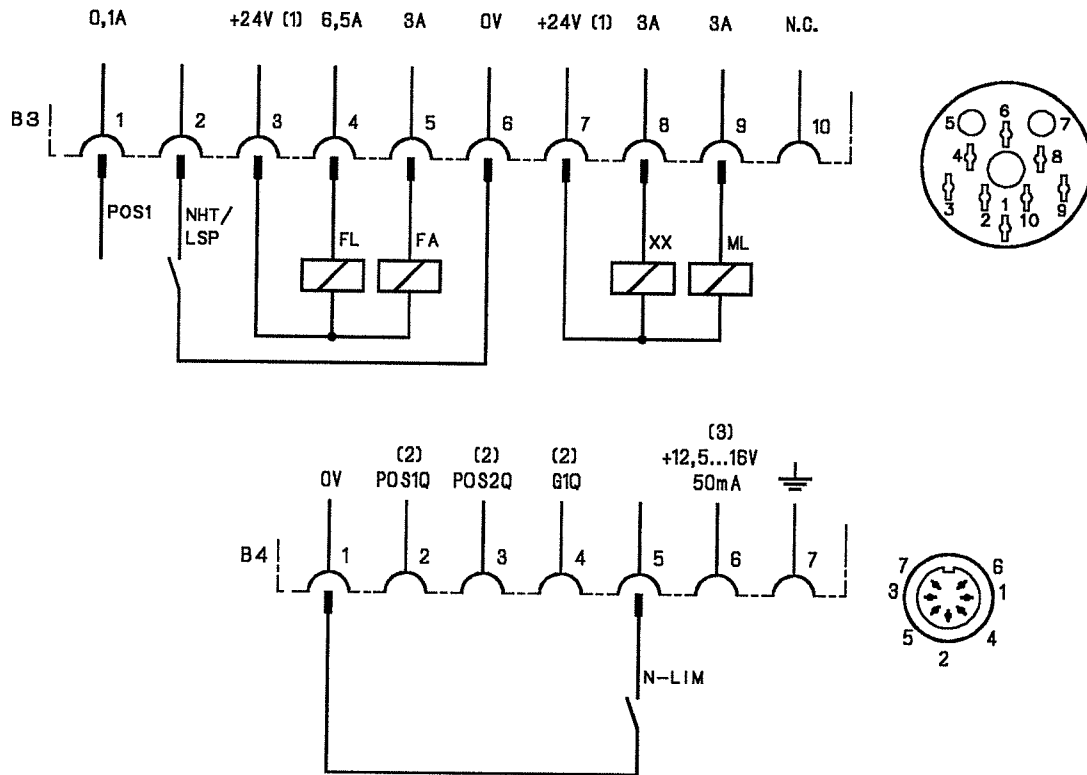
Potentiometer settings		
Potentiometer	Position	Signification
P1	180 RPM	Positioning speed (n.pos)
P2	4000 RPM	Maximum speed (n.maxmax)
P3	1200 RPM	Limited speed (n.lim)
P8	4000 RPM	Maximum speed limitation (n.max)

Switches accessible from outside		
Switch	Position	Signification
S2	left	Thread trimmer on
S3	right	Needle position at stop in the seam - down
S4	right	Presser foot lifting at stop in the seam - not automatic

Other values preset in the programming mode		
Values	Signification	
off	Braking power at standstill	
0 ms	Reversing delay	(drd)
0 °	Reversing angle	(ird)
80 ms	Start delay from lifted presser foot	
120 ms	Thread wiper operating time	(lockstitch mode 1) (t6)
200 ms	Thread wiper operating time	(chainstitch mode 1) (t6)
200 ms	Stitch condensing operating time	(stitch condensing mode) (t6)
80 ms	Activation delay FL after FW	(lockstitch mode 1) (t7)
80 ms	Activation delay FL after FW	(chainstitch mode 1) (t7)
80 ms	Activation delay FL at the seam end	(stitch condensing mode) (t7)
80 ms	Activation delay FL after FW	(overlock mode) (t7)
150 ms	Thread trimmer operating time	(chainstitch mode 1 + 2) (t8)
150 ms	Thread trimmer operating time	(stitch condensing mode) (t8)
150 ms	Thread trimmer operating time	(overlock mode) (t8)
80 ms	Activation delay FW after FA	(chainstitch mode 1) (t9)
80 ms	Activation delay stitch condensing	(stitch condensing mode) (t9)
1040 ms	Blow wiper operating time	(chainstitch mode 2) (t11)
420 ms	Activation delay FL after FA	(chainstitch mode 2) (t12)
420 ms	Activation delay BW after FA	(chainstitch mode 2) (t13)
(+/-10 ms)	Tolerance for all times	

Other preset values (which cannot be changed)		
Values	Signification	
120 ms	Delay of presser foot lifting with pedal in position -1	(t2)
400 ms	Full power of presser foot lifting	(t4)
15 kHz	Clock frequency of presser foot lifting	(t5)
1:1	Clock ratio of presser foot lifting = 50 % operating time	
40 ms	Activation delay of presser foot lifting without thread wiper (only lockstitch modes)	(t10)
300 ms	Start delay after thread trimming	(t15)
500 RPM	Softstart speed	(n.soft)
2	Softstart stitches	(c.soft)
(+/-10 ms)	Tolerance for all times	

10. Connection Diagram



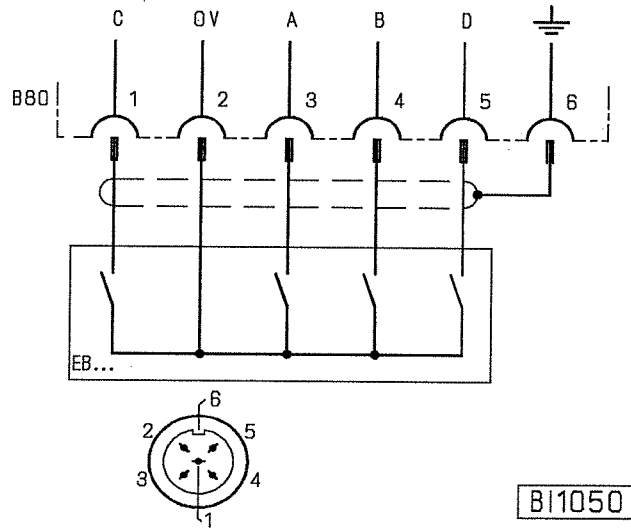
B11088

FA	- Thread trimmer
FL	- Presser foot lifting
ML	- Motor running/needle cooling
XX	- Thread wiper (lockstitch mode 1)
	- Motor running/needle cooling (lockstitch mode 2)
	- Thread wiper (chainstitch mode 1)
	- Blow wiper (chainstitch mode 2)
	- Stitch condensing (stitch condensing mode)
	- Motor running/needle cooling (overlock mode)
NHT/LSP	- Needle up-down/blocking of machine run (according to programming)
N-LIM	- Limited speed
GEN1Q	- Speedometer impulses 120/rotation (inverted activation)
POS1Q	- Position 1 (inverted activation)
POS2Q	- Position 2 (inverted activation)

**Attention!**

The indicated currents are maximum values per output. Under a constant load the total power must not exceed 96VA.

