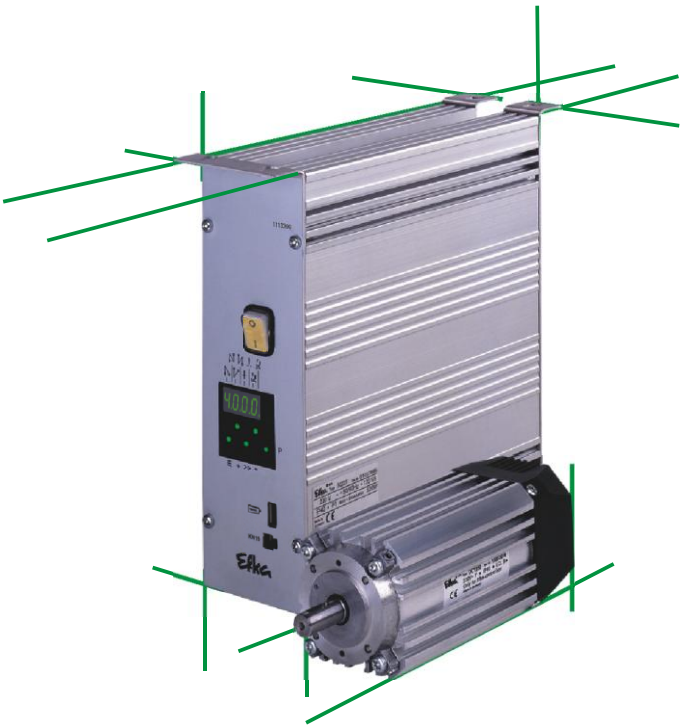
dc1550

CONTROL DA321G5321



Instruction Manual

- Putting into Service
- Settings
- Functional Description

No. 402313 English

FRANKL & KIRCHNER GMBH & CO KG

EFKA OF AMERICA INC.

EFKA ELECTRONIC MOTORS SINGAPORE PTE. LTD.

Important Notes

The particulars used in various figures and tables, such as type, program number, speed, etc., serve as examples. They may differ from those in your display.

For current versions of the Instructions for Use and Lists of Parameters, necessary for operating EFKA drives in accordance with regulations, please refer to the EFKA web site **www.efka.net, page "Downloads"**.

On our web site you will also find the following supplementary instructions for this control:

- General instructions for use and programming
- Use with USB Memory Stick
- Use of the C200 compiler
- Adapter cords

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1 Range of Applications

The drive is suitable for lockstitch and chainstitch machines Dürkopp Adler, for different models.
It can be operated with or without control panel.
The easy-to use V810, V820 or V850 control panels extend the range of functions.
Further control functions can be programmed using the Efka Compiler C200 software and the user-friendly V900 touchscreen panel.
Stepping motor mode is also possible in combination with the Efka SM210A controller.

1.1 Use in Accordance with Regulations

The drive is not an independently operating machine, but is designed to be incorporated into other machinery by specially trained personnel.
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:

IEC/EN 60204-31 Electrical equipment of industrial machines:
Particular requirements for industrial sewing machines, sewing units and sewing systems.

Operate the drive only in dry areas.

ATTENTION

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

Standard Scope of Supply		
1	Direct current motor	**DC1550**
1	Electronic control/Power supply unit	**DA321G5321/N208**
1	Actuator	**EB301A**
1	Set of accessories (standard)	**B158**
	consisting of:	Plastic bag for B156 + documentation
Option 1		
1	Set of standard accessories	**B156**
	consisting of:	Plastic bag for B156 and documentation
Option 2		
1	Set of standard accessories	**B159**
	consisting of:	Plastic bag for B159, documentation
		and motor mounting parts
and		
1	Set of accessories	**Z54**
	consisting of:	Pitman rod 400...700mm long
		Table mounting for EB3..

NOTE

If there is no metallical contact between drive (motor) and machine head, the potential equalization cord supplied with the unit is to be wired from the machine head to the terminal provided on the control box!

2.1 Special Accessories

The special accessories available ex works allow the augmentation and enhancement of functions, operating, connecting, and mounting options.
Since the range of available components is continually expanded, we kindly ask you to contact us in case of need.

Designation	Material No.
Control panel Variocontrol V810	5970153
Control panel Variocontrol V820	5970154
Control panel Variocontrol V850	5990159
Control panel Variocontrol V900 (only in conjunction with compiler programming)	5990161
Reflection light barrier module LSM002	6100031
Hall sensor module HSM001	6100032
Pulse encoder IPG001	6100033
Interface EFKANET IF232-USB	7900081
Adapter cord for the connection of light barrier module and/or Hall sensor module HSM001 and/or pulse encoder IPG001 and/or EFKANET	1113229
Actuating solenoid type EM1.. (for e. g. sewing foot lifting, backtacking, etc.)	Ask for available models
Extension cable approx. 1000 mm long for commutation transmitter DC15..	1113151
Extension cable approx. 1000 mm long for Netz DC15.. line	1113150
Potential equalization cord 700 mm long, LIY 2.5 mm^2, gray, with spades on both sides	1100313
Foot control type FB302B with three pedals for standing operation, with approx. 1400 mm connecting cable and plug	4170025
Fitting piece for position transmitter	0300019
Knee switch type KN3 (pushbutton) with cord of approx. 950 mm length without plug	5870013
Knee switch type KN19 (pushbutton) with cord of approx. 450 mm length without plug	5870021
Undertable mounting kit for DC15..	1113235
Undertable mounting kit (reinforced) for DC15..	1113427
Adapter cord to connect the DA321G... controller as a replacement for the DA82GA to Dürkopp Adler sewing machine models 367, 381, 382, 467, 767, 768, N291, 8967	1113692
Adapter cord to connect the DA321G... controller to Dürkopp Adler model 467, 767 sewing machines as a replacement for the DA720, DA820	1113777
Adapter cord to connect a knee switch with a 3-pin Hirschmann connector to the Western connector (RJ11) of the controller	1113693
Sewing light transformer	please indicate line voltage and sewing light voltage (6.3V or 12V)
9-contact SubminD male connector	0504135
9-contact SubminD female connector	0504136
Half-shell housing for 9-contact SubminD	0101523
37-contact SubminD male connector, complete	1112900
Single pins for 37-contact SubminD with strand of 50 mm length	1112899

3 Putting into Service

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

- The correct installation of the drive, position transmitter and accompanying devices, if necessary
- If necessary, the correct adjustment of the direction of motor rotation using parameter **161**
- The correct positioning speed using parameter **110**
- The correct maximum speed compatible with the sewing machine using parameter **111**
- Configuration of the positions
- The setting of the remaining relevant parameters
- Begin sewing in order to save the set values

4 Setting and Putting into Service with the Aid of the Fast Installation Routine (SIR)

The Fast Installation Routine (SIR) passes through all parameters necessary for programming the functional sequence and the positions.

Input parameter 500 (call-up SIR) ➔

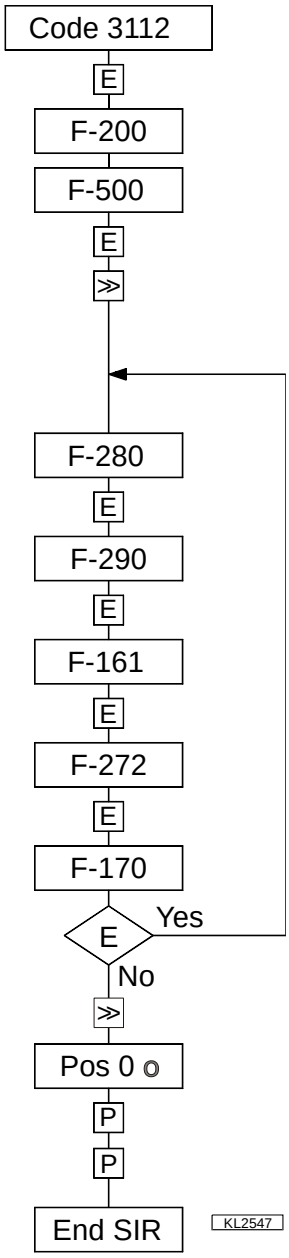
Display of the select resistor

Enter machine model for the select resistor detected

Parameter for direction of motor rotation

Parameter for transmission ratio
(**Important!** The transmission ratio should be determined and indicated as precisely as possible.)

Setting the reference position



The values can be varied by pressing key **+/-**. When the parameter is displayed on the V810 control panel, press the E key once more for the value to be displayed.

Function		Control
Call-up of the Fast Installation Routine SIR	(Sir)	500

Setting on the V810 control panel:

- Input code number **3112**!
- Press the **E** key ➔ the lowest parameter **2.0.0.** of this level appears
- **Select** 500 ➔ Parameter **5.0.0.** displayed
- Press the **E** key ➔ The character **[o]** appears and flashes
- Press the >> key ➔ Parameter **2.8.0** appears
- Press the **E** key ➔ Parameter value of the select resistor detected, e.g. 1000, is displayed. +/- keys now do not work, parameter value cannot change
- Press the **E** key ➔ Parameter **2.9.0.** appears **(functional sequence "thread trimming operations")**
- Press the **E** key ➔ Parameter value **00** appears
- Press the **+/-** key ➔ Parameter value (machine model (mode) for the select resistor detected) can be configured
- Press the **E** key ➔ Parameter **1.6.1.** appears **(Direction of motor rotation)**
- Press the **E** key ➔ Parameter value **1** appears
- Press the **+/-** key ➔ The parameter value can be changed
- Press the **E** key ➔ Parameter **2.7.2.** appears **(transmission ratio)**
- Press the **E** key ➔ Parameter value **1000** appears
- Press the **+/-** key ➔ The parameter value can be changed
- Press the **E** key ➔ Parameter **1.7.0.** appears **(setting the reference position)**
- Press the **E** key ➔ The character **[o]** appears and flashes

Upon pressing the **E** key once more the program returns to parameter **2.8.0**!
Press the **P** key twice The system exits the SIR routine

Setting on the V820/V850 control panel:

- Input code number **3112**!
- Press the **E** key ➔ the lowest parameter **2.0.0** of this level appears
- **Select** 500 ➔ Parameter **5.0.0** displayed
- Press the **E** key ➔ The character **[o]** appears and flashes
- Press the >> key ➔ Parameter **280 SEL 1000** appears (display of the select resistor e. g. 1000). +/- keys now do not work, parameter value cannot change
- Press the **E** key ➔ Parameter **290 MkA 00** appears (**machine model (mode)** for the select resistor detected)
- Press the **+/-** key ➔ Parameter value for mode can be set
- Press the **E** key ➔ Parameter **161 drE 1** appears **(Direction of motor rotation)**
- Press the **E** key ➔ Parameter value **1** appears
- Press the **E** key ➔ Parameter **272 trr 100** appears **(transmission ratio)**
- Press the **+/-** key ➔ The parameter value can be changed
- Press the **E** key ➔ Parameter **170 SR1** appears **(setting the reference position).** the character **[o]** appears and flashes

Upon pressing the **E** key once more the program returns to parameter **2.8.0**!
Press the **P** key twice The system exits the SIR routine

5 Setting the Basic Functions

5.1 Direction of motor rotation

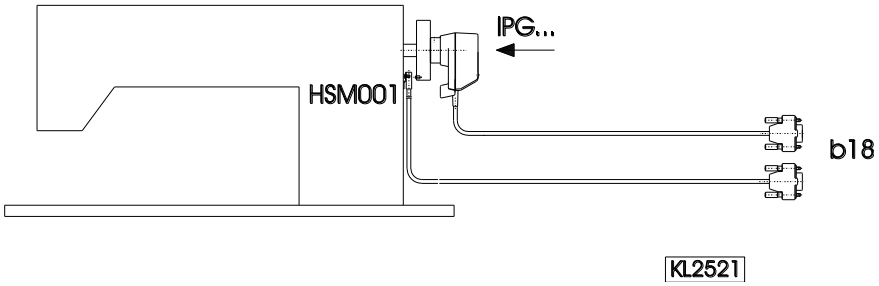
Function **with** or **without** control panel		Parameter
Direction of motor rotation	(drE)	161

161 = 0 Clockwise motor rotation (look at the motor shaft)
161 = 1 Counterclockwise motor rotation

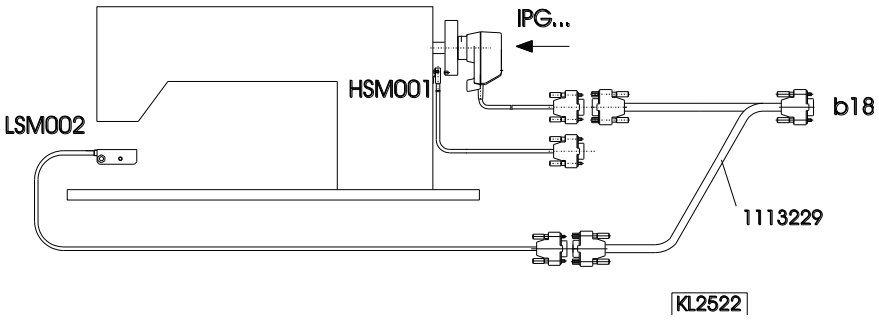
ATTENTION
If the motor is mounted differently, e. g. at a different angle or with gear, make sure that the value set using parameter 161 corresponds to the direction of rotation.

5.2 Use of a HSM001 Hall Sensor Module or IPG... Pulse Encoder

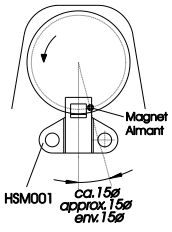
Connection and mounting schematic of a HSM001 Hall sensor module or IPG... pulse encoder !



Connection and mounting schematic of a HSM001 Hall sensor module or PG... pulse encoder together with a LSM002 light barrier module by means of adapter cord no. 1113229 !



Operation with HSM001 Hall sensor module

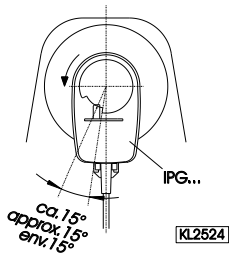


← - Get machine to the needle-up position.
- Position bore for magnet such that the magnet is located approx. 15° after the sensor in the sense of rotation.

Operation with IPG... pulse encoder

- Get machine to the needle-up position.
- Turn disk in the pulse encoder such that the leading edge will be located approx. 15° after the sensor on the board in the sense of rotation.

→



5.3 Selection of the machine series

Function **with** or **without** control panel		Parameter
Display of the machine series	(SEL)	280

The different machine models are characterized by resistors The following resistance values (tolerance ± 1%) are provided:

Select resistor	machine model
100Ω	271*, 272*, 273*, 274*, 275*
220Ω	205*
680Ω	069*, 267*, 268*, 269*, **4180, 4280**
1000Ω	367*, 381*, 382*, 467*, 767*, 768*, **867**
4700Ω	467, 767 as a replacement for DA720V/DA820V
*) For these machine models, the parameter values are prepared. Before commissioning, the settings must always be checked for suitability for the machine in use.	

Select resistor is connected:

Depending on the resistance detected, the special functions for this machine model and the different preset values are activated. If such a select resistor is connected, it can be read out from parameter **280**. The resistance value is displayed directly in ohms on the control panel. It is not possible to change the value.

Select resistor is not connected:

If no select resistor is connected, the note **A5** (emergency run) is displayed. After power on and entry of the code number, parameter **280** can be used to enter a select resistor value to be assumed. After input is complete parameter **401 = 1** must be used to store the input. Then the **P** key must be pressed twice and info **A4** appears. After power is turned off and on again, the select-depending preset value for the corresponding machine model will be set.

5.3.1 Use of the DA321G5321 as a replacement for DA720V/DA820V

The adapter enables the use of the DA321G controller on older Dürkopp Adler sewing machines in the 467/767 classes in which the RP20 was used as the high lift for walking foot potentiometer (built before 1998).
The connection is detected by a selection resistor (4700Ω) in the adapter.
In order to activate appropriate preset values for the machine class, the corresponding mode must simply be selected with parameter 290.
Order numbers for the adapter and the adapter cable for connection of the switch for high lift for walking foot can be found in the section Special Accessories.

5.3.1.1 Configuration instructions for high lift for walking foot for older Dürkopp Adler sewing machines (class 467/767)

parameter	Designation	Unit	max	min	Preset	Ind.
501	High lift for walking foot - measurement value of potentiometer for minimum lift		255	0	Machine-dependent	
502	High lift for walking foot - measurement value of potentiometer for maximum lift		255	0	Machine-dependent	
503 MP2	Selecting the potentiometer used 0 = MP20 pot, standard on machines built in 1998 or later 1 = RP20 pot, standard on machines built before 1998		1	0	0	
117 n10	High lift for walking speed at maximum high lift	RPM	6000	400	Machine-dependent	

Use parameter **503 = 1** to select the RP20 pot for machines up to 1998. Parameter **188** then has no effect.
Parameter **501** is used to program the value for the minimum lift, and **502** for the maximum lift.
Proceed as follows:

			Select parameter **501**! Set the handwheel for a minimum high lift for walking foot.		
1x	**E**		Potentiometer value currently 114, with 112 stored.	➔	**F-501 114 112**
1x	**+**		Potentiometer value 114 taken.	➔	**F-501 114 114**
1x	**E**		Next parameter displayed: potentiometer value currently 114, with 055 stored.	➔	**F-502 114 055**
			Set handwheel for high lift for walking foot to maximum lift, current potentiometer value now 057.	➔	**F-502 057 055**
1x	**+**		Potentiometer value 057 taken.	➔	**F-502 057 057**
2x	**P**	**P**	End of programming. The maximum speed configured and the controller type are displayed.	➔	**3500 DA321G**

5.3.2 Emergency run function for invalid machine select

If no valid value is detected by the controller for the machine select resistor, only emergency run functions are possible. All parameter settings and preset values are retained.

