Efka vario dc

CONTROL AC62AV1461

INSTRUCTION MANUAL

No. 402099 english

Efka
FRANKL & KIRCHNER
GMBH & CO KG

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EFKA OF AMERICA INC.

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SINGAPORE PTE. LTD.

Contents Page

1. Important Safety Instructions

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

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

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

- Use this drive only for its intended use as described in the instruction manual.
- Use only attachments recommended by the manufacturer or as contained in the instruction manual.
- Do not operate without corresponding protective devices.
- Never operate this drive if one or more parts (e.g. cables, plugs) are damaged, if it is not working properly, if any damages can be identified or are to be suspected (e.g. after it has been dropped). Only qualified personnel are authorized to make adjustments, eliminate faults and complete repair work.
- Never operate the drive with the air openings blocked. Keep ventilation openings of the drive free from the accumulation of lint, dust and loose cloth.
- Never drop or insert any object into any opening.
- Do not use drive outdoors.
- Do not operate where aerosol (spray) products are being used or where oxygen is being administered.
- To disconnect, turn off main switch, then remove plug from outlet.
- Do not unplug by pulling on cord. To unplug, grasp the plug, not the cord.
- Keep fingers away from all moving machine parts. Special care is required e.g. around the sewing machine needle and the V-belt.
- Before mounting and adjusting accompanying devices, i.e. position transmitter, reversing device, light barrier, etc., disconnect drive from mains (turn off main switch, remove mains plug from outlet [DIN VDE 0113 part 301; EN 60204-3-1; IEC 204-3-1]).
- Always switch off (0) machine and remove plug from outlet, when removing covers, mounting accompanying devices, position transmitter especially, light barrier, etc., or any other devices mentioned in the instruction manual.
- Only qualified personnel are authorized to work on the electrical components.
- Work on high voltage circuit areas is forbidden, except as stated in the respective regulations, e.g. DIN VDE 0105 part 1.
- Only specially trained personnel are authorized to complete repair work.
- Cables to be wired must be protected against expectable strain and fastened adequately.
- Cables near moving machine parts (e.g. V-belts) must be wired at a minimum distance of 25 mm (see DIN VDE 0113 part 301; EN 60204-3-1; IEC 204-3-1).
- For safety it is preferred to wire the cables separately from each other.
- Before connecting the mains line make sure that the mains voltage corresponds to the specifications on the motor rating plate and on the nameplate of the power pack.
- Connect this drive to a properly grounded outlet only. See Grounding Instructions.
- Electric accompanying devices and accessories must only be connected to safety low voltage.
- EFKA DC drives are protected according to overvoltage class 2 (DIN VDE 0160 § 5.3.1).
- Observe all safety guidelines before undertaking conversions or modifications.
- For repair and maintenance use only original replacement parts.

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

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

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

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

Save these instructions for future reference.

2. Range of Applications

The drive is suitable for sewing machines:

Brand	
General	Overlock machines

2.1 Use in Accordance with Regulations

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

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

EN 60204-3-1: 1990 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 AC62AV1461
	- Power pack	N153 (optional N155)
	- External actuator	EB301 (optional EB302, reduced actuating force)
1	Position transmitter	P5-2
1	Mains switch	NS105
1	Set of standard accessories consisting of:	B131 belt guard, complete set of hardware motor mounting foot bracket 1 and 2, short documentation
1	Pulley	

3.1 Special Accessories

Control panel VARIOCONTROL type V62LK	- part no. 5900149
Reflection light barrier module Variolux LSM001	- part no. 6100028
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 control	- 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 mm², grey, with forked cable brackets on both sides	- part no. 1100313
Fitting piece for position transmitter on Juki machines	- part no. 0300019
Extension cable for position transmitter P4-.. and P5-.., as well as for commutation transmitter, 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 transmitter, approx. 1100 mm long, complete with plug and socket connector	- part no. 1111584
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)
3-pin plug with slide index	- part no. 0500402
5-pin plug with slide index	- part no. 0501431
6-pin plug with slide index	- part no. 0500703
10-pin plug (Hirschmann Mes100)	- part no. 0500357

4. Starting Service

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

- **The correct installation of the drive, the position transmitter and accompanying devices, if necessary**
- **The correct adjustment of the direction of rotation of the motor**
- **The setting of the positions**

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 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 changed by the operator, e.g. needle position up/down, presser foot stored at the seam end, chain cutting at the start of the seam and/or at the seam end on/off, maximum speed reduction, etc.
The operating elements (switches, potentiometers) for this level are accessible directly outside on the control or on the Variocontrol. Any setting changed by these operating elements is immediately effective.

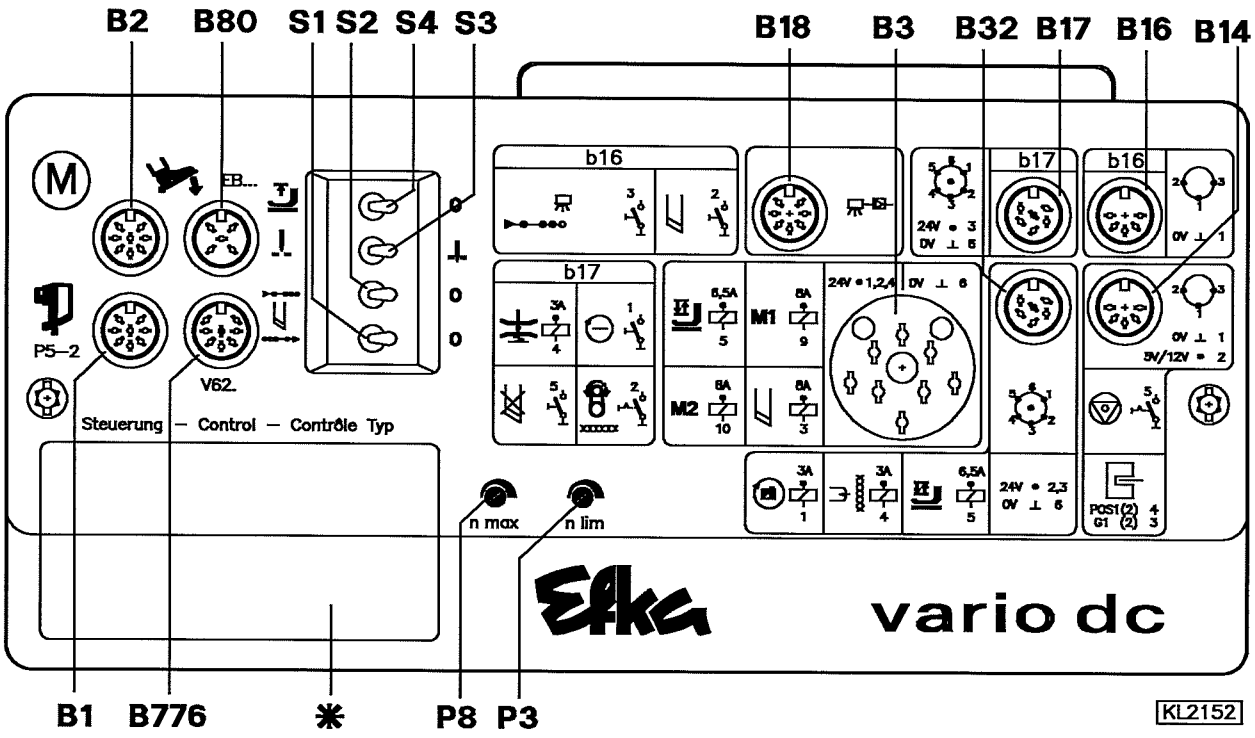


Fig. 1:

B1	- Position transmitter	B17	- Solenoids and switches
B2	- Commutation transmitter for d.c. motor	B18	- Light barrier module
B3	- Solenoids	B32	- Solenoids/solenoid valves
B14	- Switches / sensor	B80	- Actuator
B16	- Pushbuttons	B776	- Control panel

* = Service flap with type designation

Switch	Function	left	right
S1	Chain cutter at the start of the seam	on	off
S2	Chain cutter at the seam end	on	off
S3	Needle position at stop in the seam	up	down
S4	Presser foot up at the seam end	on	off

Potentiometer	Function	Turn to the left	Turn to the right
P3	Stitch counting speed	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 are located under the service flap. Basic settings for the adaptation to the type of machine are additionally protected by a programming mode.