- 1) Nominal voltage 24V, no-load voltage max. 36V
- 2) Transistor output with open collector (max. 40V, 30mA)
- 3) Auxiliary voltage for e.g. sensor

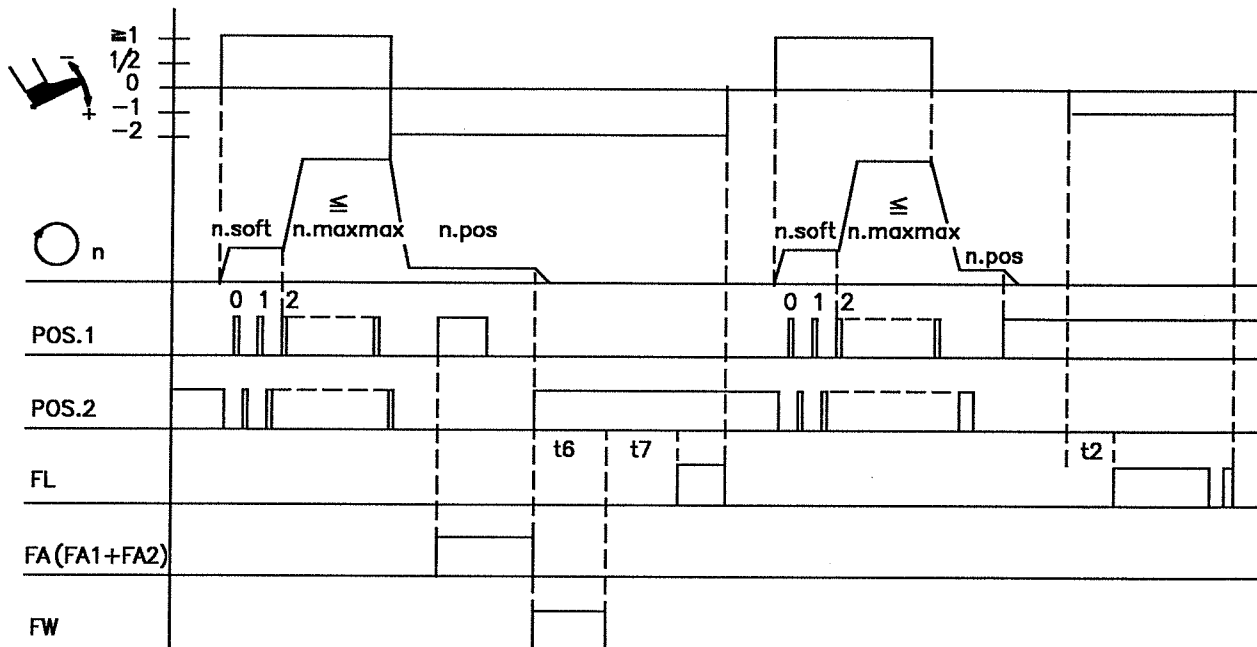


BI1050

EB... - External actuator

11. Function Diagrams

Trimming from full run (lockstitch mode 1)

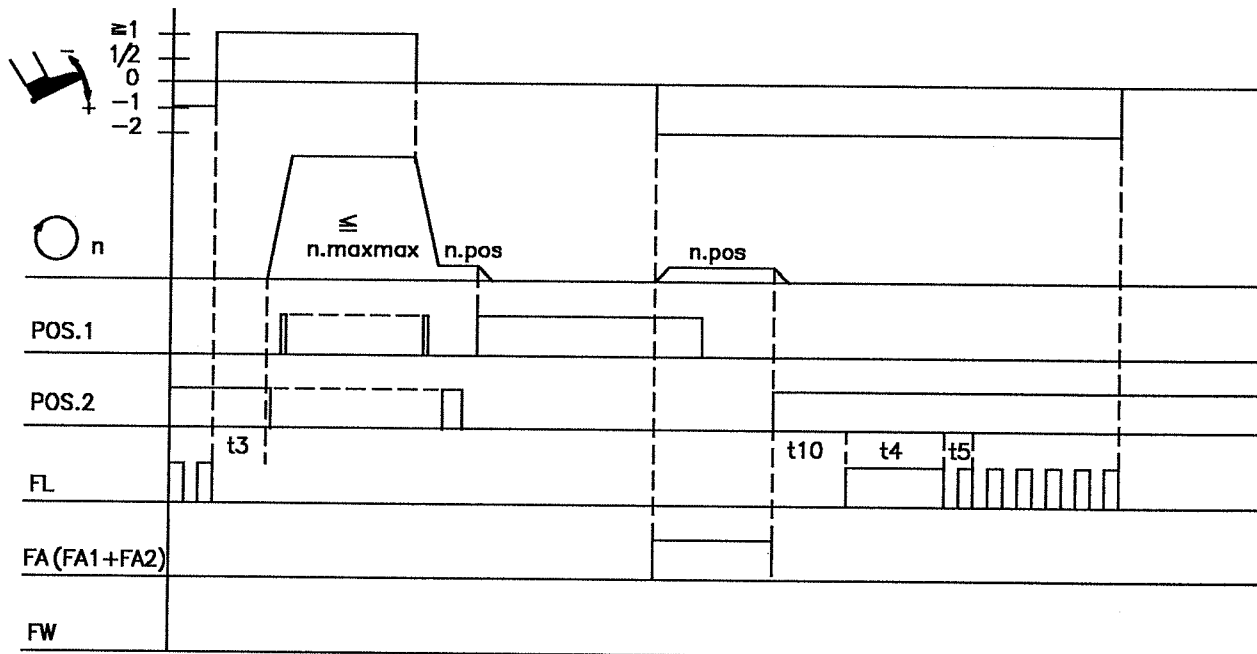


0211/STPEP1

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2	Activation delay of presser foot lifting with pedal in position -1	
t3	Start delay from lifted presser foot	
t4	Full power of presser foot lifting	
t5	Clock frequency of presser foot lifting	
t6	Thread wiper operating time	
t7	Activation delay of presser foot lifting after thread wiping	
t10	Activation delay of presser foot lifting without thread wiping	

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 FW = Thread wiper

Run with intermediate stop (lockstitch mode 1)