The display shows the information:		**V810**	**V820/V850**
Emergency functions due to invalid machine select	➔	**InF A5**	**InF A5**

Available emergency run functions
- Speed limited to 1000 RPM
- Machine run blockage
- Sewing foot lifting when pedal released (-1, -2)

5.3.3 Selection of machine model using parameter 290

This drive with this controller is suitable for different sewing machines.
The mode for the functional sequence required on the respective machine can be selected using parameter **290**.
The presets for different machines depend on the specific select resistor and vary based on the value selected here (mode).
A tabular listing can be found in the parameter list.

NOTE

If no valid select resistor is detected upon commissioning or after a master reset and parameter **290 = 0**, no valid mode is selected.
The maximum speed is limited to 1000 RPM (for R-select 200 Ω to 200 RPM), and thread trimmers and wipers are turned off. Only after changing the setting of the maximum speed and turning the thread trimmer and/or wiper on will these settings be permanently in effect.
Exception: For R-select = 100 Ω, parameter **290 = 0** is a valid mode.

5.4 Transmission Ratio

NOTE

The transmission ratio must always be input, because only motors with integrated incremental transmitter will be used. **The transmission ratio should be determined and set as precisely as possible!**

The transmission ratio between motor shaft and shaft of the sewing machine head must be input, so that the set speeds of parameters **110...117** correspond to the sewing speeds.

Function **with** or **without** control panel		Parameter
Transmission ratio between motor shaft and machine shaft	(trr)	272

The transmission ratio can be selected within a range of 150...40000 using parameter **272**.

Example: With a motor pulley diameter of 1.57 in and a sewing machine head pulley diameter of 3.15 in the value 500 can be calculated using the formula below. If the value 2000 has been selected in parameter 272, it follows that the motor pulley is double the size of the sewing machine head pulley.

$$\text{Value of parameter 272} = \frac{\text{Motor pulley diameter}}{\text{Machine pulley diameter}} \times 100$$

5.5 Positioning speed

Function **with** or **without** control panel		Parameter
Positioning speed	(n1)	110

The positioning speed can be set using parameter **110** on the control within a range of 70...390 RPM.

5.6 Maximum Speed Compatible with the Sewing Machine

The maximum speed of the machine is determined by the selected pulley and by the following settings:

- Set the maximum speed using parameter **111** (n2)
- The limitation of the maximum speed to the level typical for the application is set by the function "Direct entry of maximum speed limitation" (DED) (see instruction manual for controls on the series 221/321, general operation)

5.7 Maximum speed

Function **with** or **without** control panel		Parameter
Maximum speed	(n2)	111

NOTE
See instruction manual of the sewing machine manufacturer for the maximum speed of the sewing machine.

NOTE
Select the pulley such that the motor runs at approx. 4000 RPM with max. number of stitches.

5.8 Positions

Function **with** or **without** control panel		Parameter
Setting the reference position	(Sr1)	170
Setting the needle positions	(Sr2)	171
Selection according to position sensor	(PGm)	270
Transmission ratio between motor shaft and machine shaft	(trr)	272

After setting parameter **270** at “1, 2, 3 or 4“, an angular degree must be selected using parameter **171**, which determines the stop in position 2 or 1 after the sensor position. The transmission ratio must already have been input using parameter **272**.
For setting **270 = 6**, only the reference position need be set. The angle values are specified accordingly, using the mode selected with parameter **290**.

Connection of a sensor as a position transmitter (normally open contact function), e. g. light barrier to socket B18/7

The following settings must be made using parameter **270**:

270 = 0 - The positions are generated using the transmitter incorporated in the motor and can be set using parameter 171.

270 = 1
- Setting the sensor to position 2.
- Position 1 is set according to the angular degree setting by means of parameter 171.
- Start measuring from leading edge position 2.
- 0V at input B18/7 (inside of the window)
- +5V at input B18/7 (outside of the window)

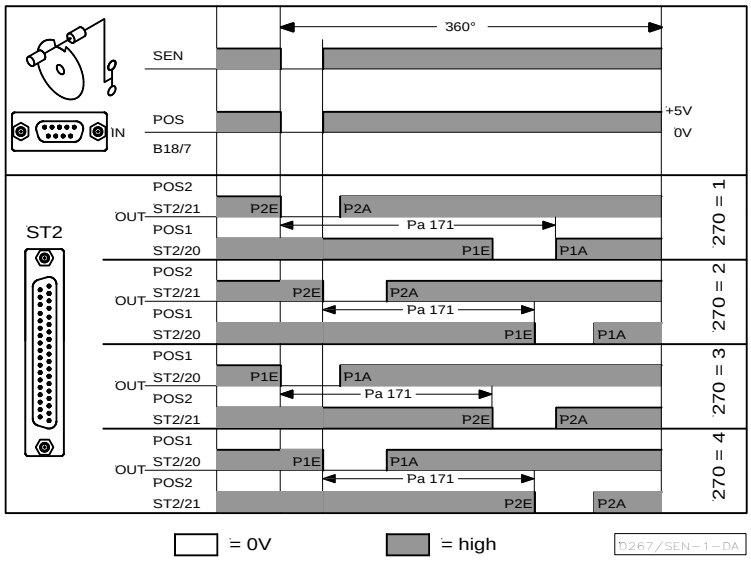
270 = 2
- Setting the sensor to position 2.
- Position 1 is set according to the angular degree setting by means of parameter 171.
- Start measuring from trailing edge position 2.
- Input and output level as with setting "1"

270 = 3
- Setting the sensor to position 1.
- Position 2 is set according to the angular degree setting by means of parameter 171.
- Start measuring from leading edge position 1.
- Input and output level as with setting "1"

270 = 4
- Setting the sensor to position 1.
- Position 2 is set according to the angular degree setting by means of parameter 171.
- Start measuring from trailing edge position 1.
- Input and output level as with setting "1"

270 = 5 - No position sensor available. The drive stops unpositioned. The thread trimmer function is suppressed with this setting.

270 = 6 - The positions are determined by preset values. The reference position must be correctly set for this purpose. In machines with position sensors incorporated in the handwheel the reference position is determined by mechanical adjustment. In all other cases the reference position must be set (see chapter “Setting the Reference Position”) in order for the angles preset by machine select for positions 1 and 2 to be correct. If necessary, the preset values can be adapted as described in chapters “Setting the Positions”.



OUT (position window) = npn transistor (emitter to 0V) is conductive. The width of position window cannot be adjusted.

Connection of a sensor as apposition transmitter (normally closed contact function), e. g. light barrier or proximity switch to socket B18/7

The following settings must be made using parameter **270**:

270 = 0
- The positions are generated using the transmitter incorporated in the motor and can be set using parameter 171.

270 = 1
- Setting the sensor to position 2.
- Position 1 is set according to the angular degree setting by means of parameter 171.
- Start measuring from trailing edge position 2.
- 0V at input B18/7 (inside of the window)
- +5V at input B18/7 (outside of the window)

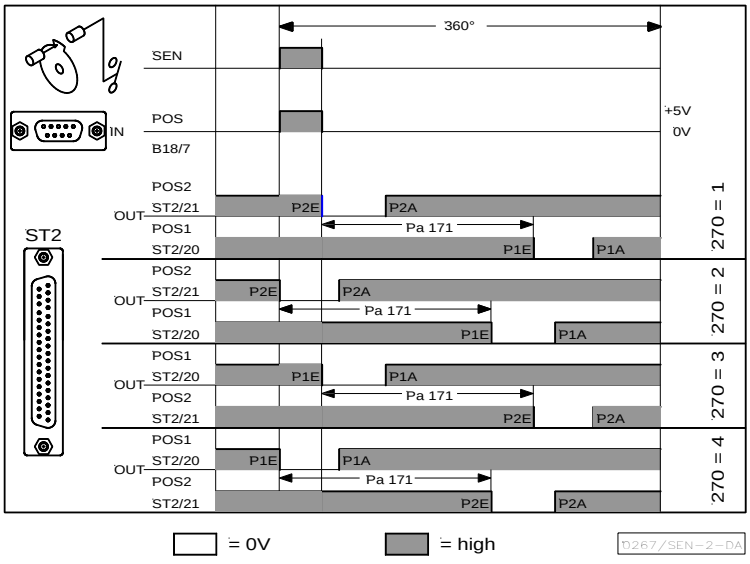
270 = 2
- Setting the sensor to position 2.
- Position 1 is set according to the angular degree setting by means of parameter 171.
- Start measuring from leading edge position 2.
- Input and output level as with setting "1"

270 = 3
- Setting the sensor to position 1.
- Position 2 is set according to the angular degree setting by means of parameter 171.
- Start measuring from trailing edge position 1.
- Input and output level as with setting "1"

270 = 4
- Setting the sensor to position 1.
- Position 2 is set according to the angular degree setting by means of parameter 171.
- Start measuring from leading edge position 1.
- Input and output level as with setting "1"

270 = 5
- No position sensor available. The drive stops unpositioned. The thread trimmer function is suppressed with this setting.

270 = 6
- The positions are determined by preset values. The reference position must be correctly set for this purpose. In machines with position sensors incorporated in the handwheel the reference position is determined by mechanical adjustment. In all other cases the reference position must be set (see chapter “Setting the Reference Position”) in order for the angles preset by machine select for positions 1 and 2 to be correct. If necessary, the preset values can be adapted as described in chapters “Setting the Positions”.



OUT (position window) = npn transistor (emitter to 0V) is conductive. The width of position window cannot be adjusted.

5.8.1 Setting the Reference Position (Parameter 270 = 0 or 6)

The angular positions necessary on the machine e.g. “needle down position“ or “thread lever up position“ are stored in the control. A reference position is needed in order to establish a relationship between position transmitter information and actual mechanical position. The reference position can difference according to the setting of the parameter, generally "Insertion point of the needle into the needle plate (EP)" (see parameter **290**).

The reference position must be set:

- for initial operation
- after replacing the motor
- after replacing the microprocessor

Setting the reference position on the control

- Input code number and select parameter **170**!
- Press the **E** key → Display **Sr1**
- Press the **>>** key → Display **P o** (character o rotating)

Turn handwheel until rotating character **o** goes off on the display. → Display **P**

- By turning the handwheel, set the needle to the bottom dead center or the needle point to the height of the needle plate in the direction of rotation of the motor shaft, while needle is moving downward. → Configuration of the zero point of the machine
- Press the **P** key once → actual parameter number is displayed
- Press the **P** key twice → Exit programming at the technician level.

Setting the reference position on the V810 control panel

- Input code number and select parameter 170!
- Press the **E** key → Display **Sr [o]**
- Press the **>>** key → Display **PoS0 o** (character o rotating)

Turn handwheel until rotating character **o** goes off on the display. → Display **PoS0**

- Set the needle to the bottom dead center by turning the handwheel. → Configuration of the zero point of the machine
- Press the **P** key once → actual parameter number is displayed
- Press the **P** key twice → Exit programming at the technician level.

Setting the reference position on the V820/850 control panel

- Input code number and select parameter **170**!
- Press the **E** key → Display **F-170 Sr1 [o]**
- Press the **>>** key → Display **PoS0 o** (character o rotating)

Turn handwheel until rotating character **o** goes off on the display. → Display **PoS0**

- Set the needle to the bottom dead center by turning the handwheel. → Configuration of the zero point of the machine
- Press the **P** key once → actual parameter number is displayed
- Press the **P** key twice → Exit programming at the technician level.

If error message A3 (reference position not set) appears, repeat the above setting sequence!

5.8.2 Setting the Positions on the Control (Parameter 270 = 0 or 6)

This setting must be set if no reference position was configured or the settings should be changed.

- Input code number and select parameter 171.
- Press the **E** key → **[o]** is displayed
- Press the **>>** key → **P1E** is displayed; set "position 1 On" on the handwheel
- Press the **E** key → **P2E** is displayed; set "position 2 On" on the handwheel
- Press the **E** key → **P1A** is displayed; set "position 1 Off" on the handwheel
- Press the **E** key → **P2A** is displayed; set "position 2 Off" on the handwheel
- Press the **P** key twice → Exit programming at the technician level.

**) During turning, the position information is deleted and the angle of the position displayed in degrees*

5.8.3 Setting the Positions on the V810 Control Panel (Parameter 270 = 0 or 6)

This setting must be set if no reference position was configured or the settings should be changed.

- Call parameter 188!

E	Press the **E** key!	→	**F – 1 7 1**
F2	Press the **F2** key! Actual display.	→	**[o]**

>>			Press key **>>** (B key). Display of the 1st parameter value of position 1	→	P 1 E 0 0 0
+	-		If necessary, change parameter value by pressing key **>>** or **+/-** or by turning the handwheel	→	P 1 E X X X
E			Parameter value of position 2 appears on the display	→	P 2 E 2 5 7
+	-		If necessary, change parameter value by pressing key **>>** or **+/-** or by turning the handwheel	→	P 2 E X X X
E			Parameter value of position 1A appears on the display	→	P 1 A 0 7 0
+	-		If necessary, change parameter value by pressing key **>>** or **+/-** or by turning the handwheel	→	P 1 A X X X
E			Parameter value of position 2A appears on the display	→	P 2 A 3 3 8
+	-		If necessary, change parameter value by pressing key **>>** or **+/-** or by turning the handwheel	→	P 2 A X X X
P	P		Press the P key twice! Settings are completed, exit programming!	→	d A 3 2 1 G

These values are saved when you begin sewing. They remain in effect even after turning the machine off!
Storage without starting sewing is possible by using parameter 401!

5.8.4 Setting the Positions on the V820/V850 Control Panel (Parameter 270 = 0 or 6)

This setting must be set if no reference position was configured or the settings should be changed.

			Display before programming!	→	4000 dA321G
P			A parameter number blinks on the display	→	F-XXX
1	7	1	Input parameter number 171 !	→	F-171
E			The abbreviation of the parameter appears on the display	→	F-171 Sr2 [o]
F2			Display of the 1st parameter value of position 1 (B key)	→	P1E 000
0	…	9	If necessary, change parameter value by pressing keys +/- or 0...9 or by turning the handwheel.	→	P1E XXX
E			Parameter value of position 2 appears on the display	→	P2E 257
0	…	9	If necessary, change parameter value by pressing keys +/- or 0...9 or by turning the handwheel.	→	P2E XXX
E			Parameter value of position 1A appears on the display	→	P1A 070
0	…	9	If necessary, change parameter value by pressing keys +/- or 0...9 or by turning the handwheel.	→	P1A XXX
E			Parameter value of position 2A appears on the display	→	P2A 338
0	…	9	If necessary, change parameter value by pressing keys +/- or 0...9 or by turning the handwheel.	→	P1A XXX

P	P	Settings are completed, exit programming!	→	4000 dA321G

NOTE
When setting the positions by turning the handwheel, make sure that the displayed numerical value changes.

The set values of the position are programmed at the factory. After setting the reference position, the machine is ready to operate. It is only necessary to change the settings for machines that deviate from the standard and/or for fine adjustment.

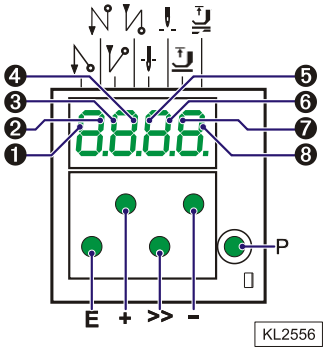
- The unit of the position values set is "degrees".

5.9 Display of the Signal and Stop Positions

Function **with** or **without** control panel		Parameter
Display of positions 1 and 2	(Sr3)	172

The position settings can easily be checked by means of parameter **172**.

- Select parameter **172**
- The control panel display shows "Sr 3"
- Turn handwheel according to the direction of motor rotation



Segment	❺	is turned on	corresponds to position 1
Segment	❺	is turned off	corresponds to position 1A
Segment	❻	is turned on	corresponds to position 2
Segment	❻	is turned off	corresponds to position 2A

V810/V820/V850 control panel display

- Arrow above symbol "position 1" on key 4 (V810) / on key 7 (V820/V850) is displayed corresponds to position 1
- Arrow above symbol "position 1" on key 4 (V810) / on key 7 (V820/V850) is displayed corresponds to position 1A

- Arrow above symbol "position 2" on key 4 (V810) / on key 7 (V820/V850) is displayed corresponds to position 2
- Arrow above symbol "position 2" on key 4 (V810) / on key 7 (V820/V850) is displayed corresponds to position 2A

If the control panel is connected, the positions will be displayed only on the control panel!

