

MINI-STOP

QE5540

CE

Type

Q45MSL

Instruction Manual

Part 2

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Technical updatings reserved!

7. Description of the MINI-STOP Drive System

The MINI-STOP Drive System is an electronically commutated, brushless DC motor.

The system is composed of the following subassemblies

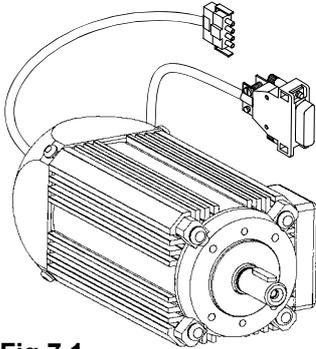


Fig.7.1

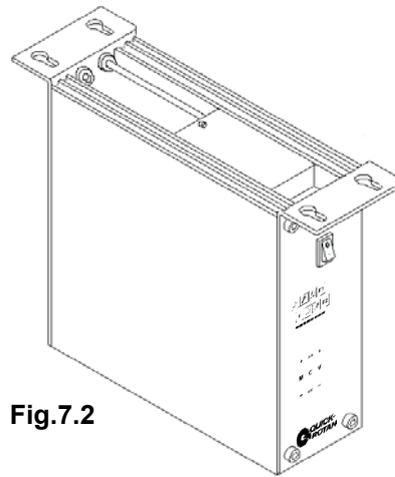


Fig.7.2

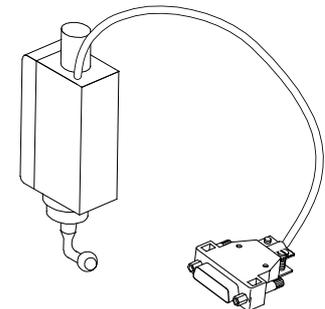


Fig.7.3

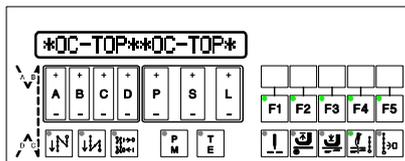


Fig.7.4

Motor QE5540 (Fig.7.1) with integrated optoelectronic incremental encoder for commutation and positioning.

Control (Fig.7.2) with

- integrated mains switch
- mains connection with interference rejection circuit
- electronically controlled combinational circuit
- intermediate DC circuit
- motor-driven current inverter
- electronic control for motor control and machine specific functions

Speed control unit SWG2 (Fig.7.3)

Control panel OC-TOP (Fig.7.4 - optional)

7.1 Motor QE5540

The motor is a synchronous motor. It has a permanent-magnetic rotor, a stator with three-phase winding and an optoelectronic increment encoder for commutation and positioning.

The rated capacity of the motor (shaft capacity) is 370 W in S5 mode. The rated speed of the motor is 6000 rpm, the maximum speed is 9000 rpm.

The motor has two mains leads:

- four-wire with special quadripolar AMP plug (X1) for connecting the stator coil to the control system
- six-wire shielded with nine-pole D-sub plug (X2) for connecting the increment encoder to the control system.

7.2 Control system

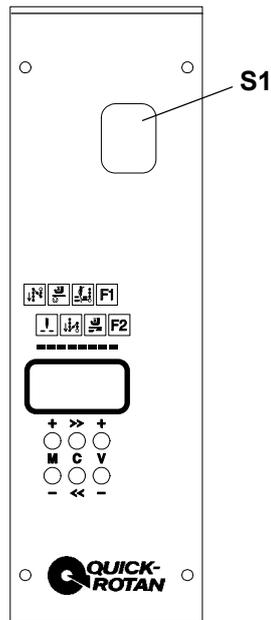


Fig. 7.5

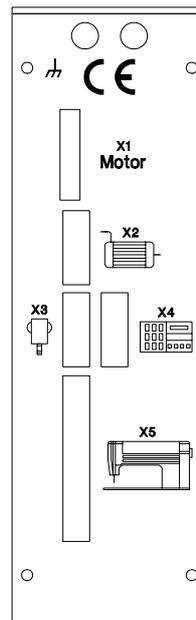


Fig 7.6

The control box is attached to the underside of the machine table by means of the four enclosed screws.

The mains connection is single-phase, using the three-wire cord protruding from the rear and a standard safety plug.

The control system has peripheral functions

on the front panel (Fig. 7.5):

1 mains switch **S1**

the Mini control panel (MPF)

contents: an LCD Display with 8 places

and 6 small keys: **M+ / M-**
 C>> / C<<
 V+ / V-

on the rear panel (Fig. 7.6):

sockets or connector plugs

- X1** quadripole socket for connecting the motor's stator coil
- X2** nine-pole D-sub jack for connecting the motor's increment encoder
- X3** nine-pole D-sub plug for connecting set point adjuster SWG2 (Art. No. 63.012)
- X4** nine-pole D-sub plug for connecting the control panel OC-TOP/AP (Art. No. 64.175)
- X5** 37-pole D-sub jack for connecting the process control system (keys, switches, solenoids, solenoid valves) on the machine.

The control system is connected with the sewing machine/ sewing equipment via:

inputs (Ex), such as for keys, switches, proximity switches, monitors, and
outputs (Ax), such as for solenoids, solenoid valves, signal indicators.

Function of the inputs (Ex) and the outputs (Ax)

Inputs (Ex)

- E1:** Feed reverse / stitch condensation
- E2:** Needle position change-over if <616> = I ¹⁾
Needle up without trimming if <616> = II
- E3:** Single stitch
- E4:** Presser foot if <427> = 1
Stroke adjustment if <427> = 2
Puller if <427> = 3
Presser foot if <427> = 4
Chopper if <427> = 5, <578> = I, <799> = 1
- E6:** Stop / start lock
- E13:** Speed limitation

¹⁾ <616> = I means that parameter 616 (the parameter number 616) is set to „I“.
<616> = II means that parameter 616 (the parameter number 616) is set to „II“.

Outputs (Ax)

- A1:** Thread trimmer forward
- A2:** Thread trimmer backward
- A3:** Thread wiper if <799> = 1, 2, 3, 4
Chain blowing if <799> = 5
- A4:** Presser foot lift
- A5:** Feed reverse if <799> = 1, 2, 3, 4
Stitch condensation if <799> = 5 and <427> ≠ 5
Vacuuming if <799> = 5 and <427> = 5
- A6:** Thread trimmer if <799> = 1, 2, 3, 4
Chopper if <799> = 5 and <427> = 5 and <578> = I
- A7:** Presser foot down if <427> = 1
Stroke adjustment if <427> = 2
Puller if <427> = 3
- A8:** Motor running
- A10:** Thread tension release
- A16:** Count signal

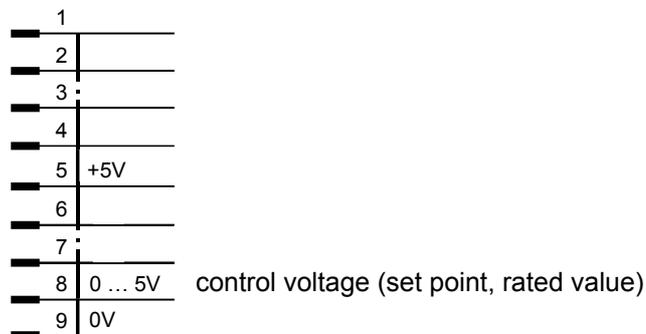
7.3 Speed control unit SWG2

The SWG2 is attached to the underside of the machine table with the enclosed brackets and connected mechanically to the machine's pedal by means of the enclosed rod assembly. The mains connection of the SWG2 is by means of a nine-pole connector on plug X3 on the rear control panel.

The SWG2 is an analogous mechatronic converter, which converts the pedal path into analog voltage. This analog output voltage of the SWG2 is digitized in the control system so that the pedal path can be divided into 16 steps (positions).