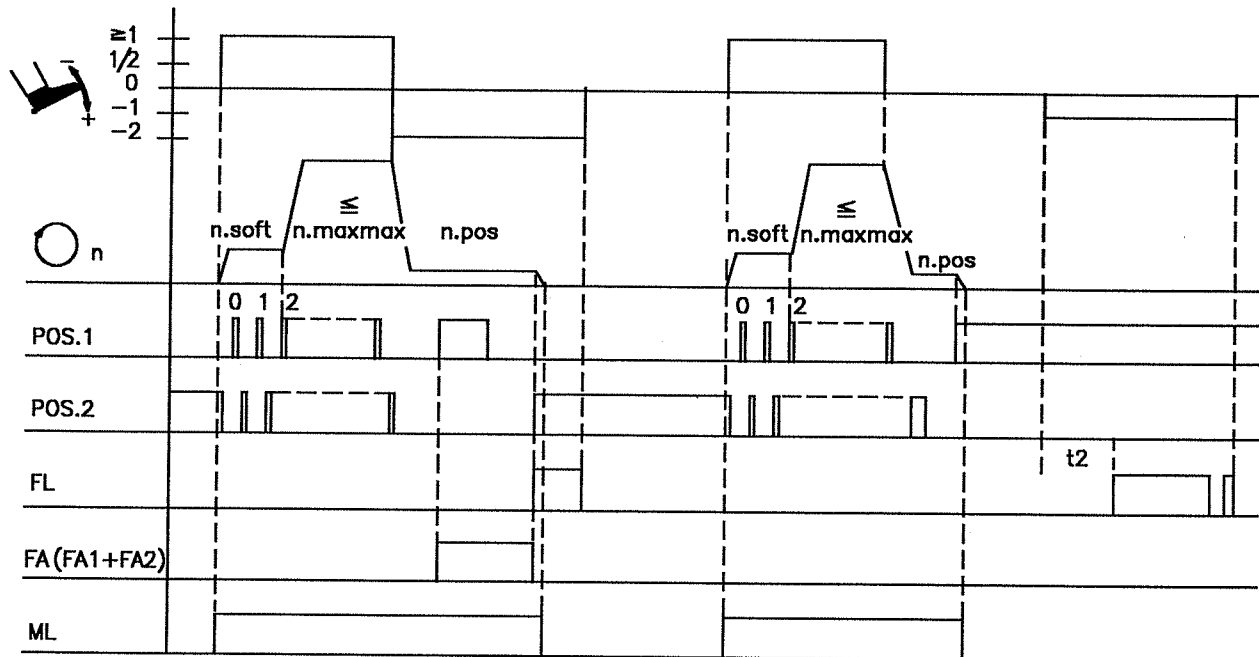


0211/STEPP1A

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2	Activation delay of presser foot lifting with pedal in position -1	
t3	Start delay from lifted presser foot	
t4	Full power of presser foot lifting	
t5	Clock frequency of presser foot lifting	
t6	Thread wiper operating time	
t7	Activation delay of presser foot lifting after thread wiping	
t10	Activation delay of presser foot lifting without thread wiping	

- Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 FW = Thread wiper

Trimming from full run (lockstitch mode 2)

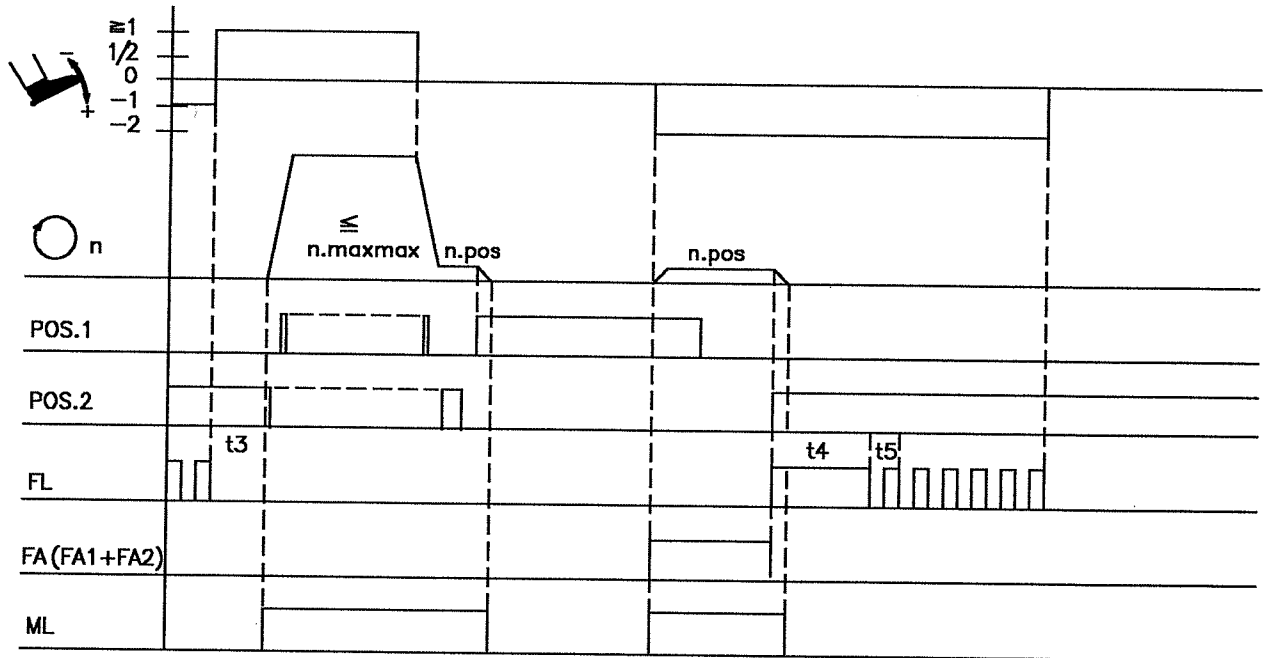


0211/STEPP2

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2 t3 t4 t5	Activation delay od presser foot lifting with pedal in position -1 Start delay from lifted presser foot Full power of presser foot lifting Clock frequency of presser foot lifting	

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 ML = Motor running/needle cooling

Run with intermediate stop (lockstitch mode 2)