5.10 Positioning shift

Function **with** or **without** control panel		Parameter
Positioning shift	(PSv)	269

Parameter **269** can be used for fine adjustment of the stop position. By setting a value ≥0, the drive is positioned by the angle set here after the stop position configured with part **171**.

5.11 Braking Characteristics

Function **with** or **without** control panel		Parameter
Braking effect when varying the preset value ≤ 4 stages Braking effect when varying the preset value ≥ 5 stages	(br1) (br2)	207 208

- Parameter **207** regulates the braking effect between speed stages
- Parameter **208** influences the braking effect for the stop

The following applies to all setting values:

the higher the value, the stronger the braking reaction!

5.12 Braking Power at Standstill

Function **with** or **without** control panel		Parameter
Braking Power at Standstill	(brt)	153

This function prevents unintentional "wandering" of the needle at standstill.
The effect can be checked by turning the handwheel.

- The braking power is effective at standstill
  - at stop in the seam
  - after the seam end
- The effect can be set
- The higher the set value, the stronger the braking power

5.13 Starting Characteristics

Function **with** or **without** control panel		Parameter
Starting edge	(ALF)	220

The drive acceleration dynamics can be adapted to the sewing machine characteristic (light/heavy).

- High setting value = high acceleration

With a high starting edge setting and, in addition, possibly high braking parameter values on a light machine, the characteristic may appear coarse. In this case, one should try to optimize the settings.

5.14 Actual Speed Display

Function **with** or **without** control panel		Parameter
Actual speed display	(nIS)	139

If parameter **139 = 1**, the V810/820 display shows the following information:

		V810	V820/V850
During operation: ▪ The actual speed ▪ **Example:** 2350 revolutions per minute	➔	**2350**	**2350**
At stop in the seam: ▪ The stop indication	➔	**StoP**	**StoP**
At standstill after trimming: On the V810, indication of the type of control On the V820/V850, indication of the set maximum speed and the type of control **Example:** 3300 revolutions per minute and type of control DA321G	➔	**dA321G**	**3300 dA321G**

5.15 Operating Hours Counter

Function **with** or **without** control panel		Parameter
Acoustic Signal	(AkS)	127
Service routine for total operating hours	(Sr6)	176
Service routine for operating hours before service	(Sr7)	177
Input of operating hours before service	(Sr)	146
Selection of the output for flashing if the time until service is exceeded.	(oSe)	147

The integrated operating hours counter records the time of motor operation. Downtimes are not recorded. Time recording accuracy is 1ms. There are two ways of operating hours counting.

1. Basic operating hours counting:

217 = 0 Operational mode: Operating hours counting

2. Service Hours Monitoring:

146 = >0 Operational mode: Number of operating hours before the next service.
Input of operating hours before the next service.
This value is compared to the operating hours counter.
The hours are programmed in steps of 10, i. e. the lowest display of 001 corresponds to 10 hours (e. g. 055 = 550 hours).
When the set number of operating hours are reached, the message "C1" will show on the display after each trimming operation. In addition, the speed indicator blinks on the control or on the V820/V850 control panel during operation or after drive standstill.
Moreover, an acoustic signal is emitted when using a control panel if parameter 127 = 1.
If parameter 147=11, output M11 (socket ST2/31) is prepared for displaying the reached number of pre-selected operating hours. Upon reaching the operating hours, a connected indicator lamp blinks continuously until the counter is reset.

176 In this service routine, the total operating hours can be read out according to the procedure example described below for parameter 177.

177 Display of operating hours since the **last** service.

Display example of operating hours or hours since the last service and operating hours counter reset.

Display on the control:

- Select parameter 177.
- Press the **E** key ➔ **Sr7**
- Press the **>>** key ➔ **h t** (hours /thousands letter symbol)
- Press the **E** key ➔ **000** hours /thousands display)
- Press the **E** key ➔ **h h** (hours / hundreds letter symbol)
- Press the **E** key ➔ **000** (hours / hundreds display)
- Press the **E** key ➔ **Min** (minutes letter symbol)
- Press the **E** key ➔ **00** (minutes display)
- Press the **E** key ➔ **Sec** (seconds letter symbol)
- Press the **E** key ➔ **00** (seconds display)
- Press the **E** key ➔ **MS** (milliseconds letter symbol)

- Press the **E** key ➔ **000** (milliseconds display)
- Press the **E** key ➔ **rES** see chapter "Set and Reset Operating Hours Counter"
- Press the **E** key ➔ The process will be repeated from the hours display.
- Press the **P** key twice ➔ e. g. **400** (sewing process can be started)

Display on the V810 control panel:

- Select parameter 177.
- Press the **E** key ➔ **Sr7 [°]**
- Press the **>>** key ➔ **hoUr** (hours letter symbol)
- Press the **E** key ➔ **000000** (hours display)
- Press the **E** key ➔ **Min** (minutes letter symbol)
- Press the **E** key ➔ **00** (minutes display)
- Press the **E** key ➔ **SEc** (seconds letter symbol)
- Press the **E** key ➔ **00** (seconds display)
- Press the **E** key ➔ **MSEc** (milliseconds letter symbol)
- Press the **E** key ➔ **000** (milliseconds display)
- Press the **E** key ➔ **rES F2** see chapter "Set and Reset Operating Hours Counter"
- Press the **E** key ➔ The process will be repeated from the hours display.
- Press the **P** key twice ➔ e. g. **DA321G** (sewing process can be started)

Display on the V820/V850 control panel:

- Select parameter 177.
- Press the **E** key ➔ **F-177** **Sr7** [°]
- Press the **>>** key ➔ **hoUr** **000000** (hours display)
- Press the **E** key ➔ **Min** **00** (minutes display)
- Press the **E** key ➔ **Sec** **00** (seconds display)
- Press the **E** key ➔ **MSEc** **000** (milliseconds display)
- Press the **E** key ➔ **rES** **F2** see chapter "Set and Reset Operating Hours Counter"
- Press the **P** key twice ➔ e. g. **3500** **DA321G** (sewing process can be started)

5.15.1 Set and Reset Operating Hours Counter

The number of hours has been reached (service necessary):

- Press the **>>** key or **F2** once ➔ The operating hours counter is set to "0" and restarted.

The number of hours has not yet been reached:

- Press the **>>** or **F2** key 3 times ➔ The operating hours counter is set also to "0" and restarted.

A value in parameter 177 has been changed:

- After displaying **rES ...,** when the **E** key is pressed again, **SEt** will then be displayed.
- If the changed value is to be saved, press the **>>** or **F2** key 3 times.

5.15.2 Total Operating Hours Display

In this service routine enabled using parameter 176, the total number of operating hours is displayed.
The sequence of displayed values is as with parameter **177**.
The values can only be displayed, not varied. Therefore, letter symbols "rES" for "reset" and "SEt" for "set" will not appear.

6 Functions with or without Control Panel

6.1 Softstart

Function **with** or **without** control panel		Parameter
Softstart On/Off	(SSt)	134
Soft start on/off (using function key when using V820/V850)	(-F-)	008 = 1
Softstart speed, Number of softstart stitches	(n6)	115
Number of softstart stitches	(SSc)	100

The abbreviations set in parentheses ( ) are only visible if a V820/V850 control panel is connected!

Functions:

- after power on
- at the beginning of a new seam
- speed pedal controlled and limited to (n6)
- lower speed of a parallel function prevailing (e. g. start backtack, stitch counting)
- stitch counting synchronized to position 1
- suspension with pedal in position 0 (neutral)
- interruption by full heelback (position -2)

When using the V820/V850 control panel, direct access by means of the function key (key 9) is possible.

6.2 Sewing foot lifting

Function **without** control panel		Control
Automatic in the seam	Segment 7 on	Key **–** (S4)
Automatic after thread trimming	Segment 8 on	

Function **with** control panel		V810	V820/V850
Automatic in the seam	left-hand arrow above key On	Key 3	Key 6
Automatic after thread trimming	right-hand arrow above key On	Key 3	Key 6

Function **with** or **without** control panel		Parameter
Automatic sewing foot lifting with pedal forward at the seam end, if light barrier or stitch counting is On	(AFL)	023
Switch-on delay with pedal in position –1	((t2)	201
Start delay after disabling the sewing foot lifting signal	(t3)	202
Time of full power of sewing foot lifting	(t4)	203
Duty ratio (ED) with pulsing	(t5)	204
Delay after thread wiping until sewing foot lifting	(t7)	206
Sewing foot lifting switch-on delay with thread wiper off	(tFL)	211
Fast shutoff of the sewing foot lifting on/off	(FLS)	216
Time monitoring of sewing foot lifting	(tFL)	297
Upper limit ON period of sewing foot lifting 1...100	(EF-)	298
Mode for full sewing foot lifting engagement and holding power (parameter 203, 204 / 333, 334)	(FLd)	332
Time of full power of sewing foot lifting	(t4_)	333
Duty ratio (ED) with pulsing	(t5_)	334

Foot is lifted:

in the seam	by heelback (position -1) or automatically (using the **S4** key on the control, segment 7 lights up) or automatically (using key **3** on the V810 control panel) or automatically (using key **6** on the V820/V850 control panel) or push key for manual sewing foot lifting
after thread trimming	by heelback (position -1 or -2) or automatically (using the **S4** key on the control, segment 8 lights up) or automatically (using key **3** on the V810 control panel) or automatically (using key **6** on the V820/V850 control panel) or push key for manual sewing foot lifting automatically by light barrier when pedal forwards, according to the setting of parameter **023**

automatically by stitch counting when pedal forwards, according to the setting of parameter **023**
Switch-on delay after thread wiper (t7)

It is possible to prevent unintentional foot lifting before thread trimming when changing from pedal position 0 (neutral) to position -2 by setting a switch-on delay (t2) using parameter**201**.

NOTE

The maximum time the sewing foot can be permanently lifted is limited by parameter **297**. After this time elapses, it is automatically lowered and can be lifted again by pushing the pedal (-1). After that time, the time limit starts again! Parameter **297 = 0** can be used to turn off the sewing foot monitoring.

Holding power of the lifted foot

The sewing foot is lifted by full power. Then the system switches automatically to partial power in order to reduce the load for the control and the connected solenoid.
Set the duration of full power using parameter **203** and the partial holding power using parameter **204**.

ATTENTION

If the holding power is set too high, the solenoid and the control may be permanently damaged. Please observe the permissible duty ratio (ED) of the solenoid and set the appropriate value according to the table below.

Value	Duty ratio (ED)	Effect
1	1 %	low holding power
100	100%	high holding power (full power)

Sewing foot lowers:

- Press pedal to position 0 (neutral)
- Press pedal to position ½ (slightly forward)
- Release key for manual sewing foot lifting
- After the time limit elapses that is set with parameter 297.

Upon pressing the pedal forward from lifted sewing foot, the start delay (t3) that can be set using parameter **202** becomes effective.
See also: Chapter "Timing Diagrams" in theList of Parameters!

6.2.1 Sewing foot lifting on workstations with standing operator

Function **with** or **without** control panel		Parameter
Sewing foot lifting function for standing operation	(FLS)	024

To avoid having to keep the pedal down for sewing foot lifting on workstations operated while standing, parameter **024** can be used to program the function as a flip-flop. If the sewing foot is lifted, it will be lowered after the pedal is briefly pressed. If it is lowered, it will be lifted.
The function for automatic sewing foot lifting must be appropriately turned on (see section Sewing foot lifting).

024 = 0 Function Off
024 = 1 Function on only in the seam
024 = 2 Function on only at seam end
024 = 3 Function on in the seam and at the seam end

6.3 Start backtack

Function **without** control panel		Control
Single start backtack	Segment 1 on	key **E** (S2)
Double start backtack	Segment 2 on	
Start backtack Off	Both segments off	

Function **with** control panel		V810/V820/V850
Single start backtack	left-hand arrow above key On	Key 1
Double start backtack	right-hand arrow above key On	
Start backtack Off	both arrows Off	

Function **with** or **without** control panel		Parameter
Stitch length during backtack	(SLu)	137
Speed for start backtack can be interrupted by pedal 0	(n2A)	125
Start and end backtack can be interrupted by pedal in pos. 0	(StP)	284

The start backtack starts by pressing the pedal forward at the beginning of the seam. From lifted foot the backtack is delayed by the time t3 (start delay after switching off the sewing foot lifting signal). The start backtack automatically runs at speed n3. If softstart is running parallel, the respective lower speed is prevailing. Parameter **284** can be used to determine whether an interruption of the start and end backtack is permitted. For ornamental backtacks parameter **284** has no effect.

284 = 0 The backtacks run automatically and are not interruptible.

284 = 1 The backtacks can be interrupted by returning the pedal to 0. For this setting, the speed setting of parameter 125 applies.
After an interrupted start backtack, the pedal can be moved forward to continue the backtack, and pedal position –1 lifts the sewing foot while pedal position –2 stops the trimming process without an end backtack. Automatic lifting of the sewing foot does not take place if the backtack is interrupted.

Parameter **137** can be used to select the stitch length (normal or long stitch) during the backtack. The display does not light up during the backtack.

137 = 0 The backtack is executed with a long stitch length.

137 = 1 The backtack is executed with a normal stitch length.

Counting as well as turning the stitch regulator on and off is synchronized to position 1.
The stitch regulator will be switched off after completion backwards section and the start backtack counter after a delay time t1. Then pedal control is returned.

6.3.1 Speed n3 at the Start of the Seam

Function **with** or **without** control panel		Parameter
Speed for start backtack	(n3)	112

6.3.2 Stitch counting for start backtack

Function **with** or **without** control panel		Parameter
Stitch counting forwards	(c2)	000
Number of stitches backward	(c1)	001

When using a control panel, the function "HIT" can be used for quick information for the user. When the start backtack is turned on with key **1**, the associated value is shown on the display for about 3 seconds. During this time, the value can be varied directly by pressing key **+** or **-**.

6.3.3 Stitch Correction and Speed Release

Function **with** or **without** control panel		Parameter
Stitch correction time	(t8)	150
Delay until speed release after start backtack	(t1)	200

Speed release after single and double backtack can be influenced by parameter **200** .

In the case of slow backtack mechanisms it is possible to delay disabling of the stitch regulator in the single and double start backtack by the time t8 (start backtack stitch correction) and thereby prolong the backward section. This time-lag can be selected by means of parameter **150**.

6.3.4 Double start backtack

The forward section will be sewn for a number of stitches that can be set. Then the stitch regulator signal will be issued and the backward section will be executed. The number of stitches for the two sections can be set separately.

6.3.5 Single start backtack

A configurable stitch count is used to give the backtack signal and finish the backward section.

6.4 End backtack

Function **without** control panel		Control
Single end backtack	Segment 3 on	key **+** (S3)
Double end backtack	Segment 4 on	
End backtack Off	Both segments off	

Function **with** control panel		V810	V820/V850
Single end backtack	left-hand arrow above key On	Key 2	Key 4
Double end backtack	right-hand arrow above key On		
End backtack Off	both arrows Off		

Function **with** or **without** control panel		Parameter
Stitch length during backtack	(SLu)	137
Speed for end backtack can be interrupted by pedal 0	(n2E)	126
Start and end backtack can be interrupted by pedal in pos. 0	(StP)	284

The end backtack starts either by heelback, by a seam with stitch counting at the end of counting, o, from the light barrier seam at the end of the light barrier compensating stitches. The stitch regulator is immediately enabled from machine standstill.
After lowering the sewing foot, the switch-on point of the signal is delayed by the time t3 (start delay after switching off the sewing foot lifting signal). The first leading edge of position 1 counts as 0 stitch whenever the function is not started in position 1. The counting and turning off of the stitch regulator is synchronized at position 1.
From full machine run, end backtack will be switched in only after having reached the speed n4 and synchronization to position 1.

Parameter **284** can be used to determine whether an interruption of the start and end backtack is permitted. For ornamental backtacks parameter **284** has no effect.

284 = 0 The backtacks run automatically and are not interruptible.

284 = 1 The backtacks can be interrupted by returning the pedal to 0. For this setting, the speed setting of parameter 125 applies.
After an interrupted end backtack, the pedal can be pushed forwards to continue the backtack; pedal position –1 lifts the sewing foot, or pedal position –2 ends the trimming process without an end backtack. Automatic lifting of the sewing foot does not take place if the backtack is interrupted.

Parameter **137** can be used to select the stitch length (normal or long stitch) during the backtack. The display does not light up during the backtack.
137 = 0 The backtack is executed with a long stitch length.
137 = 1 The backtack is executed with a normal stitch length.

6.4.1 Speed n4 at the Seam End

Function **with** or **without** control panel		Parameter
End backtack speed	(n4)	113

6.4.2 Stitch Counting for End Backtack

Function **with** or **without** control panel		Parameter
Stitch counting forwards Number of stitches backward	(c3) (c4)	002 003

The stitches for end backtack backwards or forwards can be programmed and changed using the above parameters directly on the control or on a connected V810/V820/V850 control panel.

When using a control panel, the function "HIT" can be used for quick information for the user. When the end backtack is turned on with key **2** (V810) or **4** (V820/V850), the associated value is shown on the display for about 3 seconds. During this time, the value can be varied directly by pressing key **+** or **-**.