Level	Position	Voltage [V]	Meaning
0	-2 (full backwards)	0,00 - 0,50	Seam end, thread trimming
1	-1 (a little backwards)	0,50 - 0,94	Presserfoot up
2	0 (neutral position)	0,94 - 1,76	Treadle position 0
3	+1	1,76 - 2,21	Presserfoot down
4	+1 D	2,21 - 2,43	Speed n1
5	+2 D	2,43 - 2,66	Speed n2
6	+3 D	2,66 - 2,90	Speed n3
7	+4 D	2,90 - 3,13	Speed n4
8	+5 D	3,13 - 3,37	Speed n5
9	+6 D	3,37 - 3,60	Speed n6
10	+7 D	3,60 - 3,84	Speed n7
11	+8 D	3,84 - 4,07	Speed n8
12	+9 D	4,07 - 4,31	Speed n9
13	+10 D	4,31 - 4,54	Speed n10
14	+11 D	4,54 - 4,78	Speed n11
15	+12 D	4,78 - 5,00	Speed n12

Pin connection of speed control plug (X3) of the SWG2



7.4 External Operator Panel OC-TOP

The operator panel **OC-TOP** has the following components:

- **a display:** 16-digit LCD matrix
- **14 programming keys:**
A+ / A-, B+ / B-, C+ / C-, D+ / D-, P+ / P-, S+ / S-, L+ / L-
- **two keys (T9, T10)** for selection of the operating mode
- **13 keys (T1...T8, T11...T15)** for machine functions
- **one connector for a light sensor** at rear for connection of one or two (with adapter) light sensors

7.4.1 External Operator Panel OC-TOP/AQ

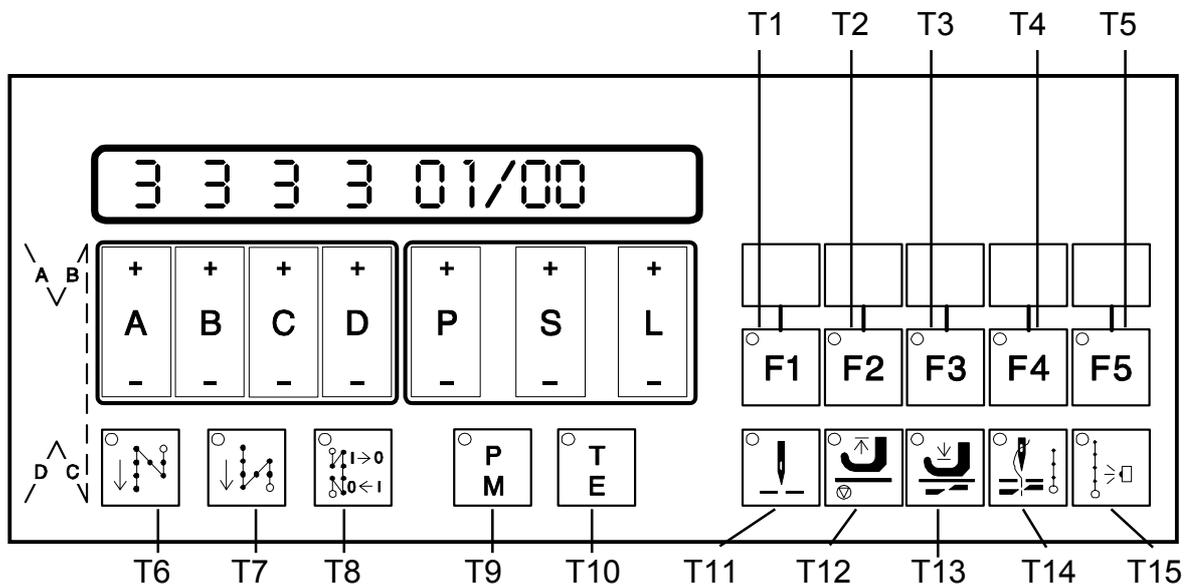


Fig. 7.7

Function of the programming keys in operating mode "manual sewing"

(key T9 is dark, key T10 is dark)

- **A+/A-** adjustment of stitchcount A start backtack
- **B+/B-** adjustment of stitchcount B start backtack
- **C+/C-** adjustment of stitchcount C end backtack
- **D+/D-** adjustment of stitchcount D end backtack

Function of the programming keys in operating mode "programmed sewing"

(key T9 is bright, key T10 is dark)

- **A+/A-** adjustment of speed nx in program x
- **A+/A-** adjustment of stitchcount A start backtack
- **B+/B-** adjustment of stitchcount B start backtack
- **C+/C-** adjustment of stitchcount C end backtack
- **D+/D-** adjustment of stitchcount D end backtack
- **D+/D-** preselection of the program following program x
- **P+/P-** adjustment of program x (program number x)
- **S+/S-** adjustment of seam section (01...05) in program x
- **L+/L-** adjustment of the cycle counter for stacker activation

Function of the programming keys in operating mode "parameter programming"
(key **T9** is dark, key **T10** is bright)

- **P+/P-** switch over of the hundreds of the parameter numbers
- **S+/S-** switch over of the parameter number in the switched on hundred section
- **L+/L-** programming of the parameter value of the switched on parameter number

Function of the keys T9 and T10 for selection of the operating mode

- **T9** dark, **T10** dark: manual sewing
- **T9** bright, **T10** dark: programmed sewing
- **T9** dark, **T10** bright: parameter programming
- **T9** bright, **T10** bright: teach in (s. chapter 9.1.1)

Function of the programming keys for machine functions

- **T5** function change-over for keys **T1** ... **T4** (shift key)
- **T1** linking for following seam sections (with / without)
- **T2** for speed control at programmed sewing:
variable (treadle-controlled), if **T2** dark
constant (automatic), if **T2** bright
- **T3** feed reverse for a seam section
- **T5+T3** single stitch
- **T4** seam section manual or stitchcounted
- **T5+T4** unit count in display
- **T6** start backtack (on / off)
- **T7** end backtack (on / off)
- **T8** backtack inversion
- **T11** needle position at sewing stop (up / down)
- **T12** presser foot position at sewing stop (up / down)
- **T13** presser foot position after seam end (up / down)
- **T14** thread trimming (on / off)
- **T15** sewing with light barrier (on / off)

Caution: After programming push key **T5** till LED goes out

The keys **T1...T15** are provided with one signal lamp each (LED). Each LED provides optical feedback on the control position of the function assigned to each key. If the function is ON, the LED is bright; if the function is OFF, the LED is dark.

7.4.2 External Operator Panel OC-TOP OC-TOP/FQ

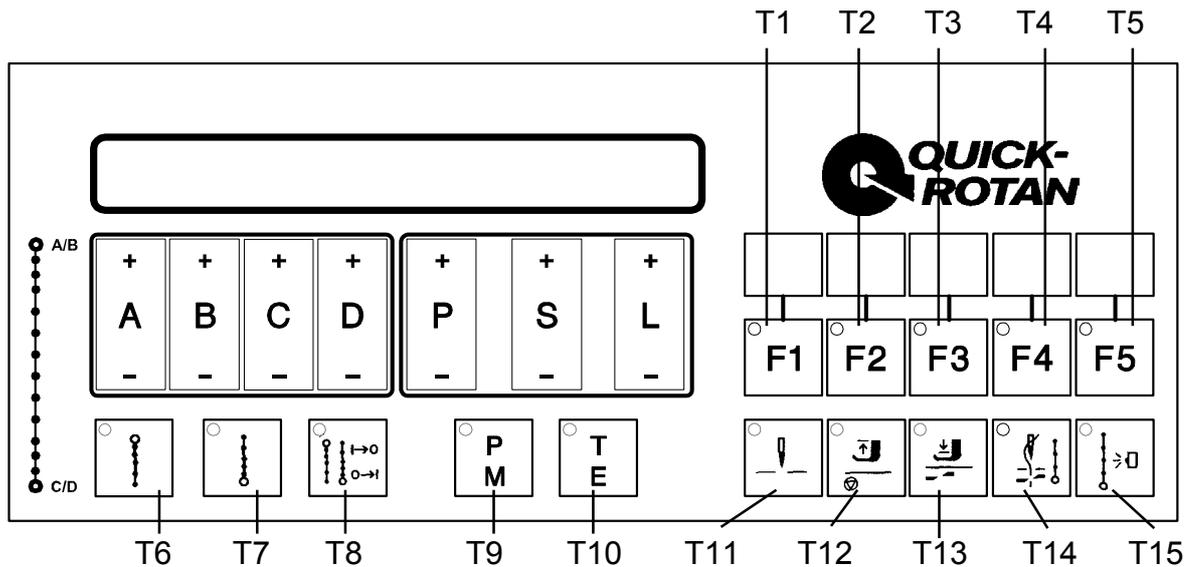


Abb. 7.8

Function of the programming keys in operating mode "manual sewing" (key T9 is dark, key T10 is dark)

- **A+/A-** adjustment of stitchcount A/B start stitch condensation
- **B+/B-** adjustment of stitchcount A/B start stitch condensation
- **C+/C-** adjustment of stitchcount C/D end stitch condensation
- **D+/D-** adjustment of stitchcount C/D end stitch condensation

Function of the programming keys in operating mode "programmed sewing" (key T9 is bright, key T10 is dark)