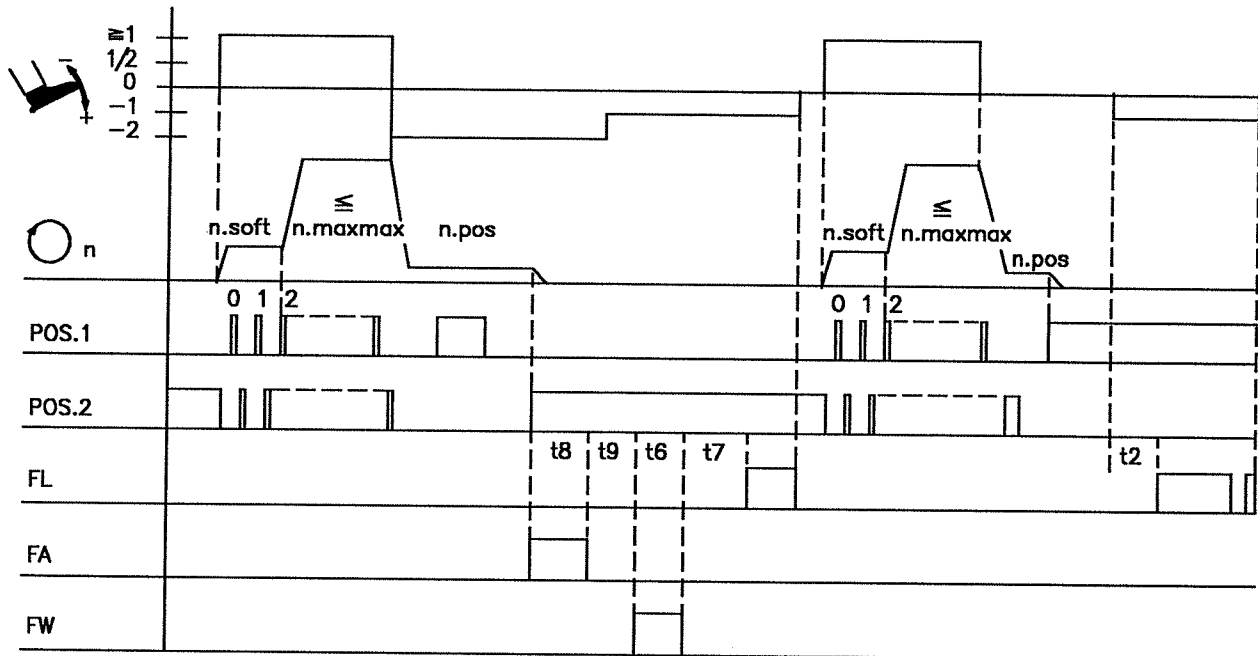


0211/STEPP2A

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2	Activation delay of presser foot lifting with pedal in position -1	
t3	Start delay from lifted presser foot	
t4	Full power of presser foot lifting	
t5	Clock frequency of presser foot lifting	

- Abbreviation:
- POS.1 = Position 1
 - POS.2 = Position 2
 - FL = Presser foot lifting
 - FA = Thread trimmer
 - ML = Motor running/needle cooling

Trimming from full run (chainstitch mode 1)

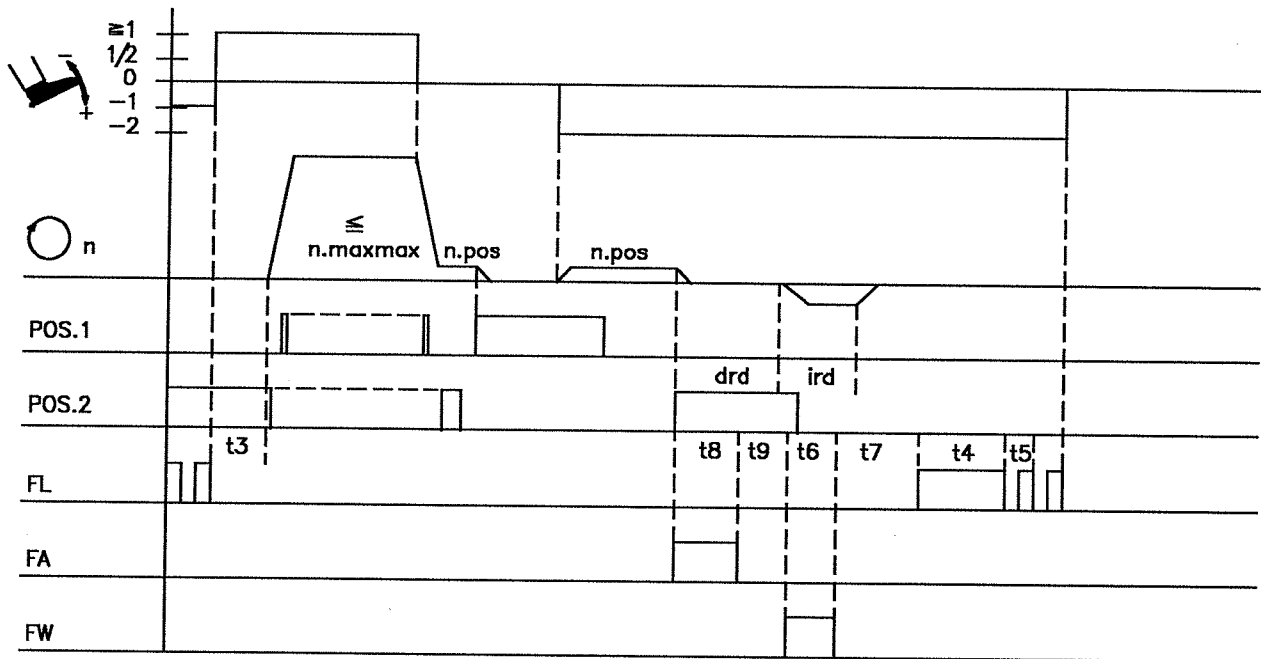


0211/KETTE1

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2	Activation delay of presser foot lifting with pedal in position -1	
t3	Start delay from lifted presser foot	
t4	Full power of presser foot lifting	
t5	Clock frequency of presser foot lifting	
t6	Thread wiper operating time	
t7	Activation delay of presser foot lifting after thread wiping	
t8	Thread trimmer operating time	
t9	Activation delay of thread wiper after thread trimming	

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 FW = Thread wiper

Run with intermediate stop (chainstitch mode 1)