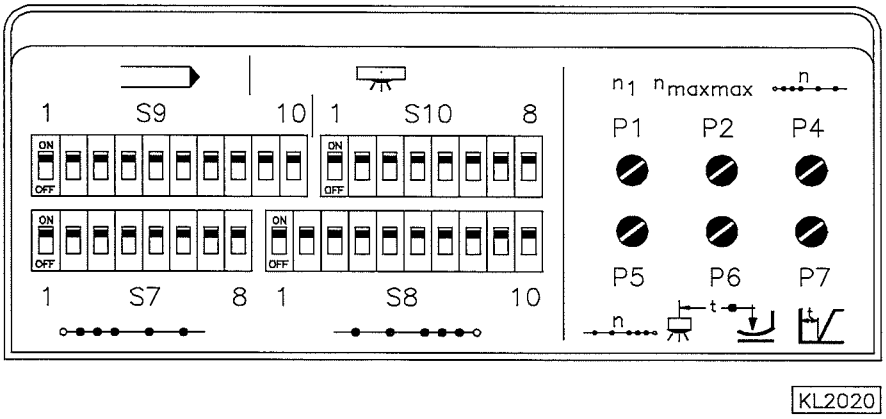


Fig. 2:

DIL/DIP Switches	Functions
S7/1-8	Z1 stitch counting chain suction from the start of the seam to chain cutting
S8/1-8	Z3 stitch counting chain suction at the seam end from light barrier uncovered to stop
S8/9-10	Z4 stitches after chain cutter off; functions as clamp during counting at the start of the seam
S9/1	Programming mode on / off
S9/2	Blocking of machine run activated with opened / closed connection
S9/3	Automatic seam speed on / off (interruption by pedal in position -2)
S9/4	Chain suction speed at the start of the seam automatic / limited (P4)
S9/5	Chain suction speed at the seam end automatic / limited (P5)
S9/6	Direction of rotation of the motor shaft right / left
S9/7	Chain suction at the start of the seam on / off
S9/8	Chain suction at the seam end on / off
S9/9-10	Z2 stitch counting from chain cutting on to chain suction off at the start of the seam
S10/1-2	Z2 stitch counting from chain cutting on to chain suction off at the start of the seam
S10/3	Sewing start blocked with light barrier uncovered on / off
S10/4	Automatic light barrier start on / off
S10/5	Seam end without stop on / off
S10/6-8	Filter stitches for knitted fabrics

Potentiometer	Functions
P1	Positioning speed
P2	Maximum speed of the sewing machine
P4	Chain suction speed at the start of the seam
P5	Chain suction speed and light barrier speed at the seam end
P6	Start delay in the case of automatic start of the light barrier until presser foot off
P7	Delay time until presser foot up with pedal -1 (t2)

Potentiometer	Programmable times in the programming mode
P3	Reversing angle when unlocking the chain
	Braking power at standstill
	Operating time M1
	Operating time M2
	Operating time chain cutter
	Start delay from presser foot up
P8	Activation delay of unlocking the chain
	Delay until M1
	Delay until M2
	Activation delay of chain cutter
	Delay of presser foot at the seam end

Note
See also chapter "Functions With Connected Control Panel V62LK".

6. Functions and Settings on the Operator Level

6.1 Chain Cutter at the Start of the Seam

The chain cutter at the start of the seam is switched on or off by flip switch S1.

- **S1 = left Chain cutter at the start of the seam on**
- **S1 = right Chain cutter at the start of the seam off**

The chain cutter delay t11 can be effective from the beginning of position 1 until machine standstill.

6.2 Chain Cutter at the Seam End

The chain cutter at the seam end is switched on or off by flip switch S2.

- **S2 = left Chain cutter at the seam end on**
- **S2 = right Chain cutter at the seam end off**

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 Presser Foot Lifting

The control is suitable for the connection of magnetic or pneumatic presser foot lifting.

- **S4 = left** **Presser foot lifting stored at the seam end on**

- **S4 = right** **Presser foot lifting stored at the seam end off**

The presser foot is lifted:

- in the seam - by heelback (position -1)

- at the seam end - by heelback (position -1 or -2) or automatically (S4 = left)
  - by light barrier, automatically
  - by stitch counting, automatically
  - 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) by P7.

The start delay (t3) from lifted presser foot can be set on the technician level.

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

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

6.5 Maximum Speed Limitation

Maximum speed limitation to the most common level is done by P8 (nmax).
It can be set while the drive is running.

- **Turn P8 to the left** **Speed is reduced (left stop = 1/4 nmaxmax).**

- **Turn P8 to the right** **Speed is increased (right stop = nmaxmax).**

6.6 Limitation to Stitch Counting Speed

The maximum speed can be reduced to stitch counting speed by the pushbutton on socket B17/1-6.

6.7 Setting the Stitch Counting Speed

The stitch counting speed can be set with potentiometer P3. It is controled by the pedal and limited.

- **Turn P3 to the left** **Speed is reduced (left stop = 1/8 nmaxmax).**

- **Turn P3 to the right** **Speed is increased (right stop = nmaxmax).**

Note
Stitch counting only in conjunction with control panel V62LK.

6.8 Chain Cutter Suppression/Recall

The next chain cutter operation can be recalled or suppressed once by pressing the pushbutton (knee switch) for chain cutter suppression/recall connected to socket B17/5-6.

When using the control panel V62LK this function can also be performed by using the corresponding pushbutton.

6.9 Manual Chain Cutter

By pressing the pushbutton (knee switch) connected to B16/1-2 the chain cutter can be activated at any time, even if the function is switched off by switches S1 and S2. Moreover, this function can be activated when using the control panel V62LK.

6.10 Unlocking the Chain

When the function "unlocking the chain" at the seam end is on, thread trimming is automatically suppressed.

Switch on socket B17/2-6	Function
Switch closed Switch open	Unlocking the chain On Unlocking the chain Off

Sequence with heelback from machine run or from position 2:

- Run to position 1
- Activation delay according to setting (drd)
- Reversing angle according to setting (ird)

Sequence with heelback from machine standstill in position 1:

- Reversing angle according to setting (ird)

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

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 discribed in the following are located under 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.
The programming mode can only be switched on after power on and/or after a seam has been completed.

- 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:

- Direction of rotation of the motor
- Braking power at standstill
- Reversion when unlocking the chain
- Delay until M1
- Operating time of M1
- Delay until M2
- Operating time of M2
- Delay until chain cutter
- Operating time of chain cutter
- Delay of presser foot at seam end
- Start delay after lifted presser foot

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 ± 5°.

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

7.2 Direction of Rotation of the Motor

- S9/1 = on — Switch on programming mode (acoustic signal depending upon the position of the flip switches S1 - S4)
- S9/6 = on — Clockwise rotation (look at the motor shaft)
- S9/6 = aus — Counterclockwise rotation
- S9/1 = aus — Switch off programming mode (no acoustic signal) or continue settings in the programming mode

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.

7.3 Speed Settings

7.3.1 Maximum Speed

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

Note
Set the speed ratio between sewing machine shaft and motor shaft such that the maximum speed is 4000 RPM.

The setting range is between 4000 and 10000 RPM.

Setting the maximum speed

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

Note
Modifications of the maximum speed setting also influences the chain suction speed at the start of the seam and/or at the seam end and the stitch counting speed.

Maximum speed limitation to the most common level is possible on the operator level.

7.3.2 Positioning Speed

The positioning speed can be set with potentiometer P1 (npos) within a range of approx. 60 - 440 RPM.
Drive must be running with pedal pushed forward (first step).

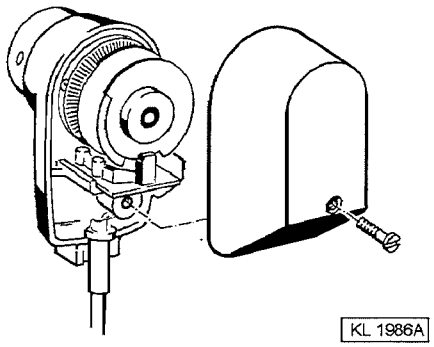
7.4 Setting the Positions

Attention!
Turn power off before adjusting the position transmitter discs.

Caution!
Be very careful when adjusting the position transmitter discs.
Risk of injury.
Please ensure that position transmitter discs and generator disc (inner disc) are not damaged.

How to set the positions

- Remove position transmitter cover after loosening the screw
- Set flip switch S3 to the right, 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 srew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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°.

7.5 Further Speed Settings

7.5.1 Chain Suction Speed at the Start of the Seam

The chain suction speed at the start of the seam can be set by potentiometer P4 (n.av).

· Turn P4 to the left	Speed is reduced (left stop = 1/8 nmaxmax)
· Turn P4 to the right	Speed is increased (right stop = nmaxmax)

7.5.2 Chain Suction Speed at Seam End and Light Barrier Speed

The chain suction speed at the seam end can be set by potentiometer P5 (n.ev). After light barrier sensing the motor runs at this speed.