- **A+/A-** adjustment of speed nx in program x
- **A+/A-** adjustment of stitchcount A/B start stitch condensation
- **B+/B-** adjustment of stitchcount A/B start stitch condensation
- **C+/C-** adjustment of stitchcount C/D end stitch condensation
- **D+/D-** adjustment of stitchcount C/D end stitch condensation
- **D+/D-** preselection of the program following program x
- **P+/P-** adjustment of program x (program number x)
- **S+/S-** adjustment of seam section (01...05) in program x
- **L+/L-** adjustment of the cycle counter for stacker activation

Function of the programming keys in operating mode "parameter programming" (key T9 is dark, key T10 is bright)

- **P+/P-** switch over of the hundreds of the parameter numbers
- **S+/S-** switch over of the parameter number in the switched on hundred section
- **L+/L-** programming of the parameter value of the switched on parameter number

Function of the keys T9 and T10 for selection of the operating mode

- **T9 dark, T10 dark:** manual sewing
- **T9 bright, T10 dark:** programmed sewing
- **T9 dark, T10 bright:** parameter programming
- **T9 bright, T10 bright:** teach in (s. chapter 9.1.1)

Function of the programming keys (T1...T8, T11...T15) for machine functions

- **T5** function change-over for keys **T1 ... T4** (shift key)
- **T1** linking for following seam sections (with / without)
- **T2** for speed control at programmed sewing:
variable (treadle-controlled), if **T2** dark
constant (automatic), if **T2** bright
- **T3** feed reverse for a seam section
- **T5+T3** single stitch
- **T4** seam section manual or stitchcounted
- **T5+T4** unit count in display
- **T6** start stitch condensation (on / off)
- **T7** end stitch condensation (on / off)
- **T8** stitch condensation inversion
- **T11** needle position at sewing stop (up / down)
- **T12** presser foot position at sewing stop (up / down)
- **T13** presser foot position after seam end (up / down)
- **T14** thread trimming (on / off)
- **T15** sewing with light barrier (on / off)

Caution: After programming push key **T5** till LED goes out

The keys **T1...T15** are provided with one signal lamp each (LED). Each LED provides optical feedback on the control position of the function assigned to each key. If the function is ON, the LED is bright; if the function is OFF, the LED is dark.

7.5 Drive System Application

(Machine Classes)

The drive system Type Q40MS can be used on various machine classes. Each machine class requires a specific control program. Activation (switching on) of the control program specific to a machine is made via parameter <799> (see chapter 9.1.2.2 for parameter programming).

The following is applicable:

<799> = 1	machine class 1 = lockstitch	Singer
<799> = 2	machine class 2 = lockstitch	Pfaff
<799> = 3	machine class 3 = lockstitch	Dürkopp, Juki
<799> = 4	machine class 4 = lockstitch	Refrey
<799> = 5	machine class 5 = chainstitch	Union Special
<799> = 6	machine class 6 = chainstitch	Yamato

8. Application

This **MINI-STOP drive** can be used **either with or without an external operator's control panel OC-TOP**. Without the **OC-TOP** is only manual sewing possible.

Switching on

The on/off switch (mains switch) S1 is located at the front of the control unit. When activated and live, switch S1 is lit up.

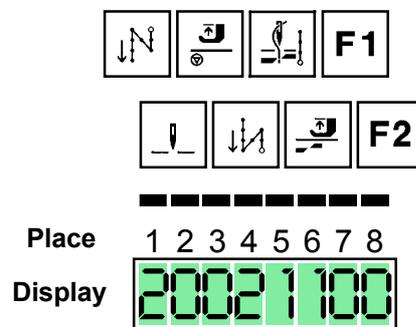
Maximum speed

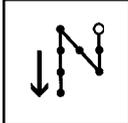
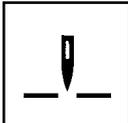
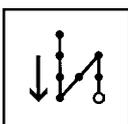
The maximum speed can be adjusted with parameter <607> either with control panel **OC-TOP** or with the mini control panel at the front of the control unit.

8.1 Sewing without an external operator's control panel

For sewing without external operator panel, programming on the mini programming panel located on the control housing front is function-relevant.

When Indication 3 „sewing functions“ is shown on the MPF display, the following functions can be selected:



Place	Symbol	Function	Display	Meaning
1		start backtack or start stitch condensation	0 1 2	without single double
2		needle position at seam stop	0 1	down up
3		presser foot at seam stop	0 1	down up
4		end backtack or end stitch condensation	0 1 2	without single double
5		thread trimming	0 1	without thread trimming with thread trimming

Place	Symbol	Function	Display	Meaning
6		presser foot after seam end	0 1	down up
7			0	without function
8			0	without function

8.2 Sewing with External Operator's Control Panel OC-TOP

8.2.1 Sewing without Sewing Program (manual Sewing)

Condition: key T9 (P/M) is dark
key T10 (T/E) is dark

Display showing

- before start or after start for machine classes 1 ... 4 (<799>=1/2/3/4), if <605> = II

A rectangular digital display with a black border. The display shows the number '3' four times in a row, followed by '0x /00'.

rated backtack stitchcount
sewing program activated when
key T9 (P/M) is pressed (bright)

Setting of rated backtack stitchcount is possible only with the machine at standstill

- for front backtack forward with key A+ or key A-,
- for front backtack backward with key B+ or key B-,
- for end backtack backward with key C+ or key C-,
- for end backtack forward with key D+ or key D-.

Display showing

- before start or after start for machines class 5 and 6 (<799>=5/6), if <605> = II

A rectangular digital display with a black border. The display shows the number '05' twice, followed by '0x /00'.

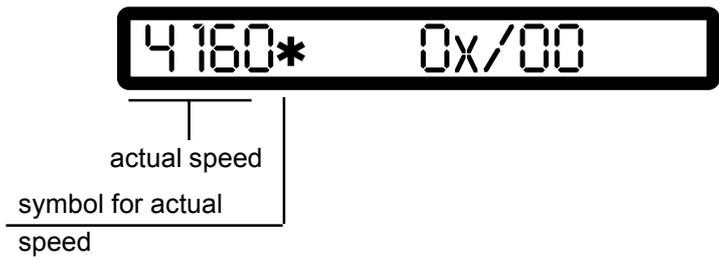
Nominal stitchcount for
front densification
Nominal stitchcount for
end densification
Sewing program being activated
when key T9 (P/M) is pressed (light ON)

Adjustment of nominal stitchcount for front and end densification is possible only when the machine is stopped:

- for front densification use key A+ or B+ or key A- or B-,
- for end densification use key C+ or D+ or key C- or D-.

Display showing

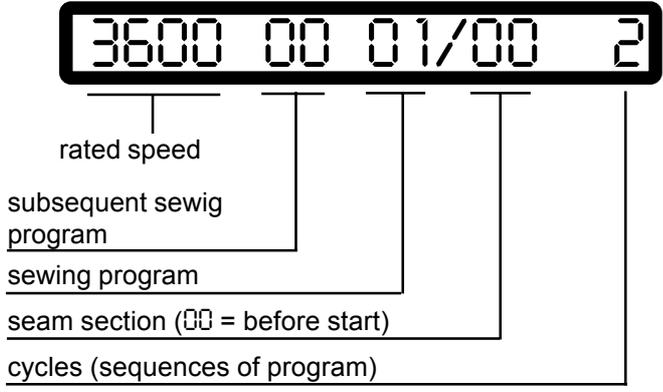
- before start, when <605> = 1



8.2.2 Sewing with Sewing Program (programmed sewing)

Condition: key T9 (P/M) is bright
key T10 (T/E) is dark

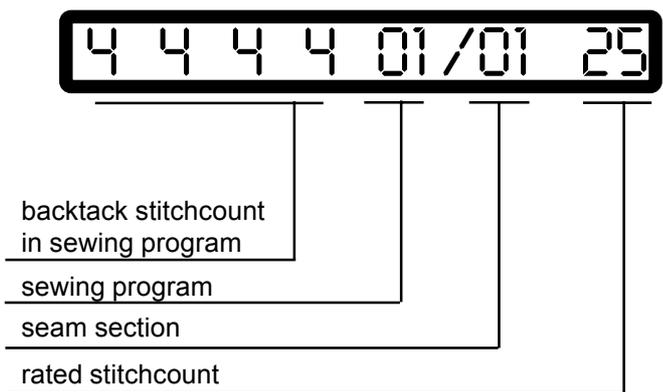
Display showing before start



When this is displayed, the following can be modified:

- program: by actuating keys P+ or P-
- seam section: by actuating keys S+ or S-
- cycles: by actuating keys L+ or L-
- the subsequent sewing program via keys D+ or D-
- rated speed for the program: by actuating keys A+ or A-
This speed is limited by parameter <221>

