OPERATING & MAINTENANCE MANUAL

EXSM 230 C and 350 C
Clarus Control

438 9030-08/01
02.32

WARNING: ALL OPERATING AND MAINTENANCE PROCEDURES SHOWN ON THE NEXT PAGE OF THIS MANUAL MUST BE FOLLOWED DAILY FOR PROPER OPERATION OF YOUR WASCOMAT MACHINE.

PLEASE ENTER THE FOLLOWING INFORMATION AS IT APPEARS ON THE MACHINE(S) DATA PLATE(S).

MACHINE TYPE OR MODEL	
MACHINE SERIAL NUMBER(S)	
ELECTRICAL CHARACTERISTICS: _____ VOLTS, _____ PHASE, _____ HZ.	

MAKE CERTAIN TO KEEP THIS MANUAL IN A SECURE PLACE FOR FUTURE REFERENCE.

NOTICE TO: OWNERS, OPERATORS AND DEALERS OF WASCOMAT MACHINES

IMPROPER INSTALLATION AND INADEQUATE MAINTENANCE, POOR HOUSEKEEPING AND WILLFUL NEGLECT OR BYPASSING OF SAFETY DEVICES MAY RESULT IN SERIOUS ACCIDENTS OR INJURY. TO ASSURE THE SAFETY OF CUSTOMERS AND/OR OPERATORS OF YOUR MACHINE, THE FOLLOWING MAINTENANCE CHECKS MUST BE PERFORMED ON A DAILY BASIS.

1. Prior to operation of the machine, check to make certain that all operating instructions and warning signs are affixed to the machine and legible. (See the following page of this manual for description and location of the signs.) Missing or illegible ones must be replaced immediately. Be sure you have spare signs and labels available at all times. These can be obtained from your dealer or Wascomat.

2. Check the door safety interlock, as follows:

   (a) OPEN THE DOOR of the machine and attempt to start in the normal manner:

   For CLARUS microprocessor models, choose a program and press the START button.

THE MACHINE(S) SHOULD NOT START !

   (b) CLOSE THE DOOR to start machine operation and, while it is operating, attempt to open the door without exerting extreme force on the door handle. The door should remain locked!

   If the machine can start with the door open, or can continue to operate with the door unlocked, the door interlock is no longer operating properly. The machine must be placed out of order and the interlock immediately repaired or replaced. (See the door interlock section of the manual.)

3. DO NOT UNDER ANY CIRCUMSTANCES ATTEMPT TO BYPASS OR REWIRE ANY OF THE MACHINE SAFETY DEVICES AS THIS CAN RESULT IN SERIOUS ACCIDENTS.

4. **Be sure to keep the machine(s) in proper working order**: Follow **all** maintenance and safety procedures. Further information regarding machine safety, service and parts can be obtained from your dealer or from Wascomat through its Teletech Service Telephone - 516/ 371-0700.

All requests for assistance must include the model, serial number and electrical characteristics as they appear on the machine identification plate. Insert this information in the space provided on the previous page of this manual.

5. **WARNING**: DO NOT OPERATE MACHINE(S) WITH SAFETY DEVICES BYPASSED, REWIRED OR INOPERATIVE! DO NOT OPEN MACHINE DOOR UNTIL DRUM HAS STOPPED ROTATING!

SAFETY AND WARNINGS SIGNS

Replace If Missing Or Illegible

One or more of these signs must be affixed on each machine as indicated, when not included as part of the front instruction panel.

LOCATED ON THE OPERATING INSTRUCTION SIGN OF THE MACHINE:

CAUTION

1. Do not open washer door until cycle is completed, operating light is off, and wash cylinder has stopped rotating.
2. Do not tamper with the door safety switch or door lock.
3. Do not attempt to open door or place hands into washer to remove or add clothes during operation. This can cause serious injury.

MACHINE SHOULD NOT BE USED BY CHILDREN

PRECAUCION

1. No abra la puerta de la máquina lavadora sino hasta que la máquina haya terminado su ciclo, la luz operativa esté apaga da y el cilindro de lavado haya completamento terminado de girar.
2. No interferia o manipule el switch o la cerradura de la puerta.
3. No trate de abrir la puerta o meta las manos dentro de la máquina para meter o sacar ropa mientras la máquina está en operación, pues puede resultar seriamento herido.

LAS MÁQUINAS NO DEBEN SER USADAS POR NIÑOS

LOCATED AT THE REAR OF THE MACHINE:

INSTALLATION AND MAINTENANCE WARNINGS – *AVERTISSEMENT*

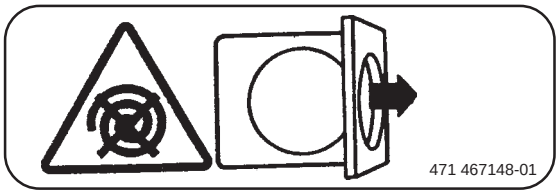
1. **This machine MUST be securely bolted according to the installation instructions, to reduce the risk of fire and to prevent serious injury, or damage to the machine.**
   Pour reduire les risques d'incendie, fixer cet appareil sur un plancher beton sans revetement.
2. **If installed on a floor of combustible material, the floor area below this machine must be covered by a metal sheet extending to the outer edges of the machine.**
3. **This machine MUST be connected to a dedicated electrical circuit to which no other lightning unit or general purpose receptacle is connected. Use copper conductor only.**
   Utiliser seulement des conducteurs en cuivre.
4. **This machine MUST be serviced and operated in compliance with manufacturer's instructions. CHECK DOOR LOCKS EVERY DAY FOR PROPER OPERATION TO PREVENT INJURY OR DAMAGE. IF THE DOOR LOCK FAILS TO OPERATE PROPERLY, PLACE THE MACHINE OUT OF ORDER UNTIL THE PROBLEM IS CORRECTED.**
5. **Disconnect power prior to servicing of machine.**
   Deconnecter cet appareil del'alimentation avant de proceder a l'entretien.
6. **To remove top panel, first remove eventual screws at the rear. When remounting the top, reinstall them. To remove the top panel on models on which it is secured by one or two keylocks, use the keys originally shipped in the drum package. Be certain to relock after remounting the top panel.**

MANUFACTURED BY WASCATOR
DISTRIBUTED BY WASCOMAT, INWOOD, NEW YORK, USA

471 766202-04

LOCATED ON THE DOOR:

If you need to order more safety or warning signs, call Wascomat's parts department at 516-371-2000, or call your local dealer.



471 467148-01

Contents

The manufacturer reservs the right to make changes to design and material specifications.

Safety instructions

- **The machine is designed for water washing only.**
- **The machine must not be used by children.**
- **All installation operations are to be carried out by qualified personnel. Licensed personnel are necessary for all electric power wiring.**
- **The interlock of the door must be checked daily for proper operation and must not be bypased.**
- **All seepage in the system, due to faulty gaskets etc., must be repaired immediately.**
- **All service personnel must be fully familiar with the operating manual before attempting any repair or maintenance of the machine.**
- **The machine must not be sprayed with water, otherwise short circuiting may occur.**
- **Fabrics softener with volatile or inflammable fluids are not to be used in the machine.**

Introduction

Fig. 1 The EXSM-C model solid mounted washer/extractor has been developed to cover the heavy duty requirements of hotels, motels, nursing homes, hospitals, professional laundries, restaurants, airlines, ships, schools, colleges and all on-premises laundries where flexibility and quick formula variation, coupled with high quality automatic washing, are required.

The CLARUS microcomputer allows for complete programming of water temperatures, water levels, wash and extraction periods and supply injections. The machine is designed for connection to hot and cold water supplies and may be used with free-standing powder or liquid supply injectors which can be activated by signals from the machine.

All parts of the machine which come into contact with the items being washed are made of heavy gauge surgical stainless steel, ensuring long life and lasting beauty, as well as full protection for no-iron fabrics. All electrical components are made accessible for servicing by simply removing the top panel.

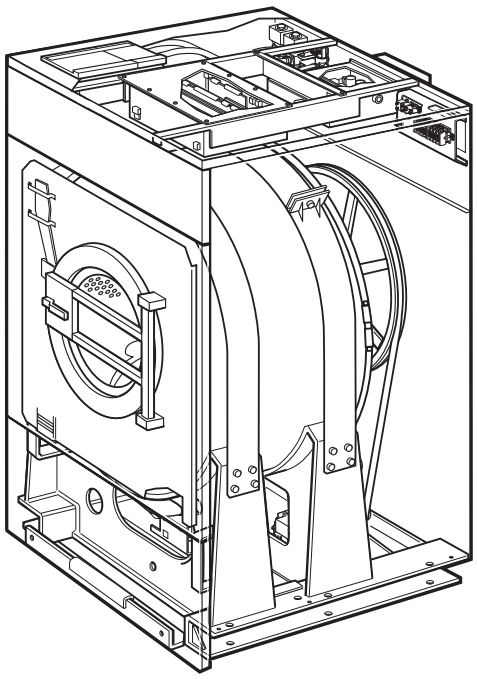
This manual contains a technical description of the machine and instructions for its installation, operation and maintenance. Together with the wiring diagram which accompanies each individual machine it should be kept in a safe place for easy reference.

When ordering spare parts or contacting the manufacturer for any purpose always give the machine serial number, model, voltage and other electrical characteristics appearing on the nameplate at the rear of the machine.

The C-machine is equipped with a frequency controlled motor, which gives:

- better distribution of the wash load prior to extraction.
- a low of start current.
- a choice of extraction speeds up to 690 rpm (220 G-force).

1



4941

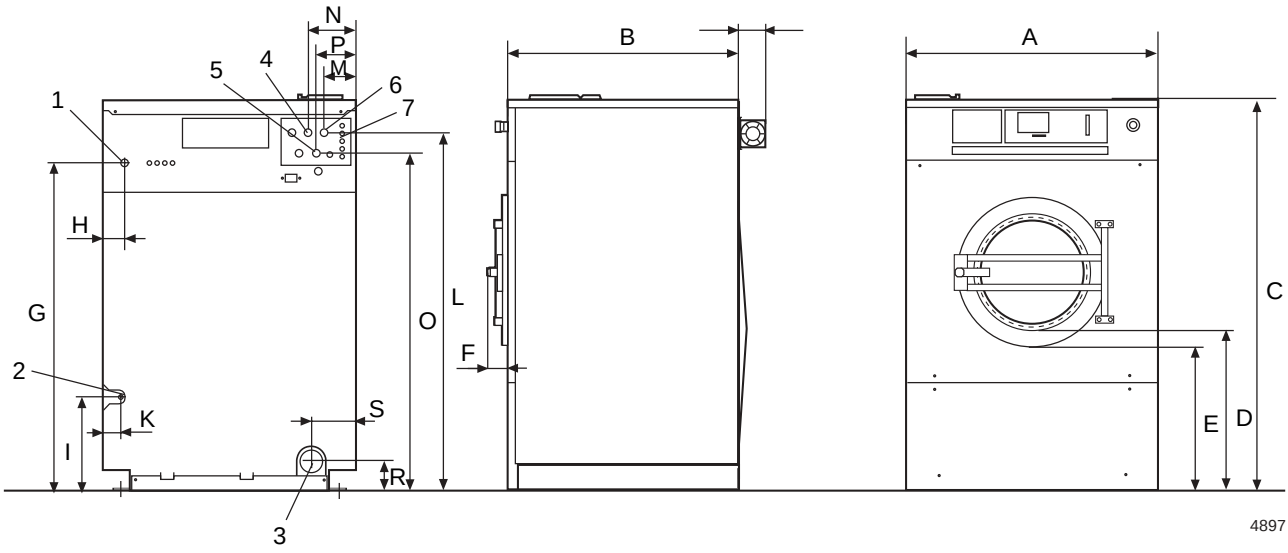
EXSM 230 C

Dry load capacity	up to		65 lbs
Overall dimensions	Width	935 mm	
	Depth (at the top)	870 mm	
	Height	1430 mm	
	Net weight	365 kg	805 lbs
Max. floor load at extraction		5,0±11.5 kN	1200±2760 lbs.force
Frequency (dynamic force)		12 Hz	
Crated Dimensions	Volume	1.85 m^3	65 cu.ft
	Weight	361 kg	795 lbs
Inner drum	Diameter	830 mm	32 11/16"
	Depth	425 mm	16 3/4"
	Volume	230 litre	8.12 cu.ft
Speed of rotation	Wash		41 rpm
	Distribution		72 rpm
	Extraction, max		690 rpm
G-factor	During wash		0.8
	During extrac., max		220
Motor speed	During wash		450 rpm
	During distrib.		770 rpm
	During extrac., max		7390 rpm
Rated power	Motor, wash		0.85 kW
	Motor, distrib.		0.25 kW
	Motor, extrac.		1.0 kW
Voltage requirements			208-240 V 1-Phase 60 Hz
Full load amps			15A
Overcurrent protection			20A max
Water connections			
Recommended water pressure	2-6 kp/cm^2		25-85 psi
Hose connection, water	DN 20		3/4"
Hose connection, steam	DN 15		1/2"
Hose connection, drain	75 mm		3"

EXSM 350 C

Dry load capacity	up to		80 lbs
Overall dimensions	Width	1085 mm	
	Depth (at the top)	1095 mm	
	Height	1540 mm	
	Net weight	545 kg	1200 lbs
Max. floor load at extraction		6.5±14 kN	1560±3147 lbs.force
Frequency (dynamic force)		10,8 Hz	
Crated Dimensions	Volume	2.4 m^3	85 cu.ft
	Weight	545 kg	1199 lbs
Inner drum	Diameter	920 mm	36 1/4"
	Depth	520 mm	20 1/2"
	Volume	350 litre	12.6 cu.ft
Speed of rotation	Wash		40 rpm
	Distribution		70 rpm
	Extraction, max		650 rpm
G-factor	During wash		0.8
	During extrac., max		220
Motor speed	During wash		500 rpm
	During distrib.		870 rpm
	During extrac., max		8200 rpm
Rated power	Motor, wash		1.2 kW
	Motor, distrib.		0.3 kW
	Motor, extrac.		1.5 kW
Voltage requirements			208-240 V 1-Phase 60 Hz
Full load amps			15A
Overcurrent protection			20A max
Water connections			
Recommended water pressure	2-6 kp/cm^2		25-85 psi
Hose connection, water	DN 20		3/4"
Hose connection, steam	DN 15		1/2"
Hose connection, drain	75 mm		3"

Outline and dimensions



1. Electrical cable connection
2. Steam connection (option)
3. Drain connection
4. Hot water connection
5. Hot water connection
6. Cold water connection
7. Liquid supply connection

	EXSM 230 C		EXSM 350 C	
	mm	inches	mm	inches
A	935	36 13/16	1085	42 11/16
B	870	34 1/4	1095	43 1/8
C	1430	56 5/16	1540	60 5/8
D	595	23 7/16	595	23 7/16
E	525	20 11/16	530	20 7/8
F	135	5 5/16	135	5 5/16
G	1210	47 5/8	1325	52 3/16
H	75	3	90	3 9/16
I	355	14	525	20 11/16
K	55	2 3/16	60	2 3/8
L	1315	51 3/4	1430	56 5/16
M	115	4 1/2	120	4 3/4
N	175	6 7/8	180	7 1/16
O	1240	48 13/16	1355	53 3/8
P	145	5 11/16	150	5 7/8
R	115	4 1/2	120	4 3/4
S	170	6 11/16	190	7 1/2

Installation

Machine foundation

The machines are designed to be bolted in position to a concrete floor or specially prepared concrete foundation. A template showing the size of the foundation and positioning of the foundation bolts is available.

For installation on an existing concrete floor, the floor must be at least 8'' thick and of good quality. If the floor does not meet these requirements, then a 6-8'' high concrete foundation should be made.

Refer to "Technical data" for static and dynamic floor loading.

Follow the instructions below when making a concrete foundation:

Fig. (2) 1. Decide where to place the machine and consider maintenance requirements, i.e. determine a suitable distance from the rear of the foundation to the wall, and the distance from the foundation to the nearest side wall. The distance should be at least 16 and 2 inches, respectively.

Fig. (3) 2. Break up the floor to a depth of at least 3 inches, making sure that the sides of the hole slope inwards - the bottom of the hole should be 5 inches longer than the upper length.

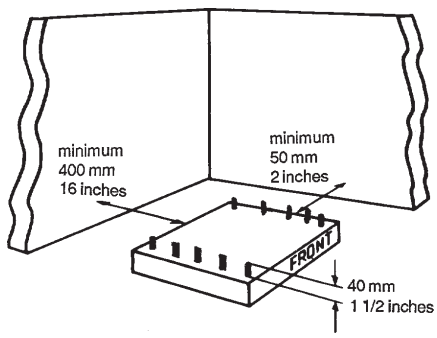
3. Wet the hole well. Brush the bottom and sides with cement grout.

4. Prepare a casing and fill with concrete to form foundation. Make sure the foundation is level.

Fig. (4) 5. Use the template to position the foundation bolts correctly - bolts are to extend 1 1/2'' above concrete.

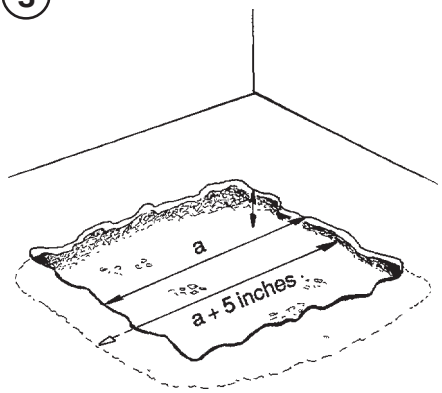
Reinforcing ironrods A shall be used around the base. The ironrods shall be placed between the bolts and the edge of the foundation.

2



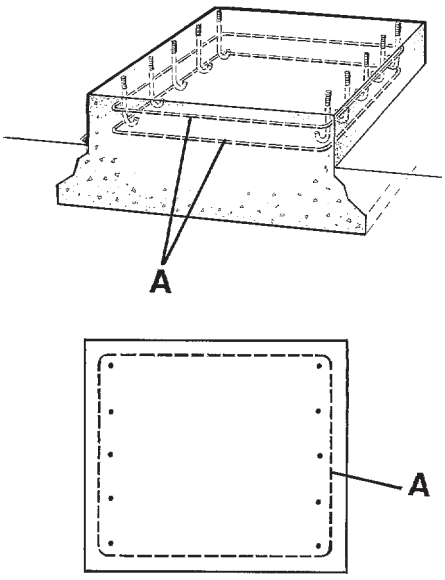
1755

3



0272

4



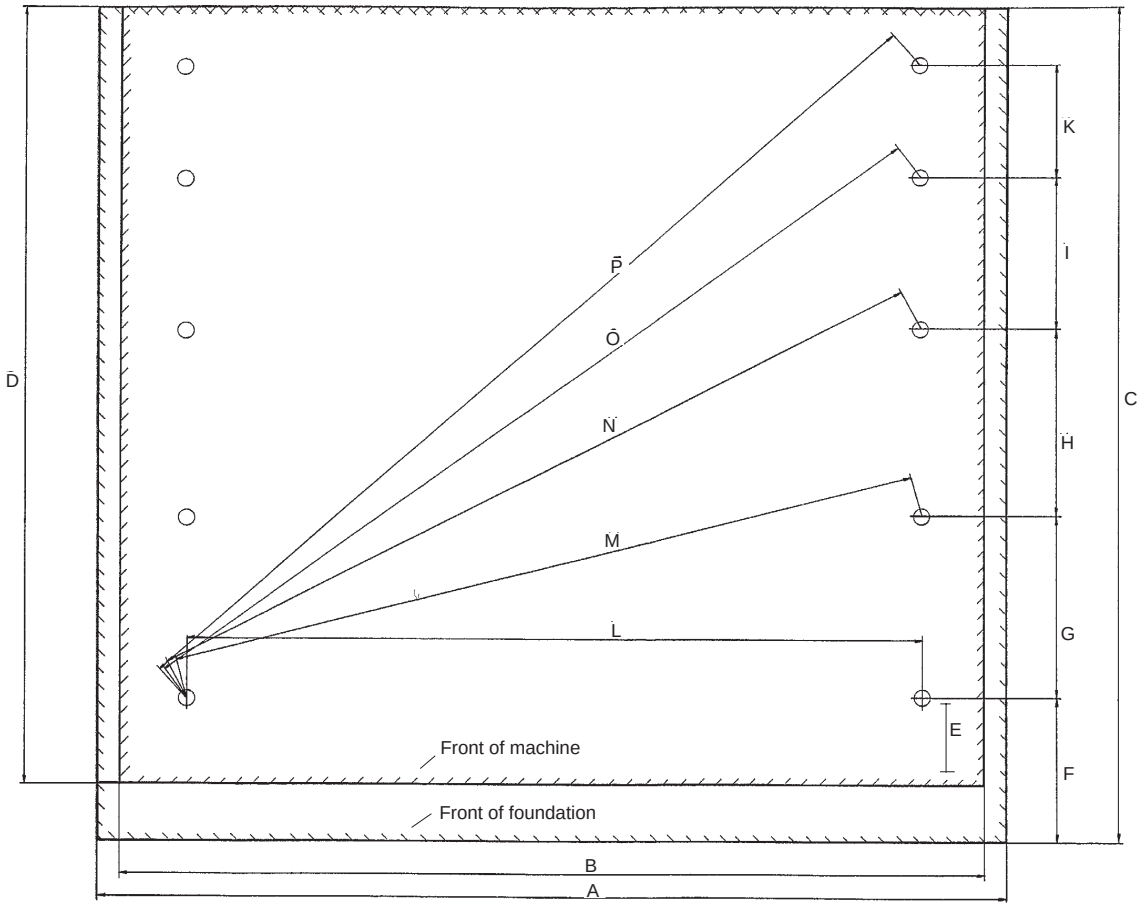
1756

EXSM 230 C

Fig. 5 Measurements for foundation in inches and (mm).