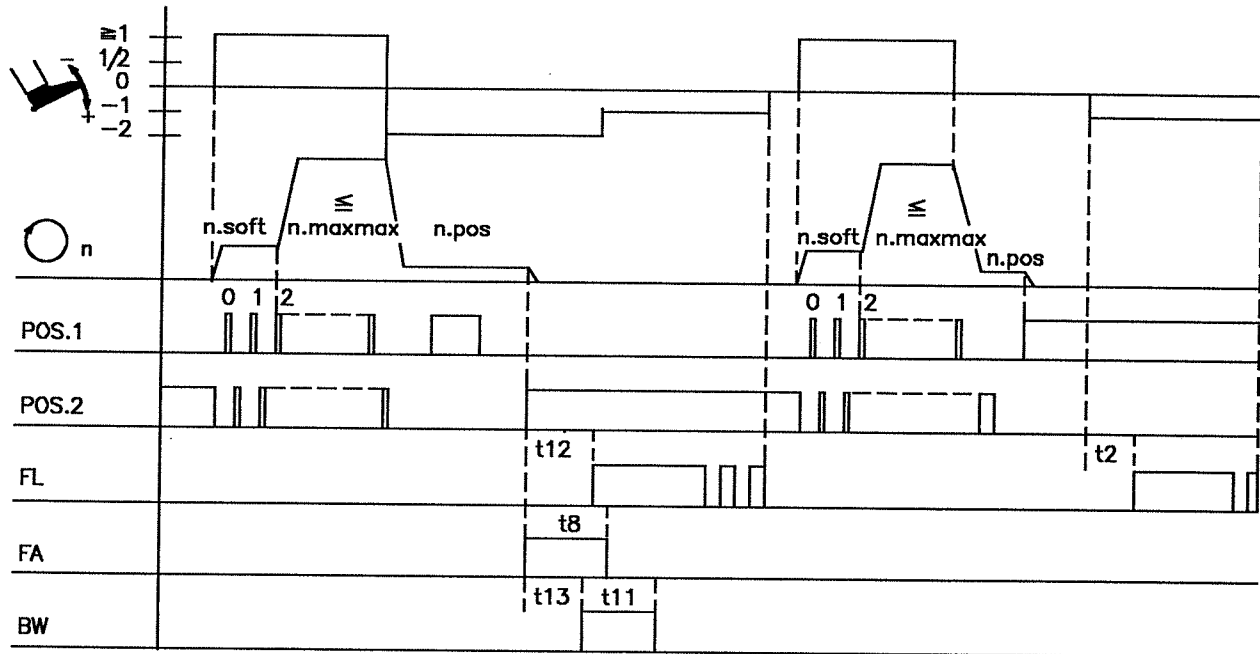


0211/KETTE1A

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2	Activation delay of presser foot lifting with pedal in position -1	
t3	Start delay from lifted presser foot	
t4	Full power of presser foot lifting	
t5	Clock frequency of presser foot lifting	
t6	Thread wiper operating time	
t7	Activation delay of presser foot lifting after thread wiping	
t8	Thread trimmer operating time	
t9	Activation delay of thread wiper after thread trimming	

- Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 FW = Thread wiper

Trimming from full run (chainstitch mode 2)

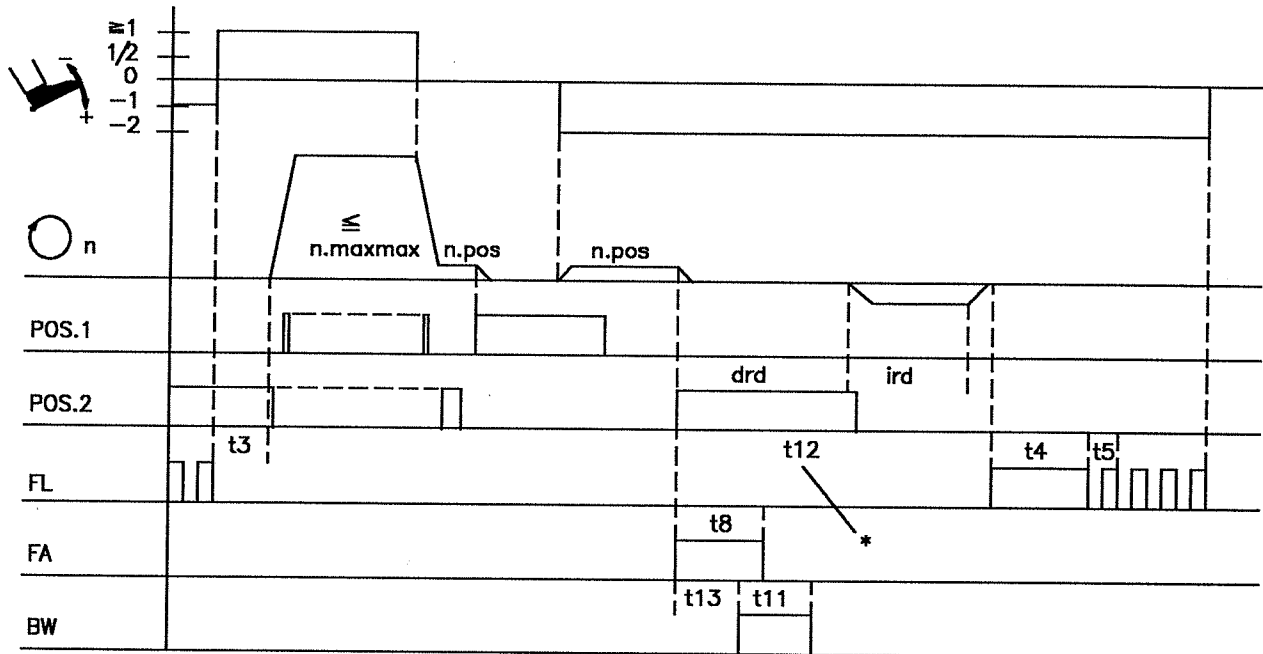


0211/KETTE2

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2 t3 t4 t5 t8 t11 t12 t13	Activation delay of presser foot lifting with pedal in position -1 Start delay from lifted presser foot Full power of presser foot lifting Clock frequency of presser foot lifting Thread trimmer operating time Blow wiper operating time Activation delay of presser foot lifting after thread trimming Activation delay of the blow wiper after thread trimming	

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 BW = Blow wiper
 FL = Presser foot lifting
 FA = Thread trimmer

Run with intermediate stop (chainstitch mode 2)



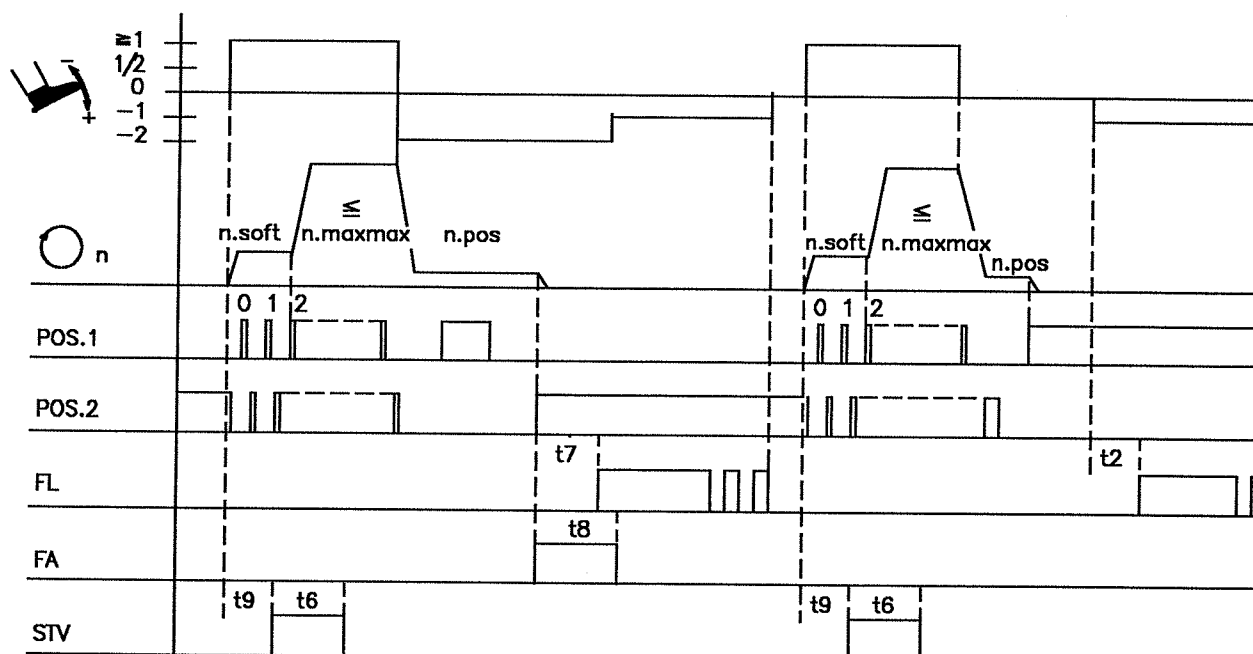
0211/KETTE2A

*) Presser foot lifting only after reversion has been completed

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2 t3 t4 t5 t8 t11 t12 t13 drd ird	Activation delay of presser foot lifting with pedal in position -1 Start delay from lifted presser foot Full power of presser foot lifting Clock frequency of presser foot lifting Thread trimmer operating time Blow wiper operating time Activation delay of presser foot lifting after thread trimming Activation delay of the blow wiper after thread trimming Reversing delay Reversing angle	

