

MINI-STOP

QE3760

CE

Type

DA47MS

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

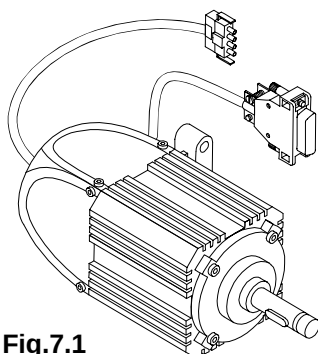


Fig.7.1

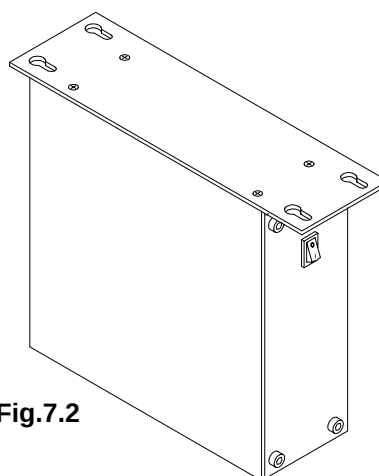


Fig.7.2

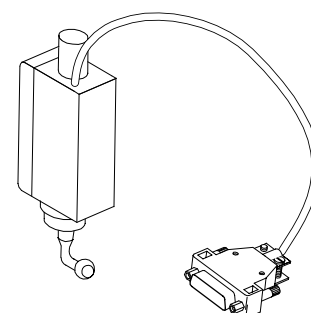


Fig.7.3

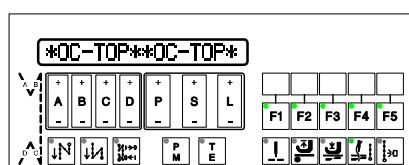


Fig.7.4

Motor QE3760 (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 QE3760

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:

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

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7.2 Control system

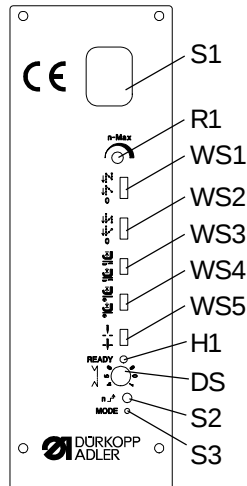


Fig. 7.5

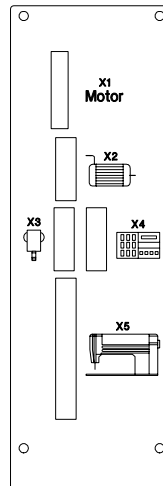


Fig 7.6

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	
5 selector switches	WS1	for front backtack (none, single, double)
	WS2	for end backtack (none, single, double)
	WS3	for presser foot position after seam end (down, up)
	WS4	for presser foot position at sewing stop (down, up)
	WS5	for needle position at sewing stop (down, up)
1 rotary switch	DS	for programming bartack stitching, needle positions and maximum speed
2 buttons	S2	(n ↺) for setting the rotational speed
	S3	(MODE) for programming the needle position and maximum speed
1 LED	H1	(READY) for indicating readiness for operation

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
X4	nine-pole D-sub plug for connecting the control panel OC-TOP
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.

Inputs (Ex)	E1:	Feed reverse (manual backtack)
	E2:	Needle position change-over if <616> = I ¹⁾
		Needle up without trimming if <616> = II
	E3:	Single stitch
	E4:	Presser foot
	E14:	Synchronisation signal

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)	A2:	Thread trimmer magn.
	A3:	Thread wiper
	A4:	Presser foot lift
	A5:	Feed reverse
	A8:	Thread tension release

7.3 Speed control unit SWG2

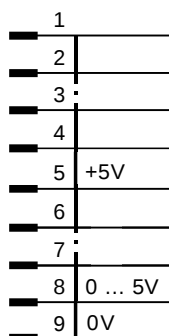
The SWG2 is attached to the underside of the machine table with the enclosed brackets and connected mechanically to the machine's pedal by means of the enclosed rod assembly.

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 mechanoelectronic 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).

