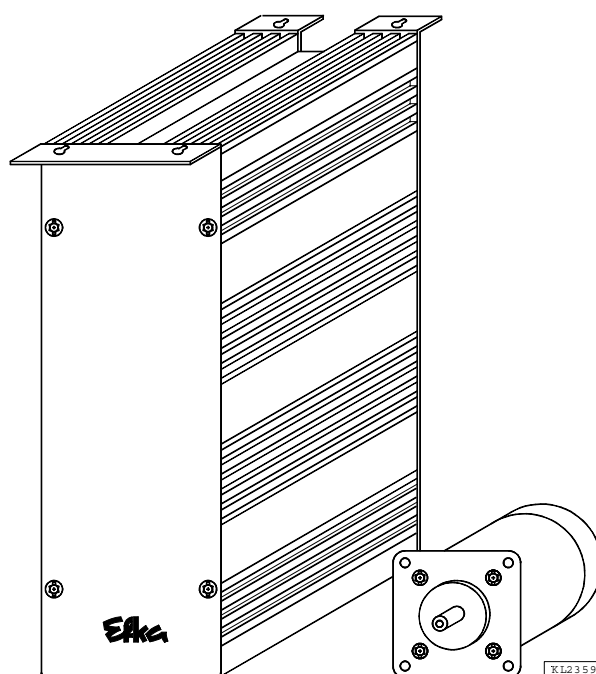




STEPPING MOTOR CONTROL

SM210A5711



INSTRUCTION MANUAL

With List of Parameters

No. 402299

English

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1 Range of Applications

The stepping motor control can be used separately or as expansion unit for EFKA drives (AB60D, AB62CV, AB220A) and for other controls in puller mode 9. See chapter „Stepping Motor Function ‘Puller’”.

1.1 Use in Accordance with Regulations

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

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

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

The drive is to be operated only in dry areas.



CAUTION

When selecting the installation site and the layout of the connecting cable, the Safety Instructions must be followed with no exceptions. Particular attention should be paid to maintaining the proper distance from moving parts!

2 Scope of Supply

| | | |
|---|---|--|
| 1 | Stepping motor control | SM210A5711 |
| 1 | Set of standard accessories consisting of: | B157 Documentation |
| 1 | Set of accessories consisting of | Z55 37-pin SubminD plug Potential equalization |
| | cord | |

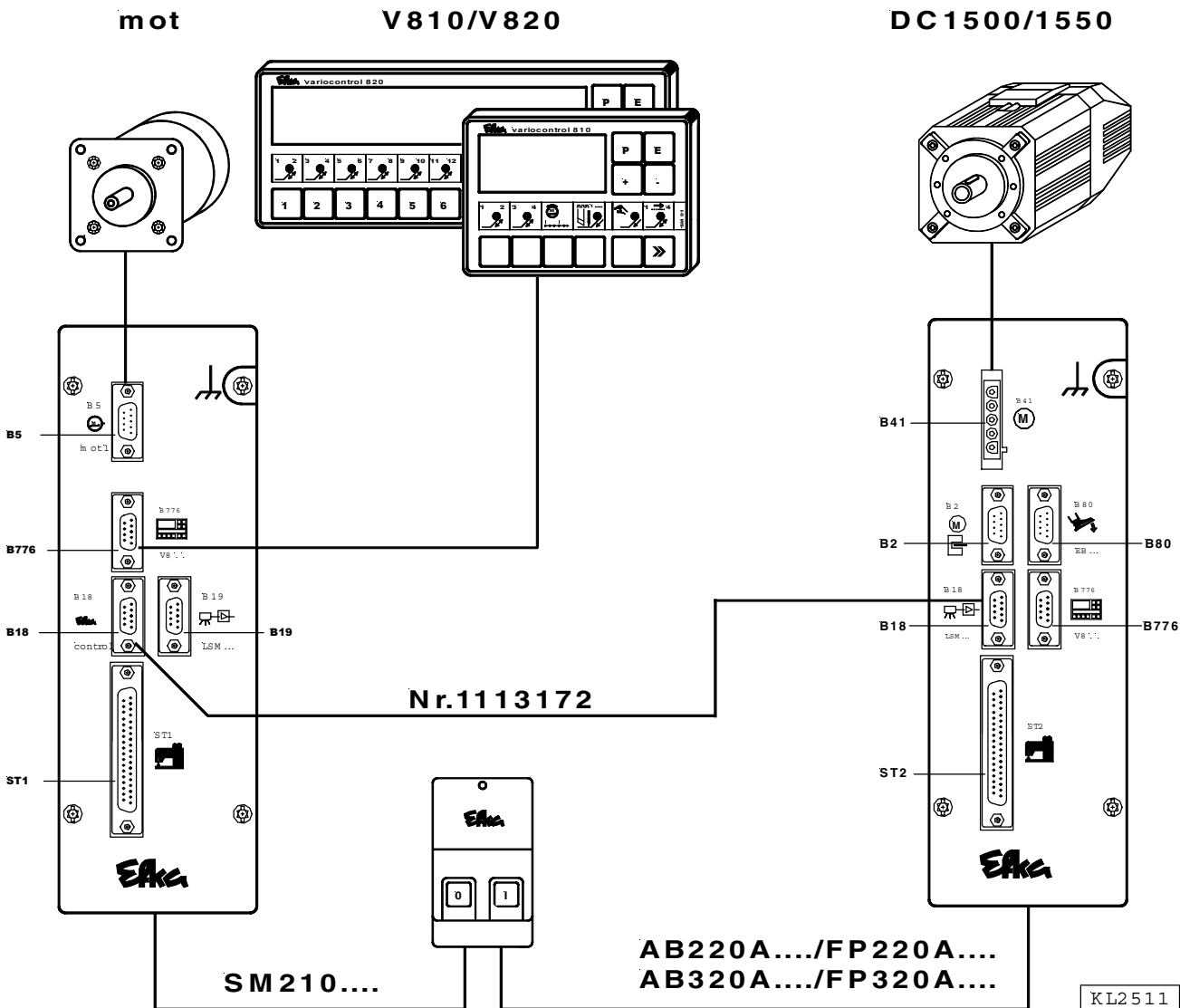
2.1 Special Accessories

| | |
|--|------------------|
| Stepping motor SM200 | part no. 7900069 |
| Stepping motor SM250 | part no. 7900070 |
| Connecting cable from the stepping motor control to the AB62CV d.c. drive | part no. 1113113 |
| Connecting cable from the stepping motor control to the AB220A d.c. drive | part no. 1113172 |
| Control panel Variocontrol V810 | part no. 5970153 |
| Control panel Variocontrol V820 | part no. 5970154 |

3 Technical Data of the Stepping Motor Control

| | |
|-------------------------------|---|
| Motor driver voltage | 35-45VDC |
| 8 inputs | 24VDC, active high/low |
| 2 analog inputs | 5VDC, Ri max. 1kΩ |
| 5 outputs | open collector, max. 60VDC, 0.5A, sum <2A |
| Mains voltage | 230VAC, 50/60Hz |
| Stepping motors | 2 phases, with 4, 6, 8 connections, max. 3A/phase |
| Stepping motor control | bipolar chopper, CW/CCW, half step, full step |
| Weight | 4.0 kg |

4 Connection Scheme for SM210A



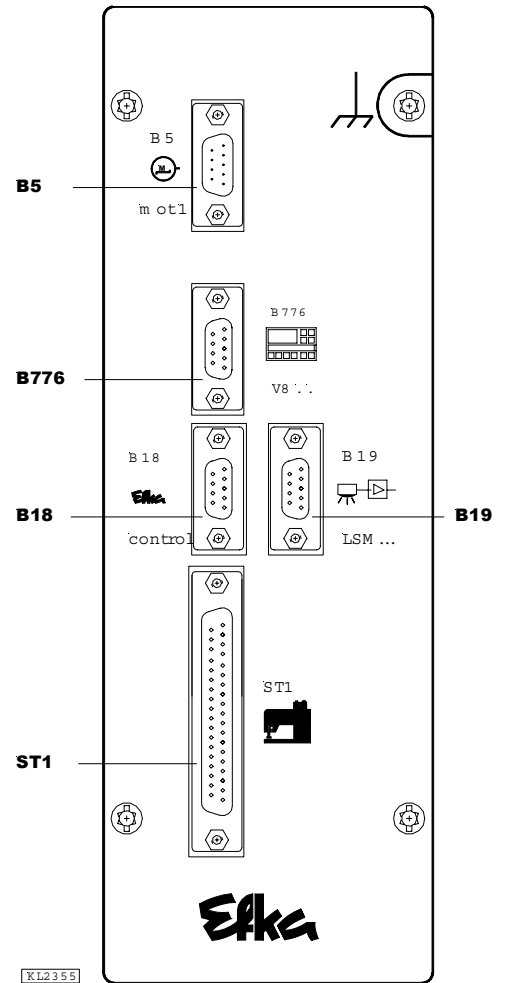
AB62CV... control (B18) and SM210A...stepping motor control (B18) are connected by means of adapter cord no. 1113113. Adapter cord no. 1113172 is provided for operating AB220A... / AB320A... / FP220A... / FP320A... control with the SM210A... stepping motor control.

If a light barrier is required for the sewing process it must be connected to socket B9 on the stepping motor control. The light barrier signal is transmitted via the connecting cable from the SM210A to the sewing drive.

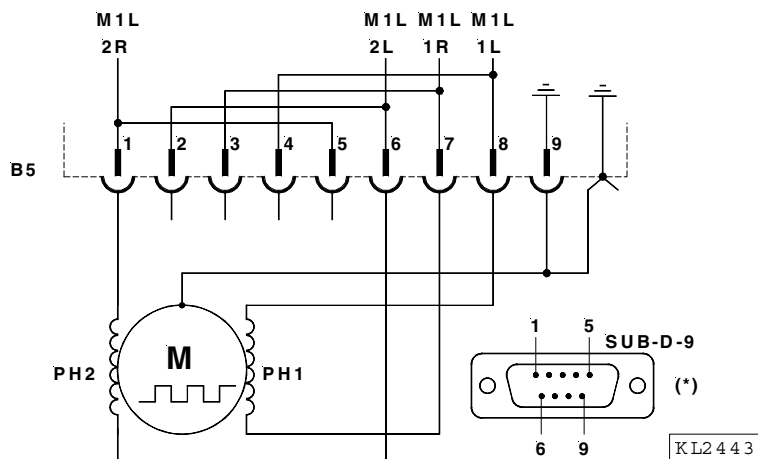
5 Socket Connectors

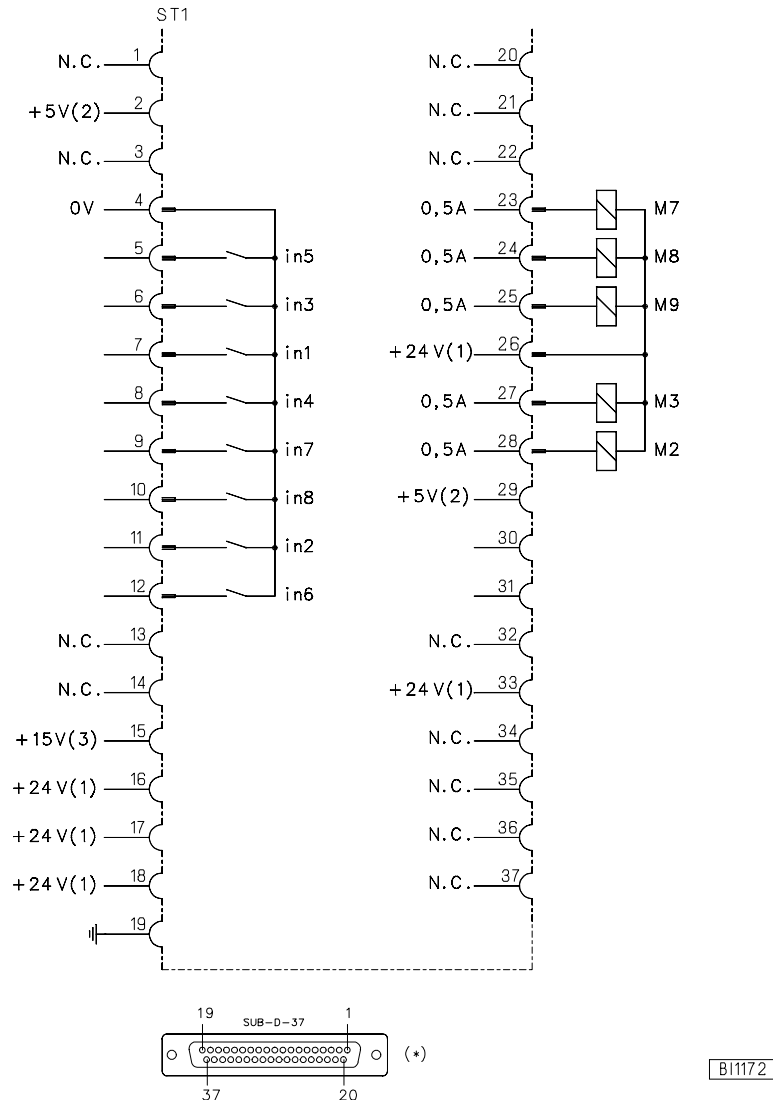
5.1 Position of the Socket Connectors

- B5** Socket for stepping motor 1
- B18** Socket for light barrier module or transmission line
- B19** Socket for light barrier module
- B776** Socket for V810/V820 control panel
- ST1** Socket for inputs and outputs of the solenoid valves / displays / keys and switches



5.2 Connection Diagram





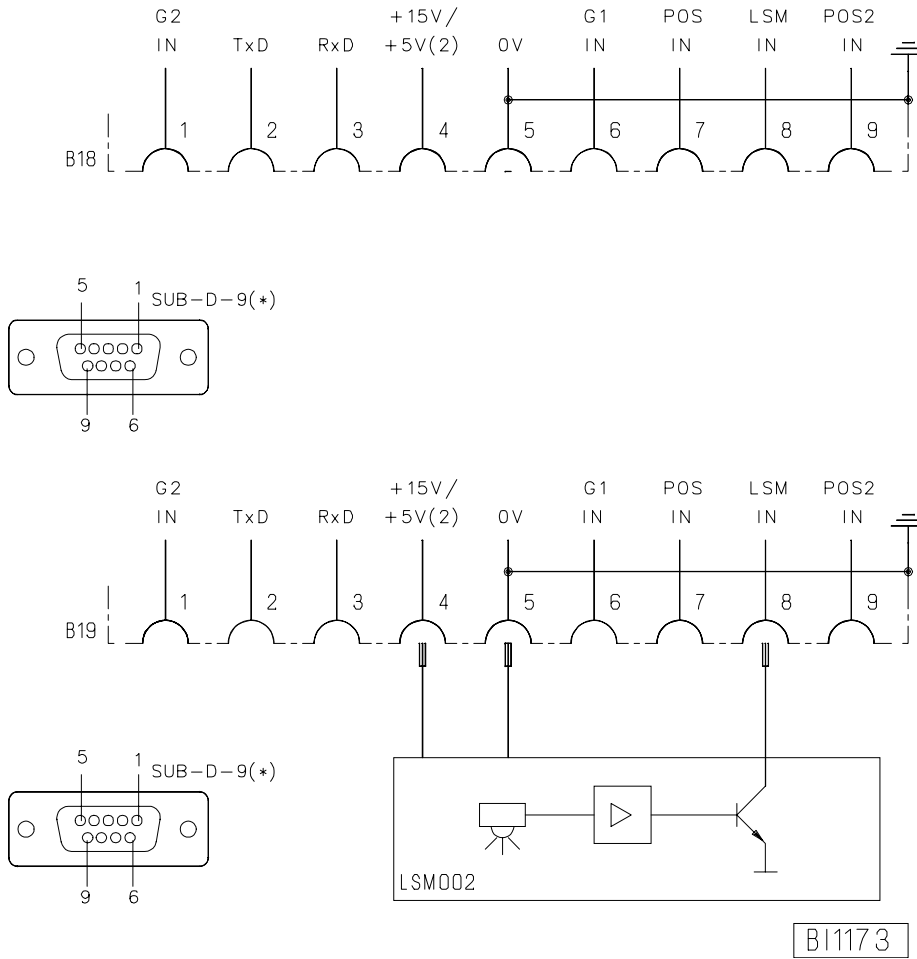
ATTENTION

When connecting the outputs, ensure that a total power of 48VA constant load will not be exceeded !

- | | | | |
|-----|-----------|----|------------|
| IN1 | - Input 1 | M2 | - Output 2 |
| IN2 | - Input 2 | M3 | - Output 3 |
| IN3 | - Input 3 | M7 | - Output 7 |
| IN4 | - Input 4 | M8 | - Output 8 |
| IN5 | - Input 5 | M9 | - Output 9 |
| IN6 | - Input 6 | | |
| IN7 | - Input 7 | | |
| IN8 | - Input 8 | | |

The input and output functions depend on the mode set with parameter 290.

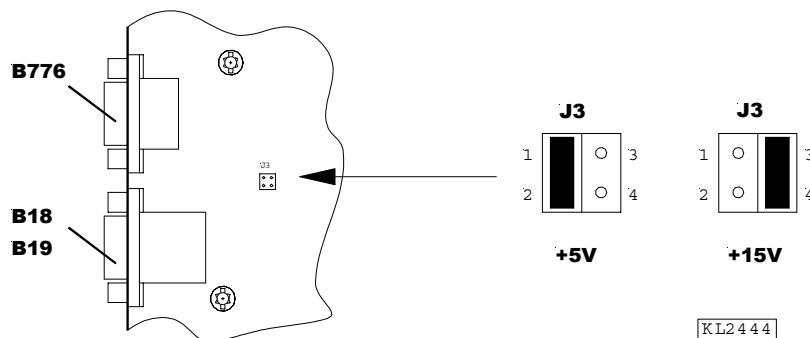
- 1) **Nominal voltage 24V, no-load voltage max. 30V momentarily after power On**
- 2) **Nominal voltage 5V, I_{max} = 20mA**
- 3) **Nominal voltage 15V, I_{max} = 30mA**
- *) **Front view (component side) of the socket and/or rear view (soldering side) of the plug**



- POS IN - Input for position / connection of external pulse encoder IPG001
- POS2 IN - Input for position 2 / connection of external control for puller operation in mode 9
- G1/G2 IN - Input for generator impulses (see [F-200](#))
- TXD/RXD - Serial transmission lines (see [F-272](#))
- LSM IN - Possibility of connecting a light barrier module to socket B18/8 (sensing of the signal upon switching to 0V)
- LSM002 - Reflection light barrier module

For external devices there is a supply voltage of +5V on socket B19/4. After opening the cover, this voltage can be changed to +15V by moving a multipole connector J3 to a different position on the printed circuit board.

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



2) **Nominal voltage 5V, I_{max} = 20mA**
 *) **Front view (component side) of the socket and/or rear view (soldering side) of the plug**

6 Programming of Sections (TEACH IN)

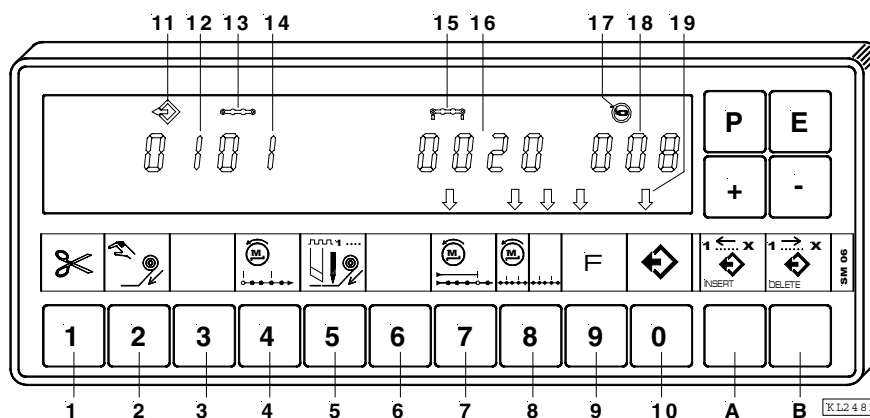
- A maximum of 99 patterns with a total of 99 sections can be programmed, i. e. 1 pattern with 99 sections each or 99 patterns with 1 section each. In between, all combinations are possible.
- Programming is possible with or without code number.
- Programming with TEACH IN is possible for modes 0, 1, 2, 5, 7, 8, 9.
- Several patterns can be linked as desired (key 9).
- Upon actuating a switch on input in3, the program switches to the next section.
- Upon actuating a switch on input in4, the program switches to the previous section.

Sections and/or patterns can be added by pressing the **INSERT “A”** key or erased by pressing the **DELETE “B”** key. Before programming new patterns and/or sections, it is advisable to erase previously saved patterns and/or seams by pressing the **DELETE “B”** key according to chapter “Deleting a Section or Pattern“. If patterns or sections are to be inserted between existing ones, press the **INSERT “A”** key according to chapter “Inserting a Section or Pattern“.

Example: 3 patterns are in the memory. Delete the 2nd pattern by pressing the **DELETE “B”** key. The 3rd pattern takes the place of the 2nd pattern. A new 2nd pattern can be installed by pressing the **INSERT “A”** key. The pattern in 2nd place will go back to being pattern no. 3.

If patterns and/or sections are only to be added, proceed as described in the following chapters.

The figure below shows all the functions assigned to programming of sections TEACH IN.

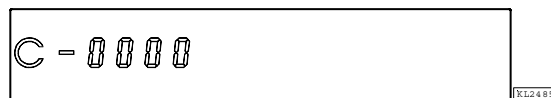


| | | | |
|--|-----------------------|---|-------------------------------|
| | F-290 | | F-290 |
| 1 =Manual tape cutting. Output M8 over a period of time that can be set. | 0, 1, 2, 7 5, 8 | 9 =Switching to any selectable pattern. | 0....10 |
| 2 =Tape cutting and metering device. Stepping motor runs to the reference position. Stepping motor runs during a number of increments. | 0, 1, 2, 7 5 8 | 10 =TEACH IN On/Off (left-hand arrow). 11 =Program symbol. 12 =Display of program number. | 0....10 0....10 0....10 |
| 3 =No function. | | 13 =Section symbol. | 0....10 |
| 4 =Setting the number of stitches for the d.c. drive with which the stepping motor runs in reverse direction | 0, 1, 2, | 14 =Display of section number. 15 =Symbol for number of stitches of a seam. 16 = Display of number of stitches. | 0....10 0....10 0....10 |
| 5 =Setting the number of stepping motor steps for tape tension | 0, 1, 2, | 17 =Motor running. | 0....10 |
| 6 =No function. | | 18 =Display of transmission ratio. | 0, 1, 2, 8 |
| 7 =Switching to the next section at the seam end, which is signaled by the d.c. drive. Left-hand arrow On. | 0....10 | 19 =Arrow for TEACH IN. | 0....10 |
| 8 =Left-hand arrow On: Switching to the next section after stitch counting. Right-hand arrow On: Without stepping motor operation. Switching to the next section after stitch counting. Both arrows Off: Switching to the next section by way of input IN3. | 0....10 | 20 =INSERT → Insert sections or patterns. 21 =DELETE → Delete sections or patterns. | 0....10 0....10 |

6.1 Preparing TEACH IN

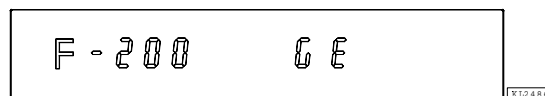
The TEACH IN function can be called up only after the no. 6 slide-in strip has been inserted into the V820 control panel and parameter [F-292](#) has been set to "6".

- Press key **P** and turn power on!
Keep key P pressed down until the opposite indication appears on the display.



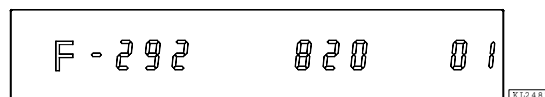
Input code number (3112) using keys **0...9**.

- Press key **E**.

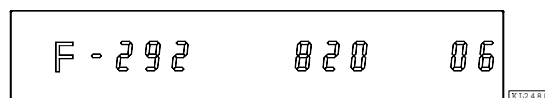


Select parameter 292 using keys **0...9**.

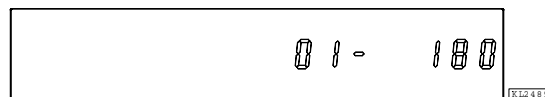
- Press key **E**.



- Select the new value using keys **+ / -**.



- Press key **P** twice.