· Turn P5 to the left	Speed is reduced (left stop = 1/8 nmaxmax)
· Turn P5 to the right	Speed is increased (right stop = nmaxmax)

7.6 Braking Power at Standstill

This function prevents unintentional "wandering" of the needle at standstill.
After the first start of sewing, the effect can be tested by turning the handwheel.

· S9/1 = on	Switch on programming mode (acoustic signal depending upon the position of the flip switches S1 - S4)
· S1 - S4 = on	Switch to the left (acoustic signal · 5 sec ·)
· Turn P3 to the left	Braking power becomes weaker
· Turn P3 to the right	Braking power becomes stronger
· S9/1 = off	Switch off programming mode (no acoustic signal) or continue settings in the programming mode

· Reset S1 - S4 to the desired position

Attention

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

7.7 Reversion when Unlocking the Chain

Reversion is only performed in conjunction with the function unlocking the chain. The reversing angle (0 - 380°) and the delay until the reversion starts (0 - 1000ms), can be set.

· S9/1 = on	Switch on programming mode (acoustic signal depending upon the position of the flip switches S1 - S4)
· Close B17/2-6	Unlocking the chain On
· S1 - S4 = on	All switches to the right (acoustic signal · · 5 sec · ·)

Setting the reversing angle (ird)

· Turn P3 to the left	Reversing angle becomes smaller
· Turn P3 to the right	Reversing angle becomes wider

Setting the delay until reversion (drd)

· Turn P8 to the left	Delay becomes shorter
· Turn P8 to the right	Delay becomes longer
· S9/1 = off	Switch off programming mode (no acoustic signal) or continue settings in the programming mode

· Reset S1 - S4 to the desired position

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

7.8 Blocking of Machine Run (Safety Switch)

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

The blocking of machine run is activated by a switch connected to socket B14/1-5. Whether or not to use a make (N.O.) or break (N.C.) contact can be selected with DIL switch S9/2.

· S9/2 = off	Blocking of machine run with switch open
· S9/2 = on	Blocking of machine run with switch closed

If the blocking of machine run is activated at standstill the machine start is blocked.
- Presser foot lifting is possible

If the blocking of machine run is activated during sewing the drive stops in the basic position.
- Presser foot lifting is possible

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

7.9 Programming the Power Transistors

· S9/1 = on — Switch on programming mode
(acoustic signal depending upon the position of the flip switches S1 - S4)

Power transistor M1 — acoustic signal: · · · 5 sec · · ·
Power transistor M2 — acoustic signal: · · · · 5 sec · · · ·
Power transistor AH — acoustic signal: · · · · · 5 sec · · · · ·
Power transistor FL — acoustic signal: · · · · · · 5 sec · · · · · ·

Power transistor	S4	S3	S2	S1	Potentiometer P8		Potentiometer P3	
M1	right	left	left	left	delay until M1	t16	M1-operating time	t8
M2	left	right	left	left	delay until M2	t10	M2-operating time	t9
AH	left	left	right	left	delay until chain cutting	t11	Operating time of chain cutter	t6
FL	left	left	left	right	delay presser foot lifting at the seam end	t7	Start delay after presser foot lifting	t3

Setting range			
t2 = 0...310 ms (P7) t3.. = 0...510 ms t4 = fixed t5 = fixed	t6 = 0...2.5 s t7 = 0...2.5 s t8 = 0...600 ms t9 = 0...510 ms	t10 = 0...510 ms t11 = 0...2.5 s t12 = fixed t13 = 0...2.5 s (P6)	t16 = 0...510 ms

· Turn P3 / P8 to the left — Delay and/or operating time becomes shorter
· Turn P3 / P8 to the right — Delay and/or operating time becomes longer

Check setting:

· Start short seam by pushing the pedal forward (programming mode remains on)
· Initiate seam end by full heelback (-2)
- A complete seam end sequence is performed

· If necessry, correct delay and/or operating time with P3 / P8

· S9/1 = off — Switch off programming mode
(no acoustic signal)
or continue settings in the programming mode

· Reset S1 - S4 to the desired position

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

7.10 Trimming Operation

This control has connections for a chain stitch thread trimmer. The trimming operation is performed at standstill.

The signals M1, M2, FL of the thread trimming function are parallel (time overlappings are possible).
The times can only be set on the technician level.

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

7.11 Chain Suction

Note
If Variocontrol is connected, chain suction at the start of the seam and at the seam end are switched on and off mainly by slide switches on the control panel (see instruction manual V62LK).

7.11.1 Chain Suction at the Start of the Seam

The function chain suction at the start of the seam is activated on the control panel or on the control with open service flap by switch S9/7.

- S9/7 = on Chain suction at the start of the seam ON
- S9/7 = off Chain suction at the start of the seam OFF

Chain suction at the start of the seam is performed at fixed speed (n.ar) or at pedal controlled speed limited to n.ar.

- S9/4 = on Fixed speed
- S9/4 = off Limited speed

The number of stitches for chain suction at the start of the seam is set by the switches S7/1-8.

· S7/1	1	stitch for chain suction at the start of the seam
· S7/2	2	stitches chain suction at the start of the seam
· S7/3	4	stitches chain suction at the start of the seam
· S7/4	8	stitches chain suction at the start of the seam
· S7/5	16	stitches chain suction at the start of the seam
· S7/6	32	stitches chain suction at the start of the seam
· S7/7	64	stitches chain suction at the start of the seam
· S7/8	128	stitches chain suction at the start of the seam

Example: Switch S7/2 = on and S7/4 = on ==> 10 stitches for chain suction at the start of the seam.

If the light barrier is uncovered during chain suction at the start of the seam, chain suction at the seam end is immediately initiated.

7.11.2 Chain Suction at the Seam End

The function chain suction at the seam end is activated on the control panel or on the control with open service flap by switch S9/8.

- S9/8 = on Chain suction at the seam end ON
- S9/8 = off Chain suction at the seam end OFF

Chain suction at the seam end is performed at fixed speed (n.er) or at pedal controlled speed limited to n.er.

- S9/5 = on Fixed speed
- S9/5 = off Limited speed

If the speed for chain suction at the seam end is set at pedal control (S9/5 = off), only thread trimming will be initiated with pedal in position -2. Otherwise, the seam end with chain suction is performed with pedal in position -2.

The number of stitches for chain suction at the seam end is set by the switches S8/1-8.

· S8/1	1	stitch for chain suction at the start of the seam
· S8/2	2	stitches chain suction at the seam end
· S8/3	4	stitches chain suction at the seam end
· S8/4	8	stitches chain suction at the seam end
· S8/5	16	stitches chain suction at the seam end
· S8/6	32	stitches chain suction at the seam end
· S8/7	64	stitches chain suction at the seam end
· S8/8	128	stitches chain suction at the seam end

Example: Switch S8/2 = on and S8/5 = on ==> 18 stitches for chain suction at the seam end.

7.12 Light Barrier

Operation of the control with light barrier is possible by using the light barrier module EFKA-LSM001. The light barrier module is connected to socket B18 of the control.

When using a control panel Variocontrol V62LK, sewing patterns with special light barrier operations are available. For more details see chapter "Functions with Connected Control Panel V62LK".

The following settings for the light barrier function are possible:

- S10/3 = OFF Sewing start with light barrier uncovered
- S10/3 = ON Sewing start with light barrier uncovered not possible

- S10/4 = OFF Automatic start at the beginning of the seam by light barrier inactive
- S10/4 = ON Automatic start at the beginning of the seam by light barrier active

· S10/6	1 filter stitch for knitted fabrics
· S10/7	2 filter stitches for knitted fabrics
· S10/8	4 filter stitches for knitted fabrics

The light barrier filter for knitted fabrics is activated by setting the number of filter stitches not equal to 0 by switches S10/6...S10/8.

Functional sequence with light barrier see timing diagrams!

7.13 Automatic Start by Light Barrier

The function of the automatic light barrier start at the beginning of the seam is to start sewing by sensing the insertion of fabric. When the light barrier is covered by inserting the fabric, the presser foot lowers after a delay time (t13), which can be set by potentiometer P6. The drive starts after a delay (t3).

The following conditions must be met:

·	Automatic start at the beginning of the seam by light barrier	S10/4 = ON
·	Sewing start blocked with light barrier uncovered	S10/3 = ON
·	Delay automatic start light barrier	t13

· One seam must be executed the normal way, i.e.:
- Pedal in neutral position
- Cover light barrier
- Push pedal forward
- Seam end by light barrier uncovered
- Keep pedal pushed forward

When the light barrier is covered again with pedal pushed forward, the "automatic start" is activated.
This function is interrupted, when the pedal is put back to the neutral position after the seam end.

