Efka vario dc

CONTROL PF60A

INSTRUCTION MANUAL

No. 402051 english

Contents

1. Safety instructions

1. Motor, accessories and auxiliary devices can be mounted and put into operation only by an expert after taking note of the instruction manual.

2. Motor, accessories and auxiliary devices must be used only in conformity with their designed function.

3. Operation without corresponding protective devices is forbidden.

4. Motor must be completely mounted before electric connection.

5. Only skilled labour is allowed to work on the electric appliances.

6. Only especially trained staff is allowed to complete repair work.

7. Cables to be wired must be protected against expectable strain and fastened adequately.

8. Cables near moving machine parts (e.g. pulleys) must be wired at a minimum distance of 25 mm. (DIN VDE 0113)

9. For a safe separation it is preferred to wire the cables separately from each other. (DIN VDE 0160)

10. Connect the sewing light to the mains independently of the motor power supply.

11. Before connecting the mains line make sure that the mains voltage corresponds to the specifications on the control nameplate.

12. Machine and motor must be connected through a potential equalization conductor.

13. Before mounting and adjusting auxiliary devices and accessories, especially position transmitter, reversing device, light barrier, etc., disconnect the motor (disconnect the main switch, pull off mains plug [DIN VDE 0113]).

14. Electric auxiliary devices and accessories must only be connected to protective low voltage.

15. Disconnect the motor for any repair and maintenance work. (disconnect the main switch, pull off mains plug [DIN VDE 0113]).

16. The motor resists overvoltage according to overvoltage class 2. (DIN VDE 0160)

17. Working on parts and devices under voltage is forbidden.
    - Exceptions to prescriptions DIN VDE 0105

18. Observe all safety instructions before undertaking conversions and modifications.

19. Use for repair and maintenance only original parts from the manufacturer.

20. Warning indications in the instruction manual point out particular risks of personal injury or risk for the machine and are characterized by the below-mentioned symbol at the concerned place.
    Observe and follow these indications as well as the prevailing safety instructions!

2. Application field of the control

You can use this control for Pfaff industry sewing machines of all series as well as for lock stitch machines and chain stitch machines.

The functions of the control are distributed among two fields.

Adjustments outside the service flap (see fig. 1 page 7)

With **potentiometer P3**

in the programming mode
- reversing angle during reversion
- partial braking at standstill

With **potentiometer P8**

- reduction of the maximum speed (n.max)

and in the programming mode
- activation delay until reversion
- activation delay for thread trimmer, thread wiper and foot lifting

Softstart ON/OFF	Switch S2
Needle position at stop within the seam	Switch S3
Foot lift at stop within the seam	Switch S4

Adjustments with opened service flap

- Programming mode
- Foot lift at seam end
- Mode commutation lock stitch/chain stitch
- Sense of rotation of the motor shaft
- Thread trimmer ON/OFF
- Speed range

The sewing machine is ready for operation immediately after:

- mounting the motor and the position transmitter
- adjusting the needle position on the position transmitter.
- adapting the control to the sewing machine

3. Short instructions for the operator

3.1 How to adjust the working speed

The working speed can be adjusted while the motor is running.

Increase the speed by:

- turning potentiometer P8 to the right.

Reduce the speed by:

- turning potentiometer P8 to the left.

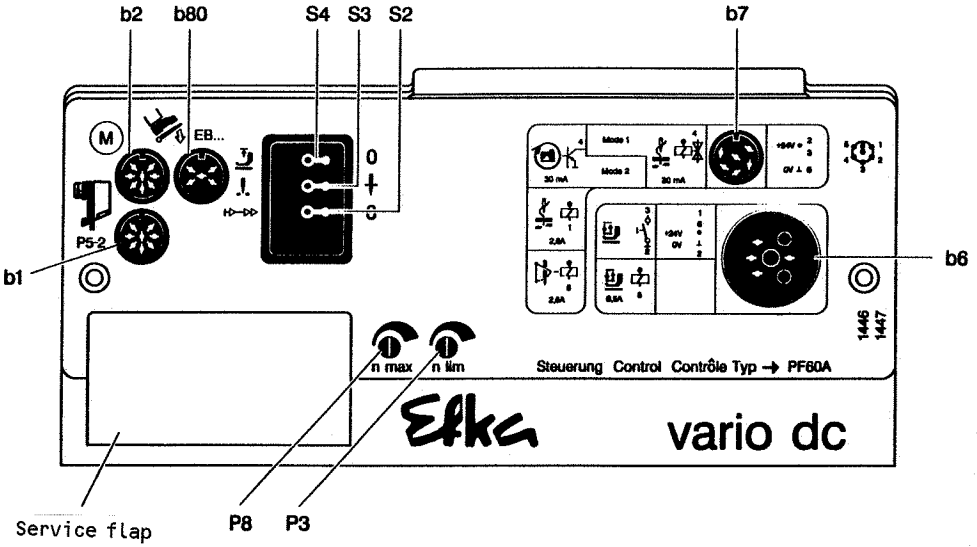


Figure 1

3.2 Selector for presser foot, needle position and softstart

Switch	Function	Switch position left	middle	right
S2	Softstart	on	-	off
S3	Needle position at stop within the seam	up	-	down
S4	Presser foot up at each stop within the seam	yes	-	no

4. Instructions for the technician

4.1 The programming mode

The programming mode aims at protecting the sewing machine from unintentional operating errors. The functions essential to safety described in chapter 4.3 can only be adjusted when the programming mode is on. The switches assigned for programming are accessible when the service flap is opened.

