Service Manual

FLE120 – FLE220

471 1553-11

Electrolux

Wascator

NOTICE TO SERVICE PERSONNEL

INSTALLATION

Improper installation of Wascomat laundry and wet cleaning equipment can result in personal injury and severe damage to the machine.

REFER INSTALLATION TO QUALIFIED PERSONNEL!

RISK OF ELECTRIC SHOCK

The equipment utilizes high Voltages. Disconnect electric power before servicing.
The use of proper service tools and techniques, and the use of proper repair procedures, is essential to the safety of service personnel and equipment users.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL!

RISK OF PERSONAL INJURY

This equipment contains moving parts, and some components that may have sharp edges. Improper or careless service procedures may result in serious injury to service personnel.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL!

ABOUT THIS MANUAL

This manual is intended to provide service guidance to qualified service personnel. Wascomat and its authorized dealers make no determination regarding the qualification of individuals requesting this service manual. The service provider assumes all risks inherent to the servicing of this equipment and any risks that arise as result of the lack of knowledge or ability of any person servicing this equipment.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL!

NOTE:

Improper installation or servicing of Wascomat equipment will void the manufacturer's warranty!

1. Machine description

The machines referred to in this book have drum volumes of 120 and 220 litres and are high speed spin washing machines with flexible programmes. They are intended for installation in hotels, laundries, industry, hospitals, small institutions etc.

The machines differ in size and capacity.

The machines are free-swinging, ie, the drum is moveable and spring suspended in relation to the frame. This minimises vibrations transferred to the frame thus simplifying installation, as no concrete base is required.

The drum rotates at distribution speed thus distributing the washing before the spin. This also reduces vibration caused by imbalande.

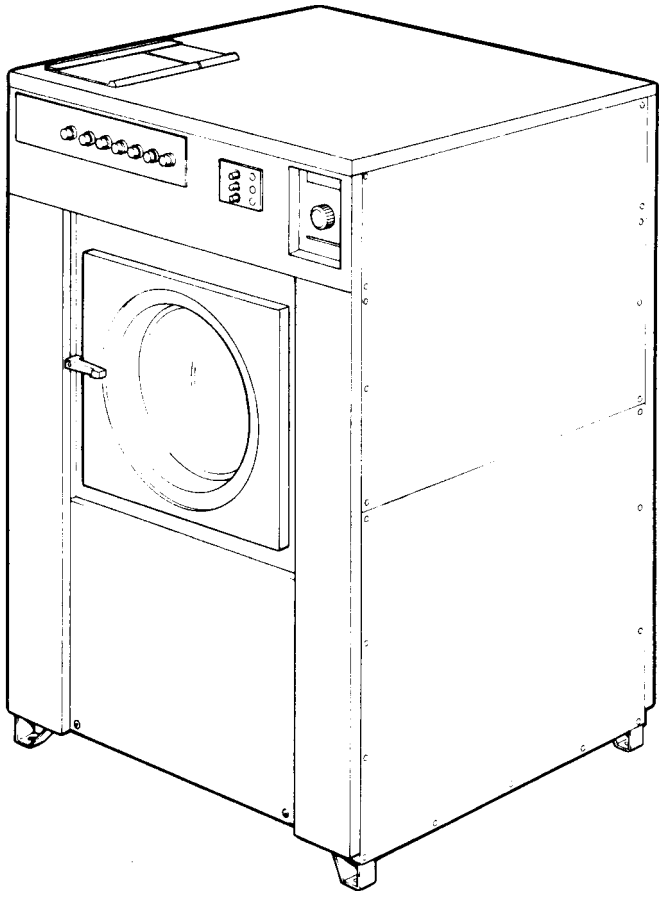
The distribution speed and the drain provide effective water removal.

The high speed spin gives a G factor of approximately 300, providing very efficient water removal during the spin.

The washing programs are programmed by means of programmable cards.

The machines are supplied in accordance with the customer's specifications, i.e. for heating by electricity, steam, gas or without heating. Standard conversion kits are available to convert electrical heating to steam heating.

The machines are also available in different water connection options with cold, hot and cold hard water.



Safety provisions

- The machine is designed for water washing only.
- The machine must not be used by children.
- Installation and servicing must be carried out by qualified personnel.
- The machine door safety locking device should be in working order and must not be by-passed under any circumstances.
- All leakage in the system, such as a worn door seal, must be rectified immediately.
- The personnel concerned must study the relevant manuals before undertaking repairs or service.
- The exterior of the machine must not be sprayed with water.

FLE/FLE MP

		120 l		220 l	
Dry weight capacity					
for filling factor 1:13		9.0	kg	17	kg
for filling factor 1:10		12	kg	22	kg
Drum volume		120	l	220	l
diameter		620	mm	750	mm
depth		412	mm	500	mm
Drum speed	wash	48	r/m	44	r/m
	distribution	78	r/m	70	r/m
	extraction, low	475	r/m	425	r/m
	extraction, high	950	r/m	850	r/m
G-faktor	wash	0,8		0,8	
	distribution	2,1		2,0	
	extraction, low	75		75	
	extraction, high	310		300	
Dimensions	width	870	mm	1000	mm
	depth	900	mm	1080	mm
	height	1330	mm	1460	mm
Recommended service space					
	side	300	mm	300	mm
	rear	500	mm	500	mm
Weight	net	302	kg	554	kg
	gross, crate packed	318	kg	583	kg
	gross, box packed	385	kg	644	kg
Transport volume					
	crate packed	1,32	m^3	1,45	m^3
	box packed	1,95	m^3	2,10	m^3
Max floor load during extraction		3,3 ±1,1	kN	6,0±2,0	kN
Frequency (dynamic load)		16	Hz	14	Hz
Motors 3AC 50/60 Hz (power rating)					
input power	wash speed	0,59/0.60	kW	0,95/1,10	kW
	distribution speed	0,68/0,80	kW	1,10/1,20	kW
	extraction speed	2,30/2,90	kW	4,20/4,10	kW
Water walves					
connection		DN 20 3/4	"	DN 20 3/4	"
rec. water pressure		200-600	kPa	200-600	kPa
pressure limits		40-1000	kPa	40-1000	kPa
capacity at 300 kPa		27	l/min	100	l/min
Drain valve					
conn. outside diameter		75	mm	75	mm
capacity		170	l/min	180	l/min
Steam valve					
connection		DN15 1/2	"	DN15 1/2	"
rec. steam pressure		300-600	kPa	300-600	kPa
pressure limits		50-800	kPa	50-800	kPa

Voltage	Element output kW	Total output kW	Fuse A	Connection cable Area mm²
Electric heating, 120 litres				
220 V, 3AC 50 Hz	12	12,6	35	4 x 6
380 V, 3NAC 50 Hz	12	12,6	25	5 x 4
415 - 440 V, 3NAC 50 Hz	12	12,6	20	5 x 2,5
208 - 240 V, 3AC 60 Hz	12	12,6	35	4 x 6
Electric heating, 220 litres				
220 V, 3AC 50 Hz	15	16,0	50	4 x 10
380 V, 3NAC 50 Hz	15	16,0	35	5 x 6
415 - 440 V, 3NAC 50 Hz	15	16,0	25	5 x 4
208 - 240 V, 3AC 60 Hz	15	16,1	50	4 x 10
Steam heating, 120 litres				
220 V, 3AC 50 Hz		2,3	10	4 x 1,5
380 - 440 V, 3NAC 50 Hz		2,3	10	5 x 1,5
208 - 240 V, 3AC 60 Hz		2,9	10	4 x 1,5
Steam heating 220 FC 1-phase			16	3 x 2,5
Steam heating, 220 litres				
220 V, 3AC 50 Hz		4,2	16	4 x 1,5
380 - 440 V, 3NAC 50 Hz		4,2	10	5 x 1,5
208 - 240 V, 3AC 60 Hz		4,2	16	4 x 1,5

FLE MP FC (machine with frequency control)

		120 l		220 l	
Dry weight capacity					
for filling factor 1:13		9.0	kg	17	kg
for filling factor 1:10		12	kg	22	kg
Drum volume		120	l	220	l
diameter		620	mm	750	mm
depth		412	mm	500	mm
Drum speed	wash, normal	48	r/m	44	r/m
	wash, low	24	r/m	24	r/m
	distribution	78	r/m	70	r/m
	extraction, low	340-510	r/m	300 - 460	r/m
	extraction, high	590-950	r/m	540 - 850	r/m
G-factor	wash	0,8		0,8	
	extraction, low	40-90		40 - 90	
	extraction, high	120-310		120 - 300	
Dimensions	width	870	mm	1000	mm
	depth	900	mm	1080	mm
	height	1330	mm	1460	mm
Recommended service space					
	side	300	mm	300	mm
	rear	500	mm	500	mm
Weight	net	302	kg	554	kg
	gross, crate packed	318	kg	583	kg
	gross, box packed	385	kg	644	kg
Transport volume					
	crate packed	1,32	m^3	1,45	m^3
	box packed	1,95	m^3	2,10	m^3
Max floor load during extraction		3,3 ±1,1	kN	6,0±2,0	kN
Frequency (dynamic load)		16	Hz	14	Hz
Water valves					
connection		DN 20 3/4	"	DN 20 3/4	"
rec. water pressure		200-600	kPa	200-600	kPa
pressure limits		40-1000	kPa	40-1000	kPa
Drain valve					
conn. outside diameter		75	mm	75	mm
capacity		170	l/min	180	l/min
Steam valve					
connection		DN15 1/2	"	DN15 1/2	"
rec. steam pressure		300-600	kPa	300-600	kPa
pressure limits		50-800	kPa	50-800	kPa

The machine is a free-swinging model i.e. the outer drum and motor bridge and suspended in the machine chassis via a spring suspension with a strong spring in each corner of the machine. Each spring has a shock absorber which dampens the movement of the machine.

The wash drum or inner drum is driven by two motors via a V-belt: one motor for washing and distribution speed and one for spin speed. The inner drum is mounted in the outer drum with two heavy duty bearings at the back plate and is sealed with two V-rings.

The motors are suspended underneath on a motor support with a belt tensioning device. The motors are mechanically coupled to each other with V-belts. During wash and distribution speed the spin motor transmits power to the drum.

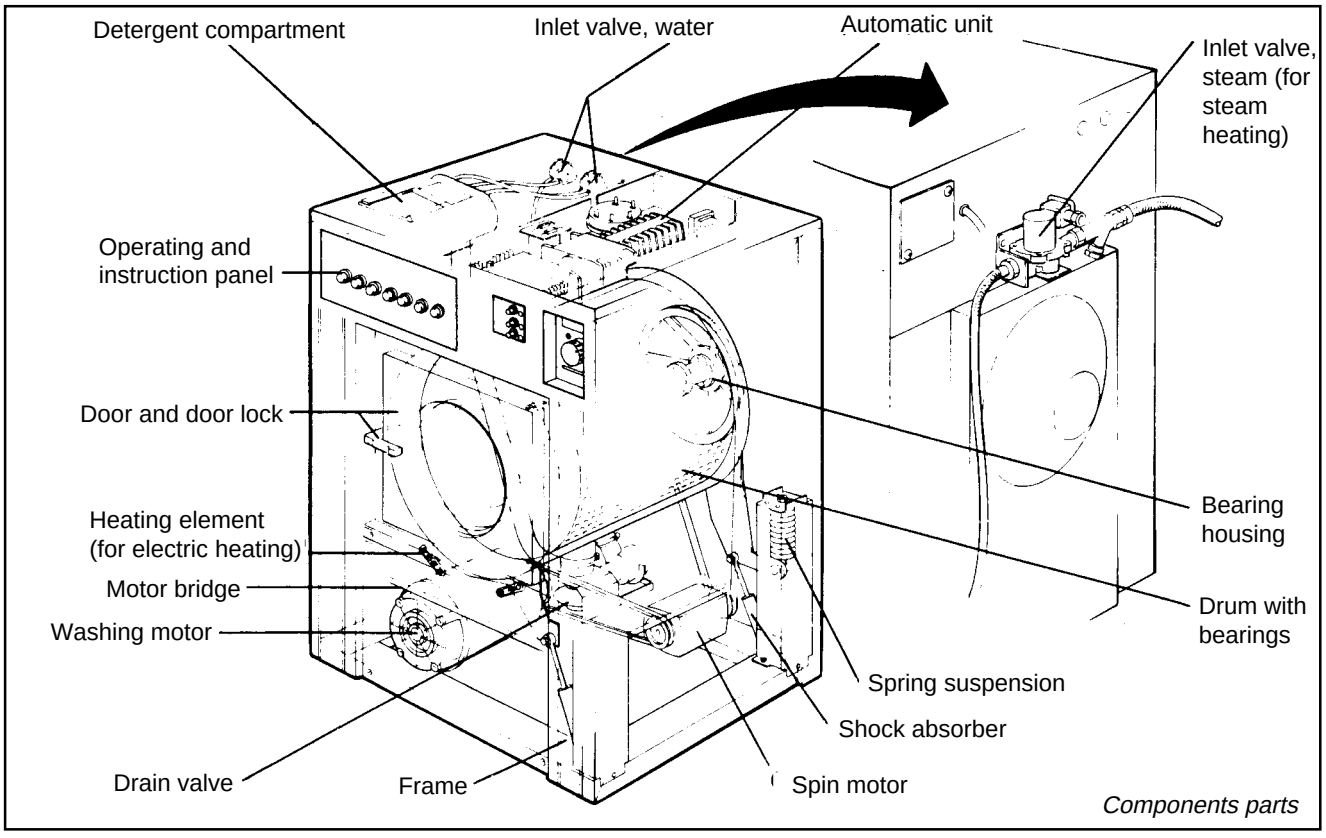
The water inlet and drain are both situated under the outer drum. This improves the flow during filling and prevents water vapour from entering the detergent compartment.

The robust square door is locked with a handle which is interlocked by a safety locking device when the machine is running.

The operating panel contains several buttons for manual control of certain functions: restart button; indication light; thermostat and a flat-card unit through which programmed cards can control the washing programmes.

Reverses, level switches, relays etc are placed in the automatic unit, which is easily accessible from above and can be replaced via a plug-in system.

The machine housing consists of hot-dip galvanised, painted steel plates and stainless steel sheets, painted on the front and sides. It has a stainless door (and front, on request).



Components parts

The following is a description of the test card supplied with the machine. The basic procedure for programming (punching) cards is described in chapter "5. Card Programming".

Function description of the card's 16 tracks

A Detergent, compartment 1
B Heating, index B on the thermostat
C Detergent, compartment 2
D Heating, index C on the thermostat
E Detergent dispensing
F Heating, index D on the thermostat
G Detergent dispensing
H Spin
I Detergent dispensing, compartment 3
K Drain
L Cold hard water (only certain machines)
M Programme stop, buzzer yellow signal light on
N High water level
O Inflow valve for cold water
P Cooling
Q Inflow valve for hot water

When connecting external metering equipment for liquid detergent, use tracks A, C, E, G and I for pulse sending

The programme card/test card supplied with the machine is programmed for normal soiled washing according to the following description. In the table truncated pegs are marked "x" and remaining pegs are marked ".".

Programme stage	Track	Removed peg	Tracklks on card A B C D E F G H I J K L M N O P Q	Peg nr
			x x . . . . . x x . .	-1
Prewash	O "Cold water"	0 to 6	x x . . . . . x x . .	0
	N "High water level"	0 to 6	. x . . . . . x x . .	1
	A "Detergent 1"	0	. x . . . . . x x . .	2
	B "Heat index B"	0 till 6	. x . . . . . x x . .	3
	K "Drain"	7	. x . . . . . x x . .	4
			. x . . . . . x x . .	5
			. x . . . . . x x . .	6
			. . . . . x	7
Main wash	O "Cold water"	8 to 24	. . x x . . . . . x . x	8
	Q "Hot water"	8 to 24	. . . x . . . . . x . x	9
	C "Detergent 2"	8	. . . x . . . . . x . x	10
	D "Heat index D"	8 to 24	. . . x . . . . . x . x	11
	K "Drain"	25	. . . x . . . . . x . x	12
			. . . x . . . . . x . x	13
			. . . x . . . . . x . x	14
			. . . x . . . . . x . x	15
			. . . x . . . . . x . x	16
			. . . x . . . . . x . x	17
			. . . x . . . . . x . x	18
			. . . x . . . . . x . x	19
			. . . x . . . . . x . x	20
			. . . x . . . . . x . x	21
			. . . x . . . . . x . x	22
			. . . x . . . . . x . x	23
			. . . x . . . . . x . x	24
			. . . . . x	25
Rinse 1	O "Cold water"	26 to 31	. . . . . x x . .	26
	N "High water level"	26 to 34	. . . . . x x . .	27
	K "Drain"	32 to 34	. . . . . x x . .	28
	H "Spin"	33 to 34	. . . . . x x . .	29
			. . . . . x x . .	30
			. . . . . x x . .	31
			. . . . . x . . x . . .	32
			. . . . . x . x . . x . . .	33
			. . . . . x . x . . x . . .	34
Rinse 2	O "Cold water"	35 to 40	. . . . . x x . .	35
	N "High water level"	35 to 43	. . . . . x x . .	36
	K "Drain"	41 to 43	. . . . . x x . .	37
	H "Spin"	42 till 43	. . . . . x x . .	38
			. . . . . x x . .	39
			. . . . . x x . .	40
			. . . . . x . . x . . .	41
			. . . . . x . x . . x . . .	42
			. . . . . x . x . . x . . .	43
Rinse 3	O "Cold water"	44 to 49	. . . . . x x . .	44
	N "High water level"	44 to 52	. . . . . x x . .	45
	K "Drain"	50 to 52	. . . . . x x . .	46
	H "Spin"	51 to 52	. . . . . x x . .	47
			. . . . . x x . .	48
			. . . . . x x . .	49
			. . . . . x . . x . . .	50
			. . . . . x . x . . x . . .	51
			. . . . . x . x . . x . . .	52
Rinse 4	O "Cold water"	53 to 58	. . . . x . . . . . x x . .	53
	N "High water level"	53 to 69	. . . . . x x . .	54
	E "Detergent 3"	53	. . . . . x x . .	55
	K "Drain"	59 to 70	. . . . . x x . .	56
	H "Spin"	60 to 69	. . . . . x x . .	57
			. . . . . x x . .	58
			. . . . . x . . x . . .	59
			. . . . . x . x . . x . . .	60
			. . . . . x . x . . x . . .	61
			. . . . . x . x . . x . . .	62
			. . . . . x . x . . x . . .	63
			. . . . . x . x . . x . . .	64
			. . . . . x . x . . x . . .	65
			. . . . . x . x . . x . . .	66
			. . . . . x . x . . x . . .	67
			. . . . . x . x . . x . . .	68
			. . . . . x . x . . x . . .	69
			. . . . . x	70
End	M "Programme stop"	71	. . . . . x	71

Prewash

Prewash lasts for 4 minutes (track numbers 0 to 7). It starts with cold water to high level, detergent dispensing compartment 1 and heating until thermostat value selected on dial B is reached (peg number 0 in tracks A, B, N and O removed).

The card programme is held on water fill cut until selected temperature is reached. As the card must be punched for the entire time advance is necessary, cams B, N and O are removed for the running time required. The removal of these pegs during the running time does not cause water and heating to be on continually, as these functions are now controlled by the thermostat and level check. The absence of a peg is required in order to initiate a function and to advance the automatic card device. After the water level and temperature have been reached the running time of this card is 2,5 minutes (peg 1 to 6 have been removed in cams B, N and O). Cams A, B, N and O have been removed in peg -1 as a safety measure to ensure the washing is done correctly even if the card is incorrectly adjusted, see "4. Card Programing").

The prewash ends with emptying, Drain, for 0,5 minutes (peg 7 in cam K removed)

Main wash

The main wash takes 9 minutes and starts with cold water inflow, hot water detergent dispensing from compartment 2 and heating till the value selected on thermostat dial D is reached (peg no 8 in cams C, E, O and Q removed).

The advance of the programmed card stops at peg 8 until the water level and temperature of thermostat D have been reached. As the card must be punched for the whole time advance is required track D, I and Q are removed for the appropriate time. The removal of these pegs during the running time does not cause water and heating to be on continually, as these functions are now controlled by the thermostat and level check. The absence of a peg is required in order to initiate a function and to advance the automatic card device. When the water level and temperature have been reached the running time of this card is 7,5 minutes (peg 8 to 24 have been removed in tracks D, O and Q).

The main wash ends with emptying, Drain, for 0,5 minutes (peg 25 in track K removed).

Rinses 1 to 3

Rinses 1-3 last for 4,5 minutes and are identical. Rinse 1 is described here. The rinse starts with cold water inflow until high water level is reached (peg 26 in track N and O removed).

The automatic card device stops advancing the programmed card at peg 26 until the water level is reached. As the card must be punched for the entire time advance is necessary. Tracks N and O are removed for the required running time. The removal of these pegs during the running time does not cause water to be flushing continually, as this function is now controlled by the level check. The absence of a peg is required in order to initiate a function and to advance the automatic card device. When the water level and temperature have been reached the running time of this card is 2,5 minutes peg 26 to 31 have been removed in tracks N and O).

The rinse ends with Drain for 1,5 minutes with Spin for the last half minute peg 41 to 43 in tracks K and N peg 42 to 43 in track H removed). Track K should always be progarmmed parallel with cam H so that the water can drain, but as spinning should not take place when the drum is filled with water, cam K (Drain) is programmed one peg earlier than the spin, allowing the water to empty before the spin starts.

Rinse 4

Rinse 4 lasts for 9 minutes and starts with inflow of cold water to high level and detergent dispensing (fabric conditioner) from compartment 3 peg 53 in tracks E, N and O removed).

The advance of the programmed card stops at peg 53 until the water level has been reached. As the card must be punched for the whole time advance is required, tracks N and O are punched for the appropriate time. The removal of these pegs during the running time does not cause the water to flush continually, as this function is now controlled by the level check. The absence of a journal is required in order to initiate a function and to advance the automatic card device. When the water level has been reached the running time of this card is 3 minutes (peg 54 to 58 have been removed in tracks N and O).

Rinse 4 ends with Drain for 6 minutes peg 59 to 70 in track K removed). When the drain has run for 0,5 minutes the spin starts and lasts for 5 minutes peg 60 to 69 in track H removed). The first minute of spin is slow and the remaining 4 minutes high speed. The spin ends with distribution speed for 0,5 minutes. This is achieved through clipping track K one after the last journal of the spin.

Completion

Completion of the washing process can be achieved through punching peg 71 in track M (Programme Stop). A programme stop is indicated by a buzzer and the yellow signal lamp in the restart button lights up.

Machines with the card programming facility have an automatic card device which reads a programmed card. The machines are intended for cards with 12, 16 or 24 tracks. Each track consists of a number of pegs which actuate the automatic card device's inbuilt sensors thus controlling the different stages of the washing process. The card is driven by mechanically transmitted step pulses from the timer motor with a speed of one step each 30 seconds, which is the equivalent of one peg on the card. The cards are available with 80 and 120 rows. These respectively give 40 and 60 minutes effective running time.

Each track has its own function which is activated by removing one or more pegs depending on the length of time the function is required. For identification purposes the tracks are marked with letters.

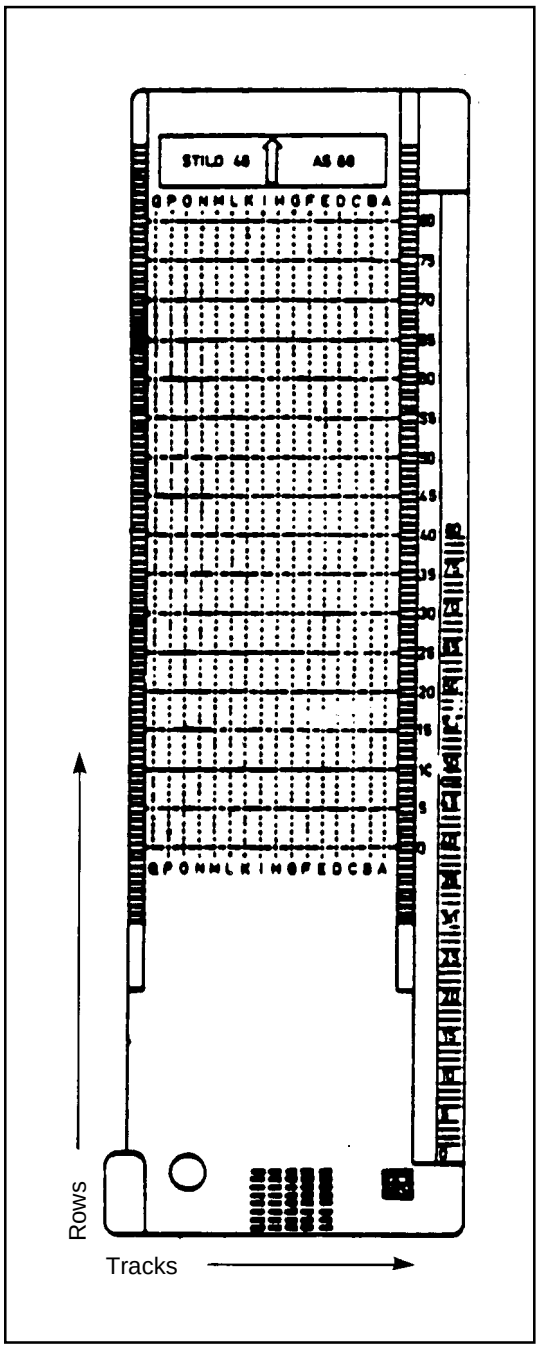
To locate the timing of the function changes, every 5th peg is numbered on one side with two different number sequences; one marks the peg numbers and one marks the peg numbers in relation to the front panel of the programme unit. The machine is delivered with a programmed card and a punch device for punching the cards. The card is programmed for normal wash. This can be used for test runs and to wash normal soiled washing.

Four factors must be taken into account when programming (punching) a card:

1. Type of soiling
2. Degree of soiling
3. Textiles
4. Previous experience

The following points should be noted during programming:

- All tracks except machine stop have pegs in position minus one. A good safety measure is to punch position minus one on those tracks which have position 0 punched. This allows the machine to wash correctly even if the card is incorrectly adjusted.
- Each peg on the programme card is the equivalent of 30 seconds.



- During water inlet the timer will hold. It will restart when the level switch opens to indicate that the water level in the drum has been reached.
- Hot and/or cold water may be programmed "Inlet".
- Use the facility to reduce the heating time by programming hot water or mixed cold and hot water filling.
- During "Heating" the timer will hold. It will restart when the thermostat opens to indicate that the selected temperature has been reached.
- By cutting track detergent must NOT be dispensed during heating.
- Cold water enters the machine during programming. "Cooling". This provides a cooling of 3-4°/minute.
- The last punched peg in a sub routine determines where the first one of the next sub routine should be punched. For example, if the first rinse ends with a spin punch in peg 38 the second rinse starts with cold water filling peg 39.
- If there are no punched pegs, the advane of the automatic card device stops. This means a row cannot be left unpunched during a programme, the programme must be a complete sequence with information about the washing process.
- Programming of "Stop" can be made serveral time during the same washing programme. When the programme reaches the stop the buzzer sounds and the machine stops. It is then possible to carry out required action such as detergent dispensing. When restart is required press the restart button and the washing process continues in accordance with the programme.

PLEASE NOTE
Ensure that the programme card does not come in contact with detergent or any other substance which could cause interference in the programme.
Detergent on the card may coat the microswitches and can cause them to fail or may deposit a layer of detergent on the advance reels thus increasing their diameter. As a result, they will press the programme card harder against the micro switches which in turn may interpret this as the presence of a peg even when the peg has been removed. The required function may start later or may be completely absent.

The following steps should be taken to maintain optimum safety and performance of the machine and to prevent breakdowns.

The timing should be adapted to the usage of the machine.

Daily

- Chek door and safety locking device.
  - Close door, start machine and check door cannot be opened.
  - Stop machine and check that door cannot be opened until 20-30 seconds have elapsed after programme ends.
  - Open door and raise hadle to closed position. Check machine cannot be started. If it can, there is a fault on the hinge side switch which must be dealt with immediately.
  - Check that door does not leak.
    Clean door seal.
- Check that drain valve and inlet valve does not leak wash.
  - Leak can be detected by the machine filling with water during washing or water from the drain valve.

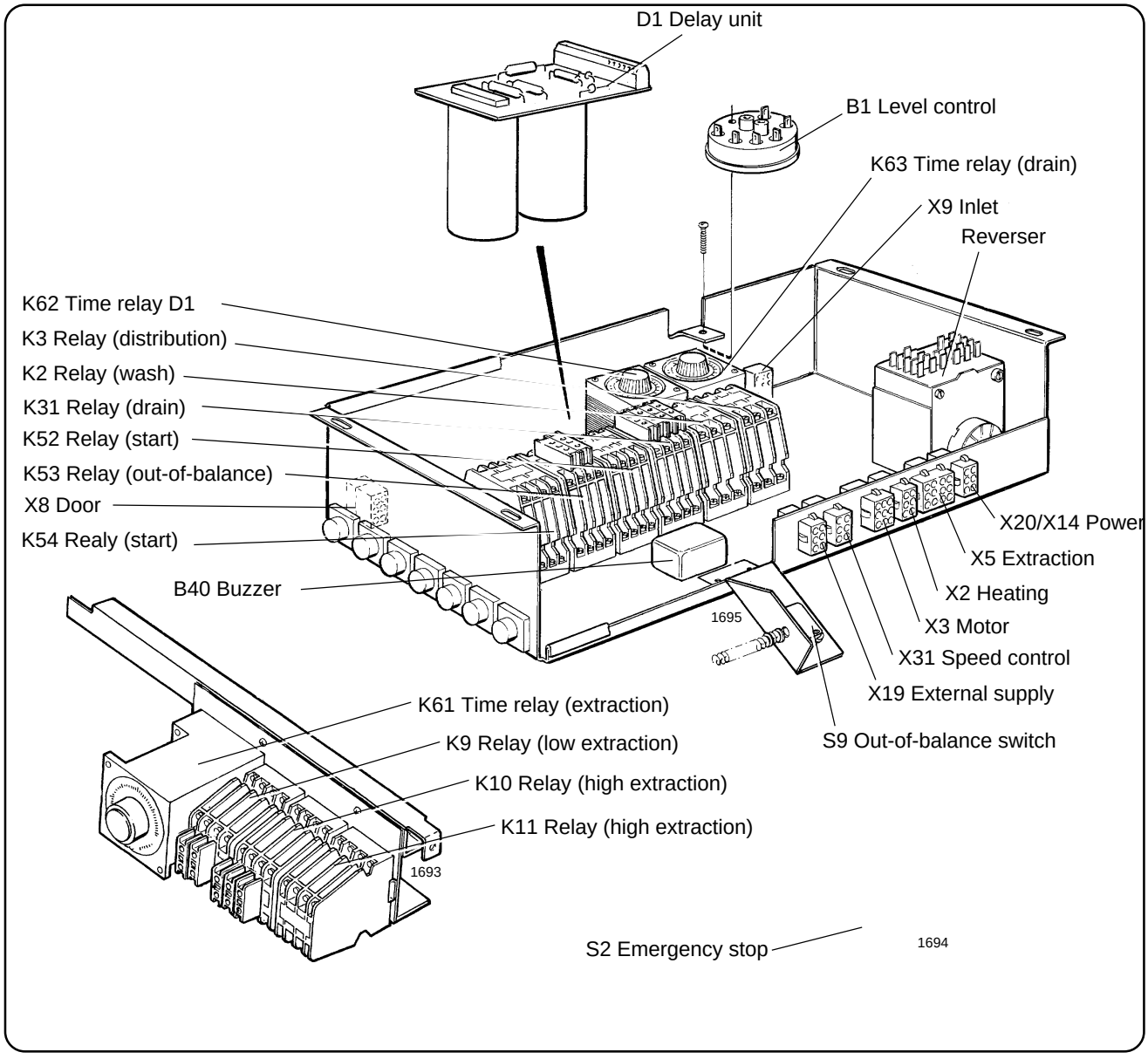
Every three months

- Switch off main switch.
- Remove rear and front protective plates and top panel. Do not forget screws for detergent compartment. Check in the detergent compartment that there is no leak between the compartment and the top panel.
- Check that all inner pipe connections are not leaking.
- Check door does not leak.
- Check V-belts; tighten or replace as required, refer to section 30. Motor – drive unit.
- Check spring suspension and shock absorbers.
- Check heater elements if heating time unusually long. See section 40. Heating elements.
- If water is very hard, check the elements for "lime scale". Where necessary, treat with descaling agent. Use descaling agent in accordance with manufacturer's instructions.
- Check the spin cutout with the machine unloaded, the centre of the bracket should be about 5 cm above the pin.