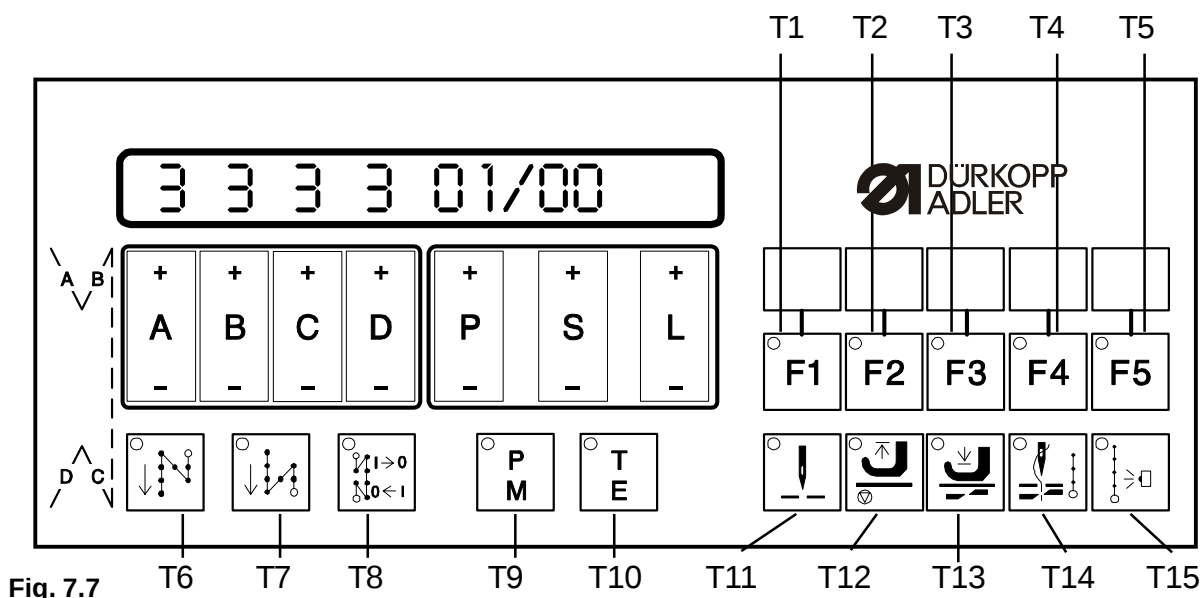
Level	Position	Voltage [V]	Meaning
0	-2	0,00 - 0,50	Seam end, thread trimming
1	-1	0,50 - 0,94	Presserfoot up
2	0	0,94 - 1,76	Treadle position 0
3	+1	1,76 - 2,21	Presserfoot down
4	+1 D	2,21 - 2,43	Speed n1
5	+2 D	2,43 - 2,66	Speed n2
6	+3 D	2,66 - 2,90	Speed n3
7	+4 D	2,90 - 3,13	Speed n4
8	+5 D	3,13 - 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



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7.4 External operator panel OC-TOP



The operator panel **OC-TOP/APM** (Fig. 7.7) 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-
- **2 keys (T9,T10)** for operating mode selection
- **13 keys (T1...T8, T11...T15)** for machine functions
- **outlet for two light barriers** on the rear of the OC-TOP
- **5 keys (T1 ... T5)** with their functional signification being specified by the control program (control software)

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

(key T9 is dark, key T10 is dark)

- **A+/A-** adjustment of stitchcount for start back tack forward (section A)
- **B+/B-** adjustment of stitchcount for start back tack backward (section B)
- **C+/C-** adjustment of stitchcount for end back tack backward (section C)
- **D+/D-** adjustment of stitchcount for end back tack forward (section D)

Function of the programming keys in the 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 for front backtack forward (section A)
- **B+/B-** adjustment of stitchcount for front backtack backward (section B)
- **C+/C-** adjustment of stitchcount for end backtack backward (section C)
- **D+/D-** adjustment of stitchcount for end backtack forward (section D)
- **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 program repeat

Function of the programming keys in the operating mode "programming parameters"

(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 the selection of the operating mode

- **T9** dark, **T10** dark: manual sewing
- **T9** bright, **T10** dark: programmed sewing
- **T9** dark, **T10** bright: programming parameters
- **T9** bright, **T10** bright: teach in

Function of the keys (**T9** ... **T8**, **T11** ... **T15**) for machine functions

- **T5** function change-over for keys **T1** ... **T4** (shift key)
- **T1** linking of seam sections at programmed sewing
- **T2** speed control at programmed sewing
variable (treadle-controlled), if **T2** dark or
constant (automatic), if **T2** bright
- **T3** feed reverse for a seam section at programmed sewing
- **T5+T3** single stitch
- **T4** seam section manual or stitch counted at programmed sewing
- **T5+T4** piece count in display
- **T6** front 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)

7.5 Drive System Application

The drive system Type P47MS is a special drive for Pfaff machines classes 470/490. Deviated from the most applications of the MINI-STOP motors, drive of the machine with gear ratio 1:1, is here the gear ratio 3:1.