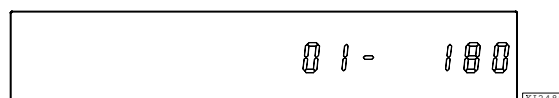
Start TEACH IN programming without turning the power off.

6.2 Example of a Programming Procedure

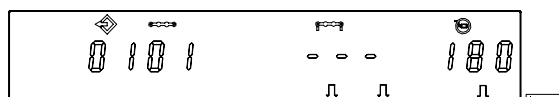
4 sections are to be programmed.

- Section 1: The speed ratio between stepping motor and d.c. drive is 180. Switch to the next section using the key on input IN3 (socket ST1/6).
- Section 2: Select the left-hand arrow using key 8 on the V820 control panel. The program switches automatically to the next section after 30 stitches. The speed ratio between stepping motor and d.c. drive should be set at 360.
- Section 3: Select the right-hand arrow using key 8 on the V820 control panel. The program switches automatically to the next section after 40 stitches. The stepping motor should not be running during this time.
- Section 4: The speed ratio between stepping motor and d.c. drive is 240 in this section. Select the left-hand arrow using key 7 on the V820 control panel. The procedure is completed at the seam end (pedal in pos. -2). Then the control panel display shows section 1 again.

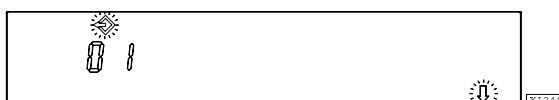
- Turn power on!



- Press key **0**.



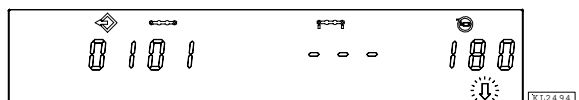
- Press key **P**.
The program number is displayed and can be changed.



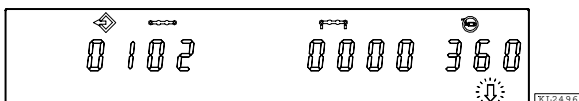
- Press key **E**.



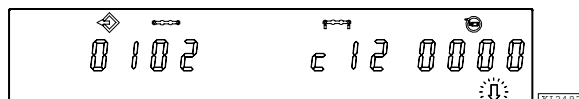
- Press key **E**.



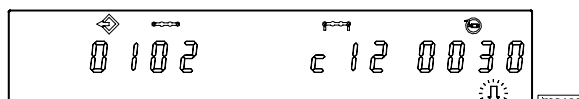
- Press key **E**.
Set or vary the transmission ratio 360 using keys **+ / -**.



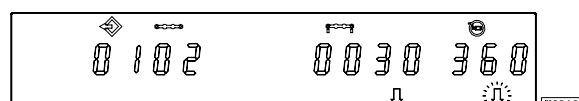
- Press key **8**.



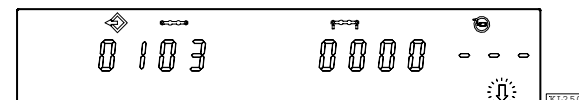
- Press key **+ / -** for **<3sec.**



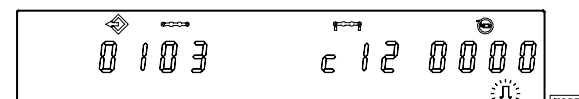
After **3sec.** the display changes.
Select the function “switching to the next section after stitch counting” using key **8** on the control panel.
The left-hand arrow above key 8 is displayed.



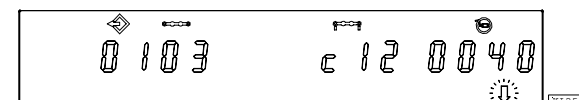
- Press key **E**.



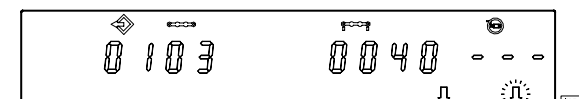
- Press key **8**.



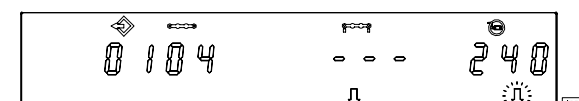
- Press key **+ / -** for **<3sec.**



After **3sec.** the display changes.
Select the function “without stepping motor operation, switching to the next section after stitch counting ” using key **8** on the control panel.
The right-hand arrow above key 8 is displayed.



- Press key **E**.
Set or vary the transmission ratio 240 using keys **+ / -**.
Select the function “switching to the next section with pedal in pos. -2 (seam end)” using key 7 on the control panel.
The left-hand arrow above key 7 is displayed.



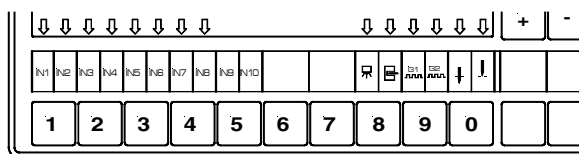
Press key **P** twice.
Request for storing the program.



Press key **+**.
The program is stored.
The program will not be stored by pressing key **-**.



- The storing procedure is completed.

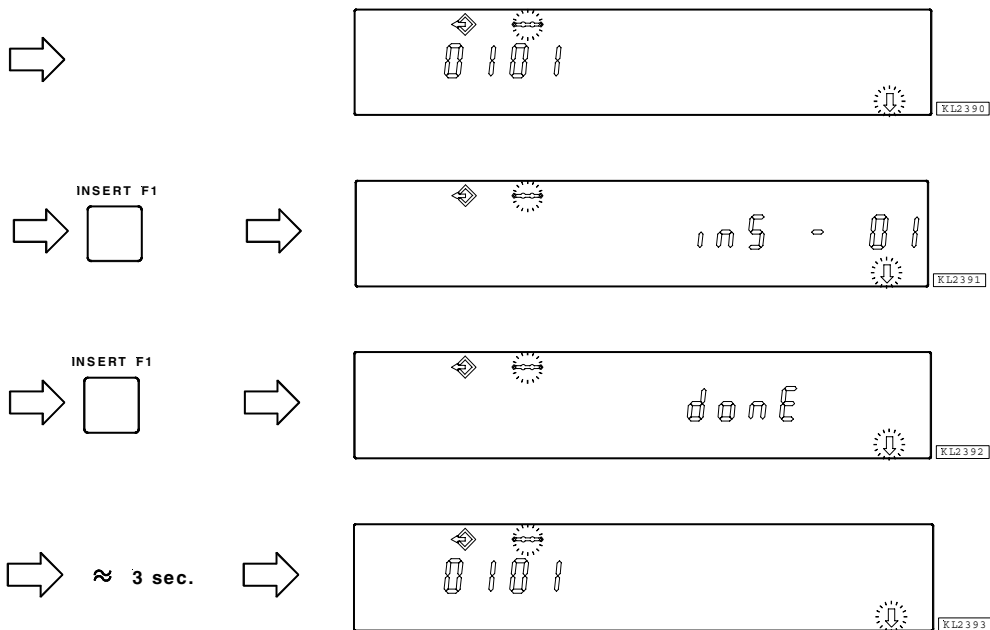


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6.2.1 Inserting a Section or Pattern

A pattern or section can be inserted using the A “INSERT” key, on condition that the symbol above the pattern or section number is blinking during programming.

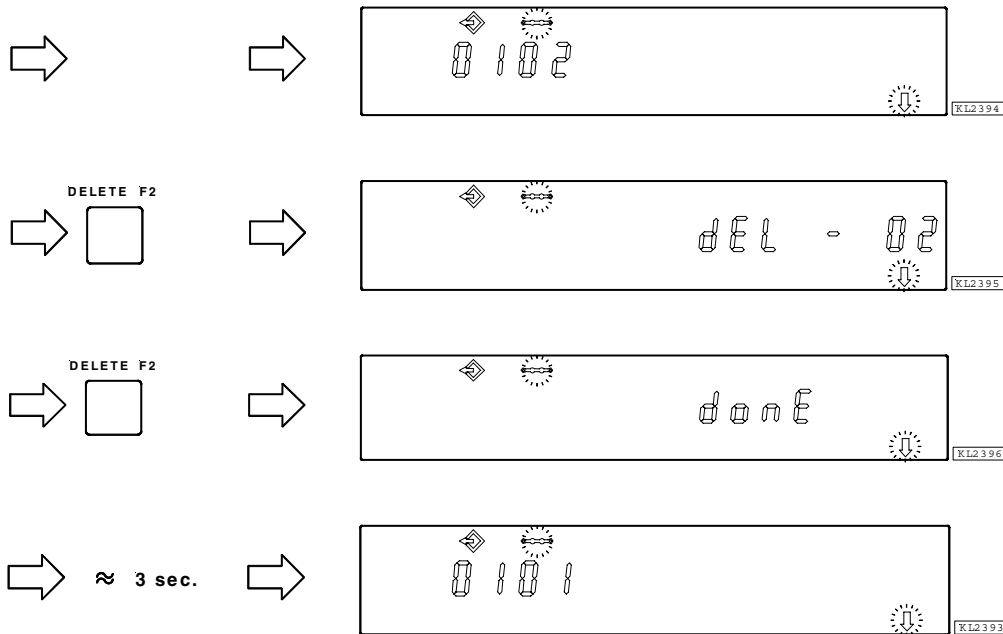
- Select the pattern or section number where the new number is to be inserted. The symbol above the pattern or section number must be blinking. Proceed as shown in chapters “Programming with or without Code Number Input”.
- Press the A “INSERT” key twice in brief succession. The new pattern or section number will be inserted. All subsequent numbers are automatically augmented by “1”. The following example shows how a section is inserted before the existing section.



6.2.2 Deleting a Section or Pattern

A pattern or section can be deleted using the B “DELETE F2” key, on condition that the symbol above the pattern or section number is blinking during programming.

- Select the pattern or section number to be deleted. The symbol above the pattern or section number must be blinking. Proceed as shown in chapters “Programming with or without Code Number Input”.
- Press the B “DELETE F2” key twice in brief succession. The pattern or section number will be deleted. All subsequent numbers are automatically reduced by “1”. The following example shows how section number 2 is deleted.



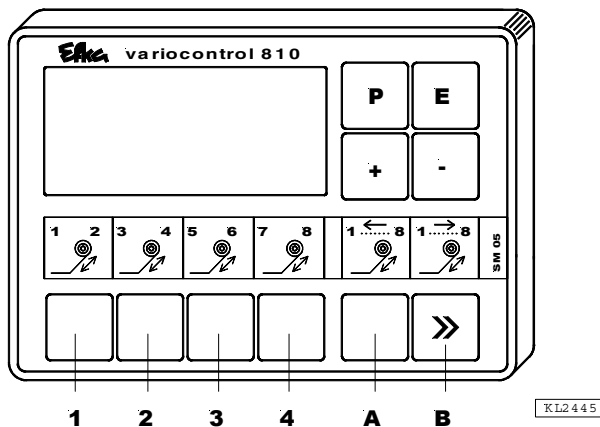
6.2.3 Execution (Pattern) Mode

- Press key 0 The programmed sections are enabled. Arrow above the 0 key is On (but it does not blink).
- Press key +/- Selection of pattern. Only if several patterns have been programmed.
- Press key E If you do not wish to start with the first section, select a different section number. Press key E several times until the desired section number is displayed.
- The drive can now be started by pressing the pedal, and the pattern can be executed.
- Press key 0 The programmed sections are disabled. Arrow above key 0 is Off.

7 Stepping Motor Control Functions

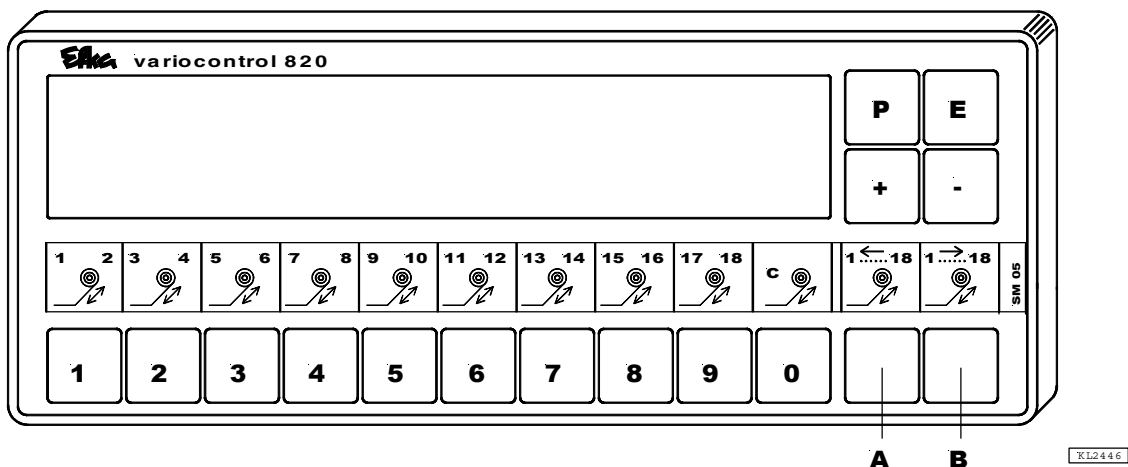
7.1 Stepping Motor Function “Synchronous Operation” (F-290 = 0)

| Parameter | Function |
|---------------------------|---|
| F-290 = 0 | Metering device |
| F-291 = 5 | Slide-in strip SM 05 on the V810 control panel |
| F-292 = 5 | Slide-in strip SM 05 on the V820 control panel |
| F-240 = 3 | Connection of a key to socket ST1/7 (IN1) for tape cutter |
| F-242 = 6 | Connection of a key to socket ST1/6 (IN3) for selection of tape tension 8...1 and/or 18...1 |
| F-243 = 5 | Connection of a key to socket ST1/8 (IN4) for selection of tape tension 1...8 and/or 1...18 |
| F-244 = 7 | Connection of a key to socket ST1/5 (IN5) for metering device using a sensor |
| F-245 = 1 | Connection of a key to socket ST1/12 (IN6) for metering device (command “run”) |



V810

| Key | Function |
|-------|---|
| Key 1 | Setting tape tension 1 or 2 (ratio stepping motor/d.c. drive) |
| Key 2 | Setting tape tension 3 or 4 (ratio stepping motor/d.c. drive) |
| Key 3 | Setting tape tension 5 or 6 (ratio stepping motor/d.c. drive) |
| Key 4 | Setting tape tension 7 or 8 (ratio stepping motor/d.c. drive) |
| Key A | Selection of tape tension 8...1 (parallel to input IN3) |
| Key B | Selection of tape tension 1...8 (parallel to input IN4) |



V820

| Key | Function |
|------------|---|
| Keys 1...9 | Setting tape tension 1...18 (ratio stepping motor/d.c. drive) |
| Key 0 | Correction factor for switching between 2 tape tension values |
| Key A | Selection of tape tension 18...1 (parallel to input IN3) |
| Key B | Selection of tape tension 1...18 (parallel to input IN4) |

Parameters used whenever parameter [F-290](#) = 0 (synchronous stepping motor operation)

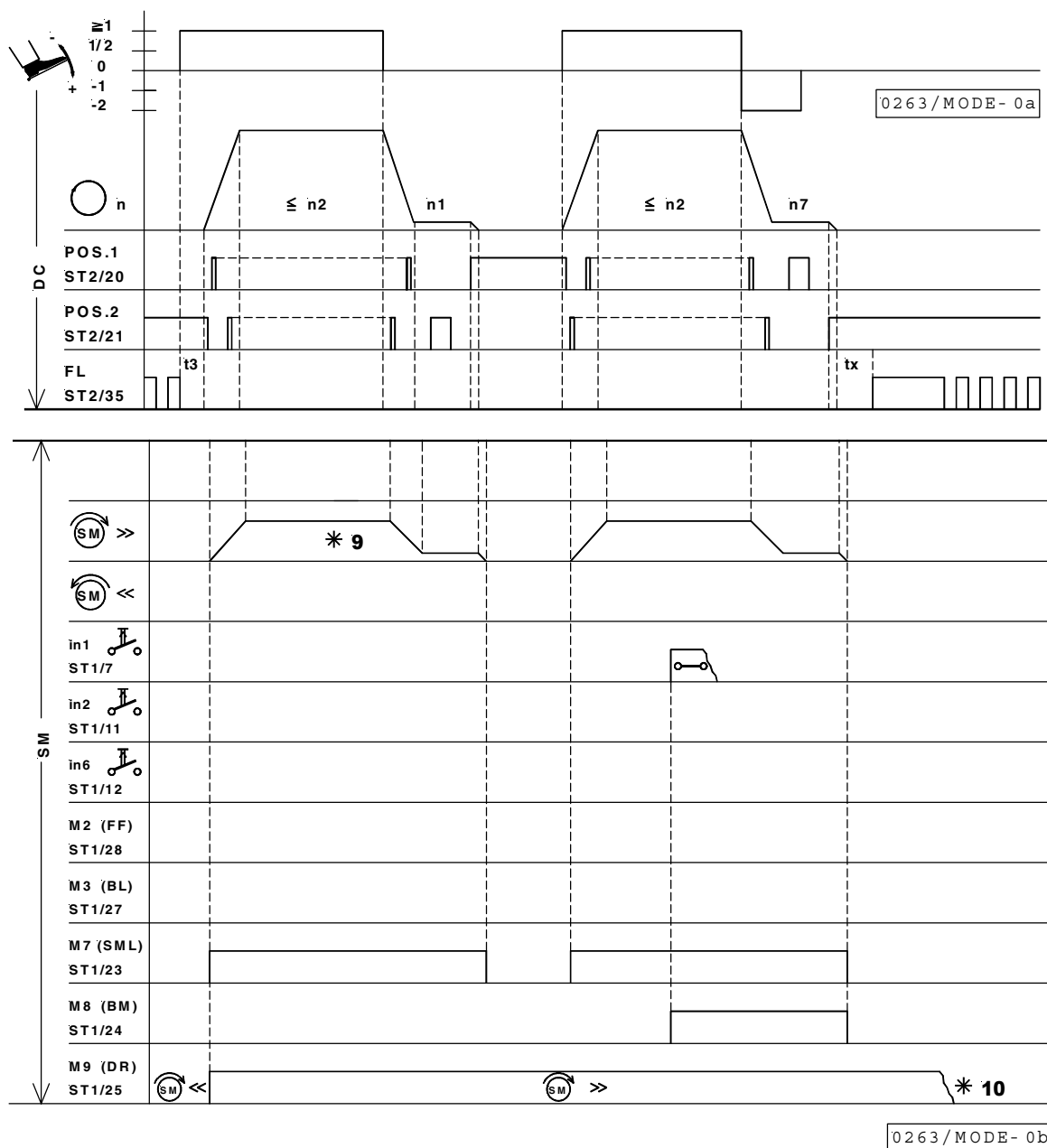
| Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value |
|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
| F-002 | 600 | F-063 | 75.0 | F-112 | 100 | F-220 | 100 |
| F-051 | 18.0 | F-064 | 80.0 | F-113 | 10 | F-221 | 100 |
| F-052 | 20.0 | F-065 | 85.0 | F-120 | 0 | F-223 | 100 |
| F-053 | 23.0 | F-066 | 88.0 | F-130 | 1 | F-224 | 100 |
| F-054 | 27.0 | F-067 | 90.0 | F-131 | 0 | F-225 | 100 |
| F-055 | 32.0 | F-068 | 94.0 | F-132 | 1 | F-226 | 100 |
| F-056 | 38.0 | F-069 | 96.0 | F-134 | 0 | F-227 | 100 |
| F-057 | 45.0 | F-070 | 23.0 | F-135 | 300 | F-228 | 100 |
| F-058 | 50.0 | F-071 | 20.8 | F-136 | 1 | F-229 | 100 |
| F-059 | 55.0 | | | F-137 | 1 | F-230 | 25 |
| F-060 | 60.0 | | | F-140 | 0 | F-231 | 90 |
| F-061 | 65.0 | | | F-141 | 0 | F-291 | 5 |
| F-062 | 70.0 | | | F-142 | 300 | F-292 | 5 |
| | | | | F-143 | 0 | F-293 | 3 |
| | | | | F-152 | 0 | F-294 | 2 |
| | | | | F-190 | 0 | | |

See chapter "[List of Parameters](#)" for parameter values as well as for more detailed explanations.

DC drive parameters:

| Sign | Function | Parameter |
|------|------------------------------|-----------|
| n1 | Positioning speed | F-110 |
| n2 | Maximum speed | F-111 |
| n7 | Trimming speed | F-116 |
| t3 | Start delay from lifted foot | F-202 |

7.1.1 Timing Diagram “Synchronous Stepping Motor Operation“ ($F-290 = 0$)



Letter symbols for d.c. drive:

| Sign | Function |
|------|----------------------------------|
| POS1 | Position 1 on the sewing machine |
| POS2 | Position 2 on the sewing machine |
| FL | Sewing foot lift |

Letter symbols for stepping motor:

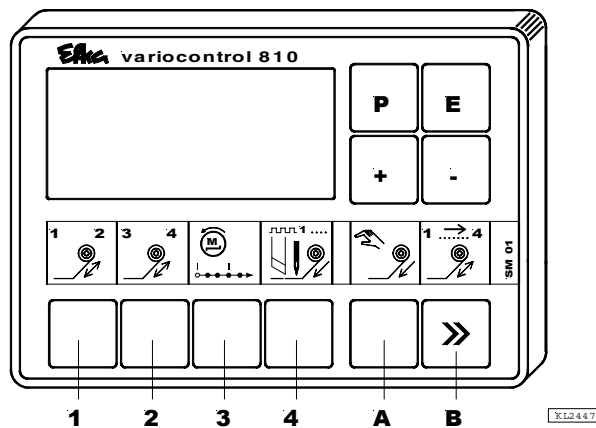
| Sign | Function |
|----------|--|
| SM<< | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| IN1 | Key for tape cutter |
| IN2 | Key for metering device |
| M3 (BL) | Signal “blowing” |
| M7 (SML) | Signal “stepping motor running” |
| M8 (BM) | Tape cutter |

***9** Synchronous operation according to d.c. drive speed. The transmission ratios are selected using keys 1...4 on the V810 and keys 1...9 on the V820.