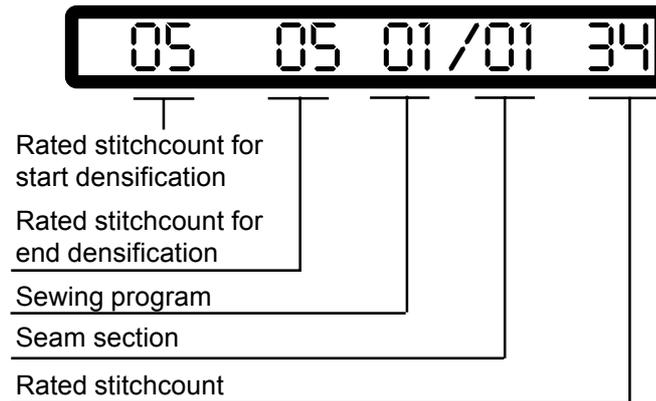
Display before start for machines class 1 ... 4 (<799>=1/2/3/4), if a seam section has been activated



When this is displayed, the following can be modified:

- the preset backtack stitchcount for the program by actuating the keys located below the respective digits
- rated stitchcount of a seam section: by actuating keys L+ or L-
- seam section: by actuating keys S+ or S-
- program: by actuating keys P+ or P-

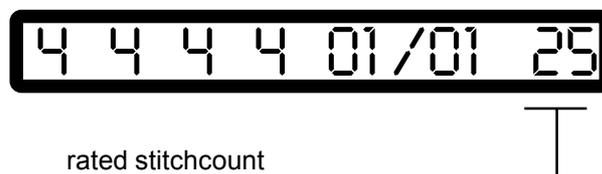
Display showing before start for machines class 5 and 6, if a seam section is activated



When this display is shown, the following can be modified:

- nominal stitchcount for front densification via keys A+, A-, B+ or B-
- nominal stitchcount for end densification via keys C+, C-, D+ or D-
- nominal stitchcount of the seam section by pressing key L+ or L-
- seam section by pressing key S+ or S-
- program by pressing key P+ or P-

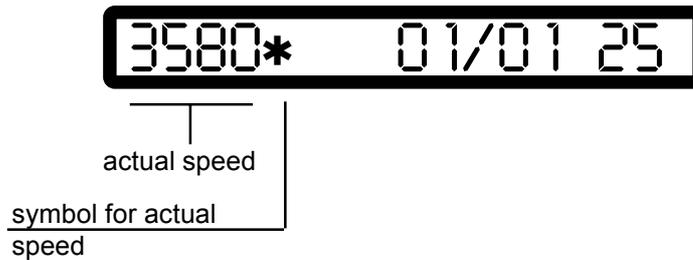
Display showing after start for machines class 1 ... 4, when <605> = II



Display showing after start for machines class 5 and 6, when <605> = II



Display showing after start, when <605> = 1



8.2.3 Sewing programs

- a) **Number of sewing programs:** 5
- b) **Number of seam sections per sewing program:** 5
- c) **Number of stitches per seam section:** max. 99
- d) **Adjustment of seam functions at the seam section:**
 - front backtack via key T6
 - end backtack via key T7
 - needle position at sewing stop via key T11
 - presser foot position at sewing stop via key T12
 - presser foot position after seam end via key T13
 - thread trimming via key T14
 - feed reverse via key T3 if T5 is off
 - Linking with the next seam section via key T1 if T5 is off
 - Sewing speed constant(automatic) or variable (treadle controlled) via key T2 if T5 is off
 - Seam section without stitchcount via key T4 if T5 is off
 - Light barrier control via key T15
- e) **Breaking of stitchcount**

Stitchcount of a seam section can be broken via treadle position "-2."-letter " M " appears on the display. Manual sewing (without stitchcount) is now possible. Set treadle again at "-2" to complete seam section and advance the next one.
- f) **Seam section without stitchcount**

Seam sections can be also be sewn without stitchcount (manual): switch on T4 when T5 is off (LED dark). "m" on display signals manual seam section. For seam sections without stitchcount, display must show stitchcount ³ 1. Set treadle at "-2" to complete seam section and advance the next one.
- g) **Seam section with light barrier control**

The rated stitchcounts stored for this seam section are light barrier compensation stitches.
- h) **Sewing speed**

The sewing speed can be individually set for each program via display before starting the sewing operation. The maximum sewing speed to be programmed is defined by parameter <221>.
- i) **Interlinking of sewing programs**

It is possible to run several consecutive sewing programs. When programming, the subsequent program is displayed by digits 6 and 7 and can be entered via key D+ and D-. 00 means that the current program will be performed exclusively; at its end return is made to its start.

8.3 Error Messages (Malfunction Diagnostics)

The control system of the drive cyclically tests its own functional condition and the functional condition of the complete drive system.

Malfunctions are signalled via the display of the external operator panel, for instance:



List of possible error codes:

1	Treadle not in zero position when mains power is turned ON
9	Start lock
10	Machine class, <799> was changed; remedy: turn mains power switch OFF and ON again
62	Short circuit on 24 V (32 V) DC
63	Overload on 24 V (32 V) DC, load current > 4 amps
64	Power supply monitor: voltage too low (90 V - 150 V)
65	Power electronics not operational after mains power ON, mains power < 130 V
66	Earth short (motor or motor supply line has earth short in one or more phases)
67	Internal malfunction
68	Power electronics shut-off
	a) Overcurrent, short circuit in motor or supply line
	b) Overvoltage, mains voltage too high (>300 V), motor overloaded while decelerating
	c) Undervoltage
70	Machine blocked, no increment from synchronizer at max. motor torque
71	Commutation transmitter plug not inserted
73	Motor overloaded
75	Internal malfunction
90	EEPROM does not exist
91	EEPROM not programmable
92	Start lock while motor running
93	Wrong EEPROM
100-117	} Internal malfunction

In case of error messages ≥ 62 , the motor will stop in undefined positions.

Control system reset possible only by mains power OFF/ON.

9. Programming by the user

Programming by the user is specific switching-on or adjustment of machine-functions and parameters.

User programming of the **MINI-STOP** is possible either via the integrated miniature control panel (**MPF**) or via the external operators panel (**OC-TOP**)

User programming of the **MINI-STOP** is possible via:

- **direct programming** and/or
- **programming parameters.**

The programming of parameters is possible via three levels of program:

- **Programming level A** (operator level)
- **Programming level B** (technician's level)
- **Programming level C** (special level)

9.1 User programming with operator panel OC-TOP

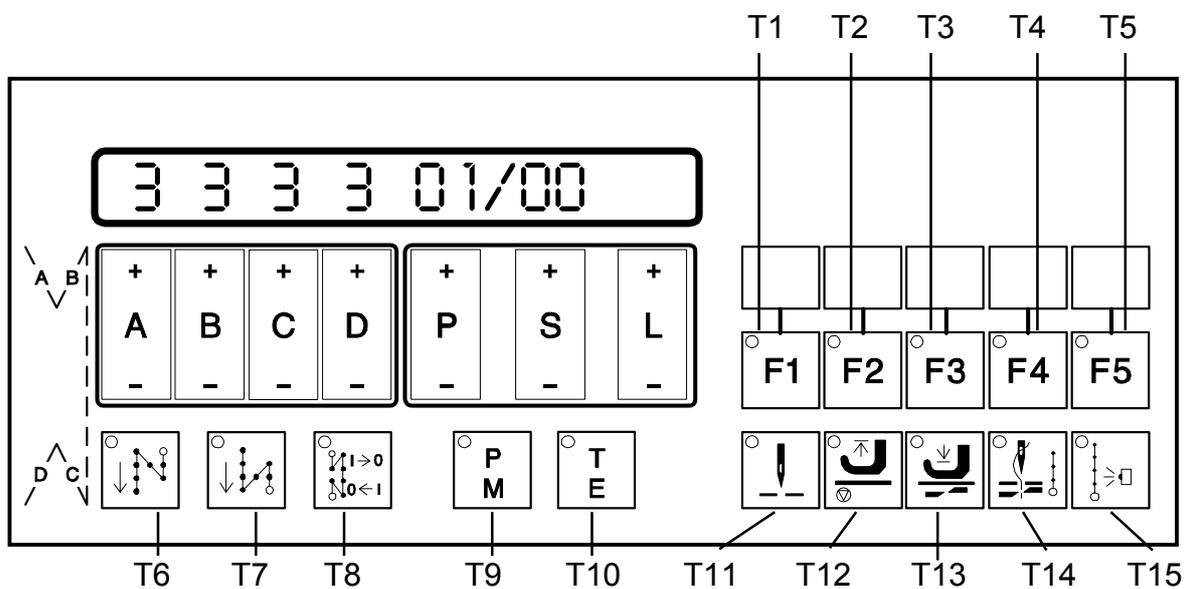


Fig. 9.1

9.1.1 Direct programming

Attention! All values modified within direct programming are stored only when
a) the drive system is started or
b) key T9 (P/M) are pressed.
If the drive system is switched off via the mains power switch immediately after any values were modified, the values set before modification will be retained!