A signal for synchronisation from the machine is necessary.

As position control unit (synchronizer) get used the type PD3 (Art.Nr. 62.055).

8. Application

This MINI-STOP drive can be used either with or without an external operator's control panel **OC-TOP**.

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.

Readiness for operation

The green „READY“ LED (H1) is located at the front of the control unit.

When this is continuously lit, the drive is ready for operation.

A flashing LED means that there is a malfunction (error) in the drive.

The malfunction is to be found under error messages 62 (see Sect. 8.4)

When the drive is switched off at the mains, the LED likewise starts to blink.

The LED goes off when the control unit is no longer live.

Maximum speed

The maximum speed can be adjusted:

either with control panel OC-TOP by means of parameter <607>

or without control panel by means of button S2 at the front of the control unit.

The maximum speed can be reduced by means of potentiometer „n-max“ (R1) at the front of the control unit.

8.1 Sewing without an external operator's control panel

When working without an external operator's control panel the switches **WS1** to **WS5** and **DS** are used.

The following functions can be called up via these switches:

WS1: Initial backtack: without / single / double

WS2: End backtack: without / single / double.

WS3: Presser foot position (up/down) after seam end

WS4: Presser foot position (up/down) when stopping before seam end

WS5: Needle position (up/down) when stopping before seam end

DS: number of stitches for front backtack and end backtack

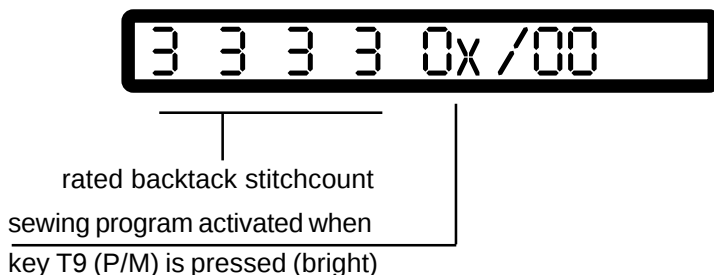
8.2 Sewing with External Operator's Control Panel OC-TOP

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

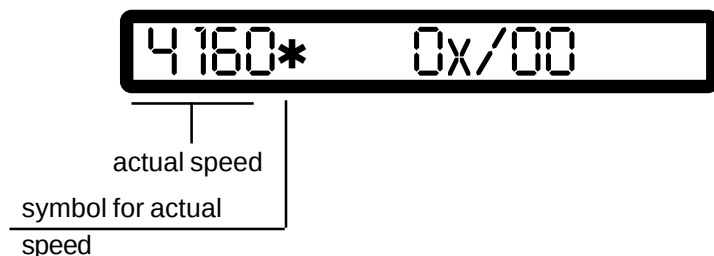


Setting of rated backtack stitchcount is possible only with the machine at standstill

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

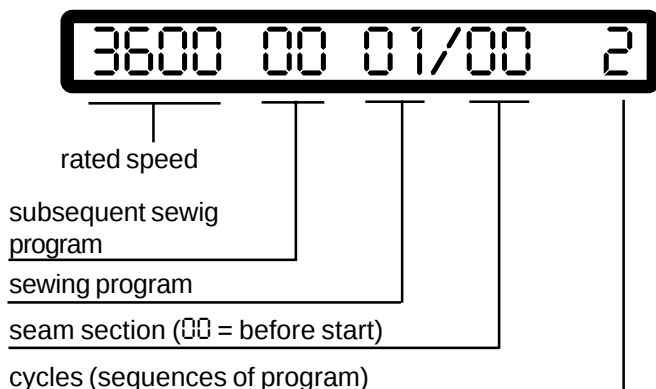
- before start, when <605> = I



8.2.2 Sewing with Sewing Program

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

Display showing before start

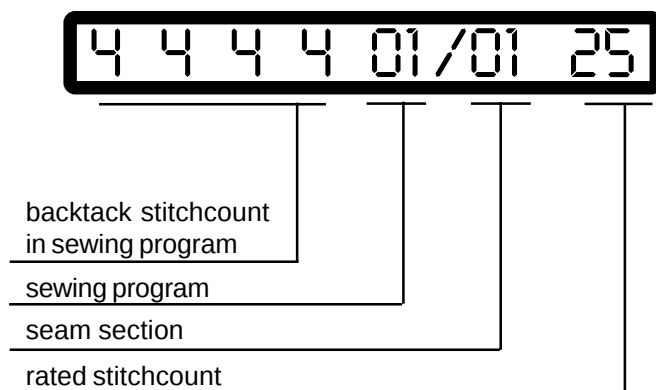


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When this is displayed, the following can be modified:

- 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>

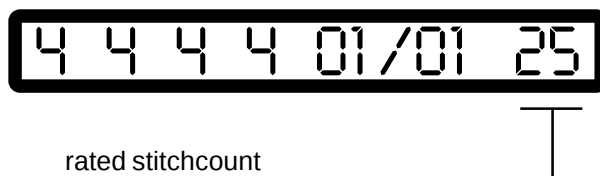
Display before start, if a seam section has been activated



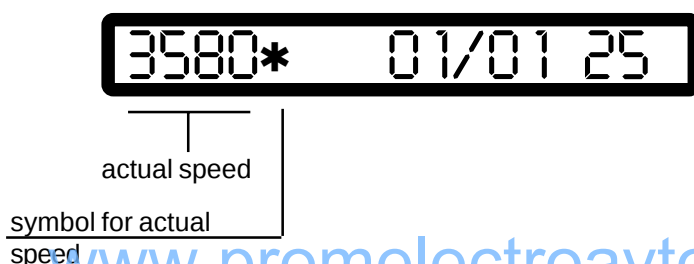
When this is displayed, the following can be modified:

- 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 after start



Display showing after start, when <605> = I



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 "ñ" 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 ≥ 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-.
□□ means that the current program will be performed exclusively; at its end return is made to its start.
- j) The programs can be used as backtack/darn programs
Change-over is made via parameter <313>

8.2.4 Backtack / Darning Programs

- The sewing programs are turned into backtack/darning programs when parameter <313> = I.
- In each program, only seam sections 1 and 2 become active, section 1 being sewn forward and section 2 backward.
- The cycle counter (shown on the righthand side of the display above keys L+/L- before sewing start) determines the number of backtacks (single, double, 3 times, 4 times).
- The **darning program** is a special backtack program.
In this case, reset the cycle counter to "0".
- Seam end is initiated in the darning program by treadle position "-2".
- Five backtack/darning programs are available.
- Each program has one of the five function keys T1 ... T5 assigned to it.
- The activated program is indicated on the display above keys P+/P- and/or by the assigned key T1 ... T5 being luminous.
- On the lefthand side of the display, the preset maximum speed possible in the program is shown before sewing start. This speed can be varied via the keys A+/A- and can be limited via parameter <221>.
- The backtack/darning programs can be operated either at variable (treadle-controlled) or constant speed (not controlled by the treadle).
- Sewing at constant speed:
With <313> = II, switch on key T2 (luminous) during the seam sections, subsequently set <313> = I; this means backtack/darning program activated.
- Stitch compensation is activated via parameter 304. Its value (<304>) determines delayed deactivation (ms) of the feed reverse after seam section 2.

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-	Internal malfunction
117	

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**
- **Programming parameters**