***10** Signal “direction of rotation” remains On until the direction of rotation is reversed.

7.2 Stepping Motor Function “Automatic Metering Device“ (F-290 = 1 / 2)

| Parameter | Function |
|-----------|---|
| F-290 = 1 | Metering device at the start of the seam |
| F-290 = 2 | Metering device at the seam end |
| F-291 = 1 | Slide-in strip SM 01 on the V810 control panel |
| F-292 = 1 | Slide-in strip SM 01 on the V820 control panel |
| F-240 = 3 | Connection of a key to socket ST1/7 (IN1) for tape cutter |
| F-241 = 4 | Connection of a key to socket ST1/11 (IN2) for tape cutter and metering device |
| F-242 = 6 | Connection of a key to socket ST1/6 (IN3) for selection of tape tension 8...1 and/or 18...1 |
| F-243 = 5 | Connection of a key to socket ST1/8 (IN4) for selection of tape tension 1...8 and/or 1...18 |
| F-244 = 7 | Connection of a key to socket ST1/5 (IN5) for metering device via sensor |
| F-245 = 1 | Connection of a key to socket ST1/12 (IN6) for metering device (command “run“) |



| Key | Function |
|------------|---|
| | V810 |
| Key 1 | Setting tape tension 1 or 2 (ratio stepping motor/d.c. drive) |
| Key 2 | Setting tape tension 3 or 4 (ratio stepping motor/d.c. drive) |
| Key 3 | Setting the number of stitches for the d.c. drive with which the stepping motor runs in reverse direction |
| Key 4 | Setting the number of stepping motor steps for metering device |
| Key A | Key for activating the metering device |
| Key B | Selection of tape tension 1...4 (parallel to input IN4) |
| | V820 |
| Keys 1...8 | Setting tape tension 1...16 (ratio stepping motor/d.c. drive) |
| Key 9 | Setting the number of stitches for the d.c. drive with which the stepping motor runs in reverse direction |
| Key 0 | Setting the number of stepping motor steps for metering device |
| Key A | Key for activating the metering device |
| Key B | Selection of tape tension 1...16 (parallel to input IN4) |

Valid parameters if parameter [F-290](#) = 1 or 2 (automatic metering device)

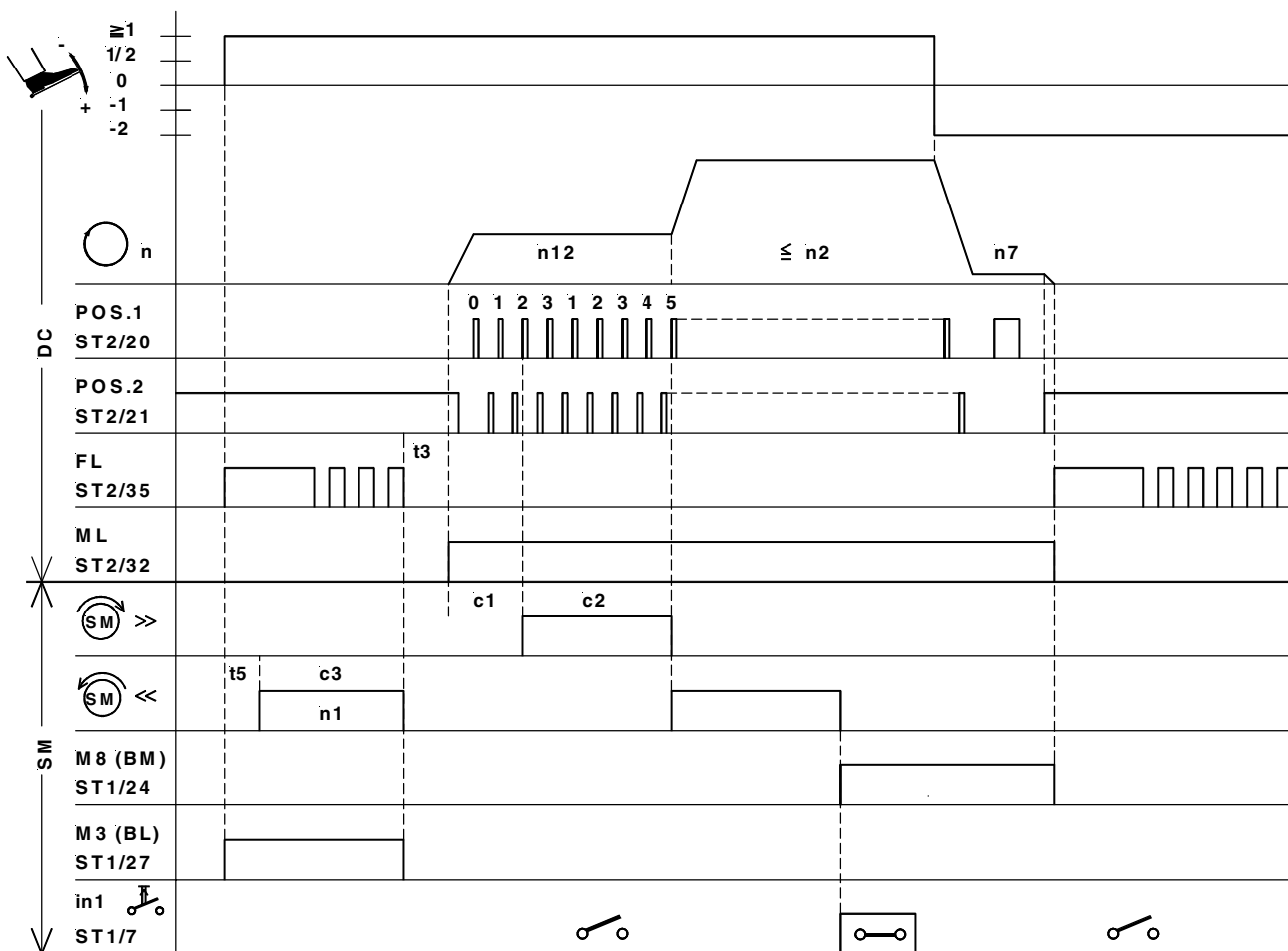
| Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value |
|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
| F-000 | 1 | F-063 | 75.0 | F-112 | 100 | F-220 | 100 |
| F-001 | 3 | F-064 | 80.0 | F-113 | 10 | F-221 | 100 |
| F-002 | 600 | F-065 | 85.0 | F-120 | 0 | F-223 | 100 |
| F-051 | 18.0 | F-066 | 88.0 | F-130 | 1 | F-224 | 100 |
| F-052 | 20.0 | F-067 | 90.0 | F-131 | 0 | F-225 | 100 |
| F-053 | 23.0 | F-068 | 94.0 | F-132 | 1 | F-226 | 100 |
| F-054 | 27.0 | F-069 | 96.0 | F-134 | 0 | F-227 | 100 |
| F-055 | 32.0 | F-070 | 23.0 | F-135 | 300 | F-228 | 100 |
| F-056 | 38.0 | F-071 | 20.8 | F-136 | 1 | F-229 | 100 |
| F-057 | 45.0 | | | F-137 | 1 | F-230 | 25 |
| F-058 | 50.0 | | | F-140 | 0 | F-231 | 90 |
| F-059 | 55.0 | | | F-141 | 0 | F-291 | 1 |
| F-060 | 60.0 | | | F-142 | 300 | F-292 | 1 |
| F-061 | 65.0 | | | F-143 | 0 | F-293 | 1 |
| F-062 | 70.0 | | | F-152 | 0 | F-294 | 2 |
| | | | | F-190 | 0 | | |

See chapter "[List of Parameters](#)" for parameter values as well as for more detailed explanations.

DC drive parameters:

| Sign | Function | Parameter |
|------|------------------------------|-----------|
| n2 | Maximum speed | F-111 |
| n7 | Trimming speed | F-116 |
| n12 | Automatic speed | F-118 |
| t3 | Start delay from lifted foot | F-202 |

7.2.1 Timing Diagram 1 “Automatic Metering Device“ (F-290=1)



0263/MODE- 1a

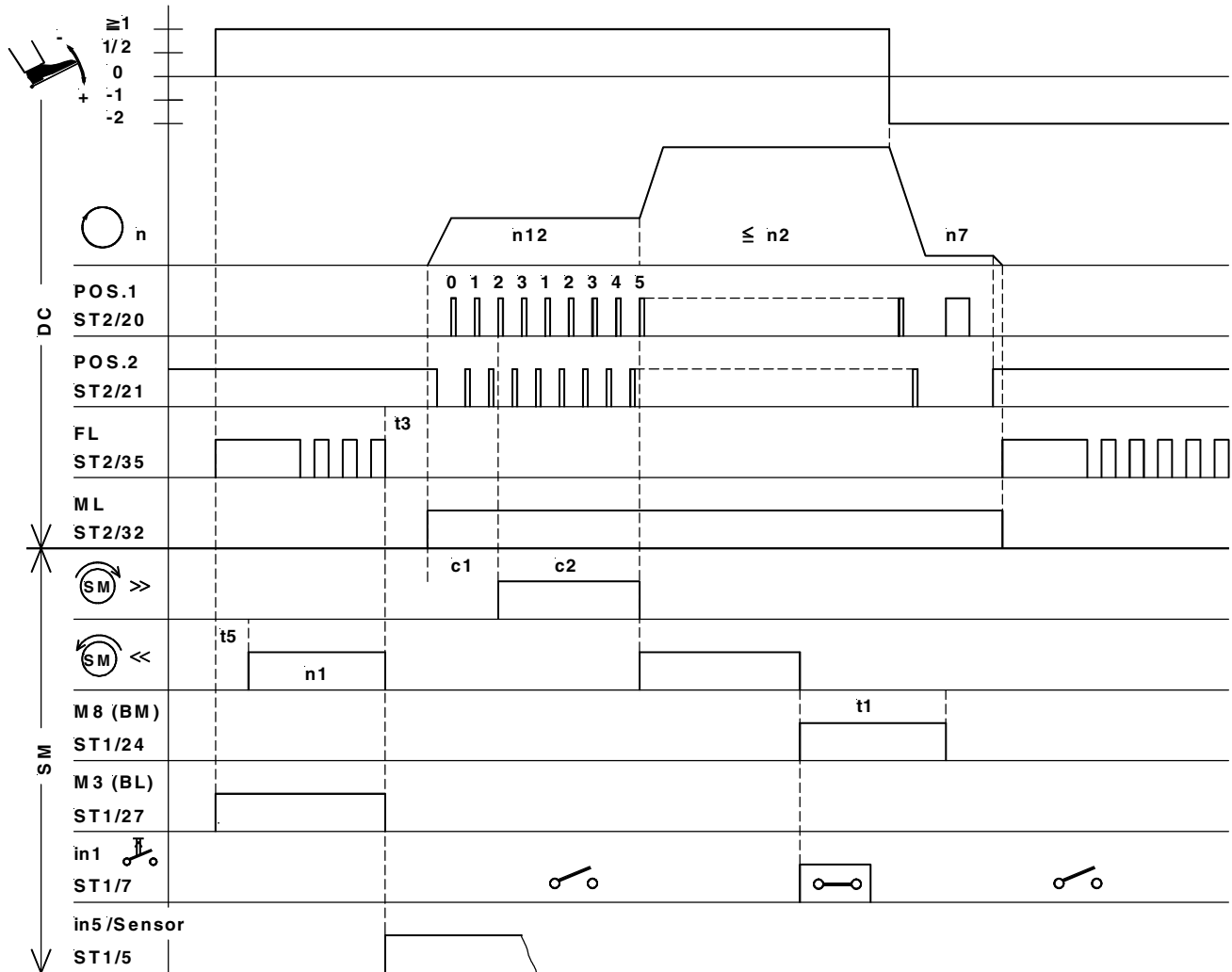
Letter symbols:

| | | |
|---------|---|--|
| SM >> | = | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM << | = | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| M3 (BL) | = | Blowing |
| IN1 | = | Key for tape cutter |

Parameter setting of stepping motor control for above timing diagram:

| Sign | Function | Parameter |
|------|--|-----------|
| FAM | Mode of operation “automatic metering device at the start of the seam“ | F-290 = 1 |
| n1 | Stepping motor speed for metering device | F-112 |
| bEE | Metering device by means of number of steps | F-131 = 0 |
| Ft2 | Tape cutter until seam end | F-143 = 0 |

7.2.2 Timing Diagram 2 “Automatic Metering Device at the Start of the Seam“ (F-290=1)



0263/MODE- 1b

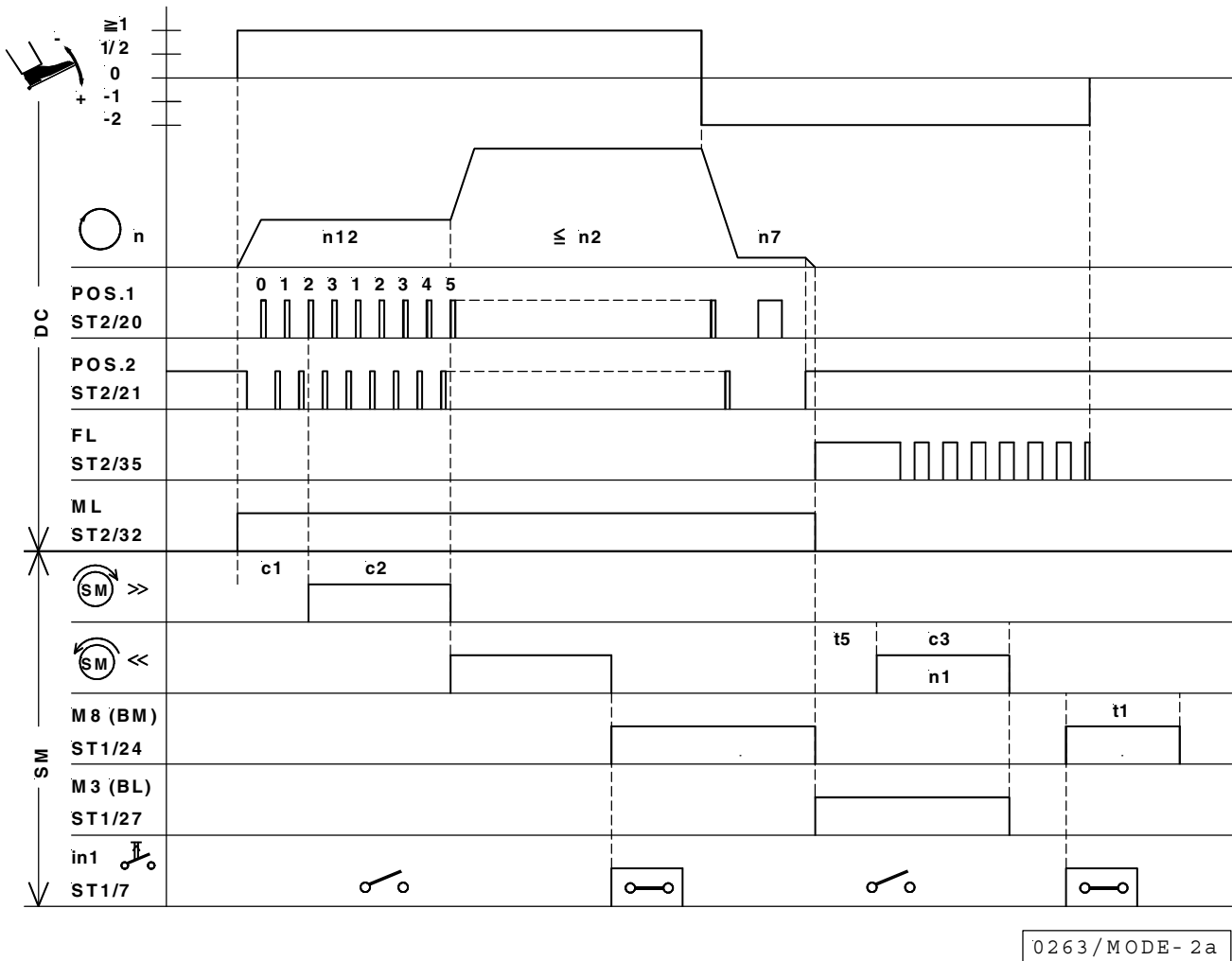
Letter symbols:

| | | |
|---------|---|--|
| SM >> | = | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM << | = | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| M3 (BL) | = | Blowing |
| M8 (BM) | = | Tape cutter |
| IN1 | = | Key for tape cutter |
| IN5 | = | Sensor for disabling the metering device |

Parameter setting of stepping motor control for above timing diagram:

| Sign | Function | Parameter |
|------|--|-----------|
| FAM | Mode of operation “automatic metering device at the start of the seam“ | F-290 = 1 |
| n1 | Stepping motor speed for metering device | F-112 |
| bEE | Metering device limited by sensor | F-131 = 1 |
| Ft2 | Tape cutter over time | F-143 = 1 |

7.2.3 Timing Diagram 1 “Automatic Metering Device at the Seam End“ (F-290=2)



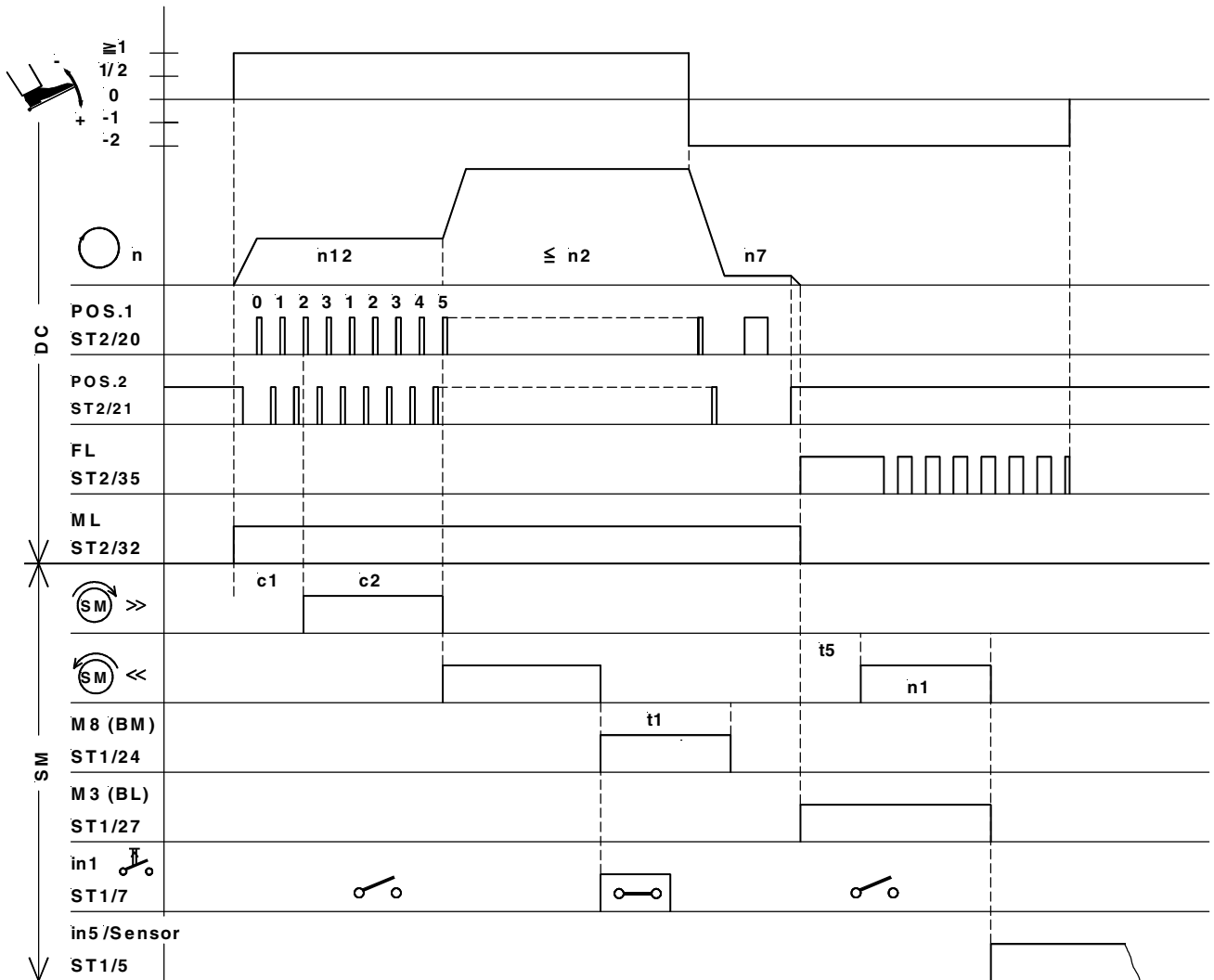
Letter symbols:

| | | |
|---------|---|--|
| SM >> | = | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM << | = | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| M3 (BL) | = | Blowing |
| M8 (BM) | = | Tape cutter |
| IN1 | = | Key for tape cutter |

Parameter setting of stepping motor control for above timing diagram:

| Sign | Function | Parameter |
|------|---|-----------|
| FAM | Mode of operation “automatic metering device at the seam end“ | F-290 = 2 |
| n1 | Stepping motor speed for metering device | F-112 |
| bEE | Metering device by means of number of steps | F-131 = 0 |
| Ft2 | Tape cutter until seam end | F-143 = 0 |

7.2.4 Timing Diagram 2 “Automatic Metering Device at the Seam End“ (F-290=2)



0263 / MODE- 2b

Letter symbols:

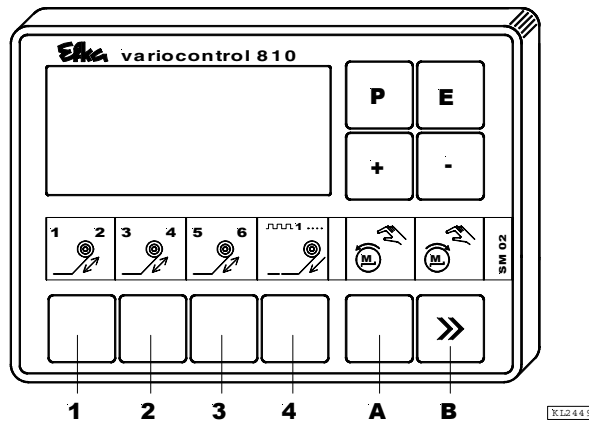
| | | |
|---------|---|--|
| SM >> | = | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM << | = | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| M3 (BL) | = | Blowing |
| M8 (BM) | = | Tape cutter |
| IN1 | = | Key for tape cutter |
| IN5 | = | Sensor for disabling the metering device |

Parameter setting of stepping motor control for above timing diagram:

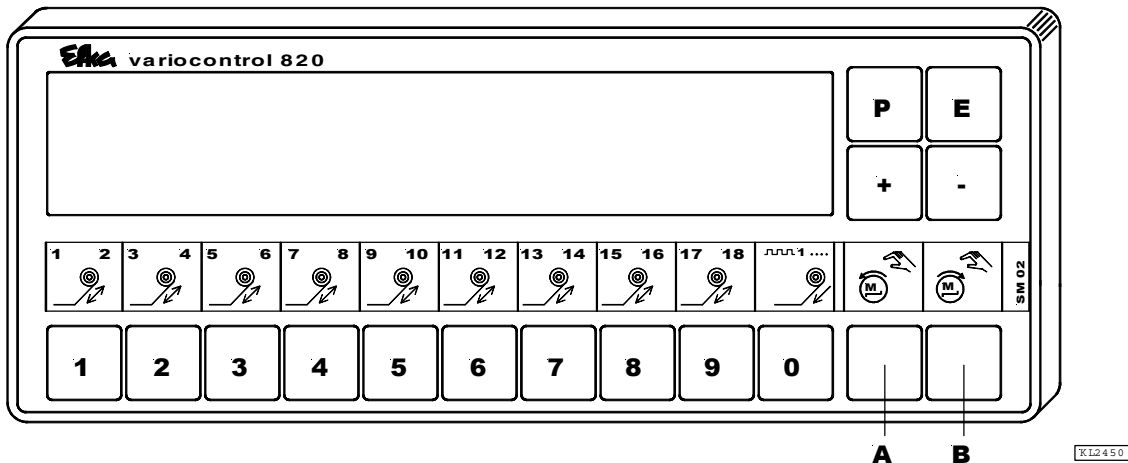
| Sign | Function | Parameter |
|------|--|-----------|
| FAM | Mode of operation “automatic metering device at the start of the seam“ | F-290 = 1 |
| n1 | Stepping motor speed for metering device | F-112 |
| bEE | Metering device limited by sensor | F-131 = 1 |
| Ft2 | Tape cutter over time | F-143 = 1 |

7.3 Stepping Motor Function “Expander Feeding“ ([F-290=3](#))

| Parameter | Function |
|---------------------------|---|
| F-290 = 3 | Expander feeding |
| F-291 = 2 | Slide-in strip SM 02 on the V810 control panel |
| F-292 = 2 | Slide-in strip SM 02 on the V820 control panel |
| F-240 = 3 | Connection of a key to socket ST1/7 (IN1) for tape cutter |
| F-241 = 8 | Connection of a key to socket ST1/11 (IN2) for reset |
| F-242 = 6 | Connection of a key to socket ST1/6 (IN3) for selection of tape tension 8...1 and/or 18...1 |
| F-243 = 5 | Connection of a key to socket ST1/8 (IN4) for selection of tape tension 1...8 and/or 1...18 |
| F-244 = 7 | Connection of a key to socket ST1/5 (IN5) for sensor |
| F-245 = 1 | Connection of a key to socket ST1/12 (IN6) for expander feeding (command “run“) |



- | Key | Function |
|-------------|---|
| V810 | |
| Key 1 | Setting tape tension 1 or 2 (ratio stepping motor/d.c. drive) |
| Key 2 | Setting tape tension 3 or 4 (ratio stepping motor/d.c. drive) |
| Key 3 | Setting tape tension 5 or 6 (ratio stepping motor/d.c. drive) |
| Key 4 | Setting the number of stepping motor steps for expander feeding |
| Key A | Direction of stepping motor rotation: ccw according to speed setting of parameter F-113 |
| Key B | Direction of stepping motor rotation: cw according to speed setting of parameter F-113 |
| V820 | |
| Keys 1...8 | Setting tape tension 1...16 (ratio stepping motor/d.c. drive) |
| Key 9 | Setting the number of stitches for the d.c. drive with which the stepping motor runs in reverse direction |
| Key 0 | Setting the number of stepping motor steps for expander feeding |
| Key A | Direction of stepping motor rotation: ccw according to speed setting of parameter F-113 |
| Key B | Direction of stepping motor rotation: cw according to speed setting of parameter F-113 |