Open the service flap!
For this purpose, press the top side of the flap!

You can see one group of miniature switches called DIL switches (S9), and 2 potentiometers (P1 and P2).

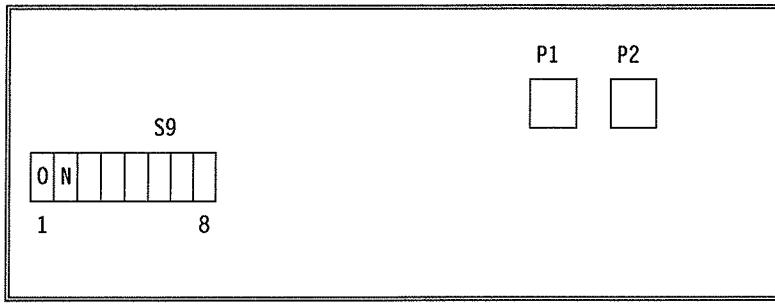


Figure 2

Caution! DIL switches are connected by pressing down the written side

Connection of programming mode

- Terminate the started seam by heeling the pedal back
- S9/1 = **ON**

An acoustic signal can be heard in the programming mode (see § 4.12).

Note:
Potentiometers P3 and P8 receive another function as long as the programming mode is connected.

Disconnection of programming mode

S9/1 = **OFF**

Note:
The changed values will be stored, if potentiometers P3 and P8 are adjusted in a range lower than -5° or higher than +5° in the programming mode. The original value of P8 has to be readjusted.

4.2 The selection of the sewing machine type

You can select a certain sewing machine type, lock stitch or chain stitch, only if you are in the programming mode.

Open the service flap

Switch
S9/1 = ON = programming mode

Select mode 1 = lock stitch

Switch
S9/5 = ON

Select mode 2 = chain stitch

Switch
S9/5 = OFF

Mode 1 (lock stitch)

Signals for magnetic or pneumatic thread trimmer are activated during machine run (npos). The activation time can be influenced with the position transmitter. The activation time of the thread wiper can be programmed. (see also signal diagrams chap. 7)

Mode 2 (chain stitch)

Signals for thread trimmer and thread wiper are activated at machine standstill. The activation times can be programmed. Signals for thread trimmer, thread wiper and foot lift can overlap.
(see also signal diagrams chap. 7)

4.3 Necessary adjustments in the programming mode before use

4.3.1 The sense of rotation of the motor shaft

Switch on the programming mode according to chapter 4.1. An acoustic signal can be heard (see chapter 4.12).

Adjust the sense of rotation of the motor shaft with switch S9/6.

S9/6 = **ON** = clockwise rotation (look at the pulley)

S9/6 = **OFF** = anticlockwise rotation (look at the pulley)

Actuating switch S9/6 when the programming mode is disconnected will cause no reaction.
In order to keep stored any change in the sense of rotation after switching on the programming mode, first set S9/6 to the initial position.
The sense of rotation will reverse only after changing anew the switch position.

4.3.2 The braking at machine standstill

The braking at machine standstill can only be adjusted if the motor had already started once immediately after power on, and if the started seam has been terminated by heeling the pedal back.

Open the service flap

Switch
- **S9/1** = **ON** = programming mode

Turn
- **S2-S4** to the left.

You can hear the beeper signal as long as the adjusting function is activated (see chap. 4.12).

The braking effect is tested at the handwheel and can be adjusted by means of **potentiometer P3.**

Set DIL switch **S9/1** to **OFF** in order to store the adjustment and to conclude the programming. Then turn potentiometer P3 and switches S2-S4 back to their initial position.

4.3.3 The reversion of the machine

The reversion of the machine can only be adjusted if the motor had already started once immediately after power on, and if the started seam has been terminated by heeling the pedal back.

Open the service flap

Switch on the programming mode according to chapter 4.1. An acoustic signal can be heard (see § 4.12).
Turn switches S2 to S4 to the right.

As long as this setting function is effective, it will be indicated by a beep (see § 4.12).

Adjustment of the reversing angle

You can adjust the reversing angle from 0-380° by means of **potentiometer P3**, i.e. the motor can make a reversion of slightly more than 1 rotation max.