A 39 (990)	I 6 5/8 (168)
B 37 (940)	K 4 29/32 (125)
C 36 3/8 (925)	L 31 1/2 (800)
D 33 7/8 (860)	M 32 1/2 (825)
E 3 3/4 (95)	N 35 11/32 (898)
F 6 5/16 (160)	O 38 3/4 (985)
G 7 7/8 (200)	P 41 27/32 (1063)
H 8 5/32 (207)	

5



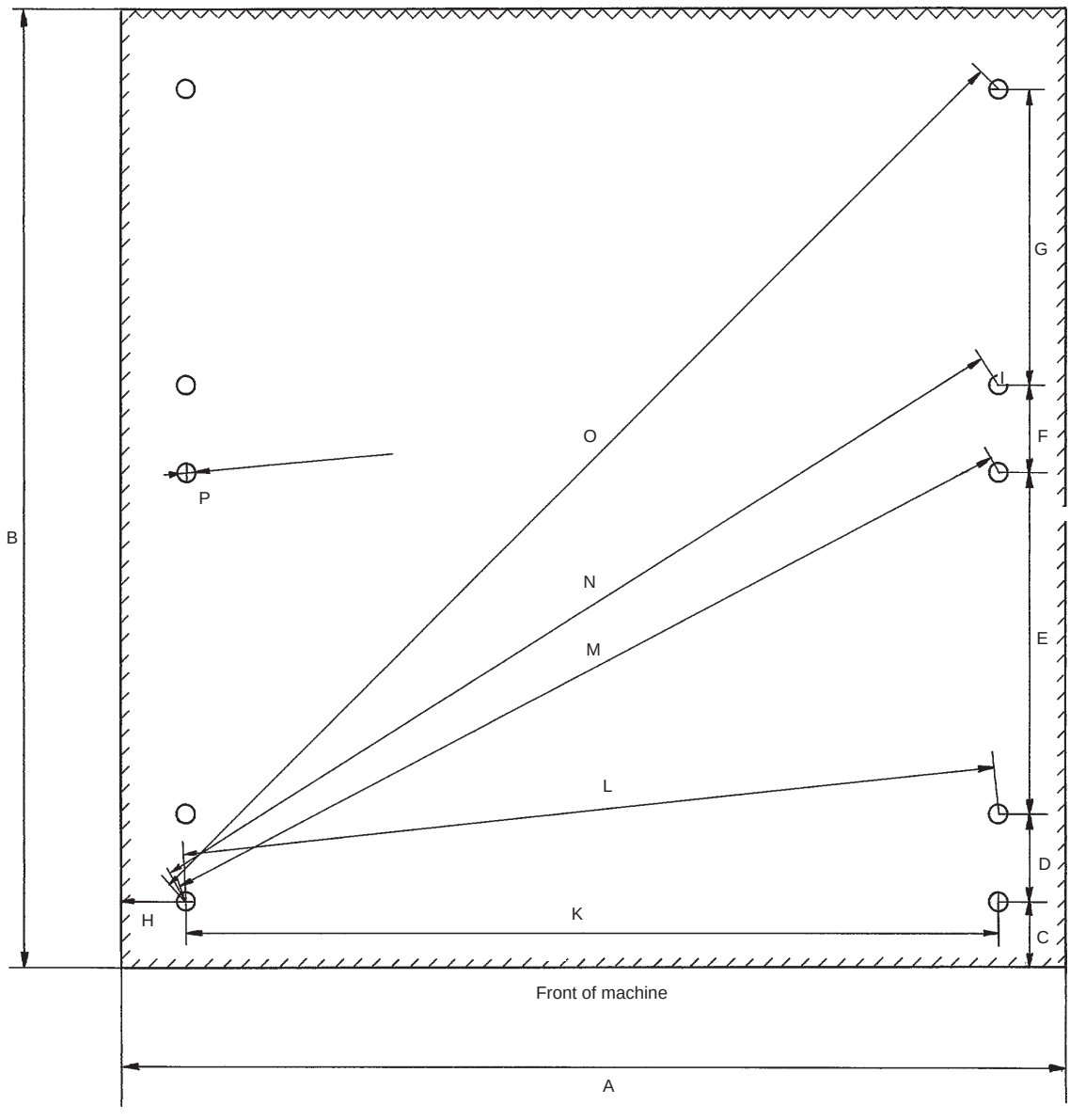
2155

EXSM 350 C

Fig. Measurements for foundation in inches and (mm).
6

A 42 29/32" (1090)
B 43 15/64" (1100)
C 3" (75)
D 3 15/16" (100)
E 15 23/64" (390)
F 3 15/16" (100)
G 13 25/64" (340)
H 3" (77)
K 36 13/16" (935)
L 37 1/64" (940)
M 41 9/16" (1056)
N 43 17/32" (1106)
O 51 59/64" (1319)
P 7/8" (22)

6



Mechanical installation

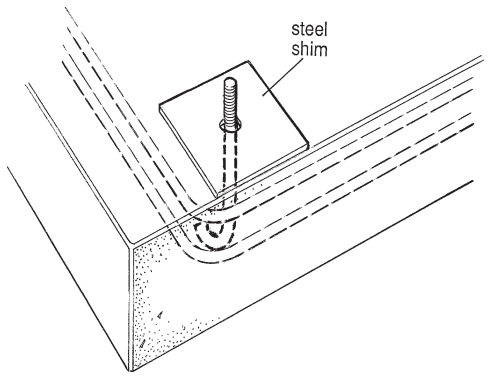
Fig. 7
- Place wide steel shims on the concrete foundation over the bolts.
- Lift the machine and lower it in position. Never use the door or the door handle to lift or lower the machine.

Fig. 8
- Check that the machine is level front-to-rear and side-to-side and standing firmly on the ten supporting points. Spacing washers must be mounted if one or more of these points is not resting against the floor/foundation.

Fig. 9
- Place flat washers over the foundation bolts and secure the machine in position by tightening the self-locking nuts. See illustration below.

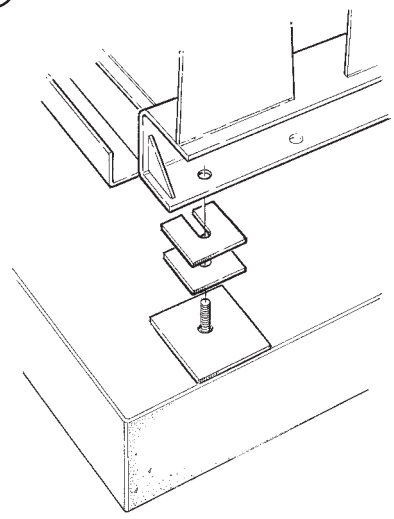
Fig. 10
- Tighten the nuts in sequence as shown.
- Check and tighten the nuts every week for the first month.

7



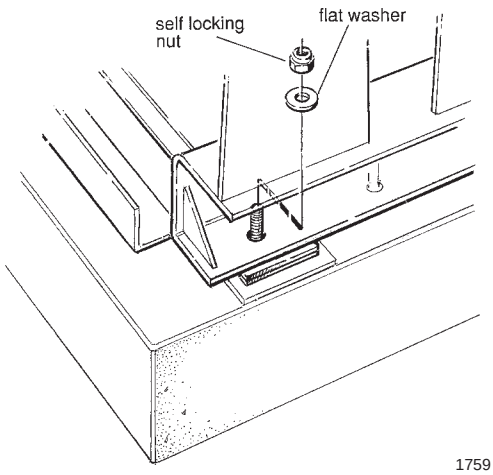
1757

8



1758

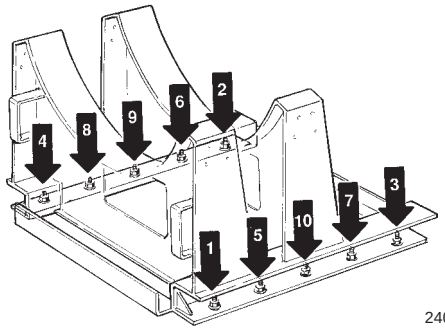
9



1759

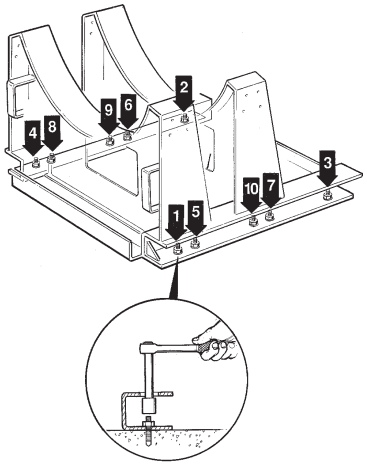
10

EXSM 230 C



2408

EXSM 350 C



2399

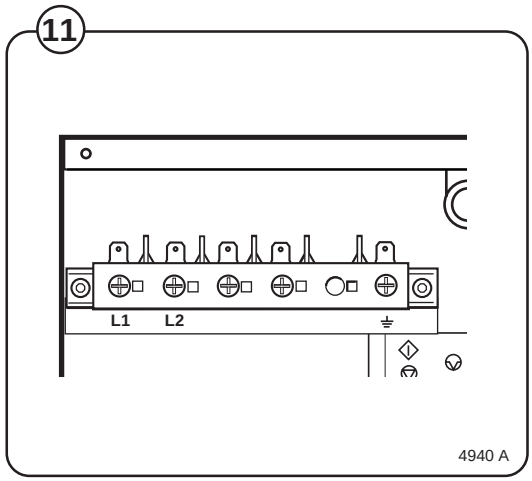
Electrical installation

Although the machines are fitted with a thermal overload in the motor windings and fuses for the control circuit, a separate circuit breaker must be installed for each machine.

For proper overcurrent protection, check the data plate at the rear of the machine. Also consult local electrical code for special requirements.

The machine is equipped with a control circuit transformer, mounted on the control unit and connected for 220 volt operation.
If your incoming voltage is below 210 volts move the wire connection to the 208 volt tab on the transformer. If it is above 230 volts move the wire to the 240 volt tab on the transformer.

Fig. (11) Connect L1, L2 and ground wires according to the markings of the terminal block. The cable is to hang in a large loose loop, supported by the clip of the terminal block.



Connection of external units (optional equipment)

Electrical installation must be carried out by an authorized personnel!

All optional equipment connected must be EMC-approved to EN 50081-1 or EN 50082-2.

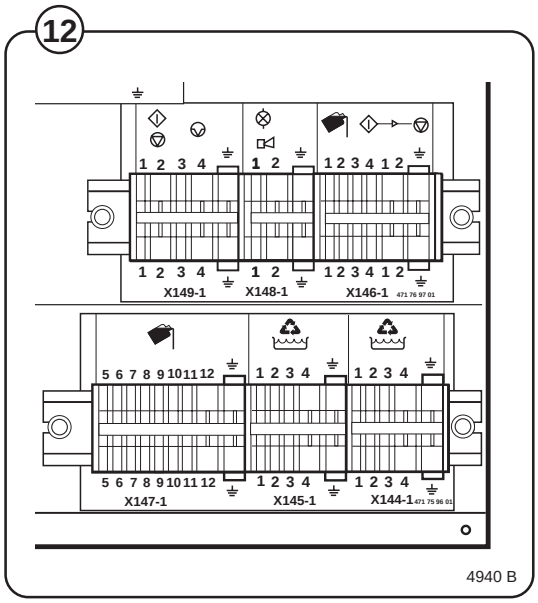


Fig. (12)

Connector X149-1.

Connector for external START/STOP/PAUSE function for machine.

Connector X148-1 (only on machines with at least two I/O boards).

Connector for external buzzer or signal.

Connector X146-1.

Connector for external liquid supply pumps. Control signals on 1-4 on left and Neutral to be connected to 1 and Phase to 2 on right-hand side.

Connector X147-1 (only on machines with at least two I/O boards).

Connector for additional external liquid supply pumps.

Connector X145-1 (only on machines with three I/O boards).

Connections for recycling system 2.

Connector X144-1 (only on machines with at least two I/O boards).

Connections for recycling system 1.

Water connections

All plumbing must conform to national and local plumbing codes.

All intake connections to the machine are to be fitted with manual shut-off valves and filters, to facilitate installation and servicing. In certain cases non-return valves will need to be fitted before the machine to comply with local plumbing regulations.

Water pipes and hoses should be flushed clean before installation. After installation hoses should hang in gentle arcs.

The machine may have between two and four DN 20 (R 3/4") water connectors. All connectors present on the machine must be connected up. The table shows the possible connection options, which will depend on the water types to be connected to the machine. Check the machine plates too.

All water connectors must be connected up, otherwise the wash program will not function correctly.

Hoses are to be of an approved type and grade, to comply with national regulations.

The water pressure data is as follows:

- min: 40 kPa (0,4 kp/cm^2)
- max: 1 MPa (10 kp/cm^2)
- recommended: 200-600 kPa (2-6 kp/cm^2)

Water type	Water connection		
	1	2	3
cold and hot	cold	hot	cold or hot

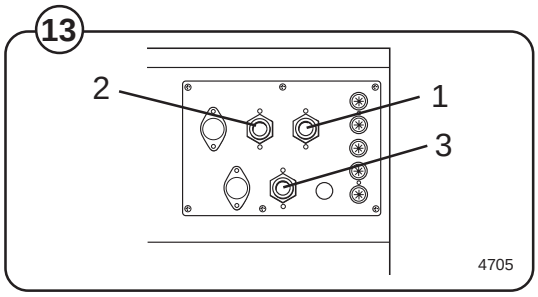


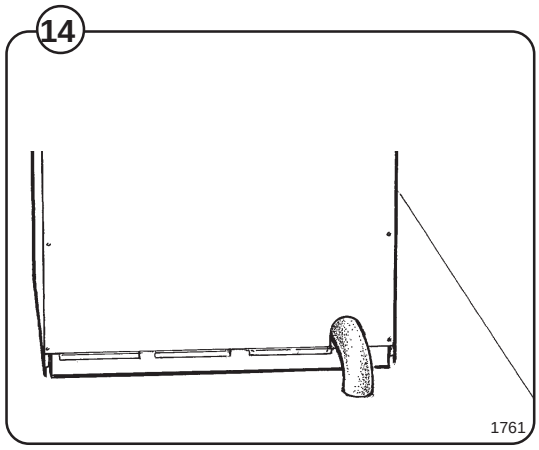
Fig. 13

Drain connection

Fig. (14) Connect a 3" (75 mm) flexible hose to the drain outlet of the machine.

The drain hose must not have any sharp bends and must slope from the machine to assure proper drainage. The outlet must open freely to the main drains.

Do not reduce the size of the drain connection from the machine to the waste line.



Steam connection (optional steam heating)

Fig. 15

The steam inlet pipe must be fitted with a manual cut-off valve in order to facilitate installation and service operations.

Attach the filter supplied with the machine to the manual cut-off valve.

Conncection hoses should be of the quality required according to regulations in the country of use.

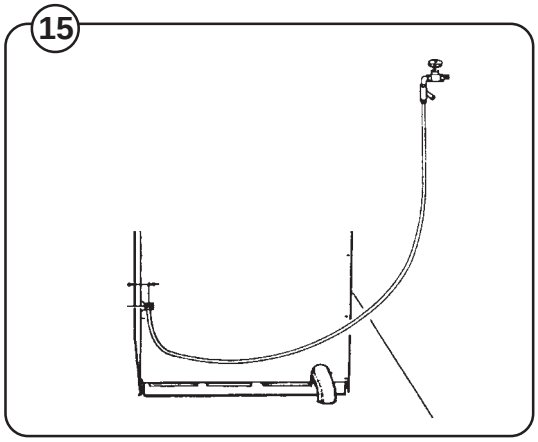
Connections size at filter: DN 15 (1/2").

Steam pressure required:

- minimum: 50 kPa (0.5 kp/cm^2) (7 psi)
- maximum: 800 kPa (8 kp/cm^2) (113 psi)

Check there are no sharp angles or bends in the connection hose.

15



Installing top-mount manifold for connection of liquid supplies

Remove the cover and cover support over the soap box.

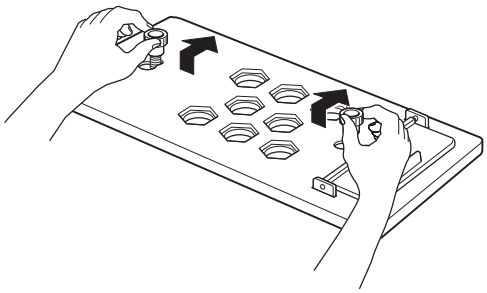
If comp 3 has a metal plate at the rear, bend it all the way as shown.

Fig. 16 Pull the manifold knobs up and forward.

1. Loosen both knobs so that one side of the metal fingers underneath can slide under the top lid of the machine, within the supply box. Fig. 17
2. Fit the supply manifold into the supply box so that both sides are held securely in place by the metal fingers.

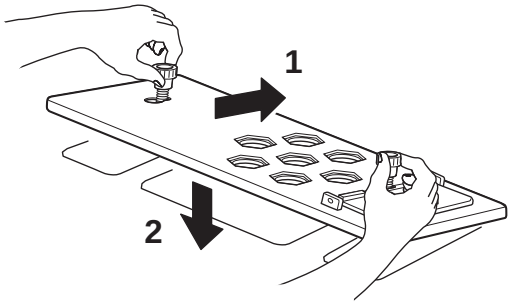
If the supply manifold does not fit turn it around. You have it in backwards.

16



3649

17



3648

Fig. 18

1. Drop the knob into the larger opening in the supply manifold lid.
2. Tighten securely. Do not overtighten! Do not use pliers or other tools to tighten the knobs!

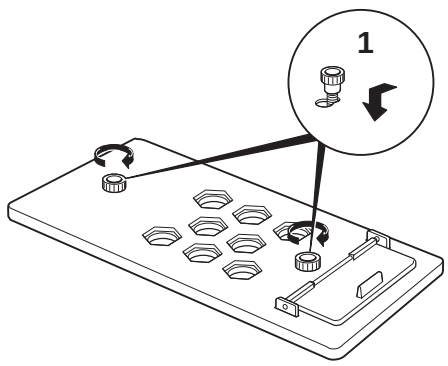
Fig. 20

1. Select the correct size rubber ring which will fit snugly on the chemical tube you are using. Ring A is used for tubes with Ø5/16''.
2. Use scissors or a razor to carefully cut out the proper size rubber ring. Wrap the rubber ring around each tube after threading each tube through the strain relief. Run the tube through the compression nut to the bottom of the soap box compartment. Cut the end of the tube at an angle. Hand tighten the strain relief on to the compression nut.

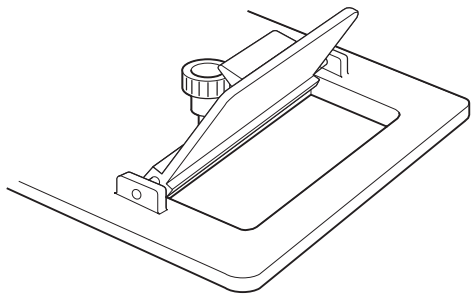
Fig. 19

Separate lid which gives possibilities to add powder detergent in compartment 1.

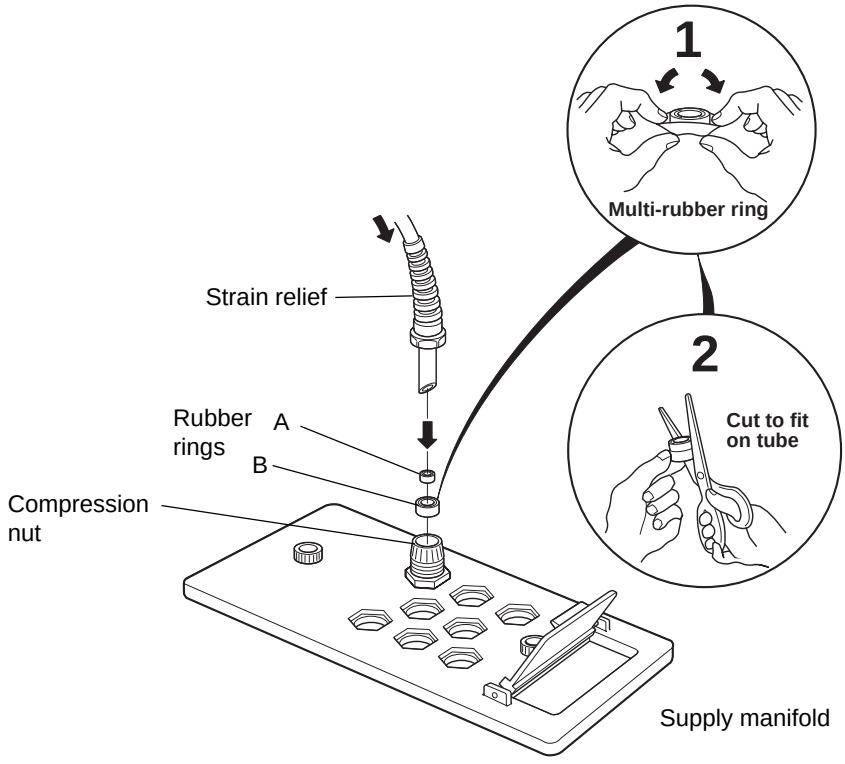
18



19



20



Function control and safety check list

In the machine cylinder, you will find the warranty registration card, a copy of the warranty policy and other pertinent material.