See section 28. Spin cutout.

General, From machine No. 91/5501- (120 l machine)
91/5875- (220 l machine)

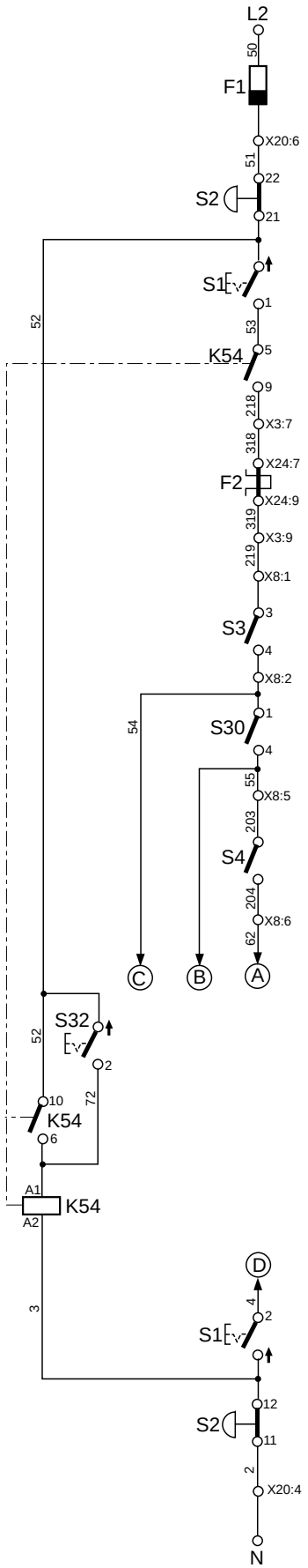
To facilitate in faults tracing in the electrical system, the circuit diagram is broken down into a number of sequences, as follows:



Power supply and start

The door must be closed (closing switch S3 (6)) and locked (switch S4 (8)) before power is supplied to machine. Turning programmer knob from 0 to I closes switch S30 (7). Point Ⓐ is energised and the machine now starts if a programmed card is inserted in the programmer.

The machine is normally switched ON and OFF using switch S1 (3) (12). This means that relay K54 (11) is kept activated by (K54:10-6 (10) is closed) even when the machine is off. When the emergency stop button S2 (2) (13) is depressed, relay K54 is released. To restart the machine, you must first reset the emergency stop button and then press S32 Restart (9). This activates K54.



(1) F1 Fuse

(2) S2 Emergency stop

(3) S1 ON/OFF switch

(4) K54 Relay, start

(5) F2 Overheat protection

(6) S3 Switch, door

(7) S30 Switch, programmer

(8) S4 Switch, door lock

Ⓐ Ⓑ Ⓒ : Power supply to other function sequences

(9) S32 Switch, restart

(10) K54 Relay, start

(11) K54 Relay coil, start

Ⓓ : Power supply to other function sequences

(12) S1 ON/OFF switch

(13) S2 Emergency stop

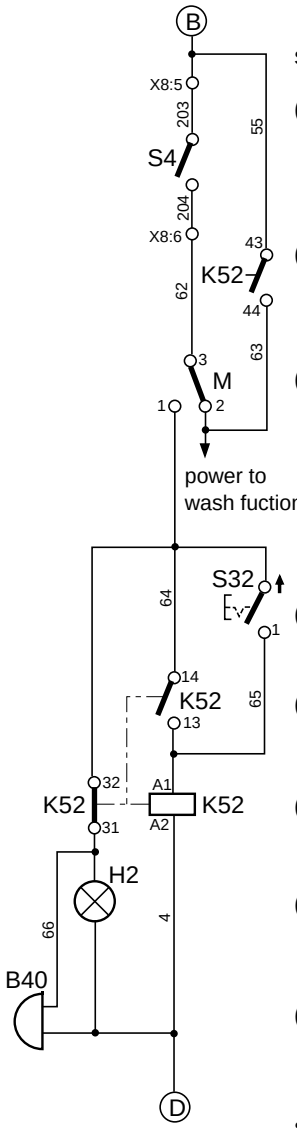
Restart

Use row M, stop (3) on the program card, to stop the program sequence either to dispense detergent or when the wash is done.

When row M (3) has been programmed, the programmer switch changes from position 2-3 to 1-3. This supplies power to buzzer B40 (8) and lamp H2 (7), and at the same time disconnects the washing functions and programmer motor (although the drain remains closed).

Relay coil K52 (6) is energised by pressing switch S32 (4) and is locked via K52:13-14 (5). K52:43-44 (2) closes, re-energising the wash functions and the wash cycle continues.

When the program card has been fed so far that row M no longer is programmed (switch M then switches to position 2-3), the lock releases on K52 (6).



Ⓑ : Power supply: see "Power supply and start " diagram

(1) S4 Switch, door lock

(2) K52 Relay, restart

(3) Programmer, row M, stop

(4) S32 Switch, restart

(5) K52 Relay, restart

(6) K52 Relay, restart

(7) H2 Lamp, restart

(8) B40 Buzzer

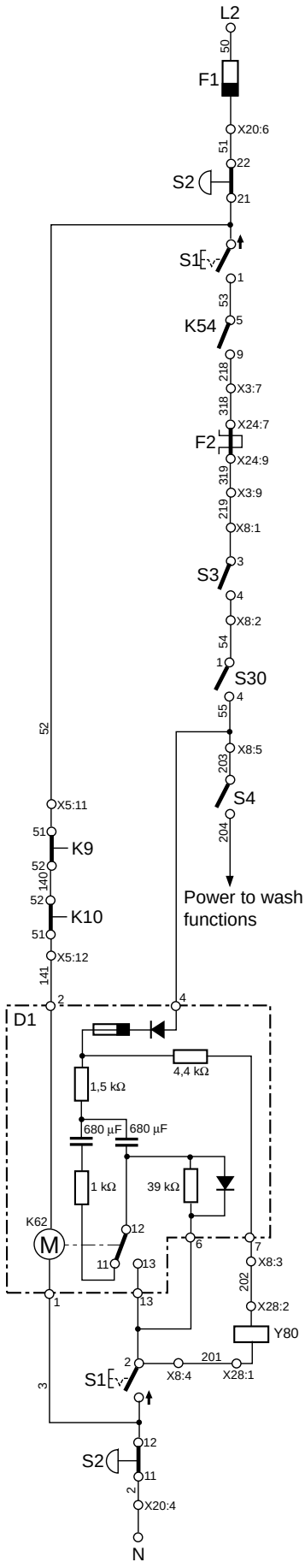
Ⓓ : Power supply: see "Power supply and start" diagram

Door lock

When the door has been locked with the handle the microswitch S3 (6) is activated in the locking unit. Turning programmer knob to I closes switch S30 (7), delay unit D1 (11) is receiving power and door lock coil Y80 (12) locks the door. Switch S4 (8) then closes, so that the machine can start.

To prevent the door being opened immediately after a extraction (roll-out time may be 2-3 minutes), while at the same time limiting the delay time once washing has finished to approx. 35 seconds, the delay unit is fitted with a time relay and works as follows:

- Time relay motor K62 (11) is energised even if machine switch S1 (3) (13) is at OFF. This means the time relay is normally in position 12-13 from the start and when the machine runs at wash or distribution speed. In this position, one of the capacitors in the delay unit (11) is cut out, at the same time as the 39 kΩ resistor is short circuit. The door can now be opened approx. 35 seconds after a power failure or when the programmer knob is turned to 0 and breaking S30 (7).
- Extraction activates relay K9 or K10 and the power to time relay motor K62 is cut by K9:51-52 (9) or K10:51-52 (10). The time relay contact switches to position 11-12, and the delay circuit now keeps the door closed about 3-3.5 minutes at a power failure or the programmer knob is turned to 0. After extraction, time relay K62 is re-energised. At the end of the time set on the relay (2 minutes for 120 litre machines and 3 minutes for 220 litre machines), the time relay contact resets to position 12-13.



(1) F1 Fuse

(2) S2 Emergency stop

(3) S1 ON/OFF switch

(4) K54 Relay, start

(5) F2 Overheat protection, wash and distribution motor

(6) S3 Switch, door

(7) S30 Switch, programmer

(8) S4 Switch, door lock

(9) K9 Relay, low extraction

(10) K10 Relay, high extraction

(11) D1 Delay unit

(12) Y80 Door lock coil

(13) S1 ON/OFF switch

(14) S2 Emergency stop

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Water filling

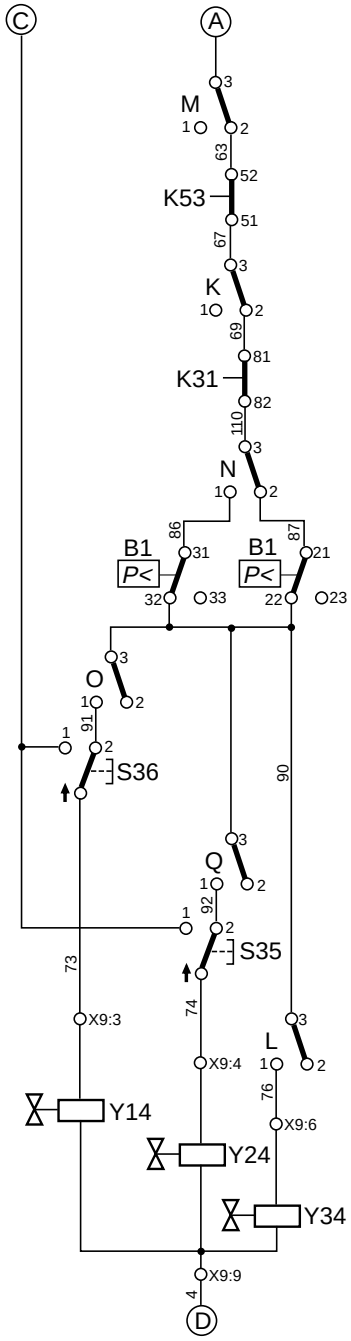
The following conditions must be met for water valves Y14 (12), Y24 (13) or Y34 (14) to be energised:

- Row M, stop (1) must not be programmed
- The out-of-balance switch must not have tripped (breaks K53:51-52 (2) power supply)
- Row K, drain (3) must not be programmed
- The water level must not exceed low or high level

  Level control B1 (6) has two switching contacts, 21-22 switches at low level and 31-32 switches at high level. Which of these contacts activate the water valves depend on whether row N, high level (5) is programmed or not.

If the the above conditions are met, the water valves can be controlled by programming row O, Cold water (7), row Q, Hot water (9) and Row L, Cold hard water (11).

The water valves Y14 (12) and Y24 (13) can also be controlled manually with the switches S36 (8) and S35 (10) on the machine control panel.



Ⓐ Ⓒ : Power supply: see "Power supply and start" diagram

(1) Programmer, row M, stop

(2) Relay K53, out-of-balance

(3) Programmer, row K, drain

(4) Relay K31, drain

(5) Programmer, row N, high level (shown in normal position = low level)

(6) Level control B1, low/high

(7) Programmer, row O, cold water

(8) Switcher S36 (cold water)

(9) Programmer, row Q, hot water

(10) Switcher S35 (hot water)

(11) Programmer, row L, cold hard water

(12) Valve Y14, cold water (directly into the drum)

(13) Valve Y24, hot water (directly into the drum)

(14) Valve Y34, cold hard water (directly into the drum)

Ⓓ : Power supply: see function sequence "Power supply and start"

Detergent

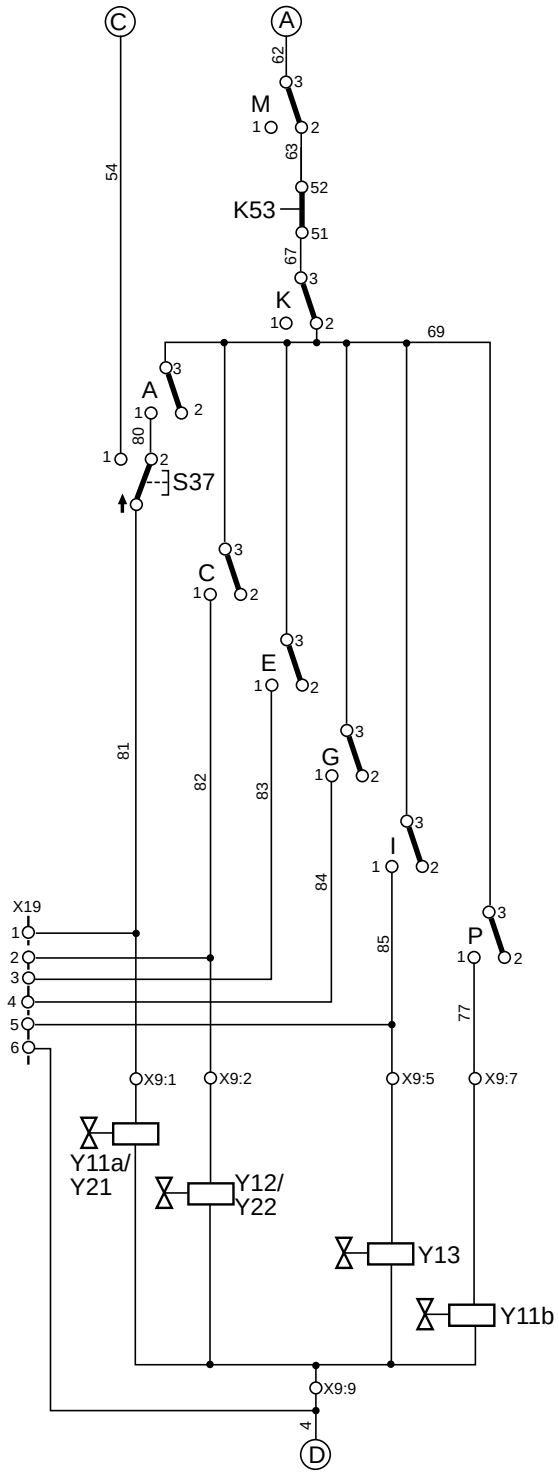
The machine has three built-in detergent compartments controlled by three water valves. A total of five valves can also be controlled in an external supply unit via connector X19. The following conditions must be met to control the valves:

- The door must be closed and locked, and the programmer knob must be in position I (see ”Power supply and start” sequence).
- Row M, stop (1) must not be programmed
- The out-of-balance switch must not have tripped (breaks K53:51-52 (2) power supply)
- Row K, drain (3) must not be programmed

Once these conditions are met, the water valves can be controlled by programming row A (4), detergent prewash, row C (6), detergent main wash and row I (9), softener. Row E (7) and row G (8) can be used to control another two valves in an external supply unit.

Row P (10) controls valve Y11b (14) which is used for cool-down (see sequence ''Cool-down'').

Water valve Y11a/Y21 (12) can also be controlled manually with switch S37  (5) on the machine control panel.



Ⓐ Ⓒ : Power supply: see ”Power supply and start” sequence

(1) Programmer, row M, stop

(2) Relay K 53, out-of-balance

(3) Programmer, row K, drain

(4) Programmer, row A, detergent prewash V1

(5) Switch S37 , (detergent)

(6) Programmer, row C, detergent main wash V2

(7) Programmer, row E, detergent V3

(8) Programmer, row G, detergent V4

(9) Programmer, row I, softener V5

(10) Programmer, row P, cool-down

(11) Valve Y11a, cold water compartment 1 / Y21, hot water compartment 1

(12) Valve Y12, cold water compartment 2 /Y22, hot water compartment 2

(13) Valve Y13, cold water compartment 3

(14) Valve Y11b, cold water, cool-down

Ⓓ : Power supply: see ”Power supply and start” sequence

Heating

The following conditions must be met for relay K21/valve Y51 (11) to be energised:

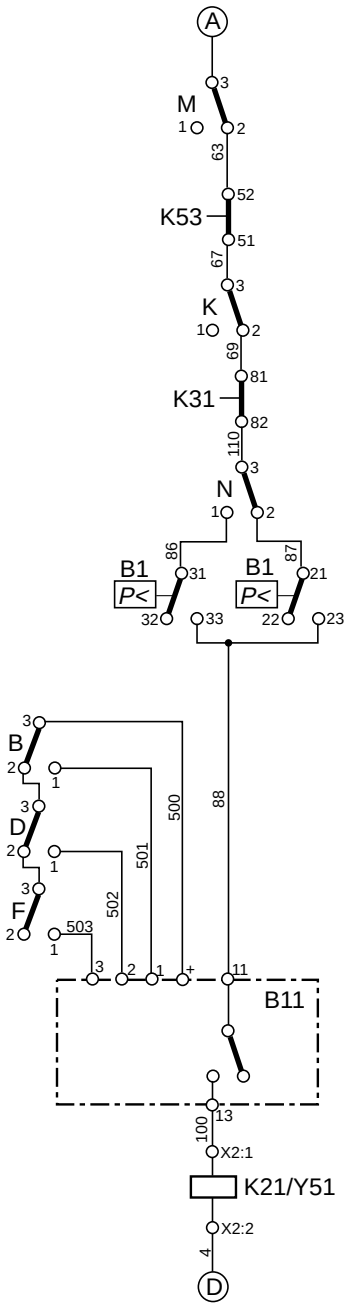
- The door must be closed and locked, and the programmer knob must be in position **I** (see ”Power supply and start” sequence)
- Row M, stop (1) must not be programmed
- The out-of-balance switch must not have tripped (breaks K53:51-52 (2) power supply)
- Row K, drain (3) must not be programmed
- The drum must be filled with water to the correct level.

  Level control B1 (6) has two closing contacts, 21-23 (low water level) and 31-33 (high water level). Which of these is active depends on whether row N (5) is programmed or not.

If the above conditions are met, the closing contact in thermostat B11 (10) is energised.

The thermostat has three different temperature settings, using the three dials B, D and F. Which setting the thermostat is to follow depends on whether row B (7), D (8) or F (9) has been programmed on the program card.

If any of the three rows are programmed, and the water temperature is lower than the set temperature, the closing contact 11-13 in the thermostat switches and relay K21/valve V51 (11) is energised.



Ⓐ Ⓑ :Power supply: see "Power supply and start" sequence

(1) Programmer, row M, stop

(2) Relay K53, out-of-balance

(3) Programmer, row K, drain

(4) Relay K31, drain

(5) Programmer, row N, high level

(6) Level control B1, high/low level

(7) Programmer, row B, temperature 1, red

(8) Programmer, row D, temperature 2, blue

(9) Programmer, row F, temperature 3

(10) Thermostat B11

(11) Relay K21, heating (electrically heated)/ valve V51 (steam heated)

Ⓓ : Power supply: see "Power supply and start" sequence

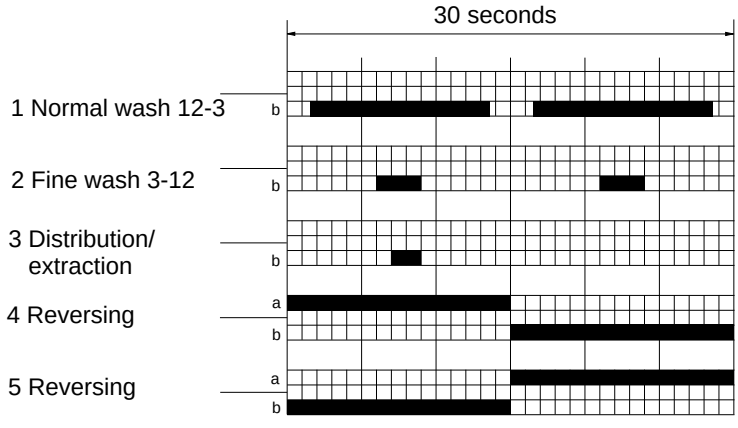
Wash speed

Relay K2 connects the wash speed windings on the wash motor. The following conditions must be met for relay coil K2 (7) to be energised:

- The door must be closed and the programmer knob must be in position I (see ”Power supply and start” sequence)
- Row M, stop (1) must not be programmed
- The drum speed must be less than 550 rpm (120 litre) or 310 rpm (220 litre). If it exceeds this, speed control B31 (2) breaks to avoid damaging the motor.
- The drain must be closed. (K31:51-52 (3) is closed when the drain is closed). If the drain is open, the machine will run at distribution speed. In this case, K31:51-52 (3) breaks, cutting out the wash windings on motor M1.

If the above conditions are met, reverser motor M22 (8) starts. Reverser contacts 1 (5) for normal action and 2 (6) for gentle action now open and close according to a preset schedule (see diagram below). Switch S33 (4) on the front panel governs which of the two reverser contacts controls relay K2.

Reverser diagram



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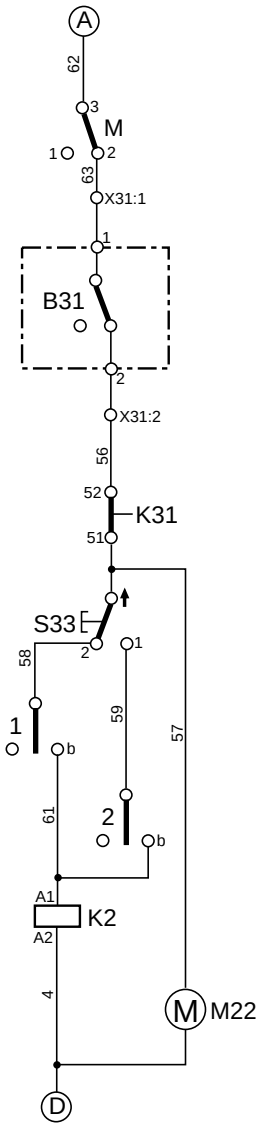


Ⓐ : Power supply: see "Power supply and start" sequence

(1) Programmer, row M, stop

(2) Speed control B31

(3) Relay K31, drain

(4) Switch S33 (gentle action)

(5) Reverser row 1

(6) Reverser row 2

(7) Relay coil K2, wash

(8) Motor M22 Reverser

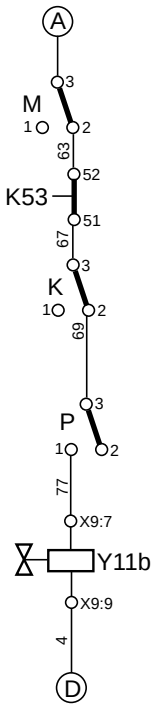
Ⓓ : Power supply: see "Power supply and start" sequence

Cool-down

The following conditions must be met for the cool-down valve Y11b (5) to be energised:

- The door must be closed and locked, and the programmer knob must be in position **I** (see ”Power supply and start” sequence)
- Row M, stop (1) must not be programmed
- The out-of-balance switch must not have tripped (breaks K53:51-52 (2) power supply)
- Row K, drain (3) must not be programmed

If the above conditions are met, the cool-down valve Y11b (5) can be controlled by programming row P (4).



Ⓐ : Power supply: see "Power supply and start" sequence

(1) Programmer, row M, stop

(2) Relay K53, out-of-balance

(3) Programmer, row K, drain

(4) Programmer, row P, cool-down

(5) Valve Y11b, cool-down

Ⓓ : Power supply: see "Power supply and start" sequence

Distribution speed

Relay K3 connects the distribution speed windings on the wash motor. The following conditions must be met for relay coil K3 (13) to be energised:

- The door must be closed and locked and the programmer knob must be in position **I** (see ”Power supply and start” sequence).
- Row M, stop (1) must not be programmed.

The machine runs at distribution speed when the drain valve, controlled by relay K31, is open. The following conditions must be met for relay K31 (5) to be energised:

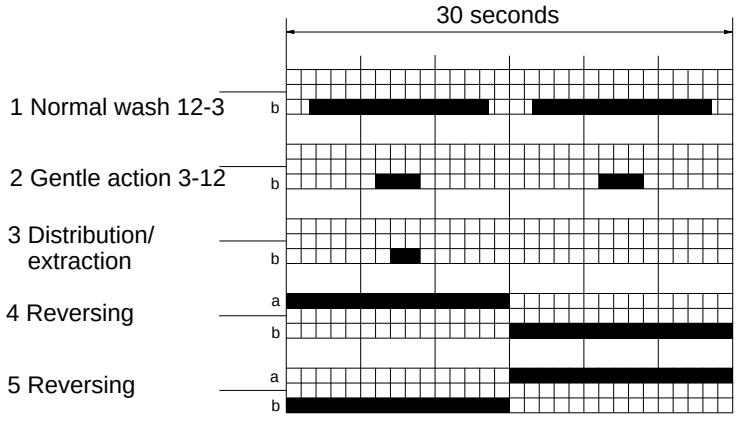
- The out-of-balance switch must not have tripped (breaks K53:51-52 (2) power supply).
- Row K, drain (3), must be programmed.
- Row 3b (4) in the reverser must be closed (see diagram below).

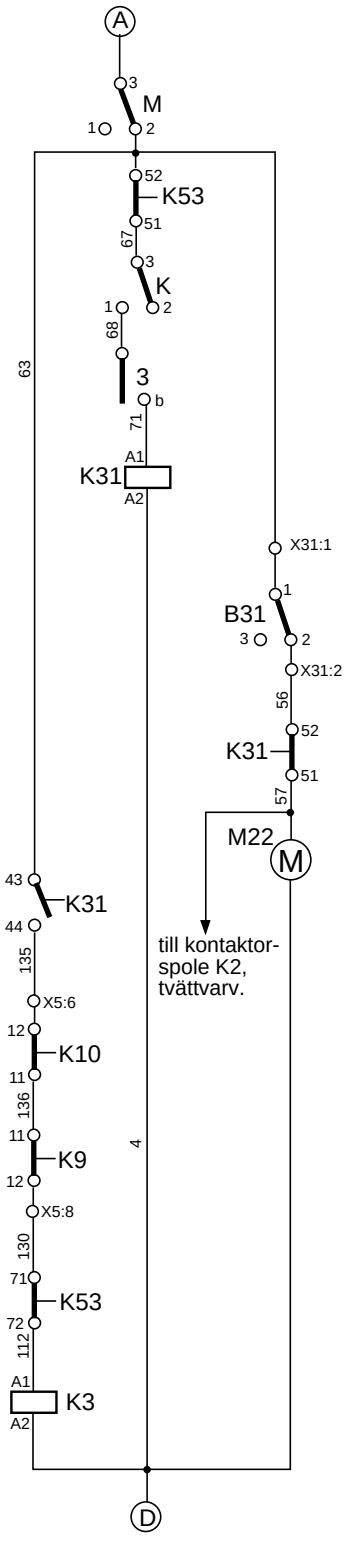
  This contact closes when the wash motor is running and the drum is rotating in the same direction as at distribution speed. This prevents unnecessary stress on the motor, belts and drum bearings when engaging distribution speed.

When K31 energized, K31:51-52 (7) cuts the power supply to relay K2, which de-energises the motor wash windings. K31:51-52 also cuts the power to reverser motor M22 (8). The reverser stops, which means that reverser contact 3b (4) remains closed until the motor is running at distribution speed.

When K31 is energized, closes K31:43-44 (9), which means that relay coil K3 (13) is energised and connect the motor distribution speed windings.

Reverserdiagram





Ⓐ : Power supply: see "Power and start" sequence

(1) Programmer, row M, stop

(2) Relay K53, out-of-balance

(3) Programmer, row K, drain

(4) Reverser, row 3

(5) Relay coil K31, drain

(6) Speed control B31

(7) Relay K31, drain

(8) Motor M22, reverser

(9) Relay K31, drain

(10) Relay K10, high extraction

(11) Relay K9, low extraction

(12) Relay K53, out-of-balance

(13) Relay coil K3, distribution speed

Ⓓ : Power supply: see "Power supply and start" sequence

Drain

Relay K31 (5) controls the drain valve. The following conditions must be met for relay K31 to be energised:

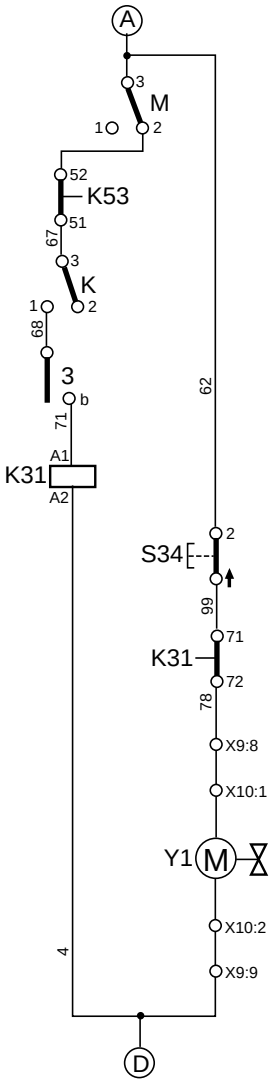
- The door must be closed and locked, and programmer knob must be in position **I** (see ”Power supply and start” sequence).
- Row M, stop (1) must not be programmed.
- The out-of-balance switch must not have tripped (breaks

  K53:51-52 (2) power supply).
- Row K, drain (3) must be programmed.
- Reverser, row 3b (4) must be closed.