Adjustment of the activation delay until reversion

An activation delay from 0-1000 ms until the beginning of the reversion can be adjusted through **potentiometer P8.**

The value can only be changed if the potentiometer has been adjusted in a range higher than +5° and lower than -5°.

You can check the adjustments by performing a test operation in the active programming mode.

> **CAUTION!** If P3 is set on 0 (= turned entirely to the left), there will be no reversion of the motor.
> Set S9/1 to OFF in order to store the setting values. Programming is concluded, P3 and P8 preserve their initial signification and values. Bring switches S2-S4 back to the previous position.

4.3.4 The selection of the speed range

The speed range can only be changed if the programming mode (S9/1 = **ON**) is connected. You can hear a signal as long as the programming mode is connected (see chapter 4.12).
S9/8 = **ON** = maximum speed until 10000 RPM
S9/8 = **OFF** = maximum speed until 5000 RPM

CAUTION! Actuating S9/8 while the programming mode is disconnected will cause no reaction. In this case, switch S9/8 must be first brought back into its initial position after connecting the programming mode.
The change of the switch position will then occasion the commutation of the speed range.

Caution! The maximum speed of the motor comes to 5000 RPM. In order that the sewing machine reaches its maximum speed a pulley must be mounted, which will have the convenient transmission ratio for the speed range.

4.3.5 Adjustment of the operating and delay time for thread trimmer, thread wiper and foot lift

According to the sewing machine type the output transistors can be programmed by means of switches S2-S4.
(see table)
Terminate the started seam by heeling the pedal.

- **Open the service flap**
  Set
- **S9/1** to **ON** = programming mode
  Select your output transistor with **S2-S4**
  Begin the desired adjustment with **P3** and **P8.**

  You can check your adjustments thanks to a test operation (in the programming mode)

Storing the values

Set
- **S9/1** to **OFF**
  The values are durably stored.
- Bring switches and potentiometers back to the initial position.

Programming of output transistors						
Mode	Output transistor	S4	S3	S2	Potentiometer P8	Potentiometer P3
Mode 1 lock stitch	Foot lift	right	left	left	Delay foot lift without thread wiper t10	no reaction
	Th. wiper	left	right	left	Delay th. trim. end/th. wiper t9	Operating time of th. wiper t6
	Foot lift	left	left	right	Delay th. wiping end/foot lift t7	Start. delay after foot lift t3
Mode 1 chain stitch	Thread trimmer	right	left	left	no reaction	Operating time of thread trimmer t8
	Th. wiper	left	right	left	Delay th. trim. start/th.wip. t9	Operating time of th. wiper t6
	Foot lift	left	left	right	Delay th. trim. start/f. lift t7	Start. delay after foot lift t3

4.4 Necessary adjustments before use on position transmitter P5-2, switches and potentiometers

Before adjusting the position transmitter make sure that the sense of rotation of the motor shaft is correctly set.
(see § 5 Adjustments of your control at delivery)

4.4.1 How to adjust the position transmitter

Caution! Power off for adjusting the discs of the position transmitter

- Open the position transmitter
(unscrew the cover of the position transmitter)

Adjustment of position 1 (lower needle position)
- Turn switch **S3** to the right
- Actuate the pedal forward, then release it
- Adjust the (central) disc for position 1

Repeat the above-mentioned process until the desired position is reached

Adjustment of position 2 (upper needle position)
- Turn switch **S3** to the left
- Actuate the pedal forward, then release it
- Adjust the (outer) disc for position 2

Repeat the above-mentioned process until the exact position is reached

Caution! Make sure that the minimum slot width of both positions between leading edge and trailing edge does not come up to 20°.

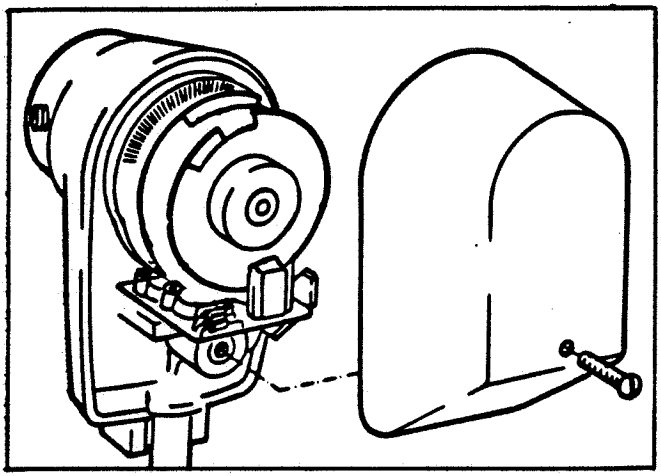


Figure 3

4.4.2 The adjustment of the machine speed

How to adjust the desired speed of your machine

Open the service flap!