7.14 Automatic Sewing

· S9/3 = on	Automatic seam speed
· S9/4 = on	Automatic speed at the start of the seam
· S9/5 = on	Automatic speed at the seam end

With pedal in position >1, the drive starts automatically and runs at the speed of the various seam sections. The seam end is performed after the seam section is counted, in light barrier programs by using the light barrier. Interruption of the automatic sequence is possible by pedal in position -2.

7.15 Seam End without Stop

Only in program 0 with connected control panel V62LK or without control panel.

· S10/5 = off	Seam end with stop
· S10/5 = on	Seam end without stop

With pedal in position >1 the drive runs and does not stop at the seam end nor is the thread trimmed. The seam is immediately started again, as long as the pedal is in position >1. The drive stops when the pedal is in position 0 (neutral), and the thread is trimmed when the pedal is in position -2. If S9/4 and S9/5 are set at fixed speed for chain suction at the start of the seam and at the seam end, stopping is impossible in these seam sections. Interruption is possible with pedal in position -2.
See also timing diagrams!

7.16 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

7.17 Signal Output 120 Impulses/Rotation

- Transistor output with open collector
- Switches whenever a slot on the positioning track of the position transmitter disc is sensed (120 times per rotation)
- Independent of sewing, thus also when turning the handwheel manually
- Suitable e.g. for the connection of a counter

7.18 External Actuator EB301 and EB302

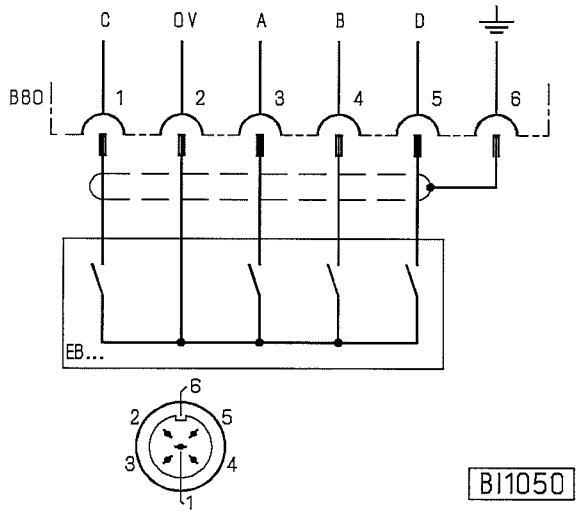
With the help of the external actuator connected with the pedal the commands for the sewing operation are inputted. Instead of the external actuator connected to the socket connector B80 (see chapter Socket Connectors) another external actuator can be connected.

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

Table: Coding of the pedal steps

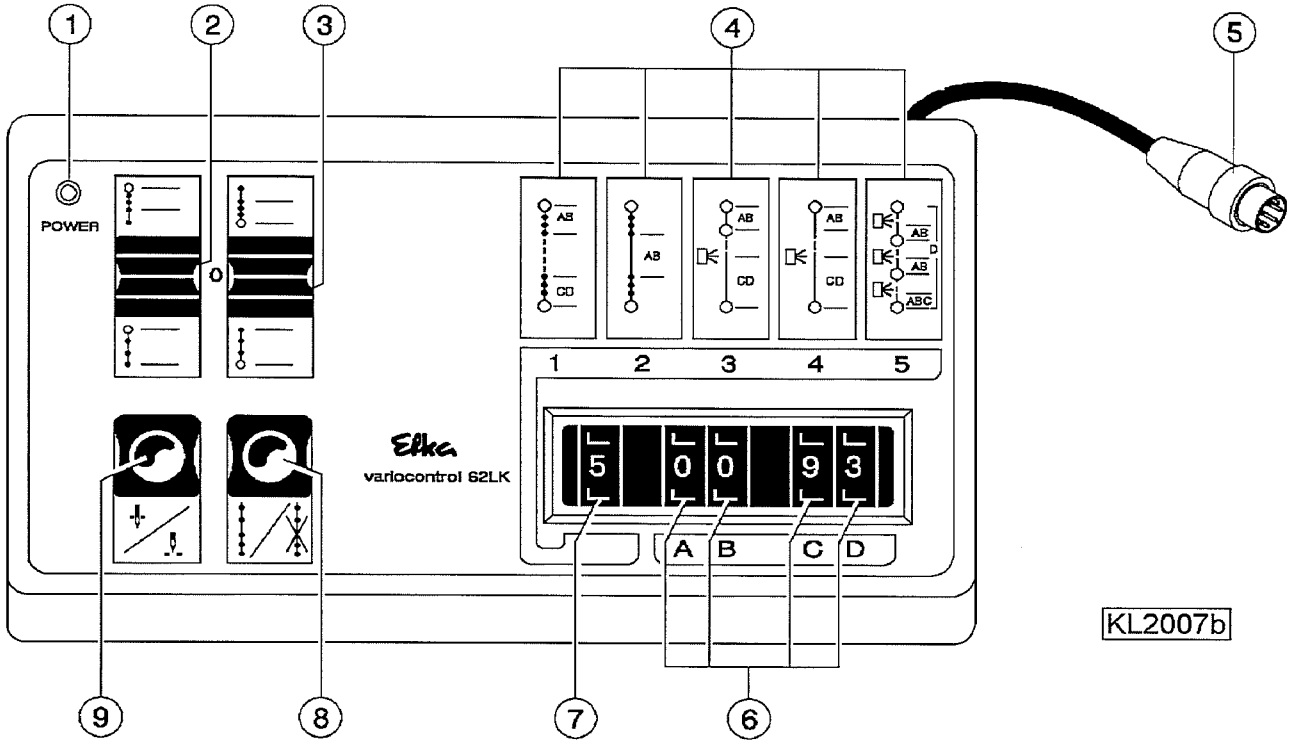
Pedal step	D	C	B	A		
-2	H	H	L	L	Full heelback	(e.g. initiating the seam end)
-1	H	H	H	L	Slight heelback	(e.g. presser foot lifting)
0	H	H	H	H	Pedal in position 0 (neutral)	
½	H	H	L	H	Pedal slightly forward	(e.g. presser foot lowering)
1	H	L	L	H	Speed stage 1	(n_{pos})
2	H	L	L	L	.	
3	H	L	H	L	.	
4	H	L	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



EB... - Actuator

8. Functions with Connected Control Panel V62LK



1	Pilot lamp	- Lights up when power is on and Variocontrol and control are correctly connected.
2	Slide switch	- For selection of the function chain suction at the start of the seam.
3	Slide switch	- For selection of the function chain suction at the seam end.
4	Symbols for patterns	- Symbolize the sewing sequence when selecting patterns 1...5.
6	Preselector for number of stitches	- Function depends on selected pattern.
7	Pattern selector switch	- Selection of patterns 0...5.
8	Pushbutton	- For chain cutter recall or suppression.
9	Pushbutton	- Manual chain cutter.

Attention!
The imprint on the control for operating elements does not correspond to the functions of the program.

8.1 Chain Suction at the Start of the Seam and at the Seam End

8.1.1 Chain Suction at the Start of the Seam

The function chain suction at the start of the seam can be selected by slide switch (2).

Slide switch (2)	Functions
Up	Chain suction at the start of the seam ON
Center	Off
Down	Chain suction at the start of the seam ON

8.1.2 Chain Suction at the Seam End

The function chain suction at the seam end can be selected by slide switch (3).

Slide switch (3)	Functions
Up	Chain suction at the seam end ON
Center	Off
Down	Chain suction at the seam end ON

8.2 Chain Cutter Suppression/Recall

By pressing pushbutton (8) it is possible to suppress or to recall automatic chain cutting, depending on whether the chain cutter function is switched on or off.

Whether the chain cutting will be performed or suppressed at the start of the seam or at the seam end is determined by the moment in which the pushbutton (8) is pressed.

When pressing pushbutton (8):

- after power on or after a trimming operation, the chain cutter reacts at the start of the seam.
- in the seam, the chain cutter reacts at the seam end after initiating the seam end.

8.2.1 Chain Cutter Suppression

If the chain cutter is switched on in the control:

Pushbutton (8)	Functions
Press once	The next chain cutting operation will not be performed

8.2.2 Chain Cutter Recall

If the chain cutter is switched off in the control:

Pushbutton (8)	Functions
Press once	The next chain cutting operation will be performed

8.3 Manual Chain Cutter

By pressing pushbutton (9) the chain cutter is switched on during activation time.