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

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

9.1 User programming with operator panel OC-TOP

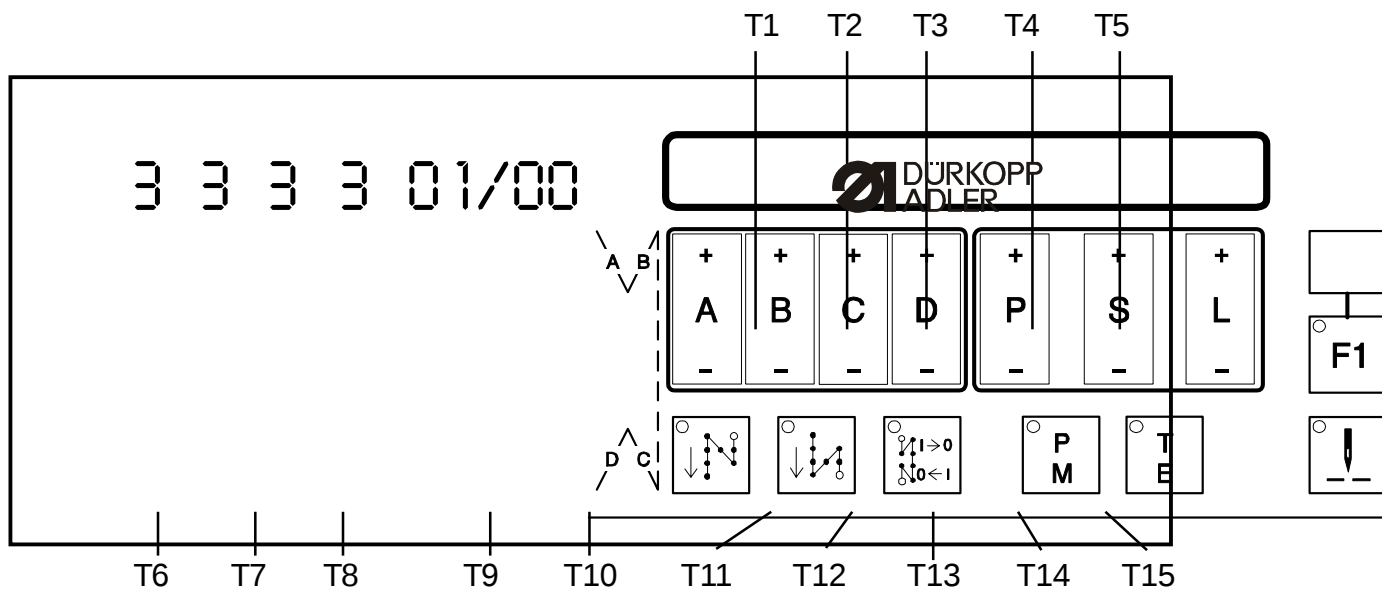


Fig. 9.1

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 stitchcountbackward
End backtack stitchcountforward
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) not luminous)

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

Display shown when "programmed sewing" is ON (T9 (P/M) luminous, T10 (T/E) not luminous)

A rectangular digital display with a black border. It shows the number '4' twice, '3' twice, 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

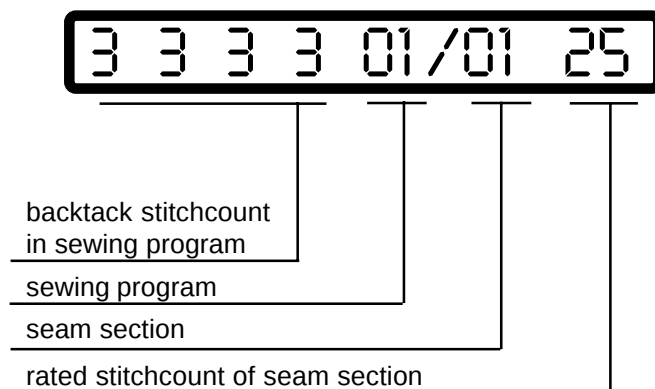
A+/A- for backtack section A,
B+/B- for backtack section B,
C+/C- for backtack section C,
D+/D- for backtack section D

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:



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:

a) Treadle forward

Reaction: the stitchcount which has been registered up to now will be eliminated

b) Treadle returns to zero position

c) Treadle forward

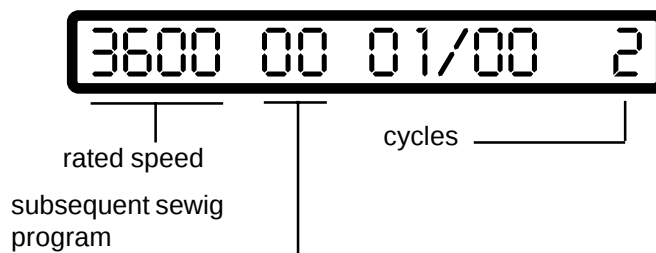
Reaction: machine sews, the sewed stitches will be added in, shown in the display and registered

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:



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 (with/without)
T7	End backtack (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 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)



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



- 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.

3 3 3 3 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.

3 3 3 3 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.

3 3 3 3 104 8

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

- a) Activate programming level B (see 9.1.2.2)
- b) Call up parameter 798
- c) Set parameter value <798> to I
- d) Deactivate programming level B
- e) Turn mains power switch OFF, wait for >2 secs. to elapse
- f) Turn mains power switch back ON
- g) 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

The LCD display shows the text 'RESET Y - - N' in a monospaced font. The characters are arranged in a single line: 'R', 'E', 'S', 'E', 'T', a space, 'Y', a space, two dashes, and a space, '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:

The LCD display shows the text 'MASTER-RESET' in a monospaced font. The characters are arranged in a single line: 'M', 'A', 'S', 'T', 'E', 'R', '-', 'R', 'E', 'S', 'E', 'T'.