- Select your speed range (see § 4.3.4)
Turn (see fig. 4)
- potentiometer **P2** entirely to the left
From outside turn
- potentiometer **P8** entirely to the right
Actuate now the pedal forward
Motor runs at corresponding speed
- Turn potentiometer **P2** to the right until
the desired speed is adjusted

4.4.3 The external speed reduction

The maximum speed adjusted by means of **P2** (n.maxmax) can be reduced up to 1/4 through potentiometer **P8** (nmax).
By turning **P8** entirely to the right the maximum speed adjusted with **P2** will be performed.

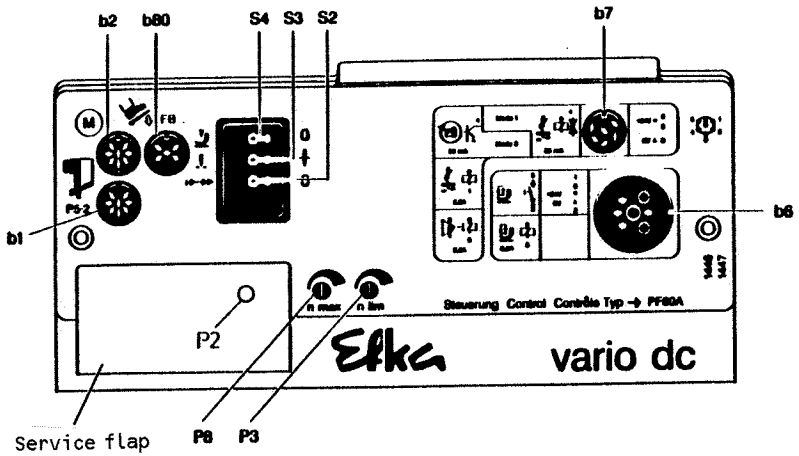


Figure 4

4.4.4 The maximum speed

By means of potentiometer P2 (n.maxmax) you can change the maximum speed.
The setting range for speed class up to 5000 RPM comes to 625 - 5000 RPM.
The setting range for speed class up to 10000 RPM comes to 4000 - 10000 RPM.

Adjustment:

Open the service flap

- select speed class (see § 4.3.4)
- turn potentiometer **P2** (n.maxmax) entirely to the left
- turn potentiometer **P8** (n.max) entirely to the right
- turn potentiometer **P2** (n.maxmax) to the right until you reach the desired maximum speed

4.4.5 The adjustment of the positioning speed

Open the service flap

By means of potentiometer **P1** you can adjust the positioning speed in a range between 60 RPM and approx. 440 RPM.

4.5 The thread trimmer and thread wiper

The control is provided with sockets for thread trimmer and thread wiper.
The trimming process is performed at positioning speed (can be adjusted with P1, see chap. 4.4.5)

Open the service flap

Switch
S9/7 = **ON** = thread trimmer active
S9/7 = **OFF** = thread trimmer not active

> **Caution!** If no thread trimmer is connected, the operating time is set to zero and the activation delay is changed.

4.6 The presser foot position

Select your presser foot lift!

Presser foot lift at stop within the seam **ON**
Turn switch S4 to the **left**

Presser foot lift at stop within the seam **OFF**
Turn switch S4 to the **right**

Presser foot lift at seam end

Open the service flap

Switch S9/4 = **ON**
Presser foot lift stored at seam end **ON**
Switch S9/4 = **OFF**
Presser foot lift stored at seam end **OFF**

4.7 The adjustment of the basic position of the needle

The motor stops in the selected basic position at stop within the seam.

needle up

switch **S3** = left

needle down

switch **S3** = right

4.8 The selection of softstart

You can adjust the function softstart by means of switch S2

S2 = **to the left** = **ON** softstart connected
S2 = **to the right** = **OFF** softstart disconnected

When softstart is connected, the first 2 stitches will be performed at a speed of 500 RPM.
If the programmed speed is under 500 RPM, this speed will be performed.

4.9 First slow stitch after power on

For protecting the sewing machine this control can be programmed in such a way that the first stitch after power on will be performed at positioning speed.

Caution! Function cannot be switched off

4.10 The external set-point adjuster

The external set-point adjuster is connected to socket b80 (see fig. 1 page 7).
The following table describes the coding of each pedal steps:

Pedal steps:	D	C	B	A	Function
-2	H	H	L	L	Function sequence for seam end
-1	H	H	H	L	Lift presser foot
0	H	H	H	H	Motor stops
½	H	H	L	H	Lower presser foot
1	H	L	L	H	Speed stage 1
2	H	L	L	L	Speed stage 2
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

L = input set on 0V Switch closed
H = input opened Switch opened

4.11 Acoustic error messages

CAUTION! All error messages cause the machine to stop.
The error message, except error 5, is emitted until disconnection of the motor.

ERROR 1: **Position transmitter defective or not mounted**

Signal: 1 short beep, short pause, 1 long beep, ...

This error message will be sent in the following cases:
- the position transmitter is defective or not connected
- the connections for position transmitter and commutation transmitter have been inter-changed.
- the position transmitter is not mounted on the sewing machine shaft

ERROR 2: **Blocking control**

Signal: 2 short beeps, short pause, 1 long beep, ...