6.4.3 Stitch correction of the double end backtack

Function **with** or **without** control panel		Parameter
Stitch correction of the double end backtack	(t9)	151

For a double end backtack, the activation time of the stitch regulator can be extended by selecting a stitch correction time (t9) using parameter **151**.
It does not apply to ornamental backtacks)

6.4.4 Double end backtack

The backward section and/or end stitch condensing will be executed for a number of stitches that can be set. Then the stitch regulator will be disabled and the forward section and/or normal stitch condensing stitches will be executed. The number of stitches for the two sections can be set separately.
After stitch counting (parameter **003**) the trimming function will be initiated. During the entire operation the sewing speed is reduced to speed n4,. with the exception of the last stitch, which will be performed at positioning speed n1.
In the case of slow backtack mechanisms it is possible to delay disabling of the stitch regulator in the single and double end backtack by the time t9 (end backtack stitch correction).

6.4.5 Single end backtack

The stitch regulator signal will be issued and the backward section will be executed. During the last stitch the speed is reduced to positioning speed.

6.4.6 Backtack Synchronization

Function **with** or **without** control panel		Parameter
Backtack synchronization for the end backtack on/off	(nSo)	123
Backtack synchronization speed	(nrS)	124

If parameter **123** is on, the backtack speed will be switched to backtack synchronization speed one stitch before engaging and disengaging of the backtack solenoid. The backtack speed is released at the next position 2. If the synchronization speed that can be set by means of parameter **124** is higher than the backtack speed, the latter is maintained. Backtack synchronization applies only for the end backtack.

6.5 Start ornamental backtack

Function **without** control panel		Control
Single start ornamental backtack	Segment 1 on	key **E** (S2)
Double start ornamental backtack	Segment 2 on	
Start ornamental backtack Off	Both segments off	

Function **with** control panel		V810/V820/V850
Single start ornamental backtack	left-hand arrow above key On	Key 1
Double start ornamental backtack	right-hand arrow above key On	
Start ornamental backtack Off	both arrows Off	

Function **with** or **without** control panel		Parameter
Ornamental backtack stitch count forwards	(SAv)	080
Ornamental backtack stitch count backwards	(SAr)	081
Start backtacking speed	(n3)	112
Function "ornamental backtack" On/Off	(SrS)	135
Start delay after disabling the sewing foot lifting signal	(t3)	202
Ornamental backtack stop time	(tSr)	210
Last selected forward section on start ornamental backtack on/off	(Zrv)	215

The abbreviations set in parentheses ( ) are only visible if a V820/V850 control panel is connected!

Difference from the standard start backtack:
- The drive stops for stitch regulator switching
- The stop time can be set
- After the backwards section of the backtack, there is another forwards backtack section with the same stitch count as the previous backward section, corresponding to the setting of parameter **215**.
- The stitch count of the ornamental backtack can be set with separate parameters.

Parameter **137** can be used to select the stitch length (normal or long stitch) during the backtack. The display does not light up during the backtack.
137 = 0 The backtack is executed with a long stitch length.
137 = 1 The backtack is executed with a normal stitch length.

When using the V820/V850 control panel, direct access by means of the function key (key 9) is possible.

Function **with** control panel		Parameter
Ornamental backtack On/Off	(-F-)	008 = 2

6.6 End ornamental backtack

Function **without** control panel		Control
Single end ornamental backtack Double end ornamental backtack End ornamental backtack Off	Segment 3 on Segment 4 on Both segments off	key **+** (S3)

Function **with** control panel		V810	V820/V850
Single end ornamental backtack Double end ornamental backtack End ornamental backtack Off	left-hand arrow above key On right-hand arrow above key On both arrows Off	Key 2	Key 4

Function **with** or **without** control panel		Parameter
Ornamental backtack stitch count backwards	(SEv)	082
Ornamental backtack stitch count forwards	(SEr)	083
End backtacking speed	(n4)	113
Function "ornamental backtack" On/Off	(SrS)	135
Start delay after disabling the sewing foot lifting signal	(t3)	202
Ornamental backtack stop time	(tSr)	210

The abbreviations set in parentheses ( ) are only visible if a V820/V850 control panel is connected!

Difference from the standard end backtack:
- The drive stops for stitch regulator switching
- The stop time can be set
- The stitch count of the ornamental backtack can be set with separate parameters.

Parameter **137** can be used to select the stitch length (normal or long stitch) during the backtack. The display does not light up during the backtack.
137 = 0 The backtack is executed with a long stitch length.
137 = 1 The backtack is executed with a normal stitch length.

When using the V820/V850 control panel, direct access by means of the function key (key 9) is possible.

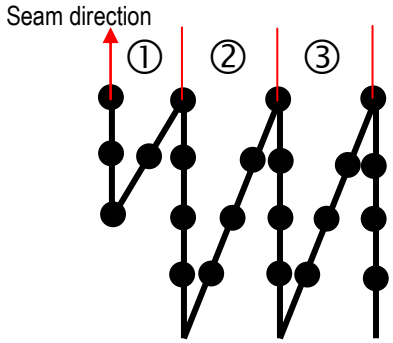
Function **with** control panel		Parameter
Ornamental backtack On/Off	(-F-)	008 = 2

6.7 Multiple backtack

Function **with** or **without** control panel		Parameter
Repetitions of the start backtack	(wAR)	090
Repetitions of the end backtack	(wER)	091

After completion of the multiple backtack function, the configured stitch count for the forward or backward section of the start or end backtack is repeated according to the value selected with parameter **090/091** (value 0 = multiple backtack off).
The function is possible with single or multiple backtacks.

① Catch backtack
② Normal backtack
③ Multiple backtack

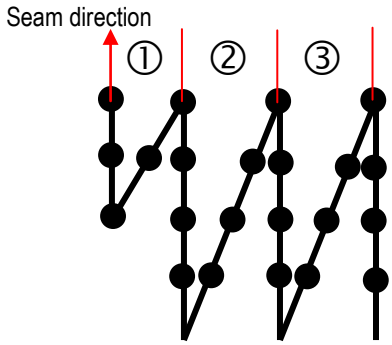


6.8 Catch backtack

Function **with** or **without** control panel		Parameter
Number of forward stitches of catch backtack	(cb1)	092
Number of backward stitches of catch backtack	(cb2)	093

The catch backtack applies only to the start of the seam if double catch backtack is turned on, not for double start ornamental backtacks (value 0 = catch backtack off). The catch backtack function is only active if at least parameter **093 > 0**.

① Catch backtack
② Normal backtack
③ Multiple backtack



6.9 Triple end backtack

Function **with** or **without** control panel		Parameter
Triple end backtack	(3Er)	060

The function applies if the double end backtack/end ornamental backtack is turned on and parameter **060 > 0**. After the end of the double end backtack, the stitch count set with parameter **060** is sewn backwards again. Afterwards, the thread trimming process is executed corresponding to the setting of parameter **136**.

6.10 Intermediate backtack/Intermediate ornamental backtack

If an external key is pushed on the A/5-33 socket, the backtack solenoid can be turned on at any point in the seam and during a stop. Depending on the setting of parameter **135** and parameter **287**, the corresponding speed limitation of parameter **288** or **289** is in effect.
See List of Parameters chapter **Connection Diagram**!

Function **with** or **without** control panel		Parameter
Counted manual backtack On/Off	(chr)	089
Forward section for intermediate ornamental backtack on/off	(vct)	096
Speed limitation DB3000 for manual backtack on/off	(dbA)	287
Manual ornamental backtack speed limit	(n9)	288
Manual backtack speed limit	(n11)	289

Intermediate Backtack:
As long as the key is held down, sewing runs backwards with speed limitation (parameter **289**) or with the pedal, depending on the setting of parameter **287**.

In addition, parameter **089** can be used to select whether at the end of the manual backtack, release of the key immediately removes the speed limit (n11) or it is extended by a stitch count.

089 = 0 Manual backtack **without** extension of the speed limit
089 = 1...255 Stitch count for extension of the speed limitation after end of the backtack

Intermediate ornamental backtack:

After pressing the appropriate key in the seam, the drive stops in position 1. The backtack solenoid is enabled. After expiration of the ornamental backtack stop period (parameter **210**) and furthermore after the pedal is pushed forward, the drive runs at the ornamental backtack speed and stitches are counted as long as the key remains down. The drive stops again in position 1. The backtack solenoid turns off.

After expiration of the ornamental backtack stop period, the previously counted stitch count is repeated forward if this function is enabled with parameter **096=1**. At the end of the count, the speed limit is cancelled.
The entire sequence is performed with speed limit n9.

6.11 Backtack suppression / recall

Effective in standard and ornamental backtack

By pushing an external key on socket A/14-33, the next backtack sequence can be suppressed or called once. A response to the key press is indicated on the LED connected on socket A/24. The display goes off when the next backtack function is completed or the key has been pushed again.

Upon pressing the key,	Start Backtack On	Start backtack off	End backtack on	End backtack off
Before the start of the seam	No backtack	Backtack	---	---
in the seam	---	---	No backtack	Backtack

The double backtack is performed in the above cases.
See List of Parameters chapter **"Connection diagram"!**

6.12 Holding Power of the Stitch Regulator Solenoid

Function **with** or **without** control panel		Parameter
Time of full power	(t10)	212
Holding Power of the Stitch Regulator Solenoid	(t11)	213
Upper limit stitch regulator ON period	(EV-)	299

The stitch regulator solenoid is engaged by full power. Then the system switches automatically to partial power in order to reduce the load for the control and the connected stitch regulator solenoid. Set the duration of full power using parameter **212** and the partial holding power using parameter **213**.

ATTENTION

If the holding power is set too high, the solenoid and the control may be permanently damaged. Please observe the permissible duty ratio (ED) of the solenoid and set the appropriate value according to the table below.

Value	Duty ratio (ED)	Effect
1	1 %	low holding power
100	100%	high holding power (full power)

6.13 Reverse motor rotation

Function **with** or **without** control panel		Parameter
Positioning speed	(n1)	110
Reverse motor position	(rd)	180
Switch-on delay of reverse motor rotation	(drd)	181
Reverse motor rotation On/Off	(Frd)	182

The function "reverse motor rotation" is performed after trimming. When the stop position is reached, the drive stops for the duration of the switch-on delay of reverse motor rotation (parameter **181**).. Then it turns at 100 RPM back to the position set with parameter **180**. After the end of the reverse motor process, the thread wiper is activated for time t6.
The motor reverse also takes place with the thread wiper off.

6.14 Machine run blockage

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

Function **with** or **without** control panel		Parameter
Sewing return after machine run blockage	(PdO)	281
Working with the machine run block switch	(LOS)	282
Machine run block function	(LSP)	283

Parameter **281** is used to preselect how the drive is turned back on after the machine run block is lifted.
281 = 0 Back on immediately from any pedal position
281 = 1 Back on only when pedal in 0 position

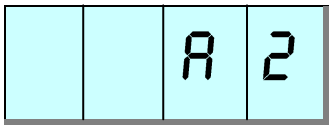
Parameter **282** is used to determine the effect of the run block switch.
282 = 0 N.O. (switch closed = machine run block on)
282 = 1 N.C. (switch open = machine run block on)

The machine run block is toggled in its function with parameter **283**.
283 = 0 Machine run block turned off
283 = 1 Machine run block function 1 (safety function) fastest possible stop without positioning
283 = 2 Machine run block function 2 (control function) with positioning to the currently configured position

The machine run block function is enabled by connecting a switch to socket A/11-33. When using a control panel, an acoustic signal can be switched on and/or off by means of parameter **127**.

Display after enabling machine run blockage <u>without</u> control panel:

Control display ➔



Display after enabling machine run blockage <u>with</u> control panel:

Display on the V810 control panel! ➔
(Symbol blinking. If parameter 127 = 1, an acoustic signal sounds)

Display on the V820/V850 control panel ➔
(Stop flashes. If parameter 127 = 1, an acoustic signal sounds)

In all variants of the machine run block function, sewing foot lifting is possible. Needle up/down and/or its variants are not possible, however.

6.14.1 Run block (block 1 and 2)

If the machine run block input is active during machine standstill, the drive is stopped despite actuation of the pedal. Starting is only possible after the input is deactivated.

6.14.2 Machine run block function 1 (safety function) parameter 283 = 1

In start backtack:

- Fastest possible stop without positioning. The start backtack is interrupted.
- Trimming is not possible.
- After lifting of the machine run block, pedal > 1 continues the start backtack and the seam, or pedal –2 starts thread trimming.

In the free seam:
- Fastest possible stop without positioning.
- Trimming is not possible.
- After lifting of the machine run block, pedal > 1 continues the seam, or pedal –2 starts thread trimming.

In stitch counting:
- Fastest possible stop without positioning. Stitch counting is interrupted.
- Trimming is not possible.
- After lifting of the machine run block, pedal > 1 continues the stitch counting, or pedal –2 starts thread trimming.

During light barrier compensation stitches:
- Fastest possible stop without positioning. The light barrier compensation stitches are interrupted.
- Trimming is not possible.
- After lifting of the machine run block, pedal > 1 continues the light barrier compensating stitches, or pedal –2 starts thread trimming.

In the end backtack:
- Fastest possible stop without positioning. The end backtack is interrupted.
- Trimming is not possible.
- After lifting of the machine run block, pedal > 1 continues the end backtack, or pedal –2 starts thread trimming.

6.14.3 Machine run block function 2 (safety function) parameter 283 = 2

In start backtack, in stitch counting, and in light barrier compensation stitches:
- Stop in the selected position.
- Cutting without an end backtack with pedal –2 with machine run block active is possible. If cutting is done with run block active, a new seam is started after the machine run block is lifted.
- After lifting of the machine run block, pedal > 1 continues the start backtack or the stitch counting, or pedal –2 starts thread trimming.

in the free seam:
- Stop in the selected position.
- Cutting without an end backtack with pedal –2 with machine run block active is possible. If cutting is done with run block active, a new seam is started after the machine run block is lifted.
- After lifting of the machine run block, pedal > 1 continues the seam, or pedal –2 starts thread trimming.

In the end backtack:
- The end backtack runs until the end with stop in the selected position. The start of the next seam is blocked.
- Cutting with pedal –2 with machine run block active is possible.
- After lifting of the machine run block, pedal -1 with thread trimming the seam process ends, if this was not yet done.
- If cutting is done with run block active, a new seam is started after the machine run block is lifted.

During thread trimming:
- Thread trimming runs to its end. The start of the next seam is blocked.
- After the machine run block is lifted, the start of the next seam is released.

6.15 Bobbin thread monitor

Function **with** or **without** control panel		Parameter
Stitch count for bobbin thread monitor (parameter 195 = 1 to 3)	(cFw)	085
Stitch count A for bobbin thread monitor (parameter. 195 = 4)	(cA)	086
Stitch count B for bobbin thread monitor (parameter 195 = 4)	(cb)	087
Stitch count C for bobbin thread monitor (parameter 195 = 4)	(cc)	088
Bobbin thread monitor mode	(rFw)	195

If the bobbin thread monitor function is turned on (parameter **195 = 1 to 4**), after power is turned on the display shows the controller type and the configured maximum speed for 1 second.

Display of maximum speed: ➔ **4000 dA321G** ➔ **Control type**
(e. g. 4000 ^{RPM})

Then the bobbin thread monitor status display appears.

Bobbin thread monitor stitch count: ➔ **250 --II--** ➔ **Status display**
(e. g. 250 stitches)

At this point (after power-on) the stitch count can be set with the +/- keys in steps of 10.
The function**DED (direct input of speed limit)** is available after the first sewing start or trimming.

6.15.1 Input signals

The form of the input signal can be used to distinguish which bobbin is empty.

Right bobbin empty: **= continuous signal (on for at least 1 second)**
Left bobbin empty: **= Frequency 5 Hz, or about 100 msec long signal**
Left and right bobbins both empty: **= Frequency 10 Hz, or about 50 msec long signal**

6.15.2 Bobbin thread monitor function off (parameter 195 = 0)

The bobbin thread monitor function is turned off.

6.15.3 Bobbin thread monitor without stop / sewing foot down after seam end (parameter 195 = 1)

Upon detection of an input signal after the bobbin runs empty, the bobbin thread counter is activated and the bobbin thread monitor symbol appears on the display of the V810 or V820/V850 control panel. After the counter runs out, the V810 control panels shows a **C** for the left bobbin and/or **D** for the right bobbin. On the V820/V850 control panel, instead of the model name, another symbol for right, left, or both is displayed. The corresponding LEDs on the machine (right, left, or both) will continue to flash about 4 times per second. The displays will remain in place even after the input signal is no longer applied. After the thread trimming and after the counter runs down the sewing foot is not lifted. The sewing foot is only lifted after the pedal has been in the 0 position and then returned to its position. The displays are removed (the flashing frequency of 4 Hz is turned off) if, after the thread trimming and the following start of sewing, no input signal has come in after 14 stitches. The bobbin has therefore been replaced and the bobbin thread counter is reset to zero.