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 BW = Blow wiper
 FL = Presser foot lifting
 FA = Thread trimmer

Trimming from full run (stitch condensing mode)

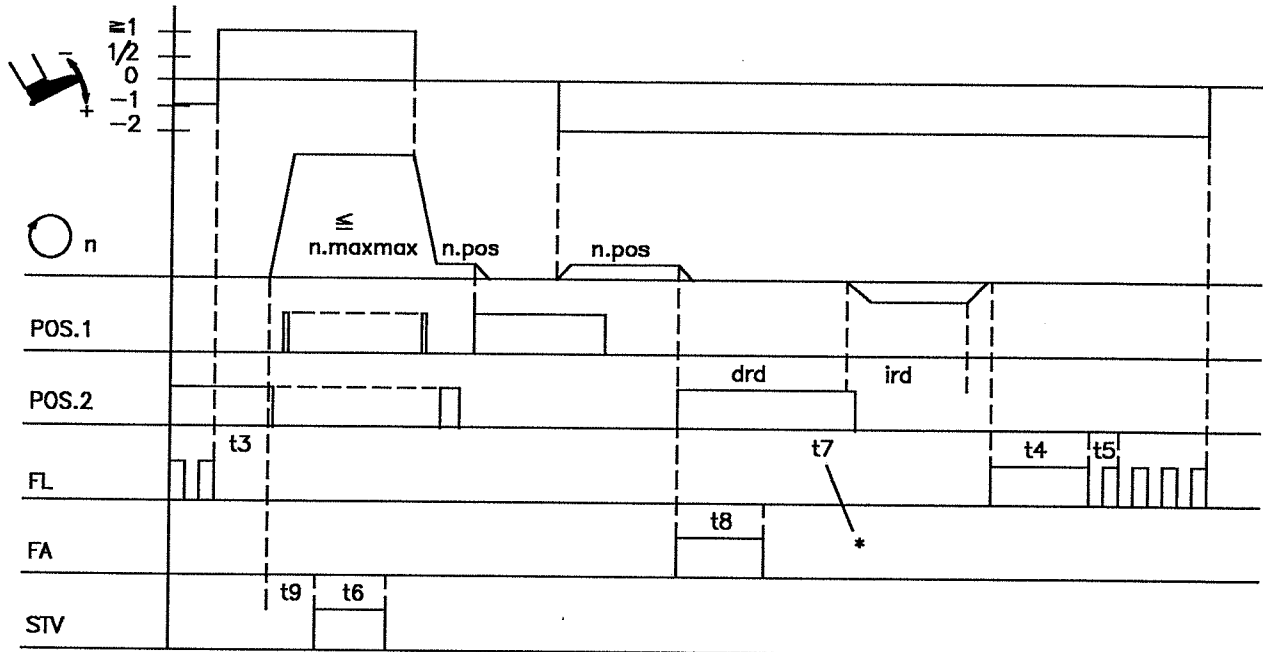


0211/STV1

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2	Activation delay of presser foot lifting with pedal in position -1	
t3	Start delay from lifted presser foot	
t4	Full power of presser foot lifting	
t5	Clock frequency of presser foot lifting	
t6	Thread wiper operating time	
t7	Activation delay of presser foot lifting after thread wiping	
t8	Thread trimmer operating time	
t9	Activation delay of thread wiper after thread trimming	

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 STV = Stitch condensing

Run with intermediate stop (stitch condensing mode)



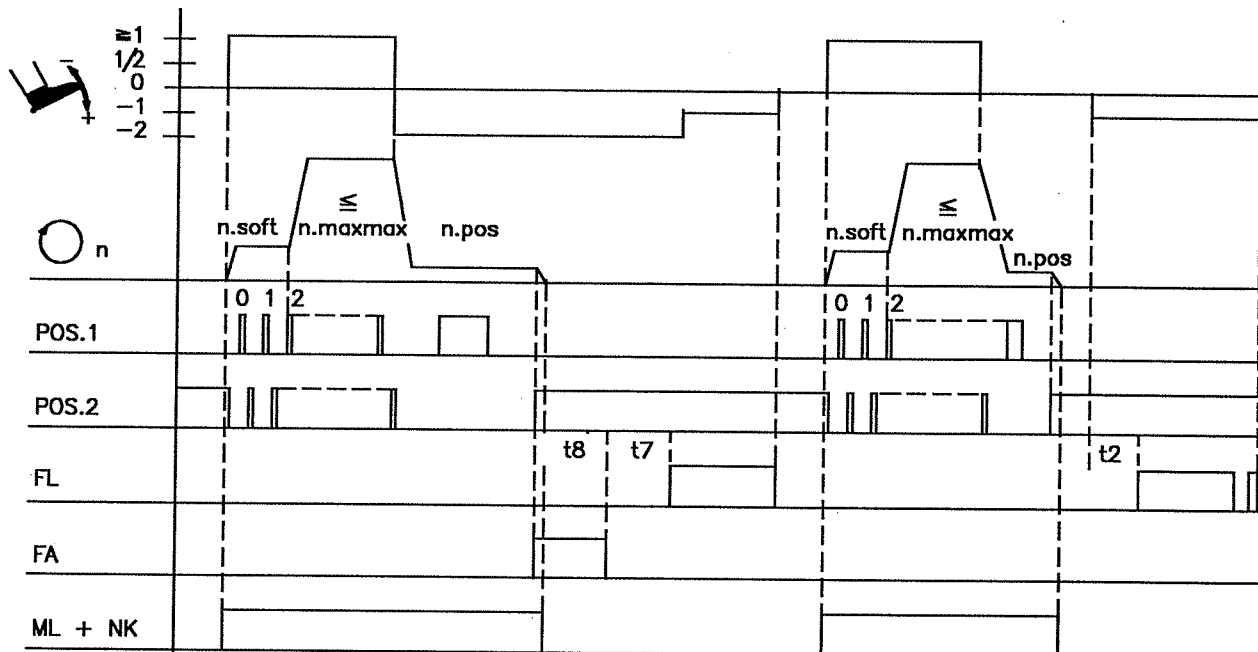
0211/STV1A

*) Presser foot lifting only after reversion has been completed

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2 t3 t4 t5 t6 t7 t8 t9 drd ird	Activation delay od presser foot lifting with pedal in position -1 Start delay from lifted presser foot Full power of presser foot lifting Clock frequency of presser foot lifting Thread wiper operating time Activation delay of presser foot lifting after thread wiping Thread trimmer operating time Activation delay of thread wiper after thread trimming Reversing delay Reversing angle	