This message can have the following causes:
- the control notices that the machine shaft does not move despite motor activation
- The maximum speed is not reached (e.g. wrong pulley etc.)
- The actual value is by 1000 RPM higher than the set value

ERROR 3: **Commutation transmitter**

Signal:	3 short beeps, short pause, 1 long beep, ...

This error message will be emitted if the control identifies that the commutation transmitter is defective or not connected.

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

Signal:	4 short beeps, short pause, 1 long beep, ...

This error message indicates that the micro-processor is no more able to work properly.
This failure can have the following causes:
- disturbances from outside (e.g. sewing machine head not connected to earth, defective power supply etc.)
- hardware malfunction on the printed circuit board of the computer.

ERROR 88: **Mains interruption**

Signal:	1 long beep, long pause, ...

This error message appears when the mains supply is briefly interrupted (about 2 sec.)

4.12 Acoustic messages in the programming mode

Braking at standstill

Signal:	1 short beep, long pause, ...

This message indicates that the programming mode is activated and the braking at standstill can be adjusted by means of potentiometer P3.

Reversion

Signal:	2 short beeps, long pause, ...

This message indicates that the programming mode is activated and the reversion can be adjusted by means of potentiometers P3 and P8.

Programming of output transistor for thread trimmer

Signal:	3 short beeps, long pause, ...

This message indicates that the programming mode is activated and the thread trimmer can be adjusted by means of potentiometers P3 and P8.

Programming of output transistor for thread wiper

Signal:	4 short beeps, long pause, ...

This message indicates that the programming mode is activated and the thread wiper can be adjusted by means of potentiometers P3 and P8.

Programming of output transistor for foot lift

Signal:	5 short beeps, long pause, ...

This message indicates that the programming mode is activated and the presser foot lift can be adjusted by means of potentiometers P3 and P8.

5. Adjustments of your control at delivery

Programming of operations		
Switch	Position	Signification
S9/1	off	Programming mode off
S9/2	---	no function
S9/3	---	no function
S9/4	off	Foot lift at seam end
S9/5	on	Mode commutation mode 1 (lock stitch)
S9/6	off	Left rotation of the motor shaft
S9/7	off	Thread trimmer on
S9/8	off	Speed class 5000 RPM

Switches accessible from outside		
Switch	Position	Signification
S2	right	Softstart off
S3	right	Needle position at stop within the seam needle down
S4	right	Foot lift at stop within the seam off

Adjustments of potentiometers		
Potentiometer	Position	Signification
P1	150 RPM	Positioning speed (n.pos)
P2	1500 RPM	Maximum speed (n.maxmax)
P3		
P8	1500 RPM	n.max = n.maxmax

Other preset functions (via programming mode)			
Switch	Position	Signification	
	off	Braking at standstill	
	0 ms	Reversing delay	
	0°	Reversing angle	
	80 ms	Starting delay from lifted foot on	t3
	120 ms	Operating time th. wiper (lock st.)	t6
	200 ms	Operating time th. wiper (chain st.)	t6
	80 ms	Delay foot lift after th. wiper (lock st.)	t7
	320 ms	Delay th. trimming start / foot lifting (chain st.)	t7
	150 ms	Operating time th. trim. (chain st.)	t8
	0 ms	Delay th. wiper (lock st.)	t9
	80 ms	Delay th. wiper (chain st.)	t9
	80 ms	Delay foot lift without th. wiping (lock st.)	t10
	(+/-10 ms)	Tolerance for all times	

Other preset values

The following preset values are fixed in the EEPROM and cannot be modified by the operator.

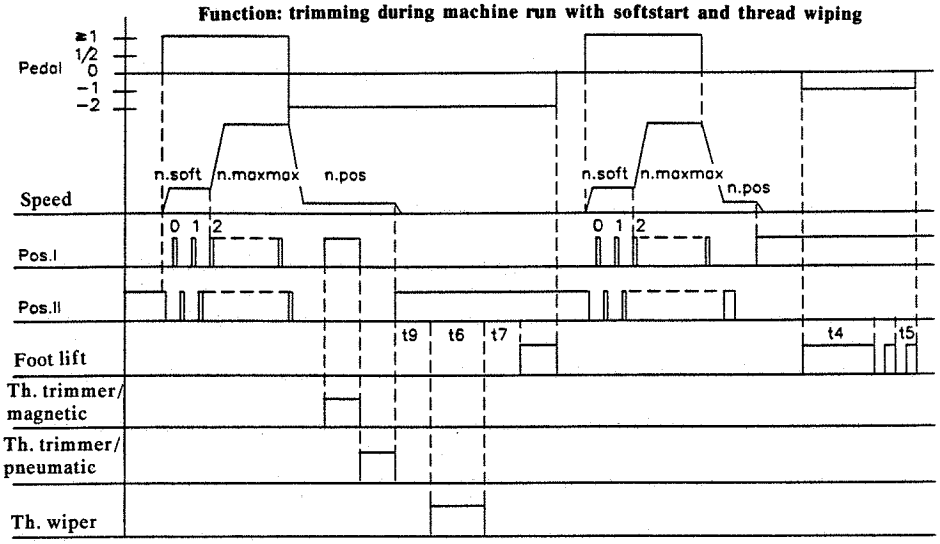
t4	Full control of presser foot lift	500 ms (+/-10 ms)
t5	Clock frequency of the presser foot lift	15 kHz
	Chopping of presser foot lift	1:1
n.soft	Softstart speed	500 RPM
c.soft	Softstart stitches	2