The warranty card should be completed and sent to Wascomat. All other items should be placed in a safe place for future reference.

The machine should be cleaned when the installation is completed, and checked out as detailed below without loading the machine with fabrics:

Fig. (21)
- Make sure the machine is properly bolted to the floor..

Fig. (22)
- Make sure that all electrical and plumbing connections have been made in accordance with applicable local codes.

1. Check the incoming power for proper voltage, phase and cycles.

- Make sure the machine is properly grounded electrically.
- Make sure that only flexible water fill and drain hoses of the proper length to avoid sags and kinks have been used.

2. Open the maunal water and steam valves.
3. Turn on electric power.

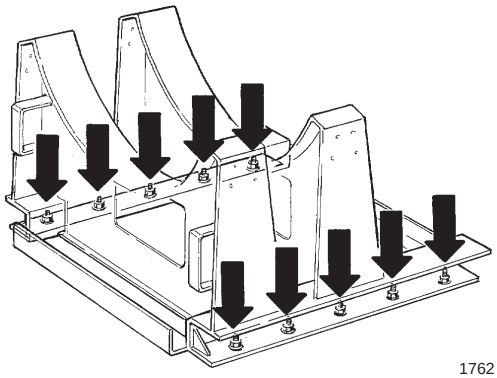
Before the machine is operated, the door safety interlock must be checked for proper operation as follows:

Fig. (23)
- When washer loading door is open, the machine must not start. Verify this by attempting to start washer with door open.

Fig. (24)
- When washer is in operation, the loading door is locked and cannot be opened. Verify this by attempting to open the loading door when the machine is operating. If necessary, consult this manual for proper operation of the door lock and door safety interlock or call a qualified serviceman.

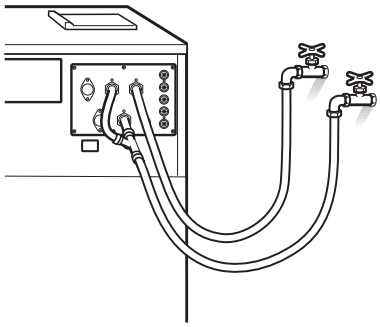
Door safety interlock must be checked daily in accordance with above procedure.

21



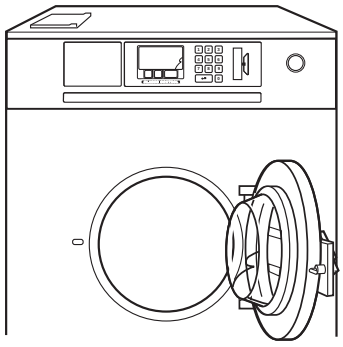
1762

22



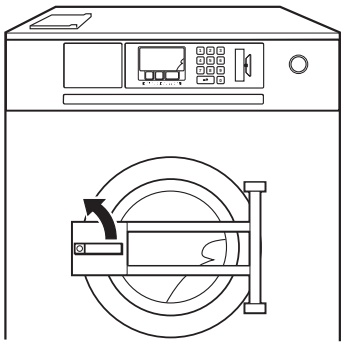
4948

23



4944

24



4945

Add detergent and conditioner.

Choose a program.

Press **START** to begin test cycle The machine will start up and the display window will show cycle information.

Check that:

- the drum is rotating normally at all program steps and that there are no unusual noises.
- there are no leaks from the water/steam connections and the drain valve.
- the detergent/conditioner compartments are flushed down.
- the door cannot be opened during the program and not until thirty seconds after the program has finished.

Fit the panels and covers removed during installation. Wipe the machine clean with a damp cloth.

If no problems were encountered, the machine is ready for use.


All machines are factory tested prior to shipment. Occasionally, some residual water may be found when the machine is installed.


Before servicing Wascomat equipment, disconnect electrical power.

Safety rules

- **This machine is designed for water washing only.**
- **All installation operations are to be carried out by qualified personnel. Licensed personnel are necessary for all electric power wiring.**
- **The interlock of the door must be checked daily for proper operation and must not be bypassed.**
- **All seepage in the system, due to faulty gaskets etc., must be repaired immediately.**
- **All service personnel must be fully familiar with the operating manual before attempting any repair or maintenance of the machine.**
- **This machine must not be sprayed with water, otherwise short circuiting may occur.**
- **This machine must not be used by children.**
- **Fabric softeners with volatile or inflammable fluids are not to be used in the machine.**

Consignes de sécurité

- **La machine est conçue pour le lavage à l'eau exclusivement.**
- **Tous les travaux d'installation doivent être effectués par une personne qualifiée. Tous les câblages électriques doivent être réalisés par un électricien diplômé.**
- **Le verrouillage du hublot doit être vérifié chaque jour et ne peut être neutralisé.**
- **Toute fuite du système, due à des joints défectueux etc., doit être réparée sans délai.**
- **Tous les membres du personnel d'entretien doivent être parfaitement familiarisés avec le manuel d'entretien avant d'entreprendre une réparation ou un entretien de la machine.**
- **Ne jamais asperger d'eau la machine sous peine de risquer un court-circuit.**
- **La machine ne peut être utilisée par des enfants.**
- **Ne pas utiliser dans la machine des adoucissants textiles contenant des liquides volatils ou inflammables.**

General

The door and the electronic timer with display and keyboard are fitted at the front of the machine.

All control and indicating components, i.e. relays, delay unit, etc are assembled under the top cover, easily accessible from the top of the machine for simplified servicing.

Main units

Fig. 25

1 Electronic timer with display and keyboard for operating the machine.

2 Door -with automatic locking device which remains locked throughout the different wash processes.

3 Detergent supply box - three compartments for automatic injection of powered detergents and fabric softener.

4 Inner cylinder - of stainless steel supported at the rear by two ballraces.

5 Outer drum - of stainless teel (18/8) securely attached to the frame.

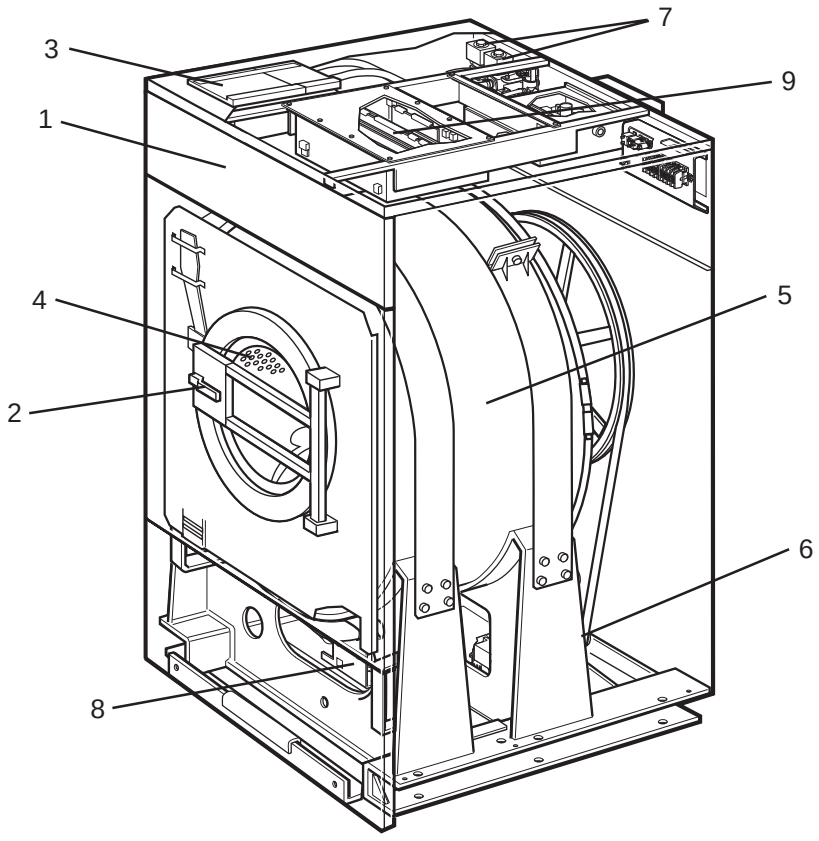
6 Motor - for reversing wash action, distribution and for high speed spin action.

7 Hot and cold water valves - program and level controlled solenoid valves for filling with water, and for flushdown of automatic detergent dispenser.

8 Drain valve - timer controlled valve for draining the machine of water.

9 Control circuit - of plug in type, for time and temperature control of the different wash cycles.

25



4941

Machine construction

Panels

The machines are equipped with a top panel and front panel made of stainless steel. The coloured panels are made of phosphatized steel plate. For servicing purposes, the panels can easily be removed.

Outer shell

Fig. 26 The outer shell is made of heavy gauge surgical steel and is attached to a heavy duty, rigid head casting (back gable).

The whole assembly is mounted on a heavy gauge fabricated steel base, hot-dip galvanized for long life and corrosion resistance.

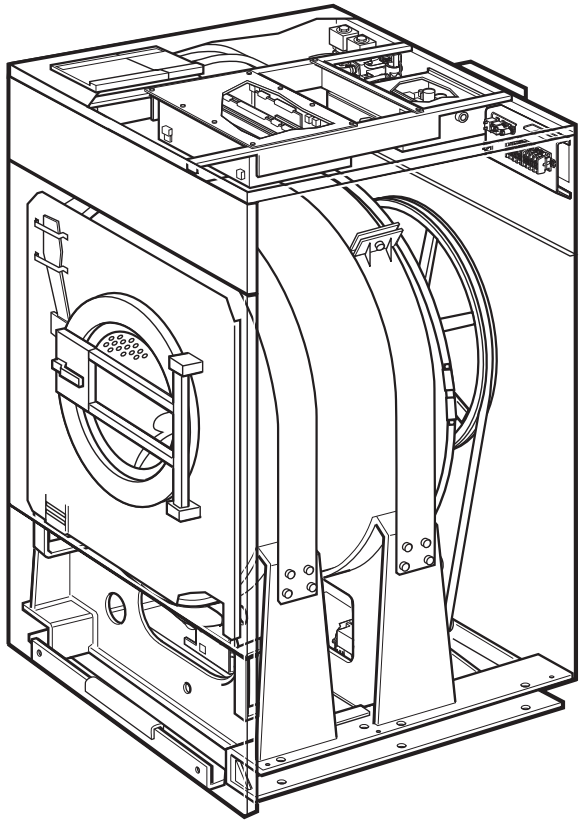
Inner cylinder

The inner cylinder is made of perforated surgical stainless steel. It is equipped with three lifting ribs and has highly-polished side sheets and back with maximum embossed perforated area to assure high flow of water and supplies through fabrics.

Scientifically correct ratio of cylinder diameter and depth assures maximum washing action.

The shaft is electrically welded to the reinforced back of the cylinder. A specially designed chromeplated sleeve bushing protects the seals from wear.

26



4941

Back gable and bearing

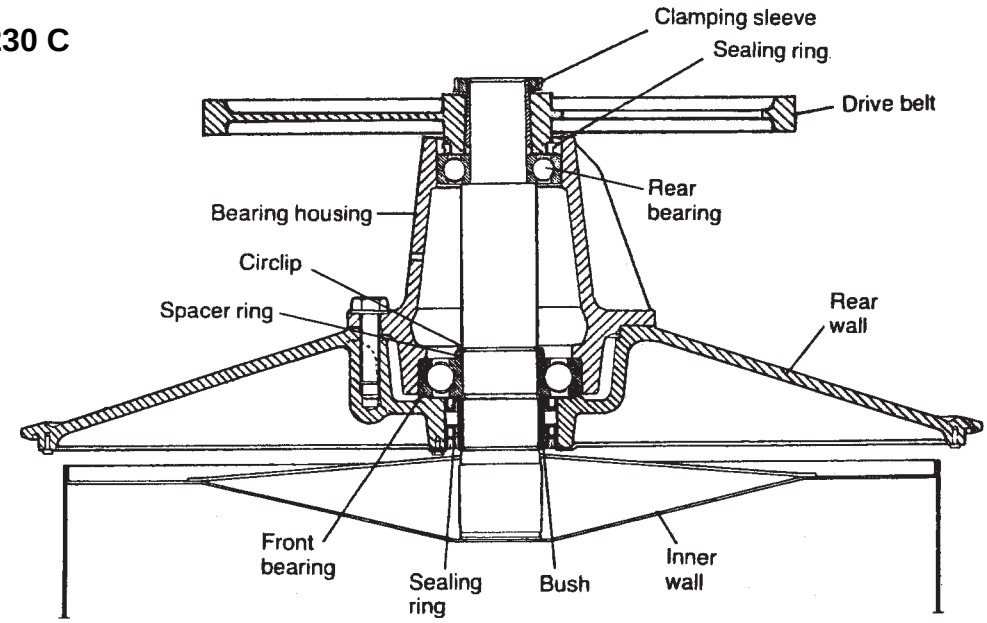
Fig. 27 The back gable and the bearing trunnion housing are constructed of a webbed heavy casting for extra rigidity. The bearings are protected against infiltration of water by three neoprene seals. An intermediate safety outlet provides an escape for any possible condensation.

The seals are mounted on a chrome-plated, noncorrosive, specially hardened sleeve bushing that is mounted on the drive shaft to prevent wear of the seals and shaft. The main bearing is fitted tight into the bearing trunnion housing. A nut is tightened on the shaft to prevent the cylinder from moving in and out.

The extension of the bearing trunnion housing supports the rear bearing holding the shaft. A grease seal is mounted to prevent escape of grease. The bearings are permanently lubricated and need no maintenance.

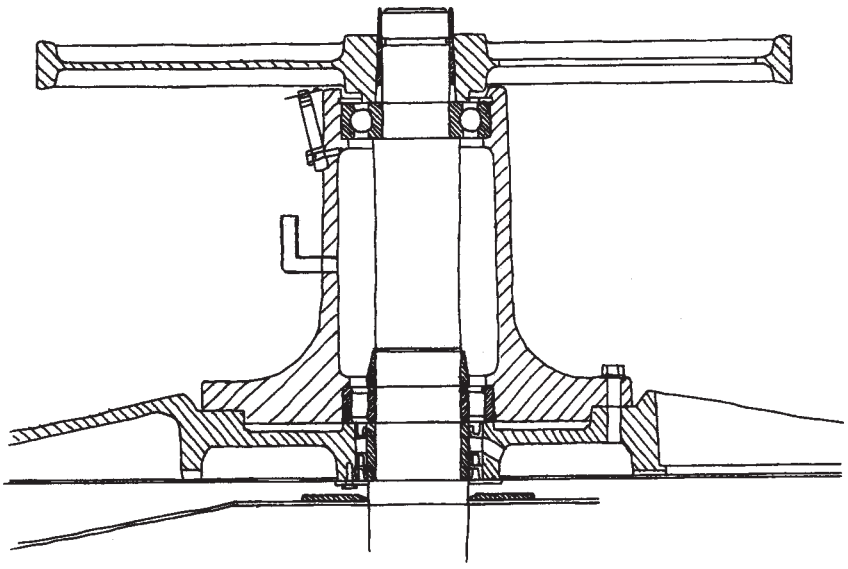
27

EXSM 230 C



5014

EXSM 350 C



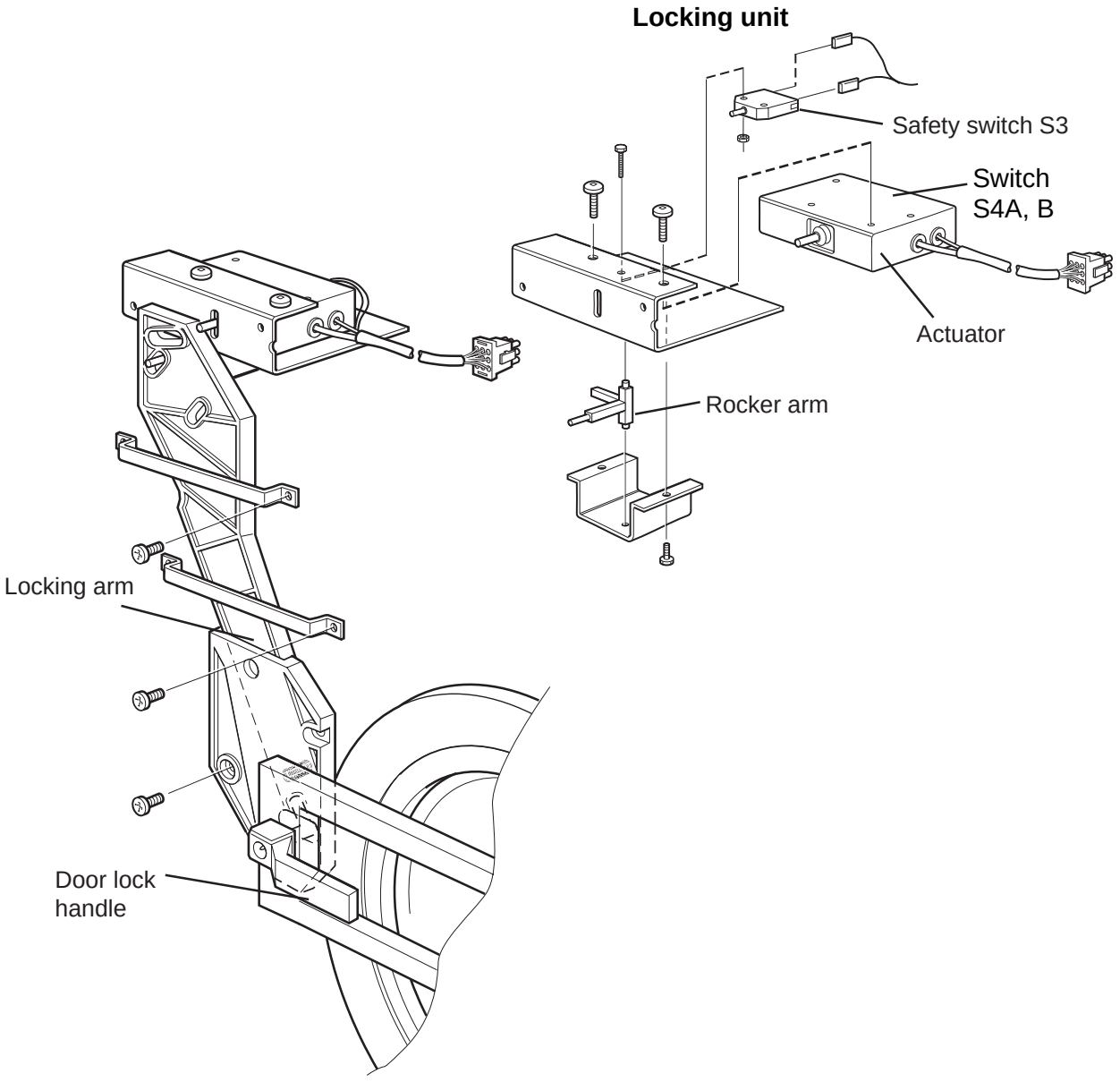
5015

Description

Fig. 28 The machine door lock consists of the following:

- The locking unit, located behind the front panel below the detergent dispenser. The unit consists of a solenoid which locks the door, and two microswitches. Switch S4A indicates that the door is locked and switch S3 indicates that the door is closed.
- The door lock control unit, located in the automatic control unit. This unit consists of a circuit board for monitoring door lock functioning.
- The locking arm, located between the door lock handle and the locking unit. This arm provides the mechanical link between door lock handle and locking unit.