8.4 Description of the Patterns

In conjunction with control panel V62LK it is possible to select 6 different sewing patterns 0...5.

The patterns can be selected by switch (7), and the stitches for countings can be preselected by switches (6).

By pressing the bottom pushbutton of the preselector marked "+" once or several times, the value of the number visible in the window will be increased.
By pressing the top pushbutton marked "-", the value will be decreased.

The settings on pattern selector switch (7) are mechanically limited, i.e. the smallest number that can be set is "0", the biggest "5".

The preselectors (6) for numbers of stitches do not have a final stop. This means that the mechanism switches from "9" to "0" when continuing to increase the setting and from "0" to "9" when continuing to decrease the setting.

8.4.1 Pattern 0

- Set sewing pattern at "0" by switch (7).
- Switch on chain suction at the start of the seam and at the seam end by slide switches (2) and (3). Set the number of stitches in the control (max. 255 stitches).
- The preselectors (6) do not have a function.
- Free sewing at pedal controlled speed is possible between chain suction at the start of the seam and at the seam end.
- The seam end with trimming operation is initiated by full heelback (position -2) or by light barrier.
  If S9/5 = off (chain suction speed at the seam end limited by the pedal), only the function chain suction at the seam end will be performed at the end of a seam with light barrier. The thread is trimmed when the pedal is in position -2.
- The presser foot is lifted according to the switch position on the control or by pedal in position -1 and/or -2.

8.4.2 Pattern 1

- Set sewing pattern at "1" by switch (7).
- Switch on chain suction at the start of the seam by slide switch (2).
- Set the number of stitches for chain suction at the start of the seam by preselectors (6) **A** and **B** on the control panel (max. 99 stitches).
- Free sewing at pedal controlled speed is possible between chain suction at the start of the seam and at the seam end.
- Switch on chain suction at the seam end by slide switch (3).
- Set the number of stitches for chain suction at the seam end by preselectors (6) **C** and **D** on the control panel (max. 99 stitches).
- The seam end with trimming operation is initiated by full heelback (position -2).
  If S9/5 = off (chain suction speed at the seam end limited by the pedal), only the trimming operation will be performed with pedal in position -2.
- The function seam end without stop is possible if S10/5 = on. Automatic speed regulation (S9/3) = on) is blocked.
- The presser foot is lifted according to the switch position on the control or by pedal in position -1 and/or -2.

Example for preselector (6) setting for the seam sections **A** and **B**:

A Tens	B Units	AB Number of stitches
0	6	6
2	5	25

8.4.3 Pattern 2

- Set sewing pattern at "2" by switch (7).
- Switch on chain suction at the start of the seam and at the seam end by slide switches (2) and (3). Set the number of stitches in the control (max. 255 stitches).
- A seam section with stitch counting (max. 99 stitches) at pedal controlled limited speed is possible between chain suction at the start of the seam and at the seam end. Set the number of stitches by preselectors (6) for the seam sections **A** and **B**.
- At the end of counting, chain suction at the seam end and the trimming operation will be automatically initiated.
- The presser foot is lifted only if the pedal is in position -2 or switch S4 on the control is on.
- The preselectors (6) for the sections **C** and **D** do not have a function.
- Seam end without stop is not possible. Operation at automatic speed is possible.

Example for preselector (6) setting for the seam sections **A** and **B**:

A Tens	B Units	AB Number of stitches
1	6	16
9	9	99

8.4.4 Pattern 3

- Set sewing pattern at "3" by switch (7).
- Switch on chain suction at the start of the seam and at the seam end by slide switches (2) and (3). Set the number of stitches for chain suction at the start of the seam in the control (max. 255 stitches).
- A seam section with stitch counting (max. 99 stitches) at pedal controlled limited speed is possible between chain suction at the start of the seam and at the seam end. Set the number of stitches by preselectors (6) for the seam sections **A** and **B**.
- After execution of the set number of stitches the machine stops.
- Free sewing at pedal controlled speed.
- After light barrier sensing, chain suction at a fixed speed that can be set is performed or if S9/5 = off at pedal controlled speed. Set the number of stitches by preselectors (6) for the seam sections **C** and **D**. Then the thread is trimmed.
- The presser foot is lifted only if the pedal is in position -2 or switch S4 on the control is on.
- Seam end without stop is not possible. Operation at automatic speed is possible.

Example for preselector (6) setting for the seam sections **A** and **B** and/or **C** and **D**:

A Tens	B Units	AB Number of stitches	C Tens	D Units	CD Number of stitches
0	6	6	1	6	16
2	5	25	9	7	97

8.4.5 Pattern 4

- Set sewing pattern at "4" by switch (7).
- Switch on chain suction at the start of the seam and at the seam end by slide switches (2) and (3).
- Chain suction at the start of the seam at a limited or pedal controlled speed is possible. Set the number of stitches by preselectors (6) for the seam sections **A** and **B**.
- After execution of the set number of stitches free sewing at pedal controlled speed is performed.
- After light barrier sensing, chain suction with trimming operation at a fixed speed that can be set or at pedal controlled speed is performed, if S9/5 = off in the control. Set the number of stitches by preselectors (6) for the seam sections **C** and **D**.
- The presser foot is lifted only if the pedal is in position -2 or switch S4 on the control is on.
- The presser foot is automatically lifted, when the pedal remains pushed forward.
- Seam end without stop is not possible. Operation at automatic speed is possible.

8.4.6 Pattern 5

Up to 9 light barrier seams can be performed in this pattern, according to the setting of switch (6) "D". The drive stops automatically after each light barrier seam. After the last seam, chain suction at the seam end and the trimming operation will be performed.

- Set sewing pattern at "5" by switch (7).
- Switch on chain suction at the start of the seam and at the seam end by slide switches (2) and (3). Set the number of stitches for chain suction at the start of the seam in the control (max. 255 stitches).
- After chain suction at the start of the seam, free sewing at pedal controlled speed is performed.
- After light barrier sensing, stitch counting (max. 99 light barrier compensating stitches) at a fixed speed that can be set is performed. Set the number of stitches by preselectors (6) for the seam sections **A** and **B**.
- After execution of the light barrier compensating stitches the machine stops.
- Further light barrier seams will be performed if several seams have been selected by preselector (6) **D**.
- The number of stitches set by preselector (6) **C** will be added to the number of stitches set by preselector (6) **A** and **B**, if only one seam is set or the last seam is performed. Chain suction at the seam end will then be performed with the number of stitches **AB+C**.

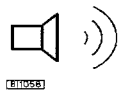
A Tens	B Units	AB Number of stitches	C Units	AB+C Number of stitches
0	6	6	1	7
2	5	25	9	34

- Seam end without stop is not possible. Operation at automatic speed is possible.
- The presser foot is automatically lifted at stop after light barrier uncovered, when the pedal remains pushed forward. After the last seam, the presser foot is lifted only if the pedal is in position -2 or switch S4 on the control is on.
- If no seam section has been selected by preselector **D**, light barrier seams will be performed until the last seam is recalled by the pushbutton on B16/1-3.

9. Acoustic Error Signals

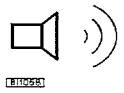
Note:
Whenever an error signal is emitted, the drive is made to stop. The error signal can be heard until the power is turned off.

ERROR 1: Position transmitter error



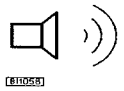
- Position transmitter defective or not connected
- Connections for position transmitter and commutation transmitter were changed by mistake
- Position transmitter not mounted on the sewing machine shaft

ERROR 2: Blocking control



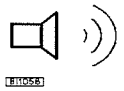
- Sewing machine shaft does not move despite motor activation
- Set speed is not reached

ERROR 3: Commutation transmitter error



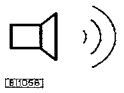
- Commutation transmitter defective or not connected

ERROR 4: Processor breakdown (illegal opcode)



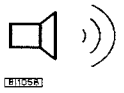
- Microprocessor does not work properly
  - Disturbances from outside (e.g. sewing machine head not grounded, line voltage disturbed)
  - Hardware malfunction on the computer printed circuit board

ERROR 5: Blocking of machine run



- Blocking of machine run is activated

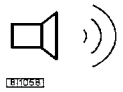
ERROR 88: Mains interruption



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

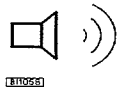
10. Acoustic Signals for Settings

Braking power at standstill



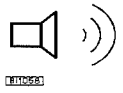
- S9/1 = on
- Set braking power at standstill with P8

Reversion when unlocking the chain



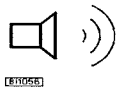
- S9/1 = on
- Set reversing angle with P3
- Set delay until reversion with P8