Valid parameters if parameter 290 = 3 (expander feeding)

| Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value |
|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
| F-002 | 600 | F-063 | 75.0 | F-112 | 100 | F-220 | 100 |
| F-051 | 18.0 | F-064 | 80.0 | F-113 | 10 | F-221 | 100 |
| F-052 | 20.0 | F-065 | 85.0 | F-130 | 1 | F-223 | 100 |
| F-053 | 23.0 | F-066 | 88.0 | F-131 | 0 | F-224 | 100 |
| F-054 | 27.0 | F-067 | 90.0 | F-134 | 0 | F-225 | 100 |
| F-055 | 32.0 | F-068 | 94.0 | F-135 | 300 | F-226 | 100 |
| F-056 | 38.0 | F-069 | 96.0 | F-136 | 1 | F-227 | 100 |
| F-057 | 45.0 | F-070 | 23.0 | F-137 | 1 | F-228 | 100 |
| F-058 | 50.0 | F-071 | 20.8 | F-142 | 300 | F-229 | 100 |
| F-059 | 55.0 | | | F-152 | 0 | F-230 | 25 |
| F-060 | 60.0 | | | F-190 | 0 | F-231 | 90 |
| F-061 | 65.0 | | | | | F-291 | 2 |
| F-062 | 70.0 | | | | | F-292 | 2 |
| | | | | | | F-293 | 4 |
| | | | | | | F-294 | 5 |

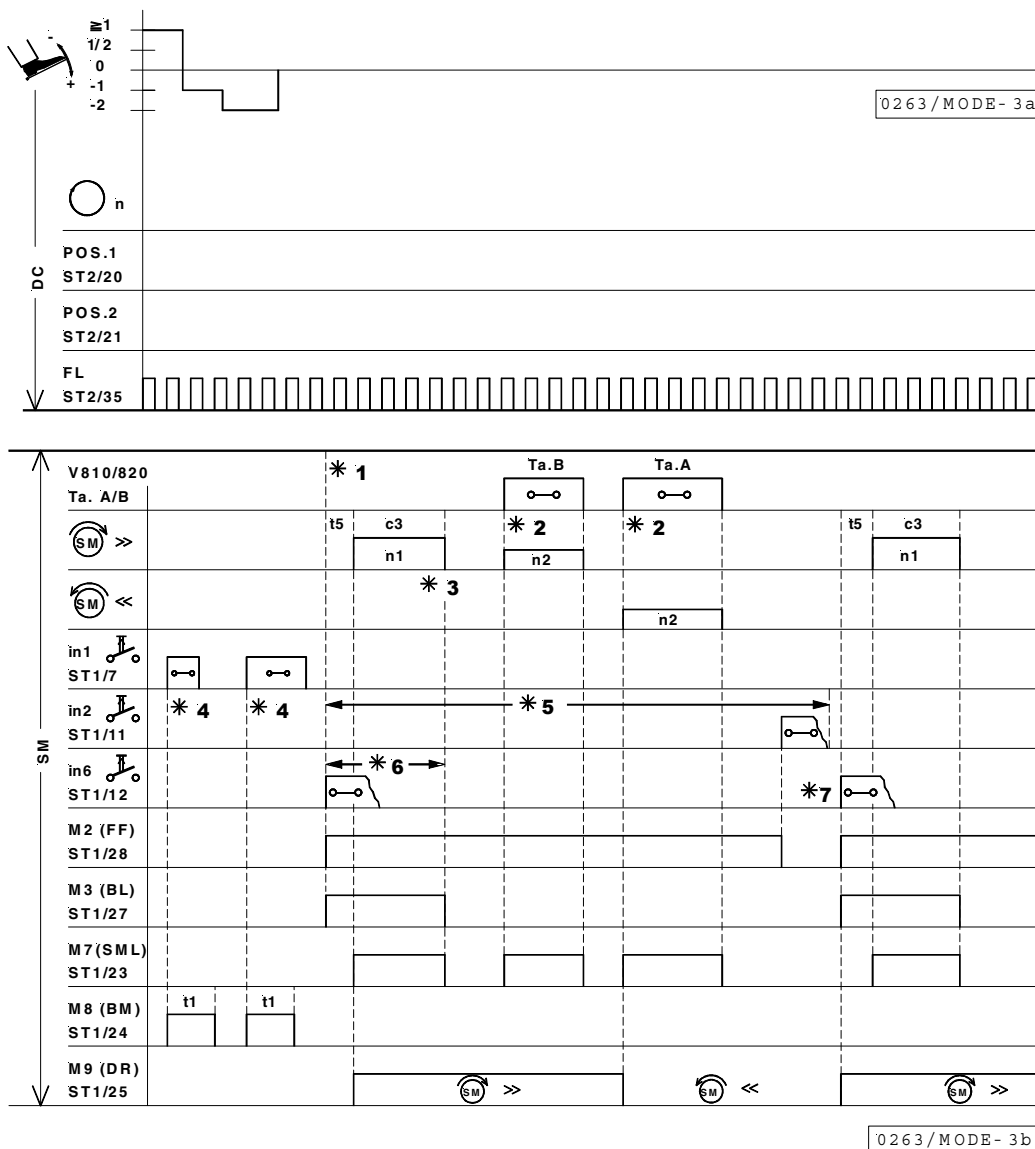
See chapter “[List of Parameters](#)“ for parameter values as well as for more detailed explanations.

DC drive parameters:

| Sign | Function | Parameter |
|------|-------------------------------------|-----------|
| n1 | Positioning speed | F-110 |
| n2 | Maximum speed | F-111 |
| n7 | Trimming speed | F-116 |
| t3 | Start delay from lifted foot | F-202 |

| Sign | Function |
|------|---|
| *1 | Expander feeding only with lifted sewing foot. |
| *2 | The stepping motor can be operated in cw direction using key B and in CCW direction using key A. |
| *3 | F-131 = 0: Expander feeding limited by count c3 (can be set using F-002). F-131 = 1: Expander feeding limited by a sensor on input IN5. |
| *4 | The tape cutter is activated using a key on socket IN1. The function is always possible. |
| *5 | The flip-flop signal can be enabled via input in6 and disabled via input IN2. This procedure can be repeated as often as required. |
| *6 | The function “expander feeding” can be started using a key on input in6. During this function the signal “blowing” is emitted. This procedure can be repeated as often as required. |
| *7 | New start of expander feeding as under *1. |

7.3.1 Timing Diagram “Expander Feeding” (F-290=3)



Letter symbols for d.c. drive:

| | | |
|------|---|--|
| POS1 | = | Position 1 on the sewing machine |
| POS2 | = | Position 2 on the sewing machine |
| FL | = | Sewing foot lift (automatic after power On or after thread trimming on the d.c. control) |

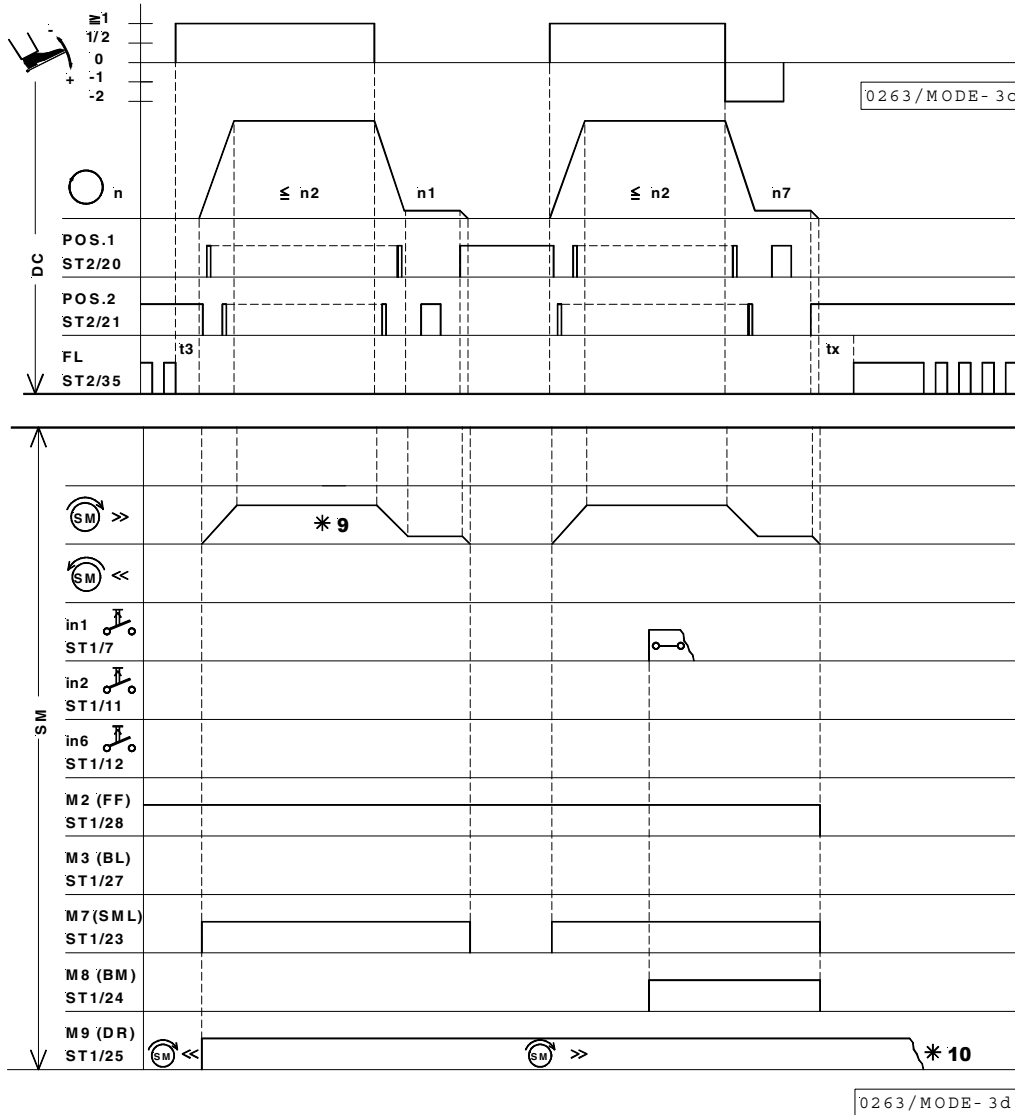
Letter symbols for stepping motor:

| | | |
|----------|---|--|
| SM>> | = | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM<< | = | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| IN1 | = | Key for tape cutter |
| IN2 | = | Input for reset (FF) |
| IN6 | = | Key for expander feeding |
| M2 (FF) | = | Signal “flip-flop” |
| M3 (BL) | = | Signal “blowing” |
| M7 (SML) | = | Signal “stepping motor running” |
| M8 (BM) | = | Tape cutter |
| M9 (DR) | = | Signal “direction of rotation” |

Parameter setting of stepping motor control for above timing diagram:

| Sign | Function | Parameter |
|------|--|-----------|
| FAM | Mode of operation “expander feeding “ | F-290 = 3 |
| n1 | Fixed stepping motor speed with asynchronous operation | F-112 |
| n2 | Fixed stepping motor speed with manual operation using key A / B | F-113 |
| rPd | Start of expander feeding using knee switch | F-130 = 1 |
| bEE | Expander feeding by means of number of steps c3 | F-131 = 0 |

7.3.2 Timing Diagram “Expander Feeding/Synchronous Stepping Motor Operation” (F-290=3)



Letter symbols for d.c. drive:

| | | |
|------|---|--|
| POS1 | = | Position 1 on the sewing machine |
| POS2 | = | Position 2 on the sewing machine |
| FL | = | Sewing foot lift (automatic after power On or after thread trimming on the d.c. control) |

Letter symbols for stepping motor:

| | | |
|----------|---|--|
| SM>> | = | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM<< | = | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| IN1 | = | Key for tape cutter |
| IN2 | = | Input for reset (FF) |
| IN6 | = | Key for expander feeding |
| M2 (FF) | = | Signal “flip-flop” |
| M3 (BL) | = | Signal “blowing” |
| M7 (SML) | = | Signal “stepping motor running” |
| M8 (BM) | = | Tape cutter |
| M9 (DR) | = | Signal “direction of rotation” |

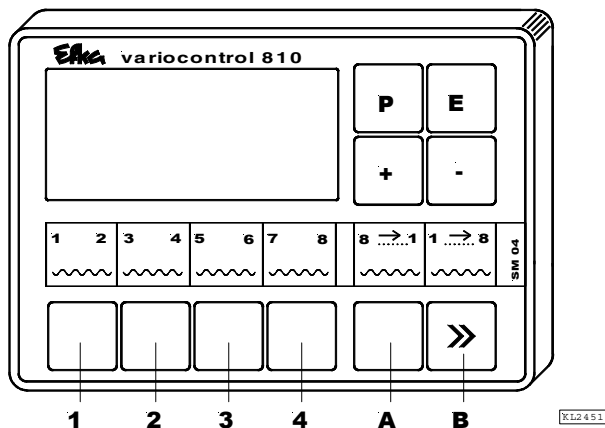
Parameter setting of stepping motor control for above timing diagram:

| Sign | Function | Parameter |
|------|---|-----------|
| FAM | Mode of operation “expander feeding “ | F-290 = 3 |
| bEE | Expander feeding by means of number of steps c3 | F-131 = 0 |

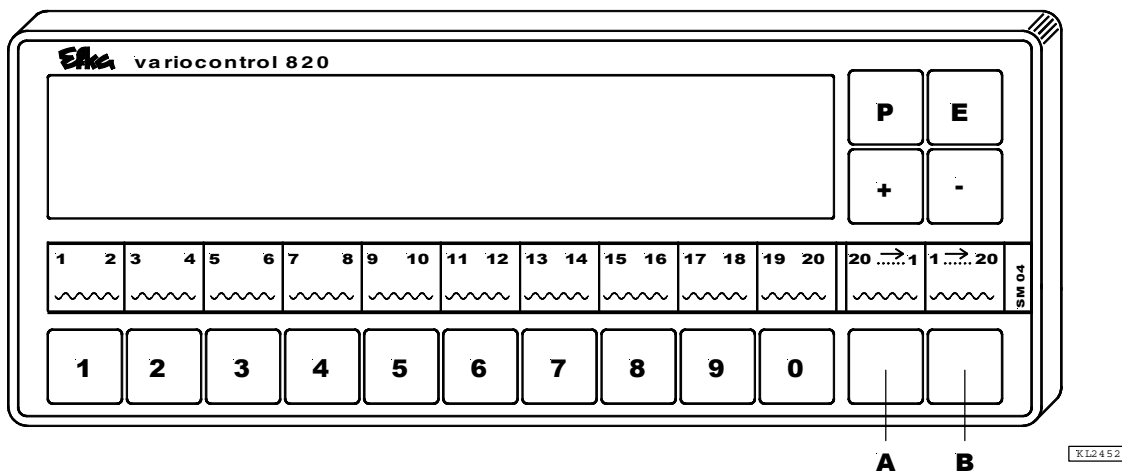
| Sign | Function |
|------|--|
| *9 | Synchronous operation according to d.c. drive speed. The transmission ratios are selected using keys 1...4 on the V810 and keys 1...9 on the V820. |
| *10 | Signal “direction of rotation” remains On until the direction of rotation is reversed. |

7.4 Stepping Motor Function “Fullness Setting“ (F-290=5)

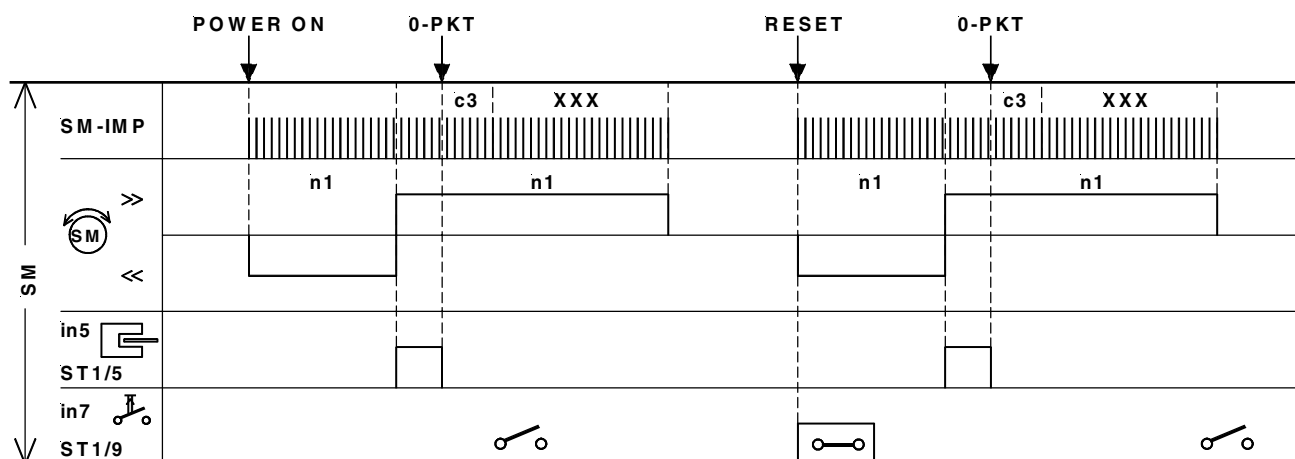
| Parameter | Function |
|-----------|---|
| F-290 = 5 | Fullness setting |
| F-291 = 4 | Slide-in strip SM 04 on the V810 control panel |
| F-292 = 4 | Slide-in strip SM 04 on the V820 control panel |
| F-242 = 6 | Connection of a key to socket ST1/6 (IN3) for switching to the next value |
| F-243 = 5 | Connection of a key to socket ST1/8 (IN4) for switching to the previous value |
| F-244 = 7 | Connection of a sensor (limit switch) to socket ST1/5 (IN5) for determining the reference point |
| F-246 = 8 | Connection of a key to socket ST1/9 (IN7) for reset |



- | Key | Function |
|-------------|---|
| V810 | |
| Key 1 = | - Setting fullness 1 or 2 (F-051 F-052) |
| Key 2 = | - Setting fullness 3 or 4 (F-053 F-054) |
| Key 3 = | - Setting fullness 5 or 6 (F-055 F-056) |
| Key 4 = | - Setting fullness 7 or 8 (F-057 F-058) |
| Key A = | - Selection of fullness 8...1 |
| Key B = | - Selection of fullness 1...8 |
| V820 | |
| Key 1...0 | = - Setting fullness 1...20 |
| Key A | = - Selection of fullness 20...1 |
| Key B | = - Selection of fullness 1...20 |



7.4.1 Timing Diagram “Fullness Setting“ (F-290=5)



0263/MODE-5

Letter symbols for stepping motor:

| | | |
|------|---|--|
| SM>> | = | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM<< | = | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| IN5 | | Input for sensor for determining the reference point |
| IN7 | | Input for reset |

Parameter setting of stepping motor control for above timing diagram:

| Sign | Function | Parameter |
|------|---|---|
| c3 | Compensating steps for reference point | F-002 |
| n1 | Stepping motor speed | F-112 |
| XXX | Value that can be selected using the keys on the V810 or V820 control panel | F-051 ... F-071 |

For fullness setting the following functions are important:

Reference point adjustment after power On

After power On, the stepping motor runs in reverse direction until reaching the sensor. Then it runs in cw direction. After leaving the sensor switching point, the steps set using parameter 002 and then the steps set on the control panel will be performed in cw direction.

Reference point adjustment using a key

After pressing the key connected to socket ST1/9, the reference point is adjusted in the same manner as after power On.

| Parameter | Function |
|---------------------------|---|
| F-131 = 0 | After power On, or pressing the key on input IN7, the stepping motor runs in reverse direction performing the steps set using F-002 . |
| F-131 = 1 | The stepping motor runs in reverse direction until reaching the sensor (limit switch) on input IN5 and then switches to cw direction. Then the stepping motor stops immediately after leaving the sensor. |
| F-131 = 2 | Operation as with setting 1; however, after leaving the sensor, the stepping motor performs the steps set using F-002 in reverse direction. |
| F-131 = 3 | Operation as with setting 1; however, after leaving the sensor, the stepping motor performs the steps set using F-002 in cw direction. Then after each of these settings, the stepping motor runs in cw direction performing the steps selected on the V810/V820 control panel (F-051 ... F-071). |
| F-190 = 0 | The keys on inputs IN3 and IN4 serve to increase or decrease the fullness values. Keys 1...0 on the control panel serve only to set the maximum values. |
| F-190 = 1 | The keys on inputs IN3 and IN4 are disabled. The fullness values are selected directly using the keys on the control panel. |
| F-274 | Setting the maximum number of steps which can be performed in the fullness function without interfering with the mechanism. |

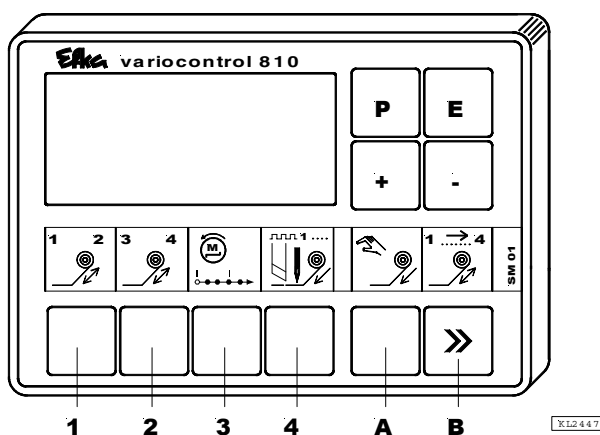
Parameters used whenever parameter [F-290](#) = 5 (fullness)

| Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value |
|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
| F-002 | 600 | F-061 | 650 | F-112 | 100 | F-274 | 65535 |
| F-051 | 180 | F-062 | 700 | F-131 | 1 | F-291 | 4 |
| F-052 | 200 | F-063 | 750 | F-132 | 0 | F-292 | 4 |
| F-053 | 230 | F-064 | 800 | F-142 | 300 | F-293 | 3 |
| F-054 | 270 | F-065 | 850 | F-152 | 0 | F-294 | 2 |
| F-055 | 320 | F-066 | 880 | F-190 | 1 | | |
| F-056 | 380 | F-067 | 900 | | | | |
| F-057 | 450 | F-068 | 940 | | | | |
| F-058 | 500 | F-069 | 960 | | | | |
| F-059 | 550 | F-070 | 230 | | | | |
| F-060 | 600 | F-071 | 208 | | | | |

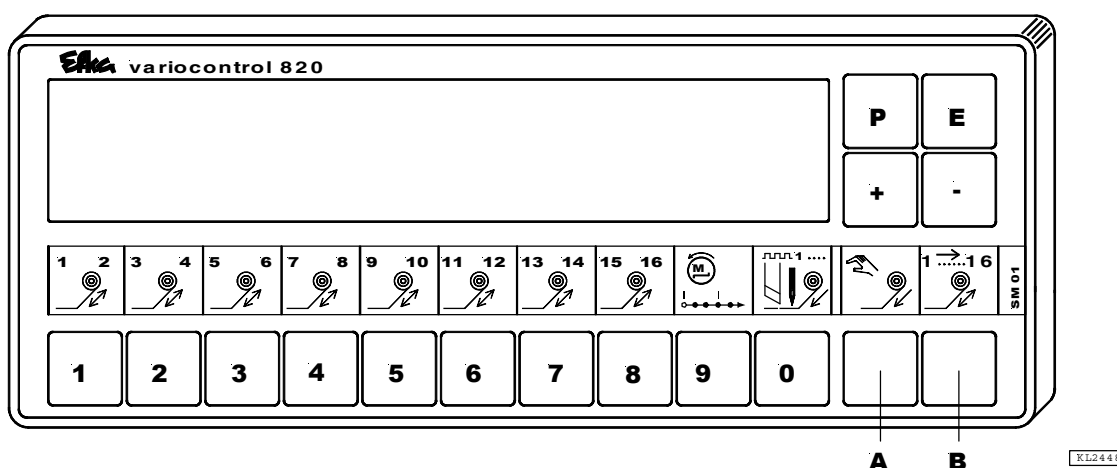
See chapter “[List of Parameters](#)” for parameter values as well as for more detailed explanations.