28



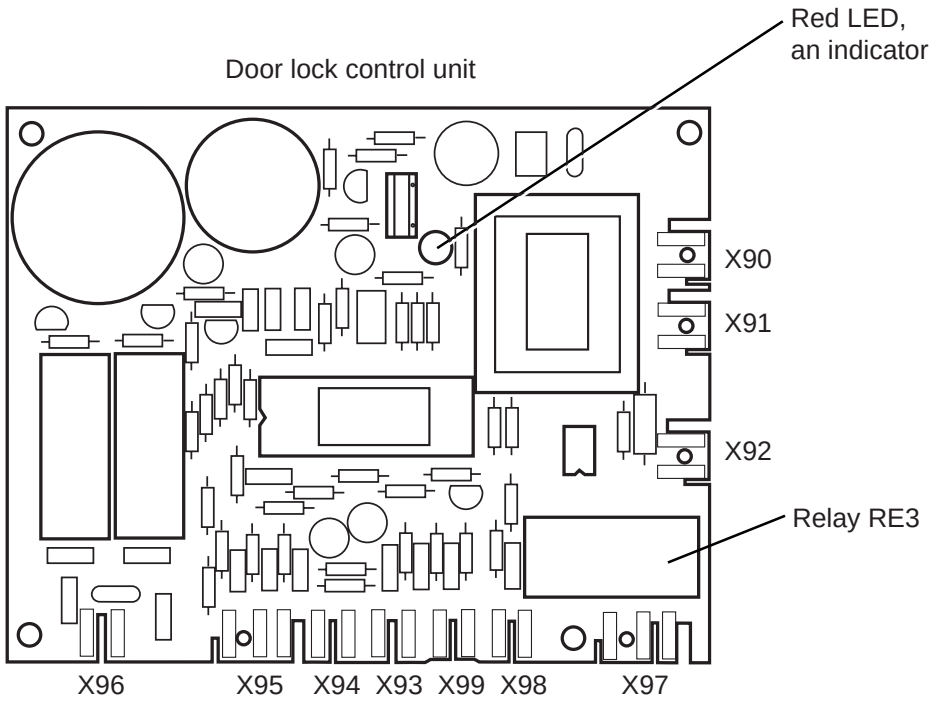
Door lock control unit

Fig. 29 The sole function of this control unit is to oversee the correct functioning of the door lock. The CPU board receives information from the motor control unit about motor rotation, and has its own level-monitoring device. The control unit also detects water level and motor speed through separate level measurement devices and the rotation guard (speed-monitoring device). Through this double monitoring, a very high level of safety can be achieved.

When the CPU board commands door locking, the control unit checks that there is no water in the drum and that the drum is not rotating. Only after that is a signal sent to the door lock. Level and rotation are checked in the same way before the door is allowed to open.

For even greater safety, the voltage feed to the I/O boards' outputs goes via both the emergency stop and the door lock switch. This means that no functions can proceed unless the emergency stop is in its normal position (not actuated) and the door is locked.

29

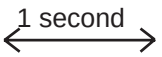


Error indication patterns

Fig. 30 If the door lock is working correctly, this is indicated by the red LED, by a pattern of flashes which indicates “OK”. The error indication patterns revealed by the LED flash at various frequencies for the various errors or faults. All error indication patterns have a frequency cycle of 50%, i.e. the LED will be on half the time, off half the time.

30

LED pattern of flashes during normal functioning



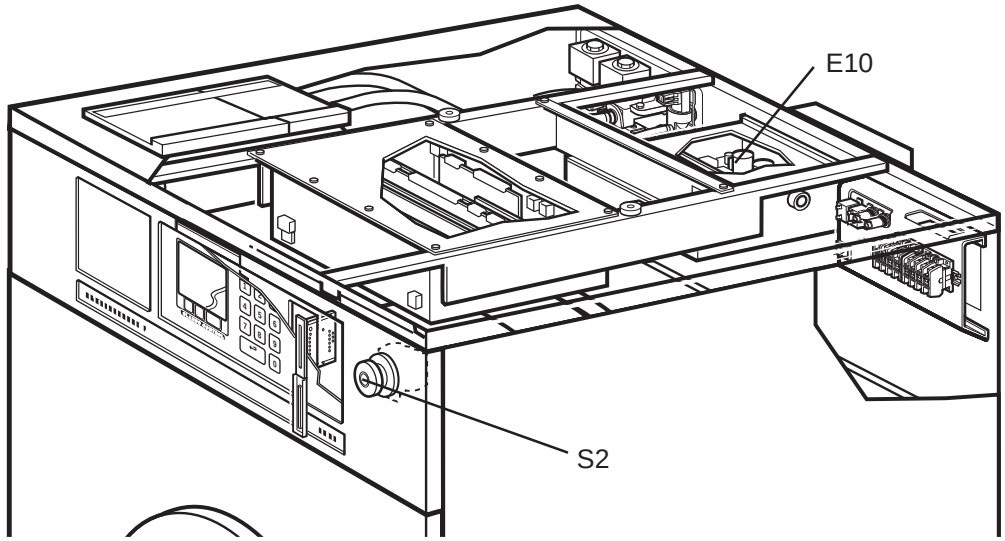
Pattern of flashes indicating “OK”, drum at standstill

Pattern of flashes indicating “OK”, drum rotating, 5 Hz

Error indication pattern	Meaning/cause
	Level-sensing device indicates water in drum when door lock is open. 2.19 Hz
	Auxiliary relay for motor indicates that the motor contactor is activated when the door lock is open (this error indication pattern does not occur when the excess-speed-monitoring device is selected). 1.88 Hz
	Signals from rotation sensor and auxiliary relay do not correspond. 1.56 Hz
	The control unit sensor circuits indicate fault/ error in drive circuits for door lock including its wiring. 0.85 Hz
	Armament circuits for RE1/RE2 activated (capacitor C8 charged when it should be discharged). 0.37 Hz

4686

31



4942

Fig. 31

E10	Motor control unit, microprocessor-controlled. Controls direction of rotation and speed of motor. The MCU is also used for imbalance detection and calculating weight of wash load.
S2	Emergency stop switch

Control unit

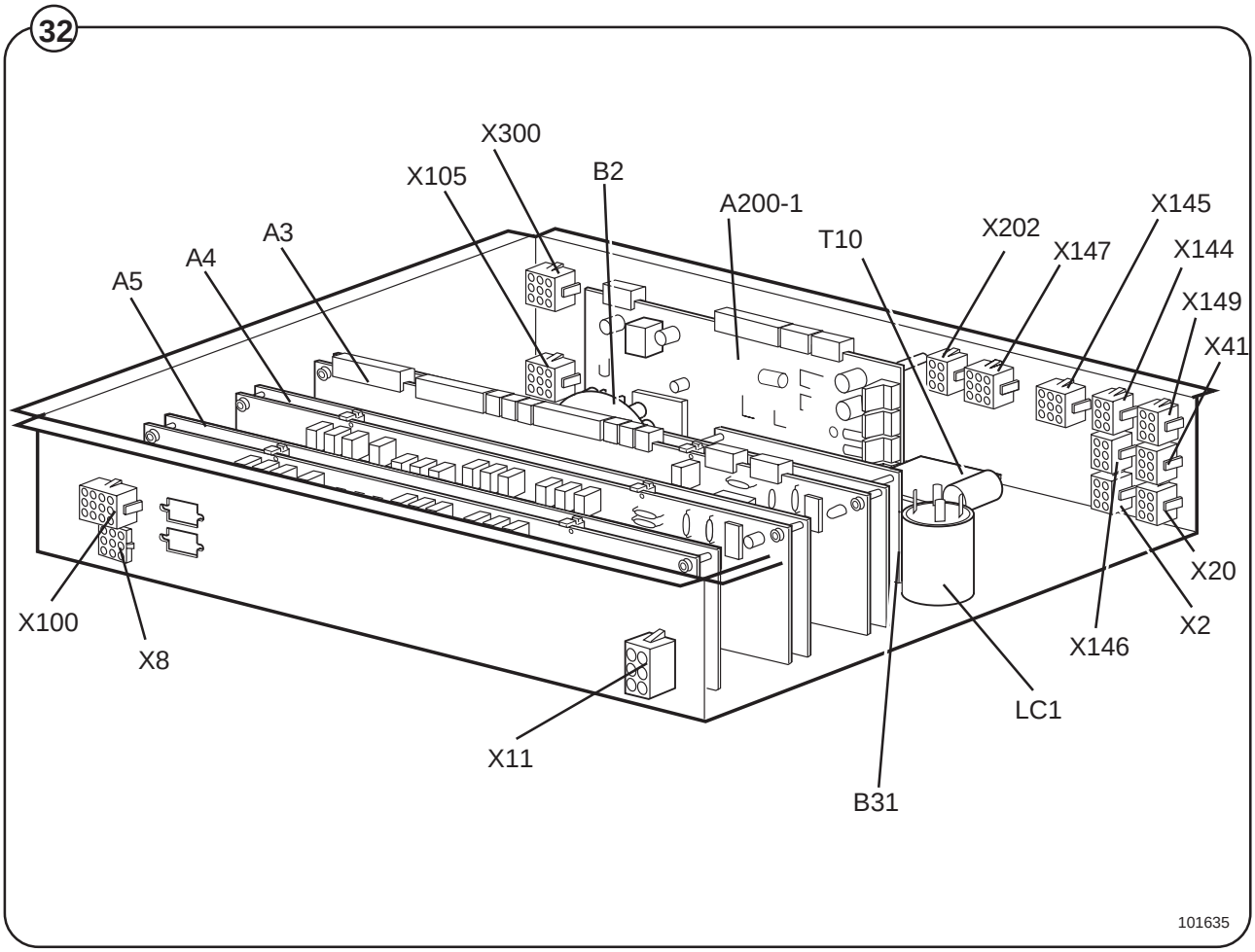


Fig. 32

A3-A5	I/O boards 1-3
A200-1	CPU board
B2	Level sensing device, door opening
T10	Transformer, power supply to circuit boards
B31	Rotation-monitoring device
LC1	Suppression filter

Connectors

X2	6-pole, heating control (option)
X8	9-pole, door
X11	6-pole, connection emergency stop switch
X20	6-pole, inward
X41	6-pole, Hall element, speed sensor
X100	12-pole, display
X105	9-pole, intakes/drain
X144	9-pole, recycling, I/O board 2
X145	9-pole, recycling I/O board 3
X146	6-pole, recycling TM1-4
X147	9-pole, recycling TM5-11
X149	6-pole, start, stop and pause
X202	6-pole, weighing equipment
X300	9-pole, communication, MCU

Supply unit

33

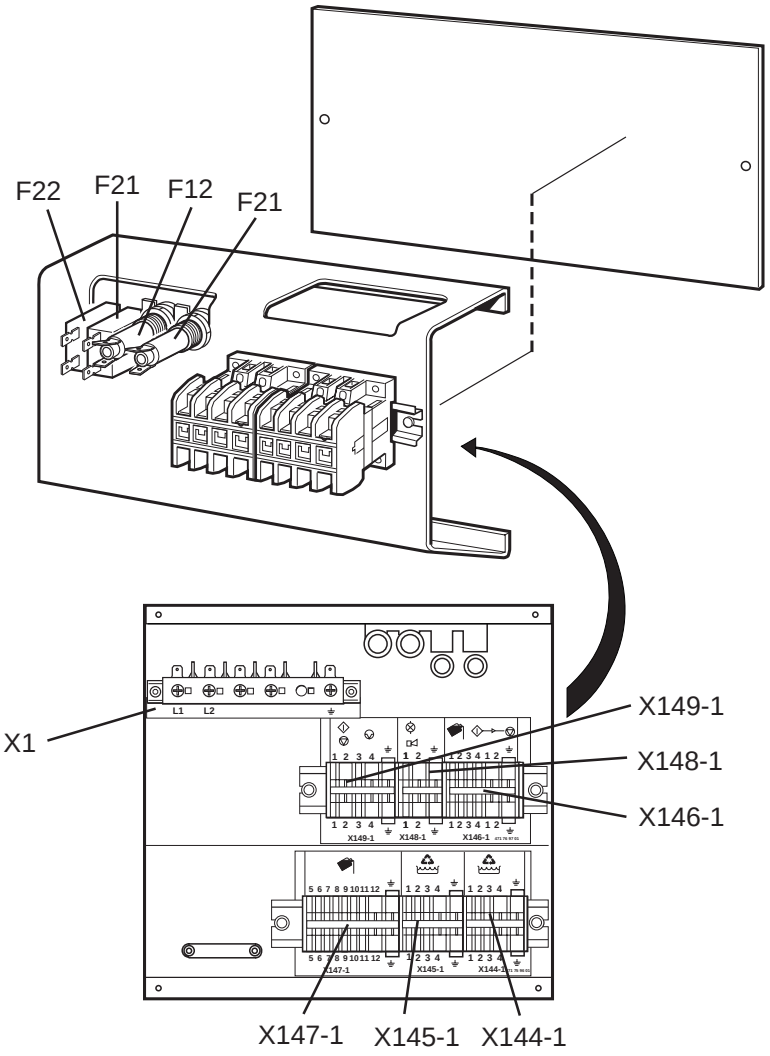


Fig. 33

F11, F12	Fuses, inward power supply
F21, F22	Fuses, motor control unit
X1	Main input
X144-1	External recycling I/O 2
X145-1	External recycling I/O 3
X146-1	Detergent signals 1-4
X147-1	Detergent signals 5-11
X148-1	External flashlight/siren (buzzer)
X149-1	Start, stop and pause

Motor

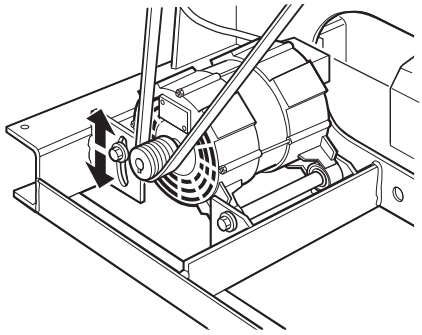
Fig. (34) In machines with frequency control the same motor is used for wash speed, distribution speed and extraction. The motor is located on a motor mounting plate, and drives the drum via a belt.

The tension of this drive belt can be altered by moving the entire motor thanks to the mounting slots on one side. The motor has a thermal cut-out located in its windings. This thermal cut-out is defected by the motor control unit causing it to shut itself off, 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.

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

34



4939

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 guards releasing repeatedly: short circuiting.

Very noisy motor

- Breakdown of bearings – replace motor.

Motor locks

Breakdown of bearings – replace motor

Motor does not turn

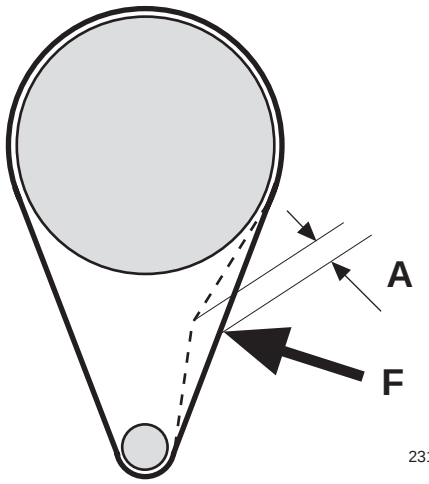
- Check belt tension.

Fig. 35

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

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

35



A_{max}	15 mm	9/16 in
A_{min}	15 mm	9/16 in
F	25 N	60 lbs

Motor control unit E10

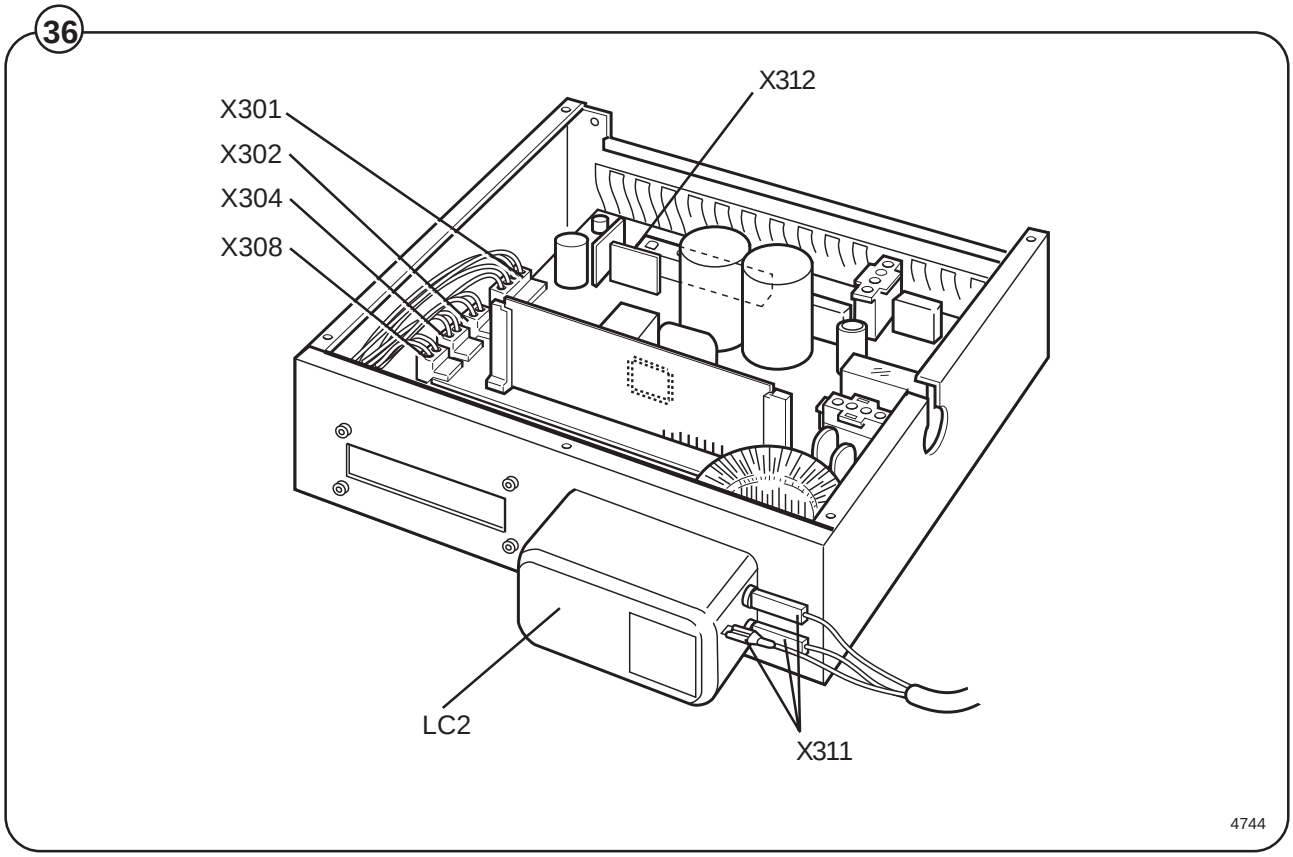


Fig. 36

LC2	Suppression filter
Connectors	
X301	Serial communication with CPU
X302	Input, lock sequence
X304	Relay output
X308	Imbalance input
X311	Main input
X312	Connection, motor and thermal protection device (Klixon)

Motor control unit

Fig. 37

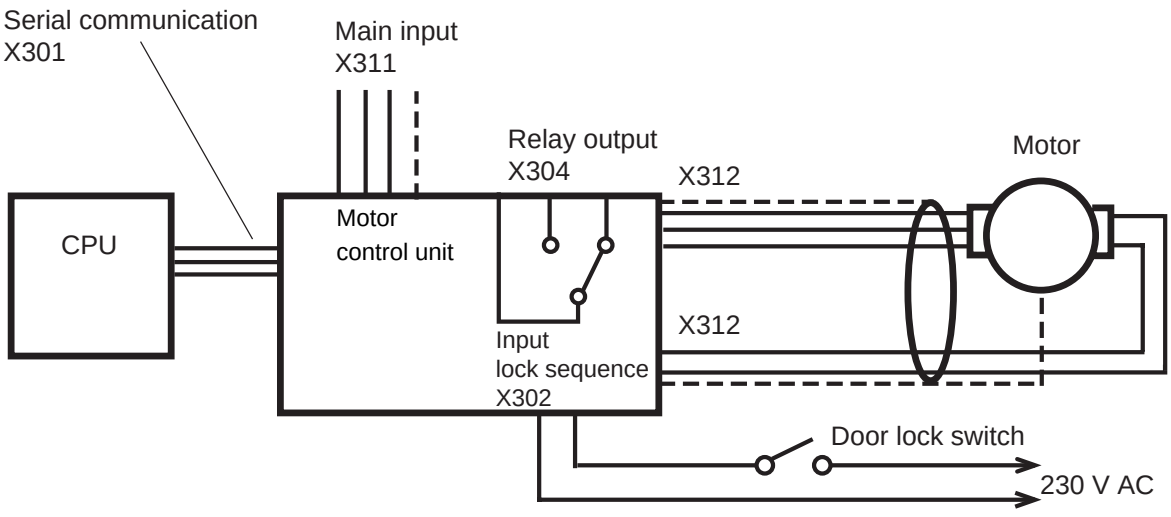
Fig. 39

The motor control unit communicates with the CPU board via a serial duplex interface. With the aid of the MCU, the CPU board can not only control the speed the motor is to have at any given moment, but also control the acceleration and deceleration rates the motor will use to reach the speed commanded. The MCU constantly relays information back to the CPU board on current operating status, e.g. whether everything is proceeding without problems or if a fault or error has arisen.

The MCU can also supply data on the torque of the motor at constant speed and when accelerating and decelerating. This data is used both for calculating the weight of the wash load and for detecting any imbalance present.

Take great care when using measuring instruments on the MCU, since all components have a potential difference of approx. 300 V in relation to earth and neutral.
The MCU will not be de-energised until 10-30 seconds after the machine is isolated from the power supply and the motor has stopped.
The green LED on the MCU board will remain lit for as long as there are hazardous voltages present in components.