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 STV = Stitch condensing

Trimming from full run (overlock mode)



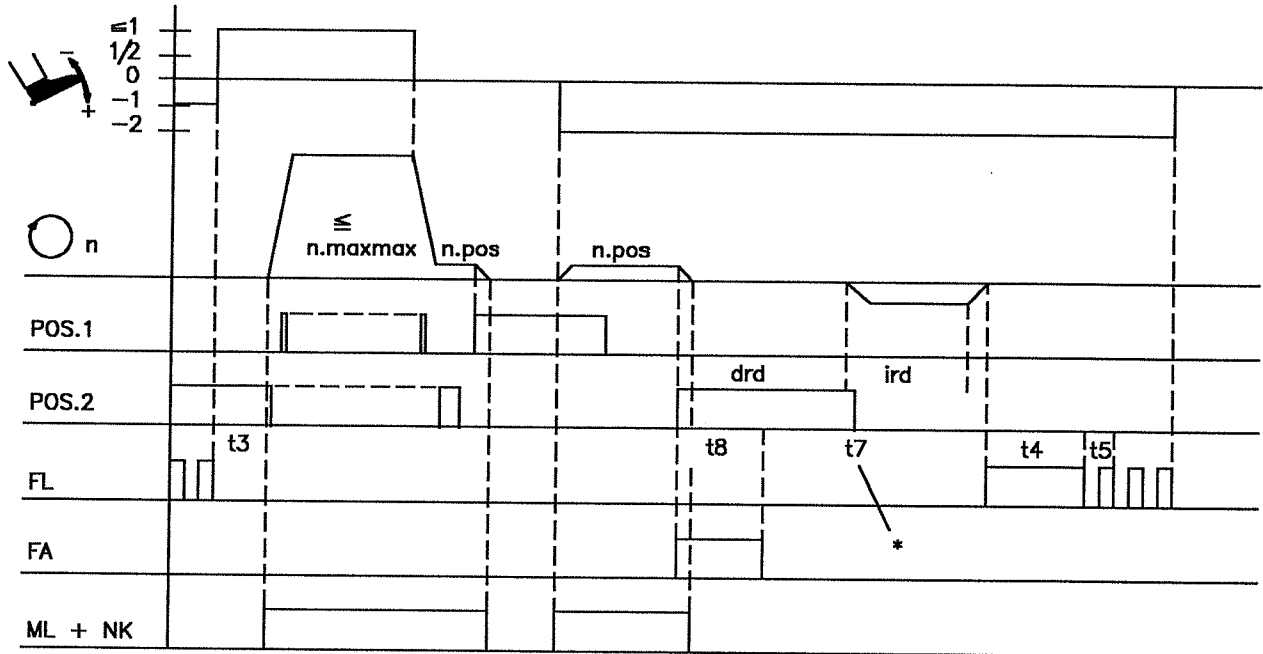
0211/OVERL1

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2 t3 t4 t5 t6 t7 t8 t9	Activation delay of presser foot lifting with pedal in position -1 Start delay from lifted presser foot Full power of presser foot lifting Clock frequency of presser foot lifting Thread wiper operating time Activation delay of presser foot lifting after thread wiping Thread trimmer operating time Activation delay of thread wiper after thread trimming	

Abbreviation:

- POS.1 = Position 1
- POS.2 = Position 2
- FL = Presser foot lifting
- FA = Thread trimmer
- ML + NK = Motor running + needle cooling

Run with intermediate stop (overlock mode)



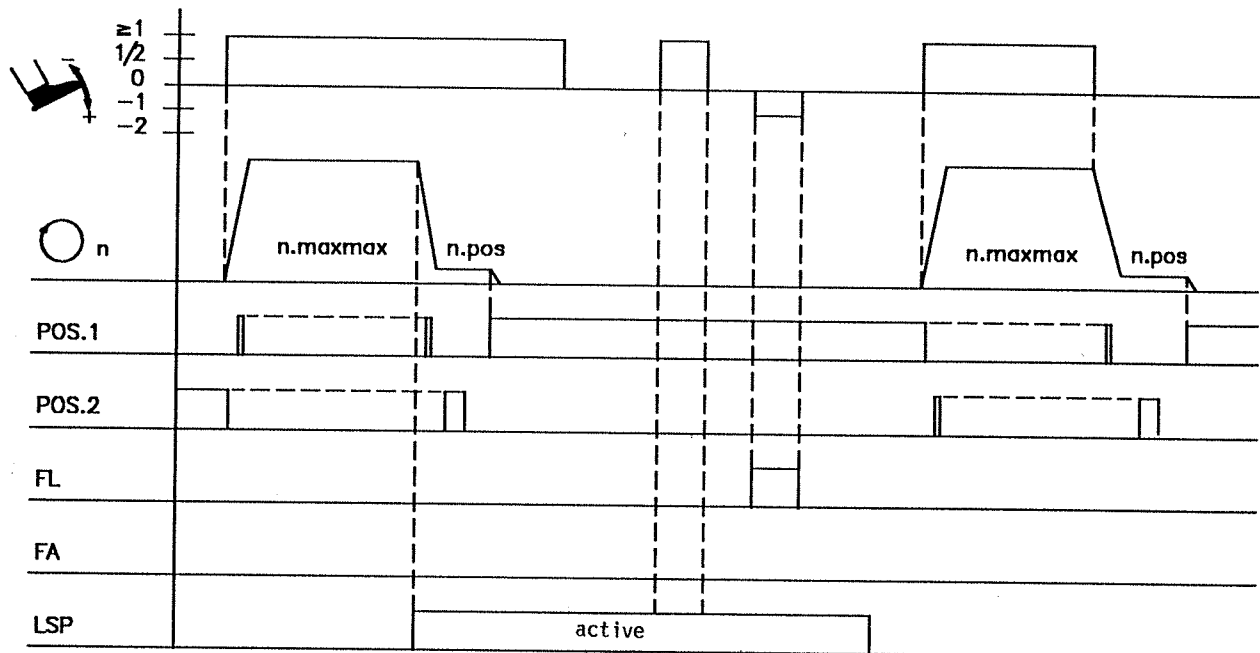
0211/OVERL1A

*) Presser foot lifting only after reversion has been completed

Abbreviation	Function	Switch / Potentiometer
n.pos n.soft n.maxmax	Positioning speed Softstart speed Maximum speed	P1 programmed P2
t2 t3 t4 t5 t6 t7 t8 t9 drd ird	Activation delay of presser foot lifting with pedal in position -1 Start delay from lifted presser foot Full power of presser foot lifting Clock frequency of presser foot lifting Thread wiper operating time Activation delay of presser foot lifting after thread wiping Thread trimmer operating time Activation delay of thread wiper after thread trimming Reversing delay Reversing angle	