7.5 Stepping Motor Function “Machine for Attaching Cuff and Heel Tape with Metering Device at the Seam End” (F-290=7)

| Parameter | Function |
|---------------------------|--|
| F-290 = 3 | Machine for attaching cuff and heel tape with metering device at the seam end |
| F-291 = 2 | Slide-in strip SM 01 on the V810 control panel |
| F-292 = 2 | Slide-in strip SM 01 on the V820 control panel |
| F-240 = 3 | Connection of a key to socket ST1/7 (IN1) for tape cutter |
| F-241 = 8 | Connection of a key to socket ST1/11 (IN2) for reset |
| F-242 = 6 | Connection of a key to socket ST1/6 (IN3) for selection of tape speed |
| F-243 = 5 | Connection of a key to socket ST1/8 (IN4) for selection of tape speed |
| F-244 = 7 | Connection of a key to socket ST1/5 (IN5) for sensor |
| F-245 = 1 | Connection of a key to socket ST1/12 (IN6) for metering device (command “run“) |



| Key | Function |
|------------|---|
| | V810 |
| Key 1 | Setting tape tension 1 or 2 (ratio stepping motor/d.c. drive) |
| Key 2 | Setting tape tension 3 or 4 (ratio stepping motor/d.c. drive) |
| Key 3 | Setting the number of stitches for the d.c. drive with which the stepping motor runs in reverse direction |
| Key 4 = | - Setting fullness 7 or 8 (F-057 F-058) |
| Key A | Key for activating the metering device |
| Key B | Selection of tape tension 1...4 (parallel to input IN4) |
| | V820 |
| Keys 1...8 | Setting tape tension 1...16 (ratio stepping motor/d.c. drive) |
| Key 9 | Setting the number of stitches for the d.c. drive with which the stepping motor runs in reverse direction |
| Key 0 | Setting the number of stepping motor steps for metering device |
| Key A | Key for activating the metering device |
| Key B | Selection of tape tension 1...16 (parallel to input IN4) |

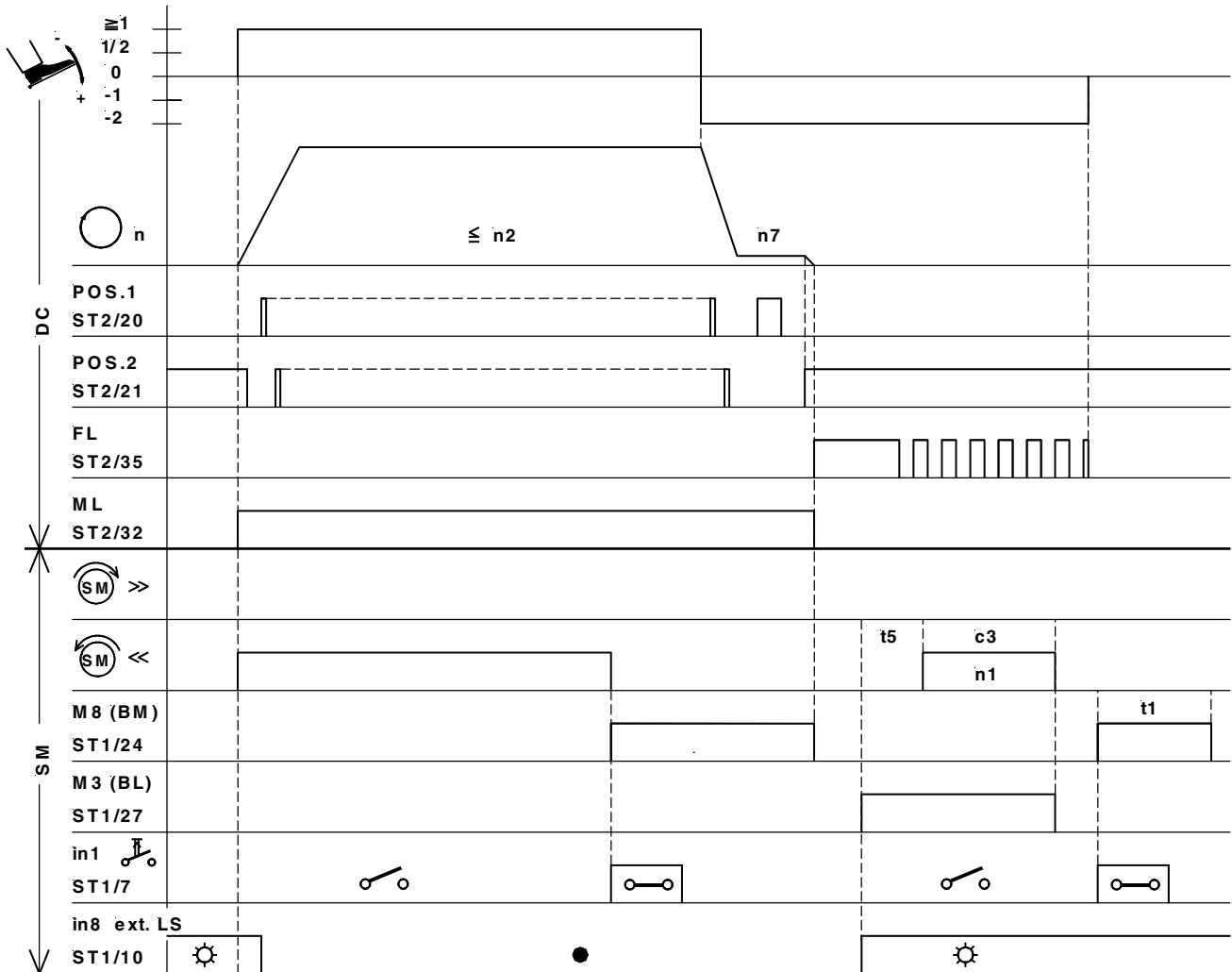


Valid parameters if parameter 290 = 7 (machine for attaching cuff and heel tape)

| Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value |
|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
| F-000 | 0 | | | | | F-220 | 100 |
| F-001 | 0 | | | | | F-221 | 100 |
| F-002 | 600 | F-061 | 65.0 | F-112 | 100 | F-223 | 100 |
| F-051 | 18.0 | F-062 | 70.0 | F-113 | 10 | F-224 | 100 |
| F-052 | 20.0 | F-063 | 75.0 | F-120 | 0 | F-225 | 100 |
| F-053 | 23.0 | F-064 | 80.0 | F-130 | 1 | F-226 | 100 |
| F-054 | 27.0 | F-065 | 85.0 | F-131 | 0 | F-227 | 100 |
| F-055 | 32.0 | F-066 | 88.0 | F-132 | 1 | F-228 | 100 |
| F-056 | 38.0 | F-067 | 90.0 | F-134 | 0 | F-229 | 100 |
| F-057 | 45.0 | F-068 | 94.0 | F-135 | 300 | F-230 | 25 |
| F-058 | 50.0 | F-069 | 96.0 | F-136 | 1 | F-231 | 90 |
| F-059 | 55.0 | F-070 | 23.0 | F-137 | 1 | F-291 | 1 |
| F-060 | 60.0 | F-071 | 20.8 | F-140 | 0 | F-292 | 1 |
| | | | | F-141 | 0 | F-293 | 1 |
| | | | | F-142 | 300 | F-294 | 2 |
| | | | | F-151 | 0 | | |
| | | | | F-190 | 0 | | |

See chapter "[List of Parameters](#)" for parameter values as well as for more detailed explanations.

7.5.1 Timing Diagram “Machine for Attaching Cuff and Heel Tape with Metering Device at the Seam End“ ([F-290=7](#))



0263/MODE-7

| Sign | Function |
|---------|--|
| SM >> | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM << | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| M3 (BL) | Blowing |
| M8 (BM) | Tape cutter |
| IN1 | Key for tape cutter |
| IN2 | External light barrier |

DC drive parameters:

| Sign | Function | Parameter |
|------|----------------|-----------|
| n2 | Maximum speed | F-111 |
| n7 | Trimming speed | F-116 |

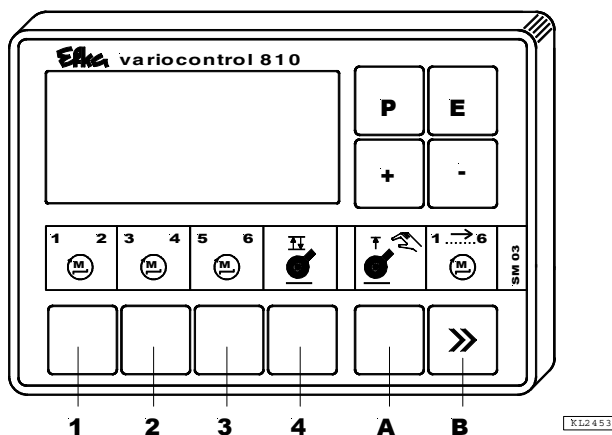
Stepping motor control parameters:

| Sign | Function | Parameter |
|------|---|-----------------------------|
| FAM | Mode of operation “automatic metering device at the seam end“ | F-290 = 7 |
| c3 | Number of stepping motor steps for metering device after seam end | F-002 |
| n1 | Stepping motor speed for metering device | F-112 = 100 |
| rPd | Start: Insert tape with external light barrier covered → uncovered | F-130 = 7 |
| bEE | Metering device by means of number of steps | F-131 = 0 |
| t5 | Delay time after d.c. drive standstill until start of the stepping motor | F-135 |
| t1 | Activation time when operating the tape cutter manually at machine standstill | F-142 |
| Ft2 | Tape cutter until seam end | F-143 = 0 |

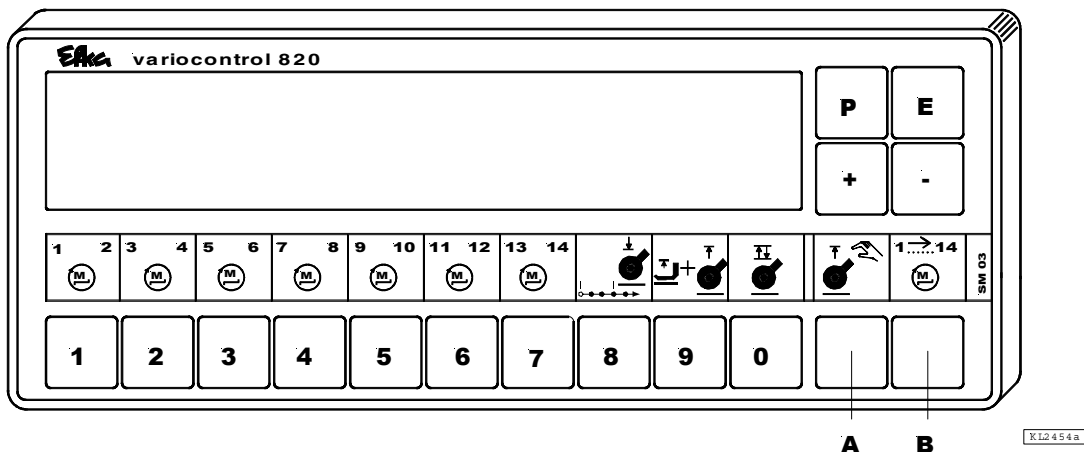
7.6 Stepping Motor Function “Puller“ (Pa. 290=8 / 9)

After mode selection using parameter 290, the puller must be enabled using key 4 on the V810 control panel or key 0 on the V820 control panel.

| Parameter | Function |
|----------------------------|--|
| F-290 = 8 | Puller operation (operation with one sewing machine control) |
| F-290 = 9 | Puller operation (without serial communication) |
| F-292 = 1 | Slide-in strip SM 01 on the V820 control panel |
| F-142 = 0 | Lockstitch mode on the main drive: Stepping motor runs in reverse direction when the backtacking solenoid is activated |
| F-247 = 17 | Connection of a key to socket ST1/10 (IN8) for puller lifting/lowering |
| F-291 = 3 | Slide-in strip SM 03 on the V810 control panel |
| F-292 = 3 | Slide-in strip SM 03 on the V820 control panel |



- | Key | Function |
|--------------|--|
| V810 | |
| Key 1 = | Setting the puller reduction ratio 1 or 2 |
| Key 2 = | Setting the puller reduction ratio 3 or 4 |
| Key 3 = | Setting the puller reduction ratio 5 or 6 |
| Key 4 = | Puller function On/Off with display and possibility of setting how long the puller must remain lifted after the start backtack (see also F-150) |
| Key A = | Key for manual puller lifting (parallel to input IN8) |
| Key B = | Selection of puller reduction ratio 1...6 |
| V820 | |
| Keys 1...7 = | Setting the puller reduction ratio 1...14 |
| Key 8 = | Setting the delay stitches until puller lowering |
| Key 9 = | Off → Puller is not lifted when sewing foot is ON On → Puller is always lifted together with the sewing foot |
| Key 0 = | Puller function On/Off with display and possibility of setting how long the puller must remain lifted after the start backtack (see also F-150) |
| Key A = | Key for manual puller lifting (parallel to input IN8) |
| Key B = | Selection of puller reduction ratio 1...14 |

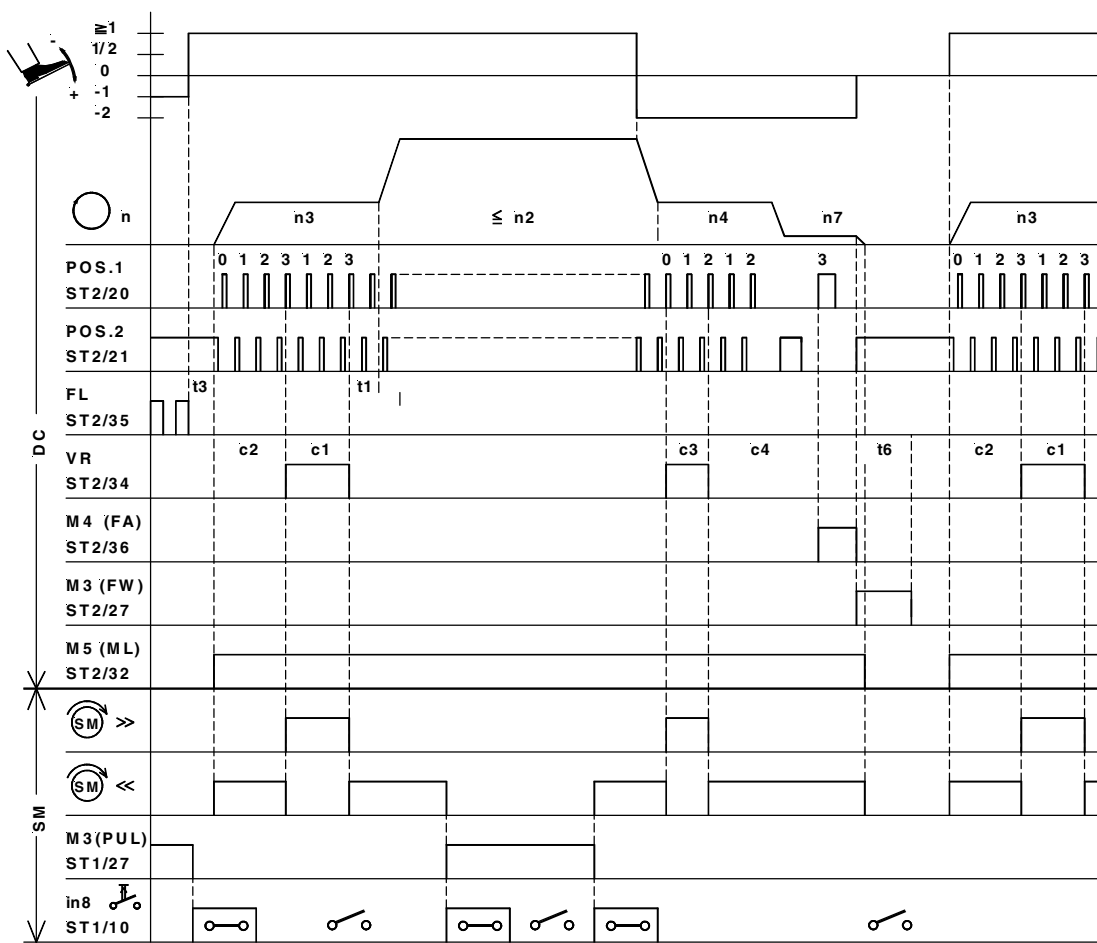


Valid parameters if [F-290](#) = 8 (puller)

| Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value |
|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
| F-002 | 600 | F-061 | 4 | F-112 | 100 | F-200 | 512 |
| F-051 | 4 | F-062 | 4 | F-113 | 10 | F-220 | 0 |
| F-052 | 4 | F-063 | 4 | F-120 | 0 | F-221 | 0 |
| F-053 | 4 | F-064 | 4 | F-131 | 0 | F-223 | 0 |
| F-054 | 4 | F-065 | 4 | F-134 | 0 | F-224 | 0 |
| F-055 | 4 | F-066 | 4 | F-135 | 300 | F-225 | 0 |
| F-056 | 4 | F-067 | 4 | F-136 | 1 | F-226 | 0 |
| F-057 | 4 | F-068 | 4 | F-137 | 1 | F-227 | 0 |
| F-058 | 4 | F-069 | 4 | F-142 | 300 | F-228 | 0 |
| F-059 | 4 | F-070 | 4 | F-150 | 1 | F-229 | 0 |
| F-060 | 4 | F-071 | 208 | F-151 | 0 | F-230 | 25 |
| | | | | F-152 | 0 | F-231 | 90 |
| | | | | F-180 | 1 | F-291 | 3 |
| | | | | F-182 | 1 | F-292 | 3 |
| | | | | F-190 | 0 | F-293 | 6 |
| | | | | | | F-294 | 2 |
| | | | | | | | |

See chapter "[List of Parameters](#)" for parameter values as well as for more detailed explanations.

7.6.1 Timing Diagram “Puller“ (F-290=8)



0263 / MODE - 8

| Sign | Function |
|----------|--|
| SM >> | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM << | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| M3 (PUL) | Puller signal |
| IN8 | Key for puller lifting/lowering |

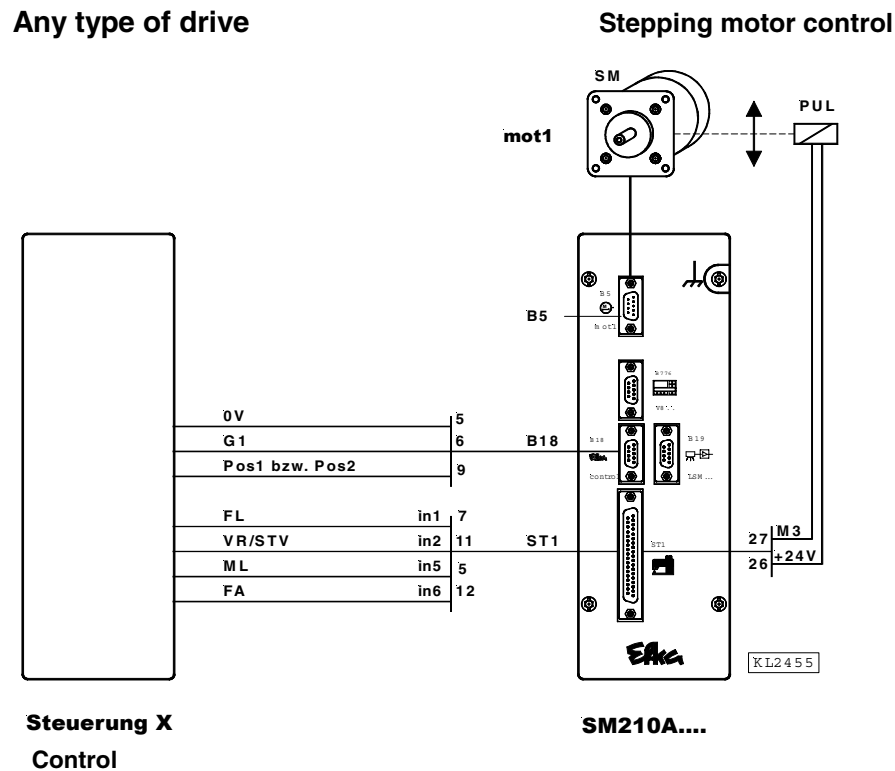
DC drive parameters:

| Sign | Function | Parameter |
|------|--|-----------|
| n2 | Maximum speed | F-111 |
| n3 | Start backtack speed | F-112 |
| n4 | End backtack speed | F-113 |
| n7 | Trimming speed | F-116 |
| t1 | Delay until speed release after start backtack | F-200 |
| t3 | Start delay from lifted sewing foot | F-202 |
| t6 | ON period for thread wiper | F-205 |
| c1 | Start backtack stitches backward | F-001 |
| c2 | Start backtack stitches forward | F-000 |
| c3 | End backtack stitches backward | F-002 |
| c4 | End backtack stitches forward | F-003 |

Stepping motor control parameters:

| Sign | Function | Parameter |
|------|---|-----------|
| FAM | Mode of operation “puller“. Operation with Efka control AB60D, AB62CV, AB220A. Stepping motor speed for puller operation according to the selection of keys 1...3 on the V810 control panel. Stepping motor speed for puller operation according to the selection of keys 1...9 on the V820 control panel | F-290 = 8 |

7.6.2 Connection Scheme for Puller Operation (F-290=9) with Other Controls

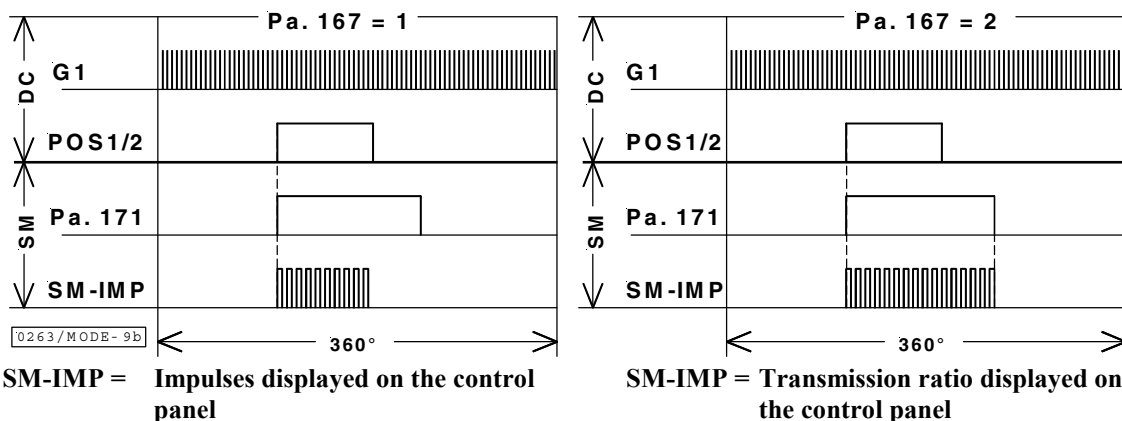


The following connections and settings are necessary for puller operation:

- Puller operation requires the signals “generator impulses” (G1), “position 1” (POS1) or “position 2” (POS2) and “machine running” (ML) from the sewing machine control to be connected.
- The number of generator impulses per rotation of the needle shaft must be set using [F-200](#).
- If the sewing machine is equipped with a backtacking solenoid, the backtacking signal must be connected to input IN2 of the stepping motor control in order to have the puller run in the opposite direction. During stitch condensing on chainstitch machines the stepping motor speed must be adapted to the stitch length.

Option: Signal “puller lifting” on socket ST1/27

- In order that the puller is automatically lifted, the sewing foot lift signal must be connected to input IN1 of the stepping motor control. The puller is lifted together with the sewing foot whenever the function has been switched on using key 9 on the V820 control panel.
- Furthermore, the thread trimming signal must be connected to input IN6 in order that the puller operation is delayed at the start of the seam.



Set a window using [F-171](#). In its angular range intermittent operation is possible. The reference point of this window is determined at the leading edge by the external position on socket B18/7 of the sewing drive. The number of stepping motor impulses depends on the setting of [F-180](#).

Valid parameters if [F-290](#) = 9 (puller)

| Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value |
|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
| F-002 | 600 | F-061 | 4 | F-112 | 100 | F-200 | 360 |
| F-051 | 4 | F-062 | 4 | F-113 | 10 | F-220 | 0 |
| F-052 | 4 | F-063 | 4 | F-131 | 0 | F-221 | 0 |
| F-053 | 4 | F-064 | 4 | F-134 | 0 | F-223 | 0 |
| F-054 | 4 | F-065 | 4 | F-135 | 300 | F-224 | 0 |
| F-055 | 4 | F-066 | 4 | F-136 | 1 | F-225 | 0 |
| F-056 | 4 | F-067 | 4 | F-137 | 1 | F-226 | 0 |
| F-057 | 4 | F-068 | 4 | F-142 | 300 | F-227 | 0 |
| F-058 | 4 | F-069 | 4 | F-150 | 1 | F-228 | 0 |
| F-059 | 4 | F-070 | 4 | F-151 | 1 | F-229 | 9 |
| F-060 | 4 | F-071 | 208 | F-152 | 0 | F-230 | 25 |
| | | | | F-180 | 1 | F-231 | 90 |
| | | | | F-182 | 1 | F-291 | 3 |
| | | | | F-190 | 0 | F-292 | 3 |
| | | | | | | F-293 | 6 |
| | | | | | | F-294 | 2 |

See chapter "[List of Parameters](#)" for parameter values as well as for more detailed explanations.