  The machine will run at distribution speed if the drain is activated. Row 3b is used to ensure that the motor windings are switched in at the right speed. For more details, see ”Distribution speed”.

When K31 is energized, K31:71-72 (7) cuts the power supply to the drain valve Y1 (8) and the drain valve opens.

The drain valve can also be controlled manually via switch S34 .



Ⓐ : Power supply: see "Power supply and start" sequence

(1) Programmer, row M, stop

(2) Relay K53, out-of-balance

(3) Programmer, row K, drain

(4) Reverser, row 3b

(5) Relay coil K31, drain

(6) Switch S34 (drain)

(7) Relay K31, drain

(8) Valve Y1, drain

Ⓓ : Power supply: see "Power supply and start" sequence

Extraction

The section below and the diagram on the next page refer to 220 litre machines. In 120 litre machines, there is no clutch between the motors.

Relays K9 (13), low extraction, and K10 (14), high extraction, control the connections to the extract motor windings. The following conditions must be met for these relays to be energised:

- The door must be closed and locked, and the programmer knob must be in position I (see ”Power supply and start” sequence).
- Row M, stop (1) must not be programmed.
- The out-of-balance switch must not have tripped (breaks

  K53:51-52 (2) power supply).
- Row K, drain (3) must be programmed.

When row K (3) switches to position 1-3 and reverser contact 3b (8) is in the right position (see ”Distribution speed” sequence), relay coil K31 (15) is energised. As a result:

- The drain valve opens.
- K31:43-44 (18) closes, relay coil K3 (22) is energised and connects the wash motor distribution speed windings.
- Relay K63 (9) is energised and after about 30 seconds closes relay contact 12-13 (9).

If row H (5), extraction, is programmed:

- Relay coil K9 (13) is energised and connects the extract motor windings for low extraction.
- K9:11-12 (20) cuts the power to relay K3 (22).
- When the drum speed exceeds approx. 310 rpm (220 litre models), the speed control B31 (17) switches to position 1-3. The clutch Y70 (23) which connects the two motors is de-energised, disconnecting the wash motor from the extract motor.

After about 60 seconds low extraction, relay K61 (10) switches to position 12-13. As a result:

- Relay coil K9 (13) cuts out, relay coil K10 (14) is energised and connects the extract motor high extraction windings.
- When relay coil K9 (13) is de-energised, K9:11-12 (20) closes. Since the speed control B31 (17) contact is in position 1-3, this energises relay coil K3 (22) and restarts the wash motor at distribution speed. This is designed to prevent the wash motor bearings being damaged by vibration during extraction.

Ⓐ : Power supply: se "Power supply and start" sequence

(1) Programmer, row M, stop

(2) Relay K53, out-of-balance

(3) Programmer, row K, drain

(4) Relay K31, drain

(5) Programmer, row H, spin extraction

(6) Relay K53, out-of-balance

(7) Level control B1, extraction

(8) Reverser, row 3b

(9) Relay K63, drain

(10) Relay K61, Low/high extraction

(11) Relay K10, high extraction

(12) Relay K9 low extraction

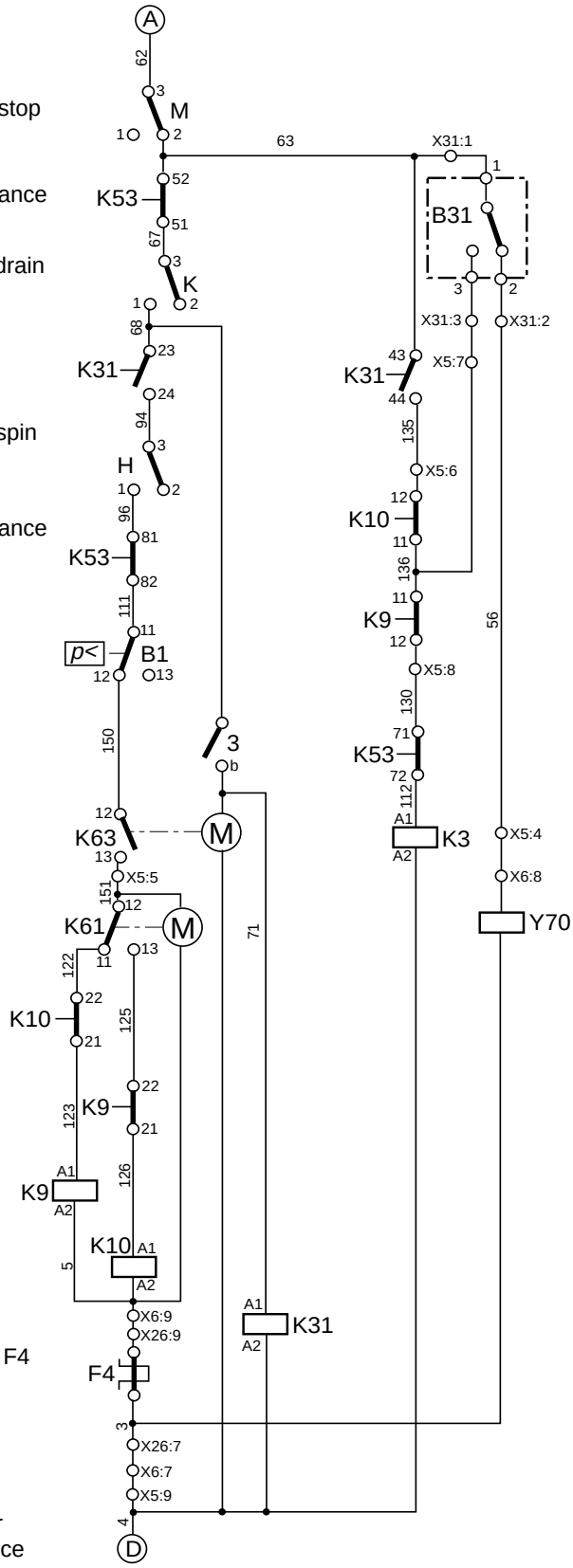
(13) Relay coil K9 low extraction

(14) Relay coil K10 high extraction

(15) Relay coil K31 Drain

(16) Overheat protection F4 extract motor

Ⓓ : Pupply: see "Power supply and start" sequence



(17) Speed control B31

(18) Relay coil K31 Drain

(19) Relay K10 High extraction

(20) Relay K9 Low extraction

(21) Relay K53, out-of-balance

(22) Relay coil K3 Distribution speed

(23) Clutch Y70 (between wash and extract motors)

Out-of-balance

This acts as a safeguard against excessive stress during the extraction. If the wash is unevenly distributed in the drum, the extraction stops, the wash is redistributed and the extraction starts again. This takes place automatically as follows:

- Out-of-balance switch S9 (3) trips.

Immediately afterwards:

- Relay coil K53 (10) is energised and locks since K53:33-34 (4) and K53:43-44 (6) closes.
- K53:81-82 (28) cuts power to spin contacts K9 and K10, and the machine stops the extraction.
- K53:71-72 (16) cuts power to relay coil K3 (17) (distribution speed).
- K53:51-52 (18) cuts power to relay coil K31 (21). This closes K31:71-72 (24), energising drain valve Y1 (25) and closing the drain.
- K53:13-14 (7) closes, energising valve Y14 (9) and letting cold water into the drum.

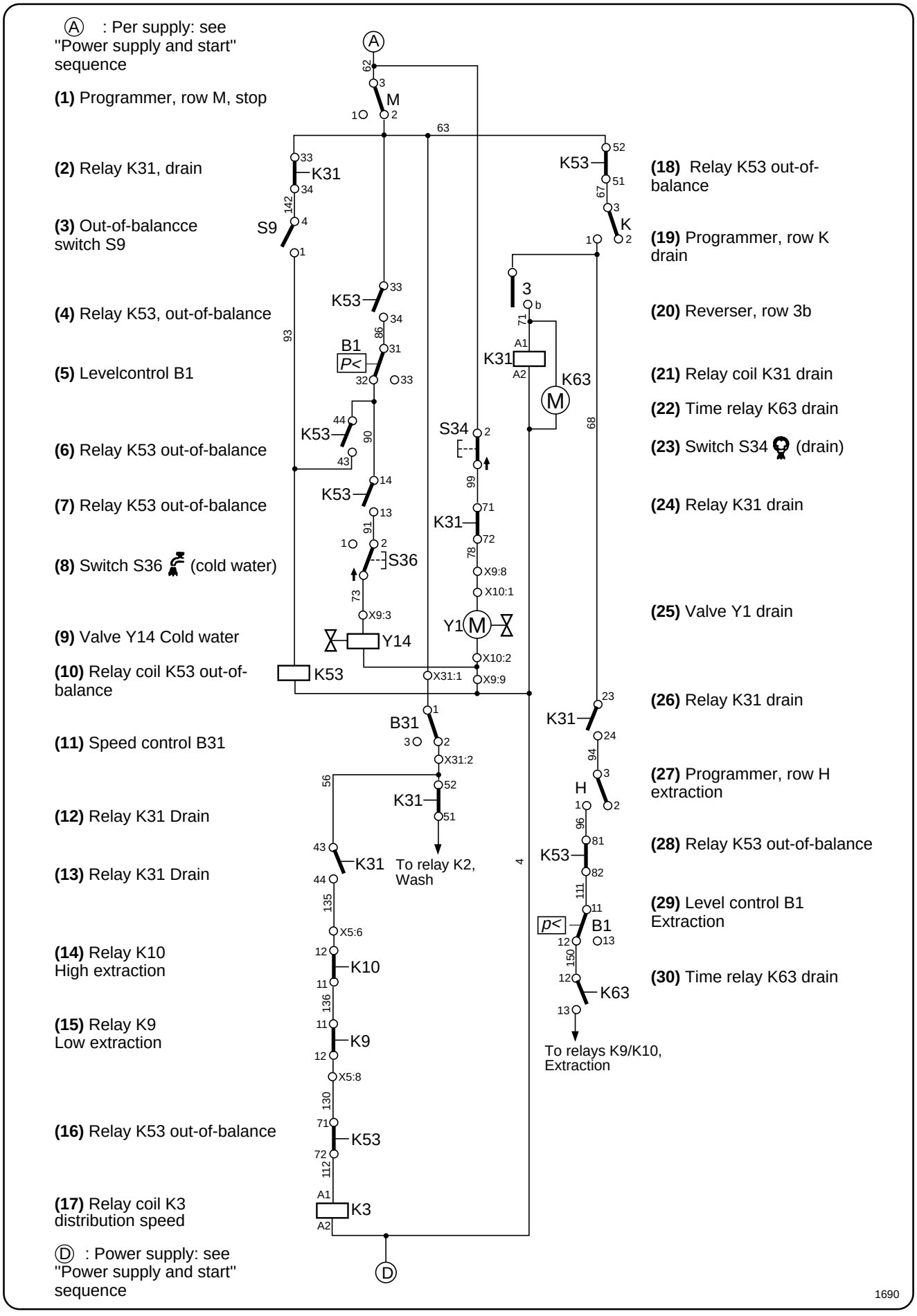
If the drum speed falls below about 310 rpm (220 litre models) or 550 rpm (120 litre models):

- Speed control B31 (11) switches to position 1-2. Since K31:51-52 (12) is closed, this energises relay K2, and the machine starts to run at wash speed.

Once the water reaches the high level:

- Level control B1 (5) switches to position 31-33, cutting the power to relay coil K53 (10). K53 unlocks. Valve Y14 (9) closes.
- K53:51-52 (18) closes, relay coil K31 (21) is energised when reverser contact 3b closes (see ”Distribution speed”). Drain valve Y1 (25) is de-energised (K31:71-72 (24) breaks) and the drain opens.
- K31:51-52 (12) cuts the power to relay K2, K31:43-44 (13) closes, energising relay coil K3 (17). The machine switches from wash speed to distribution speed.
- After about 30 seconds, time relay K63 contact 12-13 (30) closes. If the water level now falls below level control B1 (29)

  minimum safety level (extraction), this energises extraction relay K9 and the extract starts again. At the same time, K9:11-12 (15) cuts the power to relay coil K3 (17).


Ⓐ : Per supply: see "Power supply and start" sequence
(1) Programmer, row M, stop
(2) Relay K31, drain
(3) Out-of-balancce switch S9
(4) Relay K53, out-of-balance
(5) Levelcontrol B1
(6) Relay K53 out-of-balance
(7) Relay K53 out-of-balance
(8) Switch S36 (cold water)
(9) Valve Y14 Cold water
(10) Relay coil K53 out-of-balance
(11) Speed control B31
(12) Relay K31 Drain
(13) Relay K31 Drain
(14) Relay K10 High extraction
(15) Relay K9 Low extraction
(16) Relay K53 out-of-balance
(17) Relay coil K3 distribution speed
Ⓓ : Power supply: see "Power supply and start" sequence
(18) Relay K53 out-of-balance
(19) Programmer, row K drain
(20) Reverser, row 3b
(21) Relay coil K31 drain
(22) Time relay K63 drain
(23) Switch S34 (drain)
(24) Relay K31 drain
(25) Valve Y1 drain
(26) Relay K31 drain
(27) Programmer, row H extraction
(28) Relay K53 out-of-balance
(29) Level control B1 Extraction
(30) Time relay K63 drain
To relay K2, Wash
To relays K9/K10, Extraction
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Programmer advance

The programmer stops at three stages in the wash cycle: during water filling, heating and if the out-of-balance switch trips.

The following general conditions must be met for the programmer to start:

- The door must be closed and locked, and the programmer knob must be at **I** (see ”Power supply and start” sequence).
- Row M, stop (1) must not be programmed.

The events at the different stages in the wash cycle are as follows:

- Water filling

  The programmer motor (11) stops since both level control (6) switch contacts are in the left-hand position. Once the correct level is reached (depending on how row N (5) has been programmed), the level control contacts switch, and the programmer motor is energised again.

- Heating

  During heating, thermostat B11 (7) switch contact is in position 11-13. This cuts off the power to the programmer motor. Once heating has finished, the contact switches to position 11-12, and the programmer motor is energised again.

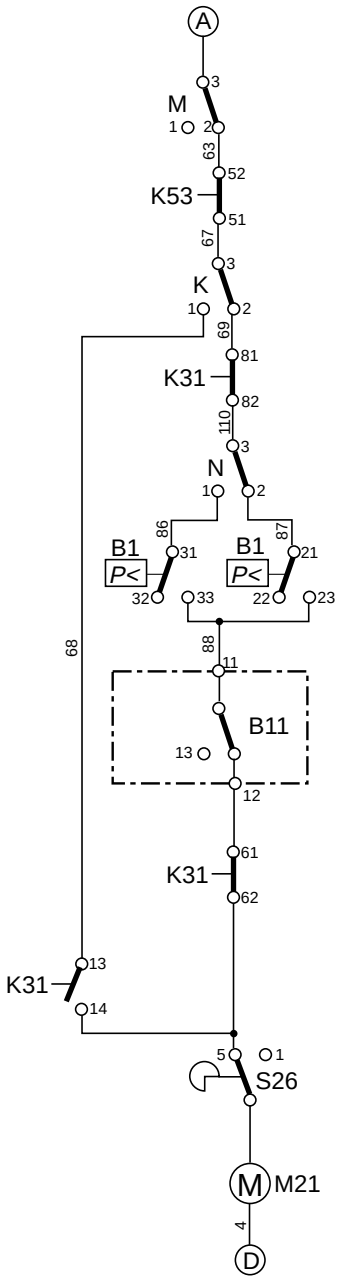
- Out-of-balance

  If the out-of-balance switch trips, relay K53 opens (see ”Out of balance”). K53:51-52 (2) then cuts the power to the programmer motor. At the end of the out-of-balance sequence, K53:51-52 closes again.

- Drain and extraction

  During the drain phase, row K (3) is in position 1-3. Relay K31 is energised during drain. In this case, K31:13-14 (9) is closed and the programmer motor is energised, even once the water level has dropped so that the switch contact on level control B1 (6) cuts the power.

  Since draining also must be programmed during extraction, the above conditions also apply during extraction.



Ⓐ : Power supply: see "Power supply and start" sequence

(1) Programmer, row M, stop

(2) Relay K53, out-of-balance

(3) Programmer, row K, drain

(4) Relay K31, drain

(5) Programmer, row N, high level

(6) Level control B1

(7) Thermostat B11

(8) Relay K31 drain

(9) Relay K31, drain

(10) Switch S26, step programme motor

(11) Motor M21, programmer

Ⓓ : Power supply: see "Power supply and start" sequence

Machine with card programmer

Fig. 1

Y1 Switch ON. Switch acts as main switch for operating circuit.

Y2 Switch RESTART. Switch restarts programme after "programme stop" and stops the advance of the buzzer.

Y3 Swtich GENTLE ACTION, provides gentle action during wash.

Y4 Switch DRAIN opens the drain valves.

Y5 Switch HOT WATER flushes hot water in the machine.

Y6 Switch COLD WATER flushes cold water in the machine.

Y7 Switch DETERGENT. Causes detergent in compartment 1 to be flushed in to the machine.

K2 Relay for wash motor – distribution speed.

K3 Relay for wash motor – wash speed.

K4 Relay for drain.

K5 Relay for restart.

K6 Relay for unbalance cut out.

K9 Extraction relay, low speed

K10 Extraction relay, high speed

K11 Extraction relay, high speed (not used for 380/220 V motor)

X1 Delay unit – relay circuit which delays the switching off of the doorlock's electromagnet from 20 to 30 seconds. This makes it possible to open the door after the corresponding time after the programme stop.

X3 Reverser – provides start impulses to reversing and extraction giving programme controlled drain and distribution respectively.

X4 Buzzer – to indicate programme stop.

X8 Timer relay – drain.

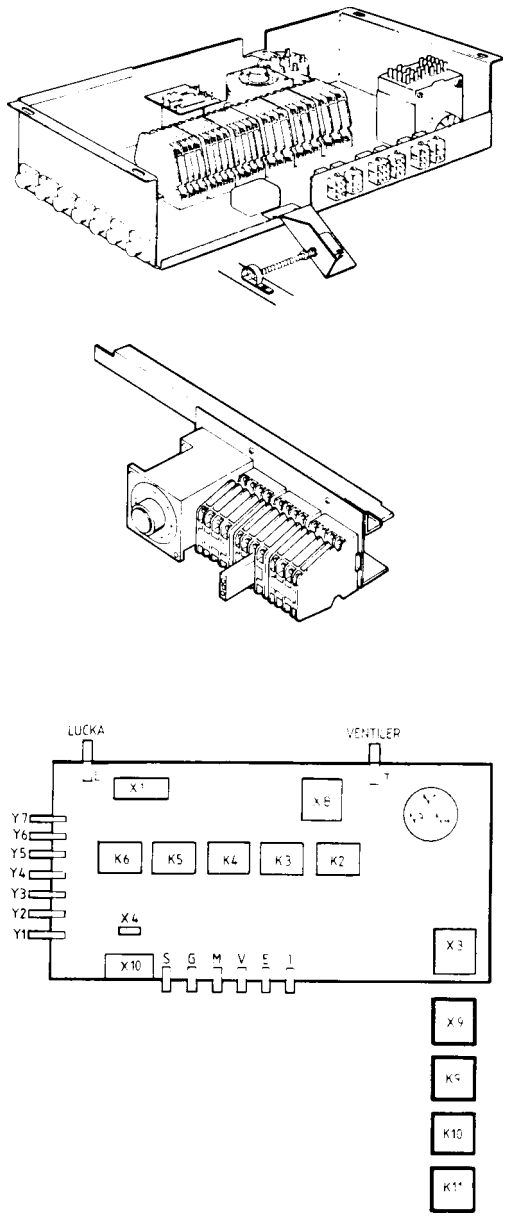
X9 Timer relay – extraction.

X10 Unbalance cut out.

N Level switch – pressostat to guard the water levels. This is connected to the drain valve's riser to the drum. The level switch also prevents heaters coming on without water.

S, G, M, V, E, I, L and T are contact components for quick connections of the different units to the automatic unit.

1



2440

Machine with frequency control

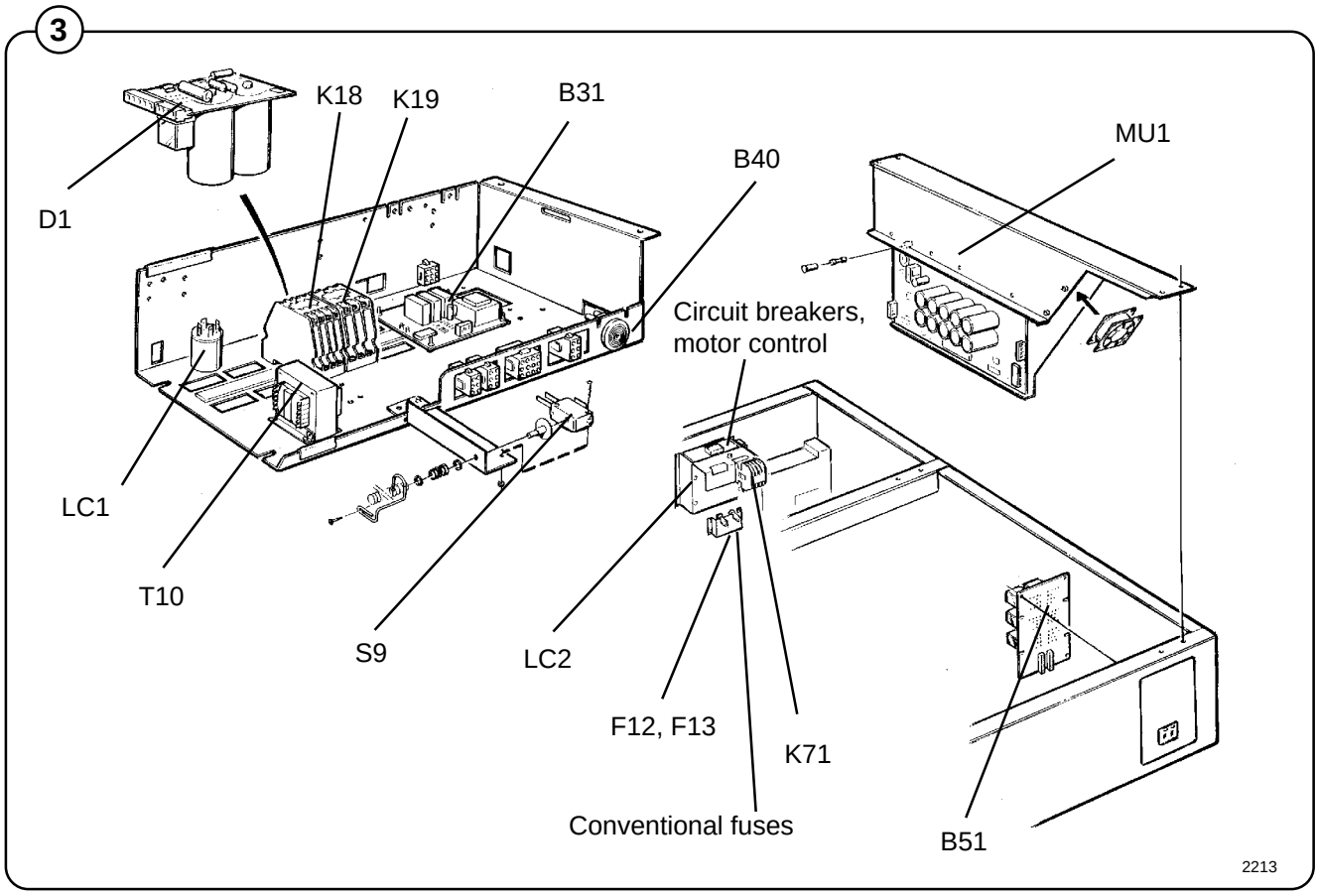
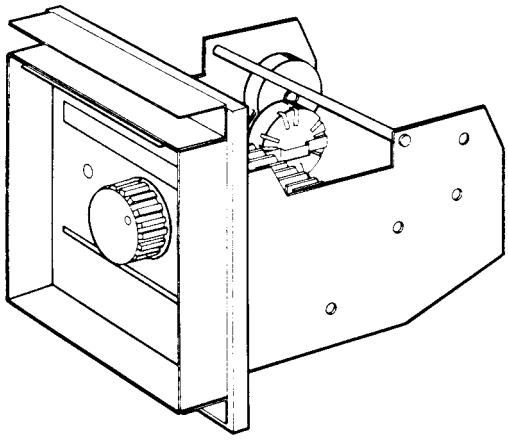


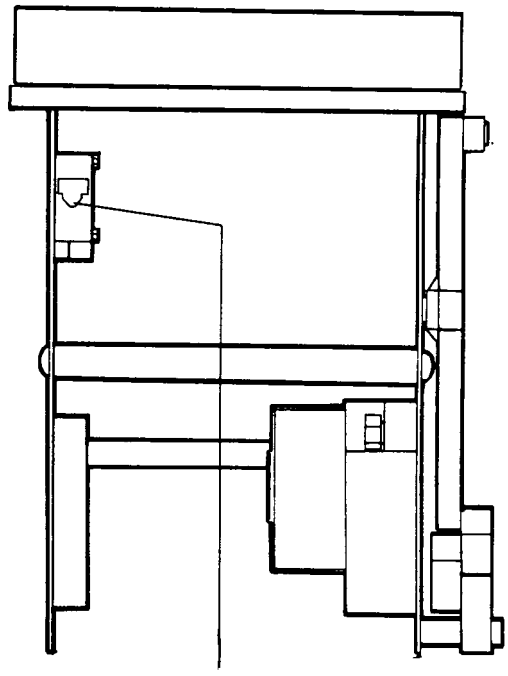
Fig. 3		
	B31	Rotation guard for sensing that the drum has stopped before the door can be opened. This guard also indicates that the drum is actually rotating when the motor is operating.
	B40	Buzzer to indicate program stop
	B51	Speed selector for extraction speed
	D1	Delay unit - a capacitor circuit which delays switching off of the door lock solenoid, and thereby makes it impossible to open the door before the delay time has expired.
	F12, F13	Motor fuses
	K18	Relay - drain tank
	K19	Relay - pump
	K71	Relay MU1
	LC1	Interference suppression unit.
	LC2	Interference suppression unit.
	MU1	Motor control unit for main motor’s direction of rotation, speed and times at various program steps.
	S9	Unbalance switch
	T10	Transformer

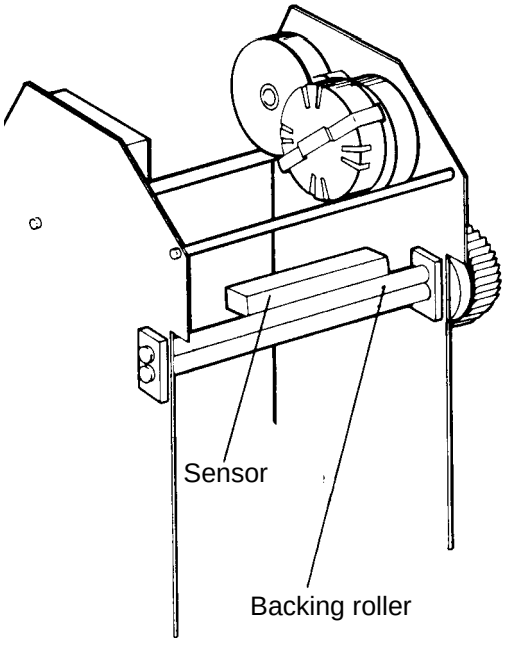
Description

The automatic card device controls machine functions such as filling of water, drain, spin etc. The automatic card device has a row of microswitches (16) which sense the absence of pegs in the tracks on a programmed card. The automatic card device has a motor which advances the programmed card one step (one peg) each 30 seconds. During the filling of water and heating the advance of the card is stopped till the relevant function is completed and the correct water level and the temperature selected on the thermostat have been reached. The advance of the card continues when the functions are completed.



Automatic card device





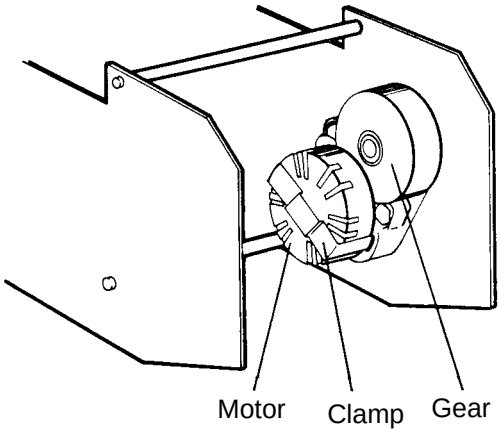
Repair instructions

- Check that the synchronised motor of the automatic card device is live. Note that the microswitch (side H, Y11) which reads the dial must be actuated. The microswitch for the synchronised motor (V-side) must also be switched on.
- Check that the backing rollers are clean and that the track followers between the card and the microswitches are clean and run smoothly. (The card can often leave detergent on the backing rollers and track followers).

If the syncronised motor receives power but the motor is not running:

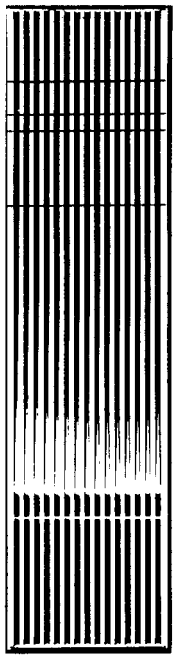
– Remove the clamp which holds the motor and check that the output shaft of the motor revolves. (A fully synchronous motor can only rotate in one direction.

– If the motor functions, change the driving gear.



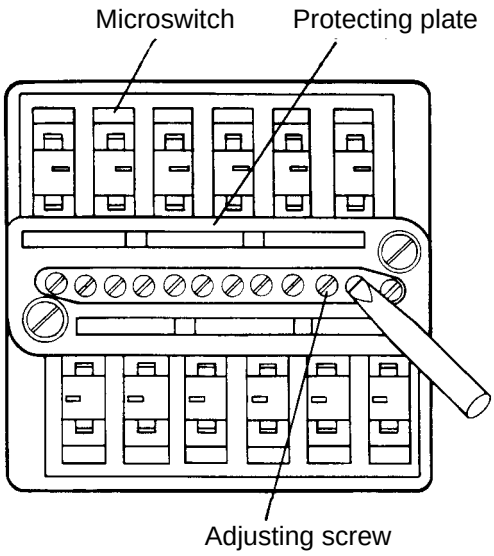
To check the microswitches:
(A special test card is available to adjust and chek the microswitches. The card is inserted in the automatic card device with the coloured area facing up and on the right. Use the edge of the opening as an indication line).