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 ML + NK = Motor running + needle cooling

Thread trimmer off, blocking of machine run (all modes)

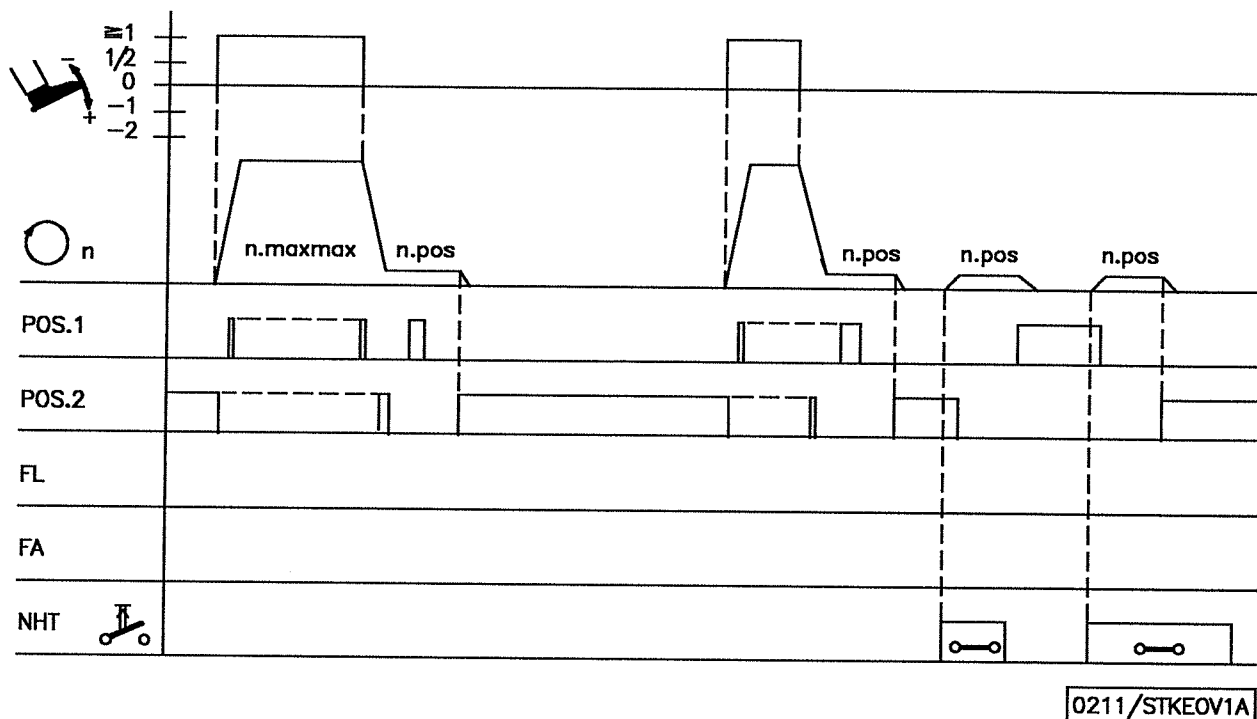


0211/STKEOV1

Abbreviation	Function	Switch / Potentiometer
n.pos	Positioning speed	P1
n.maxmax	Maximum speed	P2

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 LSP = Blocking of machine run

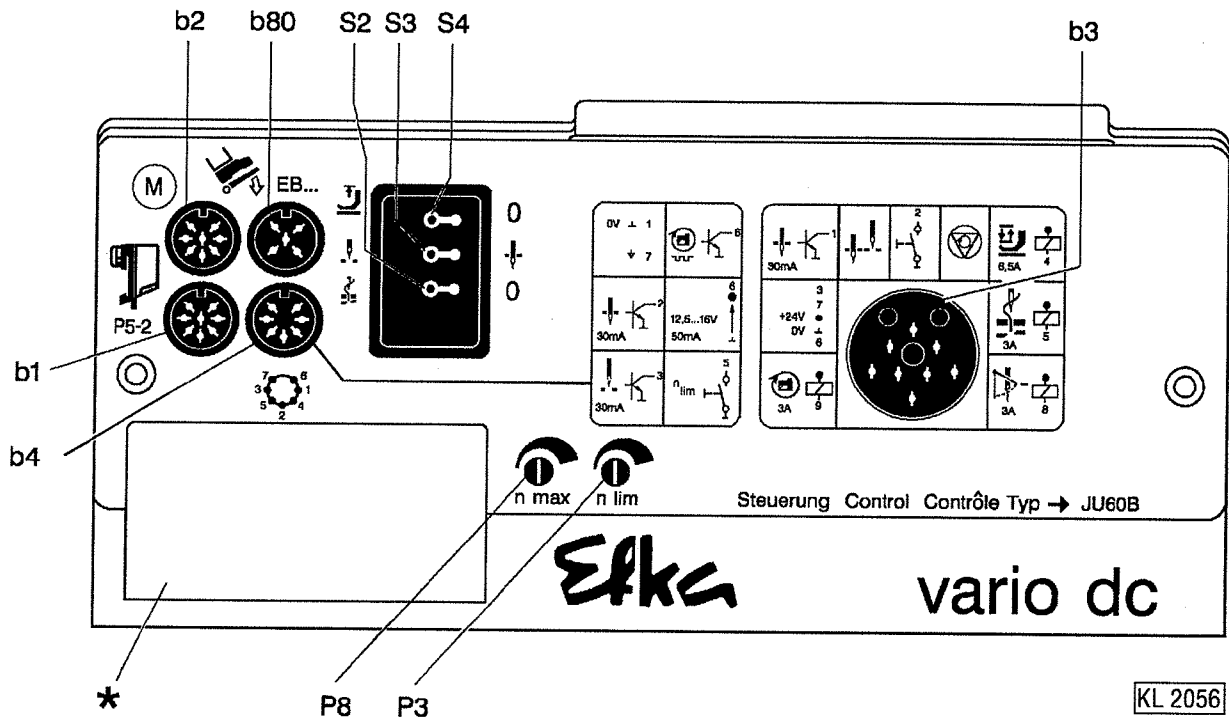
Needle up/down, basic position 2 (all modes)



Abbreviation	Function	Switch / Potentiometer
n.pos	Positioning speed	P1
n.maxmax	Maximum speed	P2

Abbreviation: POS.1 = Position 1
 POS.2 = Position 2
 FL = Presser foot lifting
 FA = Thread trimmer
 NHT = Needle up/down

12. Operating Elements and Socket Connectors



- B1 - Position transmitter
- B2 - Commutation transmitter for d.c. motor
- B3 - Various inputs and outputs
- B4 - Various inputs and outputs
- B80 - Actuator

- S2 - Thread trimmer on/off
- S3 - Basic position
- S4 - Presser foot lifting at stop in the seam

* = Service flap

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