Power transistor M1



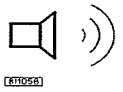
- S9/1 = on
- Set operating time M1 with P3
- Set delay until M1 with P8

Power transistor M2



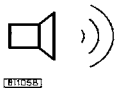
- S9/1 = on
- Set operating time M2 with P3
- Set delay until M2 with P8

Power transistor chain cutter



- S9/1 = on
- Set operating time chain cutter with P3
- Set delay until chain cutting with P8

Power transistor presser foot lifting



- S9/1 = on
- Set start delay after presser foot lifting with P3
- Set delay presser foot lifting at seam end with P8

11. Factory Control Settings

Programming of running pattern		
Switch	Position	Signification
S9/1	off	Programming mode OFF
S9/2	on	Blocking of machine run active with closed connection
S9/3	off	Automatic seam speed
S9/4	off	Chain suction speed limited at the start of the seam
S9/5	off	Chain suction speed limted at the seam end
S9/6	off	Direction of rotation of the motor shaft LEFT
S9/7	on	Chain suction at the start of the seam ON
S9/8	on	Chain suction at the seam end ON

Programming of the light barrier		
Switch	Position	Signification
S9/9	on	┐
S9/10	off	│ Z2 stitch counting from chain cutting on
S10/1	on	│ until chain suction OFF at the start of the seam
S10/2	off	┘
S10/3	off	Sewing start blocked with light barrier uncovered OFF
S10/4	off	Automatic start at the beginning of the seam with light barrier inactive
S10/5	off	Seam end without stop OFF
S10/6	off	┐
S10/7	off	│ 0 filter stitches for knitted fabrics
S10/8	off	┘

Programming of the stitch condensing sections		
Switch	Position	Signification
S7/1	off	┐
S7/2	off	│
S7/3	off	│
S7/4	off	│ Z1 stitch counting chain suction from the start of the
S7/5	off	│ seam until chain cutting
S7/6	off	│
S7/7	off	│
S7/8	off	┘
S8/1	off	┐
S8/2	off	│
S8/3	off	│
S8/4	off	│ Z3 stitch counting chain suction at the seam end
S8/5	off	│ from light barrier uncovered until stop
S8/6	off	│
S8/7	off	│
S8/8	off	┘
S8/9	off	┐ Z4 stitches after chain cutter off; functions as clamp
S8/10	off	┘ during counting at the start of the seam

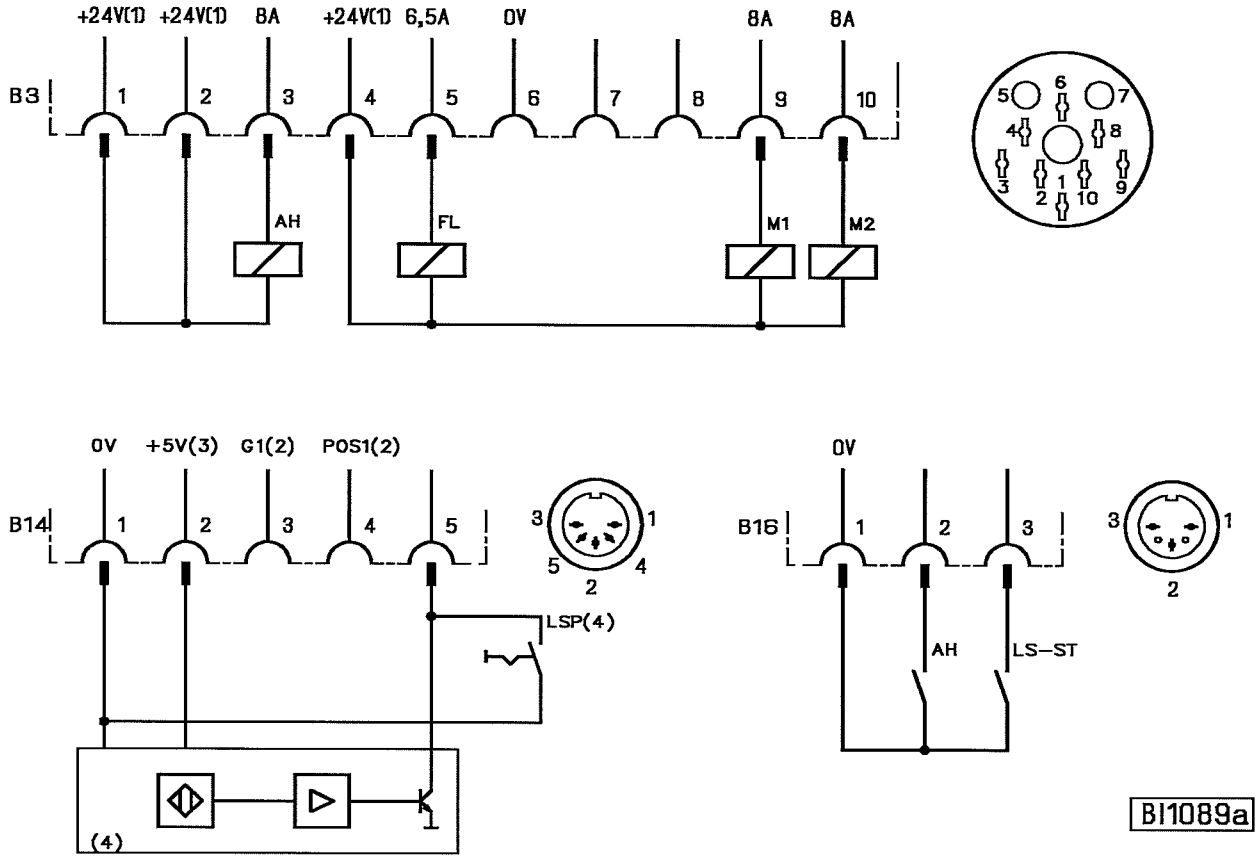
Switches accessible from outside		
Switch	Position	Signification
S1	left	Chain cutter at the start of the seam ON
S2	left	Chain cutter at the seam end ON
S3	left	Needle position at stop in the seam UP
S4	right	Presser foot up at the seam end OFF

Potentiometer settings		
Potentiometer	Position	Signification
P1	180 RPM	Positioning speed (n.pos)
P2	3000 RPM	Maximum speed (n.maxmax)
P3	left stop	Stitch condensing speed
P4	left stop	Chain suction speed at the start of the seam
P5	left stop	Chain suction speed and light barrier speed at the seam end
P6	80 ms	Start delay with automatic start of the light barrier until presser foot off (t13)
P7	50 ms	Time delay until presser foot up with pedal in position -1 (t2)
P8	3000 RPM	Maximum speed reduction (n.max)
	(+/-10 ms)	Time tolerance

Other preset functions (in the programming mode)		
	Values	Signification
	off	Braking power at standstill
	0 ms	Reversion delay when unlocking the chain (drd)
	0 °	Reversing angle when unlocking the chain (ird)
	60 ms	Start delay from lifted presser foot (t3)
	100 ms	Chain cutter operating time (t6)
	380 ms	Delay of presser foot at the seam end (t7)
	100 ms	M1 operating time (t8)
	100 ms	M2 operating time (t9)
	200 ms	Delay until M2 (t10)
	100 ms	Delay until chain cutter (t11)
	80 ms	Delay automatic start until presser foot (t13)
	100 ms	Delay until M1 (t16)
	(+/-10 ms)	Time tolerance