1. Turn the automatic card device dial to position O.
2. Insert the card.
3. Turn the automatic card device dial to position 1.



Test card for microswitch control

4. Slowly push the card out and in and check that all the microswitches switch off (within the two areas on the card). It is advisable to use a buzzer for this check.
5. If any of the microswitches need to be changed/ adjusted, remove the two screws which hold the black protecting plate and remove the protecting plate. If necessary, replace faulty microswitches.
6. When carrying out adjustments the test card shall be inserted so that the white area on the card is situated at the edge of the opening of the device. Using the screw, adjust the microswitch so that the screw switches to the ON position.
7. Repeat point 4 in order to check that the switch is in the correct position.



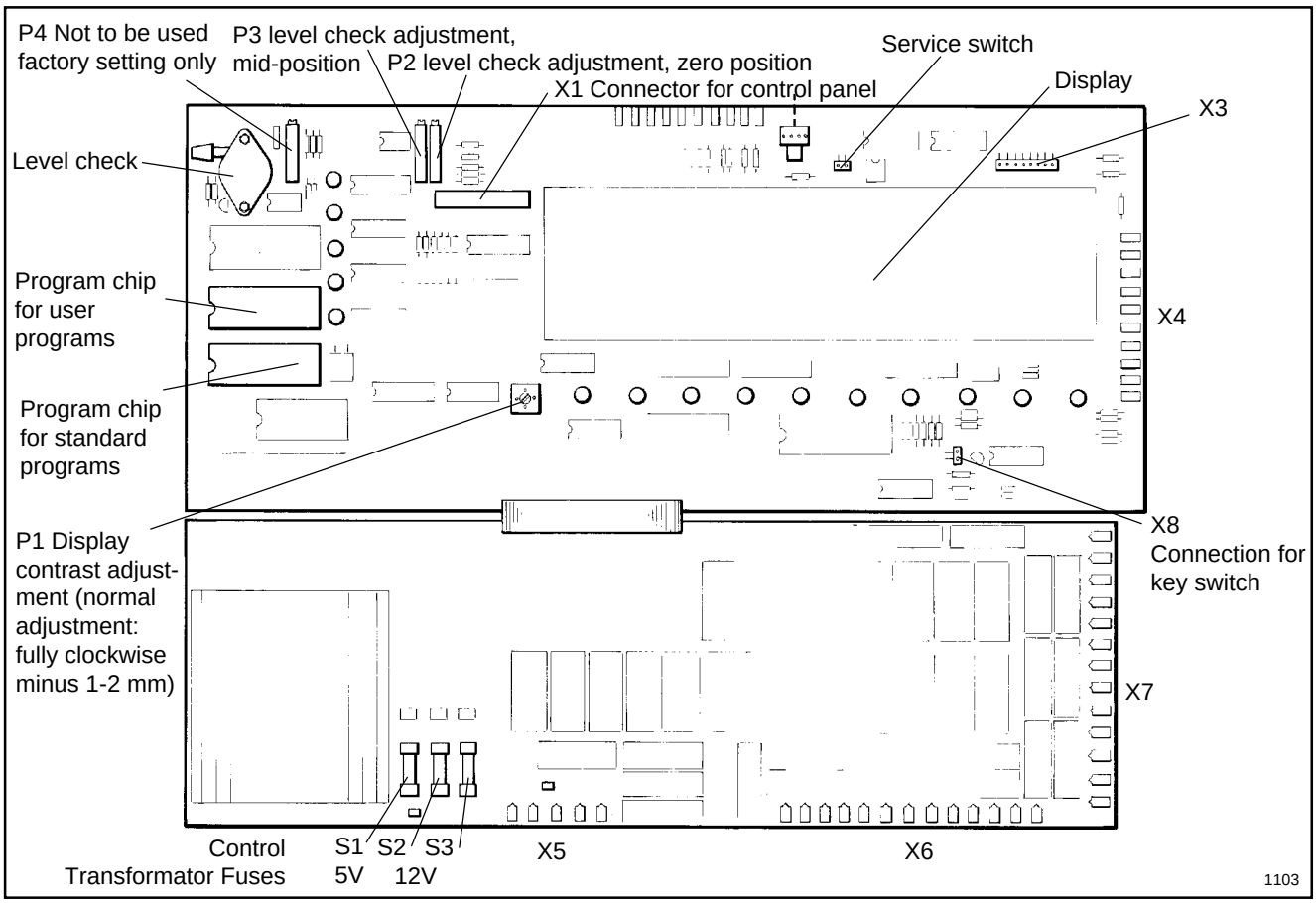
Description

The programmer is electronic and is made up of two circuit boards, the control board with microprocessors and program memory, and the relay board with relays and interference suppression circuits. The programmer has the following outputs and inputs:

- Outputs which, via relays, control the various functions of the machine such as water fill, drain, spin etc.
- Outputs which control the information that is to appear on the display.
- Inputs that detect keystrokes from the keyboard.
- Inputs that give information about the status of the washing machine from, for example, thermostat sensors, level detectors, out-of-balance detectors, door lock and speed switch.

The programmer is controlled by the instructions stored in the program memory. The memory is in the form of two memory chips (see diagram below):

- The lower chip, which contains memory information that cannot be changed, contains instructions about operation, service program, relay control, sensing of inputs etc. It also contains the standard programs supplied with the machine on delivery.
- The upper memory chip stores programs created by the customer. The content of this memory can easily be changed by erasing unwanted programs and creating new ones.



Repair Instructions

A faulty electronic unit must be replaced, not repaired.

Removing the circuit board

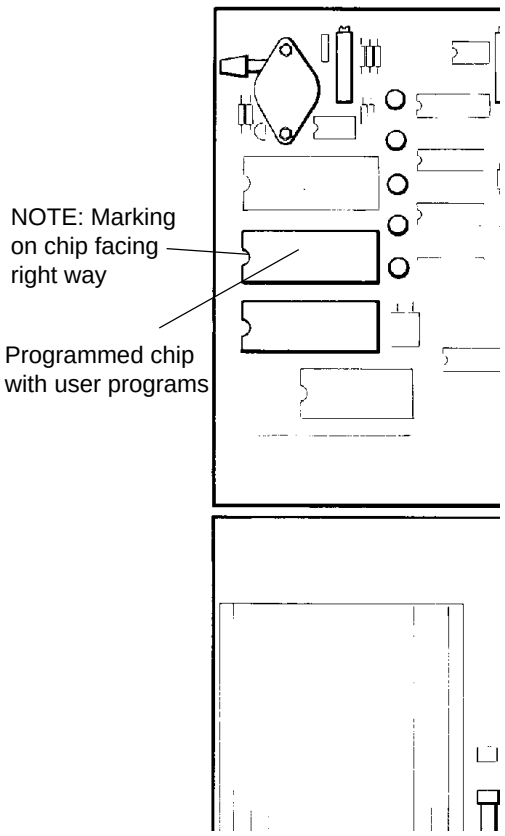
- Unplug the board connectors and the tube to the level detector (see diagram below).
- Unscrew the 6 screws that secure the board.
- Unplug the connector from the keyswitch and the ribbon from the control panel.

Changing the memory chip for user programs

If the control board has to be replaced, the program chip containing programs created by the user may be moved to the new board, provided the chip is not faulty.
Carefully remove the chip from its socket and transfer it to the new board.

IMPORTANT

The memory chip must be installed the right way round in accordance with the markings on the chip and the socket.



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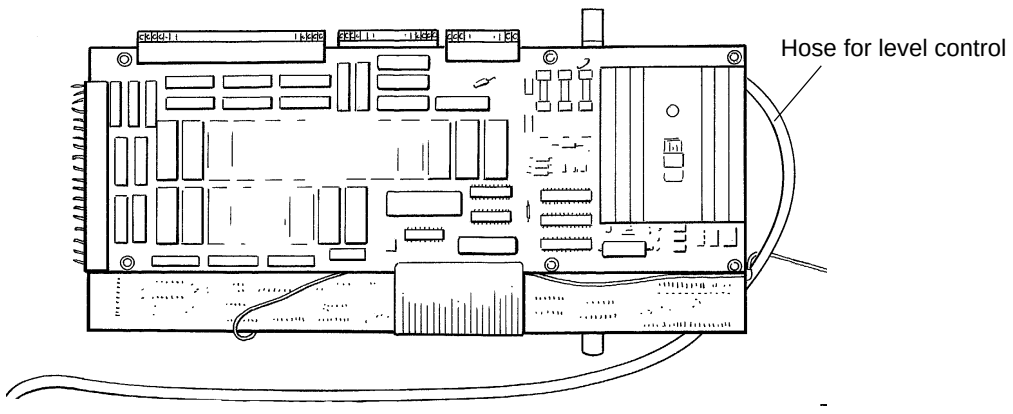
Check that the programs in the transferred memory chip can now be selected with the new circuit board.

Check that the programs statistics are correct (by selecting program number 00 and pressing PROG INFO). The statistics display must not show the characters ?\>, only numbers.

If any of the above does not work, the original memory supplied with the new board must be installed and the wash programs will have to be reprogrammed.



Example FLE 360

1379

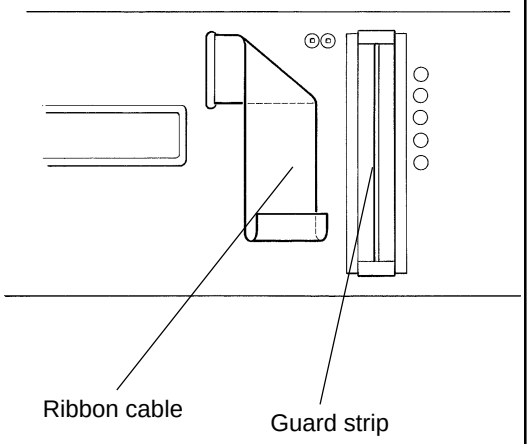
Installing the circuit board

- Plug in the connectors from the keyswitch and the ribbon cable. Note that the ribbon cable must be folded as shown in order to be plugged in the right way round.
- Check that the guard strip between the board and the control panel (see sketch) is in position.
- Secure the board with the 6 screws and put back the board connectors and the tube to the level detector.

Removing the control panel and circuit board

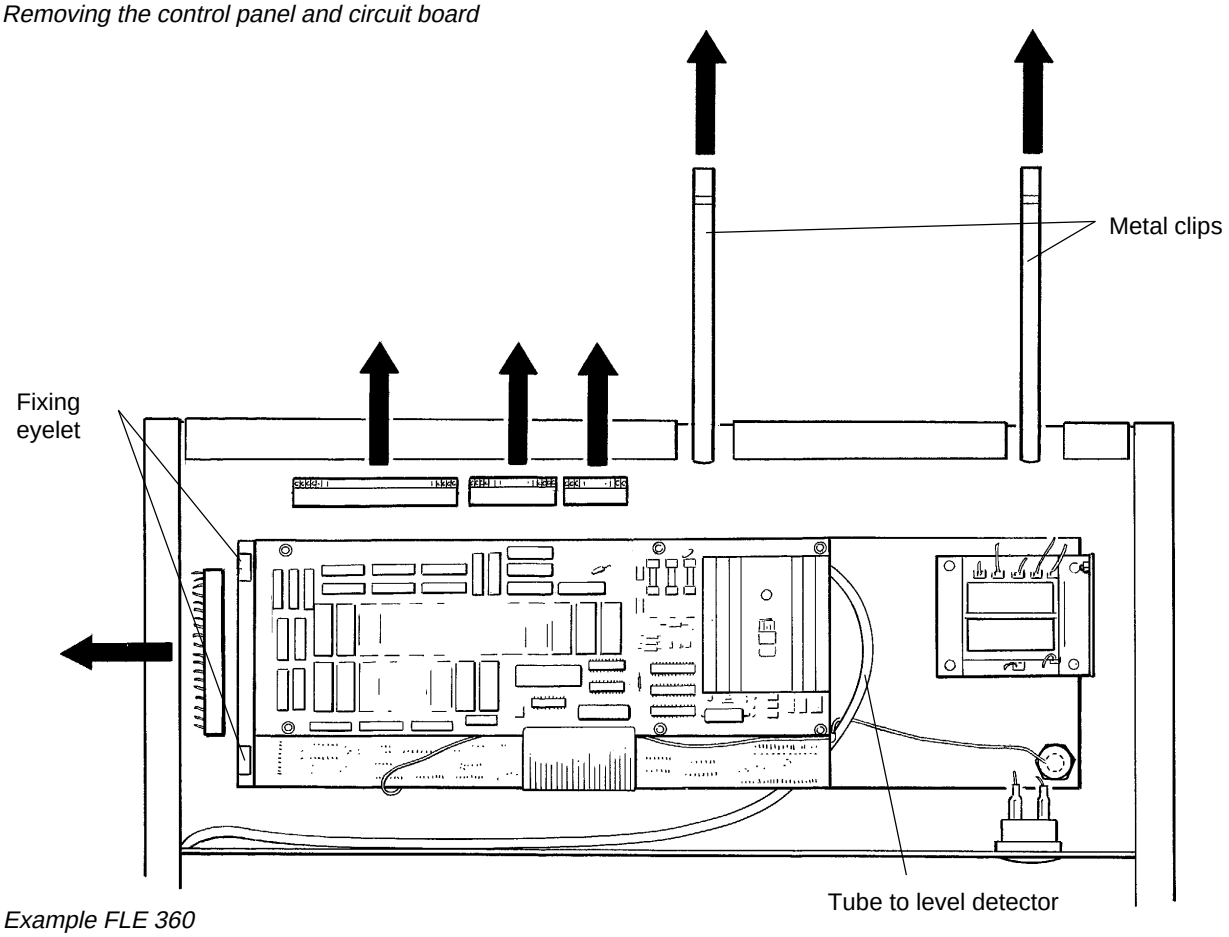
- Unplug the board connectors and the tube to the level detector.
- Remove the two metal clips by pulling them straight upwards.
- Pull the unit forward and outward so that the two metal tongues unlatch from the fixing eyelets.

Installing the ribbon cable



1380

Removing the control panel and circuit board

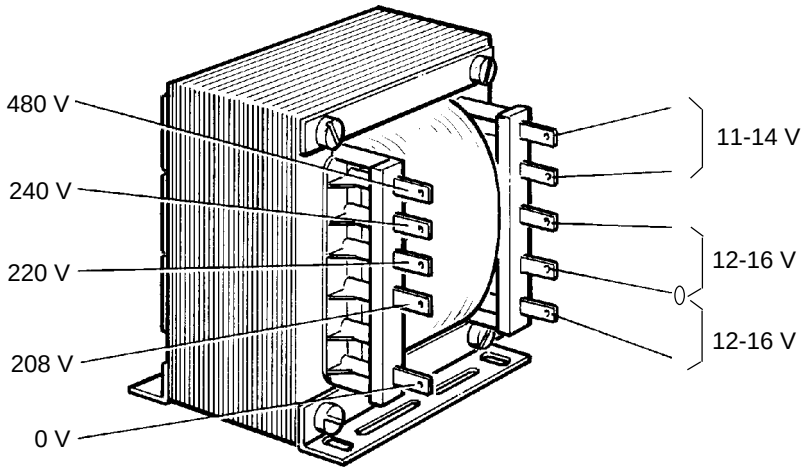


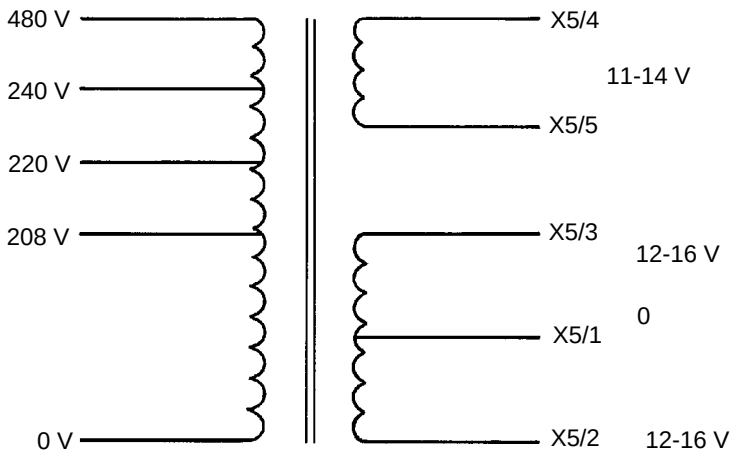
Example FLE 360

1378

Control transrormer

On the primary side of the control transformer there are four terminals for 208, 220, 240 and 480 volt, and a neutral terminal. There are two secondary windings, one of which has a centre tap. The secondary voltages are 11-14 volt and 2 x 12-16 volt. The diagram of the transformer is given below. On the secondary side there are references to the second board terminal numbers for the control voltages.





1105

Description

The revering and gentle action of the machine are controlled by the reverser. This contains a reversing cylinder with permanent cams which actuate the making and breaking contacts. The reversing cylinder is driven by a synchronised motor which rotates once in 3 minutes.

Repair instructions

Checking the reverser motor

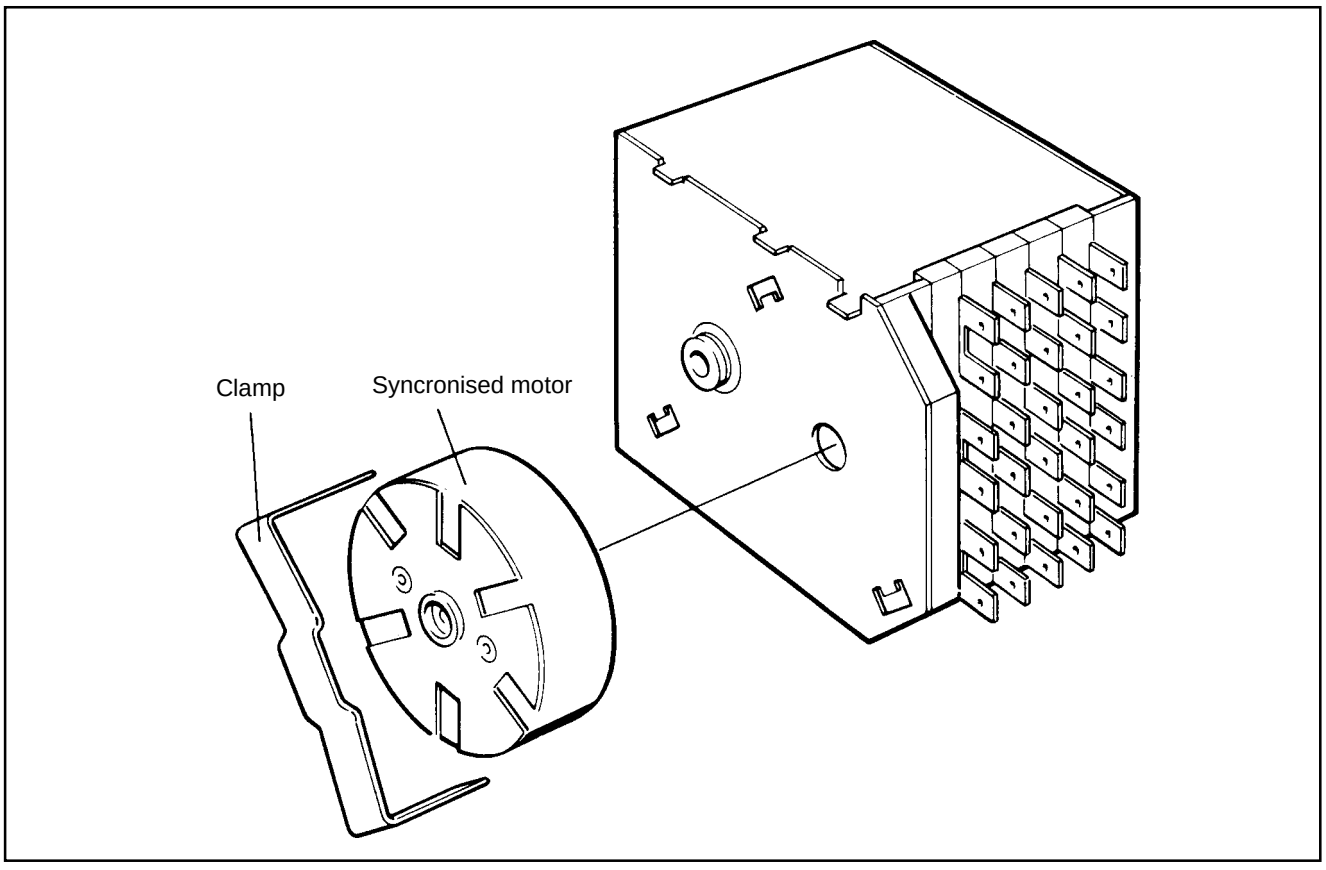
- A complete motor can only rotate in one direction.

If the reverser motor is live but the motor is not running, replace the motor.

- Remove the clamp which holds the motor.
- Mark up the push ons of the motor connections and remove them.
- Replace the motor with a new one. Check that the cogs enter the reverser correctly.
- Connect the cables and put back the clamp.

If the motor runs but the reverser cylinder does not advance, change the entire reverser as this has an internal fault.

No other measures are recommended for the reverser.



Data

The contactor can handle a nominal voltage of +10%-15%.

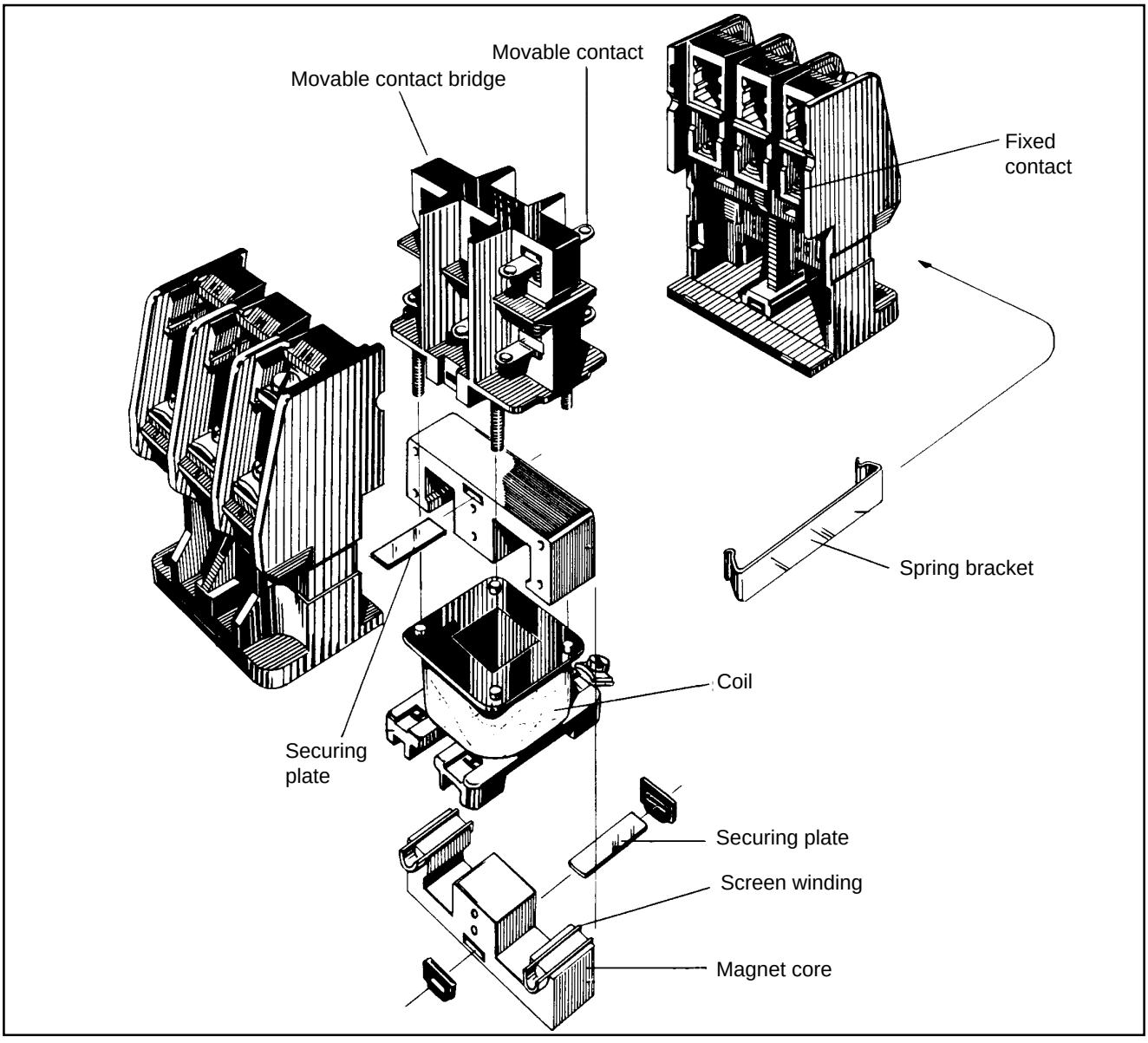
Description

The contactor consists of:

- Housing in two halves with fixed, make and break, contacts. The halves are secured by spring brackets.
- Movable contact bridge with movable contacts.
- Solenoid with coil and core.

The upper half of the core is suspended by springs and attached to the moving contact bridge.

The fixed, lower half of the core is fitted with screened windings which divide the flow through the core. The flow must never falls to zero and mains hum is prevented.



Repair instructions

The contactor fails to make or break

- Check that the operating coil is energised. If this is the case, take measurements at the coil to check for a break. If a break has occurred, replace the coil as follows.
- Undo the contactor and lift it out.
  NOTE! The connection cables to the contacts do not need to be removed.
- Price apart the spring brackets and carefully take the contactor halves apart; be carefully so that the movable contacts do not jump out.
- Loosen the connections to the coil.
- Replace the coil.
- Prior to reassembly, check that the contact surfaces to the magnet core are clean and undamaged.
- Reassamble and replace the contactor.

The contactor hums considerably

- Loosen and take the contactor apart as described above.
- Check whether or not the screen windings are intact. A damaged screen winding causes a loud hum. If this is the case, replace the contactor.
- Check for foreign particles on the contact surfaces of the magnet core. Clean carefully with a fine emery cloth if necessary.

The contactor sticks

- Undo and take the contactor apart as described above.
- Check that there are no burrs on the coil bobbin which brake the motion of the movable contactor halt. Where necessary, deburr.
- Check that the movable contact bridge can move freely in the contactor housing and that the movable contacts are correctly seated in their holders.

Other contactor faults

- Replace the contactor.

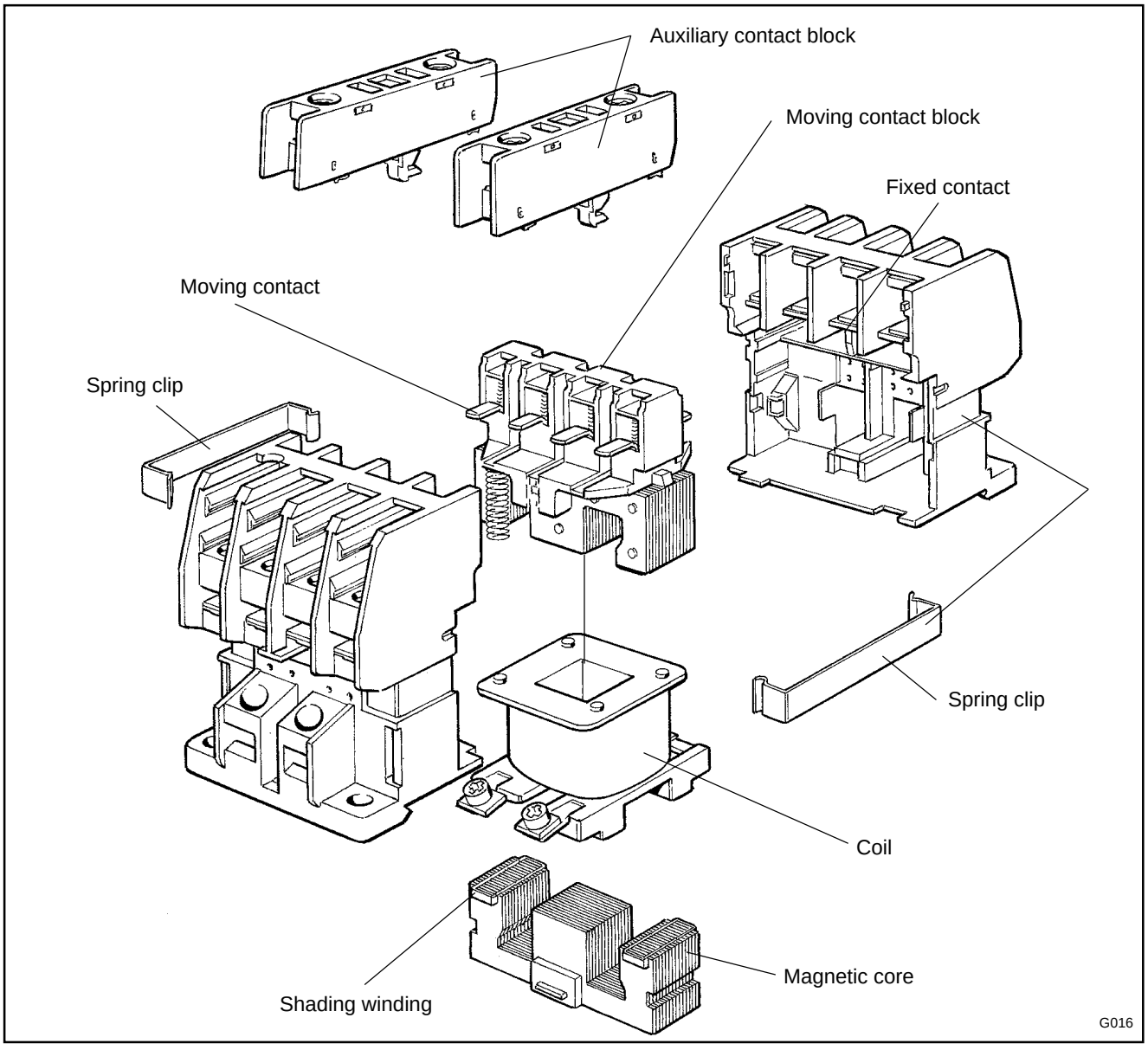
Description

Each relay consists of:

- A casing in two halves, containing six normally-open and/or normally-closed contacts. The two halves are held together by spring clips.
- A moving contact carrier containing moving contacts.
- A soleniod, with coil and core.
- (Optionally) an auxiliary contact block, for increasing the number of contacts.