37



There is a cooling fan on the MCU. The fan starts up automatically when the heat sink reaches a temperature of approx. 65°C, which can arise during extraction if the load is unfavourable or if the ambient temperature is high. When the machine power supply is first switched on the fan operates for a short time.

The MCU has an interlock signal input connected to a switch in the door, which supplies the input with main voltage when the door is locked.

PCB connector/Function

X301: Serial communication

Communications between MCU and CPU. With an interface it is possible to connect a PC for testing machine operation/functions.

X 301:2 Gnd
X 301:3 Txd
X 301:4 Rxd

X302: Input lock sequence

An input voltage of 96-276 VAC is required to start the motor.
The function of this input is to stop/not start the motor when the door lock is open.

Input voltage: 120 V-20 % (=96 V) - 240 V+15 % (=276 V), 50/60 Hz
Current: Max. 0.01 A

X304: Relay output

The relay is controlled via commands from the CPU (X301). The relay is not to be activated if communication with the CPU is lost.

Isolation voltage: 3750 V
Voltage: 250 VAC
Current: max. 2 A
Relay connections: 1-pole, 2-way (three connections)

Connector:	X304:1	Normally open
	X304:2	Normally closed
	X304:3	Common

X307: Internal

This contact is used for connection of a fan for cooling the MCU.

X311: Main input

Input voltage: Single-phase or DC three-phase: 200 V-15%(=170 V) - 240 V+10% (264 V)

X312: Output to motor and input thermal protection device (Klixon)

The output is connected to a thermal protection device, located on the motor windings, with a connection back to the input. If the motor becomes overheated, the thermal protection device switch opens. The yellow LED reveals an error code through its pattern of flashes, see the section “Error indication patterns”.

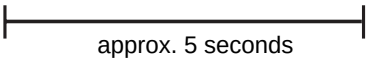
Current, max. 0.01 A

Error indication patterns

Fig. 38 Fig. 39 If a fault or error occurs in the motor or motor control unit, the MCU sends an error signal to the CPU board. In addition to an error code showing on the display, errors/faults are revealed by the flashing of a yellow LED on the MCU board. The table below shows how to identify the error/fault on the basis of the flashing pattern of this LED.

38

	LED pattern of flashes	Error code/message on display	Cause
1		HEAT SINK TOO HOT	Heat sink on MCU too hot.
2		MOTOR TOO HOT	Motor thermal protection device activated
3		NO INTERLOCK	MCU has received start command, but not received interlock signal.
4		NO MOTOR COMM	Communication error MCU – PCU
5		–	Short in motor windings, wiring or internally in MCU. MCU will restart automatically.
6		MOTOR SHORT	Once again short in motor windings, wiring or internally in MCU.
7		INTERL HARDWARE	Fault in interlock circuits in MCU.
8		LOW DC VOLTAGE	MCU DC voltage too low.
9		HIGH DC VOLTAGE	MCU DC voltage too high
10		RIPPLE DC BUS	Ripple DC-bus (EWD 4000 only).
11		KLIXON CIRCUIT	Fault/error in MCU overheating circuits.

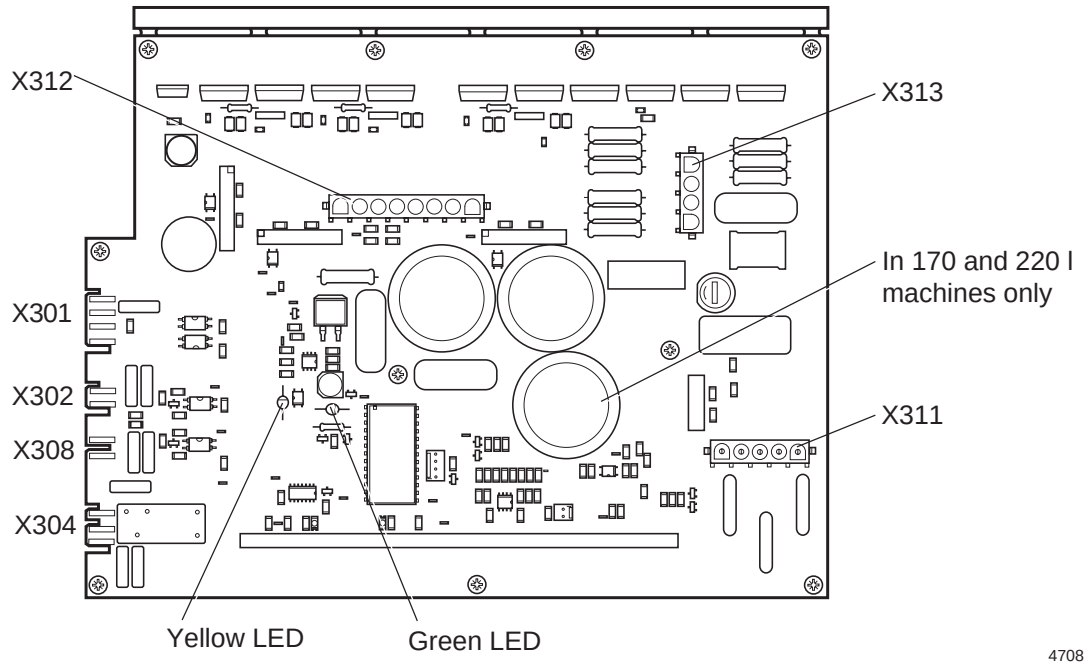


4710

Fault-finding

There are fault-finding charts for all error codes in Chapter 12, “Fault-finding”.

39



Error indication patterns, green LED

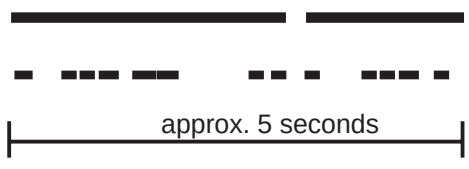
Fig. 40

The green LED on the MCU board is normally lit except for a brief pause approx. once every five seconds (pattern which indicates “OK”).

When the microprocessor for the CPU is removed from the machine or has reset status, the LED will be lit without flashing.

When the MCU current-limiting function is activated, the LED will instead flicker, and the flashing pattern which indicates “OK” will be suspended for as long as the current-limiting function is activated. When the MCU current-limiting function ceases, the pattern of flashes indicating “OK” will return after 10 seconds.

40



Pattern indicating “OK”

Flickering when MCU current-limiting function is activated.

Extraction

Fig. 41 During extraction, the motor speeds follow an extraction sequence which is always the same. This extraction sequence is used for all standard programs 991-999 for CLARUS machines.

The table shows the extraction speeds during the various phases of the sequence, for various drum volumes.

The extraction sequence is as follows:

Phase 1. Distribution period of 40 seconds, with imbalance sensing. Imbalance sensing takes place during the last 5 seconds.

Phase 2. Extraction for 30 seconds.

Phase 3. Extraction for 30 seconds.

Phase 4. Extraction for 30 seconds.

Phase 5. Extraction for remainder of the program’s total extraction time.

41

Imbalance measurement

At the start of every extraction sequence the system monitors variations in the motor torque while the drum is operating at distribution speed. If these variations are too great, it indicates that the load is unevenly distributed in the drum. At this point extraction is halted, the motor speed is reduced to wash speed and a fresh attempt to begin extraction starts. This procedure will be repeated up to three times per extraction. After the third time the system will decide whether the imbalance is “great” or “small”.

- If the imbalance is “great”, the extraction stage of the program will end without extraction having taken place.
- If the imbalance is “small”, extraction will take place, but at a reduced speed.

Supply injection valve

Construction

Fig. (42) The valve has a single-inlet with either one, two or three outlets, each with its own solenoid coil.

The body is made of heat-resistant polyamid plastic and the solenoids encased in water-tight plastic. The electrical connector terminals are spade lugs.

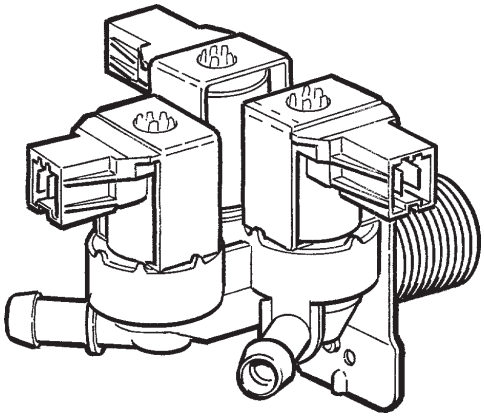
A filter screen on the inlet side prevents dirt from entering the valve. Flow restrictors can be placed at either the inlet or any of the outlets.

Operation

Fig. (43) When the solenoid is energized, the spring-loaded plunger is drawn up and the pilot valve in the centre of the diaphragm open. Because of the difference in diameter between the pilot valve opening and the ventilating hole in the diaphragm, the pressure above the diaphragm drops to a point where the admission pressure below the diaphragm can lift the diaphragm, thus opening the valve.

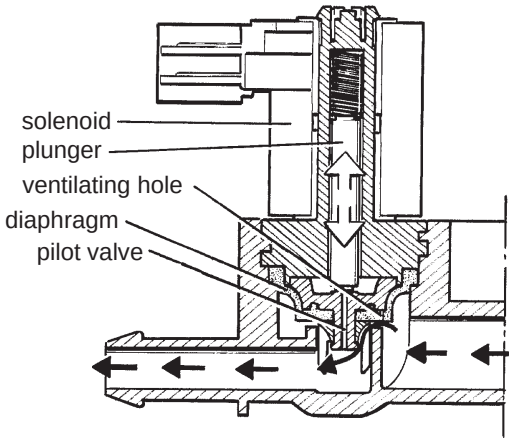
When the current to the solenoid is cut off, the plunger spring will press the plunger against the pilot opening of the diaphragm. The pressure above the diaphragm then rises to correspond to the water inlet pressure and the pressure of the spring will close the valve.

42



1161

43



1185

Repair instructions

Limescale can block the hole in the valve diaphragm and interfere with the function of the valve.

Fig. (44) It is therefore advisable to dismantle and clean the valve at certain regular intervals. The frequency depends on operating conditions and the level of contamination in the water.

If the valve does not open

- Check that power is supplied to the coil.
- Check the coil with an instrument to determine whether there is a break or a short circuit.
- Dismantle the valve (see below) and check the openings in the valve diaphragm.
- Check the inlet strainer and clean as required.
- Undo the coil and clean the surfaces of the magnetic core.

If the valve does not close

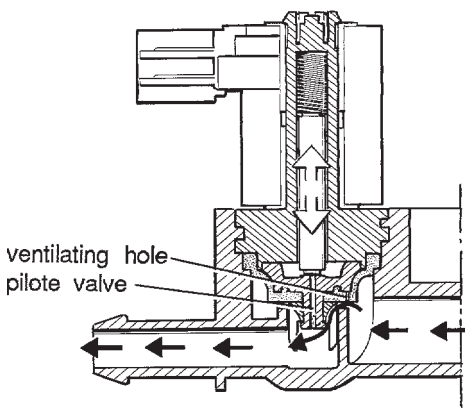
- Check that the coil is not live. The valve is normally closed when the magnet is not energised.
- Check the return spring.
- Check the diaphragm (pilot pressure opening).

Dismantling the valve.

Fig. (45)
- Pull the coil straight upwards. Use a screwdriver if necessary to carefully undo the coil.

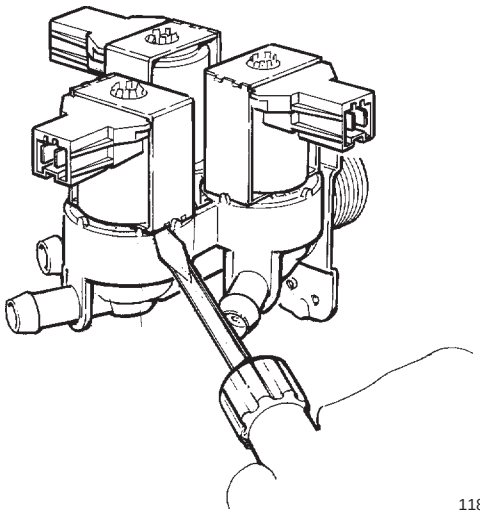
Fig. (46)
- Use the tool supplied (attached to one of the hoses when the machine is delivered) to open the valve housing. Slide the tool over the protruding plastic sleeve to that the pegs on the tool engage the corresponding sockets in the valve housing.
- Use a spanner or a pair of pliers and unscrew the upper part of the valve housing.

44



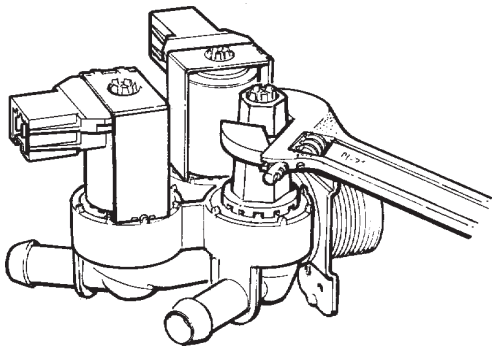
1186

45



1187

46



1181

Inlet valve

Fig. 47 The water inlets have brass bodies with larger cross section of the outlet in order to achieve a shorter filling time for the machine.

Construction

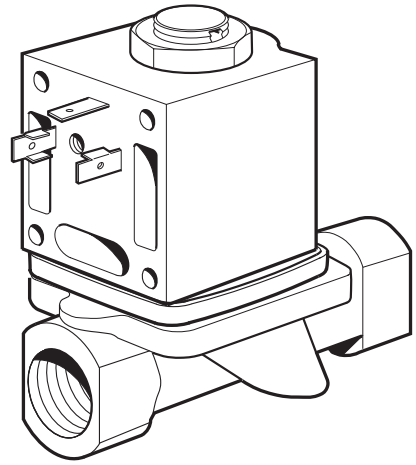
Fig. 48 The valve housing is made of pressed brass. The spring-loaded plunger is made of stainless steel and located at its lower end.

Operation

The valve is automatically operated by means of a rubber diaphragm and a pilot valve in exactly the same way as the supply injector valve.

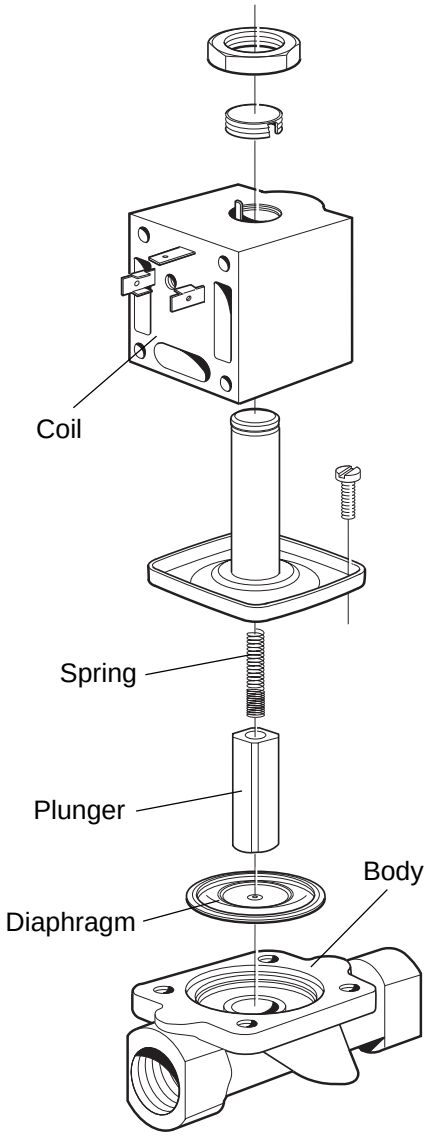
To strip, clean, re-assemble and troubleshoot the inlet valve, follow the instructions outlined for the supply injector valve.

47



3963

48



3961

Description

Fig. 49 Fig. 50

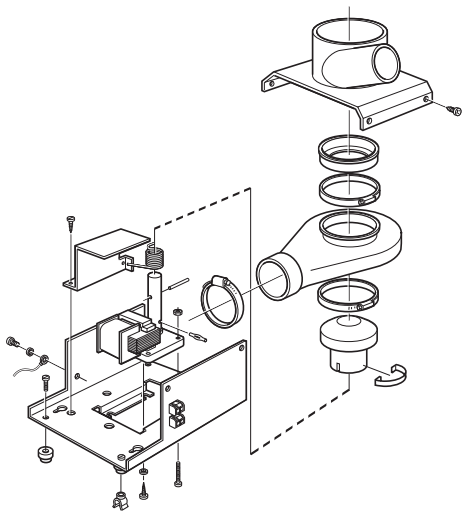
The drain valve is a motor-operated diaphragm valve which allows rapid emptying thanks to its large cross-section. This is a self-clearing design, so there is no need for a lint filter.

Main parts of the valve:

- motor plus gear
- piston rod with trapezoidal thread, plus piston and return spring
- rubber diaphragm
- connections for water filling, overfilling, drain

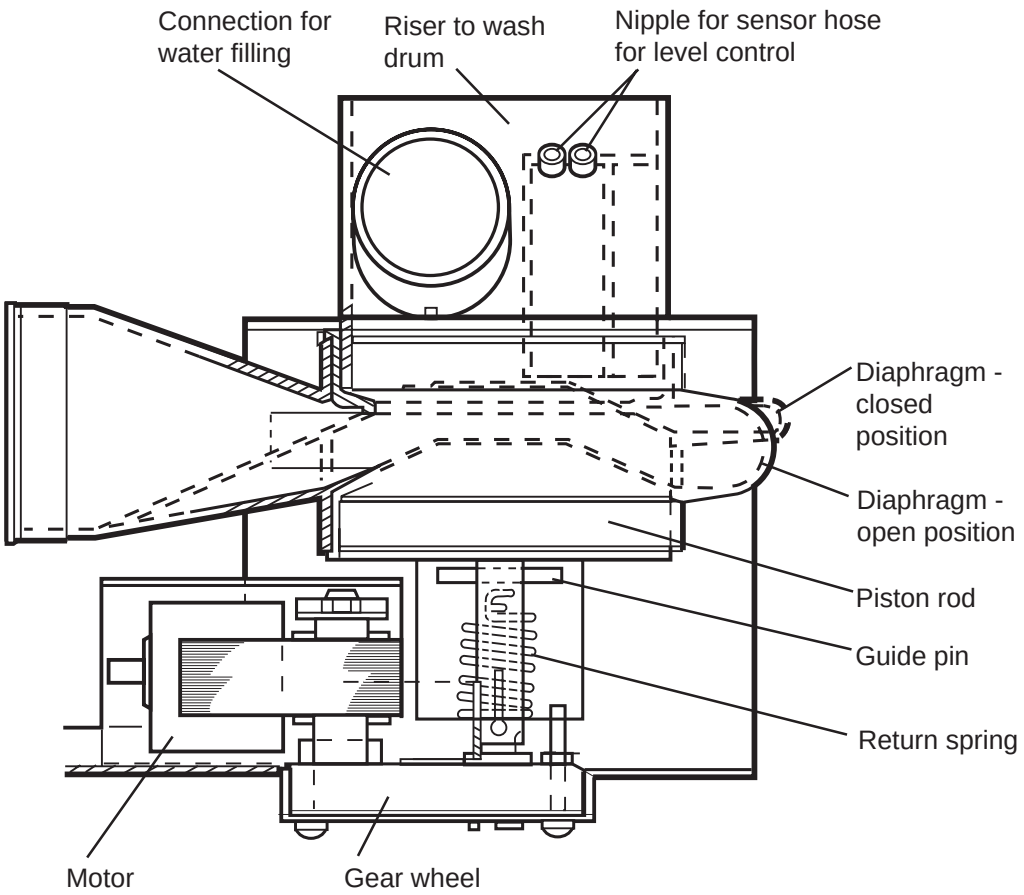
In its open state, the valve is not energised. In this state the piston rod is screwed down to its lowest position by the return spring. The diaphragm is pressed downwards with the piston and the valve is open.

49



4747

50



4748

When the motor is activated and begins to rotate, the piston rod is turned upwards via the gear, the diaphragm is pressed upwards with the piston and presses against the valve seat: the valve closes.

The connection for overfilling is connected to the upper part of the wash drum, water and foam are diverted straight to the drain if the intake valves or level control should malfunction.

On the riser for the wash drum are the connection for water filling and a nipple for connecting the sensor line for the level control.

Instructions for repair

Deposits on the diaphragm can prevent the valve from opening or closing properly. The valve should therefore be cleaned at certain intervals, depending on operating conditions and water quality.

If the valve is not opening or closing properly:

Fig. 51

- Check that the motor has the right input voltage.
- Check that the piston rod can move freely.
- Check whether the diaphragm is clogged with deposits.