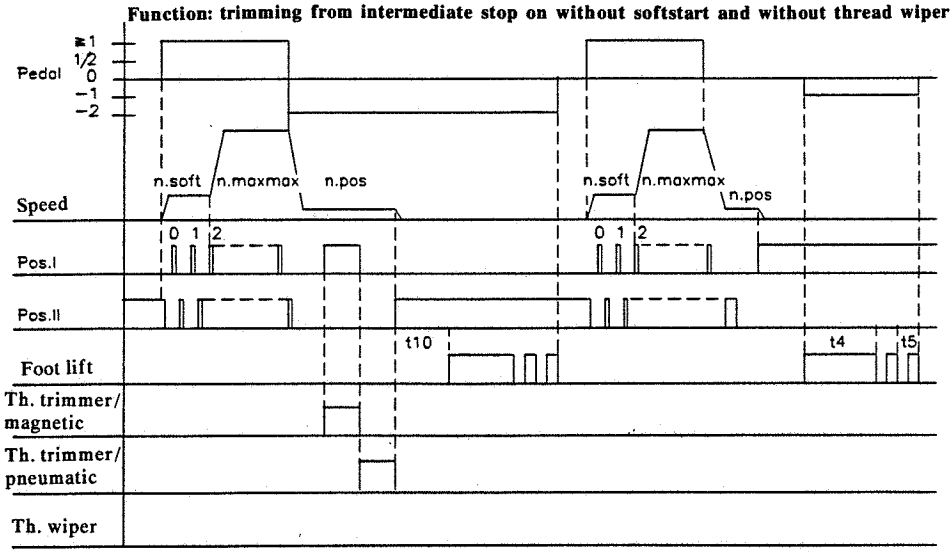
6. Definitions

Basic position of the needle	Needle position at stop within the seam
Maximum speed	Highest speed of the sewing machine
to position	Machine stop in certain positions (needle positions)
Positioning and trimming speed	Adjusted lowest speed of the sewing machine, at which positioning and thread trimming are performed
potentiometer	Adjustable electric resistance
Softstart	The first two stitches of a seam are performed at a reduced speed
Speed range	Operative range of the sewing machine limited by the positioning and trimming speed, as well as by the maximum speed
Stop braking	Braking effect at machine standstill in order to prevent the handwheel from moving by itself