The magnetic core is split, with the upper part, which carries the moving contact block, being spring-secured.

The fixed, lower portion of the core carries shading windings which modify the phase of the flux trough the core, so that it never reduces to zero, eliminating 50/60 Hz hum.



Relay repairs

The relay does not open or close

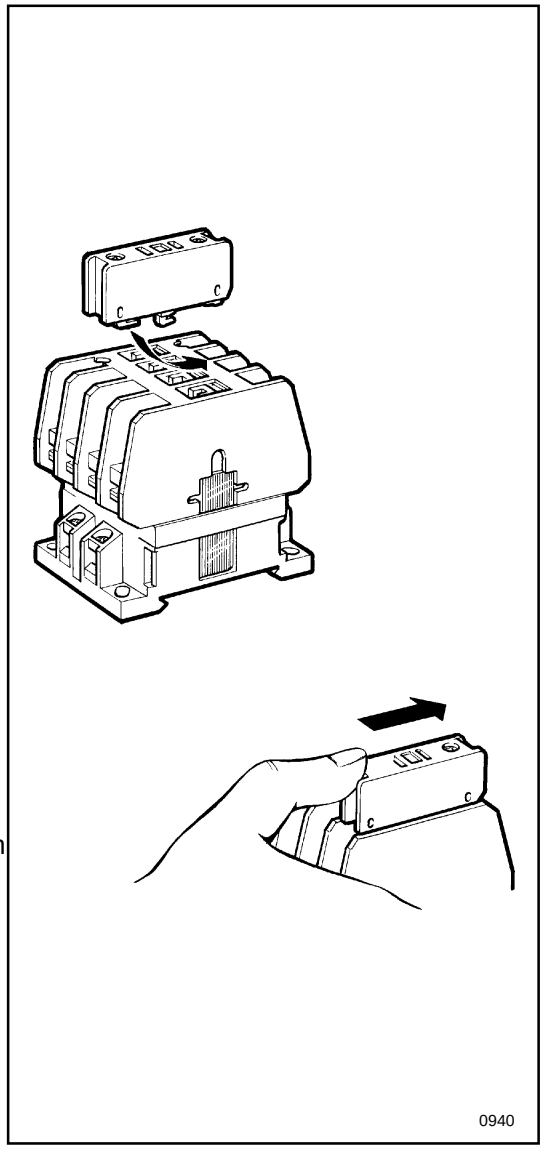
- Check that the coil is energised. If so, check its continuity. If the coil is open-circuited, replace it as follows:
- Remove the auxiliary top contact block as described below under Replacement of Auxiliary Contact Block.
- Undo the connector and remove it.
  NB: The wires to the contacts do not need to be removed.
- Prise off the spring clips and carefully separate the two halves of the main relay block. Be careful not to allow the moving contacts to spring out.
- Remove the connections to the coil and replace the coil.
- Before re-assembly, check that the surfaces of the magnetic core are clean and undamaged. Re-assemble and reposition the connector.

Loud hum from the relay

- Unscrew and disassemble the relay as described above.
- Check that the shading windings are undamaged – damaged shalding windings will result in considerable hum. If the windings are damaged, replace the entire relay.
- Check that there are no foreign particles adhering to the contact surfaces of the core. If necessary, carefully clean the surfaces with fine emery cloth.

Relay is sticking

- Remove and dissamble the relay as described above.
- Check that the coil does not have any sharp edges or flash that are/is preventing free movement of the moving part of the core. Rub off any sharp edges or flash if necessary.
- Check that the moving contact carrier can move freely in the relay casing, and that the moving contacts are correctly located in their housings.



Relay is sticking

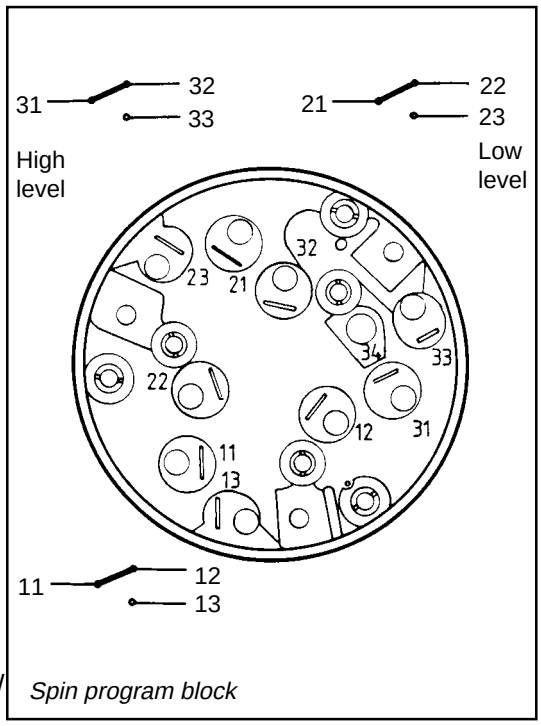
- Replace the relay.

Replacement of the auxiliary contact block

- Remove the auxiliary contact block as follows:
  – Using one finger, press the rear edge of the auxiliary contact block forwards and upwards until the block disengages. (The rear edge is that which is marked HN01/HN10: see diagram).
- Fit the auxiliary contact block as follows:
  – Position the auxiliary contact block on the body of the relay so that the black tab of the auxiliary contact block locates in the pole clips and the red tab locates in the recess in the moving contact block (see diagram).
  – Press the auxiliary contact block backwards until its rear edge drops down and clips into position.
- Check that the auxiliary contact block is operating properly, as follows:
  – Press and release the red/green pin in the middle of the auxiliary relay block, and check that the moving contact carrier moves freely without binding.

Description

The level control is a pressure guard which controls different pressures, i.e. water levels, independent of each other. The level control has two filling levels and a third level which blocks the spin cycle so that it cannot start while there is water in the drum. The terminal configuration is illustrated in the adjacent figures.



Spin program block

Control instructions

All level controls for the different machines are set by the factory. These settings should not normally be changed. For this reason, the level controls are sealed with locking varnish.

Caution! The machine's guarantee ceases to be valid if any adjustment is made to the level control.

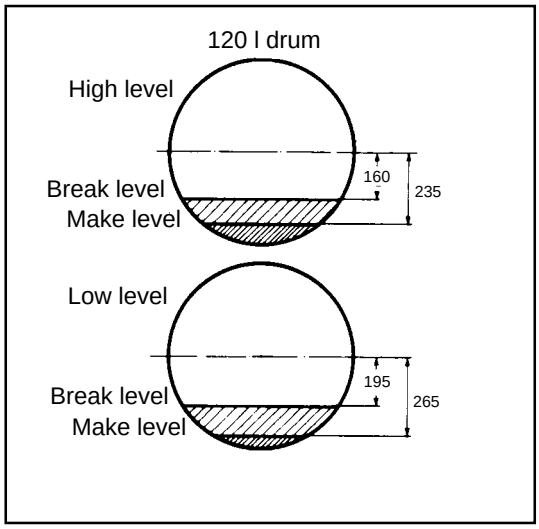
In special cases it is possible to change the break and/or make level – but only within a limited range. This is because each break level requires a special set of pressure springs.

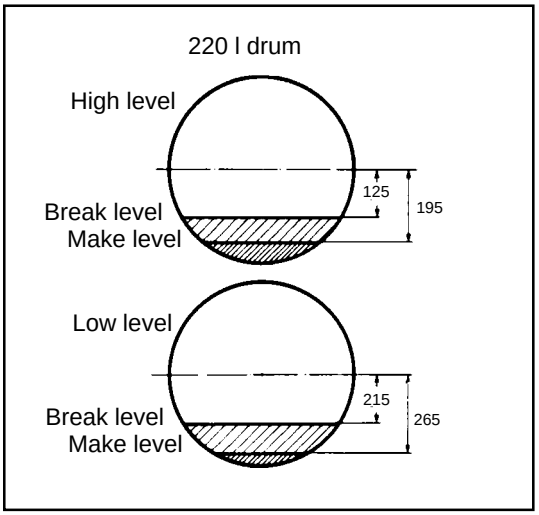
Control of water levels

- Start the machine and select a standard program. Check the low level during pre-wash or main wash, and high level during rinse. Fast forward with the start button. Check that the levels agree with the illustrations.

Action in the event of overfilling

- Check the hole in the nipple on the underside of the level control. Clean as required. Note that the hole has a restrictor which must not be enlarged.
- Check that the hose to the drain is not blocked. Clean as required. Clear the hose with compressed air and without water in the machine.
- Check that there are no holes in the hose caused by abrasion. This may happen occasionally if the hose lies against the drive wheel.
- Overfilling can also result from burnt contacts. Replace the level control if this is the case.





Water levels in relation to the centre of the drum.

The machine does not fill with water

- Check that the nipple on the underside of the level control is not blocked. A blockage can be caused by residual pressure below the level control's membrane indicating incorrectly that a level has been reached.
- Check the level control's function as follows:
  – Connect a measuring instrument across the terminal pin.
  – Remove the hose from the drain valve.
  – Blow carefully into the hose and check the terminal's function with the measurement instrument.
- The machine not filling with water can also be caused by burnt contacts. Replace the level control if this is the case.

Replacing the levelcontrol

Identify the connections, i.e. by marking, so that they can be connected to the correct pins.

- Clear the hose with compressed air before the new level control is fitted.
- There must be no water in the machine when the control is replaced.

Calibrating the level detector

The level detector is at the left-hand end of the circuit board. Both zero level and mid position must be calibrated. Potentiometers P2 and P3 are used for these adjustments.

IMPORTANT

Do not adjust potentiometer P4. It is used for factory adjustments only.

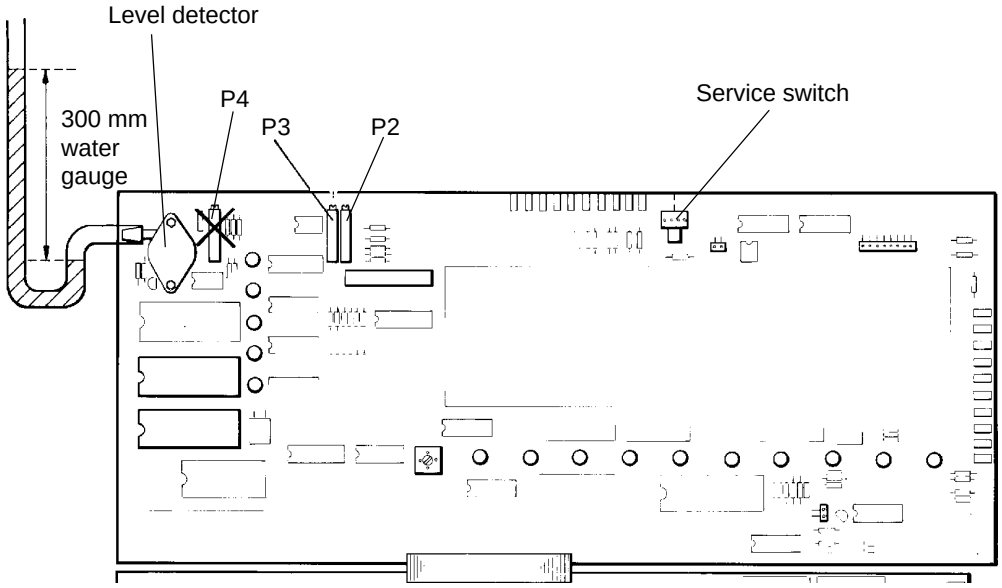
Adjust the zero level before the mid level.

Zero level adjustment

- Make sure there is no water in the drum.
- Set the service switch to position 4, Service program
- Disconnect the tube from the level detector.
- Read off the level on the display (bottom row, left). The reading must be between 0 and 4.
- If necessary, adjust with potentiometer P2.

Mid-level adjustment

- Connect a pressure of 300 mm water gauge to the level detector. See example below.
- Read off the level on the display (bottom row). The reading must be between 126-128.
- If necessary, adjust with potentiometer P3.



Setting the water level

This is the procedure for determing how many "units" are needed to reach a given water level in the drum (so that this value can be entered in the wash program):

- The key on the control panel of the machine must be in the **WASH** position. Set the service switch to posotion 4, Service program.
- Press **O**, **1** and **START**. This activates the cold water valve and the level detector. (To activate the hot water valve, press **0**, **2**, and **START**). The following text appears on the display:

```
SERVICE PROGRAM CHOOSE FUNCTION 001
COLD WATER
**ON**  LEVEL: 1>XXX  2>XXX  3>XXX
LEVEL XXX  TEMP. XXX°C
```

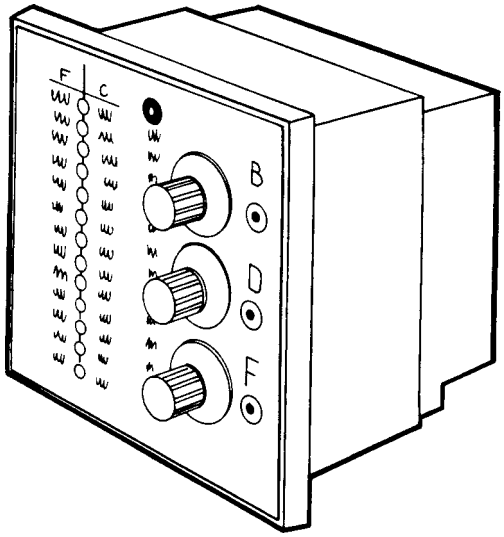
LEVEL 1, 2 and **3** show the manufacturer's recommended figures for level 1 (Empty), level 2 (Low) and level 3 (High) for this model. **LEVEL 1** (Empty) is used by the microprocessor as a limit value for opening the door, switching on heating elements (if any) and starting the spin. **LEVEL 1** cannot be reprogrammed and is shown as a reference only.

The reading at **LEVEL** on the bottom line of the display increases as the water level rises in the drum. When the desired level is reached, press **START** again to shut the water walve. The water level can now be read off on the bottom line.

The **TEMP**. indicator shows the inlet temperature of the water. On the basis of this figure the programmer can determine exactly the inlet temperature of the water when choosing **COLD WATER** or **HOT WATER**. If the model in question does not have built-in heating elements or steam heating, the highest possible water temperature is determined by the inlet temperature of the hot water (which may be very much lower than the outlet temperature from a water heater unit because of losses in pipes).

Data

Area from – to	approx 3°C
Max temperature for bulb	150°C



Description

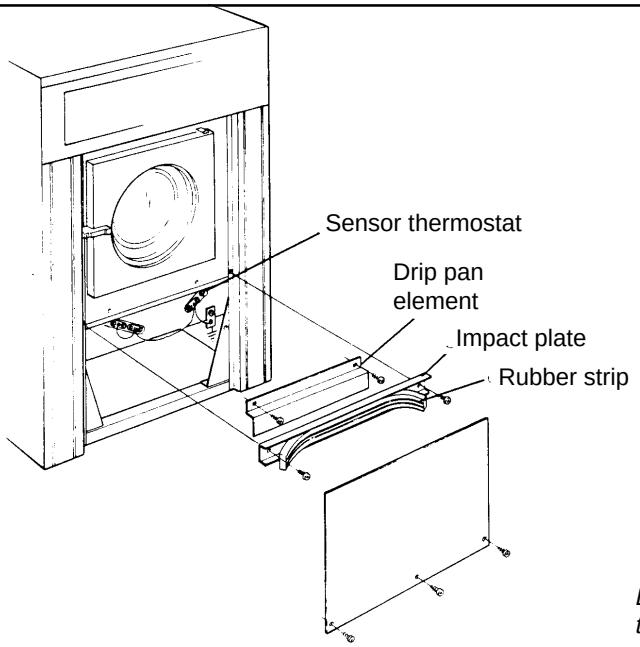
The thermostat checks the temperature during the course of the programme. The relays of the heating element are actuated by making and breaking contacts.

The thermostat sender (NTC resistor) is situated at the bottom of the outer drum to the right of the heating element. Cables go from the sender to the thermostat, which is situated in the operating panel. The resistance signal from the sender to the thermostat is determined by the water temperature. When the input signal has reached the value selected on the different contacts, the relevant contacts, B, C and D are activated. The selection of the appropriate contact is controlled by the programmed card in the automatic card device.

Repair instructions

Thermostats should be replaced, as repair is not recommended. Replacement of sender: To prevent heating of the sender, a digital instrument shall be used to measure the sender (NTC resistor). The resistance between the sender cables shall be 1 kohm at room temperature).

- Remove the protection plate at the bottom of the front of the machine.
- Bend up the rubber strip on the rail and unscrew the rod. Remove the drip pan, see illustration.
- Release the sender cables from the thermostat. Remove the sender and replace it with a new one.
- Connect the sender cables to the thermostat terminals 6 and 7.



Dismantling sender thermostat

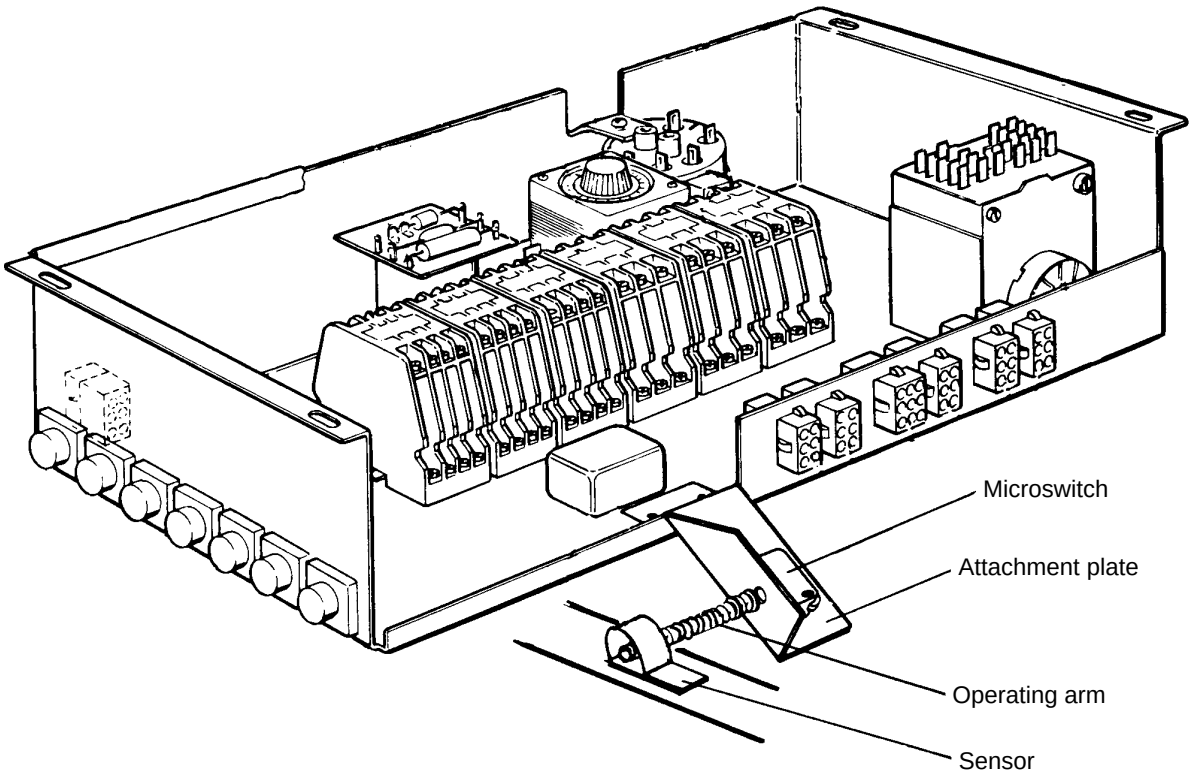
Description

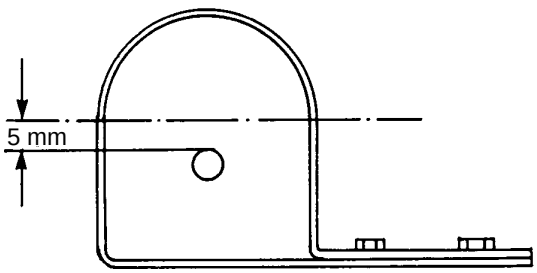
The unbalance cutout is a safety device. This prevents the machine from being damaged during spinning as a result of uneven distribution of the washing.

This unbalance cutout consists of microswitches and an operating arm installaed in the automatic unit, together with a circular sensor which is installed in the counterweight of the machine.

If the counterweight, and subsequently the sensor, move outside a certain area, the sensor will activate the microswitch via the operating arm. The operating power to the spin relay is consequently cut and the timer switches over to washing speed while at the same time the machine takes in cold water to the high level. The timer then switches over to distribution speed and a new attempt to spin is made.

For further detailes see "12. Operational Sequences".





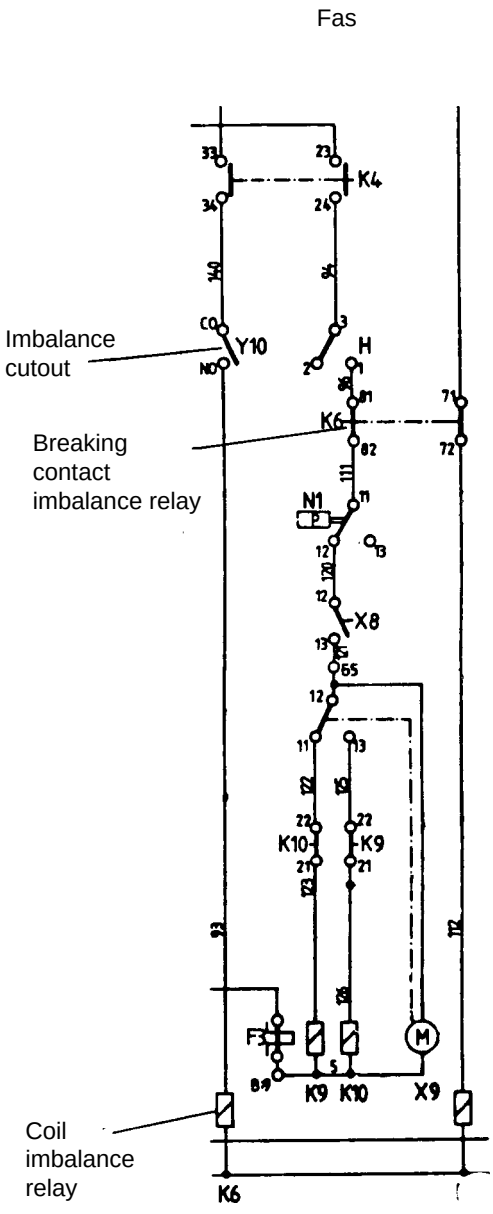
Repair instructions

Checking the adjustment of the unbalance cutout

- When the machine is empty, check that the operating arm of the unbalance cutout is situated 5 mm under the centre of the sensor. If necessary, adjust by
  – moving the sensor
  – carefully bending the attachment plate of the microswitch.

Unbalance cutout switches off several times

- Unsuitable batch of washing.
- Unbalance cutout incorrectly adjusted, see above mentioned check.
- Inferior shocks absorbers, see "43. Frame".



Imbalance cutout

Description

up to machine No. -91/5500 (120 l machine)
-91/5874 (220 l machine)

Fig. 1

The machine safety locking device is a safety system which prevents personal injury through the following precautions.

- The machine cannot be started until the door is shut.
- The door is automatically locked when the machine starts.
- It is not possible to open the door until 20-30 seconds have elapsed after the washing programme has ended. This ensures that the drum is motionless when the door is opened.

Warning!
Before opening the door of machines with an automatic card device it is essential to check that the water has been emptied for the drum, either manually or via the programme card.

Brief descripton of the function of the safety docking device

1. Door locked	Microswitches on the side of the door lock ON.
2. Timer at position 1.	Door lock's solenoid A1 locks the handle making it possible to open the door. The door lock's micro-switch is actuated by the solenoidand arrives at position ON.
3. Programme is run.	
4. Programme end. Pro-gramme dial in pos. 0.	Capacitor in the delay circuit X3 is discharged over the solenoid. The solenoid releases after 20-30 seconds, the handle is desengaged and the door may be opened.

Repair instructions

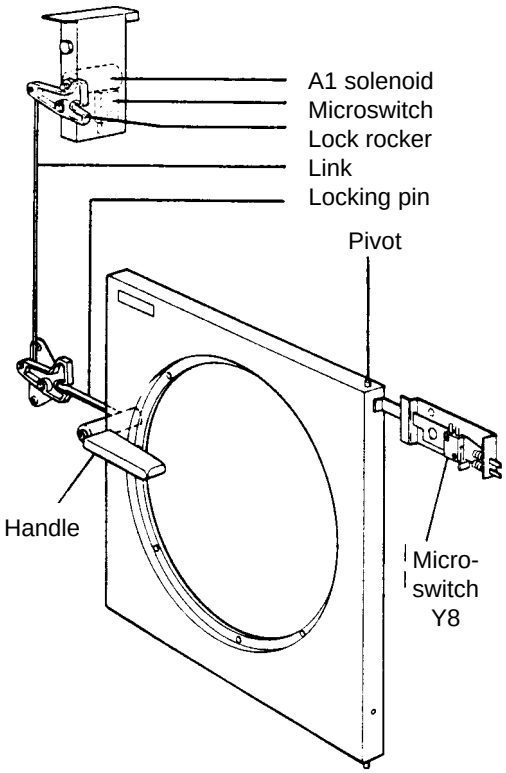
If the solenoid does not lock the door.

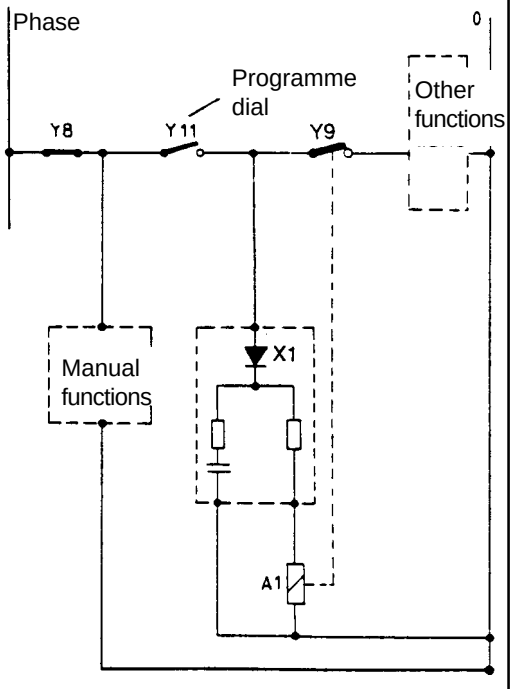
- Check that the coil is receiving 100-110V direct voltage. Measure the coil to determine if there is an interruption.
- Check that the armature of the solenoid is not stuck.
- Replace the entire solenoid.

Other possible faults:

- Faulty microswitch.
- Faulty delay unit.
- Mobile parts jammed.
- Handle not in lock position.

1





2221

Description

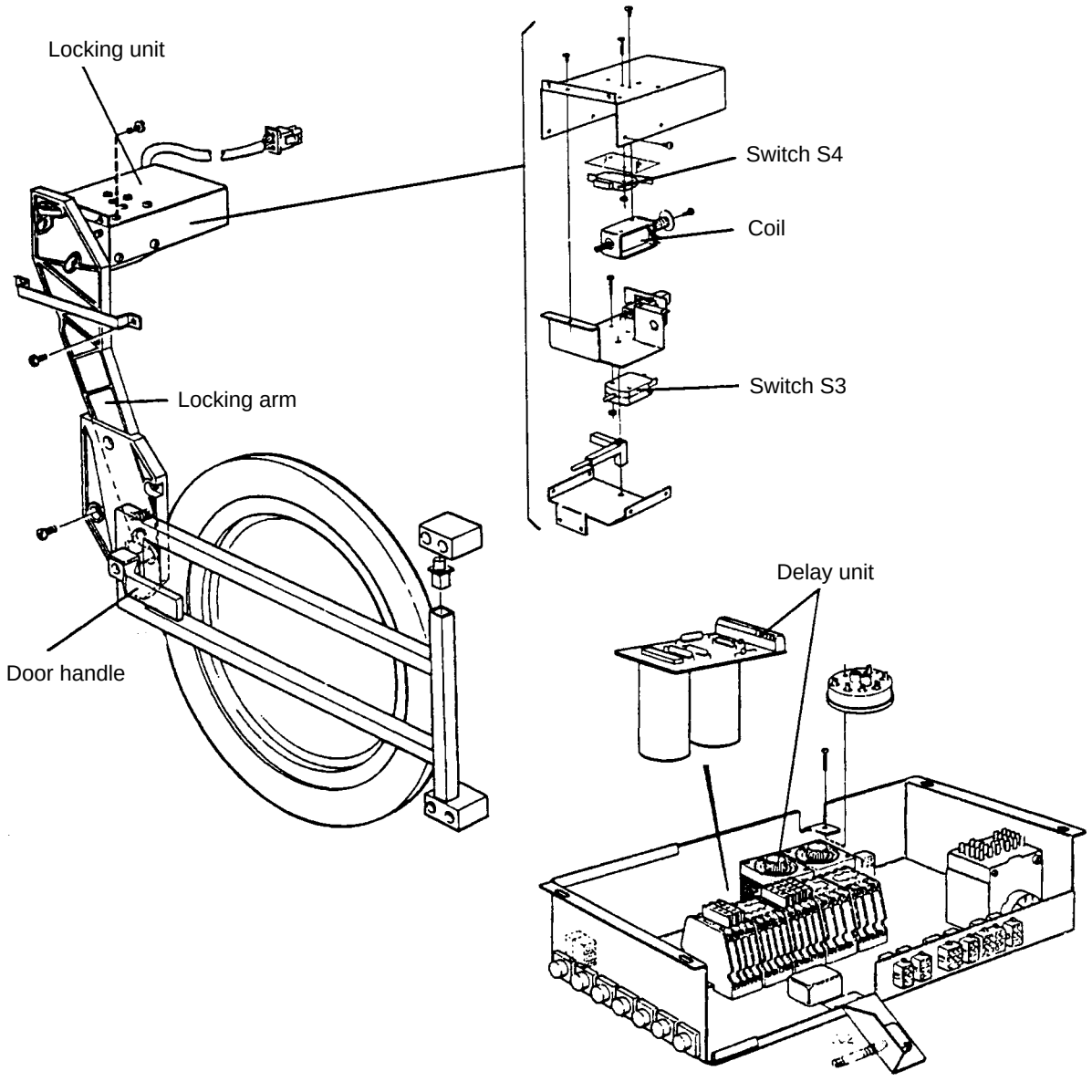
From machine No. 91/5501– (120 l machine)
91/5875– (220 l machine)

The door safety locking device consists of the following main parts:

Fig. 2

- Locking unit. The door locking unit is placed behind the front plate and under the detergent box. The unit consist of a coil, which blocks the door, and two micro switches. Switch S3 indicates that the door is locked and switch S4 that the coil is activated.
- Delay unit. The delay unit is mounted in the control unit. It consists of a printed board with two capacitors and a time relay. The dealy unit controls the time for the door locking after the program is finished or in case of electrical cut out.
- Locking arm. The arm is placed between the door handle and the locking unit and transfer the movement from the door handle to the locking unit.