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

The LCD display shows the text 'DA47MS 72.141.0' in a monospaced font. The characters are arranged in a single line: 'D', 'A', '4', '7', 'M', 'S', a space, '7', '2', '.', '1', '4', '1', '.', '0'.

and then shows the display corresponding to the operating mode selected

The LCD display shows the text '3 3 3 3 0x/00' in a monospaced font. The characters are arranged in a single line: '3', '3', '3', '3', a space, '0', 'x', '/', '0', '0'.

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:

The LCD display shows the text 'RESET Y - - N' in a monospaced font. The characters are arranged in a single line: 'R', 'E', 'S', 'E', 'T', a space, 'Y', a space, two dashes, and a space, 'N'.

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 without the OC-TOP control panel

User-programming without the OC-TOP is carried out using the following operating elements on the front control panel:

- rotary switch DS
- button S2 and
- button S3 (MODE)

9.2.1 Conditions for programming

- The drive must be switched on, i.e. LED H1 („READY“) is on
- After switching on, the motor must have rotated at least once
- The motor must not be running
- The OC-TOP control panel must not be connected
- Set rotary switch DS to desired position

Position of DS rotary switch	Meaning / function
1	Direction of rotation (<800>)
2	NP1: needle down (<702>)
3	NP2: take-up lever up (<703>)
4	NP3: Needle up (<710>)
5	NP5: end cutting signal 1 (magn.<705>)
6	NP6: start cutting signal 2 (pneum.<706>)
7	NP9: Start loosen thread tension / start thread catch (<707>)
8	NP0: Reference position of needle (<700>)
9	Maximum speed (<607>)

9.2.2 Switching on the programming mode

Press button S3 (MODE) for at least one second
Result: the LED H1 („READY“) is blinking, drive is not ready for operation.

Direction of rotation

The procedure for reversing the direction of rotation is described in section 10.2.1

Needle positions NP0/NP1/NP2/NP3/NP5/NP6/NP9

The procedure for setting the needle position is described in sections 10.2.2, 10.2.3 and 10.2.4

Maximum speed

The procedure for checking and correcting the maximum speed (rotational speed) is described in section 10.2.5

9.2.3 Concluding the programming procedure

Press button S3 (MODE) for at least one second
Result: the LED H1 („READY“) lights constantly; drive is ready for operation.

9.2.4 Reset

All parameter values which have been altered can be returned to their original value as set in our factory. To obtain this, proceed as follows:

- Switch drive off
- Push pedal forward to end position and hold in that position
- Press button S3 („MODE“) and hold down
- Switch drive on
- RESET is performed; when LED H1 („READY“) flashes, RESET is completed
- release button
- return treadle to the neutral position

Result: all parameters are reset except for <700>, <799> and <800> which remain unaltered

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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 Start of the operation with the operator's control panel OC-TOP

10.1.1 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 $<800>$ ($I \rightarrow II$ or $II \rightarrow I$) then 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 $<701> = I$.
- 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.

10.1.2 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 $<701> = I$) or via key L+ or L- (when $<701> = II$)
- 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“).

10.1.3 Control of the needle position NP5 for thread trimming (Parameter 705)

NP5 - End cutting signal 1 (<705>)

- a) Activate programming level B (technician level) (see section 9.1.2.2 „programming level B“)
- b) Set parameter 705
- c) Actuate the treadle briefly forward
Reaction: The machine performs a revolution and positions at the indicated <705>.
- 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 <705>.
- 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, <705> 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 <705> be changed again, then the sequence from c) above must be repeated.
- j) Deactivate program level B (see section 9.1.2.2 „programming level B“).

10.1.4 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")

10.2 Starting without Operator Panel OC-TOP

Procedure:

- Turn master switch S1 on - LED H1 („READY“) is lit
- OC-TOP is not plugged in
- Push pedal forward so that the motor performs at least one rotation
- Set rotary switch DS to desired position
- Turn programming mode on: Press button S3 („MODE“) with suitable tool (e.g. tip of ball-point pen) for more than 1 second

Reaction: LED H1 („READY“) flashes, programming mode is switched on

The function assigned to the selected switch setting can now be checked and corrected, if necessary.