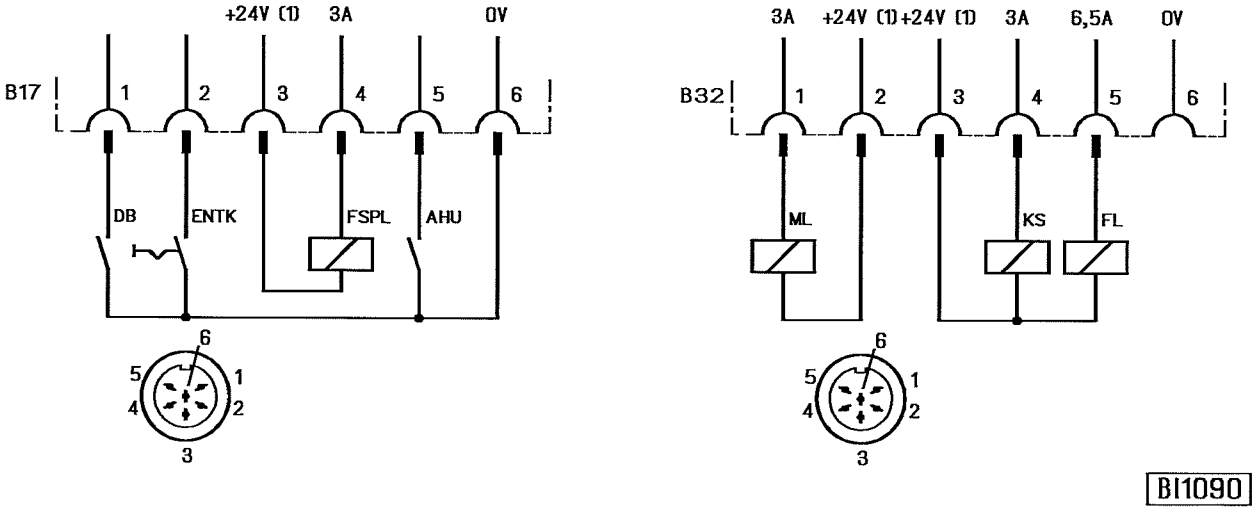
Other preset values (which cannot be changed)		
	Values	Signification
	400 ms	Full power of presser foot lifting (t4)
	15 kHz	Clock frequency of presser foot lifting (t5)
	1:1	Clock ratio of presser foot lifting
	300 ms	Start delay after thread trimming (t12)
	(+/-10 ms)	Time tolerance

12. Connection Diagrams



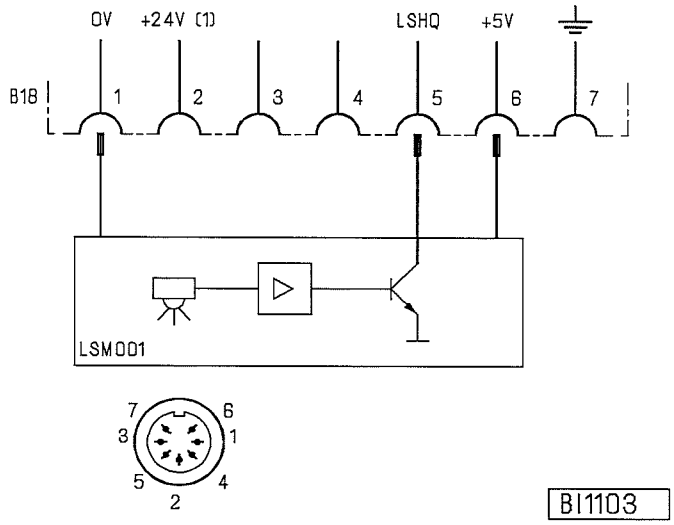
M1	- Thread trimmer/thread catcher
M2	- Thread trimmer/thread tension release
AH	- Chain cutter
FL	- Presser foot lifting
G1	- Signal output for generator impulses (2)
POS.1	- Signal output for position 1 (2)
LSP	- Blocking of machine run
LS-ST	- Recall of seam end by light barrier

1) Nominal voltage 24V, no-load voltage max. 36V
2) Transistor output with open collector (max. 40V, 30mA)
3) Nominal voltage +5V, 250 mA
4) Sensor for blocking of machine run or alternative connection of a switch possible



FSPL	- Thread tension release
ML	- Machine running
KS	- Chain suction
FL	- Presser foot lifting
DB	- Speed limitation
ENTK	- Unlocking the chain
AHU	- Chain cutter suppression/recall

1) Nominal voltage 24V, no-load voltage max. 36V



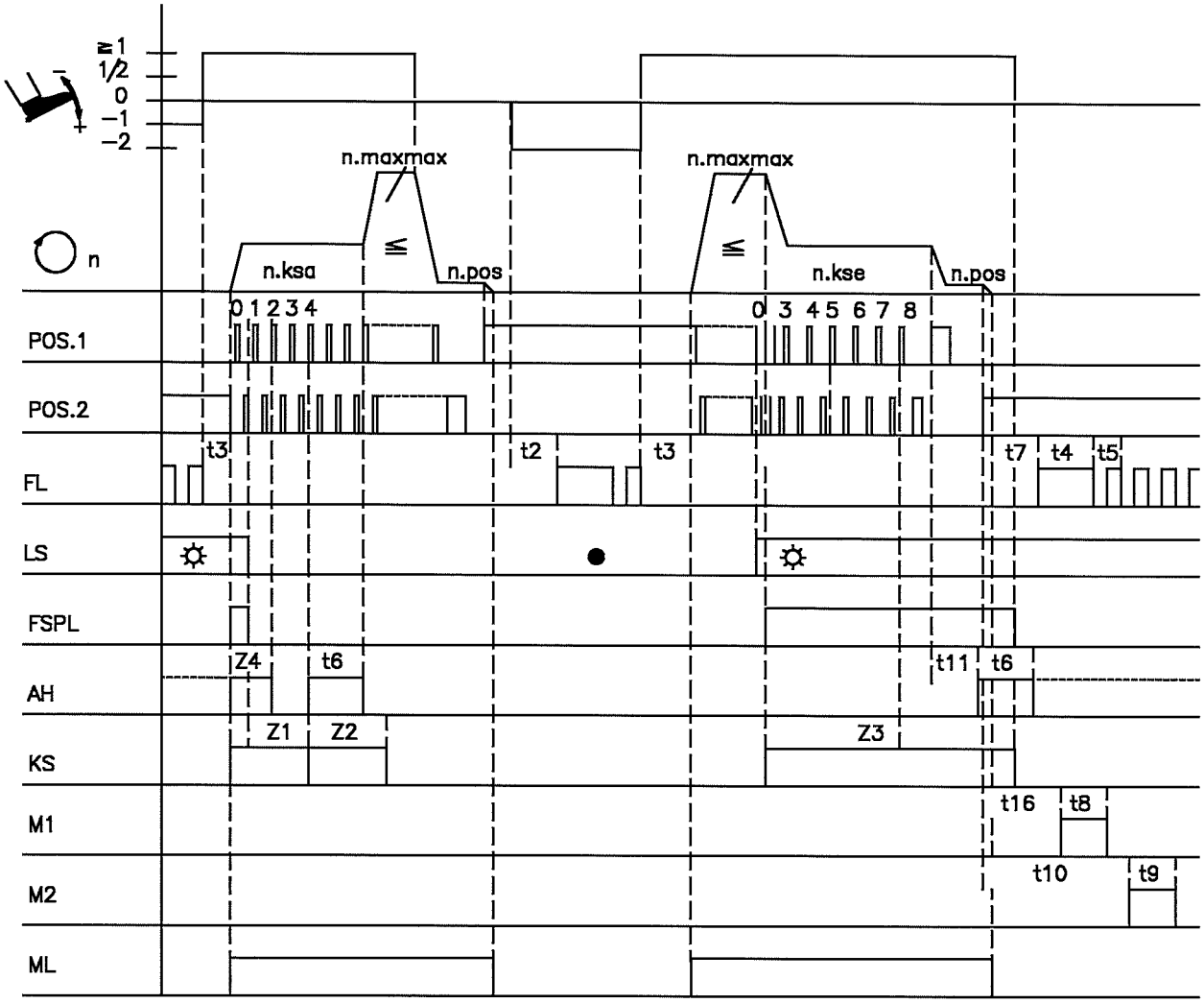
LSHQ - Light barrier command (identified when switched to 0V)