6.15.4 Bobbin thread monitor with stop / sewing foot up after seam end (parameter 195 = 2)

Upon detection of an input signal after the bobbin runs empty, the bobbin thread counter is activated and the bobbin thread monitor symbol appears on the display of the V810 or V820/V850 control panel. After the counter runs out, the V810 control panels shows a **C** for the left bobbin and/or **D** for the right bobbin. On the V820/V850 control panel, instead of the model name, another symbol for right, left, or both is displayed. The corresponding LEDs on the machine (right, left, or both) will continue to flash about 4 times per second, and the drive stops. Automatic seam sections, such as seams with stitch counts or light barrier seams, will also be interrupted. These can be ended after the pedal is moved to the 0 position and then into a forwards position.

The following exceptions should be noted:
- If the bobbin thread monitor ends in a start backtack, then the start backtack will run to the end and then the drive will stop.
- If the bobbin thread monitor ends in an end backtack, the end backtack and trimming process will run to completion.

After thread trimming, the sewing foot automatically lifts. The displays are removed (the flashing frequency of 4 Hz is turned off) if, after the thread trimming and the following start of sewing, no input signal has come in after 14 stitches. The bobbin has therefore been replaced and the bobbin thread counter is reset to zero.

6.15.5 Bobbin thread monitor with stop / sewing foot down after seam end (parameter 195 = 3)

Upon detection of an input signal after the bobbin runs empty, the bobbin thread counter is activated and the bobbin thread monitor symbol appears on the display of the V810 or V820/V850 control panel. After the counter runs out, the V810 control panels shows a **C** for the left bobbin and/or **D** for the right bobbin. On the V820/V850/ control panel, instead of the model name, another symbol for right, left, or both is displayed. The corresponding LEDs on the machine (right, left, or both) will continue to flash about 4 times per second, and the drive stops. After thread trimming, the sewing foot is not lifted. The sewing foot is only lifted after the pedal has been in the 0 position and then returned to its position.
The displays are removed (the flashing frequency of 4 Hz is turned off) if, after the thread trimming and the following start of sewing, no input signal has come in after 14 stitches. The bobbin has therefore been replaced and the bobbin thread counter is reset to zero.

6.15.6 Bobbin thread monitor with stitch counting (Parameter 195 = 4)

To work with different bobbins and be able to use the bobbin thread monitor function, three stitch counts can be programmed (A, B, C; parameters **086**, **087**, and **088**).
Before initial commissioning of a controller, and after every update of the Flash program memory, these counters must be programmed.

Programming during first commissioning (after Flash update)

▪ Call **parameter 195**; set to 4 (Display example for V820/V850)		→	F 195 rFw 4
P **P**	Press the **P** key twice!	→	3400 da321G
8	Press the **8** key (>1 Sec.). Bobbin symbol in display flashes.	→	3400 cA 00100
+	Press the **+** key. Display flashes.	→	3400 b - -| |- -
8	Press the **8** key (<1 Sec.). Bobbin symbol in display flashes.	→	3400 cb 00200
+	Press the **+** key. Display flashes.	→	3400 c - -| |- -
8	Press the **8** key (<1 Sec.). Bobbin symbol in display flashes.	→	3400 cc 00300

Turn thread monitor function on/off

Long actuation (>1 second) of a key connected to socket A/12 activates the thread monitor stitch counting (maximum 65,000 stitches) and the thread monitor display appears continually in the display.
When the V820/V850 control panel is connected, key 8 can be used to initiate the same function.
Pressing the key again turns the function back off.
The function "Direct input of maximum speed" (DED) is only possible with the thread monitor function turned off, or in the seam.

Selecting the stitch counter (A, B, or C)

At the start of the seam, the stitch count can be selected by pressing the +/- keys on the control panel. The stitch counter last used and the counter values are retained even after the power is turned off.

Resetting the stitch counter (A, B, or C)

Short actuation of the key (<1 sec.) sets the currently selected stitch counter to the value selected with the parameters **086**, **087**, or **088**.

Sequence with thread monitor function turned on

During sewing, the counter value is decremented with each stitch, and the remaining number of stitches displayed.
Once the end of the countdown is reached, the V810 indicates the left bobbin with the C symbol or D for the right bobbin. On the V820/V850, the end of the countdown is indicated by flashing of the symbols for the left and/or right bobbins on the display instead of the model designation. In addition, the LEDs provided for this function on the machine flash (flash frequency 4 Hz).
The drive stops.
Automatically sequenced seam sections such as seams with stitch counting or light barrier seams will be interrupted, except for the start and end backtacks. After the pedal is in the 0 position and a subsequent forwards actuation, the seam can be continued.
It is necessary to adjust the number of stitches in such a way that the bobbin content is not completely exhausted by the end of the count.
After replacing the bobbin, a short press on the key indicated above will reset the thread monitor counter to the starting value.
The counter value remains stored after power--off and continues the the thread monitor count after power is restored.-
On the display of the controller, there is no display for the thread monitor.

6.16 Needle cooling / undercutter

Function **with** or **without** control panel		Parameter
Needle cooling On/Off	(nk)	095
Switching speed for needle cooling on/off	(nnk)	120
Power-off delay of needle cooling after stop	(dnk)	183
Needle cooling / undercutter function	(Fnk)	185

Parameter **185** can be used to program the function of the needle cooling / undercutter output.

185 = 1 Needle cooling is turned on during the entire sewing process. The power-fulfillment can be delayed after the stop (parameter 183).

185 = 2 The undercutter output is turned on when the pedal is pushed forward.

185 = 3 Needle cooling is turned off depending on the speed. The switching speed provided for this can be adjusted with parameter 120.

When using the V820/V850 control panel, direct access by means of the function key (key 9) is possible.

Function **with** control panel		Parameter
Needle cooling On/Off	(-F-)	008 = 4

6.17 Function modules for outputs A / B / C

The function modules A / B / C are used for the flexible programming of function sequences.
The modules are each assigned one input, one output, and one LED. A signal on the inputs to the module influences, in addition to the reaction to the outputs assigned to them according to the table, things including the seam sequence, backtack, and speed limitation.

Module	A	B	C
Input / socket	in4 / A/8	in1 / A/7	in7 / A/9
Output / socket	M6 / A/30	M16 / A/20	M30 / A/15
LED (Output) / socket	M10 / A/29	M11 / A/31	M18 / A/22

6.17.1 Function module A - no function

- Parameter **250 = 0**, function module for output A is turned off.

6.17.2 Switch stitch length (Function module A)

Function **with** or **without** control panel		Parameter
Stitch length switching with output A	(FMA)	250 = 1
Light barrier compensation stitches for long stitch length	(LS)	004
Light barrier compensation stitches for long stitch length	(cLS)	010
Long stitch length with speed limitation	(StL)	145
Keep A after seam end or delete it	(AFA)	251
Output A inverted/not inverted	(Ain)	252
Speed limitation DB3000	(n11)	289

- If output A is activated, the normal stitch length applies. LED A is off.
- Parameter 252 can be used to invert output A.
- After power-on, the normal stitch length is turned on, that is, output A = ON and LED A = OFF.
- After actuation of the A key, output A is turned off and LED A turned on.
- After the key is pressed again, the system is reset to the same state as after power-on.
- If the parameter **251 = 1**, the power-on state is activated after thread trimming.
- If the seam end is initiated by the light barrier, the number of light barrier compensation stitches differs for long and normal stitch length (parameter **004/010**)..
- If the stitch count is read out for the light barrier compensation stitches using the HIT function, the value is displayed depending on the stitch length selected.

6.17.3 Single stitch with short stitch length(Function module A)

Function **with** or **without** control panel		Parameter
Single stitch with shortened stitch length	(FMA)	250 = 4

- With a key pressed after sewing starts, output A is turned on in the intermediate stop and with sewing foot down. A full rotation is carried out if the drive was first positioned in position 1.
- If the key is held down and the pedal is pressed forward after the single stitch, output A and LED A remain turned on. Sewing continues with a short stitch length until the key is pressed again or the end backtack and/or the thread trimmer turn off output A and LED A.
- If key A is pressed during sewing or sewing starts while the key is pressed, output A and LED A are turned on.
- If the key is pressed again or the end backtack or thread trimmer actuate, output A and LED A are turned off.
- Manual backtacking is not possible with output A turned on.
- During automatically sequenced seams with stitch count or light barrier, key actuation has no effect.

	Output A	LED A	Remark
power On	Off	Off	
Key A after sewing start; sewing foot down	On for one turn	On	
Press key A during sewing or first press key A and then start	On, sewing with short stitch length	On	No manual backtack possible
End backtack without thread trimmer	Off	Off	

6.17.4 Lift / lower transport roller (Function module A)

Function **with** or **without** control panel		Parameter
Lift/lower transport roller (output A)	(FMA	250 = 5
Stitch count until transport roller lowered	(cA)	253
Stitch count delay from parameter 253 on/off	(PLc)	260
Lifting of the transport roller depending on sewing foot lifting and backtack	(FLk)	261
If high lift for walking foot is on, the transport roller remains raised/lowered	(hPt)	262

-

- After power-on, output A and LED A are turned on.
- A key movement after power-on before sewing starts turns off output A and LED A.
- The next key actuation after power-on before sewing starts turns the transport roller function and thus LED A back on. Output A remains on (transport roller up).
- After sewing starts (with transport roller function turned on) after the start backtack is complete (with the start backtack turned off immediately with the start of the seam) the transport roller is lowered after an adjustable stitch count (parameter **253**). The function of the configured stitches can be turned on and off with parameter **260**. The counting process can be interrupted by pressing a key. The transport roller is lowered immediately.
- If the sewing foot is lifted with the transport roller down, the transport roller is also raised. After lowering of the sewing foot, the transport roller is lowered after the configured stitch count (parameter **253**). The counting process can be interrupted by pressing a key. The transport roller is lowered immediately. If the stitch count is set to 0, the transport roller is immediately lowered with the sewing foot.
- If a manual backtack is carried out with the transport roller lowered, the transport roller rises immediately. After the end of the backtack, the roller is lowered immediately.
- If the key is pressed for the first time during the seam, the transport roller function is turned off. The transport roller is lifted and LED A goes out. This condition remains in effect (even after thread trimming) until the next time the key is pressed. A second press of the key switches the transport roller function back on. The transport roller lowers and LED A is turned on.
- With the start of the end backtack or the thread trimmer, the transport roller is raised.

	Output A	LED A	Transport roller	Sewing foot lifting
power On	On	On	top	
Key A	Off	Off	down	
Press key A again	On	On	top	
In start backtack	On	On	top	down
After start backtack in the count *)	On	On	top	down
Key A, after start backtack in the count *)	Off	Off	down	down
After start backtack after the count *)	Off	Off	down	down
Manual backtack	On	On	top	down
Sewing foot up	On	On	top	top
After sewing foot count in the count *)	On	On	top	down
Key A after sewing foot count in the count *)	Off	Off	down	down
Key A in the seam	On	On	top	
Key A again in the seam	Off	Off	down	
With end backtack and thread trimming	On	On	top	down
After thread trimming, if previously the roller on	On	On	top	
After thread trimming, if previously the roller off	On	On	top	

**) Stitch count until output A turned on (parameter 253).*

With parameter **261**, the following functions can be set:

261 = 0 The transport roller is raised without sewing foot lifting and backtack.

261 = 1 The transport roller is raised with sewing foot lifting and backtack.

261 = 2 The transport roller is raised with sewing foot lifting. After lowering of the sewing foot, the transport roller is lowered again after the configured stitch count elapses (with parameter 253 and its activation corresponding to parameter 260) or after the key is pressed.

261 = 3 The transport roller is raised with the backtack. After completion of the backtack, the transport roller is immediately lowered again. If the transport roller is raised when the intermediate backtack is activated, it remains raised after the backtack is complete.

Parameter **262** can be used to set the following function if the parameter 250 is set to "11" and 255 to "5", or parameter 250 is set to "5" and 255 to "11".

262 = 0 The transport roller remains lowered if high lift for walking foot is turned on.

262 = 1 The transport roller is lifted when high lift for walking foot is turned on.

6.17.5 Lift / lower material stop (Function module A)

Function **with** or **without** control panel		Parameter
Raise/lower material stop (output A)	(FMA)	250 = 6
Output A inverted/not inverted	(Ain)	252

- The raising of the material stop is carried out by turning output A on. The material stop is active when output A is turned off. LED A lights when the lower material stop and/or output A is turned off.
- After power-on, output A is turned on and LED A are turned off.
- Parameter **252** can be used to invert output A.
- When a key is pressed, output A is turned off and LED A turned on. The material stop is then active. This condition also remains in effect after thread trimming and can only be deactivated again after another key is pressed or by turning the power off/on.
- If the sewing foot is lifted, the material stop is lifted. Output A is turned on and LED A remains on.
- If the sewing foot is lowered again, the material stop is also lowered. Output A is turned off and LED A remains on.
- The next time the key is pressed, the material stop is turned off. Output A is turned on and LED A turned off. This condition remains in effect even after the thread trimming process and can only be reactivated by pressing the key again.
-

	Output A	LED A	Material stop	Sewing foot lifting
power On	On	Off	top	
Press key A, sewing foot up	On	On	top	top
Press key A again, sewing foot up	On	Off	top	top
Press key A again, sewing foot down	Off	On	down	down
Sewing foot up	On	On	top	top
After thread trimming and sewing foot up	On	On	top	top
After thread trimming and sewing foot down	Off	On	down	down

6.17.6 Second thread tension (Function module A)

Function **with** or **without** control panel		Parameter
Second thread tension (output A)	(FMA)	250 = 7
Keep A after seam end or delete it	(AFA)	251
Output A inverted/not inverted	(Ain)	252

- The second thread tension can be arbitrarily turned on or off, but not during automatically sequenced seam sections.
- After power-on, output A and LED A are turned off.
- Parameter **252** can be used to invert output A.
- When the first key is pressed, output A and LED A are turned on.
- When the first second is pressed, output A and LED A are turned off again.
- If the parameter **251 = 1**, the power-on state is activated after thread trimming.

Function sequence if →	Parameter 252 = 0		Parameter 252 = 1	
	output A	LED A	output A	LED A
power On	Off	Off	On	Off
Press key A	On	Off	On	On
Press key A again or thread trimming, if Parameter 251 = 1	Off	Off	On	Off

6.17.7 Edge trimmer manual (Function module A)

Function **with** or **without** control panel		Parameter
Edge trimmer manual (output A)	(FMA)	250 = 8
Keep A after seam end or delete it	(AFA)	251

Activation of output A turns the edge trimmer on. If the setting of parameter **251 = 1**, the edge trimmer is turned off after thread trimming.

- After power-on, the edge trimmer and LED A are turned off.
- By pressing key A, the edge trimmer can be turned on at any time (output A and LED A on).
- When the key is pressed again, the edge trimmer is turned off (output A and LED A off).
- If the parameter **251 = 1**, the edge trimmer is activated after thread trimming, as well as after power-on.

	Output A	LED A	Remark
power On	Off	Off	Edge trimmer off
Press key A	On	On	Edge trimmer on
Press key A again	Off	Off	Edge trimmer off
After thread trimming if parameter 251 = 1	Off	Off	Edge trimmer off

6.17.8 Edge trimmer automatic (Function module A)

Function **with** or **without** control panel		Parameter
Edge trimmer automatic (Output A)	(FMA)	250 = 9
Edge trimmer kept at seam end and before thread trimming or it is set as it is after power-on	(AFA)	251
Stitch count until edge trimmer turned on	(cA)	253
Stitch count until edge trimmer turned off	(cA_)	254
Coupling of the sewing foot lifting with the edge trimmer	(kFk)	267

Activation of output A (M6 on socket A/30) turns the edge trimmer on. LED A is used as the display (M10 on socket A/29). The activation point of the edge trimmer is set using parameter **253** (stitch count). The duty ratio of the edge trimmer is set using parameter **254** (stitch count).

Possible operating states:

	Parameter	or parameter
Automatic operation	253 >0, 254 >0, 251 = 0	251 = 1
Semi-automatic operation	253 >0, 254 = 0, 251 = 0	251 = 1
	253 = 0, 254 >0, 251 = 0	251 = 1
Manual operation	253 = 0, 254 = 0,251 = 0	251 = 1

251 = 0 The switch state of the edge trimmer remains that of before thread trimming.
251 = 1 The switch state of the edge trimmer is set as it is after power on.

267 = 0 The state of the edge trimmer (on or off) remains unchanged during sewing foot lifting
267 = 1 The edge trimmer is turned off when the sewing foot is lifted.
267 = 2 The edge trimmer is turned off when the sewing foot is lifted and can be turned back on by pressing the key.