Note:

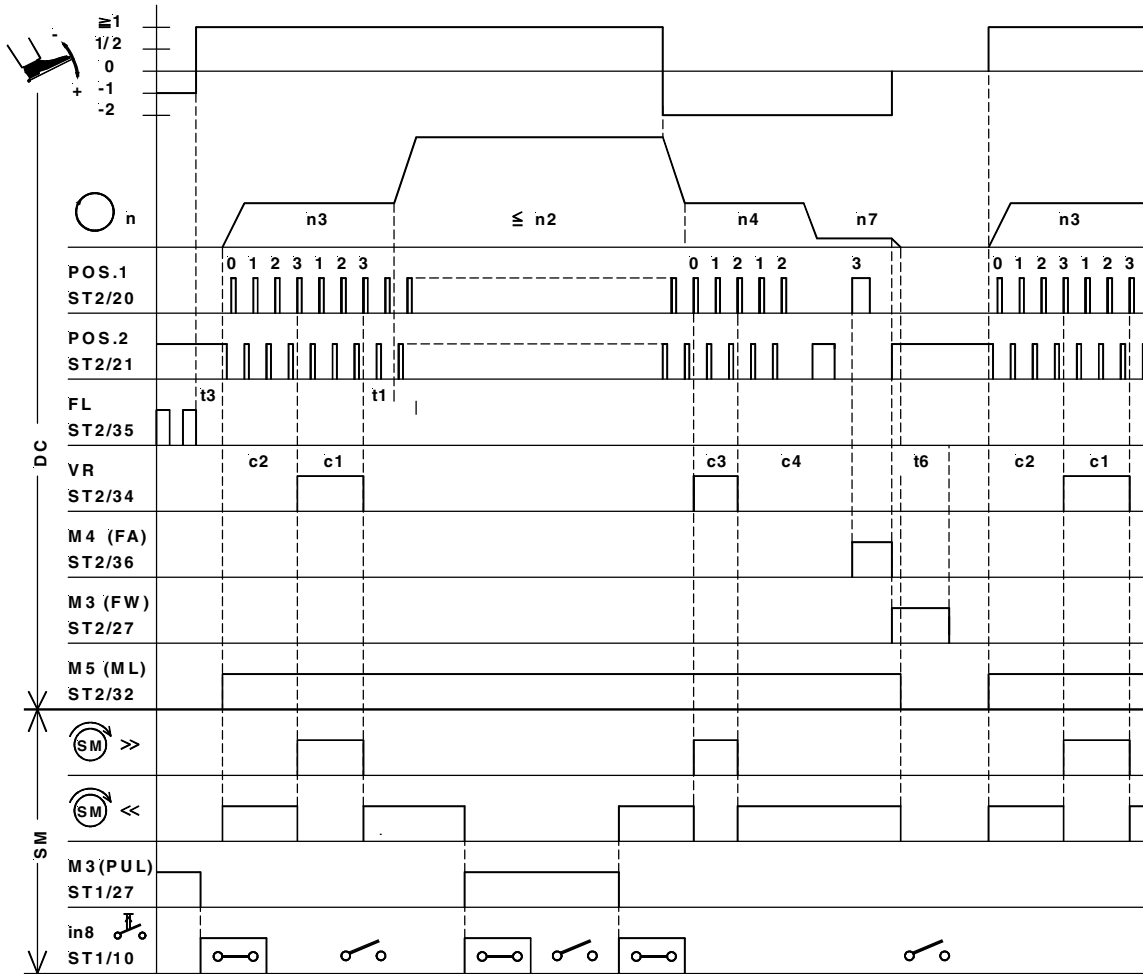
Preset values and connections in mode $F-290 = 9$ have been set for the connection to JUKI DL9000.

If different controls are used, the following external signals have to be supplied:

Speed transmitter with one generator track and 360 degree impulse:

Generator signal on socket

7.6.3 Timing Diagram "Puller" (F-290=9)



0263/MODE-9

| Sign | Function |
|----------|--|
| SM >> | Direction of stepping motor rotation: cw (speed in synchronism with d.c. drive) |
| SM << | Direction of stepping motor rotation: ccw (speed in synchronism with d.c. drive) |
| M3 (PUL) | Puller signal |
| IN8 | Key for puller lifting/lowering |

DC drive parameters:

| Sign | Function | Parameter |
|------|--|-----------|
| n2 | Maximum speed | F-111 |
| n3 | Start backtack speed | F-112 |
| n4 | End backtack speed | F-113 |
| n7 | Trimming speed | F-116 |
| t1 | Delay until speed release after start backtack | F-200 |
| t3 | Start delay from lifted sewing foot | F-202 |
| t6 | ON period for thread wiper | F-205 |
| c1 | Start backtack stitches backward | F-001 |
| c2 | Start backtack stitches forward | F-000 |
| c3 | End backtack stitches backward | F-002 |
| c4 | End backtack stitches forward | F-003 |

Stepping motor control parameters:

| Sign | Function | Parameter |
|------|---|-----------|
| FAM | Mode of operation "puller". Operation with other controls. Stepping motor speed for puller operation according to the selection of keys 1...3 on the V810 control panel. Stepping motor speed for puller operation according to the selection of keys 1...9 on the V820 control panel | F-290 = 9 |

7.7 Stepping Motor Function “Slave Mode“ ([F-290](#) = 10)

Valid parameters if [F-290](#) = 10 (slave mode)

| Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value | Parameter | Preset Value |
|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|-----------|--------------|
| F-190 | 0 | F-200 | 512 | F-229 | 100 | | |
| | | F-201 | 2 | F-230 | 25 | | |
| | | F-202 | 200 | F-240 | 1 | | |
| | | F-207 | 100 | F-241 | 9 | | |
| | | F-208 | 1000 | F-242 | 10 | | |
| | | F-209 | 200 | F-243 | 20 | | |
| | | F-210 | 200 | F-244 | 21 | | |
| | | F-220 | 100 | F-245 | 22 | | |
| | | F-221 | 100 | F-272 | 2 | | |
| | | F-222 | 100 | F-291 | 1 | | |
| | | F-223 | 100 | F-292 | 1 | | |
| | | F-224 | 100 | F-293 | 1 | | |
| | | F-225 | 100 | F-294 | 2 | | |
| | | F-226 | 100 | F-295 | 0 | | |
| | | F-227 | 1001 | | | | |
| | | F-228 | 100 | | | | |

See chapter “[List of Parameters](#)“ for parameter values as well as for more detailed explanations.

Note:

The functions are controlled by the FP220A.... and FP320A.... drives together with the C200 compiler.

8 Signal Test

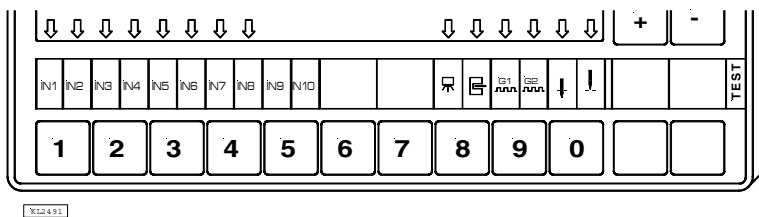
| Function with control panel | Parameter |
|-----------------------------|-----------|
| Input and output test | (Sr4) 173 |

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

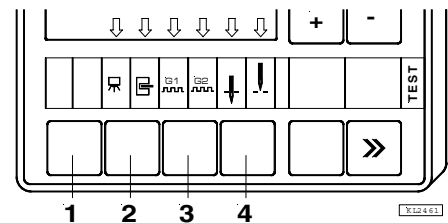
Input Test:

- Select parameter [F-173](#).
- **V810 control panel:** Functions of signals “light barrier”, “sensor”, “generator impulses 1 and 2”, “positions 1 and 2” can be checked directly and indicated by means of arrows above keys 2...4. The LC display shows only one switch function of inputs IN1...IN8 each time. If several keys and/or switches are actuated at the same time, e.g. IN3, IN5, IN6, IN7, the least significant input will be displayed, e.g. IN3.
- **V820 control panel:** Inputs IN1...IN8 and signals “light barrier, sensor, generator impulse 1 and 2, positions 1 and 2” are displayed by means of arrows above keys 1...10. Several inputs can be actuated and displayed at the same time.

V820 Control Panel



V810 Control Panel



Note

The input is displayed if the set function includes a normally open contact or a normally closed contact; e.g. if an input is active with open contact, the corresponding arrow lights up when the contact is open. If an input is active with closed contact, the corresponding arrow lights up when the contact is closed.

Output Test:

- Select the desired output using keys +/-
- Enable the selected output using key >> on the V810 or the incorporated control panel
- Enable the selected output using the key at the bottom right on the V820

| Display | Assignment of the outputs |
|---------|----------------------------|
| 01 | Output M8 on socket ST1/24 |
| 02 | Output M7 on socket ST1/23 |
| 03 | Output M9 on socket ST1/25 |
| 04 | Output M3 on socket ST2/27 |
| 05 | Output M2 on socket ST2/28 |

9 List of Parameters

| | | |
|-----|--------------------|--|
| L 0 | : Operator level | No code number required for these parameters. |
| L 1 | : Technician level | Code no. 1907 with V810 / V820 control panel operation. |
| L 2 | : Supplier level | Code no. 3112 with V810 / V820 control panel operation. |
| L 3 | : Service level | Code no. 5706 with V810 / V820 control panel operation. |
| L 4 | : EFKA level | Code no. 5913 with V810 / V820 control panel operation. |

The following parameters influence the program flow only if they are used in the selected mode ([F-290](#)):
See column <Mode>.

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|---------|----|---|---|----------|------|-----|--------|--|-----|
| 00 0 | C1 | 0 | Number of stitches of the d.c. drive at the start of the seam until start of the stepping motor in reverse direction. The stepping motor control activates the d.c. drive in such a way that the d.c. drive runs at speed n12 during the set number of stitches. | stitches | 9999 | 0 | 1 | <u>0</u> <u>1</u> <u>2</u> | A |
| 00 1 | C2 | 0 | Number of stitches during which the stepping motor runs in reverse direction for tape tension. The stepping motor control activates the d.c. drive in such a way that the d.c. drive runs at the speed n12 during the set number of stitches. | stitches | 9999 | 0 | 3 | <u>0</u> <u>1</u> <u>2</u> | A |
| 00 2 | C3 | 0 | Number of stepping motor steps for metering device. F-290 = 0,1,2: The stepping motor feeds the tape forward for the set number of steps. F-290 = 5 After sensing the reference switch, the stepping motor runs during the set number of steps depending on parameter F-131 . F-290 = 8,9 Upon pressing the key "insert tape" (optional), the stepping motor runs in a clockwise direction for the set number of steps. Functional sequence as: "insert tape" in F-290 = 0,1,2: | steps | 9999 | 0 | 600 | <u>0</u> <u>1</u> <u>2</u> <u>5</u> <u>8</u> | A |

The following keys on the Variocontrol are assigned to parameters F-051 to F-069:

| Key | V810 | | V820 | |
|-----|-------|-------|-------|-------|
| | Arrow | | Arrow | |
| | left | right | left | right |
| 1 | F-051 | F-052 | F-051 | F-052 |
| 2 | F-053 | F-054 | F-053 | F-054 |
| 3 | F-055 | F-056 | F-055 | F-056 |
| 4 | F-057 | F-058 | F-057 | F-058 |
| 5 | ---- | ---- | F-059 | F-060 |
| 6 | ---- | ---- | F-061 | F-061 |
| 7 | ---- | ---- | F-063 | F-064 |
| 8 | ---- | ---- | F-065 | F-066 |
| 9 | ---- | ---- | F-067 | F-068 |
| 0 | ---- | ---- | F-069 | F-070 |

If [F-190](#) = 0, the maximum number of select values will be determined by pressing a key and marking with an arrow. It is possible to switch between these values in an upward or downward direction by activating IN3 and IN4. The displayed value can be varied using key +/-.

If [F-190](#) = 1, the value is selected directly by pressing a key and marking with an arrow. The selected value is displayed on the Variocontrol and can be varied using key +/-.