Regardless of the programming levels, certain values can be programmed without calling up parameter numbers - i.e. directly.

The following values can be modified by direct programming:

Front backtack stitchcount forward
Front backtack stitchcount backward
End backtack stitchcount backward
End backtack stitchcount forward
Stitchcounts for seam sections
Speeds for seam sections
Functions for seam sections

a) Modification of backtack stitchcounts

Display shown when "manual sewing" is ON (T9 (P/M) and T10 (T/E) are dark)



A digital display with a black border showing the numbers 3 3 3 3 followed by 0x/00.

Display shown when "programmed sewing" is ON (T9 (P/M) is bright, T10 (T/E) is dark)



A digital display with a black border showing the numbers 4 4 3 3 followed by 0x/01 and 25.

The symbolic seam pictogram on the lefthand side of the operator panel shows the backtack sections

A: Front backtack forward
B: Front backtack backward
C: End backtack backward
D: End backtack forward

Immediately below the display, there are keys

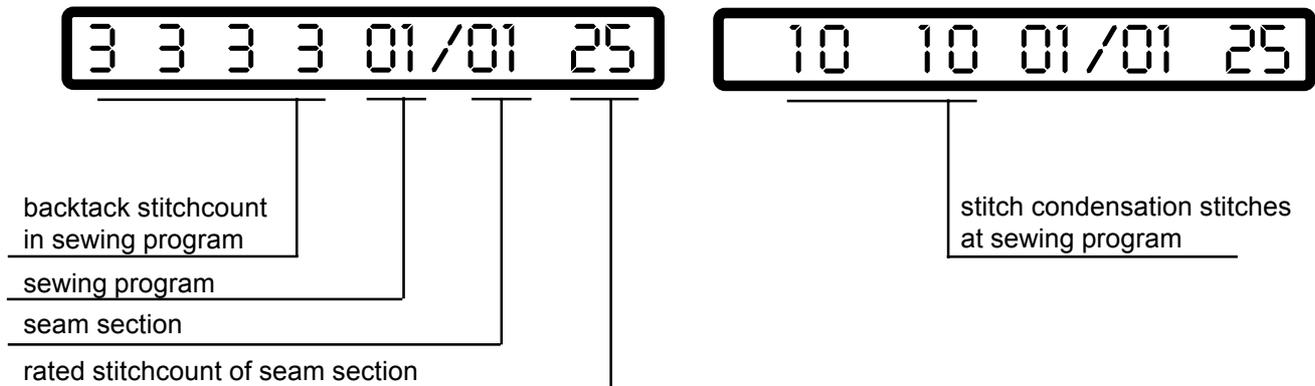
A+/A- for backtack section A,
B+/B- for backtack section B,
C+/C- for backtack section C,
D+/D- for backtack section D

These keys permit to increase or decrease the backtack stitchcounts.

b) Programming of the stitchcount for a seam section

Condition: Operation mode „programmed sewing“ is on, i.e. key T9 (P/M) is bright and key T10 (T/E) is dark, machine not sewing

Display showing



Activation of a sewing program is made via keys P+ or P-

Activation of a seam section is made via keys S+ or S-

Programming of the stitchcount for the seam section is made via key L+ (value increased) or L- (value decreased)

c) Programming of seam sections by „Teach-in“ (performing work)

Condition: Key T9 (P/M) is bright
Key T10 (T/E) is bright

The machine must have performed at least one stitch before.

Activate the desired program in the display via keys P+ or P- and the seam section to be programmed via keys S+ or S-.

Cycle:

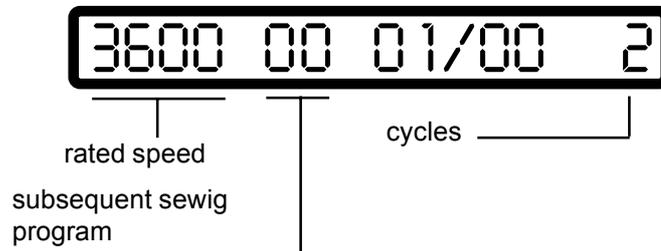
- Treadle forward
Reaction: the stitchcount which has been registered up to now will be eliminated
- Treadle returns to zero position
- Treadle forward
Reaction: machine sews, the sewed stitches will be added in, shown in the display and registered

Correction of the value shown in the display is possible via key L+ or L-.

d) Programming of cycles (number of sequences of program), of program speed and of the subsequent program

Condition: Operation mode „programmed sewing“ is on, i.e. key T9 (P/M) is bright and key T10 (T/E) is dark, machine not sewing

Display showing



Cycle programming is made via the keys L+ (number increased) or L- (number decreased)

Programming of the speed for the program is made via key A+ (value increased) or A- (value decreased)
This speed is limited by parameter <221>

Programming of the subsequent sewing program is made via keys D+ or D-.

e) Programming of functions

Functions for the seam sections are controlled via the functional keys

T6	Front backtack or start stitch condensation (with/without)
T7	End backtack or end stitch condensation (with/without)
T11	Needle position at sewing stop and at the end of a seam section (up/down)
T12	Presser foot position at sewing stop (up/down)
T13	Presser foot position at the end of a seam section (up/down)
T14	Thread trimming at the end of a seam section (with/without)
T15	Sewing with light barrier (with/without)
T1	Linking of seam section (with/without), if T5 is dark
T2	Speed control, if T5 is dark variable (treadle-controlled, T2 is dark) or constant (automatic, T2 is bright)
T3	Transport reverse or stitch condensation of a seam section, if T5 is dark
T4	Seam section manual or stitchcounted, if T5 is dark

9.1.2 Parameter programming

9.1.2.1 Programming level A (operator level)

This level is used for programming control parameters which immediately affect the operation sequence.

These are the parameters for the following functions:

- Front backtack (double or single)	<148>
- End backtack (double or single)	<149>
- Backtack (standard backtack or decorative backtack)	<523>
- Light barrier compensation stitches	<111>
- Light barrier fade-out	<112>
- Softstart	<116>

a) Activation of programming level A

Conditions

Mains power switch ON

Drive system not running

Operating mode: manual sewing must be ON (key T9 (P/M) dark)



A digital display with a black border showing the number '3' four times followed by '0x/00'.

Press key T10 (T/E)

Response:

Key T10 (T/E) becomes bright, the display shows in its righthand half the first parameter (parameter no. and parameter value) associated with programming level A.

Sewing is not possible



A digital display with a black border showing the number '3' four times, followed by '111' and '6'.

- Programming

The parameter number is set by using keys P+ or P- (hundreds of parameter no.) and keys S+ or S- (tens and units of parameter no.). The parameter value is programmed by using key L+ or L-

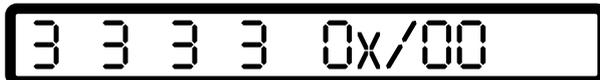
b) Deactivation of the programming level A

Press key T10 (T/E)

Response:

Key T10 (T/E) goes dark, the display returns to initial condition.

Sewing is possible.



A digital display with a black border showing the number '3' four times followed by '0x/00'.

9.1.2.2 Programming level B (technician level)

This level is used for programming the control parameters which have to be modified or adapted very rarely or only for starting operation of the system.

a) Preparation for activation of the programming level B

Turn mains power switch OFF

Press and hold keys T9 (P/M) and T10 (T/E) simultaneously

Turn mains power switch ON

Release keys

Response:

The display shows a „*“ between program and seam section.

Sewing is possible.



A digital display with a black border showing the number '3' four times followed by '0x*00'.

b) Activation of programming level B

Press key T9 (P/M) (not becoming bright) and press key T10 (T/E) (becoming bright)

Response:

In the righthand half of the display are shown: a parameter number (at first 104, then the number selected last) and the associated value.

Sewing is not possible.



Modification of parameter number:

for hundreds of parameter numbers use key P+ or P-

for tens and units of parameter numbers use key S+ or S-

Modification of parameter value: via key L+ or L-

c) Deactivation of programming level B

Press key T10 (T/E) (not becoming bright)

Response:

Parameters shown disappear from the display, the display returns to initial condition

Sewing is possible.



9.1.2.3 Programming level C (special level)

Attention!

At this level, control parameters are stored the values of which have to be modified in exceptional cases only. Correction of these parameters should therefore be made only after consultation of the manufacturer.