- Switch programming mode off: Press button S3 („MODE“) for more than 1 second

Reaction: LED H1 („READY“) is continuously lit.

Setting of rotary switch Meaning / Function

- | | |
|---|---|
| 1 | Direction of rotation (<800>) |
| 2 | NP1: Needle down (<702>) |
| 3 | NP2: Thread lever up (<703>) |
| 4 | NP3: Needle up (<710>) |
| 5 | NP5: End cutting signal 1 (<705>) |
| 6 | NP6: without function |
| 7 | NP9: Start loosen thread tension / start thread catch (<707>) |
| 8 | NP0: Reference position of needle (<700>) |
| 9 | Maximum speed (<607>) |

10.2.1 Control of Direction of Rotation

- Set rotary switch DS at position 1, switch programming mode on:
LED H1 („READY“) flashes
- Slightly touch pedal forward
Reaction: machine starts and positions itself in undetermined position
- Is direction of rotation correct?
If yes, continue with d)
If no, press button S2.
Result: direction of rotation has changed, continue with b).
- Switch programming mode off: LED H1 („READY“) is continuously lit.

10.2.2 Control of Reference Position (Needle Position NP0)

- Set rotary switch DS at position 8, switch programming mode on:
LED H1 („READY“) flashes
- Slightly touch pedal forward
Reaction: machine starts and positions itself
- Is needle position correct?
If yes, continue with f)
If no, the position has to be corrected by turning the handwheel
- Slightly touch pedal forward
Reaction: machine makes one rotation and positions itself at the corrected setting
- The position can repeatedly be corrected
- When no further correction is required, the position has to be stored:
Switch programming mode off: LED H1 („READY“) is continuously lit
The reference position is stored, drive is ready for operation.

10.2.3 Control of Needle Positions NP1/NP2/NP3/NP9

- a) Set rotary switch DS to the setting assigned to the needle position you wish to check.
Switch programming mode on: LED H1 („READY“) flashes.
- b) Slightly touch pedal forward
Reaction: machine starts and positions itself
- c) Is needle position correct?
If yes, continue with f)
If no, the position has to be corrected by turning the handwheel
- d) Slightly touch pedal forward
Reaction: machine makes one rotation and positions itself at the corrected setting
- e) The position can repeatedly be corrected
- f) When no further correction is required, the position has to be stored:
Switch programming mode off: LED H1 („READY“) is continuously lit
The reference position is stored, drive is ready for operation.

10.2.4 Control of the Needle Position NP5 for thread trimming

- a) Set rotary switch DS to position 5,
Switch programming mode on: LED H1 („READY“) flashes.
- b) Slightly touch pedal forward
Reaction: machine starts and positions itself
- c) Is needle position correct?
If yes, continue with f)
If no, the position has to be corrected by turning the handwheel
- d) Slightly touch pedal forward
Reaction: machine makes one rotation and positions itself at the corrected setting
- e) The position can repeatedly be corrected
When no further correction is required, continue with f).
- f) Push reverse pedal
Reaction: machine moves in NP2, correction of position is no longer possible
- g) Push reverse pedal
Reaction: machine makes one rotation, the thread cutting mechanism is activated.
Procedure can be repeated several times
- h) Is another position correction required?
If yes, continue with b)
If no: switch programming mode off: LED H1 („READY“) is continuously lit
The selected position is stored, drive is ready for operation.

10.2.5 Control of the Maximum speed

- a) Set rotary switch DS at position 9, switch programming mode on:
LED H1 („READY“) flashes
- b) Push pedal forward to end position and hold in that position
Reaction: the rate of rotation is set to 500 rpm
- c) Briefly press button S2.
Each time you press S2, the speed increases by 100 rpm. Press button S2 until the desired speed is reached.
- d) Do not operate pedal any more. When the pedal is in the zero position, the last rate of rotation that was set will be stored
- e) Switch programming mode off: LED H1 („READY“) is continuously lit, the drive is ready for operation.

10.3 Hardware Test

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

Hardware testing is made via test blocks. These are called up consecutively via key A+ or A-.