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|--|-----|-----|-----|--------|-------------------|-----|
| 051 | 01- | 0 | F-290 = 0,1,2 F-181 = 0,2 | | | | 180 | | A |
| 052 | 02- | | | | | | 200 | | |
| 053 | 03- | | | | | | 230 | | |
| 054 | 04- | | Values for tape tension with „automatic metering device“. This value is used as transmission ratio between d. c. motor and stepping motor. | | | | 270 | | |
| 055 | 05- | | The stepping motor and the d.c.motor are synchronized. | | | | 320 | | |
| 056 | 06- | | Stepping motor speed = d.c. motor speed *10 / value. | | | | 380 | | |
| 057 | 07- | | | RPM | | | 450 | 0 | |
| 058 | 08- | | | RPM | | | 500 | 1 | |
| 059 | 09- | | F-181 = 0 | | 999 | 10 | 550 | 2 | |
| 060 | 10- | | The stepping motor and the d.c.motor are synchronized. | | | | 600 | | |
| 061 | 11- | | | | | | 650 | | |
| 062 | 12- | | F-181 = 2 Operation in the position window. | | | | 700 | | |
| 063 | 13- | | The stepping motor and the d.c.motor are synchronized only in the position window POS1E-POS1A F-171 . | | | | 750 | | |
| 064 | 14- | | | | | | 800 | | |
| 065 | 15- | | The stepping motor stops outside the position window. | | | | 850 | | |
| 066 | 16- | | | | | | 880 | | |
| 067 | 17- | | | | | | 900 | | |
| 068 | 18- | | | | | | 940 | | |
| 069 | 19- | | | | | | 960 | | |
| 070 | --- | | | | | | 230 | | |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|---|-------|---|-----|--------|---|-----|
| 051 | 01- | 0 | <p>F-290 = 0,1,2: F-181 = 1 Operation from trigger position</p> <p>Values for the number of feeding steps performed in each trigger position (F-171) of the SM210A.</p> <p>Set the transmission ratio so that the stepping motor performs these steps in synchronization with the speed of the d.c. drive using F-071.</p> <p>The maximum number of steps that can be set depend on the value in F-071. Max = 4000 / [F-071]</p> <p>Up to speed F-110 the steps are performed under conditions of angular synchronism. If the calculated stepping motor speed (d.c. speed / value) higher than the start-stop speed (F-110), the stepping motor speed will be limited to that speed. The steps are no longer performed under conditions of angular synchronism. If, at increasing d.c. speed, 360 degrees are required for performing the steps, the stepping motor is no longer intermittently activated, and the transmission ratio is calculated by the control in such a way that the required steps can be performed in 360 degrees. The stepping motor and the d.c. drive are synchronized to this speed.</p> | steps | max. = 4000 / F-071 | 1 | 4 | 0 1 2 3 7 8 9 | A |
| 052 | 02- | | | | | | | | |
| 053 | 03- | | | | | | | | |
| 054 | 04- | | | | | | | | |
| 055 | 05- | | | | | | | | |
| 056 | 06- | | | | | | | | |
| 057 | 07- | | | | | | | | |
| 058 | 08- | | | | | | | | |
| 059 | 09- | | | | | | | | |
| 060 | 10- | | | | | | | | |
| 061 | 11- | | | | | | | | |
| 062 | 12- | | | | | | | | |
| 063 | 13- | | | | | | | | |
| 064 | 14- | | | | | | | | |
| 065 | 15- | | | | | | | | |
| 066 | 16- | | | | | | | | |
| 067 | 17- | | | | | | | | |
| 068 | 18- | | | | | | | | |
| 069 | 19- | | | | | | | | |
| 070 | 20- | | | | | | | | |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|---|-------|-------|-----|--|-------------------|-----|
| 051 | 01- | 0 | <p>F-290 = 5</p> <p>Absolute values for the stepping motor position. The absolute positions refer to the synchronization with a sensor, which marks the reference point. Each time key 1..9 on the Variocontrol is pressed, the stepping motor runs to the new position filed as a value.</p> | steps | 20000 | 0 | 180 200 230 270 320 380 450 500 550 600 650 700 750 800 850 880 900 940 960 230 | 5 | A |
| 052 | 02- | | | | | | | | |
| 053 | 03- | | | | | | | | |
| 054 | 04- | | | | | | | | |
| 055 | 05- | | | | | | | | |
| 056 | 06- | | | | | | | | |
| 057 | 07- | | | | | | | | |
| 058 | 08- | | | | | | | | |
| 059 | 09- | | | | | | | | |
| 060 | 10- | | | | | | | | |
| 061 | 11- | | | | | | | | |
| 062 | 12- | | | | | | | | |
| 063 | 13- | | | | | | | | |
| 064 | 14- | | | | | | | | |
| 065 | 15- | | | | | | | | |
| 066 | 16- | | | | | | | | |
| 067 | 17- | | | | | | | | |
| 068 | 18- | | | | | | | | |
| 069 | 19- | | | | | | | | |
| 070 | 20- | | | | | | | | |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|--|------------|------|-----|--------|---|-----|
| 071 | 21- | 0 | Transmission value during intermittent stepping motor operation. Effective only if : F-181 = 1,2 | RPM RPM | 9999 | 0 | 208 | 0,1,2,3 ,7,8,9 | A |
| 110 | SSM | 1 | <p>Maximum start/stop speed of the stepping motor.</p> <p>This value indicates up to what preset speed or how many steps per second the stepping motor can be accelerated from standstill or decelerated to standstill. In stepping motor data sheets the start-stop frequency refers to an inertia of 0.</p> | RPM | 400 | 10 | 100 | 0...9 | A |
| 111 | Sn2 | 1 | Application-specific maximum stepping motor speed. | RPM | 600 | 10 | 600 | 0...9 | A |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|--|----------|--------|--------|--------|---|-----|
| 112 | n1 | 1 | Fixed stepping motor speed with asynchronous operation | RPM | 600 | 1 | 100 | 0...9 | A |
| 113 | n2 | 1 | Fixed stepping motor speed with manual operation. The stepping motor can be operated in a forward or reverse direction using key F1 / F2 according to its selected function: F1 (F-293) or F2 (F-294). | RPM | 600 | 1 | 10 | 0...9 | A |
| 114 | n3 | 1 | Stepping motor speed during tape tension correction forward (release tape) | RPM | 600 | 1 | 100 | 0,1,2 | A |
| 115 | N4 | 1 | Stepping motor speed during tape tension correction backward (stretch tape) | RPM | 600 | 1 | 100 | 0,1,2 | A |
| 120 | SnS | 1 | From this sewing drive speed onwards, a signal M9 will be issued to the stepping motor control. If the value is 0000, no signal will be issued. | RPM | 9990 | 0 | 0 | 0...9 | A |
| 121 | MLi | 1 | Sewing guide stop On/Off ----- -- DC drive operation should be enabled without activating the expander. | ---- | 1 1 | 0 0 | 0 0 | 2,7 --- | A |
| 122 | c11 | 1 | Number of stitches for the sewing guide ON period | stitches | 1000 | 0 | 0 | 2,7 | A |
| 130 | rPd | 1 | Start of metering device and/or expander feeding. The metering device can be initiated only if the tape cutter has been activated on IN1. In mode of operation F-290 = 8,9 tape cutting is unnecessary. In mode of operation F-290 = 9 parameter value 2 is inactive. The metering device can always be initiated using the knee switch on IN2, irrespective of the parameter value. 1 = Start inserting tape only using knee switch 2 = Start inserting tape with pedal in pos. -2 of the d.c. drive. 3 = No function. 4 = Start inserting tape with light barrier on B18 or B19 (internal light barrier) when changing from uncovered → covered 5 = Start inserting tape with light barrier on B18 or B19 (internal light barrier) when changing from covered → uncovered 6 = Start inserting tape with external light barrier or sensor on input IN8 when changing from uncovered → covered 7 = Start inserting tape with external light barrier or sensor on input IN8 when changing from covered → uncovered | | 7 | 1 | 1 | 0,1,2 , 3,7 8,9 | A |
| 131 | bEE | 1 | End of metering device at the start of the seam / seam end. Metering device with number of steps c3 (F-002) 0 = Metering device until identification of sensor at input IN5. No step counting. 1 = Metering device until identification of sensor at input IN5. Run-out stitches with number of steps c3 (F-002) forward exceeding the sensor. 2 = Metering device until identification of sensor at input IN5. Run-out stitches with number of steps c3 (F-002) backward exceeding the sensor. | | 3 | 0 | 0 | 0,1,2 , 3,7 , 8,9 | A |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|---|-----|------|-----|--------|-------------------------|-----|
| 140 | mbS | 1 | <p>Tape cutter activation.</p> <ul style="list-style-type: none"> The tape cutter can be activated using input IN1 irrespective of the parameter value. The stepping motor stops. <p>0 = The function is activated using the external key on input IN1.</p> <p>1 = The function is activated with pedal in pos. -1.</p> <p>2 = The function is activated with pedal in pos. -2.</p> <p>3 = The function is activated by external key. If the light barrier function on the d.c. drive is On, it also initiates the d.c. drive seam end. A light barrier <u>must not</u> be connected.</p> <p>4 = The function is activated when the connected light barrier passes from covered → uncovered.</p> <p>5 = The function is activated when the connected light barrier passes from uncovered → covered.</p> <p>6 = The function is activated when the light barrier connected to input IN1 passes from covered → uncovered.</p> <p>7 = The function is activated when the light barrier connected to input IN1 passes from uncovered → covered.</p> <p>8 = The function is activated and stops the stepping motor when the light barrier connected to input IN1 passes from covered → uncovered.</p> <p>9 = The function is activated and stops the stepping motor when the light barrier connected to input IN1 passes from uncovered → covered.</p> | | 9 | 0 | 0 | 0,1,2,7 | A |
| 141 | rBS | 1 | <p>Time for which the stepping motor keeps running during tape cutter activation. If this value = 0, the stepping motor stops immediately. Otherwise, the motor keeps running for the time set.</p> | ms | 9990 | 0 | 0 | 0,1,2,7 | A |
| 142 | t1 | 1 | <p>ON period when operating the tape cutter manually at machine standstill</p> | ms | 9990 | 0 | 300 | 0,1,2,7 | A |
| 143 | Ft2 | 1 | <p>0 = Tape cutter function Tape cutter remains On until the d.c drive seam end</p> <p>1 = Tape cutter over time (time: F-142)</p> | | 1 | 0 | 0 | 0,1,2,7 | A |
| 149 | FPL | 1 | <p>0 = Function Off</p> <p>1 = Puller is lifted together with the sewing foot of the d.c. drive</p> | | 1 | 0 | 0 | 8,9 | A |
| 150 | MPL | 1 | <p>1 = The puller is lifted when a key is pressed on input IN8 or the d.c. drive sewing foot is lifted.</p> <p>2 = The puller remains lifted until counting has been completed (F-000).</p> <p>3 = The puller is lifted at the seam end during thread trimming. At the start of the next seam or after power On, the puller is lowered after counting (F-000). Counting can be interrupted by pressing the key on input IN8.</p> | | 3 | 1 | 1 | 8,9 | A |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|---|---------|------|-----|--------------------------|---------------------------|-----|
| 151 | StP | 1 | <p>0 = The connected main drive works in the chain stitch or overlock mode. If the stitch condensing signal is recognized, the stepping motor changes its transmission ratio according to the setting of parameter F-070.</p> <p>1 = If the d.c. drive rotates in cw direction in the lock stitch mode, the stepping motor also rotates in cw direction. If the d.c. drive rotates in ccw direction, e.g. during backtacking, the stepping motor also rotates in ccw direction. See also parameter F-182.</p> <p>2 = As with setting 1.</p> <p>2 = If, on the d.c. drive, stitch condensing is switched on in the chain stitch mode, the stepping motor rotates in cw direction at the transmission ratio that corresponds to the setting of parameter F-070.</p> | | 2 | 0 | 0 | 0,1,2,3,7 | A |
| 152 | SbS | 1 | <p>Function "start tape tension"</p> <p>0 = After "power On", start with the tape tension value last used.</p> <p>1 = After "power On", start with tape tension value 1. (Value F-051 according to setting. Left-hand arrow above key 1 on the control panel).</p> | | 1 | 0 | 0 | 0..9 | A |
| 153 | RbS | 1 | <p>Function "reset tape tension"</p> <p>0 = After a reset using the external key on IN7 or by pedal in pos. -2 (seam end of the d.c. drive, if parameter 132 = 1), the last preset value for adjusting the stepping motor is used after readjustment of the reference point.</p> <p>1 = As with setting "0"; however, the value for adjusting the stepping motor is determined by parameter F-051. (value according to setting of left-hand arrow above key 1 on the control panel).</p> | | 1 | 0 | 0 | 5 | A |
| 161 | Mdi | 1 | Adaptation of the stepping motor to the mounting direction | | 1 | 0 | 1 | ---- | A |
| 165 | Oni | 1 | <p>0 = Function Off</p> <p>1 = The stepping motor stops and/or runs regardless of the d.c. drive signal "motor running" or of any external signal. Operation and/or stop is determined by the d.c. drive speed and/or by the generator impulses. If the d.c. drive speed is <40 RPM, the stepping motor stops. If the d.c. drive speed is >40 RPM, the stepping motor runs.</p> | | 1 | 0 | 0 | 0..9 | A |
| 171 | Sr2 | 1 | <p>Settings for intermittent operation of the stepping motor. See also: F-202.</p> <p>F-180 = 0 : The set values do not have a function.</p> <p>F-180 = 1 : Setting of the trigger edge.</p> <ul style="list-style-type: none"> • 2E = Trigger edge. • 2A = Value must be min. 2E + 60. <p>F-180 = 2 : Setting of feeding.</p> <ul style="list-style-type: none"> • 2E = Start of feeding. • 2A = End of feeding. <p>Sync. Signal:</p> <p>The values refer to the POS2 signal when operating with a serial link to a d.c. drive of the 200 series.</p> <p>They refer to the POS1 signal when operating with a serial link to a d.c. drive of the 60/62 series.</p> | degrees | 359° | 0° | 2E= 140° 2A= 340° | 0..10 | A |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------------------|----------------------|---|---------|-----------------|-----|--|-----------------------|------------------|-----|--|---------|------|-----------------|-----|--|---------|------------------|-----|--|---------|------|-----------------|-----|--|---------|------------------|-----|--|---------|------|-----------------|-----|--|---------|------------------|-----|--|---------|------|-----------------|--|--|------|------------------|--|--|------|------|-----------------|--|--|------|------------------|--|--|------|------|-----------------|--|--|------|------------------|--|--|------|------|-----------------|--|---------------|------|------------------|----------------------|-----------------------|------|------|-----------------|--|-------------------------------|------|------------------|--|-------------------------------|------|------|-----------------|--|--------------------------|------|------------------|----------------------|---------|------|--|--|--|--|
| 172 | Sr3 | 1 | <p>Display on the V810 control panel: Pos. 1 to pos. 1A (left-hand arrow above key 4 On) Pos. 2 to pos. 2A (right-hand arrow above key 4 On)</p> <p>Display on the V820 control panel: Pos. 1 to pos. 1A (left-hand arrow above key 7 On) Pos. 2 to pos. 2A (right-hand arrow above key 7 On)</p> | | | | | 0..10 | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 173 | Sr5 | 1 | <p>Checking of the signal outputs and inputs using the V810/V820 control panels. For details see chapter "Signal Test"!</p> <p>1 = Output M8 on socket ST1/24 2 = Output M7 on socket ST1/23 3 = Output M9 on socket ST1/25 4 = Output M3 on socket ST1/27 5 = Output M2 on socket ST1/28</p> <p>OFF/ON = By actuating the switches connected to the control the function of these switches is checked and displayed on the control panel. Whether the control recognizes a signal at the corresponding input depends on the parameter values from F-340 to F-355.</p> <p>When using a V810 or V820 control panel, the state of IN1... to IN8 will be displayed also.</p> | | | | | 0..10 | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | <table border="1"> <tbody> <tr> <td rowspan="2">Key1</td> <td>left-hand arrow</td> <td>IN1</td> <td>Level: F-340 and F-341</td> <td>810/820</td> </tr> <tr> <td>right-hand arrow</td> <td>IN2</td> <td>Level: F-342 and F-343</td> <td>810/820</td> </tr> <tr> <td rowspan="2">Key2</td> <td>left-hand arrow</td> <td>IN3</td> <td>Level: F-344 and F-345</td> <td>810/820</td> </tr> <tr> <td>right-hand arrow</td> <td>IN4</td> <td>Level: F-346 and F-347</td> <td>810/820</td> </tr> <tr> <td rowspan="2">Key3</td> <td>left-hand arrow</td> <td>IN5</td> <td>Level: F-348 and F-349</td> <td>810/820</td> </tr> <tr> <td>right-hand arrow</td> <td>IN6</td> <td>Level: F-350 and F-351</td> <td>810/820</td> </tr> <tr> <td rowspan="2">Key4</td> <td>left-hand arrow</td> <td>IN7</td> <td>Level: F-352 and F-353</td> <td>810/820</td> </tr> <tr> <td>right-hand arrow</td> <td>IN8</td> <td>Level: F-354 and F-355</td> <td>810/820</td> </tr> <tr> <td rowspan="2">Key5</td> <td>left-hand arrow</td> <td></td> <td></td> <td>----</td> </tr> <tr> <td>right-hand arrow</td> <td></td> <td></td> <td>----</td> </tr> <tr> <td rowspan="2">Key6</td> <td>left-hand arrow</td> <td></td> <td></td> <td>----</td> </tr> <tr> <td>right-hand arrow</td> <td></td> <td></td> <td>----</td> </tr> <tr> <td rowspan="2">Key7</td> <td>left-hand arrow</td> <td></td> <td></td> <td>----</td> </tr> <tr> <td>right-hand arrow</td> <td></td> <td></td> <td>----</td> </tr> <tr> <td rowspan="2">Key8</td> <td>left-hand arrow</td> <td></td> <td>Light barrier</td> <td>V820</td> </tr> <tr> <td>right-hand arrow</td> <td>F171</td> <td>Sync. signal / sensor</td> <td>V820</td> </tr> <tr> <td rowspan="2">Key9</td> <td>left-hand arrow</td> <td></td> <td>G1 signal from the d.c. drive</td> <td>V820</td> </tr> <tr> <td>right-hand arrow</td> <td></td> <td>G2 signal from the d.c. drive</td> <td>V820</td> </tr> <tr> <td rowspan="2">Key0</td> <td>left-hand arrow</td> <td></td> <td>Internal counting signal</td> <td>V820</td> </tr> <tr> <td>right-hand arrow</td> <td>F171</td> <td>Feeding</td> <td>V820</td> </tr> </tbody> </table> | Key1 | left-hand arrow | IN1 | Level: F-340 and F-341 | 810/820 | right-hand arrow | IN2 | Level: F-342 and F-343 | 810/820 | Key2 | left-hand arrow | IN3 | Level: F-344 and F-345 | 810/820 | right-hand arrow | IN4 | Level: F-346 and F-347 | 810/820 | Key3 | left-hand arrow | IN5 | Level: F-348 and F-349 | 810/820 | right-hand arrow | IN6 | Level: F-350 and F-351 | 810/820 | Key4 | left-hand arrow | IN7 | Level: F-352 and F-353 | 810/820 | right-hand arrow | IN8 | Level: F-354 and F-355 | 810/820 | Key5 | left-hand arrow | | | ---- | right-hand arrow | | | ---- | Key6 | left-hand arrow | | | ---- | right-hand arrow | | | ---- | Key7 | left-hand arrow | | | ---- | right-hand arrow | | | ---- | Key8 | left-hand arrow | | Light barrier | V820 | right-hand arrow | F171 | Sync. signal / sensor | V820 | Key9 | left-hand arrow | | G1 signal from the d.c. drive | V820 | right-hand arrow | | G2 signal from the d.c. drive | V820 | Key0 | left-hand arrow | | Internal counting signal | V820 | right-hand arrow | F171 | Feeding | V820 | | | | |
| Key1 | left-hand arrow | IN1 | Level: F-340 and F-341 | | 810/820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | IN2 | Level: F-342 and F-343 | 810/820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key2 | left-hand arrow | IN3 | Level: F-344 and F-345 | 810/820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | IN4 | Level: F-346 and F-347 | 810/820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key3 | left-hand arrow | IN5 | Level: F-348 and F-349 | 810/820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | IN6 | Level: F-350 and F-351 | 810/820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key4 | left-hand arrow | IN7 | Level: F-352 and F-353 | 810/820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | IN8 | Level: F-354 and F-355 | 810/820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key5 | left-hand arrow | | | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | | | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key6 | left-hand arrow | | | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | | | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key7 | left-hand arrow | | | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | | | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key8 | left-hand arrow | | Light barrier | V820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | F171 | Sync. signal / sensor | V820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key9 | left-hand arrow | | G1 signal from the d.c. drive | V820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | | G2 signal from the d.c. drive | V820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Key0 | left-hand arrow | | Internal counting signal | V820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | right-hand arrow | F171 | Feeding | V820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|---|-------|-----|-----|--------|-----------------------|-----|
| 179 | Sr5 | 1 | <p>Program number of the control with index and identification number. The data will be displayed in succession by pressing a key.</p> <p>V810 control panel display: After calling up the parameter number Key E : Display [o] blinking Key >> : Program no. Key E : Year Month Day Time Key E : Checksum Key E : Identification no. 1. (xxxx_XXXXXXXX) Key E : Identification no. 2. (Skn_XXXXXXXX) Key P : Next parameter</p> <p>V820 control panel display: After calling up the parameter number Key E : Display [o] blinking Key >> : Program no. Key E : Year Month Day Key E : Time Key E : Checksum Press key P : Next parameter</p> | | | | | 0..10 | A |
| 180 | int | 1 | <p>0 = No intermittent operation 1 = Intermittent operation 1. Upon reaching the trigger position F-171, the stepping motor performs the steps set selecting a key 1...9 (F-051-F070), and then stops. The steps are performed in synchronization with those of the d.c. drive with the transmission ratio F-071.</p> <p>1 = Intermittent operation 2. The stepping motor runs during feeding F-171 in synchronization with the transmission ratio selected using a key 1...9 (F-051-F070), and then stops.</p> | | 2 | 0 | 0 | 0,1,2, 3,7, 8,9 | A |
| 182 | c11 | 1 | <p>Setting the stepping motor impulses during feeding for intermittent operation, if parameter F-180 = 1. In order to be able to compensate for different feeding conditions in the seam section with and without backtacking in the lockstitch mode of the d.c. drive, it is possible to set a value using this parameter. If the d.c. drive issues the “backtacking” signal, the steps displayed on the Variocontrol will not be performed; instead, the number of steps resulting from the difference between “value displayed” on the Variocontrol and this parameter will be performed. This numerical value cannot be negative. For this function F-151 must equal 1.</p> | steps | 999 | 0 | 0 | 0,1,2, 3,7, 8,9 | A |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|--|-----|------|-----|--------|-----------------------|-----|
| 190 | MbS | 1 | <p>This parameter determines how parameters F-051 to F-070 are selected. The selected values can be varied using the + / - key on the Variocontrol.</p> <p>0 = Sequential selection: Example: Press key 2 on the Variocontrol. The left-hand arrow is displayed marking the “upper” functional parameter of the list of values. F-051 to F-070. Upon pressing again, the right-hand arrow is displayed. When the left-hand arrow is displayed, it is possible to advance between the values of parameters F-051, F-052, F-053 in an upward direction, each time input IN4 is activated. After having reached the value of F-053, the control returns to value F-051 with the next activation of input IN4. When activating IN3, the sequence is run in a reverse direction.</p> <p>1 = Direct selection: Inputs IN3 and IN4 are blocked. Transmission ratios or steps are selected directly using the appropriate keys on the control panel.</p> | | 1 | 0 | 0 | 0..10 | A |
| 200 | GE | 2 | <p>Number of increments per revolution of the external speed encoder.</p> <p>With a serial link to a drive of the 60/62 series this parameter is automatically set to 120 and is always used after power On. A variation of the value is not effective. When using different drives or speed encoders, input the corresponding value.</p> <p>Attention: If a d.c. drive of the 200 series is operated with a transmission, the effective increments per rotation of the sewing machine must be input. Example: Transmission ratio of the d.c. drive: 1:1.5 -> 512*1.5=768 increments.</p> <p>The calculation of the synchronous speed of the stepping motor and activation of feeding in F-171 depends on the correct setting of this value.</p> | | 3072 | 60 | 512 | 0..10 | A |
| 201 | PGM | 2 | <p>Origin of the position transmitter signals:</p> <p>0 = Not used. 1 = Feeding in F-171 is activated using G1 and G2 and synchronized when the signal at B18 / 9 passes from 1->0. 2 = Feeding in F-171 is activated using G1 and G2 and synchronized when the signal at B18 / 9 passes from 0->1. 3 = As with 1 4 = As with 2 5 = No feeding. 6 = Signals G1/G2 are provided by the AB62CV d.c. drive via sockets B18/1 and 6. The value of parameter F-200 must be set to 120. Feeding is synchronized via serial communication to position 1 of the 60/62 series d.c. drive. 7 = Not used. 8 = Not used. 9 = Positions are generated only by using G1 and a synchronizing signal at B18/9. Parameter 200 must contain the value “increments per revolution of the G1 encoder“. Positions will be generated only if a “machine running“ signal is issued at input IN5.</p> | | 9 | 0 | 2 | 0..10 | A |

| F- | S | L | Designation | Dim | Max | Min | Preset | Mode | Ind | |
|-----|-----|---|---|--|------|-----|--------|-----------------------|-----------------------|---|
| 202 | ic | 2 | Number of full steps per rotation of the stepping motor. For information see data sheet of the stepping motor used. Usually, stepping motors with a stepping angle of 1.8° per full step are used. This corresponds to a setting of $360^\circ / 1.8^\circ = 200$. | steps | 480 | 60 | 200 | 0..10 | A | |
| 207 | ich | 2 | On-load current at stepping motor standstill. | mA | 5000 | 0 | 100 | 0..10 | A | |
| 208 | ir | 2 | On-load current when the stepping motor is running. | mA | 5000 | 100 | 1000 | 0..10 | A | |
| 209 | AEc | 2 | Accelerating curve of the stepping motor. The stepping motor can be accelerated or decelerated from one step to the next without loss of steps up to the start / stop speed determined in F-110 (at a given moment of inertia). If it is necessary to accelerate to a higher speed, this value serves for determining the accelerating curve until the preset speed is reached. In this acceleration phase the stepping motor ceases to be synchronized with the d.c. drive as soon as the latter accelerates faster than the stepping motor is able to follow over this curve. | RPM ms | 1000 | 1 | 200 | 0..10 | A | |
| 210 | dEc | 2 | Braking curve of the stepping motor up to the start/stop speed of parameter F-110. | RPM ms | 1000 | 1 | 200 | 0..10 | A | |
| 220 | d01 | 2 | from 700 RPM | Stepping motor speed adaptation during synchronous operation. In order to adapt the transmission ratio (F-051 to F-070) to the sewing machine conditions, the normal, linear functional sequence can be adapted using these parameters. | % | 200 | 0 | 100 | 0..10 | A |
| 221 | d02 | | from 1400 RPM | | | | | | | |
| 222 | d03 | | from 2100 RPM | | | | | | | |
| 223 | d04 | | from 2800 RPM | | | | | | | |
| 224 | d05 | | from 3500 RPM | | | | | | | |
| 225 | d05 | | from 4200 RPM | | | | | | | |
| 226 | d06 | | from 4900 RPM | | | | | | | |
| 227 | d07 | | from 5600 RPM | | | | | | | |
| 228 | d08 | | from 6300 RPM | | | | | | | |
| 229 | d09 | | from 7000 RPM (d.c. drive) | | | | | | | |
| 230 | c7 | 2 | Correction factor when switching to fast tape feeding. A transmission ratio for the application “metering device” with elastic tape” is selected using parameters F-051 to F-070 . This transmission ratio influences the tension of the elastic tape and ultimately the gathering of the material. If the control switches to a smaller transmission ratio, i.e. the tape is released, the value required for the release is calculated from the difference between previous and new value. Using the factor, this value can be increased or decreased. | | 9999 | 0 | 25 | 0..10 | A | |
| 231 | c8 | 2 | Correction factor when switching to slow tape feeding (see also F-230). | | | | | | | |

| F- | S | L | Designaton | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|----------|--|-------|-------|-----|--|-----------------------|-----|
| | | 2 | Selection of the input function: | | 63 | 0 | | | A |
| 239 | FEL | B18 / 5 | 0 = Light barrier function | | | | 0 1 2 3 7 8 9 | | |
| 240 | IN1 | ST2 / 7 | 1 = Command 'run' | | | | 0 1 2 3 7 10 | | |
| 241 | IN2 | ST2 / 11 | 2 = Not used | | | | ----- | | |
| 242 | IN3 | ST2 / 6 | 3 = Tape cutter | | | | 0 1 2 3 7 8 9 10 | | |
| 243 | IN4 | ST2 / 8 | 4 = Tape cutter and metering device | | | | 0 1 2 3 7 8 9 10 | | |
| 244 | IN5 | ST2 / 5 | 5 = Selection of tape tension 1...18 | | | | 0 1 2 3 7 8 9 10 | | |
| 245 | IN6 | ST2 / 12 | 6 = Selection of tape tension 18...1 | | | | 0 1 2 3 7 8 9 10 | | |
| 246 | IN7 | ST2 / 9 | 7 = Limit switch with sensor | | | | 5 | | |
| 247 | IN8 | ST2 / 10 | 8 = Reset of main program | | | | 0 3 5 | | |
| | | | 9 = CW stepping motor operation at speed F-113 | | | | 0 1 2 3 5 7 8 9 | | |
| | | | 10 = CCW stepping motor operation at speed F-113 | | | | 0 1 2 3 5 7 8 9 | | |
| | | | 11 = External light barrier | | | | 8 9 | | |
| | | | 12 = Stepping motor to rotate in reverse direction when the backtacking signal from the d.c. drive is present | | | | 8 9 | | |
| | | | 13 = Stepping motor to lift puller when the sewing foot lifting signal from the d.c. drive is present | | | | 8 9 | | |
| | | | 14 = Stepping motor to run when the signal „motor running“ from the d.c. drive is present | | | | 8 9 | | |
| | | | 15 = Program execution will be restarted when the thread trimming signal from the d.c. drive is present | | | | 8 9 | | |
| | | | 16 = Puller On | | | | 8 9 | | |
| | | | 17 = Lift puller | | | | 8 9 | | |
| | | | 18 = Select tape tension 01 directly | | | | 0 1 2 3 5 7 8 9 | | |
| | | | 19 = Metering device On/Off | | | | 1 7 | | |
| | | | 20 = Preselection: stepping motor cw | | | | 0..10 | | |
| | | | 21 = Preselection: stepping motor ccw | | | | 0..10 | | |
| | | | 22 = to 63... No function | | | | ----- | | |
| 272 | Adr | 2 | Device address of drive | | 6 | 0 | 2 | 0..10 | A |
| 274 | bMx | 2 | Limitation of the maximum stepping motor steps with respect to the reference point, in order not to interfere with the mechanism. | steps | 65535 | 0 | 65535 | 5 | A |

| F- | S | L | Designaton | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|---|---|-----|-----|-----|--------|-----------------------|-----|
| 290 | FAM | 2 | <p>Mode of operation of the stepping motor control:</p> <p>0 = Manual metering device Slide-in strip F-291 and F-292 = 5</p> <p>1 = Metering device at the start of the seam Slide-in strip F-291 and F-292 = 1</p> <p>2 = Metering device at the seam end Slide-in strip F-291 and F-292 = 1</p> <p>3 = Expander feeding Slide-in strip F-291 and F-292 = 2</p> <p>4 = No function</p> <p>5 = Fullness setting Slide-in strip F-291 and F-292 = 4</p> <p>6 = No function</p> <p>7 = Machine for attaching cuff and heel tape with metering device at the seam end Slide-in strip F-291 and F-292 = 1</p> <p>8 = Puller operation with control series 200 and 69/62. Slide-in strip for V810 and V820 = 3</p> <p>9 = Puller operation with machines from other manufacturers. No serial link. Slide-in strip for V810 and V820 = 3</p> <p>10 = Slave mode: functions controlled by FP220/320. Slide-in strip F-291 and F-292 = 3</p> | | 10 | 0 | 0 | 0..10 | A |
| 291 | 810 | 2 | Select slide-in strip number for V810 control panel (illustrations of slide-in strips see last chapter). | | 6 | 1 | 5 | 0..10 | A |
| 292 | 820 | 2 | Select slide-in strip number for V820 control panel (illustrations of slide-in strips see last chapter). | | 6 | 1 | 5 | 0..10 | A |
| 293 | tF1 | 2 | <p>Functions of key A on the V810/V820 control panels</p> <p>0 = No function</p> <p>1 = Insert tape</p> <p>2 = Switch tape tension upwards (see also description of F-190)</p> <p>3 = Switch tape tension downwards (see also description of F-190)</p> <p>4 = Slow cw operation at speed F-113</p> <p>5 = Slow ccw operation at speed F-113</p> <p>6.....24 No function</p> | | 20 | 0 | 3 | 0..10 | A |
| 294 | tF2 | 2 | Functions of key B on the V810/V820 control panels as with parameter F-293 | | 20 | 0 | 3 | 0..10 | A |
| 295 | nAM | 2 | <p>Switching inputs IN2, IN7, IN8, IN9 for two-wire proximity switches.</p> <p>Power is supplied to the two-wire proximity switches on the one side (24V) and via the stepping motor input on the other side. However, the two-wire proximity switch requires a load resistance where the switching signal can be decoupled. The corresponding resistance is switched in by enabling this parameter. In addition, parameters F-340...F-355 have to be set for the right signal levels.</p> | | 1 | 0 | 0 | 0..10 | A |