Activation of programming level C

- Activate programming level B (see 9.1.2.2)
- Call up parameter 798
- Set parameter value <798> to I
- Deactivate programming level B
- Turn mains power switch OFF, wait for >2 secs. to elapse
- Turn mains power switch back ON
- Press key T10 (T/E) (becoming bright)

Response:

In the righthand half of the display appears the first parameter of programming level C.

Calling up further parameter numbers and correcting the parameter values can be made in the same way as described for programming levels A and B.

Deactivation of programming level C:

- Press key T10 (T/E) (not becoming bright)
- Turn mains power switch OFF

9.1.3 Reset

a) Reset of parameter values

All parameter values having been modified from the ex-factory condition (standard value) are reset to their standard values by this procedure.

Exceptions: parameters 700, 799 and 800
For these parameters, the values programmed by the user are retained even after -Reset- has been performed.

- Reset- procedure:
- turn mains power switch OFF
 - press treadle fully forward and hold in that position
 - press and hold keys P- or P+, S- or S+ and L- or L+ simultaneously
 - turn mains power switch ON
 - release the three keys and the treadle

Response: Display showing



RESET Y - - N

Now -Reset- can be performed.

Located below the display Y (yes) there is key P+. Press this key P+ to start the reset. The display briefly shows:



MASTER-RESET

After that the display shows the power-on display for approx. 2 secs.



X4075 7Z-040-H

and then shows the display corresponding to the operating mode selected



3 3 3 3 0x/00

If it is not desired to start the -Reset-, press key L+ located below the display saying N (no).

b) Reset of parameter values and sewing programs

The reset procedure including the data of the sewing programs is analog to that described under a), until the following appears in the display:



In order to reset the data of the sewing programs to their original values, it is now required before pressing key P+ to press at first key T8 and hold until activation is acknowledged in the display.

9.2 User Programming via the Internal Mini Programming Panel (MPF)

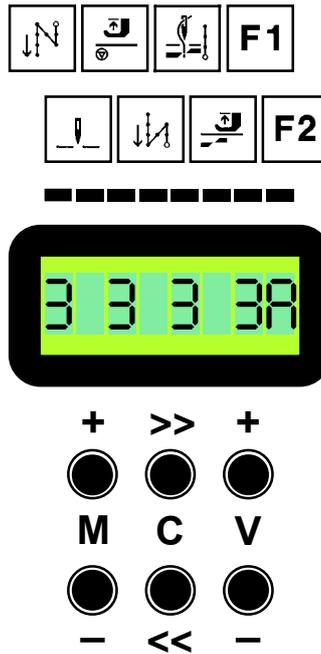


Fig. 9.2

The **MPF** comprises the following functional elements:

- the six programming keys: **M+** / **M-** / **C<<** / **C>>** / **V+** / **V-**
- the display: eight-digit LCD matrix

Each digit on the display is identified by a symbol for a sewing function.

The **MPF** is activated only when no external operating panel **OC-TOP** is connected to the control system.

When the drive system is turned on, message 01 is shown on the display for approx. 1 sec: type of control system (e.g. Q40MSII).

Indication 01:

Subsequently, Indication 02 is shown on the display: software status (e.g. 7Z_042_1).

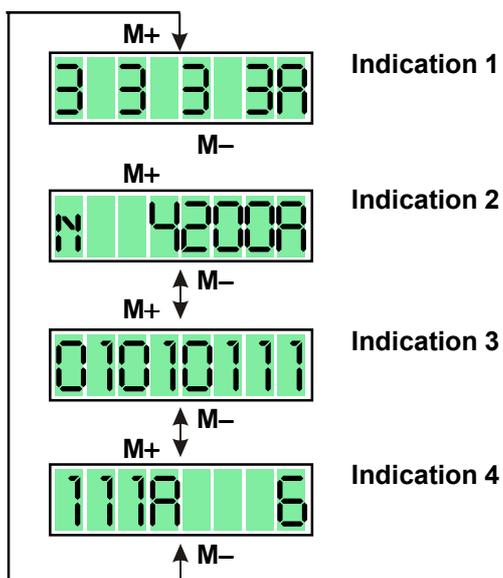
Indication 02:

After approx. 1 sec has elapsed, the display will show message 1 (backtack stitches)

The following different options can be selected on the display:

- Indication 1:** backtack stitches
- Indication 2:** speed
- Indication 3:** sewing functions
- Indication 4:** control parameters
- Indication 5:** hardware test (<797> = I, see chapter 10.5)
- Indication 6:** reset

Change-over from indication 1 to indication 4 is made by actuating keys M+ or M- and is possible only when the drive stopped.



Sewing:

Sewing can be performed under any of the options 1, 2, 3 and 4 if none of the digits is blinking.

Programming:

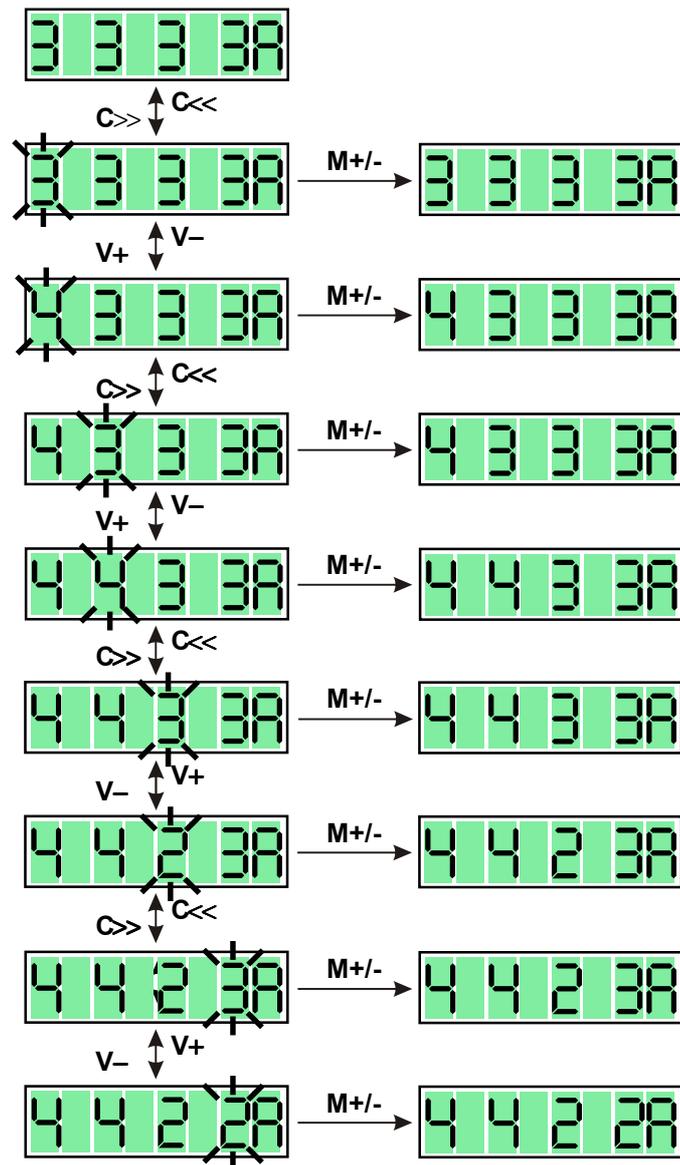


Programming is possible when one of the digits is blinking.

Release for programming and advance from digit to digit is made by actuating keys C>> / C<< and is possible only when the drive unit is at standstill.

9.2.1 Indication 1: Backtack Stitches

Backtack stitch programming

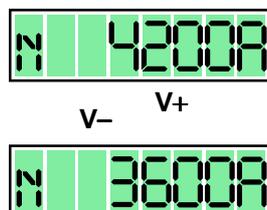


Programming Procedure

- Use keys C>> or C<< to make digits blink; sewing is not possible.
- Use keys V+ or V- to increase or decrease the number of blinking digits.
- Use keys M+ or M- to cause blinking to stop; sewing is possible again.

9.2.2 Indication 2: Speed

This option can be used for selecting the machine's operating speed (nominal speed) between maximum speed (<607>) and minimum speed (<606>), when parameter <676> = 1.



Adjustment of Nominal Speed

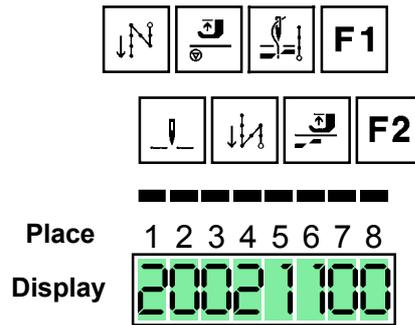
- Use keys V+ or V- to increase or decrease the figure shown in discrete steps.