2



Function

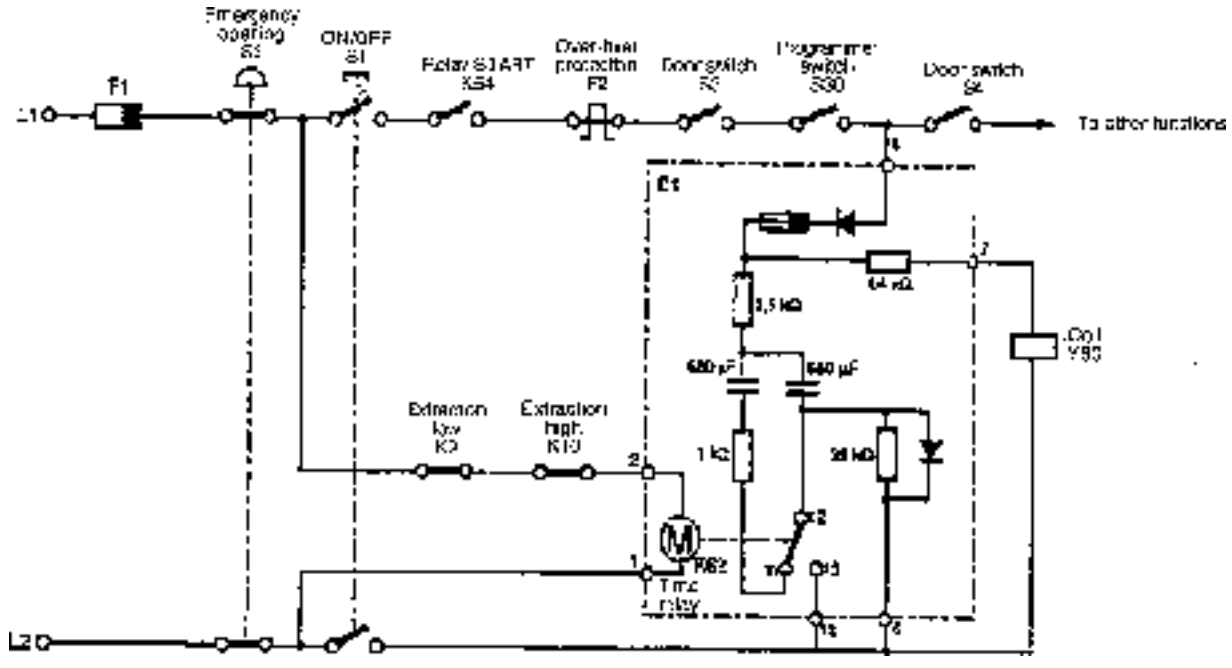
Fig. 3

When the door has been locked by the door handle, the locking arm is turned and activating the microswitch S3 in the locking unit. When the programmer knob is turned to position I, switch S30 is closed, the delay unit receives voltage and the coil is locking the door. And then switch S4 is closed and the program can start.

In order to prevent the door from being opened directly after the final extraction (roll out time can be about 2-3 minutes) but at the same time limit the delay time after the program to about 35 seconds, the delay unit has a time relay and works as follow:

- The time relay motor K62 receives voltage even if the ON/OFF switch S1 is in position OFF. This means that the contact of the time relay normally is in position 12-13 directly form start and when the drum is rotating with wash or distribution speed. During this circumstance one of the capacitors is disconnected and at the same time the 39 kΩ resistance is short circuited. The door can now be opened 35 seconds after a power cut out or when the programmer knob is turned to 0.
- At extraction relay K9 or K10 is activated and the voltage to time relay motor K62 is interrupted. The contact of the tie relay switch over to position 11-12 and the delay unit now keeps the door locked about 3-3,5 min. when the programmer knob is turned to **0** or a power cut off. After the extraction it takes two minutes (120 l machine) resp. three minutes (220 l machine) before the contact of the time relay go back to position 12-13.

3



Ex: Card programmed machine

1703

Fault finding

The coil does not lock the door when programmer knob is turned to I.

- Check that lamp in the red push button is lightning. If not, check that the emergency opening is not activated.
- Check that the coil is receiving voltage and that the plunger can move freely. Check with a ohm-meter for interruption in the coil.
- Check that the delay unit receives voltage.
- Check that switch S3 in the locking unit is activated when the door is closed and door handle is closed position.

The machine does not start in spite that the door is locked by the coil.

- Check that switch S4 is closed when the coil is activated.

Repairing

The door lock is an important safety device. Therefore a faulty locking unit or delay unit may not be repaired. It shall be changed for a new unit.

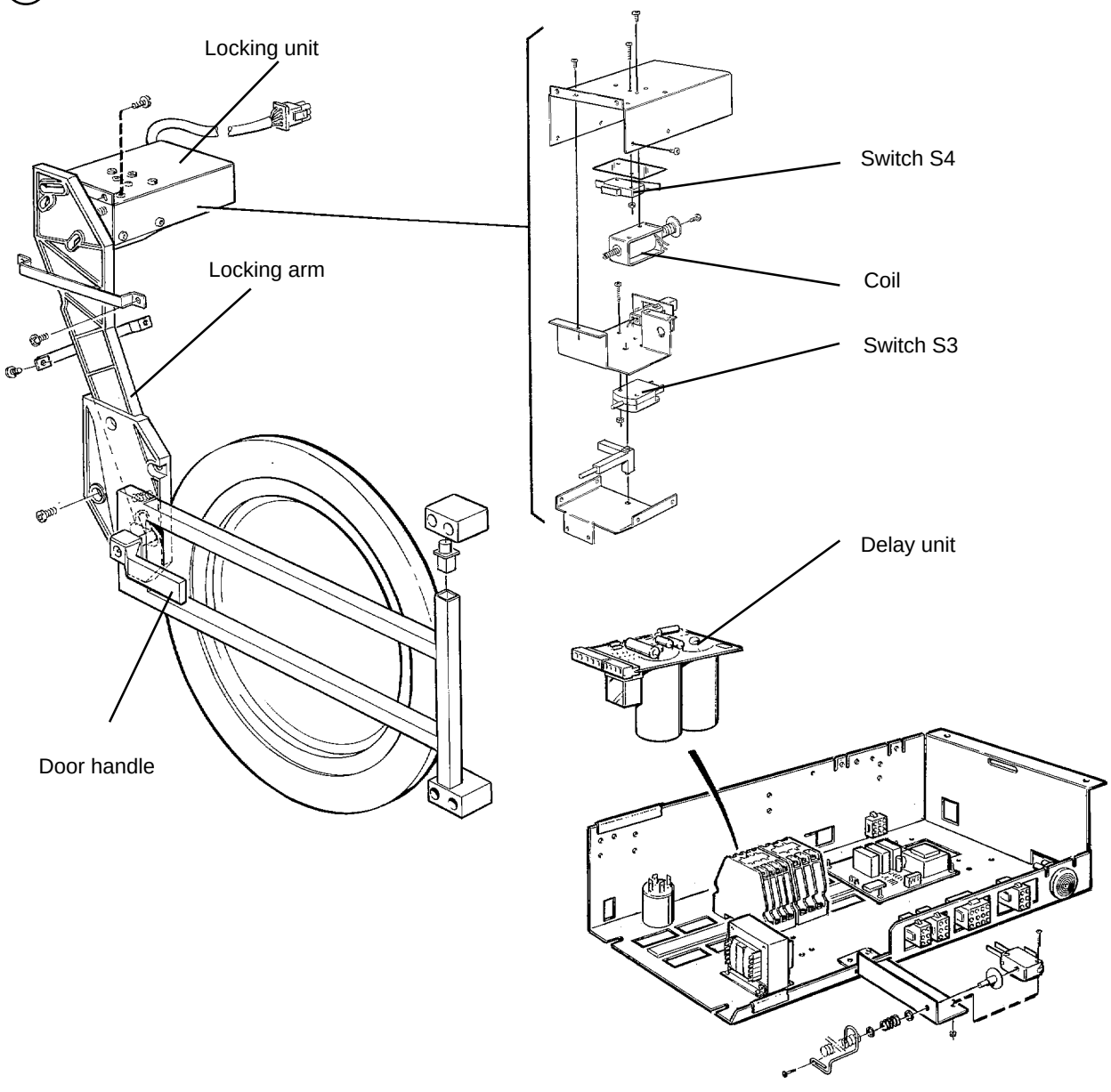
Description FLE MP FC (Machines with frequency control)

The machine door lock is made up of the following main components:

Fig. 4

- Lock unit, located behind the front panel under the detergent compartment. The unit contains a coil which locks the door, and two microswitches. Switch S3 indicates that the door is locked and switch S4 that the coil is activated.
- Delay unit, located inside the automatic control unit. This unit consists of a circuit board which controls the time that the door remains locked in a power cut.
- Locking arm which connects the door handle with the lock unit. The arm relays the mechanical action of the door handle to the lock unit.

4



Function

If the machine has not been energised within the last three minutes, the door will remain unlocked. When the machine is energised the door will be locked if a program is activated or if the drum is rotating. Upon completion of a program the door will be unlocked automatically as soon as the drum has stopped rotating.

If the power supply is cut to a machine which was energised the door will remain locked for three minutes, after which time it will be unlocked automatically.

Fig. 5

The diagram below shows how the delay unit works.

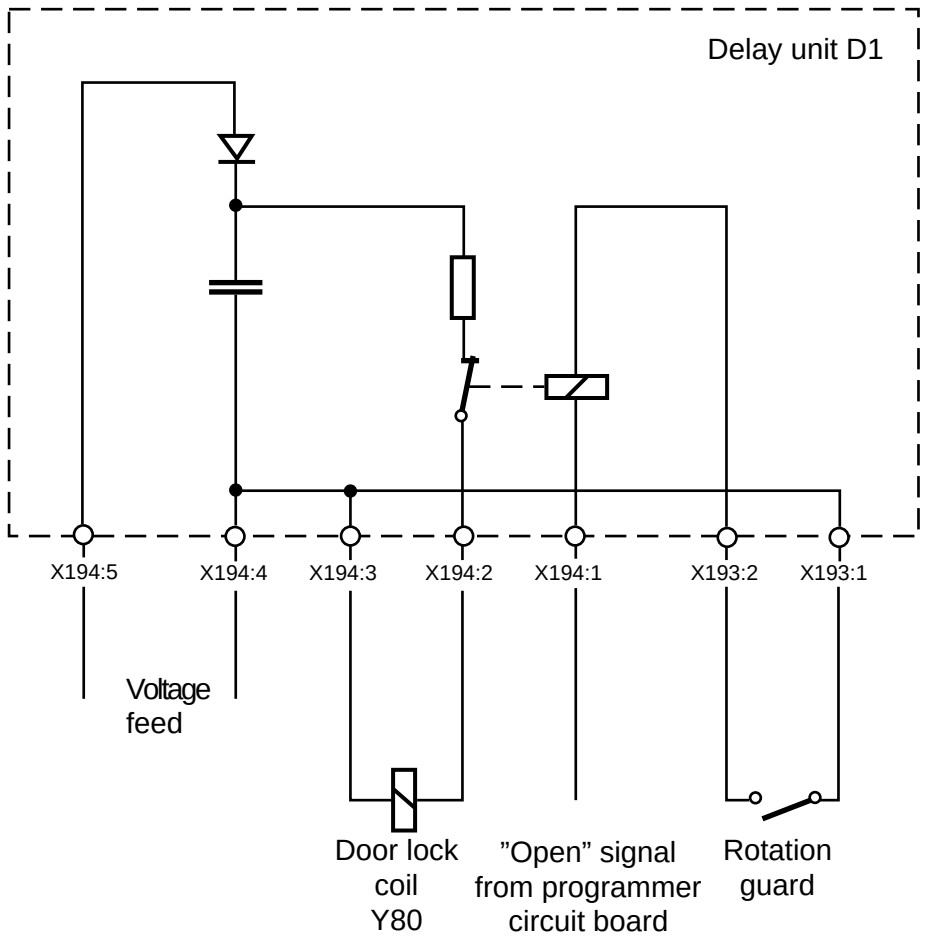
When the machine is energised the delay unit is fed phase and neutral on X194:5 and X194:4 respectively. The door lock coil Y80 is then fed phase (via a normally-closed relay contact) and neutral from X194:3. The relay coil acts on two conditions - that the drum is at a standstill and an ”open” signal from the programmer circuit board:

- One side of the relay coil receives a neutral when the rotation guard short-circuits X193:1 and 2.
- The other side of the relay coil is supplied with phase from the programmer circuit board (”open” signal).

Both of these conditions must be fulfilled for the door to be unlocked.

In the event of a power cut the capacitor will discharge via the relay and the door lock solenoid. In this way the door lock solenoid continues to operate for three minutes, after which the door is unlocked automatically.

5



Fault location

Door does not unlock

Conditions: wash program ended and drum at a standstill

Measure the voltage between the following points:

1. **X93:2 - X93:3** Should be 0 V DC. If the voltage is 220 V AC, check the rotation guard.
2. **X193:1 - X193:2** Should be 0 V DC. If the voltage is 220 V AC, check the rotation guard and the cables between rotation guard and delay unit.
3. **X194:1 - X194:4** Should be 220 V AC. If not, the ”open” signal from the programmer circuit board is absent. Check pcb and cables between pcb and delay unit.

If the door is still locked, replace the delay unit.

Door does not lock

Conditions: door closed and wash program activated.

Measure the voltage between the following points:

1. **X194:1 - X194:4** Should be 0 V AC. If the voltage is 220 V AC, the programmer circuit board will constantly send the ”open” signal. Check pcb and cables between pcb and delay unit.
2. **X194:2 - X194:3** Should be 200 V DC.
   - If there is no voltage, replace the delay unit.
   - If this voltage is present, check the door lock coil and its cables.

Description

FLE and FLE MP

Fig. 1

Both motors, one for wash and distribution and one for extraction, are installed on the same motor bridge. The motors drive the drum and are mechanically connected to each other by V-belts. On the 220 litre machine there is also an electromechanical connection. The motors rotate at each other's speed during wash speed, distribution speed and low extraction speed.

During high extraction speed the speed guard on the 220 litre machine gives a signal to the electromechanical connection. This disconnects the motors from each other mechanically. The wash motor now runs at distribution speed and the extract motor at high speed.

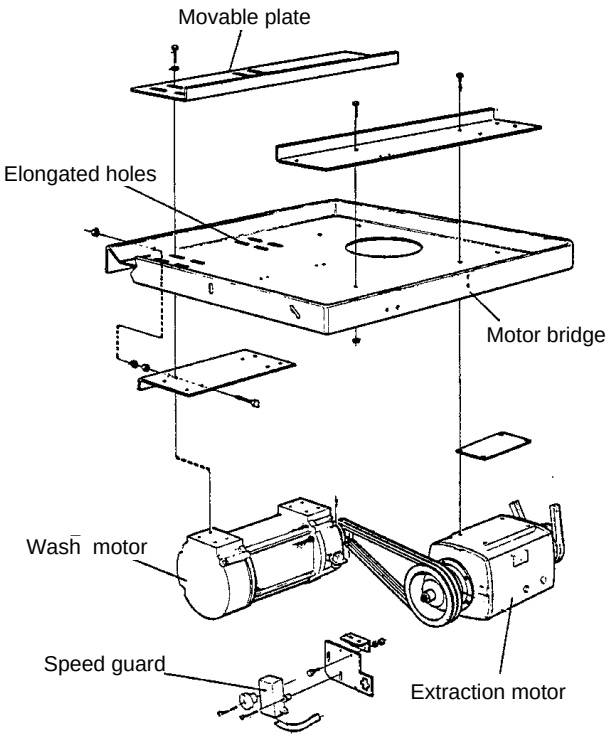
On the 120 litre machine the power supply to the wash motor is disconnected by the speed guard.

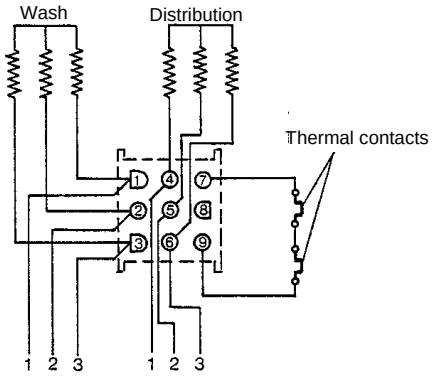
On the motor bridge there are belt tension devices. The extract motor is screwed to a mobile plate which moves via oblong holes in the motor bridge. This is used to tension the belt drive between the motors. It is possible to tilt the entire motor bridge with the use of the oblong holes on the wash motor side. This is used to tension the V-belt up to the wash drum.

The motors are equipped with thermal guards which are placed in the motor coiling. In the case of overheating in the motors e.i. if the temperature exceeds 130°C, the guard contacts cut the power to the motor relays.

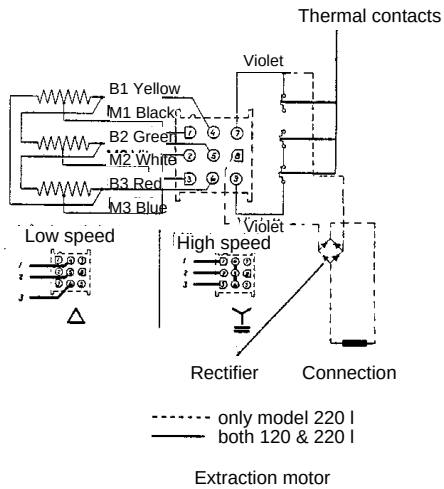
The following illustration shows the engagement of both motors. The connection is made with snap connections, which facilitate the change of motor.

1





Wash motor



Extraction motor

2431

FLE MP FC (machines with frequency control)

In machines with frequency control the same motor is used for wash speed, distribution speed and extraction. The motor is located on a motor mounting plate, and drives the drum via a belt.

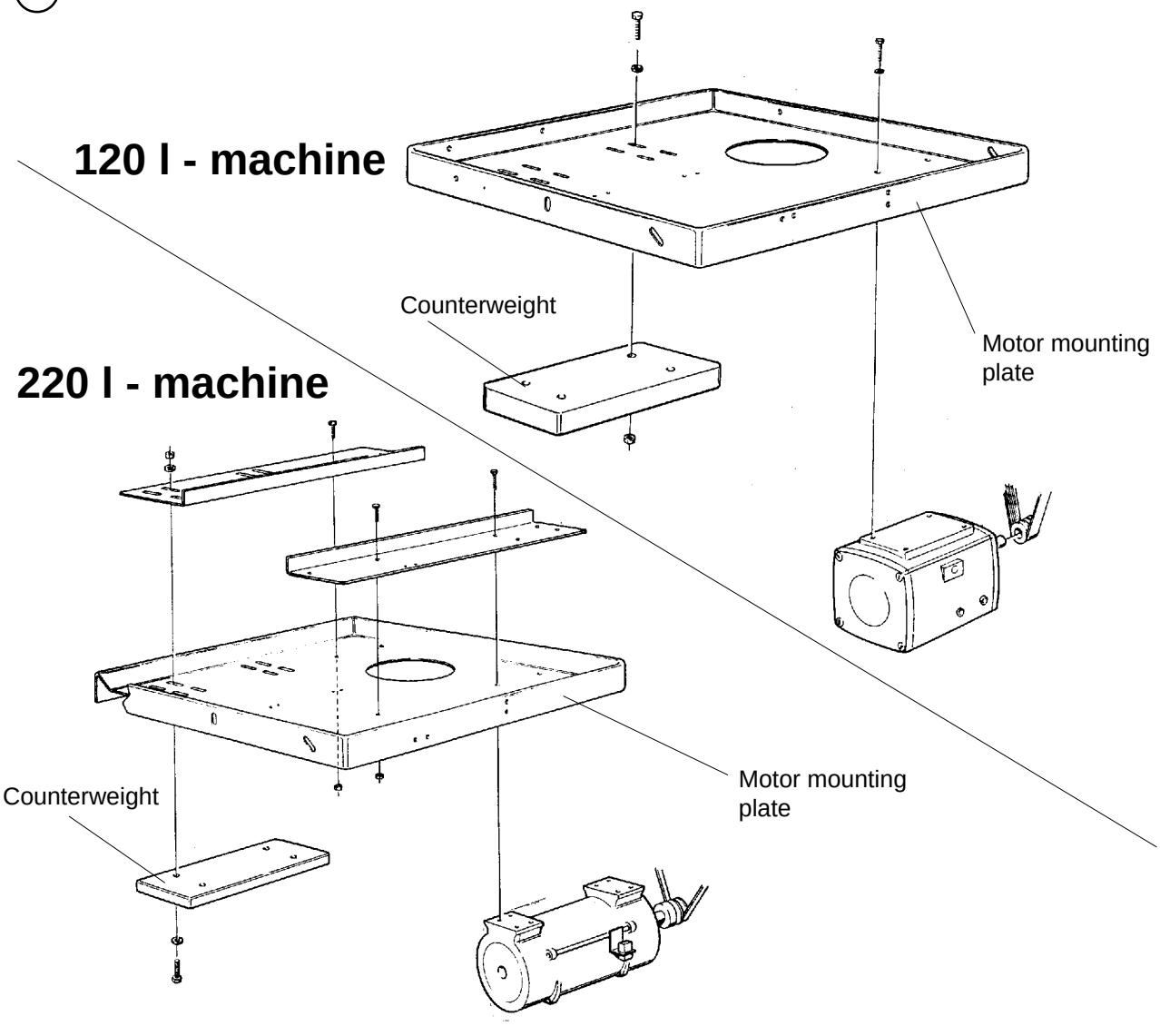
The tension of this drive belt can be altered by moving the entire motor mounting plate thanks to the mounting slots on one side. The motor has a thermal cut-out located in its windings. This thermal cut-out signals to the motor control unit in the event of the motor overheating, i.e. if the temperature exceeds 130°C.

The various motor speeds for normal action, distribution and extraction are controlled by a microprocessor-based motor control unit (MU1). The control signal for the motor control unit goes via a speed selector, which the operator can also use to select specific extraction speeds for low and high extraction.

Fig. 2

The illustration below shows how the motor is positioned. It is connected using a quick connector, which makes motor replacement easier.

2



Program start

The following conditions must be fullfilled before the motor can start:

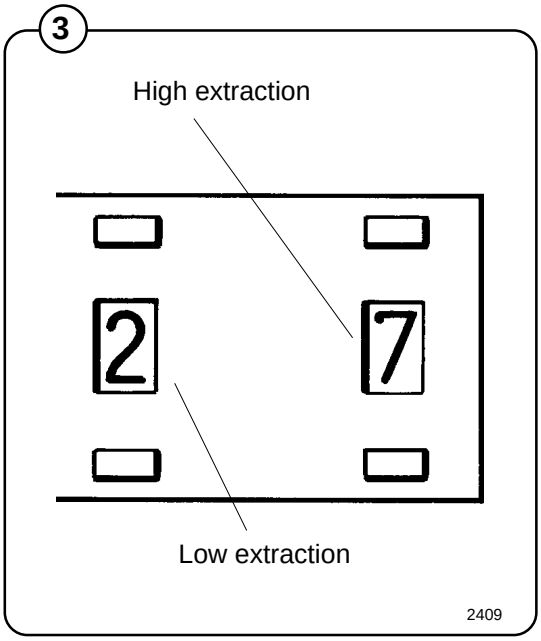
- Motor not overloaded.
- Door shut.
- Go-ahead signal from programmer.

When the door is locked relay K71 is activated feeding power to the electronic control unit and the motor is allowed to start.

Extraction

Fig. 3

For extraction the programmer sends signals for either low or high extraction. The operator selects the extraction speed required by means of the speed selector thumb wheel, on the machine front. The speeds are selected as follows:



FLE 120 MP FC

Low extraction			High extraction		
	speed	G-factor		speed	G-factor
1	340	40	4	590	120
2	420	60	5	680	160
3	510	90	6	760	200
			7	850	250
			8	950	310

FLE 220 MP FC

Low extraction			High extraction		
	speed	G-factor		speed	G-factor
1	300	40	4	540	120
2	380	60	5	620	160
3	460	90	6	700	200
			7	780	250
			8	850	300

Repair instructions

Overheated motor, motor not running

- Wait till motor has cooled down. Motor guards are automatically reset after 30 minutes. Restart.
- Possible cause of motor gurads releasing repeatedly: short circuiting. In both cases the motor should be replaced.

Very noisy motor

- Breakdown of bearings – replace motor.

Motor running slowly

The motor is probably running on two phases – measure coils on terminal.

Wash motor only runs at one of the speeds

- Check that the quick connection is correctly connected.
- Measure coils on plinth, as the fault can be caused by interruption in one of the coils.

Motor locks

Breakdown of bearings – replace motor

Motor does not turn

Fig. 4

- Check belt tension.

Fig. 5

When checking the belt tension or when changing belt, follow the instructions shown.

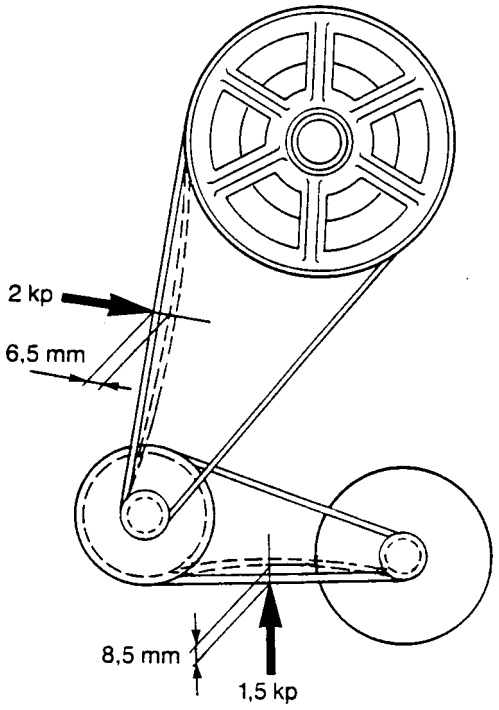
NOTE!
Checking the belt tension should always be a part of the regular maintenance.

FLE/FLE MP

- Belt between the wash motor and extraction motor. Release and adjust backing plate to correct belt tension according to illustration. Fasten plate.
- Belt between extraction motor and wash drum. Remove screws for the attachment of motor bridge at extraction motor side, lower motor bridge to correct belt tension according to illustration and fasten bridge.

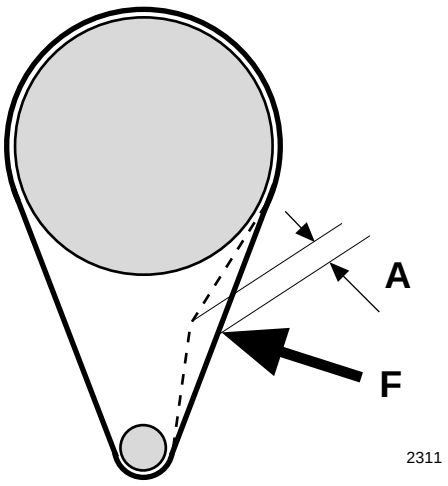
4

FLE/FLE MP



5

FLE MP FC



	120	220
F	30 N	30 N
A_{max}	12 mm	12 mm
A_{min}	10 mm	10 mm

FLE/FLE MP FC (Machines with frequency control)

Fig. 5 Loosen the screws holding the motor mounting plate on the motor side. Lower the motor mounting plate until the correct belt tension is obtained, as shown in Fig. 5. Secure the motor mounting plate in place.

To adjust the clutch (FLE/FLE MP only)

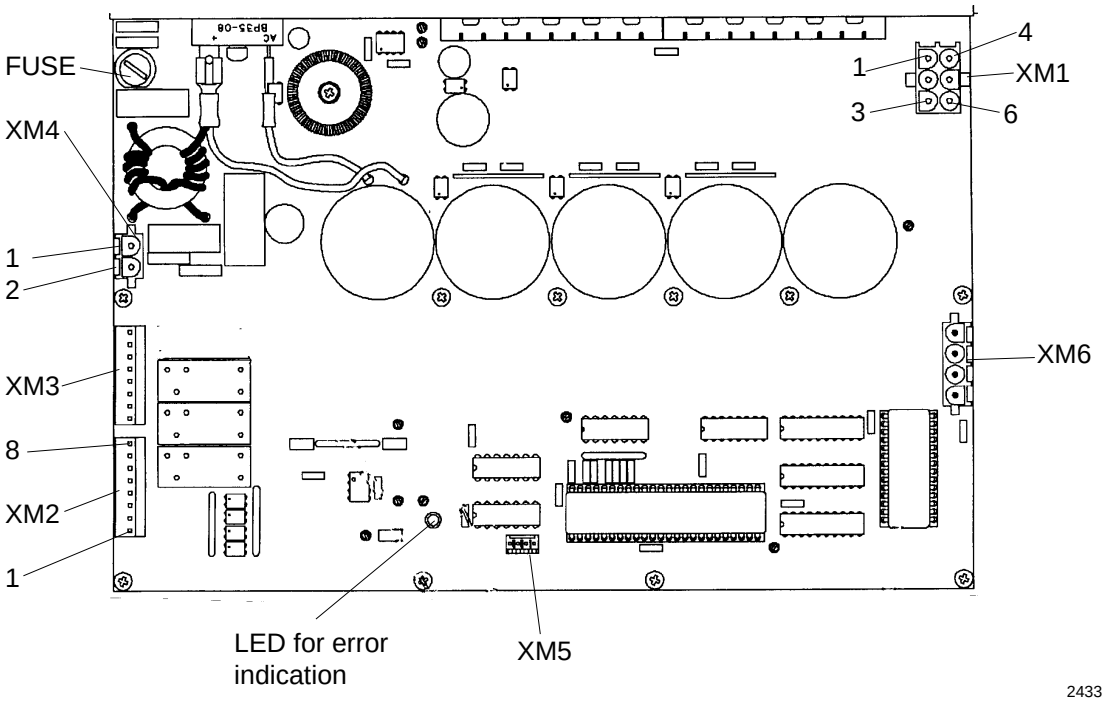
For a new clutch the airgap between stator and rotor should be 0.3 (-0.0 / +0,0 +0.2). This gap should be measured with a feeler gauge when the motor is cold. The maximum airgap allowed is 0.7 mm.