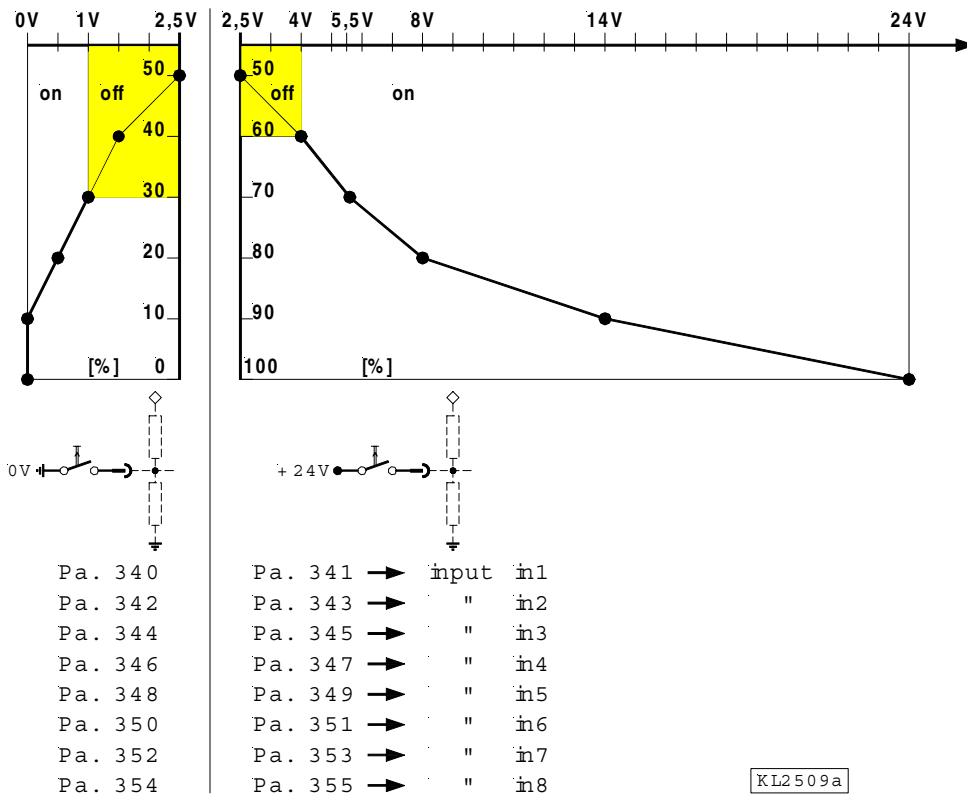
| F- | S | L | Designaton | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----|--------------------|--|------|------|------|--------|-----------------------|-----|
| | | 2 | Tape tension correction: release tape | | | | | | |
| | | | <p>The stepping motor rotates in cw direction. These parameters are active when switching between different tape tension values and varying the transmission ratio between d.c. motor and stepping motor speed using keys 1..0 on the Variocontrol.</p> <p>By way of the difference between the tape tension values F-051 to F-070 a correction value will be determined which increases tape pretension or releases the tape depending on whether the previous value was higher or lower.</p> <p>This fast tape tension adjustment results in an optimum seam appearance on the basis of the transition between different gathering values. The numerical value can be corrected in order to adapt different applications and materials: release using parameters F-301 to F-310, stretch using parameters F-311 to F-320. The adjustment speed for tape tension correction when releasing the tape can be set using F-114.</p> | | 500 | 20 | 100 | 0..10 | A |
| 301 | u02 | 700-1400 | | | | | | | |
| 302 | u02 | 1400-2100 | | | | | | | |
| 303 | u03 | 2100-2800 | | | | | | | |
| 304 | u04 | 2800-3500 | | | | | | | |
| 305 | u05 | 3500-4200 | | | | | | | |
| 306 | u06 | 4200-4900 | | | | | | | |
| 307 | u07 | 4900-5600 | | | | | | | |
| 308 | u08 | 5600-6300 | | | | | | | |
| 309 | u09 | 6300-7000 | | | | | | | |
| | | Sewing drive speed | | | | | | | |
| | | 2 | Tape tension correction: stretch tape | | | | | | |
| | | | <p>The stepping motor rotates in ccw direction. The adjustment speed for tape tension correction when stretching the tape can be set using F-115. The adjustment speed can also be adapted using parameters F-330 to F-339.</p> | | 500 | 20 | 100 | 0..10 | A |
| 311 | r02 | 700-1400 | | | | | | | |
| 312 | r02 | 1400-2100 | | | | | | | |
| 313 | r03 | 2100-2800 | | | | | | | |
| 314 | r04 | 2800-3500 | | | | | | | |
| 315 | r05 | 3500-4200 | | | | | | | |
| 316 | r06 | 4200-4900 | | | | | | | |
| 317 | r07 | 4900-5600 | | | | | | | |
| 318 | r08 | 5600-6300 | | | | | | | |
| 319 | r09 | 6300-7000 | | | | | | | |
| | | Sewing drive speed | | | | | | | |
| 325 | cti | 1 | Erasing all TEACH IN data <ul style="list-style-type: none"> • Input code number 3112 after power On • Press key E • Select parameter F-398 • Input 3112 • Press key P • The display briefly shows "deleted", and a short acoustic signal is issued. All TEACH IN programs have been erased! | code | 9999 | 0000 | 0000 | 0..10 | A |

| F- | S | L | Designaton | Dim | Max | Min | Preset | Mode | Ind | |
|-----|-----|--------------------|---|-----|-----|-----|--------|-----------------------|-----|--|
| | | 2 | Tape tension correction: correction of adjustment speed | | | | | | | |
| | | | Tape tension correction: Adaptation of the adjustment speed when changing to a different tape tension value. See also: Adjustment speed forward: F-114 Adjustment speed backward: F-115 | | 500 | 20 | 100 | 0..10 | A | |
| 330 | k02 | 700-1400 | | | | | | | | |
| 331 | k02 | 1400-2100 | | | | | | | | |
| 332 | k03 | 2100-2800 | | | | | | | | |
| 333 | k04 | 2800-3500 | | | | | | | | |
| 334 | k05 | 3500-4200 | | | | | | | | |
| 335 | k06 | 4200-4900 | | | | | | | | |
| 336 | k07 | 4900-5600 | | | | | | | | |
| 337 | k08 | 5600-6300 | | | | | | | | |
| 338 | k09 | 6300-7000 | | | | | | | | |
| 339 | k10 | > 7000 | | | | | | | | |
| | | Sewing drive speed | | | | | | | | |

Setting the lower and upper switching thresholds of the input signals:

| F- | S | L | Designaton | Dim | Max | Min | Preset | Mode | Ind |
|-----|----|---|--|-----|-----|-----|--------|-----------------------|-----|
| 340 | 1L | 2 | Lower switching threshold of input IN1 | % | 100 | 0 | (*) | 0..10 | A |
| 341 | 1h | 2 | Upper switching threshold of input IN1 | % | 100 | 0 | (*) | 0..10 | A |
| 342 | 2L | 2 | Lower switching threshold of input IN2 | % | 100 | 0 | (*) | 0..10 | A |
| 343 | 2h | 2 | Upper switching threshold of input IN2 | % | 100 | 0 | (*) | 0..10 | A |
| 344 | 3L | 2 | Lower switching threshold of input IN3 | % | 100 | 0 | (*) | 0..10 | A |
| 345 | 3h | 2 | Upper switching threshold of input IN3 | % | 100 | 0 | (*) | 0..10 | A |
| 346 | 4L | 2 | Lower switching threshold of input IN4 | % | 100 | 0 | (*) | 0..10 | A |
| 347 | 4h | 2 | Upper switching threshold of input IN4 | % | 100 | 0 | (*) | 0..10 | A |
| 348 | 5L | 2 | Lower switching threshold of input IN5 | % | 100 | 0 | (*) | 0..10 | A |
| 349 | 5h | 2 | Upper switching threshold of input IN5 | % | 100 | 0 | (*) | 0..10 | A |
| 350 | 6L | 2 | Lower switching threshold of input IN6 | % | 100 | 0 | (*) | 0..10 | A |
| 351 | 6h | 2 | Upper switching threshold of input IN6 | % | 100 | 0 | (*) | 0..10 | A |
| 352 | 7L | 2 | Lower switching threshold of input IN7 | % | 100 | 0 | (*) | 0..10 | A |
| 353 | 7h | 2 | Upper switching threshold of input IN7 | % | 100 | 0 | (*) | 0..10 | A |
| 354 | 8L | 2 | Lower switching threshold of input IN8 | % | 100 | 0 | (*) | 0..10 | A |
| 355 | 8h | 2 | Upper switching threshold of input IN8 | % | 100 | 0 | (*) | 0..10 | A |

Diagram representing the lower and upper switching threshold of inputs IN1...IN8
(parameters [F-340...F-355](#))



Inputs IN1 – IN8 can be switched to both +24V and 0V. These inputs work as a window comparator with the lower limits [F-340](#), [F-342](#), [F-344](#), [F-346](#), [F-348](#), [F-350](#), [F-352](#), [F-354](#), and the upper limits [F-341](#), [F-343](#), [F-345](#), [F-347](#), [F-349](#), [F-351](#), [F-353](#), [F-355](#).

The lower and upper limit of each input can be set individually using 2 parameters, respectively.

Lower switching threshold (switch to 0V): Below the set value the control logic recognizes “on” (switch closed); above the set value the control logic recognizes “off” (switch open).

Upper switching threshold (switch to +24V): Below the set value the control logic recognizes “off” (switch open); above the set value the control logic recognizes “on” (switch closed).

The factory setting of these parameters is 30% \approx 0.9V (for the lower switching threshold) and 60% \approx 4.0V (for the upper switching threshold).

When using a micro switch, this factory setting works without problem if any of the two contacts is connected to 0V or +24V of the stepping motor control.

These factory settings, however, will not work if control elements with bipolar signals are connected instead of switches, keys or “open collector” elements.

These elements switch one signal between 0V and +Vdd to the stepping motor control (e.g. 5V..24V).

The following settings are suitable for such signals:

| External encoder | | | Limit values | | Interpretation by SM210 | |
|-----------------------|-------------|--------|--------------|--------------|-------------------------|--------|
| Signal: | signifying: | logic: | lower limit: | upper limit: | signifying: | logic: |
| y | not active | 0 | 0 | 60 | “switch not closed” | 0 |
| +Vdd | active | 1 | 0 | 60 | “switch closed” | 1 |
| Inversion of signals: | | | | | | |
| 0V | not active | 0 | 30 | 100 | “switch closed” | 1 |
| +Vdd | active | 1 | 30 | 100 | “switch not closed” | 0 |

The same procedure applies to signal inversion with switches / keys:

Switching to 0V of the stepping motor control.

| Switch | Limit values | | Interpretation by SM210 | |
|-----------------------|--------------|--------------|-------------------------|--------|
| | lower limit: | upper limit: | signifying: | logic: |
| open | 30 | 100 | “switch not closed“ | 0 |
| closed | 30 | 100 | “switch closed“ | 1 |
| Inversion of signals: | | | | |
| open | 0 | 30 | “switch closed“ | 1 |
| closed | 0 | 30 | “switch not closed“ | 0 |

When switching to +24V of the stepping motor control, proceed correspondingly.

(*) The preset value depends on the mode of operation selected in [F-290](#): The standard is: low = 40 ; high = 60.

| F- | S | L | Designaton | Dim | Max | Min | Preset | Mode | Ind |
|------------------|-----|---|---|-----|-----|-----|--------|--|-----|
| 380 | M02 | 3 | Function of output M2 on ST2 / 28 | | 16 | 0 | (*) | | A |
| | | | 00 = No function | | | | | ---- | |
| | | | 01 = Motor running | | | | | 0..10 | |
| | | | 02 = Tape cutter | | | | | 0..10 | |
| | | | 03 = Sens of rotation | | | | | 0..10 | |
| | | | 04 = Blowing signal 1 | | | | | 0 3 | |
| | | | 05 = No function | | | | | ---- | |
| | | | 06 = Prolonged blowing signal | | | | | 0..10 | |
| | | | 07 = Tape clamp | | | | | 0 1 2 3 7 8 | |
| | | | 08 = Not used | | | | | ---- | |
| | | | 09 = Speed signal (F-120) | | | | | 0..10 | |
| | | | 10 = Puller signal | | | | | 8 9 | |
| | | | 11 = Sewing guide | | | | | 2 7 | |
| | | | 12 = No function | | | | | | |
| | | | 13 = No function | | | | | | |
| | | | 14 = No function | | | | | | |
| 15 = No function | | | | | | | | | |
| 16 = No function | | | | | | | | | |
| 381 | M03 | 3 | Function of output M3 on ST2 / 27 (see F-380) | | 16 | 0 | (*) | | A |
| 383 | M07 | 3 | Function of output M7 on ST2 / 23 (see F-380) | | 16 | 0 | (*) | | A |
| 384 | M08 | 3 | Function of output M8 on ST2 / 24 (see F-380) | | 16 | 0 | (*) | | A |
| 385 | M09 | 3 | Function of output M9 on ST2 / 25 (see F-380) | | 16 | 0 | (*) | | A |
| 400 | rSt | 4 | Control restart. All parameters will be set to the preset values of mode of operation F-290 = 0. All changed values will be overwritten. The control restarts again like after “power On“. Enable the function by varying the displayed value “93“ and by confirming with “E“ or “P“. | | 99 | 0 | 93 | 0..10 | A |
| 401 | EEP | 1 | Immediate storage of all changed data <ul style="list-style-type: none"> • Set display from “0” to “1”. • Press key E or P. • Data are stored. | | 1 | 0 | 0 | 0..10 | A |

| F- | S | L | Designaton | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----------------|---|--|------|-------|------|--------|--|-----|
| 402 | q1 | 4 | The stepping motor step signal will be issued instead of the “motor running” signal. Each variation of the signal edge is a step. | | 1 | 0 | 0 | 0..10 | A |
| 412 | bAu | 4 | ---- = after power On with 9600 baud. After having initiated communication automatic adaptation to the maximum transmission rate. 0096 = 9600 0192 = 9600 -- 19200 0312 = 9600 -- 31200 0384 = 9600 -- 38400 0416 = 9600 -- 41600 0560 = 9600 -- 56000 1250 = 9600 -- 125000 | baud | 1250 | ---- | ---- | 0 1 2 3 5 7 8 10 | A |
| 413 | cot | 4 | 0 = No serial communication 1 = Drive is master 2 = Drive is slave | | 2 | 0 | 2 | | A |
| 416 | bit | 4 | Serial communication between a 200 series drive and the stepping motor control works through a time window, which depends on the stepping motor control device address F-272 . Transmission priority and time window are calculated automatically depending on this address, the baud rate F-412 , and the transmission data (value = 000). There should not be any modifications unless data collisions occur on the RS232 bus. | µs | 999 | 0 | 0 | 0..10 | A |
| 451 | P1E | 4 | Internal counting signal. Start. This value can be adapted for synchronizing counts in the stepping motor control and in a drive of the 60/62 and 200 series (identical needle position). Please note that the value “000“ in this parameter refers to “position 1 (needle down)“ of the 60/62 series and to “position 2 (thread lever up)“ of the 200 series. The minimum difference between the values of F-451 and F-452 should be 60. | Grad | 359 | 0 | 5 | 0..10 | A |
| 452 | P1A | 4 | Internal counting signal. End. See also F-451 | Grad | 359 | 0 | 120 | 0..10 | A |
| 453 | P2E | 4 | Start feeding. See: F-171 , F-180 , F-454 | Grad | 359 | 0 | 140 | 0..10 | A |
| 454 | P2A | 4 | End feeding. See: F-171 , F-180 , F-453 | Grad | 359 | 0 | 340 | 0..10 | A |
| 500 | Sir | 2 | Fast installation. [°] blinking , press key >>>. Using key “E“, the following parameters will be displayed in succession: F-290 , F-202 , F-451 , F-452 , F-453 , F-454 , F-161 , F-207 , F-208 | | | | | 0..10 | A |
| 800 | 01_ | 4 | Minimum value of parameter F-051 | | 65535 | 0 | (*) | 0..10 | A |
| 801 | 01 ⁻ | 4 | Maximum value of parameter F-051 | | 65535 | 0 | (*) | 0..10 | A |
| 802 | 02_ | 4 | Minimum value of parameter F-052 | | 65535 | 0 | (*) | 0..10 | A |
| 803 | 02 ⁻ | 4 | Maximum value of parameter F-052 | | 65535 | 0 | (*) | 0..10 | A |
| 804 | 03_ | 4 | Minimum value of parameter F-053 | | 65535 | 0 | (*) | 0..10 | A |
| 805 | 03 ⁻ | 4 | Maximum value of parameter F-053 | | 65535 | 0 | (*) | 0..10 | A |
| 806 | 04_ | 4 | Minimum value of parameter F-054 | | 65535 | 0 | (*) | 0..10 | A |
| 807 | 04 ⁻ | 4 | Maximum value of parameter F-054 | | 65535 | 0 | (*) | 0..10 | A |
| 808 | 05_ | 4 | Minimum value of parameter F-055 | | 65535 | 0 | (*) | 0..10 | A |
| 809 | 05 ⁻ | 4 | Maximum value of parameter F-055 | | 65535 | 0 | (*) | 0..10 | A |
| 810 | 06_ | 4 | Minimum value of parameter F-056 | | 65535 | 0 | (*) | 0..10 | A |
| 811 | 06 ⁻ | 4 | Maximum value of parameter F-056 | | 65535 | 0 | (*) | 0..10 | A |
| 812 | 07_ | 4 | Minimum value of parameter F-057 | | 65535 | 0 | (*) | 0..10 | A |
| 813 | 07 ⁻ | 4 | Maximum value of parameter F-057 | | 65535 | 0 | (*) | 0..10 | A |
| 814 | 08_ | 4 | Minimum value of parameter F-058 | | 65535 | 0 | (*) | 0..10 | A |
| 815 | 08 ⁻ | 4 | Maximum value of parameter F-058 | | 65535 | 0 | (*) | 0..10 | A |

| F- | S | L | Designaton | Dim | Max | Min | Preset | Mode | Ind |
|-----|-----------------|---|---|-----|-------|-----|--------|-----------------------|-----|
| 816 | 09_ | 4 | Minimum value of parameter F-059 | | 65535 | 0 | (*) | 0..10 | A |
| 817 | 09 ⁻ | 4 | Maximum value of parameter F-059 | | 65535 | 0 | (*) | 0..10 | A |
| 818 | 10_ | 4 | Minimum value of parameter F-060 | | 65535 | 0 | (*) | 0..10 | A |
| 819 | 10 ⁻ | 4 | Maximum value of parameter F-060 | | 65535 | 0 | (*) | 0..10 | A |
| 820 | 11_ | 4 | Minimum value of parameter F-061 | | 65535 | 0 | (*) | 0..10 | A |
| 821 | 11 ⁻ | 4 | Maximum value of parameter F-061 | | 65535 | 0 | (*) | 0..10 | A |
| 822 | 12_ | 4 | Minimum value of parameter F-062 | | 65535 | 0 | (*) | 0..10 | A |
| 823 | 12 ⁻ | 4 | Maximum value of parameter F-062 | | 65535 | 0 | (*) | 0..10 | A |
| 824 | 13_ | 4 | Minimum value of parameter F-063 | | 65535 | 0 | (*) | 0..10 | A |
| 825 | 13 ⁻ | 4 | Maximum value of parameter F-063 | | 65535 | 0 | (*) | 0..10 | A |
| 826 | 14_ | 4 | Minimum value of parameter F-064 | | 65535 | 0 | (*) | 0..10 | A |
| 827 | 14 ⁻ | 4 | Maximum value of parameter F-064 | | 65535 | 0 | (*) | 0..10 | A |
| 828 | 15_ | 4 | Minimum value of parameter F-065 | | 65535 | 0 | (*) | 0..10 | A |
| 829 | 15 ⁻ | 4 | Maximum value of parameter F-065 | | 65535 | 0 | (*) | 0..10 | A |
| 830 | 16_ | 4 | Minimum value of parameter F-066 | | 65535 | 0 | (*) | 0..10 | A |
| 831 | 16 ⁻ | 4 | Maximum value of parameter F-066 | | 65535 | 0 | (*) | 0..10 | A |
| 832 | 17_ | 4 | Minimum value of parameter F-067 | | 65535 | 0 | (*) | 0..10 | A |
| 833 | 17 ⁻ | 4 | Maximum value of parameter F-067 | | 65535 | 0 | (*) | 0..10 | A |
| 834 | 18_ | 4 | Minimum value of parameter F-068 | | 65535 | 0 | (*) | 0..10 | A |
| 835 | 18 ⁻ | 4 | Maximum value of parameter F-068 | | 65535 | 0 | (*) | 0..10 | A |
| 836 | 19_ | 4 | Minimum value of parameter F-069 | | 65535 | 0 | (*) | 0..10 | A |
| 837 | 19 ⁻ | 4 | Maximum value of parameter F-069 | | 65535 | 0 | (*) | 0..10 | A |
| 838 | 20_ | 4 | Minimum value of parameter F-070 | | 65535 | 0 | (*) | 0..10 | A |
| 839 | 20 ⁻ | 4 | Maximum value of parameter F-070 | | 65535 | 0 | (*) | 0..10 | A |
| 840 | 21_ | 4 | Minimum value of parameter F-071 | | 65535 | 0 | (*) | 0..10 | A |
| 841 | 21 ⁻ | 4 | Maximum value of parameter F-071 | | 65535 | 0 | (*) | 0..10 | A |
| 901 | b01 | 4 | Tape tension On/Off, key 1, left | | 1 | 0 | (*) | 0..10 | A |
| 902 | b02 | 4 | Tape tension On/Off, key 1, right | | 1 | 0 | (*) | 0..10 | A |
| 903 | b03 | 4 | Tape tension On/Off, key 2, left | | 1 | 0 | (*) | 0..10 | A |
| 904 | b04 | 4 | Tape tension On/Off, key 2, right | | 1 | 0 | (*) | 0..10 | A |
| 905 | b05 | 4 | Tape tension On/Off, key 3, left | | 1 | 0 | (*) | 0..10 | A |
| 906 | b06 | 4 | Tape tension On/Off, key 3, right | | 1 | 0 | (*) | 0..10 | A |
| 907 | b07 | 4 | Tape tension On/Off, key 4, left | | 1 | 0 | (*) | 0..10 | A |
| 908 | b08 | 4 | Tape tension On/Off, key 4, right | | 1 | 0 | (*) | 0..10 | A |
| 909 | b09 | 4 | Tape tension On/Off, key 5, left | | 1 | 0 | (*) | 0..10 | A |
| 910 | b10 | 4 | Tape tension On/Off, key 5, right | | 1 | 0 | (*) | 0..10 | A |
| 911 | b11 | 4 | Tape tension On/Off, key 6, left | | 1 | 0 | (*) | 0..10 | A |
| 912 | b12 | 4 | Tape tension On/Off, key 6, right | | 1 | 0 | (*) | 0..10 | A |
| 913 | b13 | 4 | Tape tension On/Off, key 7, left | | 1 | 0 | (*) | 0..10 | A |
| 914 | b14 | 4 | Tape tension On/Off, key 7, right | | 1 | 0 | (*) | 0..10 | A |
| 915 | b15 | 4 | Tape tension On/Off, key 8, right | | 1 | 0 | (*) | 0..10 | A |
| 916 | b16 | 4 | Tape tension On/Off, key 8, left | | 1 | 0 | (*) | 0..10 | A |
| 917 | b17 | 4 | Tape tension On/Off, key 9, right | | 1 | 0 | (*) | 0..10 | A |
| 918 | b18 | 4 | Tape tension On/Off, key 9, left | | 1 | 0 | (*) | 0..10 | A |
| 919 | b19 | 4 | Tape tension On/Off, key 0, right | | 1 | 0 | (*) | 0..10 | A |
| 920 | b20 | 4 | Tape tension On/Off, key 0, left | | 1 | 0 | (*) | 0..10 | A |
| 921 | PUo | 4 | Puller On / Off | | 1 | 0 | (*) | 8 9 | A |
| 922 | Skt | 4 | Upper limit of the options for switching from one tape tension value to the next on the Variocontrol. | | 20 | 0 | (*) | 0..10 | A |

10 Error Displays

| V810 | V820 | Signification |
|---|------------------------|---|
| General Information: | | |
| Returns to "0000" or to last parameter number | Like V810, + INF F1 | Incorrect code number. Incorrect parameter number. |
| INF A9 | INF A9 | The mode of operation is not supported. |
| TEACH IN: | | |
| Unavailable | INF F3 | TEACH IN: incorrect mode of operation for the data. |
| Unavailable | INF F4 | TEACH IN: incorrect strip |
| Unavailable | INF F5 | TEACH IN: incorrect number of program for switching from one program to the next. |
| Unavailable | INF F6 | TEACH IN: memory area for TEACH IN data full. |
| RS232 Connection: | | |
| INF F7 | INF F7 | No response to transmitted instruction |
| INF F8 | INF F8 | Opposite terminal does not recognize instruction or data. |
| Hardware Disturbances: | | |
| INF H2 | INF H2 | Processor disturbed |
| INF H3 | INF H3 | Incorrect hardware |
| Data Storage: | | |
| INF E8 | INF E8 | Data memory, EEPROM full |
| INF E9 | INF E9 | Data memory, EEPROM defective |

For your notes:

10.1 Slide-in Strips for the V810/V820 Control Panels

Slide-in strip for the V810 control panel. Selection using parameter [F-291](#).
 The slide-in strip used depends on the mode of operation selected using [F-290](#).

| | | | | | | |
|-----|-----|-----|-------|-------|-------|-------|
| 1 2 | 3 4 | (M) | 1 ... | 1 → 4 | SM 01 | |
| 1 2 | 3 4 | 5 6 | 1 ... | (M) | (M) | SM 02 |
| (M) | (M) | (M) | 7 8 | 1 → 6 | SM 03 | |
| 1 2 | 3 4 | 5 6 | 7 8 | 8 → 1 | 1 → 8 | SM 04 |
| 1 2 | 3 4 | 5 6 | 7 8 | 1 → 8 | 1 → 8 | SM 05 |

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Slide-in strip for the V820 control panel. Selection using parameter [F-292](#).
 The slide-in strip used depends on the mode of operation selected using [F-290](#).

| | | | | | | | | | | | | |
|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|--------|--------|-------|
| 1 2 | 3 4 | 5 6 | 7 8 | 9 10 | 11 12 | 13 14 | 15 16 | (M) | 1 ... | 1 → 16 | SM 01 | |
| 1 2 | 3 4 | 5 6 | 7 8 | 9 10 | 11 12 | 13 14 | 15 16 | 17 18 | 1 ... | (M) | (M) | SM 02 |
| (M) | (M) | (M) | (M) | (M) | (M) | (M) | 15 16 | 17 18 | 19 20 | 1 → 14 | (M) | SM 03 |
| 1 2 | 3 4 | 5 6 | 7 8 | 9 10 | 11 12 | 13 14 | 15 16 | 17 18 | 19 20 | 20 → 1 | 1 → 20 | SM 04 |
| 1 2 | 3 4 | 5 6 | 7 8 | 9 10 | 11 12 | 13 14 | 15 16 | 17 18 | C | 1 → 18 | 1 → 18 | SM 05 |
| ✂ | 1 2 | | (M) | 1 ... | | (M) | (M) | F | ↻ | 1 → X | 1 → X | SM 06 |

KL2457a



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