Display of Actual Speed (<605> = 1)

During machine operation, the current operating speed (actual speed) of the machine is displayed. While actual speed is shown, „*“ appears in the 2nd digit of the display.

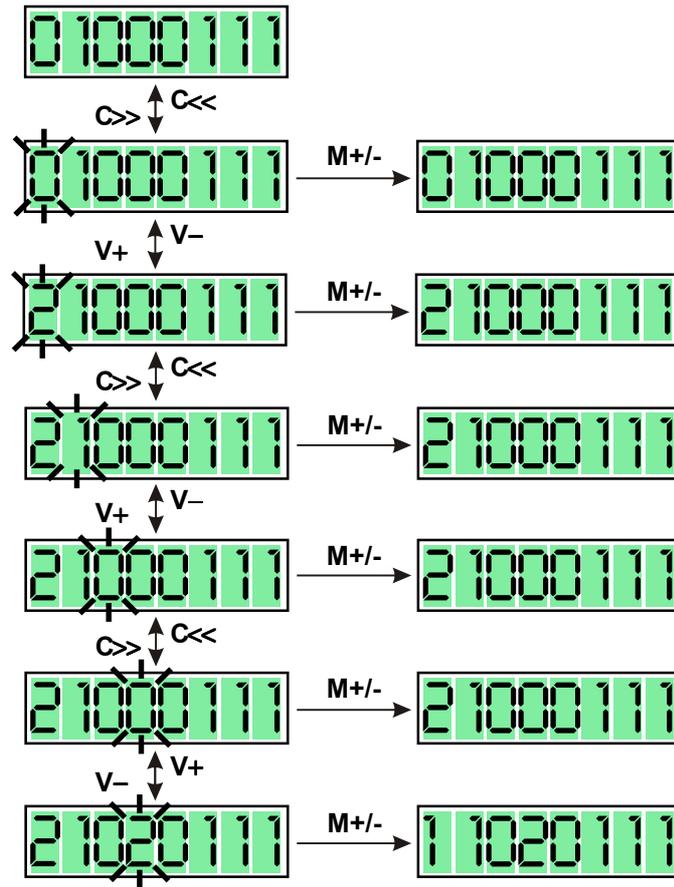


9.2.3 Indication 3: Sewing functions



Place	Symbol	Function	Display	Meaning
1		start backtick or start desification	0 1 2	without start backtick start backtick single start backtick double
2		needle position at seam stop	0 1	down up
3		presser foot at seam stop	0 1	down up
4		end backtick or end desification	0 1 2	without end backtick end backtick single end backtick double
5		thread trimming	0 1	without thread trimming with thread trimming
6		presser foot at seam stop	0 1	down up
7			0	without function
8			0	without function

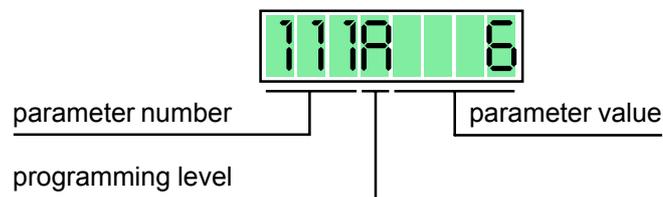
Programming of the Sewing Functions



Programming Procedure

- Use keys **C>>** or **C<<** to make digits blink; sewing is not possible.
- Use keys **V+** or **V-** to increase or decrease the number of blinking digits.
- Use keys **M+** or **M-** to cause blinking to stop; sewing is possible again.

9.2.4 Indication 4: Control Parameters



The meaning of the control parameters can be seen from Chapter 11.4 „List of Parameters“.

The control parameters are arranged on three different programming levels (A, B, C).

Programming Level A

Parameters on level A can be accessed when the drive unit is turned ON in the normal way.

Programming Level B

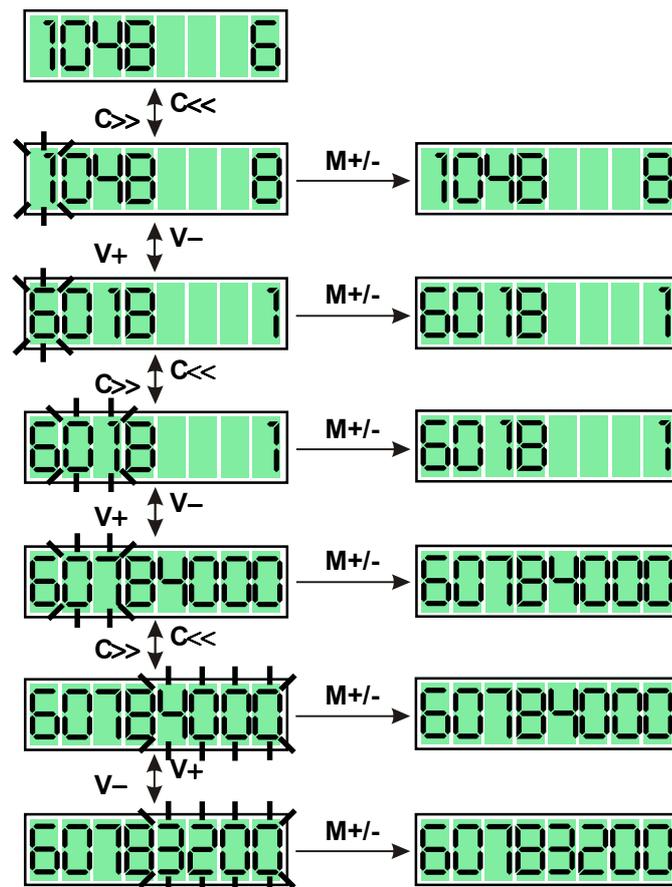
In order to access parameters on programming level B, proceed as described below when turning power on:

- Turn OFF power switch **S1**
- Press and hold key **M+** and **V+** simultaneously
- Turn ON power switch **S1**

⇒ Indication 1 shows „B“ in its extreme righthand (8th) digit.

Use keys **M+** or **M-** to advance to Indication 4.

Programming of Control Parameters



Programming Procedure

- Use keys **C>>** or **C<<** to make digits blink; sewing is not possible.
- Use keys **V+** or **V-** to increase or decrease the number of blinking digits.
- Use keys **M+** or **M-** to cause blinking to stop; sewing is possible again.

Programming Level C

In order to access parameters on programming level C, at first take preparatory action on programming level B by changing parameter (software switch) 798 to I (<798> = I). Then either change display by actuating keys **M+** or **M-** or call up a different parameter by actuating keys **C>>** or **C<<** and **V+** or **V-**. Now turn the power switch OFF and immediately ON again.

⇒ Indication 1 shows „C“ in its extreme righthand (8th) digit.

Use keys **M+** or **M-** to advance to Indication 4.
This activates programming level C.

Programming level C includes all parameters (including those on levels A and B).

9.2.5 Reset

Any parameters having been modified from their original (standard) condition can be restored to their standard condition by „reset“.

Exceptions:

Parameters 700, 799, 800 and some further parameters identified by „*“ in the list of parameters. For these parameters, the conditions programmed by the user will be maintained even after a „reset“ is performed.

Reset Procedure

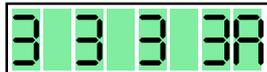
- Turn OFF power switch **S1**.
- Toe the treadle fully forward and hold in that position.
- Press and hold keys **M-** and **V-** simultaneously.
- Turn ON power switch **S1**.
- Stop pressing keys and stop toeing the treadle.

Response: Indication 6



To make „reset“, subsequently press key **M+**.
If it is intended not to make a „reset“, press key **M-**.

Subsequently, the display will show the indication 1.



10. Start of operation

If the MINI-STOP has been stored at a temperature of $<+5^{\circ}\text{C}>$, then a working temperature of between $+5^{\circ}\text{C}$ and $+40^{\circ}\text{C}$ must first be obtained.

The equipment must be dry.

Before work with the machine can be started, make sure to perform the following:

- a) Control the direction of rotation and the reference position of the needle bar
- b) Control the needle positions
- c) Control the maximum speed

10.1 Control of the direction of rotation and of the reference position from the needle bar (needle position NPO)

- a) Activate programming level B (technician level) (see section 9.1.2.2 „programming level B“)
- b) Set parameter 700
- c) Actuate treadle briefly forward:
Reaction: The machine performs a full revolution and then positions in a random position.
- d) Is the direction of rotation correct?
When yes, then proceed to adjust the reference position, proceed with e) below
If no, then activate parameter 800 and change the value $<800>$ ($\text{I} \rightarrow \text{II}$ or $\text{II} \rightarrow \text{I}$) than proceed as b)
- e) Turn the handwheel of the machine in the direction of rotation until the point of the needle coming from up to down touches the level of the throat plate (= reference position).
When doing this it is important that parameter $<701> = \text{I}$.
- f) Actuate the treadle briefly forward:
Reaction: The machine performs one revolution and positions in the same position that had been previously obtained by hand.
- g) As soon as new parameter numbers are activated, or the programming level B is negated, then the parameter value $<700>$ is memorized and the reference position adjustment is completed.