- Remove the pulley from the shaft.
- Remove the required number of shims (Each one is 0.1 mm).
- Fit the pulley to the shaft.
- Check the airgap.

Motor control FLE MP FC (Machines with frequency control)

Fig. 6 On the motor control circuit board there is a yellow LED which indicates various types of fault:

6



Indication	Cause
The LED flickers.	Motor current is at its limit.
The LED comes on and stays on.	Undervoltage in feed to motor control.
The LED flashes for 15 sec and then the machine tries to start again.	Motor control has halted because of wrong signals in control circuit.
The LED shows double flashes.	The machine has been stopped on account of a fresh fault directly after the last sequence described.

In two cases the machine will be halted without indication:

- Overvoltage in feed.
- Motor and/or motor control overheated.

Motor does not operate when it should

- Check the voltage feed to the motor control unit by:
  - Disconnecting XM4 (quick connector)
  - Using a voltmeter (AC) to measure between pins XM4:1-2. Correct value = 220 V (208 - 240 V)
  - Using a voltmeter (DC) to measure between XM6:1-4. Coorrect value = 250-375 V. If not, check fuse

Motor does not operate or operates at wrong speed

- Check against the table below whether the motor is receiving the correct control code from the speed selector circuit board. Measure at connection X99:1 - 4 with XM2:1 as reference point.

Speed	pin 1	pin 2	pin 3	pin 4
0 Stop	0 V	0 V	0 V	0 V
1 Wash speed, right	0 V	0 V	0 V	24 V
2 Wash speed, left	0 V	0 V	24 V	0 V
3 Distribution	0 V	0 V	24 V	24 V
4 Stop	0 V	24 V	0 V	0 V
5 Reduced wash speed, right	0 V	24 V	0 V	24 V
6 Reduced wash speed, left	0 V	24 V	24 V	0 V
7 Stop	0 V	24 V	24 V	24 V
8 Extraction 8 (HC)	24 V	0 V	0 V	0 V
9 Extraction 1 (LC)	24 V	0 V	0 V	24 V
10 Extraction 2 (LC)	24 V	0 V	24 V	0 V
11 Extraction 3 (LC)	24 V	0 V	24 V	24 V
12 Extraction 4 (HC)	24 V	24 V	0 V	0 V
13 Extraction 5 (HC)	24 V	24 V	0 V	24 V
14 Extraction 6 (HC)	24 V	24 V	24 V	0 V
15 Extraction 7 (HC)	24 V	24 V	24 V	24 V

FLE/FLE MP

Description

Fig. 1

The purpose of the speed guard is to protect the wash motor during extraction.

On the motor output shaft there is a polarised magnet element (wash motor on 120 litres; spin motor on 220 litres) which is sensed by the speed guard. When the extraction motor has reached a certain speed the speed guard sends a signal to the automatic unit and the power is cut. The wash motor is reconnected when the extraction motor speed has dropped and the wash motor cannot be damaged through connection.

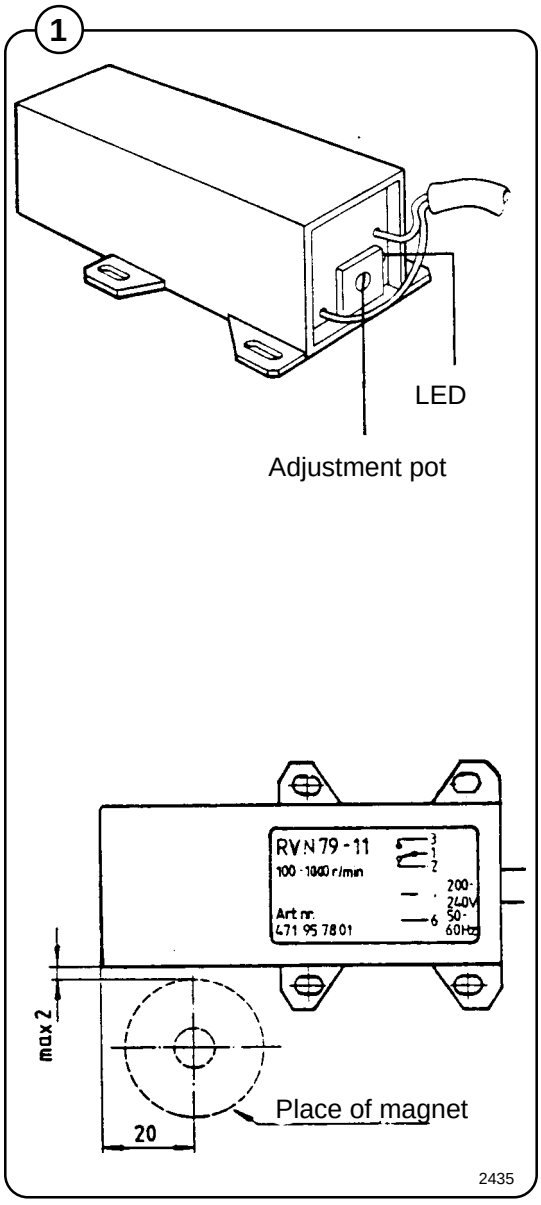
On the 220 litres machine the two motors are disconnected. The speed guard cuts the power to the electromechanical connection on the output shaft and the extraction motor can speed up without being followed by the wash motor. When the speed guard has disconnected the two motors a signal is sent to the wash motor to run at distribution speed. This is to protect the ball bearings of the wash motor against vibrations from the extraction.

The speed guard has a potentiometer for the adjustment of the cutout point and an LED which indicates when the cut out point has been reached.

Repair instructions

Speed guards should be replaced, as repair is not recommended.

1. Remove speed guard.
2. Install new speed guard and adjust position according to illustration.
3. Run machine at distribution speed. NOTE: the machine must be run at the correct frequency.
4. If the distribution relay does not chatter the guard may be too high. The speed guard should therefore be adjusted too low as a starting point to adjustment. Screw the potentiometer anticlockwise until the relay chatters. The speed guard can then be adjusted by turning the potentiometer clockwise until the distribution relay ceases to chatter.



FLE MP FC (Machines with frequency controlled motor)

Description

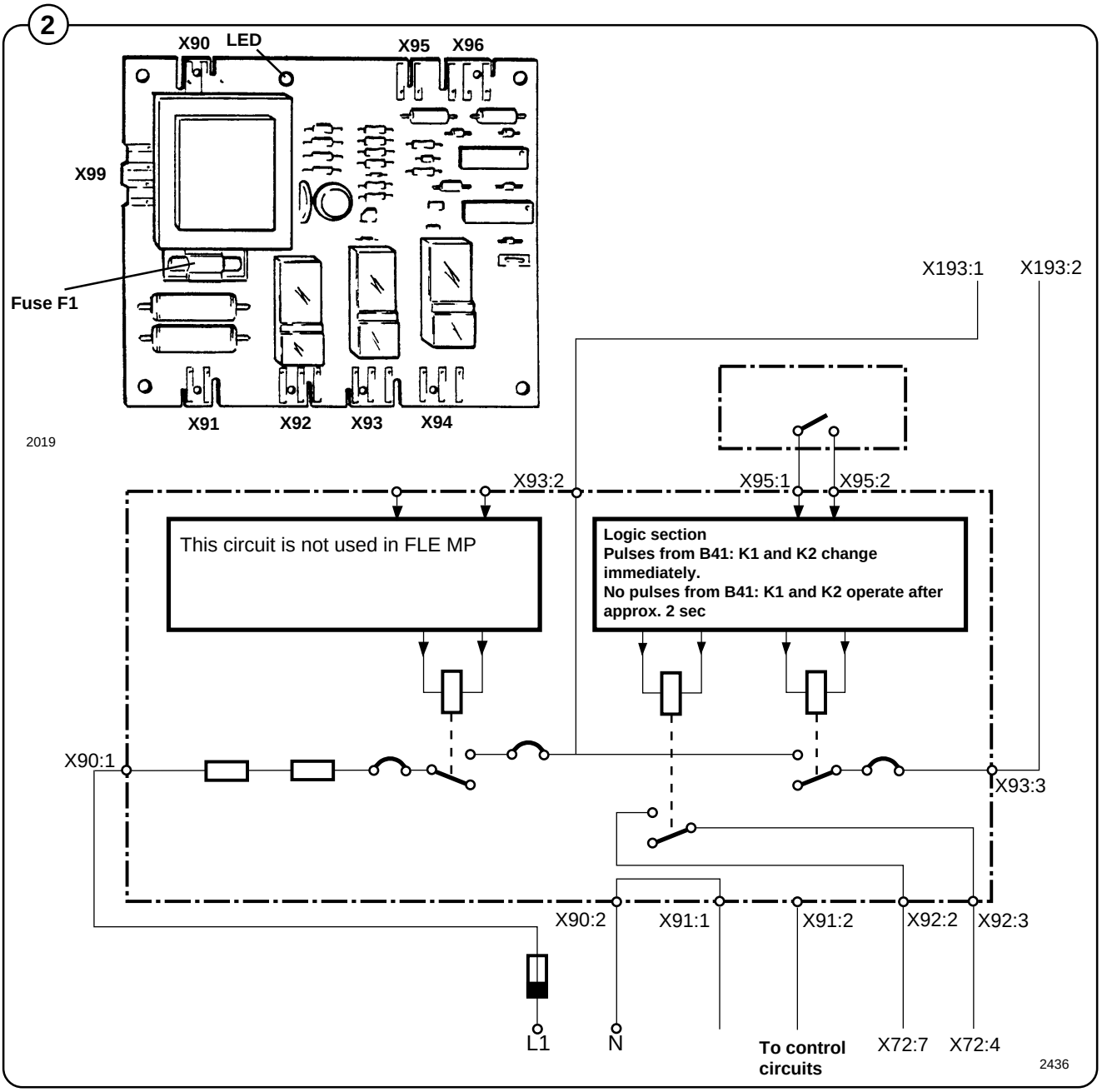
Fig. 2

The rotation guard checks that the machine is completely at a standstill before the door can be opened. When the drum has been at a standstill for approx. two seconds the solenoid in the door lock is deactivated and the lock can be opened (provided that the machine has been emptied of water and the programmer has reset). The rotation guard also checks that the drum is revolving when the wash or extraction relays are operating.

The rotation guard consists of a circuit board in the automatic control unit and a sensor in a holder on the machine rear. There is a magnet on two of the spokes of the pulley. Each time a magnet passes the sensor, a contact closes inside the sensor and it relays a pulse to the rotation guard.

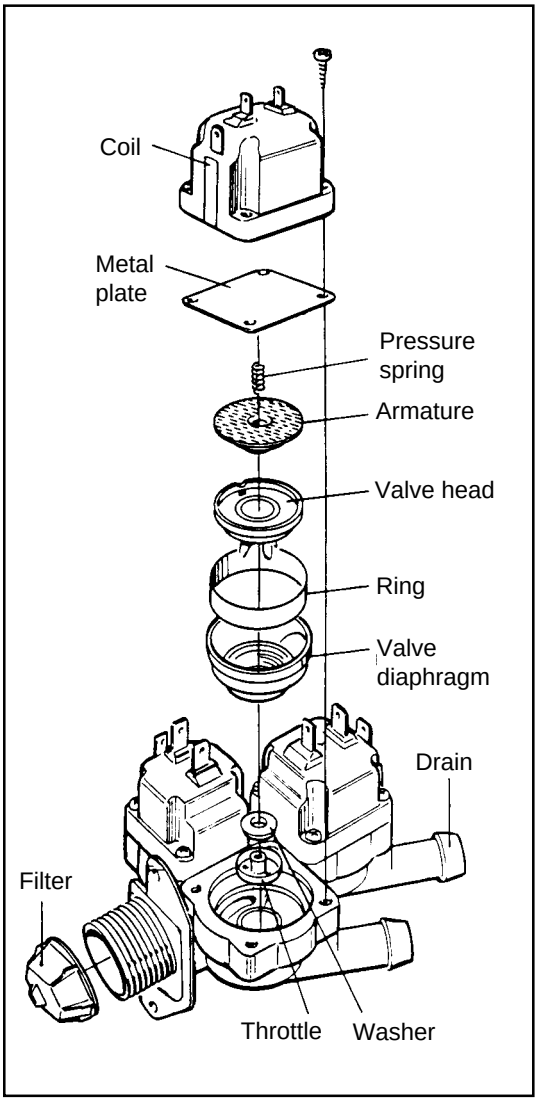
When the machine is at a standstill the rotation guard relays K1 and K2 are closed, which means that the delay unit and the FL-MP receive confirmation that the drum is not moving, i.e. the rotation guard and the FL-MP allow door opening.

2



Data

Max capacity, unrestrict., outlet	12 l/min
inlet	20 l/min
Working range, water pressure	0,3-10 bar
Number of sections	1, 2, 3 or 4



Description

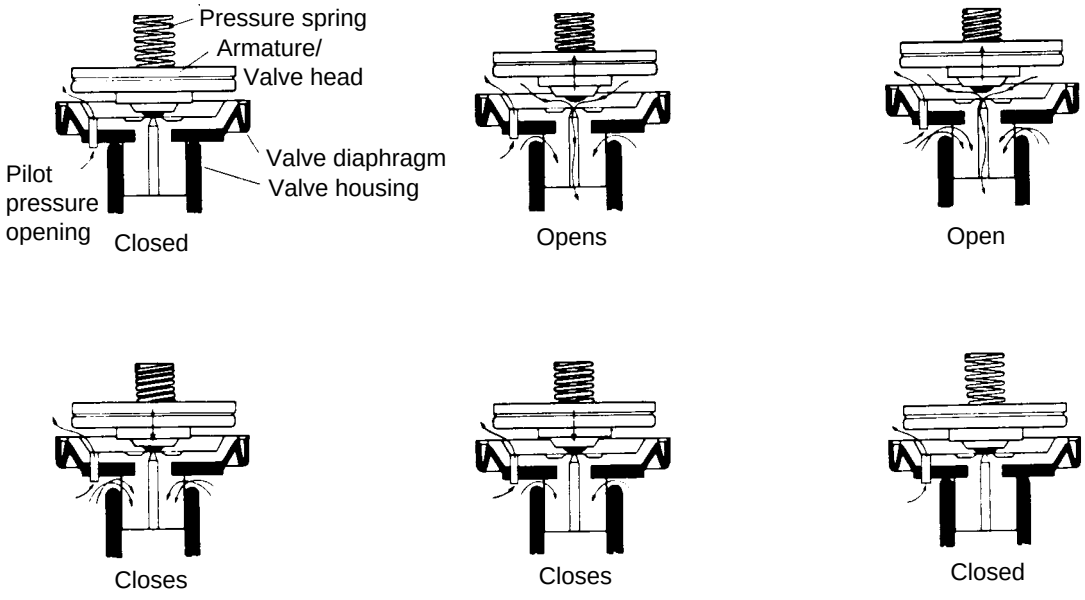
The valve is operated electromagnetically and has a rubber diaphragm as a closing and opening element. The valve utilises the water pressure in its opening and closing action.

The valve is shut when the electromagnet is not energised. A pilot pressure opening in the diaphragm causes the water pressure to press the valve diaphragm against the valve seat and keeps the valve closed. The hole in the centre of the valve diaphragm is then sealed by a rubber disc which is pressed against the valve diaphragm by the pressure spring of the electromagnet.

When the magnet is energised the armature lifts, opening the hole in the centre of the diaphragm so that the accumulated pressure can be relieved through the outlet. The water pressure in the supply line can lift the diaphragm off the valve seat, and the valve opens.

A fine mesh strainer is fitted inside the inlet line in order to trap particles of dirt etc. The strainer can be easily removed for cleaning

A restriction is mounted in the outlet which matches the water flow to the needs of the machine in question.



Repair instructions

Scale deposits can clog the hole in the diaphragm and disturb the operation of the valve.

It is thus advisable that the valve be taken apart and cleaned at regular intervals, depending on operating conditions and the degree of contamination of the water.

The valve refuses to open

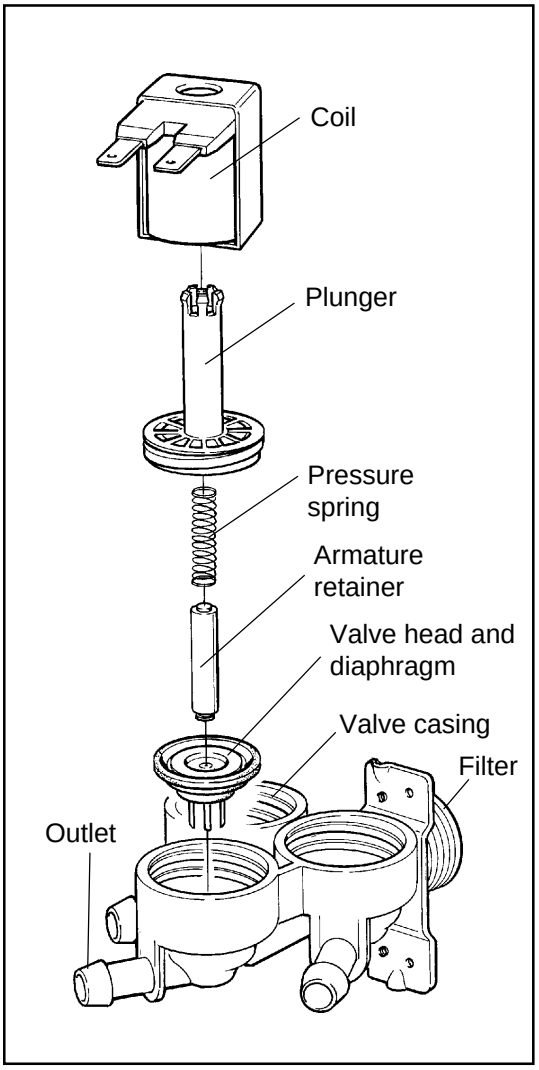
- Check that the coil is being energised.
- Take measurements at the coil to look for a break or short circuit.
- Take the valve apart and check the openings in the valve diaphragm.
- Check the inlet strainer and clean if necessary.
- Loosen the coil and clean the surfaces of the magnet core.

The valve refuses to close

- Check that the coil is de-energised.
  The valve is normally closed when the magnetic is unactivated.
- Check the return spring.
- Check the diphragm.

Data

Maximum capacity, fully open	outlet	160 l/min
	inlet	20 l/min
Working range, water pressure		0,5-10 bar
Number of outlets		1, 2, 3 or 4



Description

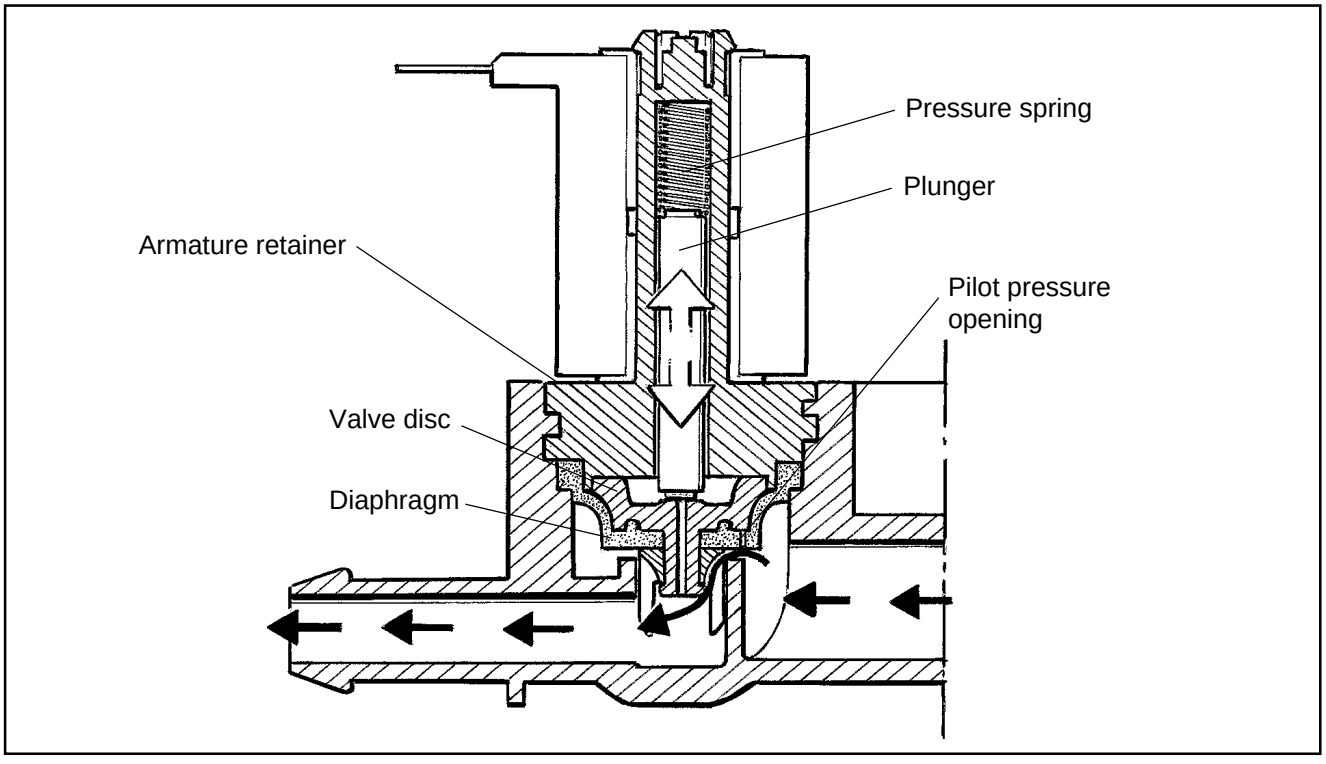
The valve is solenoid-operated, having a rubber membrane as the sealing element. Opening and closing actions are assisted by the water pressure.

With the solenoid de-energised, the valve is closed. A pilot pressure opening in the membrane allows water pressure to act on the top of the membrane and press it down on the valve seat, closing the valve. In this state, the hole in the centre of the membrane is sealed by a rubber disc pressed down on to the membrane by the compression spring above the solenoid armature.

Energising the solenoid raises the armature against the spring, opening the hole in the middle of the membrane and releasing the water pressure above the membrane. The water pressure then raises the membrane from the valve seat and the valve opens.

The inlet pipe contains a fine-mesh strainer to trap solid particles. The strainer can be easily removed for cleaning

The outlet from the valve contains a choke which adjusts the water flow rate to suit the requirements of the machine.



Repair instructions

Lime deposits can block the holes in the valve membrane and interfere with correct operation.

It is therefore recommended that the valve be dismantled and cleaned at regular intervals, depending on operating conditions and the amount of dirt in the water.

The valve does not open

- Check that the coil is energised.
- Measure the coil resistance to check for a short circuit or open circuit.
- Dismantle the valve and check the holes in the membrane.
- Check the inlet strainer and clean if necessary.
- Remove the coil and clean the armature.

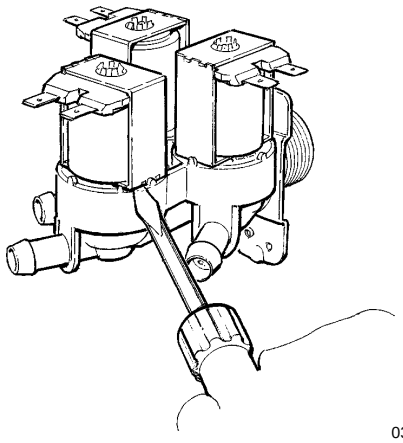
The valve does not close

- Check that the coil is de-energised. The valve is normally closed when the coil is de-energised.
- Check the return spring.
- Check the membrane (pilot pressure opening).

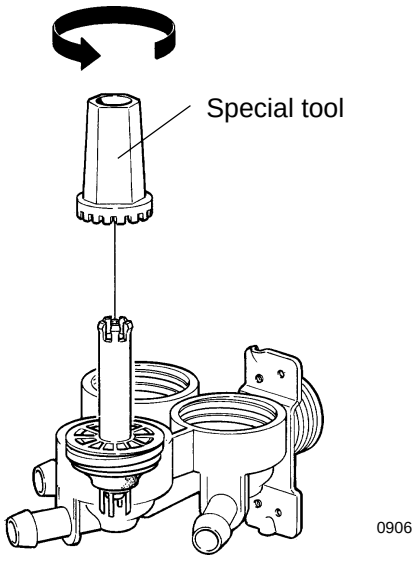
Dismantle the valve

1. Carefully prise off the coil using a screwdriver and pull the coil off the stem of the valve.
2. Place the special tool over the stem, so that its teeth engage with the corresponding teeth in the upper part of the valve casing. (The tool is supplied with the machine, secured to one of the water hoses).
3. Use an adjustable spanner to turn the tool anti-clockwise to unscrew the top of the valve.

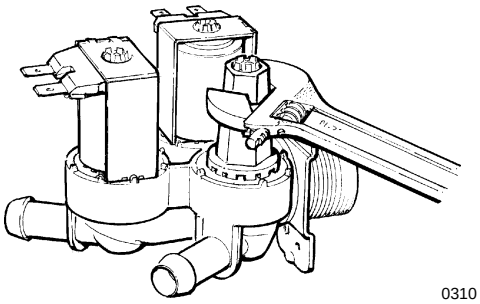
Reassemble the valve in the reverse order.



0309



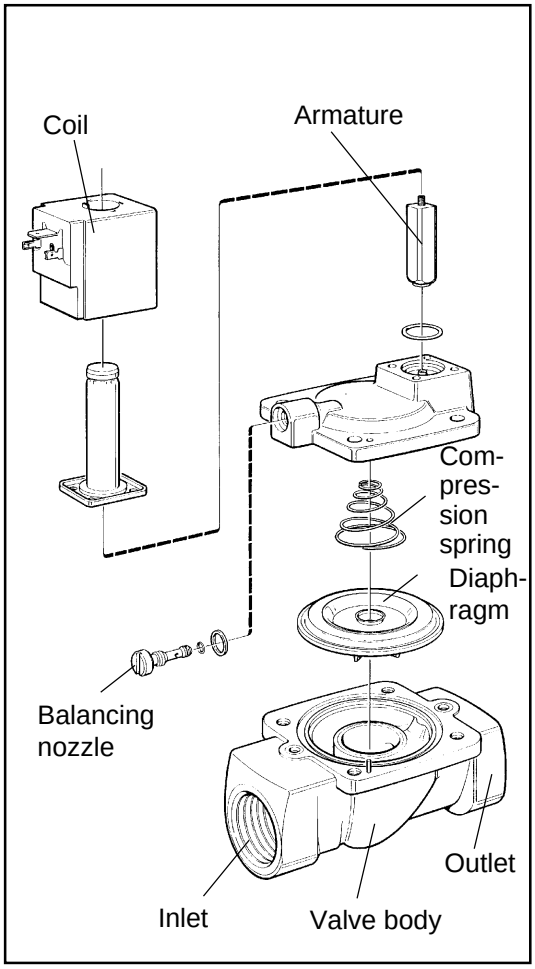
0906



0310

Data

Capacity at 300 kPa	300 l/min
Operating limits	40-1000 kPa



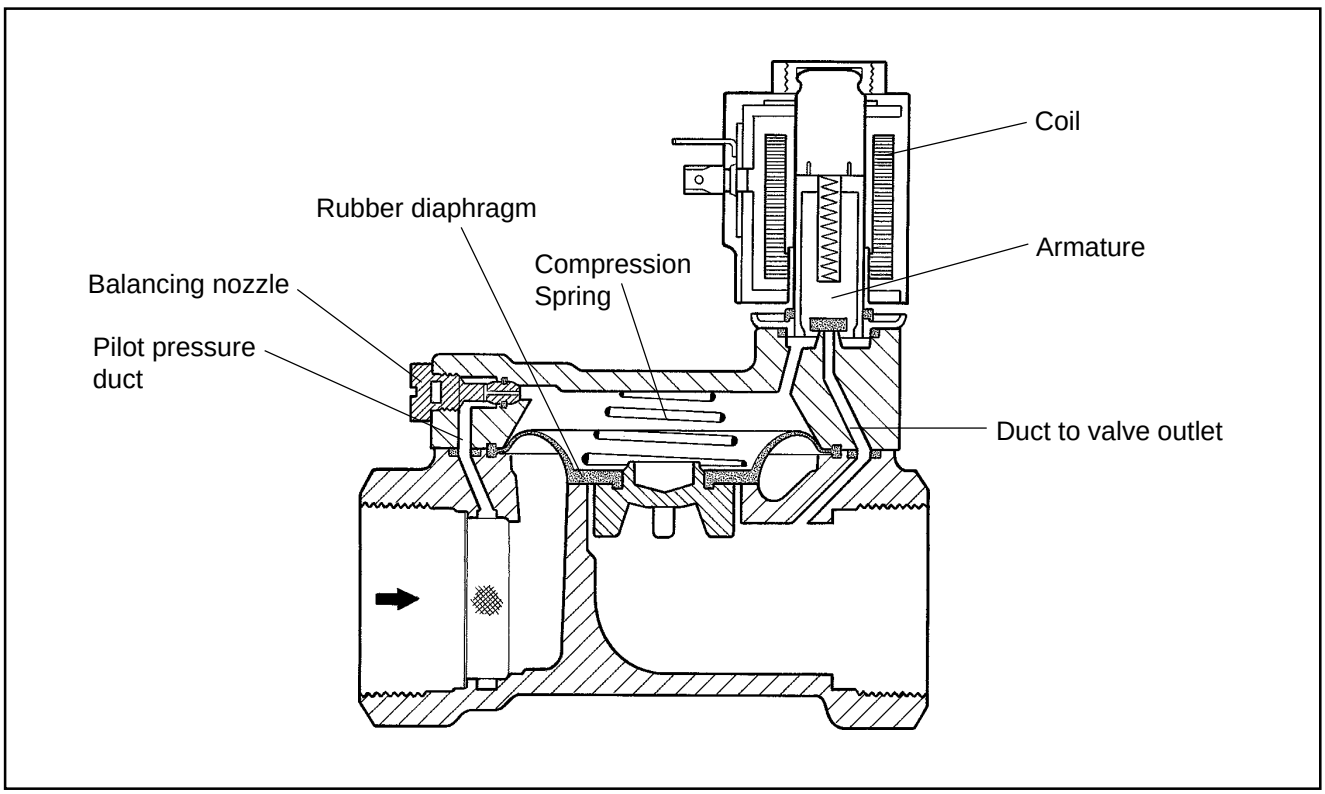
Description

The valve is electromagnetically operated and has a rubber diaphragm as its opening and closing element. The valve utilises the water pressure when opening and closing.