Automatic operation:

Parameter 253 > 0, 254 > 0, 251 = 0	Output A	LED A	Remark
power On	Off	Off	
Press key A before the seam starts	On	On	
Press key A again before the seam starts	Off	Off	
Counting after seam starts pa. 253	Off	flashing	Interruption of count possible with key A
End of counting pa. 253	On	On	
End of counting pa. 254	On	On	Interruption of count possible with key A
End of counting pa. 254	Off	Off	
Press key A	On	On	Turning on manually
Press key A	Off	Off	Turning off manually
After thread trimming	Off	Off	

Semi-automatic operation:

Parameter 253 > 0, 254 = 0, 251 = 0	Output A	LED A	Remark
power On	Off	Off	
Press key A before the seam starts	On	On	
Press key A again before the seam starts	Off	Off	
Counting after seam starts pa. 253	Off	flashing	Interruption of count possible with key A
End of counting pa. 253	On	On	
End of counting pa. 254 = 0	On	On	Edge trimmer off only manually
Press key A	Off	Off	Turning off manually
After thread trimming	Off	Off	

Parameter 253 > 0, 254 = 0, 251 = 1	Output A	LED A	Remark
power On	Off	Off	
Press key A before the seam starts	On	On	
Press key A again before the seam starts	Off	Off	
Counting after seam starts pa. 253	Off	flashing	Interruption of count possible with key A
End of counting pa. 253	On	On	
End of counting pa. 254 = 0	On	On	Edge trimmer off only manually
Press key A	Off	Off	Turning off manually
After thread trimming	Off	Off	

Parameter 253 = 0, 254 > 0, 251 = 0	Output A	LED A	Remark
power On	Off	Off	
Press key A before the seam starts	On	On	
Press key A again before the seam starts	Off	Off	
Counting after seam starts pa. 253 = 0	Off	Off	
Press key A	On	On	Trigger key on (special case)
Start of counting pa. 254	On	On	
End of counting pa. 254	Off	Off	
Press key A	On	On	Turning on manually
Press key A	Off	Off	Turning off manually
After thread trimming	Off	Off	

Parameter 253 = 0, 254 > 0, 251 = 1	Output A	LED A	Remark
power On	Off	Off	
Press key A before the seam starts	On	On	
Press key A again before the seam starts	Off	Off	
Counting after seam starts pa. 253 = 0	Off	Off	
Press key A	On	On	Trigger key on (special case)
End of counting pa. 253	On	On	
End of counting pa. 254	On	On	
End of counting pa. 254	Off	Off	
Press key A	On	On	Turning on manually
After thread trimming	Off	Off	

Manual operation:

Parameter 253 = 0, 254 = 0, 251 = 0	Output A	LED A	Remark
power On	Off	Off	
Press key A at seam start or in the seam	On	On	
Press key A at seam start or in the seam	Off	Off	
Press key A at seam start or in the seam	On	On	
After thread trimming	On	On	

Parameter 253 = 0, 254 = 0, 251 = 1	Output A	LED A	Remark
power On	Off	Off	
Press key A at seam start or in the seam	On	On	
Press key A at seam start or in the seam	Off	Off	
Press key A at seam start or in the seam	On	On	
After thread trimming	Off	Off	

6.17.9 Sewing foot high lift (Function module A)

Function **with** or **without** control panel		Parameter
High lift for walking foot with output A	(FMA)	250 = 11
High lift walking speed	(n10)	117
high lift for walking foot ratcheting = 1 / temporary = 0	(hPr)	138
Run-out time of the high lift walking speed after high lift for walking foot is turned off.	(thP)	152
Minimum stitch count with high lift for walking foot	(chP)	184
If high lift for walking foot is on, the transport roller remains raised/lowered	(hPt)	262

When key A is pressed, output A and LED A are turned on and thus brought to the maximum sewing foot lift. Turning on the solenoid valve is possible at any time. The maximum speed is limited to the high lift walking speed (DB2000). If the momentary speed is higher than the high lift walking speed, the drive brakes to the high lift walking speed before output A is turned on.
When maximum high lift is disabled, output A and LED A are turned off immediately, but the speed limitation is only removed after a configurable amount of time (parameter **152**).

Three different modes can be selected with parameters:

High Lift for Walking Foot Operational Mode Stored (parameter 138 = 1).

The first time key A or a knee switch is pushed, output A is turned on, and it is turned off on the second time.

High Lift for Walking Foot Operational Mode Not Stored (parameter 138 = 0, parameter 254 = 0).

Output A is turned on as long as key A or a knee switch is pressed.

High lift for walking foot with minimum stitch count (parameter 138 = 0, parameter 254 > 0).

When key A or a knee switch is pressed, output A is turned on and remains turned on until the configured stitch count (parameter **254**) has been counted down.

- When key A is pressed when the drive is not running, high lift is turned on, and remains turned on after sewing starts at least for the configured stitch count.
- Extension of the activation time is possible if the key remains pushed down past the end of the stitch counting.
- When the key is pressed during counting, counting is always started over.

Parameter **262** can be used to set the following function if the parameter **250** is set to "11" and **255** to "5", or parameter **250** is set to "5" and **255** to "11".
262 = 0 The transport roller remains lowered if high lift for walking foot is turned on.
262 = 1 The transport roller is lifted when high lift for walking foot is turned on.

When using the V820\V850 control panel, direct access by means of the function key (key 9) is possible!

Function **with** control panel		Parameter
high lift for walking foot ratcheting = 1 / temporary = 0	(-F-)	008 = 3

6.17.10 Sewing foot pressure reduction (Function module A)

Function **with** or **without** control panel		Parameter
Sewing foot pressure reduction by external switch with output A	(FMA)	250 = 12
Switching of full power and/or holding force of sewing foot lifting	(FLd)	332
full power if sewing foot lifting is stored.	(t4_)	333
Holding power if sewing foot lifting is stored.	(t5_)	334

After setting parameter **250 = 12**, pressing the external key on input A (socket A/8) can be used to turn sewing foot pressure reduction on. If sewing foot lifting is stored, the full power and holding power behave according to the setting of parameter **332** and the subsequent pedal positions.

- Pedal position **0** Holding power according to setting of parameter **334**
- Pedal position **>1** Holding power according to setting of parameter **334**
- Pedal position **+1** Sewing foot is lowered
- Pedal position **-1** Holding power according to setting of parameter **204**
- Pedal position **-2** Holding power according to setting of parameter **204**

332 = 0 For the function of sewing foot lifting, the settings of parameters **203** and **204** apply.
332 = 1 If sewing foot lifting in the seam is stored, the solenoid is fully activated if parameter **333** is set and cycled with parameter 334.

6.17.11 Handwheels in direction of rotation (Function module A)

Function **with** or **without** control panel		Parameter
Run of the handwheel in the direction of rotation by external switch on input A	(FMA)	250 = 13
Increments for the run of the handwheel	(ihr)	263
Speed for handwheel run	(nhr)	264
Delay time until continuous handwheel run	(dhr)	265
Function of sewing foot lifting during handwheel run	(LFL)	266

After setting parameter **250 = 13**, pressing the external key on input A (socket A/8) can be used to start the handwheel run corresponding to the setting of parameter 161. Parameter **263** can be used to select the number of increments for how long the handwheel should rotate after a short press of the key. Parameter **264** can be used to set the speed with which the handwheel should turn. Parameter **265** sets a delay time. If the key is pressed for shorter than the time set, the configured increments in parameter **263** count down. If the key press is longer than the delay time configured, a continuous handwheel run is carried out.

Parameter **266** can be used to set the sewing foot lifting function.
266 = 0 The sewing foot lowers when the key is pressed during the handwheel run.
266 = 1 The sewing foot remains lifted while the handwheel is running if pedal is at –1 or automatic sewing foot lifting is set.

When using a control panel, the parameters **293** and **294** can be used to assign the functions of the F1 and F2 keys.
293/294 = 8 When the F1/F2 key is pressed, run the handwheel in direction of rotation
293/294 = 9 When the F1/F2 key is pressed, run the handwheel against the direction of rotation

6.17.12 Handwheel run against direction of rotation (Function module A)

Function **with** or **without** control panel		Parameter
Run of the handwheel against the direction of rotation by external switch on input A	(FMA)	250 = 14

After parameter **250 = 14** is set, the handwheel runs in the opposite direction. All other parameters have the same function as in setting "13".

6.17.13 Backtack suppression / backtack call (Function module A)

Function **with** or **without** control panel		Parameter
Backtack suppression / recall	(FMA)	250 = 15

When the external key is pressed, the next backtack process can be suppressed or called one time.
Confirmation of the key press is carried out with the LED.
See also section Backtack suppression/backtack call.

6.17.14 Single stitch backwards with stitch length switch(Function module A)

Function **with** or **without** control panel		Parameter
Single stitch backwards with stitch length switch	(FMA)	250 = 16

With a key pressed after sewing starts, output A, LED A, and the backtack solenoid are turned on in the intermediate stop. The drive starts and is positioned in needle position 1.

6.17.15 Speed limitation DB2000 (Function module A)

Function **with** or **without** control panel		Parameter
Speed limitation DB2000	(FMA)	250 = 17

Once input A is confirmed, the drive runs at a limited speed n10 (parameter **117**)

6.18 Function modules for outputs B and C

The functions for modules A/B/C are identical. The functions of the mode selected with parameter **250** (A), **255** (B), and/or **275** (C) are equivalent to those described in module A.
If the same mode is selected in module B and/or C as in module A, the settings in module A take priority.
The assignment of the inputs and outputs used to the modules are shown in tabular form in section "Function modules for outputs A / B / C".

Assignment of parameter numbers to the functional modules					
Module A		Module B		Module C	
250	(FMA)	255	(FmB)	275	(FmC)
251	(AFA)	256	(AFB)	276	(AFC)
252	(Ain)	257	(Bin)	277	(Cin)
253	(cA)	258	(cB)	278	(cC)
254	(cA_)	259	(cB_)	279	(cC_)
	In mode 11, instead of 254/259/279, parameter 184 (chP) takes effect				

6.19 Speed limitation

6.19.1 Speed limitation DB2000/DB3000

Function **with** or **without** control panel		Parameter
High lift walking speed (DB2000) Speed limitation (DB3000)	(n10) (n11)	117 289

The control inputs on A/9 (DB2000) and A/10 (DB3000) limit speed to 2000 RPM and 3000 RPM respectively. The limited speeds can be changed with parameters **117** and **289**. When the states of the control inputs change, the corresponding speed limit takes effect or is canceled with a delay of about 50 ms.

NOTE
When simultaneously using different speed limits, the maximum speed is limited the lower value.

6.19.2 Analogous speed limitation

The maximum speed can be limited by an analog voltage on input A/3. The analog voltage is generated by a potentiometer connected as a voltage splitter. If no potentiometer is connected, the maximum voltage is applied to the input. A potentiometer for speed limitation on the controller is also possible.

6.19.3 Analog speed limitation with Speedomat

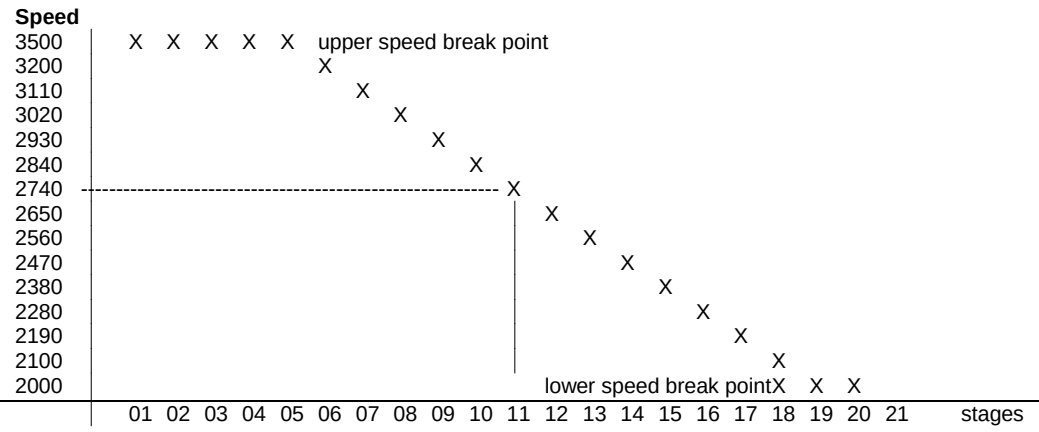
The Speedomat function permits speed limitation depending on the configured lift height of the sewing foot (21 steps). The current value of the lift height is given to the controller by the position of a potentiometer (10kΩ) with a 60° turning angle that is coupled to the lift shaft.
The maximum rotational angle of the lift shaft is 48° and move the potentiometer over a range of 9kΩ (nmax = 4.5 V on socket A/3) to 1kΩ (nlim = 0.5 V on socket A/3).

For the connection options of the potentiometer, see section "**Connection diagram**".

Function **with** or **without** control panel		Parameter
Maximum speed	(n2)	111
High lift walking speed	(n10)	117
High lift-dependent speed setting	(hP)	188

- It is possible to program the assignment of the speed limitation to the 21 high lift levels.
- Minimum high lift = maximum speed (n2)
- Maximum high lift = minimum speed (n10)

Graduation of the examples below is as follows:



Display example for parameter 188 on the V820/V850 control panel: → **ZZZZ XX AB YY**

Meaning of the values shown in the display		
XX	→	Display of the level up to which the maximum speed is effective (upper break point).
YY	→	Display of the level from which the maximum speed is effective (lower break point).
AB	→	Display of the level set on the potentiometer.
ZZZZ	→	Speed resulting from the set high lift level.
EEEE	→	Outside of the speed range.

6.19.4 Setting the Speed Limitation Depending on High Lift with the V820/V850 Control Panel

- Determine maximum speed (n2) using parameter 111!
- Determine minimum speed (n10) using parameter 117!
- Call parameter 188!

E Press the **E** key! → **F-188 hP [o]**

F2	Press the F2 key!	→	**ZZZZ XX AB YY**

- Set high lift for walking foot (potentiometer on the machine) to the level up to which full speed is to be maintained (upper break point).

E	New value of **AB** is taken over to **XX**.	→	**ZZZZ XX AB YY**

- Set high lift for walking foot (potentiometer on the machine) to the level up to which full speed is to be maintained (lower break point).

E	New value of **AB** is taken over to **YY**.	→	**ZZZZ XX AB YY**

- Press the **P** key once → Actual parameter is displayed! Press the **P** key twice. → Programming is complete!

6.19.5 Setting the Speed Limitation Depending on High Lift with the V810 Control Panel

- Call parameter 188!

E	Press the **E** key!	→	**hP [o]**
F2	Press the **F2** key! Actual display.	→	**1 1. 3 2 0 0**
F2	Press the **F2** key! Previous values are displayed.	→	**0 5 1 9**
F2	Press the **F2** key!	→	**1 1. 3 2 0 0**
	Set new value (level) with potentiometer on the machine.	→	**0 8. 3 2 0 0**
F2	Press the **F2** key!	→	**0 5 1 9**
E	Press the **E** key! New value 08 (upper break point) is accepted!	→	**0 8 0 8**
F2	Press the **F2** key!	→	**0 8. 3 2 0 0**
	Set new value (level) with potentiometer on the machine.	→	**1 7. 3 2 0 0**
F2	Press the **F2** key!	→	**0 8 0 8**
E	Press the **E** key! New value 17 (lower break point) is accepted!	→	**0 8 1 7**
P	Press the **P** key once. Display of current parameter number.	→	**F – 1 8 8**
	or		
P **P**	Press the **P** key twice. Exit programming.	→	**d A 3 2 1 G**

These values are saved when you begin sewing. They remain in effect even after turning the machine off!

NOTE

If you set a value on the potentiometer, which is between the actual break points, both values will be overwritten when the **E** key is pressed. Only after that is it possible to program new lower and/or upper break point values.

6.20 Thread trimming operation

Function **with** or **without** control panel		Parameter
Thread trimmer On/Off	(FA)	013
Thread wiper On/Off	(FW)	014

Function **with** control panel		V820/V850
Thread trimmer On	Left arrow on	Key 5
Thread wiper On	Right arrow on	
Thread trimmer and thread wiper on.	Both arrows on	
Thread trimmer and thread wiper Off.	both arrows Off	

When a V820/V850 control panel is connected, the functions can also be switched on and off using key **5**.

Function **with** or **without** control panel		Parameter
Mode for thread trimming	(FAr)	136
Thread trimmer activation angle	(iFA)	190
Switch-off delay of thread tension release	(FSA)	191
Switch-on delay angle of thread tension release	(FSE)	192
Stopping time for thread trimming	(tFA)	193
Activation delay angle of the thread trimmer	(FAE)	194
Thread wiper time	(t6)	205
Delay after thread wiping until sewing foot lifting	(t7)	206

The thread trimming operation is started when the pedal is fully back or automatically at the end of a counted seam section or automatically by light barrier detection after the compensation stitches count down. If the function "Trimming stitch backwards" is turned on (parameter **136 = 1**), for a single end backtack or triple end backtack, the backtack solenoid stays turned on in position 2 until the stop. With the thread trimmer turned off, the drive stops in the reverse direction when the seam end has been reached.

For thread trimming, different modes can be selected with parameter **136**, e.g. trimming stitch forwards, backwards, with thread wiper, etc.

136 = 0 Trimming stitch forwards and thread wiper function on.

136 = 1 Trimming stitch backwards and thread wiper function on.

136 = 2 Trimming stitch forwards with signal short thread trimmer on. Thread wiper function Off.

136 = 3 Trimming stitch forwards with output of signal for stitch shortening during the soft start and signal for short trimmer function on. Thread wiper function Off.

136 = 4 Trimming stitch forwards with output of signal for stitch shortening during soft start. Thread wiper function Off.