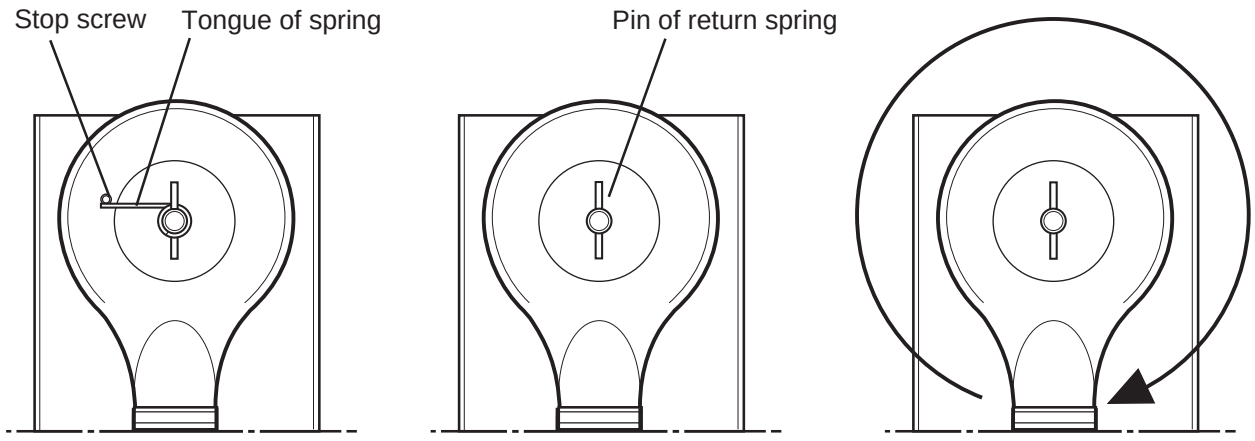
To note if replacing the motor:
Brown cable: 60 Hz
Blue cable: common
Black cable: 50 Hz

Tensioning of return spring

With the valve housing removed:

- Turn the return spring so that the “tongue” of the spring is resting against the stop screw.
- Position the valve housing over the return spring so that the pin on the spring will fit into the recess on the piston rod. (Note: the piston rod should be installed so its recess is aligned along the housing.)
- Then turn the housing one turn clockwise. (This will screw the pin of the spring into the piston rod. The spring will be now tensioned approx. 1/4 of a turn on account of the lead in the piston rod.)

51



4749

Soap supply box

Fig. 52 The three-compartment soap supply box is located at the top of the machine. Viewed from the front, the compartments marked with figures 1, 2 and 3 are used as follows:

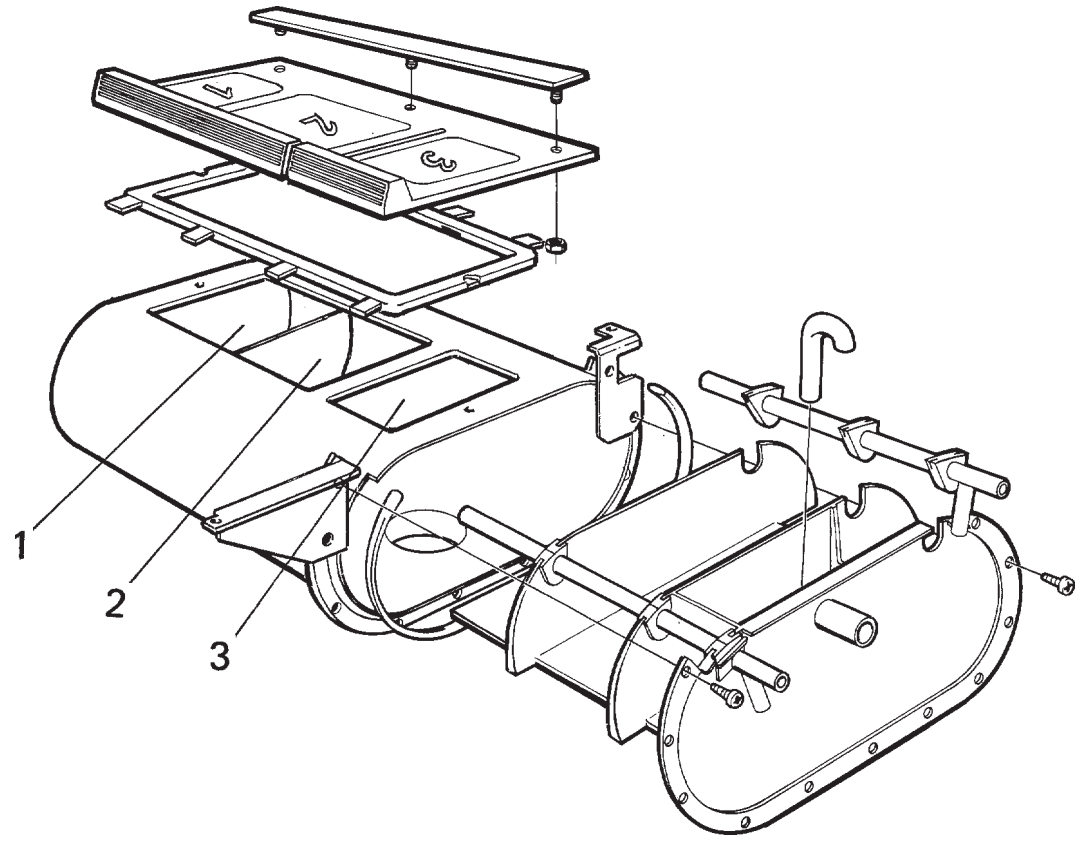
Compartment 1
This compartment is used for adding detergent directly to the wash at the beginning of a cycle or at any time during the cycle when extra supplies are required.

Compartment 2
This compartment is the main compartment for adding detergent to the wash .

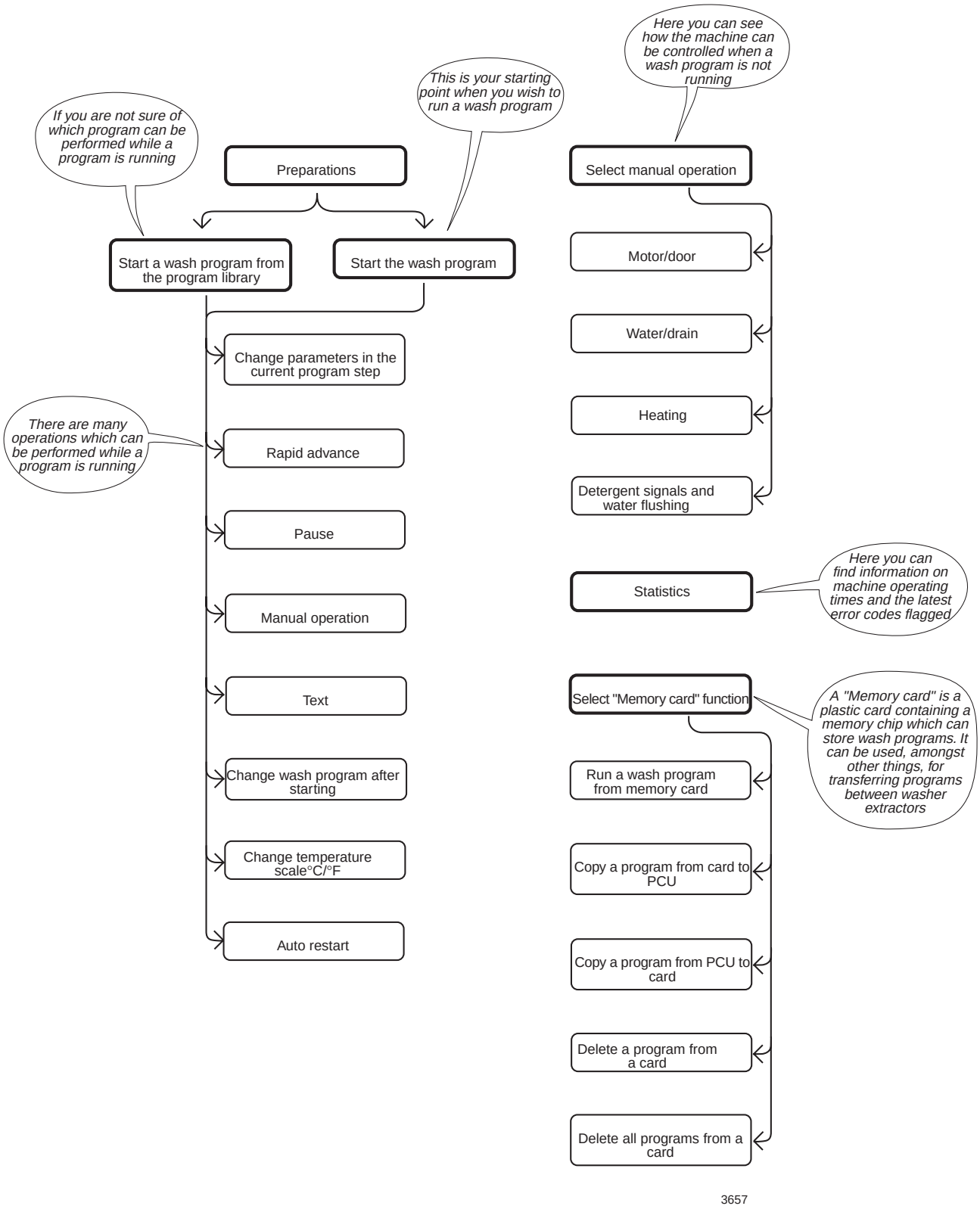
Compartment 3
The small compartment is used for adding fabric softener. The fabric softener is flushed down with water by overflowing when the injection of fabric softener is called for.

When using a top mount supply injector connection only compartment 2 will be utilized.

52



1182

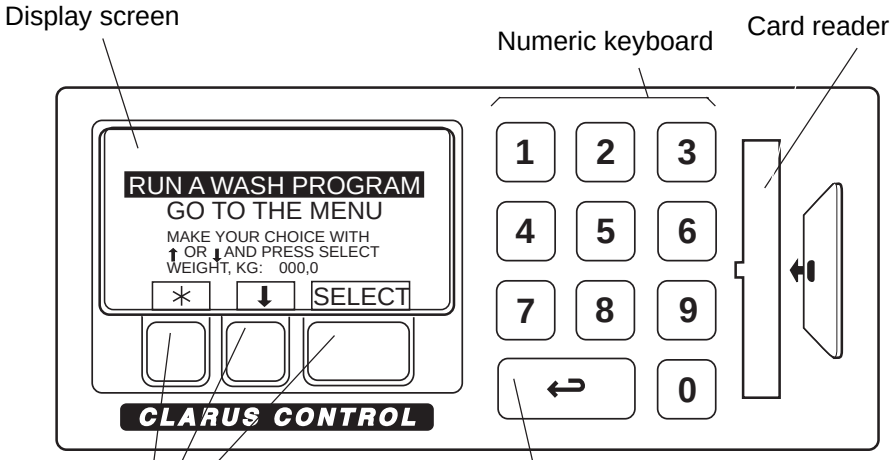

Here you can see how the machine can be controlled when a wash program is not running
This is your starting point when you wish to run a wash program
If you are not sure of which program can be performed while a program is running
Preparations
Select manual operation
Start a wash program from the program library
Start the wash program
Motor/door
Water/drain
Change parameters in the current program step
Heating
There are many operations which can be performed while a program is running
Rapid advance
Detergent signals and water flushing
Pause
Statistics
Here you can find information on machine operating times and the latest error codes flagged
Manual operation
Select "Memory card" function
A "Memory card" is a plastic card containing a memory chip which can store wash programs. It can be used, amongst other things, for transferring programs between washer extractors
Text
Change wash program after starting
Run a wash program from memory card
Change temperature scale°C/°F
Copy a program from card to PCU
Auto restart
Copy a program from PCU to card
Delete a program from a card
Delete all programs from a card
3657

General introduction

Fig. 53 This washer extractor is controlled by a microprocessor-based program control unit. There are many advantages to this equipment, including:

- timing, levels and temperatures are controlled with great precision and flexibility
- detailed information on wash programs, machine status and operations, wash times and temperatures can be accessed in plain language on the large display screen
- it is possible for the user to create new wash programs, and to adapt programs precisely on the basis of experience and to suit various types of textile, degrees of soiling etc.
- a very high level of machine safety through continuous monitoring and built-in safety interlocks
- the program control unit has a reader for ”memory cards”. These are cards the size of a credit card which contain a memory chip. Memory cards allow the user to:
  - transfer wash programs between a PC and the washer extractor, or from one washer extractor to another
  - run programs straight from a card
- great flexibility during program operation:
  - rapid advance both forwards and backwards in the program
  - change temperatures, program module lengths and extraction speeds directly, during program operation
  - start a different program at any time during program operation.

53



The functions of these keys change, depending on which menu or part of a menu you are using. Their current functions at any time are shown on the display immediately above each key.

The ”Move back” key
By pressing this key repeatedly you can move backwards through the menus you have navigated through. This will always bring you back to the menu illustrated here.

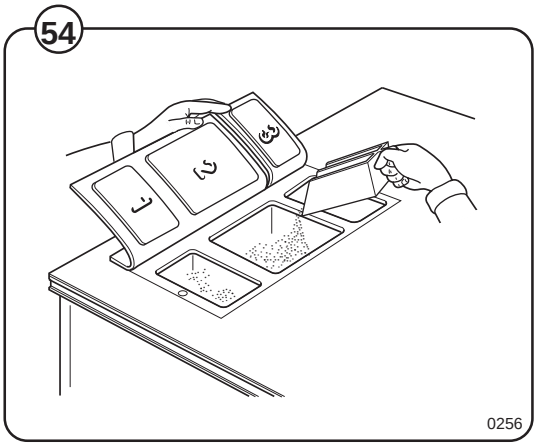
4115 3651

Preparations

- Sort the load, paying attention to the textile care labels on the items. Empty all pockets and do up zip fasteners.
- Open the machine door, check that the drum is empty, load the items into the machine and close the door.
- Check that the emergency stop button has not been pressed inwards (see ”Machine safety”).

Measuring the detergent

Fig. (54) If the machine's system for powder detergent is used: measure the detergent and other additives according to the indicator lights.



The ”Move back” key

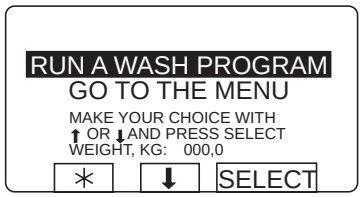
3627

If you find you are in the wrong place, or if you want to undo earlier key presses:

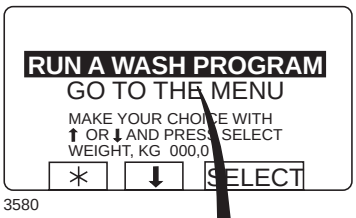
Press the ”Move back” key one or more times.

The "Move back" function

Each press of the ”Move back” key moves you back one menu, in reverse order. By pressing this key repeatedly you can return to this menu at any time:



To start the wash program



3580

If this menu is not currently displayed:

Press  **repeatedly.**

If ”GO TO THE MENU” is highlighted:

Press  **.**

When ”RUN A WASH PROGRAM” is highlighted:

Press SELECT.

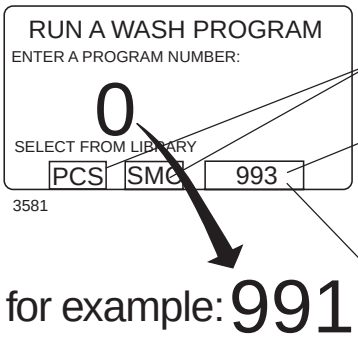
Two ways of starting a program

By entering the actual program number

Enter the actual program number if you know it, then press **SELECT**.

By starting from the program library (see section "To start a wash program from the program library)

If you are unsure about the programs available, you can select a program from the program library, where the programs are listed with their descriptions.



Here you can select programs from the program libraries. See the section entitled ”To start a wash program from the program library”.

Displayed here will be the number of the most frequently used program. S993 would indicate the number of a program on a memory card.

Press this key if you want to select this program.

SELECT

Use the numeric keys to enter the program number

Press SELECT.

If you have entered the wrong number

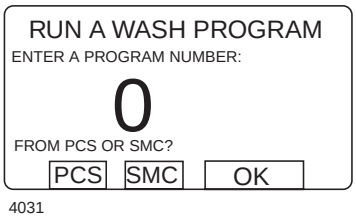
Enter the correct number to overstrike the earlier one.

Note: you must always enter three digits, even when the number is really only a one or two-digit number.

Examples:

The program number required is **9**. Enter **009** to overstrike all digits in the wrong number.

The program number required is **19**. Enter **019** to overstrike all digits in the wrong number.



If you have a memory card in the program control unit, and the program you selected is both on the memory card and in the PCU, you will be asked ”FROM PCS OR SMC?”.

PCS

Press PCS if you want to take the program from the PCU.

SMC

Press SMC if you want to take the program from the memory card.

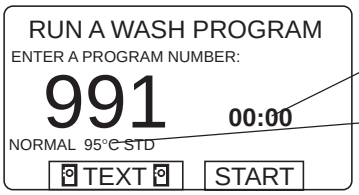
In some of the text shown on the display, Clarus Control is referred to as PCS and the memory card is referred to as SMC.

Memory cards

A memory card is a plastic card, the size of a credit card, with an electronic memory chip inside it. This card is capable of storing 10 to 15 wash programs of normal size. If the programs are mostly small ones, more of them can be stored, whereas larger programs will reduce the number which can be held by the card. Memory cards of this type can be used to:

- transfer wash programs from one washer extractor to another
- run wash programs straight from the card
- transfer wash programs from a PC to a memory card and from a memory card to a PC (these procedures, and how to write a wash program on a PC, are described elsewhere).

Memory cards are described in detail in the section entitled ”The Memory card”.



3582

Delayed start time (hrs:mins)

Program name

If you want to see the description of the program:

TEXT

Press TEXT.

Pressing "Text" displays more information

The text displayed is a description of the wash program selected. This text description is inserted when a new wash program is created. This procedure is described fully in the programming manual.

Choose 1 or 2:

① START

1 To start the program now:

Press START.

②

1 2 3
4 5 6
7 8 9
0

2 Delayed start

Use the numeric keys to enter a time (max. 24 hrs). This parameter appears on the right of the display.

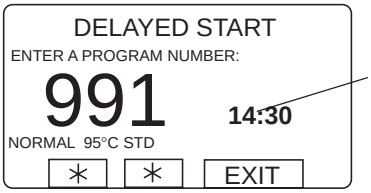
START

Press START.

Delayed start

Delayed start means that the machine will not start the wash program until the time entered has elapsed.

This function allows you, for example, to load the machine in the evening, but delay the start of the wash until early the next morning, to end in time for the next shift.



Time left before the machine is to start

If you want to cancel the delayed start:
Press EXIT

EXIT

3627

During a wash program:

Press ↩ to make the machine pause during the wash program.

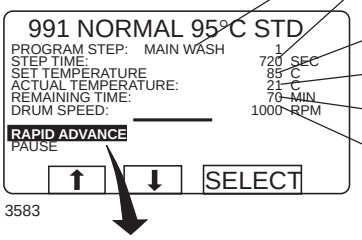
Two ways of pausing during a wash program

There are two ways of pausing during a wash program:

1 By pressing ↩.

2 As an additional function. This is described in section **"Pause"**.

The following information is displayed during the wash program:



- Current program step
- Time left for this program step
- Set temperature
- Actual temperature
- Remaining program time
- Drum speed

If required:

Select a function using the cursor keys.

Press SELECT.

To terminate a program before it has finished

- Select RAPID ADVANCE and press SELECT. Advance to ”END OF PROGRAM” and press SELECT.
- Wait until ”THE DOOR IS OPEN” appears on the display.
- Now the door can be opened.

To change parameters in the current program step

See section "To change parameters in the current program step".

Certain program step parameters can be altered during the course of the program. In the example (left), the length of the program step and the heating temperature can be altered.

Additional functions during the program

Rapid advance (see section ”To change parameters in the current program step”)
Rapid advance through the program to the program step required. Rapid advance can be used to move both forwards and backwards through the program.

Display weight (see section ”Display weight”)
The actual load weight is shown in large digits on the display (weight display mode). (On machines with weighing equipment only.)

No water level reduction (see section ”No water level reduction”)
Machines with weighing equipment installed adjust the water level automatically according to the load weight. This function lets you switch off water level reduction during the current program.

Pause (see section ”Pause”)
The machine stops. The drain valve remains closed. Another way to pause the program: Press ⮌.

Manual functions (see section ”Manual operation during a program”)
The following functions can be controlled manually during the course of the program:

- all water valves, drain and pumps (where applicable).
- limit highest extraction speed.
- motor on/off after end of wash program.
- flush detergent.

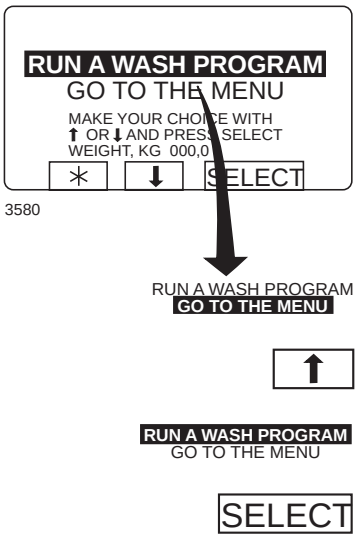
Text (see section ”Text”)
Display description of wash program (if available).