Activation of the „hardware test“ routine

- a) Activate programming level „B“ and call up parameter 797
- b) Set <797> to I
- c) Deactivate programming level „B“
- d) Turn mains power switch OFF
- e) Wait for approx. 2 secs. to elapse, and turn mains power switch back ON

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

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	Display
1	Inputs	E 01 0 X 5 : 3
2	Outputs	A 02 0 X 5 : 1
3	Speed control unit	S W G 0
4	Synchronizer	I W G 0 0 0 0
5	Potentiometer	R 1 x x x %
6	Selectors	W 5 1 - 5 0 0 0 0 0
7	Miniature Programming Field	M P F H 1 0
8	Lightbarrier	L S 1 0 L S 2 0

To call up the test blocks (advancing from test block to test block), use keys A+ and A-.

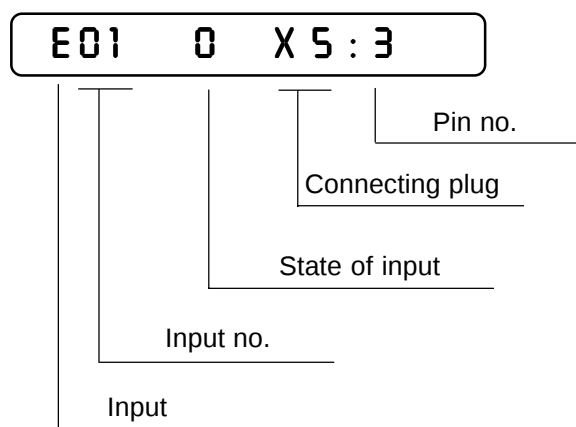
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To call up various functional elements within a test block (advancing from functional element to functional element), use keys B+ and B-.

To activate functional elements selected, use key D+

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.

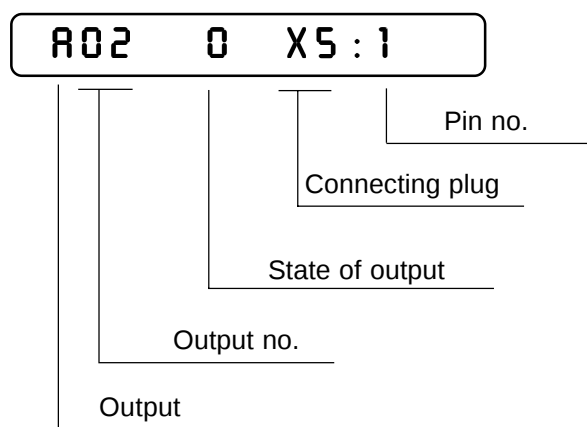
Key/switch open → display: 0

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:

SWG 0

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:

IWG 000

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.

Test block 5: Potentiometer R1

Display

R1 xxx%

This test block permits to check potentiometer R1 on the control box.

The display is in a proportion (%) of total resistance.

Turning the potentiometer axle causes the display to vary from 0 through 100.

Test block 6: Selectors

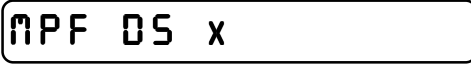
Display

WS1-5 00000

This test block permits to check the 5 selectors (WS1 ... WS5) on the control box.
 The operating state is shown in digits 8 to 12 of the display. Each switch has a display digit assigned to it.
 The operating state is signalled by 0 and 1 for WS1, WS2 and WS3 and by 0, 1 and 2 for WS4 and WS5.

Test block 7: Miniature Programming Field (MPF)

Display:

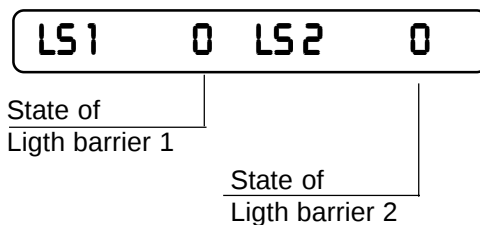
- a) 
- b) 
- c) 
- d) 
- e) 

This test block permits to check the components of the miniature programming field (MPF). To advance from display to display (a) → b) → c) ...) use key B+ or B-.

- a) LED H1 ("READY")
Switch on with button D+, H1 lights up, 8th digit in the display shows 1
- b) Key S2
The position of the button is shown in the 8th digit in the display
- c) Key S3 (MODE)
The position of the button is shown in the 8th digit in the display
- d) Rotary switch DS
Positions (0 ... 9) of rotary switch DS are shown in the 8th digit in the display
- e) External synchronizing marker ESM
If working with an external synchronizer, its function can be checked.

Test block 8: Ligth barrier

Display:



State of display 0: Ligth barrier is clear
 1: Ligth barrier is dark

To deactivate the test routine, turn the mains power switch OFF.