7. Signal diagram

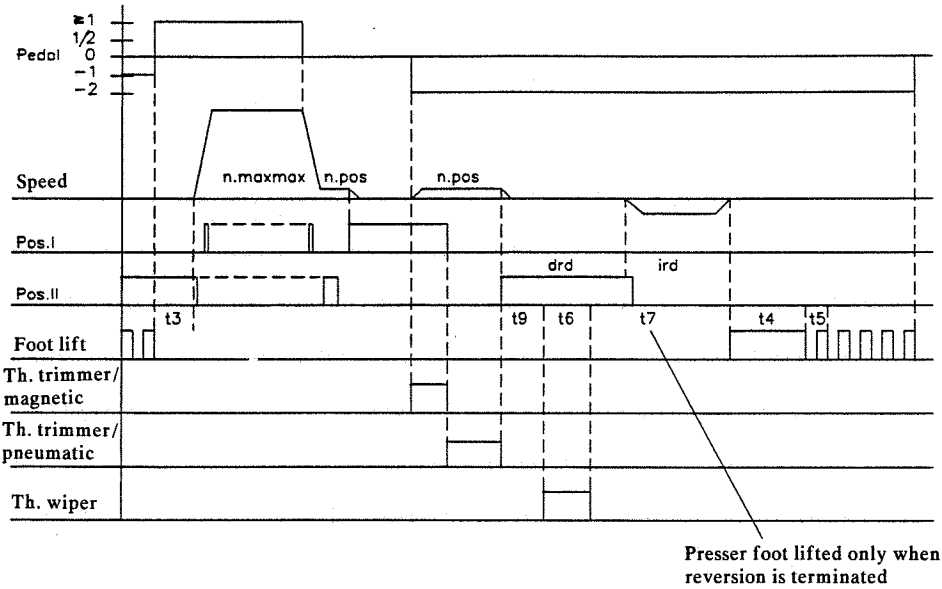
Lock stitch





Lock stitch

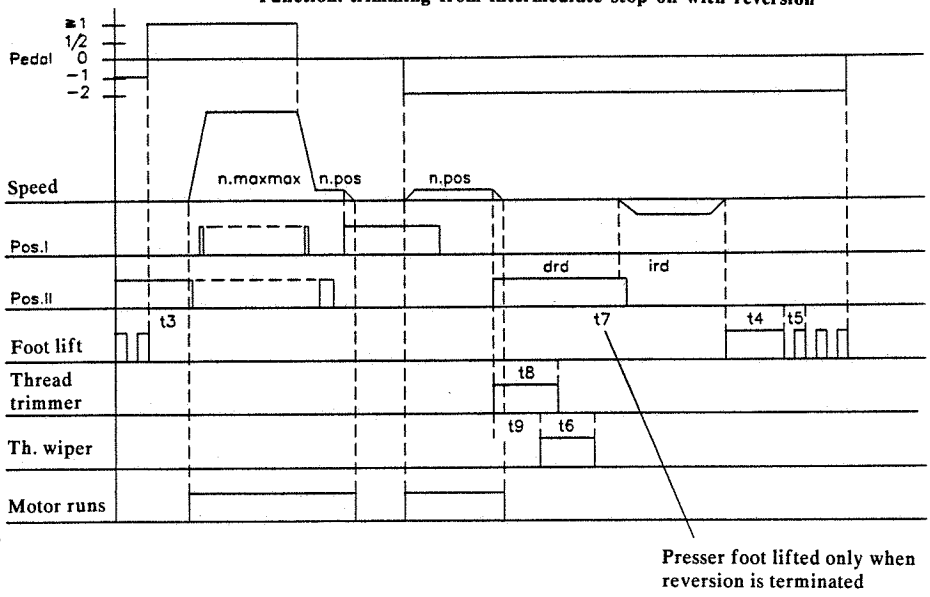
Function: trimming from intermediate stop on with reversion



t3	= Starting delay after presser foot lift	(adjustable in the programming mode)
t4	= Full control of presser foot lift	(fixed in the programme)
t5	= Partial excitation of foot lift	(fixed in the programme)
t6	= Operating time of thread wiper	(adjustable in the programming mode)
t9	= Delay of thread wiper	(adjustable in the programming mode)
t10	= Delay of foot lift without thread wiper	(adjustable in the programming mode)
drd	= Reversing delay	(adjustable in the programming mode)
ird	= Reversing angle	(adjustable in the programming mode)
n.pos	= Positioning speed	(adjustable in the programming mode)
n.soft	= Softstart speed	(fixed in the programme)
n.maxmax	= Maximum speed	(adjustable in the programming mode)

Chain stitch

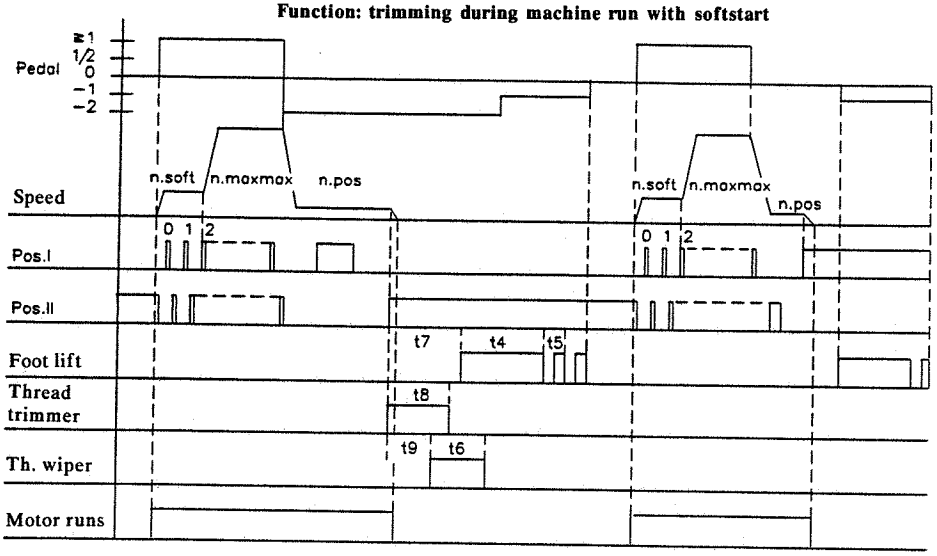
Function: trimming from intermediate stop on with reversion



t3	= Starting delay after presser foot lift	(adjustable in the programming mode)
t4	= Full control of presser foot lift	(fixed in the programme)
t5	= Partial excitation of foot lift	(fixed in the programme)
t6	= Operating time of thread wiper	(adjustable in the programming mode)
t7	= Delay of presser foot lift	(adjustable in the programming mode)
t8	= Operating time of thread trimmer	(adjustable in the programming mode)
t9	= Delay of thread wiper	(adjustable in the programming mode)
drd	= Reversing delay	(adjustable in the programming mode)
ird	= Reversing angle	(adjustable in the programming mode)
n.pos	= Positioning speed	(adjustable in the programming mode)
n.maxmax	= Maximum speed	(adjustable in the programming mode)