Select a different wash program (see section ”To change the wash program after program operation has commenced”)
You can switch to using a different wash program at any stage during the wash. Once this function has been selected, the current step (for example, rinse) of the earlier program will be allowed to finish and then the new program will start (from the beginning).

Change temperature scale °C or °F (see section ”To change temperature scale °C/°F”)

Auto restart (see section ”Auto restart”)
Here you enter the number of times you wish the wash program to restart automatically.

To start a wash program from the program library



If this menu is not currently displayed:

Press ⮌ repeatedly.

If ”GO TO THE MENU” is highlighted:

Press ⬆.

When ”RUN A WASH PROGRAM” is highlighted:

Press SELECT.

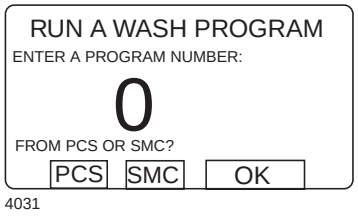
What is the program library?

The program library lists all wash programs, both user and standard programs, showing their program numbers and a description, for example:

1	MY OWN 40 °C
2	MY OWN 60 °C
3	MY OWN 90 °C
991	NORMAL 95°C STD
992	NORMAL 60°C STD
993	NORMAL 40°C STD
994	INTENSIVE 95°C
995	INTENSIVE 60°C
996	PERM. PRESS 60°C
997	PERM. PRESS 40°C
998	LOW EXTRACT 1 MIN
999	HIGH EXTRACT 5 MIN

Each time a new program is stored in the machine program memory, its number and description will be inserted automatically into the program library.

The program library may be used for starting a wash program, but is also used in programming, when a wash program needs to be modified or if a new program is to be created on the basis of an existing one.



4031

To select a program from the PCU program library:

Press PCS.

PCS

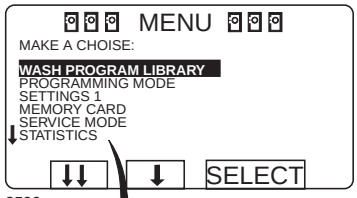
If there is a memory card in the PCU and you wish to select a program on that:

SMC

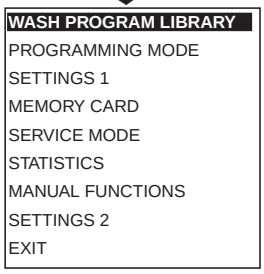
Press SMC.

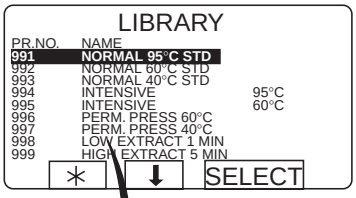
Select library via menu

You can also select the program library via the option ”GO TO THE MENU”. Then select ”WASH PROGRAM LIBRARY”.

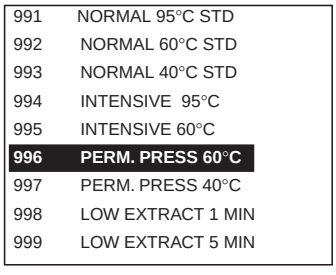


3590





3591



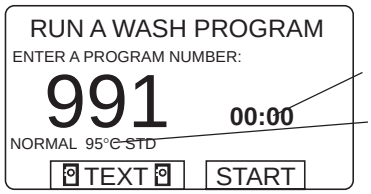
Press ⬇ the required number of times...

...to highlight the wash program required.

SELECT

Press SELECT.

Procedure for use



3582

Delayed start time (hrs:mins)

Program name

If you want to see the description of the program:

Press TEXT

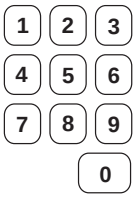
Pressing "Text" displays more information

The text displayed is a description of the wash program selected. This text description is inserted when a new wash program is created. This procedure is described fully in the programming manual.

Choose 1 or 2:

1 To start the program now:

Press START.



2 Delayed start

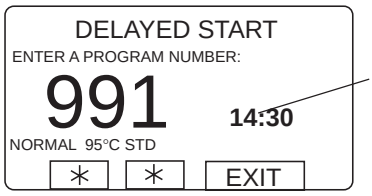
Use the numeric keys to enter a time (max. 27 hrs). This parameter appears on the right of the display.

Delayed start

Delayed start means that the machine will not start the wash program until the time entered has elapsed.

This function allows you, for example, to load the machine in the evening, but delay the start of the wash until early the next morning, to end in time for the next shift.

Press START.

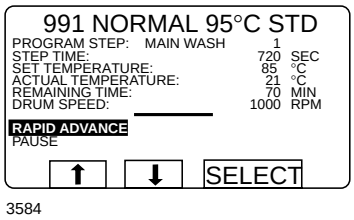


Time (in hours and minutes) left before the machine is to start.

OIf you want to cancel the delayed start:
Press EXIT.

The functions which are available during program operation are described in sections "To change parameters in the current program step - Auto restart".

To change parameters in the current program step



3584

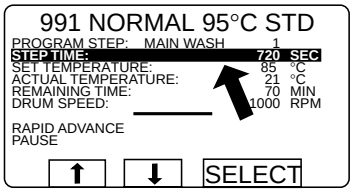
During program operation the display will look like this (see section "To start the wash program").

You can alter the following program steps:

Prewash, Main wash, Rinse, Drain, Soak
Length of program step (max. 9998 seconds), heating temperature (max. 97°C).

Extraction
Length of program step (max. 3600 seconds), extraction speed.

Press ⬆ one or more times...



...to highlight the line required.

If you have entered the wrong parameter

Continue pressing numeric keys to overstrike the incorrect parameter.

Note: always use the same number of digits as used on the display to overstrike the incorrect parameter.

Example:

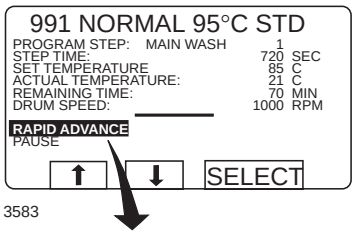
To change the time for the program step to **30** seconds, enter **030** to overstrike the earlier parameter.

Press SELECT.

Use the numeric keys to enter the new parameter.

Press SELECT.

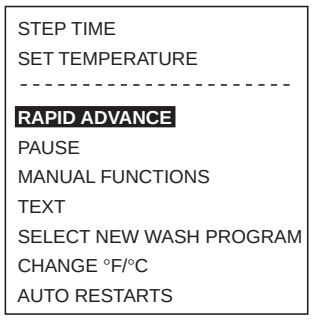
Rapid advance



3583

During program operation the display will look like this (see section "To start the wash program").

Check that "RAPID ADVANCE" is highlighted.



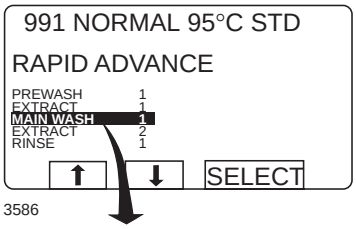
If it is not highlighted:

Press ⬆ or ⬇ one or more times to highlight "RAPID ADVANCE".

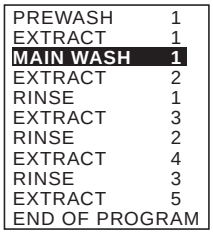
Press SELECT.

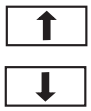
To terminate a program before it has finished

- Select RAPID ADVANCE and press SELECT. Advance to "END OF PROGRAM" and press SELECT.
- Wait until "THE DOOR IS UNLOCKED" appears on the display.
- Now the door can be opened.



3586





Press ⬇ or ⬆ one or more times to highlight the program step you wish to advance to.

Press SELECT.

Rapid advance works in both directions

Rapid advance works in both directions, using ⬇ and ⬆.

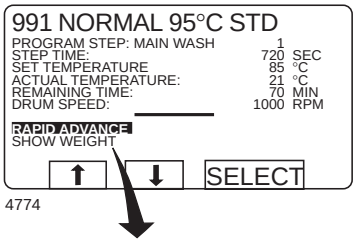
Using rapid advance to move forwards allows you to skip one or more program steps. Using rapid advance backwards allows you to repeat one or more program steps.

Automatic return to normal display

Once you have selected any of the functions below, you must make any changes required within 20 seconds. If no further keys are pressed within 20 seconds, the display will revert automatically to its normal appearance during a wash program.

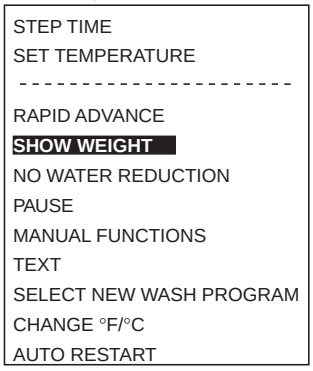
For machines with weighing equipment installed only!

Show weight



4774

During program operation the display will look like this (see section ”To start the wash program”).



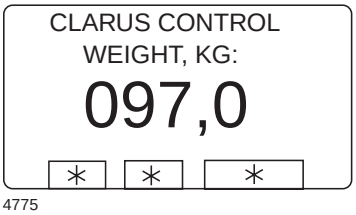
Press ⬆ or ⬇ one or more times to highlight ”SHOW WEIGHT”.

Press SELECT.

Show weight

The actual weight is shown in large digits on the display (weight display mode).

If the weighing equipment is not connected, the error message “FUNCTION NOT ALLOWED” will appear. See the section “Fault-finding, weighing equipment” in the machine manual.



4775

Weight display mode:

The actual net weight is shown in large digits on the display.

Return to normal display

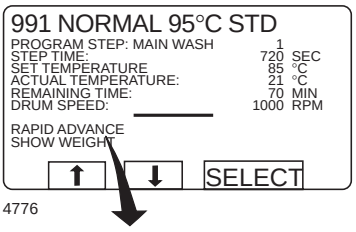
The display will return to normal at the end of the ”time for weight display” set as a parameter in Settings 1. The manufacturer’s default parameter is 20 seconds.

To end weight display sooner

Press ⏎ or use the numeric keys to enter a new program number.

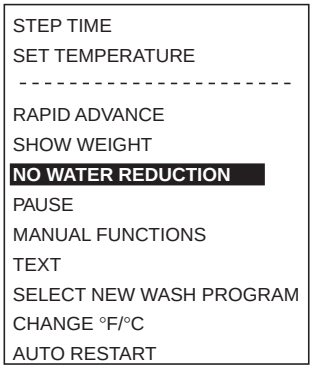
For machines with weighing equipment installed only!

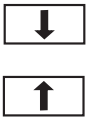
No water reduction



4776

During program operation the display will look like this (see section ”To start the wash program”).





Press ⬆ or ⬇ one or more times to highlight ”NO WATER REDUCTION”.

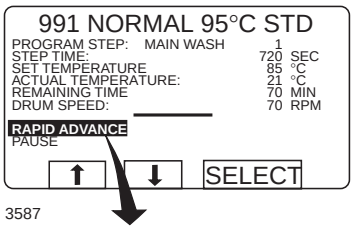
Press SELECT.

No water reduction

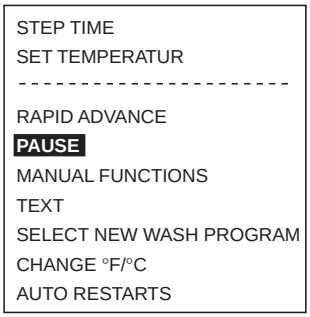
The wash load is weighed during the program and the water level is adjusted automatically according to its weight. If the load is not a full one, the water level will be reduced according to a water level reduction table. You can switch off water level reduction at any stage of a program.

Note that if you select ”NO WATER REDUCTION”, this applies only to the program currently running. The next time a program is started, water level reduction will occur automatically again.

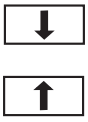
Pause



3587

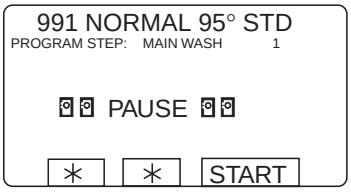


During program operation the display will look like this (see section "To start the wash program").



Press ⬆ or ⬇ one or more times to highlight "PAUSE".

Press SELECT.



3588

Press START to restart the wash program.

Two ways of pausing during a wash program

Note that you must be in normal wash mode to be able to pause in this way. If, for example, you are using "Manual Functions", you will have to exit that first before you can use Pause.

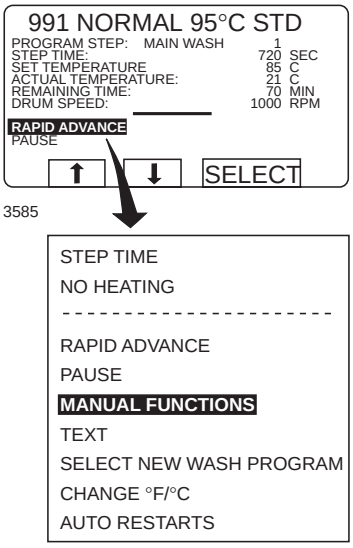
There are two ways of pausing during a wash program:

1 As an additional function. This is described in this section.
2 By pressing ↩.

When the machine pauses:

- Program operation is halted.
- Filling is halted (where applicable).
- Heating is halted (where applicable).
- The motor stops.
- The drain valve remains closed.
- The door cannot be opened.

Manual operation during a program



During program operation the display will look like this (see section **"To start the wash program").**

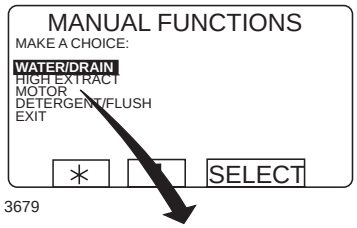
Press ⬆ or ⬇ one or more times to highlight "MANUAL FUNCTIONS".

Press SELECT.

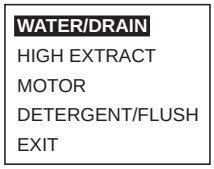
Two types of manual operation

There are two types of manual operation, which should not be confused:

- **Manual operation during a program**
  These functions are described in this section.
- **Manual operation when no program is running**
  These functions are described in **section "Manual operation"**.



3679



Use the cursor keys to select the function.

SELECT **Press SELECT.**

Automatic return to normal display

Once you have selected any of the functions below, you must make any changes required within 20 seconds. If no further keys are pressed within 20 seconds, the display will revert automatically to its normal appearance during a wash program.

Manual functions during a wash program

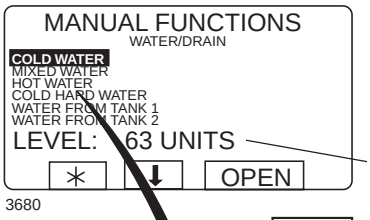
Water/drain (see section "Water/drain")
Allows manual operation of all water valves and the drain valve.

Highest extraction speed (see section "Maximum extraction speed")
Here you can limit the maximum extraction speed for the current program.

Motor (see section "Motor on after wash")
Motor on/off after program has ended.

Detergent valves (see section "Detergent signals and water flushing")
Allows you to control all valves in the detergent compartment or in external detergent supply system.

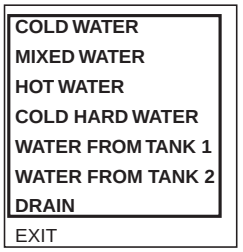
Water/drain



To access this function, see instructions in section "Manual operation".

Water level in drum

Use ⬇ and ⬆ to select the water/drain option you require.

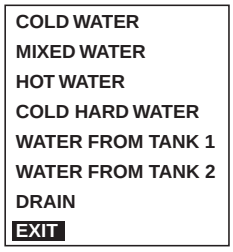


OPEN

Press OPEN.
The function will be activated for as long as you press and hold this key. The function ceases as soon as you release the key.

When you have finished:

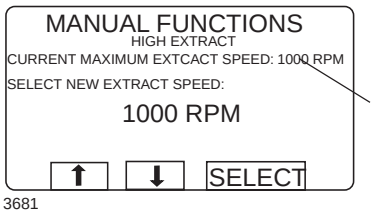
Press ⬇ repeatedly to highlight "EXIT".



SELECT

Press SELECT.

Maximum extraction speed



3681

To access this function, see instructions in section "Manual operation".

Maximum extraction speed in current program.

1 2 3
4 5 6
7 8 9
0

Enter the maximum extraction speed you require for this program.

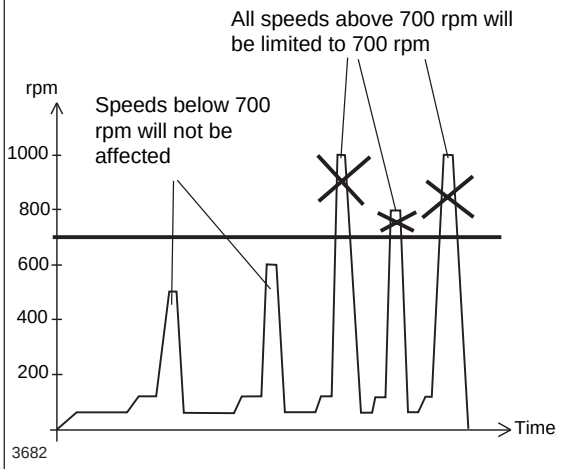
SELECT **Press SELECT.**

To limit the program's highest extraction speed

This function allows you to modify the highest extraction speed allowed during the program.

Example:

Assume that the highest speed in the program is 1000 rpm and that you have set 700 rpm as the highest speed allowed.

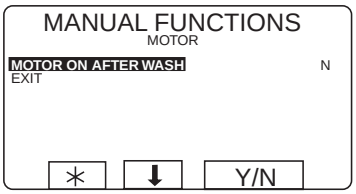


3682

This change will affect the current program only. No change will be implemented if extraction is taking place at the time of the (attempted) change.The next time that this program is used, the original maximum speed will apply.

This function does not allow you to set a **higher** speed than the usual maximum speed for the program.

Motor on after wash



3683

To access this function, see instructions in section "Manual mode".

Y/N

A toggle function:
Use Y/N to toggle the function from ON (Yes) to OFF (No).

⬇

When you have finished:
Press ⬇ to highlight "EXIT".

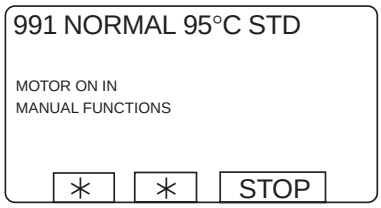
SELECT **Press SELECT.**

Motor to rotate after program has ended

If you answer **Yes (Y)**:

The motor will continue to rotate in alternative directions after the program has ended. This prevents creasing of the load.

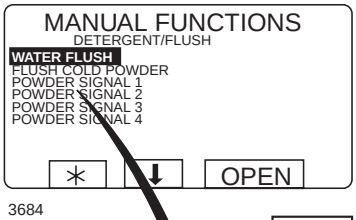
When the program has ended, the display will look like this:



4111

Press STOP to stop the motor.

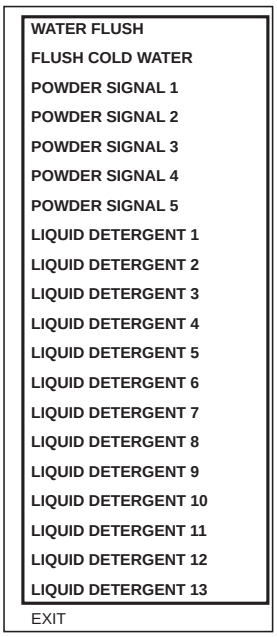
Detergent signals and water flushing



3684

To access this function, see instructions in section "Manual mode".

Use ⬇ and ⬆ to select the function you require.



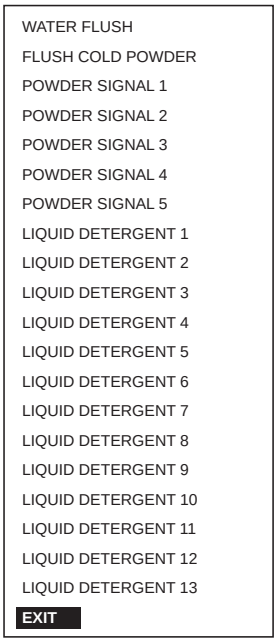
Detergent signals and water flushing

FLUSH WATER:
This function uses water to clear detergent from the supply tubes of the detergent dispensing system.

POWDER SIGNAL:
This function will either: a) use water to dispense detergent from machine compartments, or: b) dispense detergent from an external system. The number of valves present will vary according to the machine type.

OPEN

Press OPEN.
The function will be activated for as long as you press and hold this key. The function ceases as soon as you release the key.

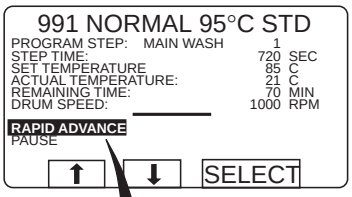


When you have finished:
Press ⬇ repeatedly to highlight "EXIT".

SELECT

Press SELECT.