LSM001 - Reflection light barrier module
EB... - External actuator

1) Nominal voltage 24V, no-load voltage max. 36V

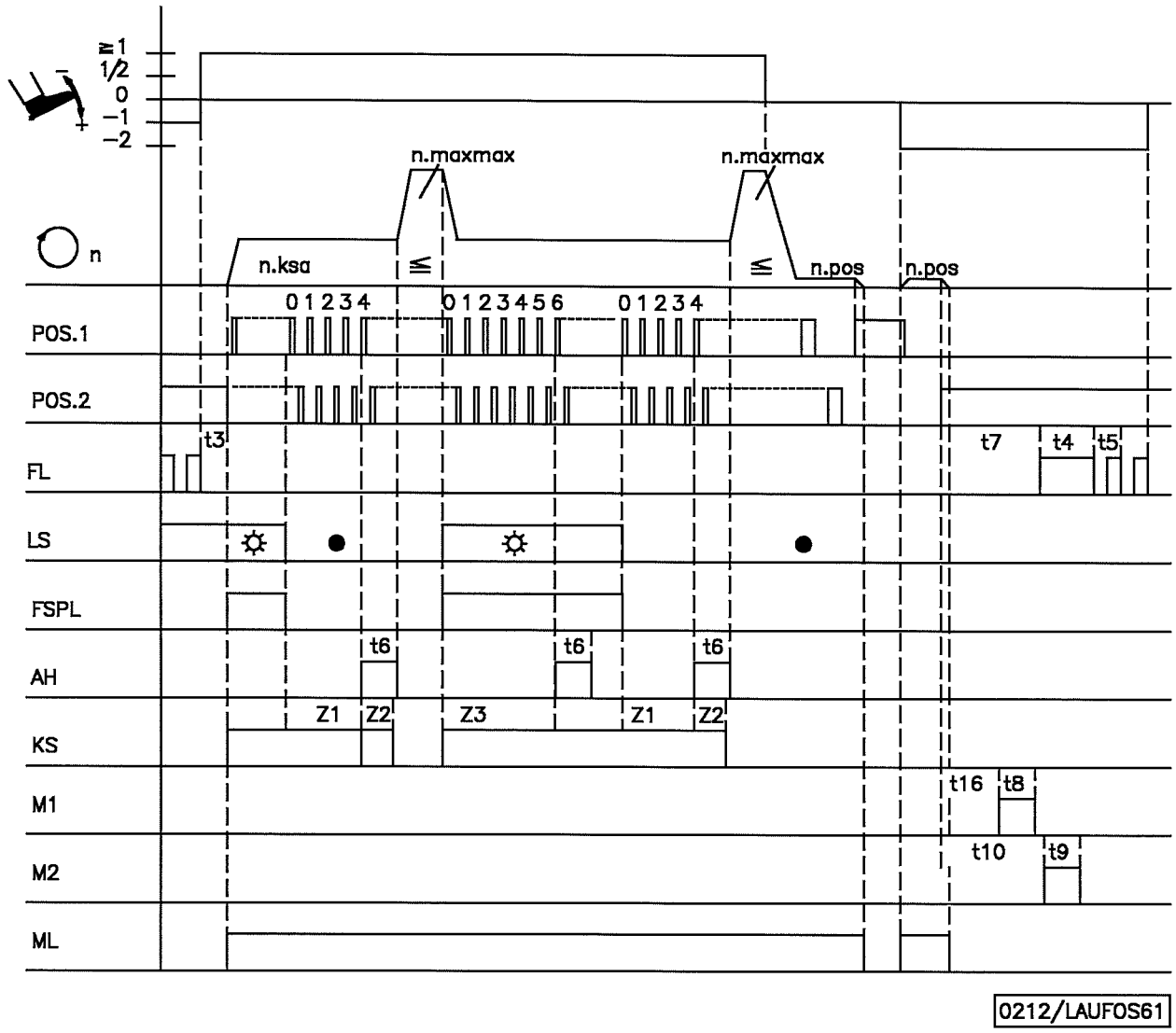
13. Timing Diagrams

Run with intermediate stop



Abbreviation	Function		Switch / Potentiometer
	Chain cutter at the start of the seam	on	S1
	Chain cutter at the seam end	on	S2
	Presser foot stored at the seam end	on	S4
n.pos	Positioning speed		P1
n.maxmax	Maximum speed		P2
n.ksa	Chain suction speed at the start of the seam		P4
n.kse	Chain suction speed at the seam end		P5
t2	Presser foot delay with pedal in position -1 / -2		P7
t3	Start delay from lifted foot		P3 (see instruction)
t4	Full power of presser foot lifting		fixed
t5	Clock frequency of presser foot lifting		fixed
t6	Operating time of chain cutter		P3 (see instruction)
t7	Activation delay of presser foot lifting after the seam end		P8 (see instruction)
t8	Operating time for M1		P3 (see instruction)
t9	Operating time for M2		P3 (see instruction)
t10	Delay for M2		P8 (see instruction)
t11	Delay for chain cutter at the seam end		P8 (see instruction)
t16	Delay for M1		P8 (see instruction)
Z1	Counting chain suction at the start of the seam		
Z2	Counting to prolong chain suction from chain cutter on at the start of the seam		
Z3	Counting chain suction at the seam end on		
Z4	Counting chain cutter on as clamp at the start of the seam		

Sequence without stop at the seam end (switch S10/5 = ON)

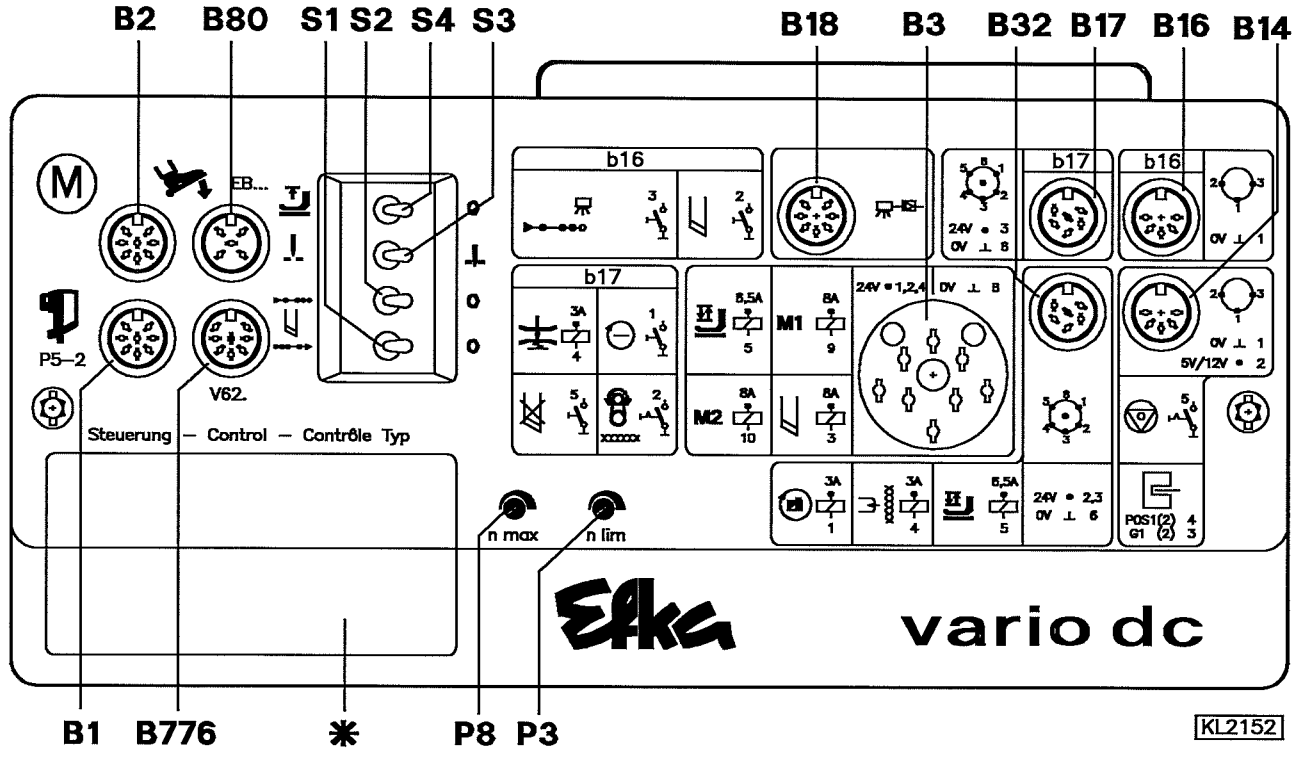


Abbreviation	Function		Switch / Potentiometer
	Chain cutter at the start of the seam	on	S1
	Chain cutter at the seam end	on	S2
n.pos	Positioning speed		P1
n.maxmax	Maximum speed		P2
n.ksa	Chain suction speed at the start of the seam		P4
n.kse	Chain suction speed at the seam end		P5
t2	Presser foot delay with pedal in position -1 / -2		P7
t3	Start delay from lifted foot		P3 (see instruction)
t4	Full power of presser foot lifting		fixed
t5	Clock frequency of presser foot lifting		fixed
t6	Operating time of chain cutter		P3 (see instruction)
Z1	Counting chain suction at the start of the seam		
Z2	Counting to prolong chain suction from chain cutter on at the start of the seam		
Z3	Counting chain suction at the seam end on		
Z4	Counting chain cutter on as clamp at the start of the seam		

For your notes:

For your notes:

14. Operating Elements and Socket Connectors



B1 - Position transmitter
B2 - Commutation transmitter for d.c. motor
B3 - Solenoid
B14 - Switch / Sensor
B16 - Pushbuttons
B17 - Solenoids and switches
B18 - Light barrier module
B32 - Solenoids / Solenoid valves
B80 - External actuator
B776 - Control panel

* - Service flap with type designation

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