Chain stitch

Function: trimming during machine run with softstart



t3	= Starting delay after presser foot lift	(adjustable in the programming mode)
t4	= Full control of presser foot lift	(fixed in the programme)
t5	= Partial excitation of foot lift	(fixed in the programme)
t6	= Operating time of thread wiper	(adjustable in the programming mode)
t7	= Delay of presser foot lift	(adjustable in the programming mode)
t8	= Operating time of thread trimmer	(adjustable in the programming mode)
t9	= Delay of thread wiper	(adjustable in the programming mode)
drd	= Reversing delay	(adjustable in the programming mode)
ird	= Reversing angle	(adjustable in the programming mode)
n.pos	= Positioning speed	(adjustable in the programming mode)
n.soft	= Softstart speed	(fixed in the programme)
n.maxmax	= Maximum speed	(adjustable in the programming mode)

8. Connections to the sockets

b1 - Position transmitter P5-2
b2 - Commutation transmitter for DC motor
b6 - Solenoid presser foot lift, pushbutton foot lift without pedal actuation
b7 - Solenoid thread trimmer magnetic/pneumatic, thread wiper
b80 - External set-point adjuster EB 301 (standard) or EB 101, EB 102, ...

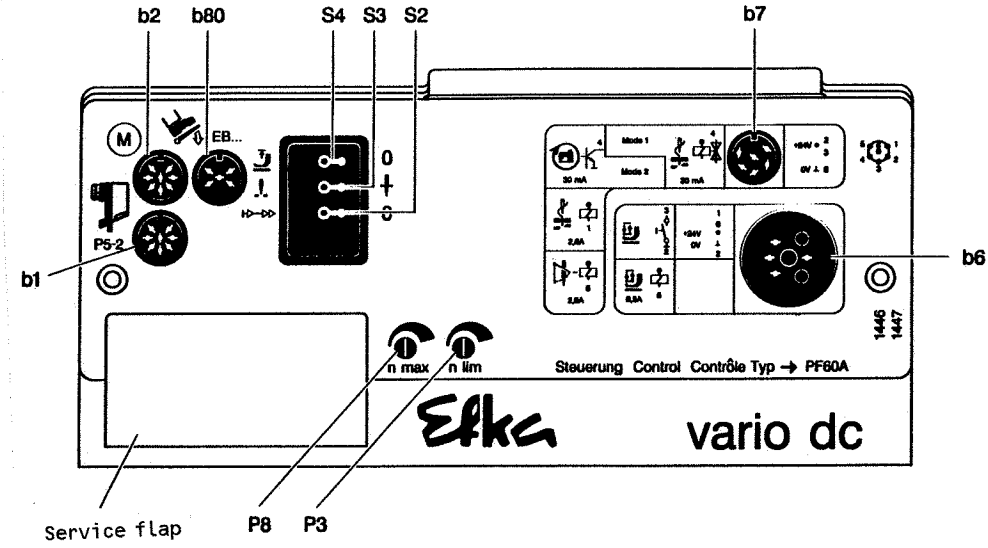
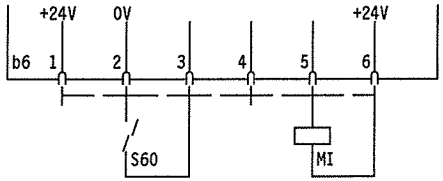
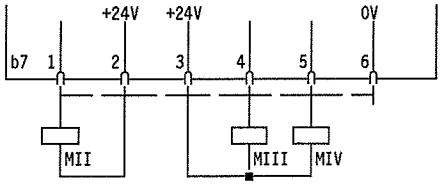


Figure 5

9. Connection diagram of the sockets





Lock stitch mode

MI - Solenoid (or solenoid valve) presser foot lift (max. 6.5A)
MII - Solenoid thread trimmer magnetic (max. 2.6A)
MIII - Solenoid thread trimmer pneumatic (max. 0.7A)
MIV - Solenoid thread wiper (max 2.6 A)

Chain stitch mode

MI - Solenoid (or solenoid valve) presser foot lift (max. 6.5A)
MII - Solenoid thread trimmer (max. 2.6A)
MIII - Solenoid motor runs (0.3A)
MIV - Solenoid thread wiper (max 2.6 A)

S60 - Pushbutton for: Presser foot lift without pedal actuation

Plugs for sockets (b6) = part No. 0500457
(b7) = part No. 0500703

Corresponding position transmitter: type P5-2
Corresponding power pack: N152

Efka

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