10.2 Control of the needle positions NP1/NP2/NP3/NP9

NP1 - needle down position ($<702>$)

NP2 - thread take up lever in the up position ($<703>$)

NP3 - needle up ($<710>$)

NP9 - thread tension release / thread catcher start ($<707>$)

- a) Activate programming level B (technician level) (see section 9.1.2.2 „programming level B“)
- b) Activate parameter 702
- c) Actuate the treadle briefly forward
Reaction: The machine performs a revolution and then positions at the programmed $<702>$.
- d) Is the needle position correct?
When yes, then proceed as with g) below.
When no, then the position must be changed by turning the hand wheel (when $<701> = \text{I}$) or via key L+ or L- (when $<701> = \text{II}$)
- e) Actuate the treadle briefly forward
Reaction: The machine performs a revolution and positions in the same position.
- f) The position can again be corrected.
When no further correction is needed, then proceed as with g) below.
- g) As soon as another parameter number is called up, e.g. example 703, the previously programmed value of $<702>$ is memorized.
- h) With parameter 703 and 710 correction is obtained as described above for parameter 702.
- i) Deactivate programming level B (see section 9.1.2.2 „programming level B“).

10.3 Control of the needle positions for thread trimming (Parameters 704, 705, 706)

NP4 - Start cutting signal 1 (<704>)

NP5 - End cutting signal 1 (<705>)

NP6 - Start cutting signal 2 (<706>)

- a) Activate programming level B (technician level) (see section 9.1.2.2 „programming level B“)
- b) Set parameter 704
- c) Actuate the treadle briefly forward
Reaction: The machine performs a revolution and positions at the indicated <704>.
- d) Is the position correct?
When yes, then proceed as g) below.
When no, then the position must be corrected by turning the hand wheel (when <701> = I) or via keys L+ or L- (when <701> = II).
- e) Activate the treadle forward.
Reaction: The machine performs a revolution and positions at the corrected program value <704>.
- f) The position can again be corrected.
If no further correction is needed, then proceed as g) below.
- g) Back heel the treadle.
Reaction: The machine rotates to NP2, <704> is memorized, programming (correction of position) is no longer possible.
- h) If the treadle is back heeled then the thread trim procedure will be activated and the machine performs one revolution.
- i) Should parameter <704> be changed again, then the sequence from c) above must be repeated. In any other event, call up parameter 705 and repeat the sequence from c) above.
- j) Deactivate program level B (see section 9.1.2.2 „programming level B“).

10.4 Control of the maximum speed

- a) Activate programming level B (see section 9.1.2.2 "programming level B")
- b) Set to parameter 607
- c) Check the parameter value <607> and make correction if necessary via keys L+ or L-
- d) Deactivate programming level B (see section 9.1.2.2 "programming level B")

10.5 Hardware Test

Hardware Test is a check routine permitting to use the operator panel **OC-TOP** or the mini programming panel **MPF** for testing various components of the drive system (control system) and of the machine installation.

Activation of the „hardware test“ = „HW-Test“ routine

- a) Activate programming level „B“ and call up parameter 797
- b) Set <797> to I
- c) Deactivate programming level „B“
- d) Turn off mains switch **S1**
- e) Wait for approx. 2 secs. to elapse, and turn on main switch S1 again.

Response: The display shows „HARDWARE TEST“ for approx. 2 secs.

indication **OC-TOP**:

A rectangular LCD display showing the text 'HARDWARE TEST' in a green, segmented font.

indication **MPF**:

A rectangular LCD display showing the text 'HW-TEST' in a green, segmented font.

After that, the display shows the first test block: Inputs.
All OC-TOP keys equipped with LEDs become bright

Survey of test blocks:

Test-Block	Check	indication OC-TOP	indication MPF
1	Inputs		
2	Outputs		
3	Speed control-unit		
4	Synchronizer		

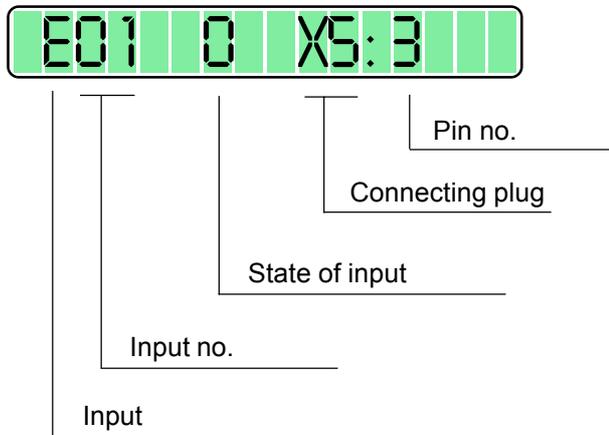
To call up the test blocks (advancing from test block to test block), use keys **A+** and **A-** on the **OC-TOP** or with the keys **M+** / **M-** on the **Mini Control Panel (MCP)** in front of the control box.

To call up various functional elements within a test block such as advancing from an Input to the next, use keys B+ and B- on the control panel **OC-TOP** or with the keys C>> / C<< on the **MCP**.

To activate functional elements selected, use key **D+** on the **OC-TOP** or the key **V+** on the **MCP**.

Test block 1: Inputs

Display:



The function assigned to the input displayed can be seen from chapter 12 „Connections Diagram for Connectors“.

The designations E (for input) are located on the lefthand side of the connectors shown.

The keys or selectors assigned to the inputs are designated S in the connections diagram and have the same numbers as the associated inputs, i.e.

key S1 is connected to input E1

key S2 is connected to input E2

key Sx is connected to input Ex.

The operating state of the input is signalled in the 7th digit of the display.

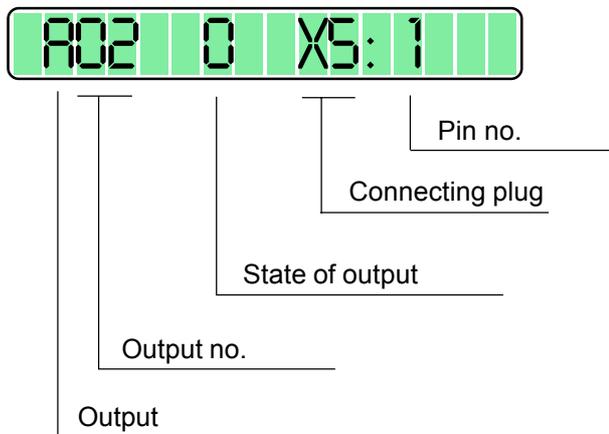
Key/switch open → display: 0

Key/switch closed → display: 1

In the righthand part of the display, the connecting plug and the pin number to which the displayed input is connected are shown for the purpose of reference.

Test block 2: Outputs

Display:



The function assigned to the output displayed can be seen from chapter 12 „Connections Diagram for Connectors“.

The designations A (for output) are located on the lefthand side of the connectors shown.
The solenoids/solenoid valves assigned to the outputs are designated Y in the connections diagram and have the same numbers as the associated outputs, i.e.
solenoid Y2 is connected to output A2
solenoid Y3 is connected to output A3
solenoid Yx is connected to output Ax

The operating state of the output displayed is signalled in the 7th digit of the display.
Output not activated → display: 0
Output activated → display: 1

To activate an output, use key D+. Deactivation is made automatically after approx. 2.5 secs have elapsed or can be caused by using key D-.

In the righthand part of the display, the connecting plug and the pin number to which the displayed output is connected are shown for the purpose of reference.

Test block 3: Speed control unit (SWG)

Display:



The treadle can be actuated to operate consecutively all 16 steps of the speed control unit.

The following is displayed in digits 6, 7 and 8

-2 / -1 / 0 / +1 / 10 / 20 / ... / 120, when the speed control unit is in proper condition.

Test block 4: Synchronizer (IWG)

Display:



This test block permits to check the synchronizer (increment encoder). For this purpose, the shaft of the motor is rotated manually.

The increments (pulses) of the synchronizer are counted and shown in display digits 7, 8 and 9. This display runs from 0 through 127 when the synchronizer is in proper condition.