6.20.1 Thread trimmer

Function **with** or **without** control panel		Parameter
Trimming speed	(n7)	116

The thread trimming signal is turned on when the trimming speed is reached with incoming position 1 and after the set angle value is reached (parameter **190**), but turned off no later than the stop in position 2. Parameter **193** can be used to set a stopping time for thread trimming, which disengages the drive for this time after position 1 has been reached. If position 2 is not reached due to mechanical error, the thread trimming signal is turned off after 10 sec. This protects a solenoid with a low permitted activation time from destruction.

6.21 Thread tension release

Function **with** or **without** control panel		Parameter
full power time for thread tension release	(t14)	164
Holding force for thread tension release	(t15)	165
Thread tension release switch-off delay	(FSA)	191
Switch-on delay angle of thread tension release	(FSE)	192

The thread tension release signal can be turned on with a delay relative to the thread trimmer. The delay is entered as an angular value in parameter **192**. Shut-off takes place in position 2. However, the signal can be extended by the configurable time in parameter **191**.
Should position 2 not be reached due to mechanical error, the output is turned off after 10 sec. This protects a solenoid with a low permitted activation time from destruction.

6.21.1 Coupling of sewing foot, thread tension release, and thread tension reduction.

Function **with** or **without** control panel		Parameter
Coupling of sewing foot, thread tension release, and thread tension reduction.	(kFn)	196

Parameter **196** can be used to set the coupling of sewing foot, thread tension release, and thread tension reduction.

196 = 0 Coupling of the sewing foot to the thread tension release and thread tension reduction in the seam and after thread trimming off.

196 = 1 Thread tension release and thread tension reduction in the seam during sewing foot lift on.

196 = 2 Thread tension release and thread tension reduction after thread trimming during sewing foot lift on.

196 = 3 Thread tension release and thread tension reduction in the seam and after thread trimming during sewing foot lift on.

When parameter **250, 255** is set and/or **275 = 7**, thread tension reduction can be turned on/off at any time. The key functions are latching.

6.21.2 Coupling of thread tension reduction, high lift for walking foot, and Speedomat

Function **with** or **without** control panel		Parameter
Coupling of thread tension reduction, high lift for walking foot, and Speedomat	(kFh)	197

Parameter **197** can be used to set the coupling of thread tension reduction, high lift for walking foot , and Speedomat.

197 = 0 Coupling of thread tension reduction with high lift for walking foot and with the Speedomat off.

197 = 1 The key on socket A/7 is used to turn off thread tension reduction and turn on high lift for walking foot. The Speedomat has no effect.

197 = 2 When the high lift speed is reached by adjustment of the Speedomat, thread tension reduction is turned off. The key on socket A/7 has no effect

197 = 3 When the high lift speed is reached by adjustment of the Speedomat, thread tension reduction is turned off.
The key on socket A/7 has the same effect as for Setting 1.

When parameter **250, 255** is set and/or **275 = 7**, thread tension reduction can be turned on/off at any time. The key functions are latching.

6.22 Speed-dependent thread tension

Function **with** or **without** control panel		Parameter
Function of output M14 (ST2/26	(MML)	198
Switching point for speed-dependent thread tension	(nFS)	143

The "motor running" output (M14, socket A (ST2)/26) can be programmed for the function "Speed-dependent thread tension". The switching point depends on the speed selected with parameter **143**.

198= 1 Motor running

198= 2 Thread tension on if the speed is higher than that set with parameter **143**.
Thread tension off if the speed is lower than that set with parameter **143**.

198= 3 Thread tension on if the speed is lower than that set with parameter **143**.
Thread tension off if the speed is higher than that set with parameter **143**.

6.23 Thread wiper/Short trimmer

The thread wiper signal is turned on after position 2 is reached for a time set in parameter **205**. After the thread wiper is turned off, a delay time set in parameter **206** still applies until the sewing foot can lift.
If the thread wiper is turned off, the delay time for sewing foot lifting (parameter **206**) does not apply.

6.24 Thread clamp

6.24.1 Thread clamp and sewing foot pressure reduction

Functions		Parameter
Thread clamp functions	(FkL)	154
Thread clamp activation angle (signal 1)	(k1)	155
Thread clamp deactivation angle (signal 1)	(k1-)	156
Thread clamp activation angle (signal 2)	(k2)	157
Thread clamp deactivation angle (signal 2)	(k2-)	158
Time of full power for the thread clamp	(t12)	162
Holding power for thread clamp 1...100%	(t13)	163
Sewing foot lifting - activation angle	(NF)	159
Sewing foot lifting - deactivation angle	(NF_)	160
Sewing foot clocking 1 - 100%	(t5_)	334

The thread clamp function can be selected by means of parameter **154**. Immediately after power is turned on, the "Thread clamp" signal is blocked.
The "Thread clamp" signal is output:
- if the sewing foot is lifted
- during reverse turning
- after the drive starts

If the thread clamp function is activated, parameter **154 = <>0**, it can be turned off directly with key 5 on the V820/V850 control panel (right arrow over key 5 is off). By programming parameter **014 = 0**, it can also be turned of.

The following settings are possible using parameter**154**:

154 = 0 Thread clamp Off

154 = 1 **Thread clamp function:** Use of values in parameters **155 to 158**. The thread clamp (signal 1) turns on after the angle specified in parameter **155** is subtended and turns back off after the angle specified in parameter **156**. If parameters **157** and **158 > 0**, the thread clamp (signal 2) is again turned on and back off.
Sewing foot pressure function: The sewing foot lifting turns on with clocking after the angle specified in parameter **159** (parameter **334**) and turns back off after the angle set in parameter **160**.

154 = 2...8 The thread clamp function is executed with a fixed angle specified

If the setting of parameter **154 > 0**, the speed is limited to 250 RPM.
The setting of the angle is always relative to the reference point set with parameter **170**.

6.24.2 Coupling of thread clamping with sewing foot lifting

Function **with** or **without** control panel		Parameter
Coupling of thread clamping with sewing foot lifting	(kFk)	199

Parameter **199** can be used to couple the thread clamp on the seam end with sewing foot lifting.
The thread clamp stays on as long as the sewing foot lifting is turned on, but is automatically turned back off after about 1 minute.

199= 0 Coupling Off
199= 1 Coupling on

6.25 Seam with Stitch Counting

Function **without** control panel		Parameter
Stitch counting On/Off	(StS)	015

Function **with** control panel		V820/V850
Stitch counting forwards On Stitch counting backwards On Stitch counting Off	Left arrow on Right arrow on both arrows Off	Key 2

6.25.1 Stitches for stitch counting

Function **with** or **without** control panel		Parameter
Number of stitches for the seam with stitch counting	(Stc)	007

The stitches for stitch counting can be programmed and varied using the above parameters directly on the control or on a connected V810/V820/V850 control panel.
For fast operator information (HIT) when using the V820/V850 control panel, the value of the function switched on using key **2** can be displayed for approx. 3 seconds. During this time, the value can be varied directly by pressing key **+** or **-**.

6.25.2 Stitch Counting Speed

Function **with** or **without** control panel		Parameter
Stitch Counting Speed Speed mode for a seam with stitch counting	(n12) (SGn)	118 141

A certain speed behavior for the stitch counting can be selected using parameter**141**.

141 = 0 Countdown at speed controlled by the pedal
141 = 1 Execution at fixed speed n12, when pressing the pedal forward (position >1)
141 = 2 Execution at limited speed n12, when pressing the pedal forward (position >1)
141 = 3 Automatic execution at fixed speed after having pressed the pedal once.
The procedure can be interrupted by "heelback (-2)"
141 = 4 Automatic execution at fixed speed n1 after having pressed the pedal once.
The procedure can be interrupted by "heelback (-2)"

The sewing speed is reduced in each stitch depending on the actual speed (max. 11 stitches before the end of stitch counting), in order to be able to stop exactly at the end of counting. When the light barrier is on, free sewing will be performed after stitch counting.

6.25.3 Seam with Stitch Counting When Light Barrier Is On

Function **with** or **without** control panel		Parameter
Light barrier On/Off Stitch counting On/Off	(LS) (StS)	009 015

Function **with** control panel	V820/V850
Light barrier On/Off Stitch counting On/Off	Key 3 Key 2

When "stitch counting and light barrier function" is set, the number of stitches will be executed first, then the light barrier will be activated.

6.26 Plugging

Function **with** control panel		V820/V850 parameter
Seam end in plug program execution	(dkn)	322 = 3

The plugging function is only possible after seam programming (teach-in).
Two seams are programmed, one forwards and one backwards.
The end of the plugging process takes place after the pedal returns after starting the thread trimming process.

6.27 Free Seam and Seam with Light Barrier

Function **with** or **without** control panel		Parameter
Positioning speed	(n1)	110
Upper limit of maximum speed	(n2)	111
Limited speed according to setting of parameter 142	(n12)	118
Lower limit of maximum speed	(n2_)	121
Speed mode free seam	(SFn)	142

Speed control for the free seam and the seam with light barrier can be selected with **parameter 142**.

142 = 0 Countdown at speed controlled by the pedal
142 = 1 Execution at fixed speed n12, when pressing the pedal forward (position >1)
142 = 2 Execution at limited speed n12, when pressing the pedal forward (position >1)
142 = 3 Only for the seam with light barrier:
- Automatic execution at fixed speed after having pressed the pedal once.
- The seam end is initiated by light barrier.
- The procedure can be interrupted by heelback (-2).
- If the light barrier is not on, speed as with parameter setting 142 = 0.

When using a control panel, the maximum speed is displayed after power on and thread trimming and can be varied directly using the **+/-** keys on the control panel. The setting range lies between the values of parameters **111** and **121**.

6.28 Light barrier

- The light barrier module LSM002 is provided as the light barrier, and is connected to socket B18.
- Furthermore, an external light barrier can be connected to socket A/13.
- Both light barrier inputs trigger the same function and can be turned on and/or off with the same parameters.

Function **with** or **without** control panel	Parameter
Light barrier On/Off	009

Function **with** control panel		V820/V850
Light barrier covered/uncovered On	Right arrow on	Key 3
Light barrier uncovered/covered On	Left arrow on	
Light barrier Off	both arrows Off	

6.28.1 Speed after Light Barrier Sensing

Function **with** or **without** control panel		Parameter
Speed after Light Barrier Sensing	(n5)	114

6.28.2 General Light Barrier Functions

Function **with** or **without** control panel		Parameter
Light barrier compensation stitches (for long stitch length)	(LS)	004
Number of light barrier seams	(LSn)	006
Light barrier compensation stitches (for normal stitch length)	(cLS)	010
Light barrier sensing uncovered/covered	(LSd)	131
Start of sewing blocked/unblocked with light barrier uncovered	(LSS)	132
Thread trimming at seam end by light barrier detection on/off	(LSE)	133

- After sensing the seam end, the compensating stitches are counted at light barrier speed.
- Suspension of the procedure with pedal in pos. 0 (neutral). Interruption of the procedure with pedal in pos. -2.
- The thread trimming operation can be disabled using parameter **133**, regardless of the setting of key **5** on the V820/V850 control panel. Stop in the basic position.
- Programming of max. 15 light barrier seams depending on the setting of parameter **006** with stop in the basic position. Thread trimming after the last light barrier seam.
- Light barrier sensing uncovered or covered at the seam end can be selected using parameter **131**.
- Start blockage with light barrier uncovered programmable using parameter **132**.

The light barrier compensating stitches can be programmed and varied using the above parameters directly on the control or on a connected control panel. For fast operator information (HIT) when using the V820/V850 control panel, the value of the function switched on using key **3** can be displayed for approx. 3 seconds. During this time, the value can be varied directly by pressing key **+** or **-**. The stitch count is always displayed according to the selected stitch length (parameter **004** or **010**).

6.28.3 Reflection Light Barrier LSM002

Sensitivity setting:

Set minimum sensitivity depending on the distance between light barrier and reflection area (turn potentiometer as far as possible to the left).

- Potentiometer directly on the light barrier module

Mechanical orientation:

Orientation is facilitated by a visible light spot on the reflection area.

6.28.4 Automatic Start Controlled by Light Barrier

Function **with** or **without** control panel		Parameter
Delay of automatic start	(ASd)	128
Automatic start On/Off	(ALS)	129
Light barrier sensing uncovered	(LSd)	131
Start of sewing blocked with light barrier uncovered	(LSS)	132

This function enables an automatic start of the sewing operation as soon as the light barrier senses the insertion of fabric.

Prerequisites for the operation:

- Parameter 009 = 1 (Light barrier On).
- Parameter 129 = 1 (Automatic start On).
- Parameter 131 = 1 (Light barrier sensing uncovered).
- Parameter 132 = 1 (No start of sewing with light barrier uncovered).
- The pedal must be kept pressed forward at the seam end.

For safety reasons this function is enabled only after a normal start of sewing. The light barrier must be covered as long as the pedal is in position 0 (neutral). Then press the pedal forward. This function is disabled when the pedal is no longer pressed forward after the seam end.

6.28.5 Light barrier filter for knitted fabrics

Function **with** or **without** control panel		Parameter
Number of stitches of the light barrier filter	(LSF)	005
Light barrier filter On/Off	(LSF)	130
Light barrier sensing uncovered or covered	(LSd)	131

The filter prevents premature enabling of the light barrier function when sewing knitted fabrics.

- Enabling/Disabling of the filter using parameter **130**
- The filter is not active if parameter **005 = 0**
- Adaptation to the mesh is possible by varying the number of filter stitches.
- Knitted fabrics sensing for light barrier detection light ➔ dark if parameter **131 = 0**
  Knitted fabrics sensing for light barrier detection dark ➔ light if parameter **131 = 1**

6.29 Switching function of inputs in2, in3, in5, in6, in8, in9 and i10

Function **with** or **without** control panel	Parameter
Selection of the input function	241...249

With parameters **241, 242, 244, 245, 247, 248** and **249** for inputs in2, in3, in5, in6, in8, in9, and in10, the function of keys/switches connected to plug connectors ST2 and B4 can be selected.

Parameter 241, 242, 244, 245, 247, 248, 249 =:

0 Input function blocked

1 Needle up/down:
Upon pressing the key, the drive runs from position 1 to the return position. This is independent of whether the return is turned on or off. If parameter **180** has a value of 0, the drive stops in position 2. If the drive is outside the slot of position 1, no movement is carried out for safety reasons. After power--on, the function is blocked until sewing starts.

2 Needle up
Upon pressing the key, the drive runs from position 1 to the return position. This is independent of whether the return is turned on or off. If parameter **180** has a value of 0, the drive stops in position 2. If the drive is outside the slot of position 1, no movement is carried out for safety reasons. After power--on, the function is blocked until sewing starts.

3 Single stitch (basting stitch):
Upon pressing the key, the drive performs one rotation from position 1 to position 1 If the drive is in the return position, it runs to position 1 upon pressing the key and from position 1 to position 1 each time the key is pressed again.

4 Full stitch:
Upon pressing the key, the drive performs a full rotation depending on the set stop position.

5 Needle to position 2:
When the key is pressed, the drive runs regardless of its position into position 2 or the return position. This function is also possible after power-on.-

6 Machine run blockage effective with open contact:
Upon opening the switch, the drive stops in the pre-selected basic position.

7 Machine run blockage effective with closed contact:
Upon opening the switch, the drive stops in the pre-selected basic position.

8 Machine run blockage effective with open contact (unpositioned):
Upon opening the switch, the drive stops immediately unpositioned..

9 Machine run blockage effective with closed contact (unpositioned):
Upon closing the switch, the drive stops immediately unpositioned.

10 Run at automatic speed (n12):
Upon pressing the key, the drive runs at automatic speed. The pedal is not used.

11 Run at limited speed (n12):
Upon pressing the key, the drive runs at limited speed. The pedal must be pressed forward.

12 Sewing foot lifting with pedal in position 0 (neutral)

13 High Lift for Walking Foot Operational Mode Not Stored :
The signal “high lift for walking foot” is issued as long as the key is held down, and the drive runs with speed limitation (n10).

14 high lift for walking foot ratcheting:
The signal “high lift for walking foot” is issued upon briefly pressing the key, and the drive runs with speed limitation (n10). The operation is disabled upon pressing the key again.