When the electromagnetic is de-energised, the valve is closed.

The water pressure acts through the pilot pressure opening on the top of the rubber diaphragm. Because the water pressure is acting on a relatively larger area on the top of the diaphragm than on the bottom (part of the underside of the diaphragm is in contact with the outlet of the valve, where there is no pressure) the water pressure from below is insufficient to lift the diaphragm, so that the diaphragm forms a seal against the valve seat.

When the magnet is energised, the opening from the top of the diaphragm to the outlet of the valve is opened. Since the diameter of this opening is greater that that of the pilot opening, the diameter of which is limited by the balancing nozzle, the pressure on the top of the diaphragm falls. The water pressure on the bottom of the diaphragm can then lift the diaphragm and open the valve.



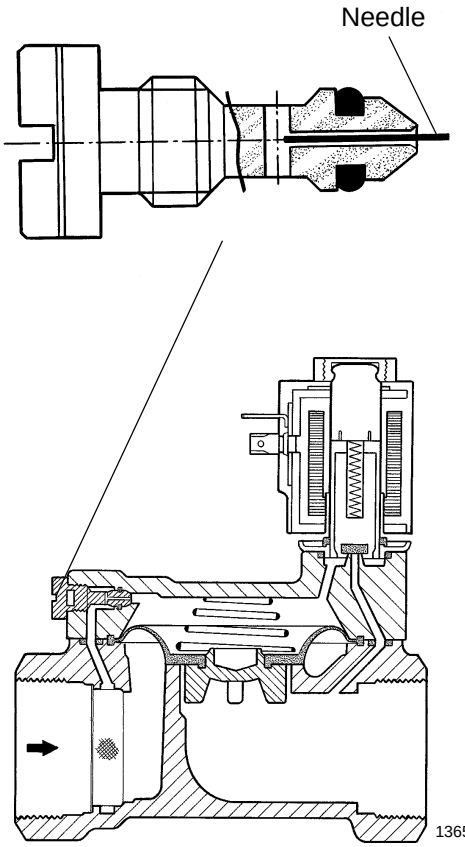
Repair instruction

Valve operation gradually gets worse

Hot water with high lime content may cause scale deposits in the balancing nozzle of the valve. Clean the nozzle as follows:

- Shut off the water.
- Unscrew the nozzle and clean it with a needle or similar. A nozzle marked with one ring around the head of the screw has a bore diameter of 0.5 mm and a nozzle with two rings has a bore diameter of 0.8 mm. The diameter of the needle used to clean the nozzle must not be greater than the bore diameter.
- Re-fit the nozzle.
- Turn on the water, check operation and check for leaks.
- If this does not help, check that the inlet filter of the pilot channel is not blocked.

Where the water is very hard, i.e. contains a high lime content, it is recommended that the 0.5 mm nozzle should be replaced with a 0.8 mm nozzle.



Balancing nozzle

Valve does not open

- Check for voltage at coil.
- Measure the resistance of the coil to check for short circuit or open circuit.
- Dismantle the valve and check that the armature is not binding. If necessary, clean to remove scale, particularly in the ducts of the valve between the top and bottom of the diaphragm.
- Remove the coil and clean the metal surfaces of the magnet core.

Valve does not close

- Check that there is no voltage across the coil. Normally the valve is closed when the coil is de-energised.
- Dismantle the valve and check the armature return spring and check that the armature is not binding. If necessary, remove limescale deposit, particularly in the ducts of the valve between the top and bottom of the diaphragm.
- Check the balancing nozzle in accordance with the instructions under the heading "Valve function gradually gets worse".

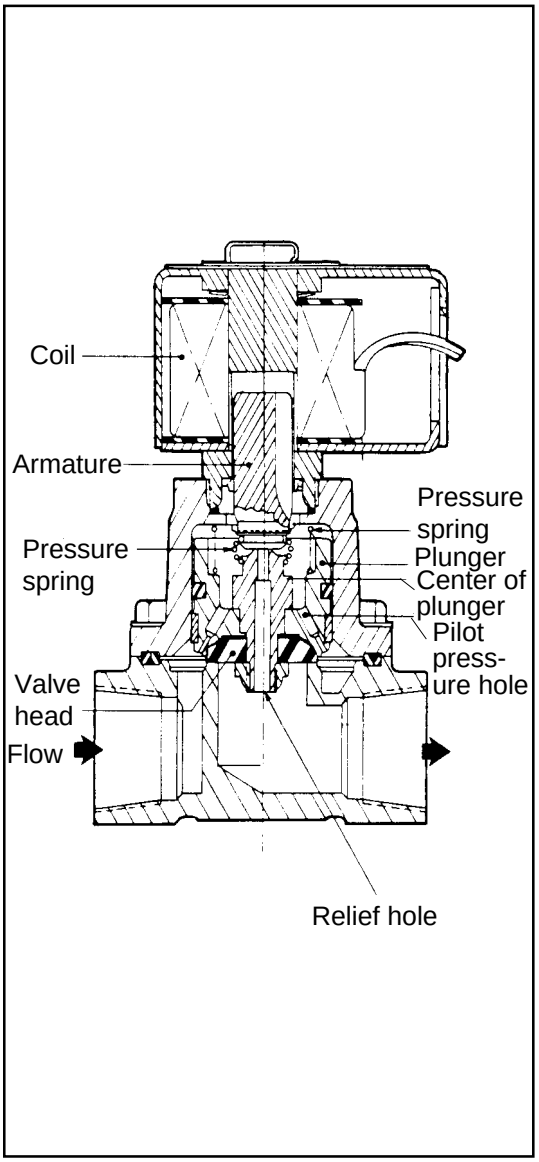
Description

The steam valve is operated electromagnetically and has a plunger with a valve head as opening and closing element.

The valve utilises the steam pressure for opening and closing. In a closed position the electromagnet is unactivated and the releif hole in the centre of the plunger is closed by the armature through its pressure spring. The plunger pressure spring moves the plunger and valve head against the valve seat.

By means of a pilot-pressure hole in the plunger the steam pressure forces the plunger and valve head against the valve seat with a force proportional to the steam pressure. The valve closes.

When the valve is to open the magnet is energised, the armature lifts and exposes the relief hole in the centre of the plunger. When the overpressure on the upper side of the plunger is gone, the steam pressure in the supply line can lift the plunger and valve head, and the valve opens.



Repair instructions

It is vital to the operation of the steam valve that the pilot pressure and relief holes are clean and unobstructed.

For this reason, the valve should be taken apart and cleaned at specific intervals which depend on operating conditions and the purity of the steam.

The valve refuses to open

- Check that the coils is energised.
- Take measurements at the coil in order to look for break of short circuit.
- Take the valve apart and check the openings in the valve head and plunger centre.

The valve refuses to close

- Check that the coil is de-energised.
  The valve is normally closed when the magnet is unactivated.
- Check the return spring.
- Check the diaphragm.

Description

The drain valve is a motor-operated diaphragm valve which ensures rapid machine emptying by its opening on a large cross-sectional surface area. Its design is self-clearing, which eliminates the need for fluff filters.

The main components are:

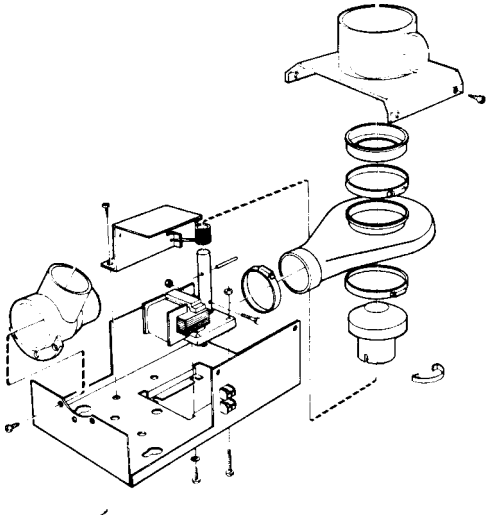
- motor with gear
- acme-threaded plunger rod with plunger and return spring
- rubber diaphragm
- connections for water filling, overfilling and drainage.

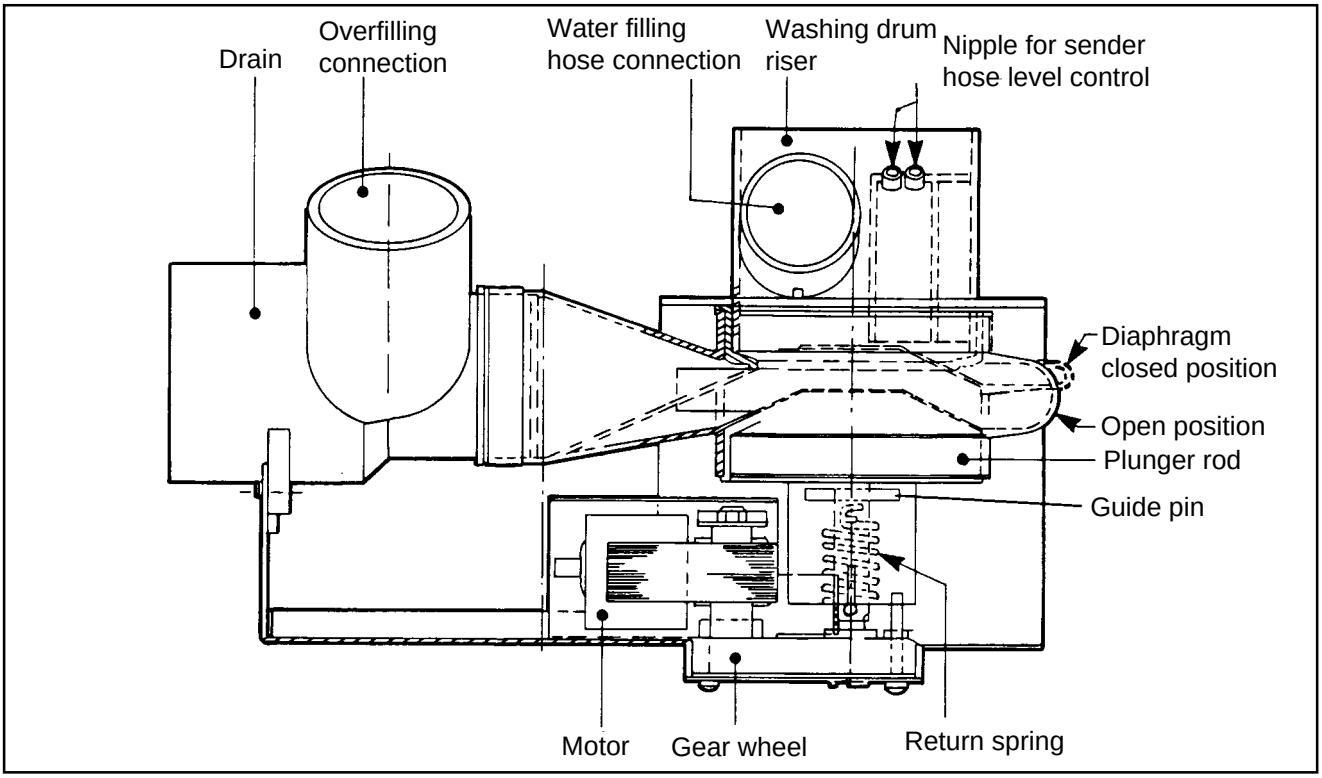
In the open position the valve is de-energised. The plunger rod is thus screwed down to its lowest position by the returning spring. The diaphragm is compressed, forcing the piston downwards and opening the valve.

When the motor is activated and begins to rotate, the plunger rod is screwed upwards via the gear, the diaphragm is compressed, forcing the plunger upwards, and the valve closes.

The overfilling connection is connected to the upper half of the washing drum, and the water and suds are led directlyto the waste outlet, should the inlet valves or level control cease to function.

The connection for water filling as well as a nipple for connection of the sensing line for the level control are located on the riser to the washing drum.





Repair instructions

Deposits of scale in the diaphragm may prevent the valve from closing or opening correctly. The valve should be cleaned at specific intervals which depend on the operating conditions and the quality of the water.

The valve fails to open or close correctly

- Check that the motor has the correct voltage supply.
- Check that the plunger rod can move freely.
- Check that the diaphragm is not clogged by deposits of scale.

Comment
When replacing the motor:
Brown cable: 60 Hz
Blue cable: common
Black cable: 50 Hz

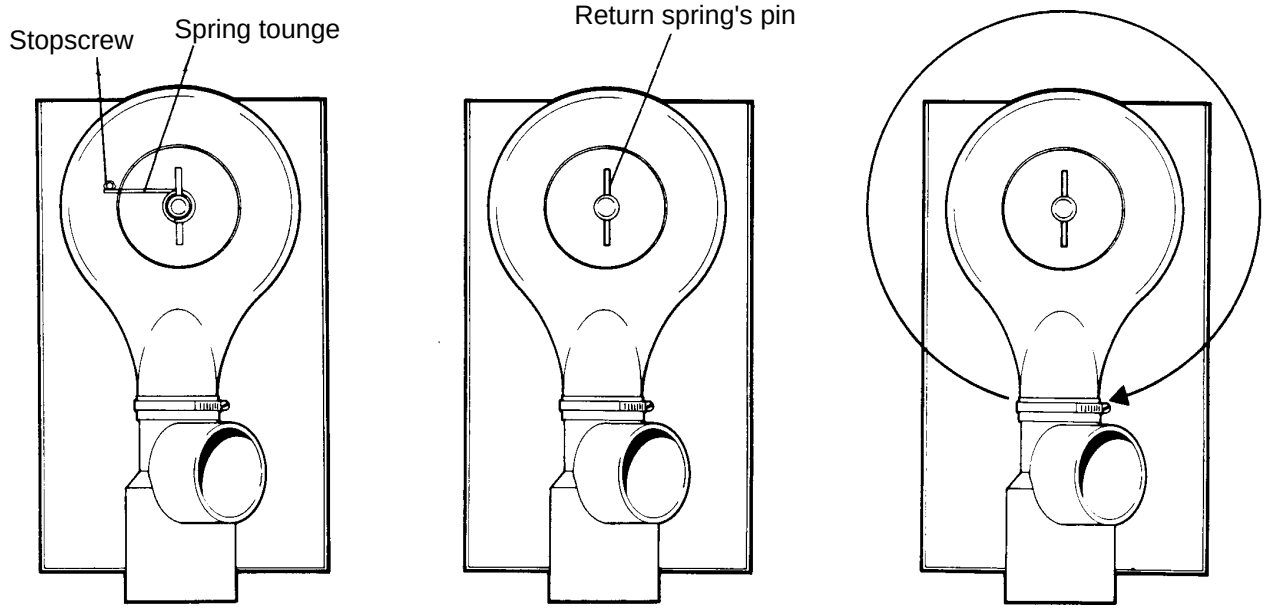
Tensioning the Return Springs

With the valve housing removed:

– Turn the return spring so that the spring's "tounge" lies against the stop screw.

– Place the valve housing over the return spring so that the pin on the spring fits into the inlet of the piston rod (CAUTION! The piston rod shall be fitted so that its input is longitudal with the housing).

– Then turn the housing one turn in a clockwise direction. (In this way the spring's pin will be threaded into the piston rod. The spring is then tensioned approximately 1/4 turn, as a result of the rise in the piston rod).



Description

The detergent container has three compartments

- compartment 1 for detergent (prewash)
- compartment 2 for detergent (main wash)
- compartment 3 for conditioner

The container is fitted with nozzles coupled to the inlet valves. These ensures that the detergent dissolves properly in the water, as well as flushing the container clean.

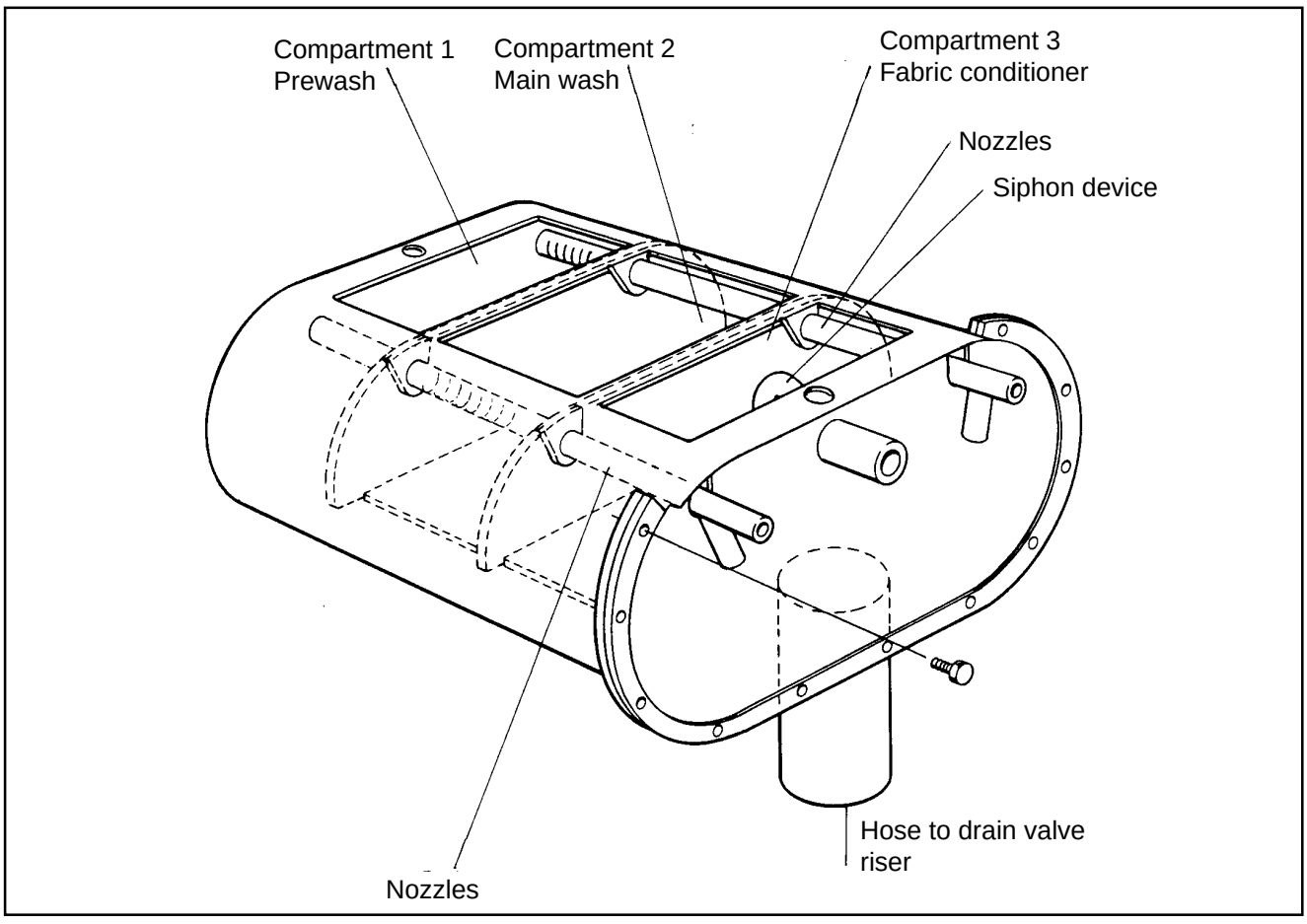
A water-filling line runs from the bottom of the container down to the drain valve riser. This ensures a favourable flow to the washing, while also stopping any fumes from the detergent solution from rising up into the detergent container.

The lid of the container is made of rubber, has a simple and robust design, and is bolted to the top panel of the machine.

A siphon device in the fabric conditioner compartment makes sure that it is completely emptied, and that no conditioner remains behind.

Repair instructions

When replacing the container, holes should be drilled for the connections on the nozzles according to the connection alternative chosen.



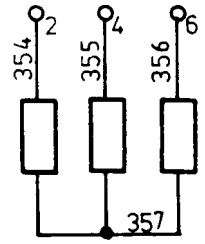
Data

Rated output	See section 2. Data
Connections	Y – connection at 380V D – connection at 220V

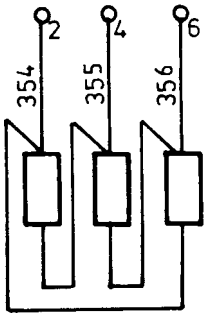
Description

The three elements are situated at the bottom of the space between the inner and outer drums. They are actuated by a heat relay which in turn is controlled by the programme unit and thermostat.

Y – connection for 380V



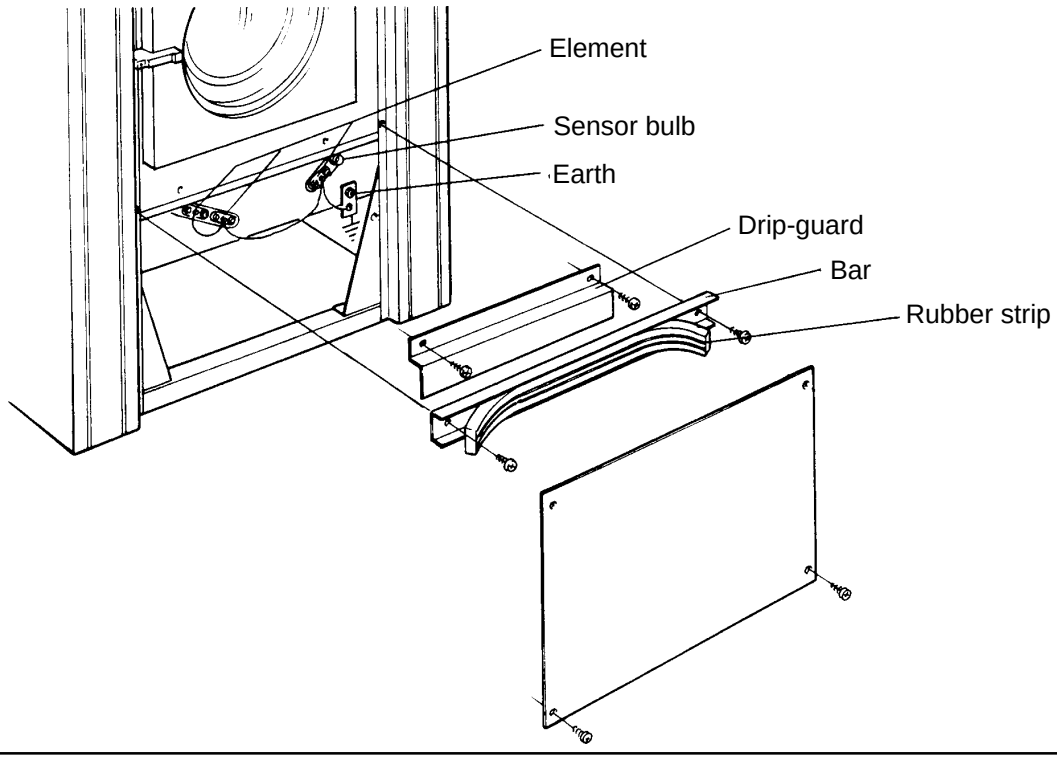
D – connection for 220V



Repair instructions

Heating time unusually long

- Using universal instrument check if one of the elements are burned out.
- Lime deposits can cause reduced element performance. refer to manufacturer's instructions for correct use of descaler. Select permanent press 90° program.
- To access element:
  – Remove lower protective plate at the front of the machine.
  – Fold up the rubber strip at the outer ends of the stay which is fitted above the lower protective plate and unscrew the stay.
  – Unscrew the drip guard over the elements.



Element replacement

- Remove the cover from the inner drum.
- Removed nuts, washers and clamps through the cover opening in the inner drum.
- Undo the nut on the middle screw of the element and turn the screw 1/4 of a turn. The counterweight on the inside is now in a position to permit the element to be withdrawn.
- Insert a new element, turn the centre screw a 1/4 turn and tighten the nut.
- Fit clamps, washer and nut through the opening in the inner drum.
- Fit the cover to the inner drum.
- Check that there are no burns on the screw head or the cover.
- Connect element. NOTE: Earthing!
- Check there is no leak by the element and reset machine.

Description

The frame is constructed on the free-swinging principle, i.e. the washing drum is freely and resiliently suspended in the fixed frame.

The entire frame is constructed of bent sheet metal and aluminium sections forming a stable and torsionally rigid structure.

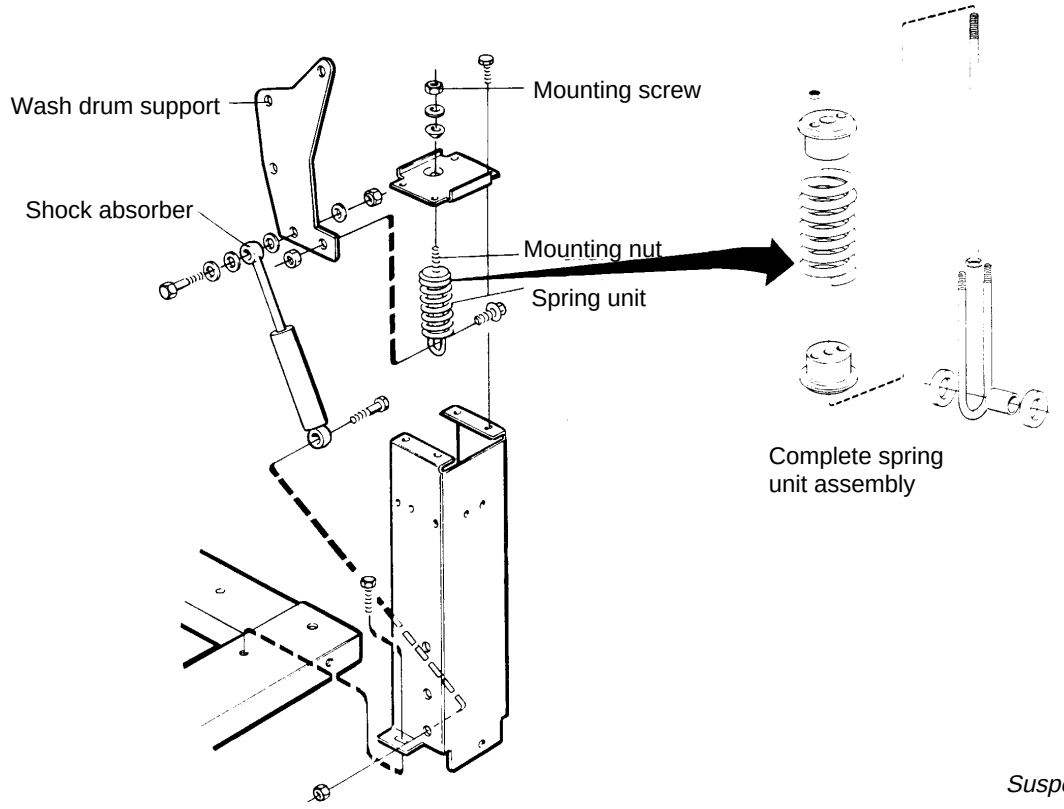
The suspension device for the drum unit and motors consists of four posts, one in each corner, each with a robust spring in which the washing drum supports are attached. In order to prevent excessibely great vibrations which can be caused by imbalance in the drum, a shock absorber is fitted between the drum and frame by each spring. (The 120 litre model has twin shock absorbers at the front).

Repair instructions

The spin cutout is repeatedly triggered

- Check the shock absorbers, replace them if required. Note that the shock absorbers should be fitted with the pluger rod upwards.
- Check the attachment of the springs:
  – on the 60 litre model the mounting bolt should protrude above the mounting nut by the height of the nut.
  – on the 120 litre model the spring is attached by a bolt from above.

Check that it has been properly tightened down. The entire spring unit should be replaced in spring replacement.



Suspension device

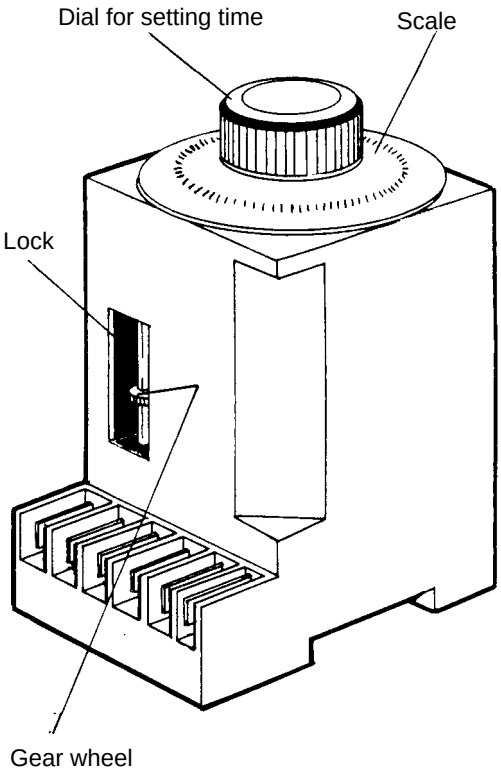
Data

Motor	220V 50/60Hz
Contacts, making capacity (breaking capacity)	6 (10) A 250V

Description

The automatic unit has a time relay for drain which prevents the spin from starting too early – the water must have drained. When the time relay for drain is live, the timer relay clock is set on a preselected time and the power to the spin is cut. (The timer relay engages peg 11 which is unconnected). The power chain for the spin is made live when the time on the clock has passed (peg 13 is engaged).

There is a further timer relay in the power chain of the spin. This timer relay ensures that the high spin speed is not connected until the low spin speed has lasted for a certain time. When the timer relay is live the circuit for low spin speed is connected and the timer relay clock is set on a pre-selected time. The circuit for high speed spin is made live when the slelected time has passed.



Timing relay

Repair instructions

The timer relay should be replaced, as repair is not recommended.

Replacing the timer relay:

1. Remove and mark the time relay connections.
2. Remove the timer relay.
3. Have the new timer relay ready and open the door above connection terminal.
   Insert plastic gear wheel to the appropriate time interval (see table by door).
4. Turn the indicating hands to the time the relay should be set on.
5. Install relay and connect cables.