15 Sewing foot pressure

16 Intermediate backtack / intermediate stitch condensing:
Upon pressing the key, the backtack or stitch condensing will be enabled anywhere in the seam and at standstill of the drive.
17 Stitch Regulator Suppression/Recall:
Upon pressing the key, the backtack or stitch condensing operation will be suppressed or recalled once.
18 Thread tension reduction
19 Reset bobbin thread monitor:
After inserting a full bobbin, the stitch counter is set to the configured value when the key is pressed. (Parameter **195=4**)
20 Handwheel running in the direction of rotation:
When the key is pressed, the drive runs (Parameter **161=0**).
21 Handwheel running in the direction of rotation:
When the key is pressed, the drive runs in the opposite direction (Parameter **161**).
22 Switch stitch length
23 Transport roller
24 No function
25 DB2000:
When the key is pressed, the drive runs with a fixed speed n10 (DB2000)
26 Input of speed limitation n11 (DB3000)
27 Input of speed limitation n10 (DB2000)
28 External light barrier:
In this mode it is possible to initiate the seam end using a key, not the light barrier. But the light barrier function must be On.
29 Single stitch with stitch length switching
30 Emergency stop:
After the key is pressed, the drive stops in position 2. The sewing foot is lifted. On the V820/V850, the run block symbol flashes; on the V810 "Stop" flashes. The drive functions are blocked. Only after power-off/on is the drive again ready to use.
31...38 No function
39 Switch to the next pattern in TEACH IN:
Upon pressing the key, the program switches to the next pattern.
40 Switch back to the previous pattern TEACH IN:
Upon pressing the key, the program switches to the previous pattern.
41...45 No function
46 Key for function module A
47 Key for function module B
48 Signal A1 is issued:
Upon pressing the key, signal A1 is issued immediately.
49 Signal A1 switchable as flip-flop:
Upon pressing the key, signal A1 is activated and deactivated when pressing the key again.
50 No function
51 Signal A2 is issued:
Upon pressing the key, signal A2 is issued immediately.
52 Signal A2 switchable as flip-flop:
Upon pressing the key, signal A2 is activated and deactivated when the key is pressed again.
53 No function
54 No function
55 Reversal of the direction of rotation
56 No function
57 No function
58 Intermediate backtack latching
59...77 No function
78 Switching of the high lift for walking foot function latching/keyed
79...88 No function

6.30 Key block

Function **with** or **without** control panel		Parameter
Select the slide-in strip number for the V810 control panel (**291 = 0,** keys 1...4 are disabled)	(810)	291
Select the slide-in strip number for the V820/V850 control panel (**292 = 0,** keys 1...0 are disabled)	(820)	292
Selection of input function on the (A) "F1" key on the V810/V820/V850 control panels (**293 = 0,** key F1 is disabled)	(tF1)	293
Selection of input function on the (B) "F2" key on the V810/V820/V850 control panels (**294 = 0,** key F2 is disabled)	(tF2)	294
Disabling the **P** and **E** keys on the control panels and the **P** key on the control	(EPE)	326
Disabling the keys **+** / **-** on the control panels and controller	(EPm)	327
Disabling the keys **E**, **+**, **-** and **>>** on the control	(ob)	328

To prevent unintended changes to important functions, settings of stitch counts (function HIT) or speeds (function DED), it is possible to disable the keys on the control panels (Variocontrol) and on the control pad of the controller.

6.31 F1/F2 Function Key Assignment on the V810/V820/V850 Control Panels

Function **with** or **without** control panel		Parameter
Selection of input function on the (A) "F1" key on the V810/V820/V850 control panels	(tF1)	293
Selection of input function on the (B) "F2" key on the V810/V820/V850 control panels	(tF2)	294

Parameters **293 and 294** can be used to select the following functions:

293/294 =

0 **Input function blocked** (key block)

1 **Needle up/down:** Upon pressing the key, the drive runs from position 1 to the return position. This is independent of whether the return is turned on or off. If parameter **180** has a value of 0, the drive stops in position 2. If the drive is outside the slot of position 1, no movement is carried out for safety reasons. After power--on, the function is blocked until sewing starts.

2 **Needle up:** Upon pressing the key, the drive runs from position 1 to the return position. This is independent of whether the return is turned on or off. If parameter **180** has a value of 0, the drive stops in position 2. If the drive is outside the slot of position 1, no movement is carried out for safety reasons. After power--on, the function is blocked until sewing starts.

3 **Single stitch (basting stitch):**Upon pressing the key, the drive performs one rotation from position 1 to position 1. If the drive is in position 2, it runs to position 1 upon pressing the key and from position 1 to position 1 each time the key is pressed again.

4 **Full stitch:** Upon pressing the key, the drive performs a full rotation depending on the stop position.

5 **Needle to position 2:** When the key is pressed, the drive runs regardless of its position into position 2 or the return position. This function is also possible after power-on.-

6 **Output A if parameter 250 > 0**

7 **Output B if parameter 250 > 0**

8 **Handwheel running in the direction of rotation**

9 **Handwheel running in the direction of rotation**

10...12 **No function**

13 **High lift for walking foot operational mode not stored:** The signal “high lift for walking foot” is issued as long as the key is held down, and the drive runs with speed limitation (n10).

14 **High lift for walking foot operational mode stored (flip flop 1):** The signal “high lift for walking foot” is issued upon briefly pressing the key, and the drive runs with speed limitation (n10). The operation is disabled upon pressing the key again.

15 **No function**

16 **Intermediate Backtack:** Upon pressing the key, the backtack will be enabled anywhere in the seam and at standstill of the drive.

17 **Backtack suppression / recall:** Upon pressing the key, the backtack will be suppressed or recalled once.

18 **No function**

19 **Reset bobbin thread monitor:** After inserting a full bobbin, the stitch counter is set to the configured value when the key is pressed. (if parameter **195= 4**).

6.32 Signals A1 and A2

When using the V820/V850 control panel, direct access by means of the function key (key 9) is possible.

Function **with** or **without** control panel		Parameter
Signal A1 and/or A2 On/Off with slide-in strip 1...4 (left-hand arrow = A1, right-hand arrow = A2)	(-F-)	008 = 5

Function **with** control panel		V820/V850
Signal A1 On	Left arrow on	Key 8
Signal A2 On	Right arrow on	
Signals A1 and A2 On	Both arrows on	
Signals A1 and A2 Off	Both arrows Off	

Parameters 300-309, 330, 331 for A1 and 310-319, 335, 336 for A2 determine when and how long the **signals** are enabled or disabled, or other conditions take effect.
When a V820/V850 control panel is used, signals A1/A2 can be assigned to a seam using key **8** (slide-in strips 6, 8, 9 and 10).

Using parameter **300/310** it is possible to set which output (M1-M11 or VR) can be switched by A1/A2.

Using parameter **301/311** it is possible to select if signal A1/A2 is effective until the seam end, stop at the seam end, over time or during stitch counting.
301/311 = 0 to end of seam (parameter **320**)
301/311 = 1 Over time (parameter **304/305/314/315**)
301/311 = 2 Until stop at the seam end
301/311 = 3 During stitch counting (parameter **308/309/318/319**)
301/311 = 4 Puller function (parameter **309/319**)

Using parameter **302/312** it is possible to select if the signal A1/A2 shall be effective at the start of the seam, after light barrier sensing or at the seam end.
302/312 = 0 Signal at the beginning of the seam
302/312 = 1 Signal after light barrier sensing
302/312 = 2 Start of the signal when the drive stops at the seam end
302/312 = 3 Signal from light barrier covered at the start of the seam
302/312 = 4 Signal switchable only manually

Using parameter **303/313** it is possible to select if the signals shall be activated with or without delay.
303/313 = 0 Without delay time
303/313 = 1 After a delay time (parameter **308/318**)
303/313 = 2 After a stitch count (parameter **309/319**)

The delay time can be selected using parameter **304/314**.

The ON period can be selected using parameter **305/315**.

The speed mode can be set using parameter**306/316** . The speed limitation is effective only when the signal is On.
306/316 = 0 Pedal controlled speed
306/316 = 1 Limitation to speed n9 (parameter 288)
306/316 = 2 Limitation to speed n11 (parameter 289)

The function for A1/A2 can be enabled or disabled separately using parameter **307/317**.

Using parameter **308/318** it is possible to select if the signals shall be activated with or without delay stitch count
308/318 = 0 Without delay stitches
308/318 = 1 with delay stitches

Separate stitch counts can be selected using parameter**309/319**.

The switch-off moment can be set using parameter **320**.
320 = 0 Signals effective until seam end
320 = 1 Signals effective until pedal has been pressed to pos. 0 (neutral)

Using parameter **330** for signal A1 and parameter **335** for signal A2, it is possible to select if these signals and sewing foot lifting shall be coupled or these signals and backtacking shall be coupled.

330/335 = 0 Coupling off
330/335 = 1 Coupling with sewing foot lifting
330/335 = 2 Coupling with backtacking
330/335 = 3 Coupling with sewing foot lifting and backtacking

Signals A1/A2 can be inverted using parameter **331/336**.
Signals A1/A2 can be switched using the "**F**" key on the V820/V850 control panel if parameter **008** is set accordingly.

6.33 Actuator

The commands for the sewing process are inputted using the actuator which is connected to the pedal. EFKA offers two different functional variants.

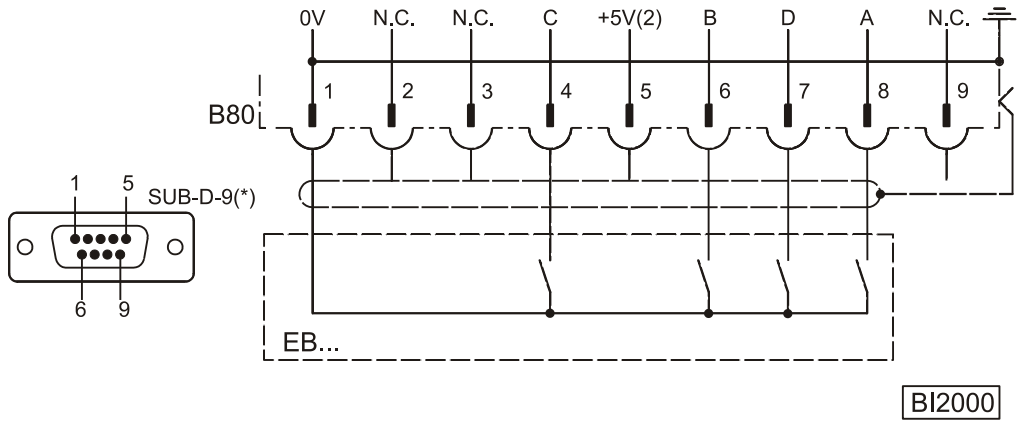
1. Digital – works only in steps (e.g. EB301A).
2. Analog – Characteristic programmable, continuously variable, 12, 24, or 60 steps (e.g. EB401).

Which actuator type is connected is automatically detected by the control.
Instead of the built-on actuator another actuator can also be connected to socket B80.

6.33.1 Digital actuator

Table: Coding of the Pedal Steps

Pedal step	D	C	B	A			
-2	H	H	L	L	Full heelback		(e. g. initiating the seam end)
-1	H	H	H	L	Slight heelback		(e. g. sewing foot lifting)
0	H	H	H	H	Pedal in pos. 0 (neutral)		
½	H	H	L	H	Pedal slightly forward		(e. g. sewing foot lowering)
1	H	L	L	H	Speed stage	1	(n1)
2	H	L	L	L	Speed stage	2	
3	H	L	H	L	Speed stage	3	
4	H	L	H	H	Speed stage	4	
5	L	L	H	H	Speed stage	5	
6	L	L	H	L	Speed stage	6	
7	L	L	L	L	Speed stage	7	
8	L	L	L	H	Speed stage	8	
9	L	H	L	H	Speed stage	9	
10	L	H	L	L	Speed stage	10	
11	L	H	H	L	Speed stage	11	
12	L	H	H	H	Speed stage	12	(n2) Pedal completely



EB.. Actuator
2) Nominal voltage 5V, I_{max} 20 mA

Function **with** or **without** control panel		Parameter
Speed stage graduation	(nSt)	119

The pedal characteristics (speed change from stage to stage) can be varied.
Possible characteristic curves:
- linear
- progressive
- highly progressive

6.33.2 Analog actuator

Function **with** or **without** control panel		Parameter
Characteristic of the "analog pedal"	(APd)	026

The effect of pedal actuation on the drive functions can be set using parameter **026**:

026 = 0 Analog function off
026 = 1 12-level selected, like prior pedal function of the digital actuator.
026 = 2 continuously variable
026 = 3 24-level
026 = 4 60-level (progressive)
026 = 5 60-level (progressive)

6.33.3 Frequency-controlled speed specification

Instead of speed specifications using a target value sensor, this can also be done by applying a frequency to input C (B80/4). The frequency between 200 and 10,000 Hz determines the set value in the range bounded by parameters **110/111** (positioning speed/maximum speed).
Start / stop takes place through input D (B80/7).
Foot lifting and thread trimming take place via inputs A and B (B80/8 and 6) according to the table above.

6.34 Acoustic Signal

Function **with** control panel		Parameter
Acoustic signal On/Off	(AkS)	127

An acoustic signal which sounds in the following cases can be enabled by means of parameter **127**:
- When the machine run blockage is On.

6.35 Masterreset

Restoration of the preset values set at the factory.

Operating and display example for V820

P				Press and hold the **P** key and turn power on	→	C-0000
3	1	1	2	Input code number 3112	→	C-3112
E				Parameter 200 will be displayed	→	F-200 t1
2	9	0		Input parameter 290	→	F-290
E				Modus value will be displayed (e. g. 20)	→	F-290 MkA 20
-	...	-		Set modus 0 by pressing the **-** key	→	F-290 MkA 00
P	P			Press the **P** key twice!	→	1000 da321G
P					→	F-290 MkA
E				Ready to input the desired mode	→	F-290 MkA 00
+	...	+		Input the desired mode (e. g. 20) by pressing the **+** key	→	F-290 MkA 20
P	P			Press the **P** key twice to finish the reset	→	3400 da321G

7 Signal Test

Function **with** or **without** 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).

7.1 Signal Test Using the Incorporated Control Panel or the V810/V820/V850

7.1.1 Inputs to the control

- Select parameter **173**.
- **Control pad on controller:** By actuating the keys or switches connected to inputs in1 to in10, the number of the input actuated appears on the display, e.g. **i06**. More than one switch and/or key may not be actuated at the same time.
  If more than one key or switch is activated at once, the number of the lowest-numbered input is displayed. If, for example, **in3, in5, in6, in7** are actuated, **i03** is displayed.
  Note: Checking of positions is described in chapter "Displaying the signal and stop positions".
- **V810 control panel:** The numbers of the inputs in1...in10, in11 (LSM), in12, and in13 appear individually on the LCD display. Here, too, several switches and/or keys may not be actuated at the same time.
  The signals "Light barrier, sensor (IPG... or HSM...), generator pulses 1 and 2, position 1 and 2" can be checked directly for functionality. The display is carried out using the arrows assigned to keys 2 to 4

Display example for input 03 on the V810 control panel: ➔ **in i03**

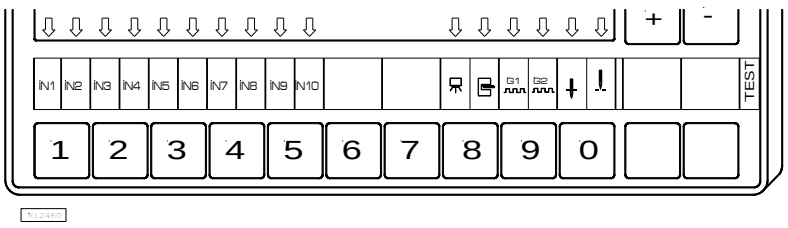
- **V820 control panel:** The numbers of the inputs in1...in10, in11 (LSM), in12, and in13 appear individually on the LCD display. In addition, the active inputs are displayed by arrows over keys 1 through 6, even if multiple inputs are actuated at once.
- If more than one key or switch is activated at once, the number of the lowest-numbered input is displayed. If, for example, **in3, in5, in6, in7** are actuated, **03** is displayed.
  The signals "Light barrier, positions, etc." are displayed by arrows above keys 8, 9, 0.

Display example for input 03 on the V820 control panel: ➔ **2-06 in 03**

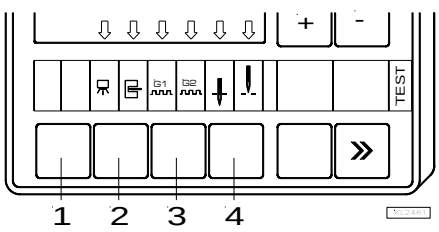
- **V850 control panel:** Like V820, but with somewhat more detailed display

Display example for input 03 on the V850 control panel: ➔ **ST2/06 : IN03 = ON**

V820/V850 Control Panel



V810 Control Panel



NOTE

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!

7.1.2 Outputs of control

- Select parameter **173**.
- Select the desired output using the **+/-** keys.
- On the V810 control panel or on the built-in keypad in the control, the **>>** key is used to turn on the associated output, if it is connected and working.
- On the V820 control panel, instead of the **>>** key the key (lower right, at the outer edge) must be pressed.

Display example for backtacking output on the V810 control panel: ➔ **2-34 oUt vr**

Display example for backtacking output on the V820 control panel: ➔ **2-34 oUt vr**

Display example for backtacking output on the V850 control panel: ➔ **ST2/34 OUT: VR**

Assignment of outputs		
Display	**Function / Output**	**on socket A (ST2)**
OUT VR	Backtacking	34
OUT FL	Sewing foot lifting	35
OUT 1	M1	37
OUT 2	M2	28
OUT 3	M3	27
OUT 4	M4	36
OUT 5	M5	32
OUT 6	M6	30
OUT 7	M7	23
OUT 8	M8	24
OUT 9	M9	25
OUT 10	M10	29
OUT 11	M11	31
OUT 30	M30	15
OUT 31	M31	18
OUT 14	M14	26
OUT 16	M16	20
OUT 17	M17	21
OUT 18	M18	22

On the V810 control panel, OUT 1, for example, is displayed as M 01.

For your notes:

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