Text



3592

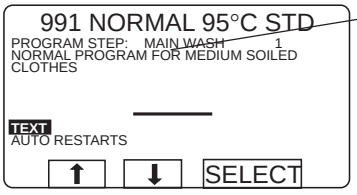
During program operation the display will look like this (see section "To start the wash program".

Press ⬆ or ⬇ one or more times to highlight "TEXT".

Press SELECT.

Pressing "Text" displays more information

The text displayed is a description of the wash program selected. This text description is inserted when a new wash program is created. This procedure is described fully in the programming manual.



3630

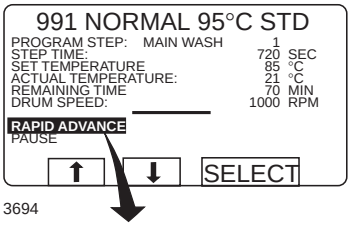
Description of wash program

To return to the normal display:
Press SELECT again.

Automatic return to normal display

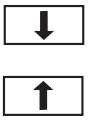
If you do not press SELECT within 20 seconds, the display will revert automatically.

To change the wash program after program operation has commenced



3694

During program operation the display will look like this (see section "To start the wash program".



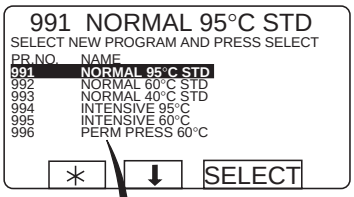
Press ⬆ or ⬇ one or more times to highlight "SELECT NEW WASH PROGRAM".

Press SELECT.

To change the wash program after program operation has commenced

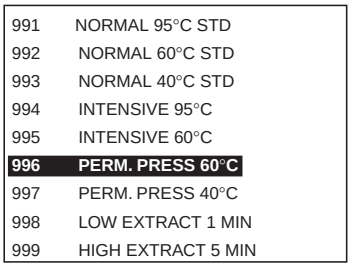
You can change to a different wash program at any time during program operation. When you do, the current function (for example, rinse) will be interrupted. The new program will start immediately after that (from the beginning).

This function is useful, for example, if you discover that you have started the wrong program.



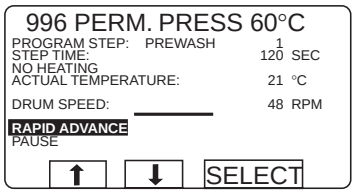
3695

Press ⬇ one or more times as required...



...to highlight the new wash program.

Press SELECT.

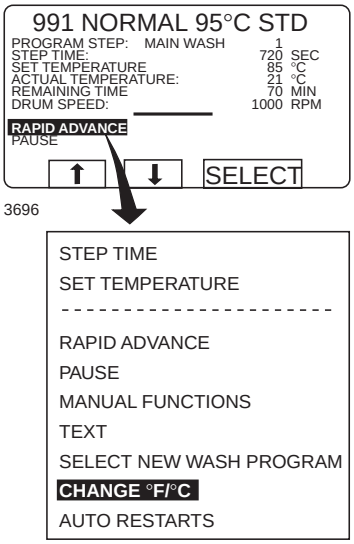


The existing wash program will now be interrupted and the new one will begin.

Automatic return to normal display

If no key is pressed within 20 seconds, the display will revert automatically.

To change temperature scale °C/°F



During program operation the display will look like this (see section "To start the wash program".

Press ⬆ or ⬇ one or more times to highlight "CHANGE °C/°F".

Press SELECT.

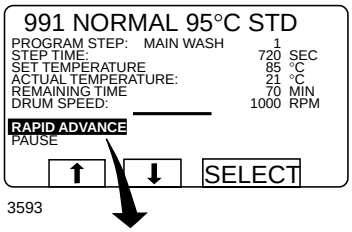
To change temperature scale °C/°F

This function changes the temperature scale used for all temperatures displayed during the wash program.

Please note that this scale change applies only to the current program. The default temperature scale will apply next time you run a program.

To change the default temperature scale for all programs, use the function "SETTINGS", which is described in the Service Manual.

Auto restart



3593

Press ⬇ one or more times to highlight "AUTO RESTART".

⬇

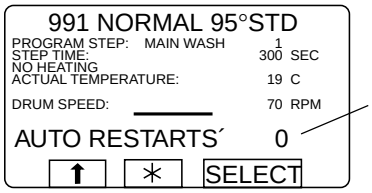
⬆

SELECT **Press SELECT.**

What is Auto restart?

Auto restart means that the same program will be repeated one or more times, according to the number set. The program will restart immediately, and the door will remain locked. If you have set auto restart, the display will show the number of restarts left.

This function is used primarily for testing.



3594

Shows the number of times the program will restart.

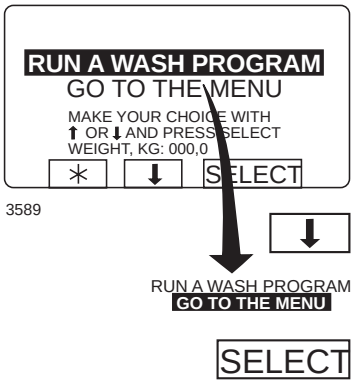
1 2 3
4 5 6
7 8 9
0

If required:
Use the numeric keys to change the required number of restarts.

SELECT **Press SELECT.**

Manual operation

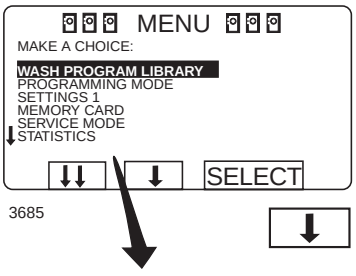
To select manual operation



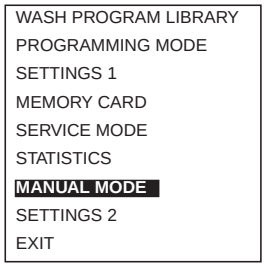
If this menu is not currently displayed:
Press ⮌ repeatedly.

Press ⬇ to highlight "GO TO THE MENU".

Press SELECT.



Press ⬇ six times...



....to highlight "MANUAL MODE".

Press SELECT.

Two types of manual operation

There are two types of manual operation, which should not be confused:

- **Manual operation when no program is running**

  These functions are described in this section.
- **Manual operation during a program**

  These functions are described in **section "Manual operation"**

Always lock the door first!

You must always close and lock the door first before you can operate the machine manually.

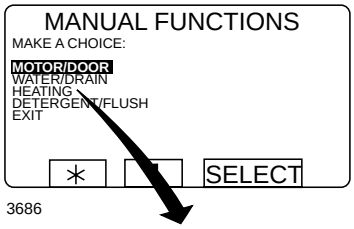
To lock the door, use the submenu MOTOR/DOOR, **see section "Motor/door"**.

All manual settings are cancelled when you exit manual operation

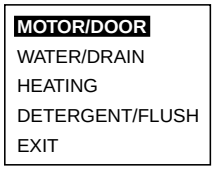
All manual settings (such as door, motor, temperature, and drain) will be cancelled when you exit manual operation.

The door is unlocked, the motor stops, the drain opens, heating is halted, and the temperature is reset to zero.

Procedure for use



3686



Select the function required using the cursor keys.

Press SELECT.

Manual operation when no program is running

Motor/door (see section "Motor/door")
Lock/unlock door. Switch motor on/off (normal drum action).

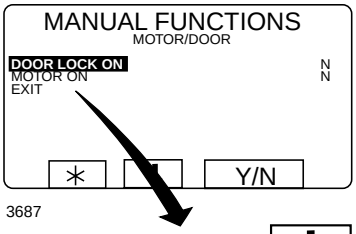
Water and drain valves (see section "Water/ drain")
Operation of drain valve and all water valves.

Heating (see section "Heating")
Heat water to any temperature required.

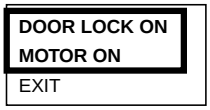
Detergent valves (see section "Detergent signals and water flushing")
Allows manual operation of all valves in detergent compartment or external detergent supply system.

Exit
Returns you to the MENU display.

Motor/door



3687



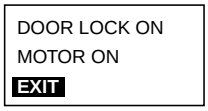
Press ⬇ as required to select a function.

A toggle function:

Use Y/N to toggle the function from ON (Yes) to OFF (No).

When you have finished:

Press ⬇ to highlight "EXIT".



Press SELECT.

Lock the door and start the motor

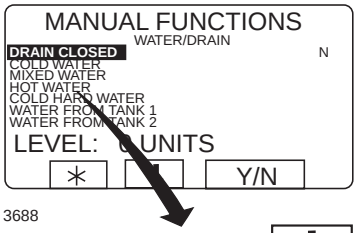
DOOR LOCK ON
If you answer **Yes (Y):**

The door will be locked. Note that you must always lock the door before you can operate the machine manually.

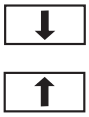
MOTOR ON
If you answer **Yes (Y)**:

The motor will start and operate, using normal action.

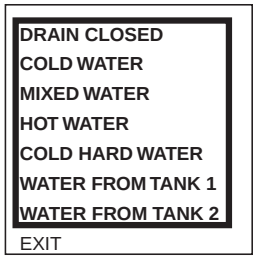
Water/drain



To access this function, see instructions in section "To select manual operation".



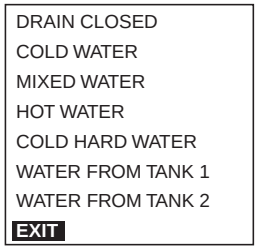
Use ⬇ or ⬆ to select Drain or one of the six Water filling alternatives.



Drain (a toggle function) :
Press Y/N to toggle the function from Yes (Y) and No (N).

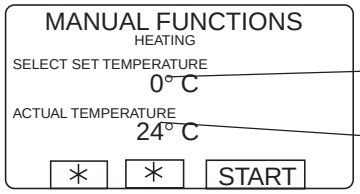
Water filling:
Press OPEN.
The function will be activated for as long as you press and hold this key. The function ceases as soon as you release the key.

When you have finished:
Press ⬇ to highlight "EXIT".



Press SELECT.

Heating

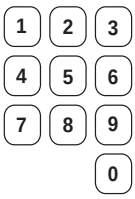


3689

To access this function, see instructions in section "To select manual operation".

Temperature selected

Actual temperature



Use the numeric keys to enter the temperature the water is to be heated to.

START

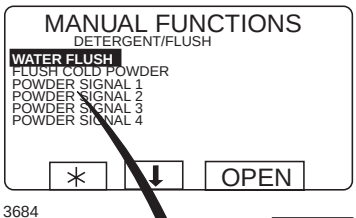
Press START.
Heating will now begin.

STOP

If you wish, you can cancel heating before the set temperature is reached:

Access this function again and press STOP.

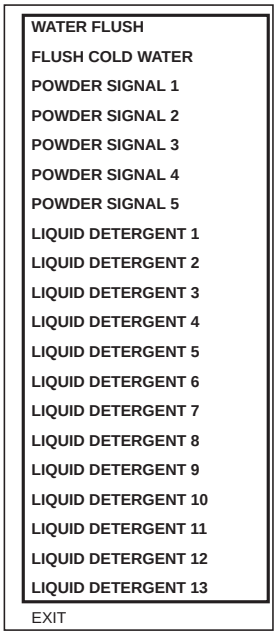
Detergent signals and water flushing



3684

To access this function, see instructions in section "To select manual operation".

Use ⬇ and ⬆ to select the function you require.



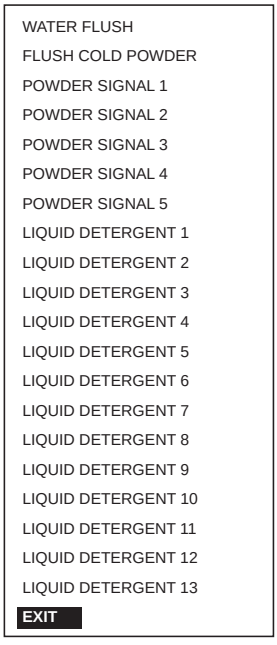
Detergent signals and water flushing

FLUSH WATER:
This function uses water to clear detergent from the supply tubes of the detergent dispensing system.

POWDER SIGNAL:
This function will either: a) use water to dispense detergent from machine compartments, or: b) dispense detergent from an external system. The number of valves present will vary according to the machine type.

Press OPEN.

The function will be activated for as long as you press and hold this key. The function ceases as soon as you release the key.



When you have finished:

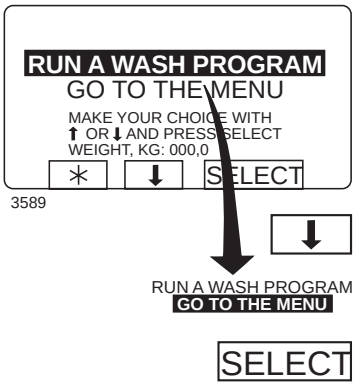
Press ⬇ repeatedly to highlight "EXIT".

SELECT

Press SELECT.

Statistics

To select Statistics

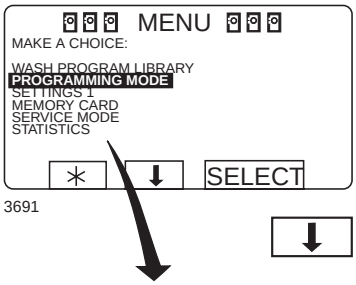


If this menu is not currently displayed:

Press ⮌ repeatedly.

Press ⬇ to highlight ”GO TO THE MENU”.

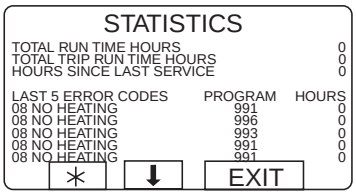
Press SELECT.



Press ⬇ five times...

...to highlight ”STATISTICS”.

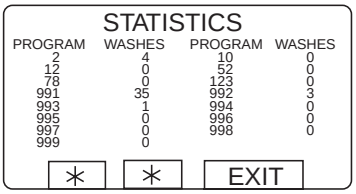
Press SELECT.



3690

To display the next page of statistics:

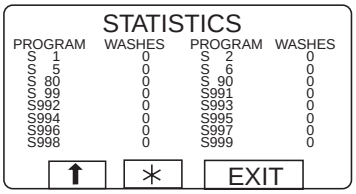
Press ⬇.



3958

To display the next page of statistics:

Press ⬇.



4040

If a memory card is in place in the PCU, the memory card program statistics will be displayed. An ”S” before the program number shows that it is a memory card program.

When you want to cancel the display of statistics:

Press EXIT.

The Statistics function

The Statistics function gives you access to the following information:

TOTAL RUN TIME HOURS:

Shows the total operating time for the machine since it was installed.

TOTAL TRIP RUN TIME HOURS:

This register records the total number of operating hours since it was last reset. It can, for example, be used to keep track of operating time since the last machine service. The procedure for resetting it is described in **section "To reset "Total trip run time hours" to zero"**.

HOURS SINCE LAST SERVICE

This register shows the time elapsed since the last service. The register can also be used to generate a signal on the display to show when service is needed (see the section ”Settings 1” in the service manual).

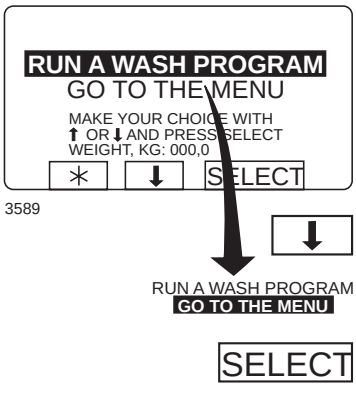
LAST 5 ERROR CODES:

This displays the most recent error codes, and tells which program was operating at the time and during which hour (according to the ”total run time” record) the error code was flagged.

NO. OF TIMES EACH PROGRAM USED:

Displays statistics for PCU programs and for programs on any memory card currently in place in the PCU.

Resetting statistic registers



If this menu is not currently displayed:

Press ⮌ repeatedly.

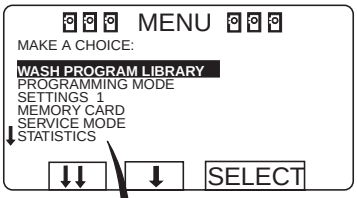
Press ⬇ to highlight "GO TO THE MENU".

Press SELECT.

Statistics registers which can be reset to zero

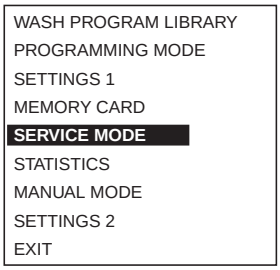
The following registers in the statistics function can be cleared (reset to zero):

- Total trip run time hours.
- Hours since last service.
- No. of times each program used (PCU programs).
- No. of times each program used (programs on any memory card currently in the PCU).



3693

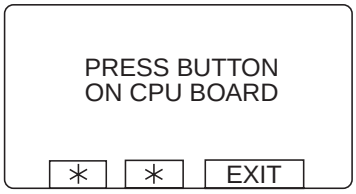
Press ⬇ ..four times....



... to highlight "SERVICE PROGRAM".

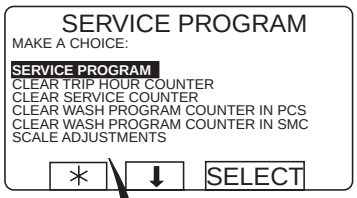
SELECT

Press SELECT



4209

Press the button on the CPU circuit board.



4042

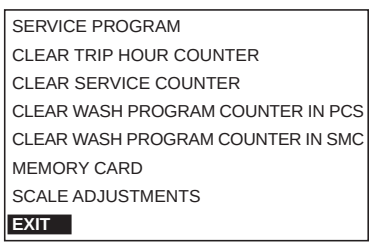
Now you can choose either to clear/reset a register or to adjust the weighing equipment.

Press ⬇ to highlight the option you want, then press SELECT.

SELECT

If you want to exit:

Press ⬇ repeatedly until EXIT is highlighted.

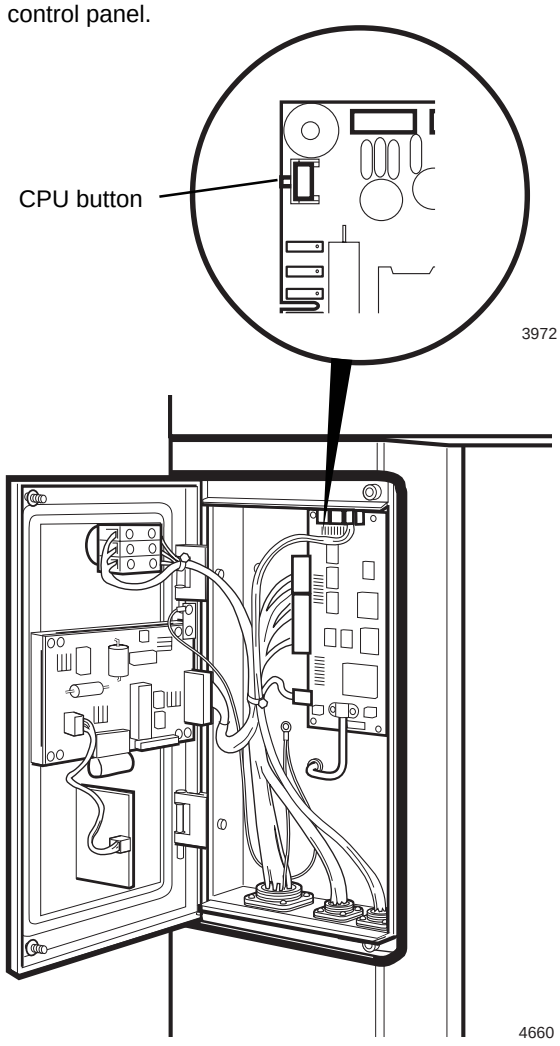


SELECT **Press SELECT.**

The service program may only be used by authorised personnel, because all safety interlocks are disabled when it is in use.

Prevention of unauthorised access

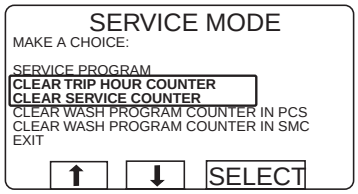
A button on the CPU circuit board has to be pressed to gain access to the service program, to prevent its unauthorised or inadvertent use. The CPU circuit board is located behind the control panel. Two screws have to be undone to open the control panel.



3972

4660

Time counter, hours after last service

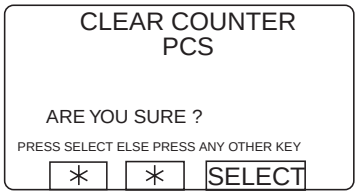


4041

Both counters can be reset in the same way.

Press ⬇ so that CLEAR TRIP HOUR COUNTER OR CLEAR SERVICE COUNTER will be marked.

Press SELECT.



4043

First you have a chance to change your mind.

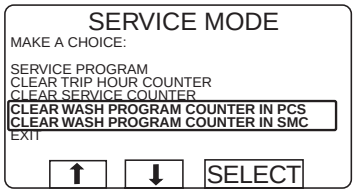
If you **do not want to reset** the register:

Press any key <u>other than</u> SELECT.

If you want to reset the register:

Press SELECT.

Number of washes for program in timer or memory card

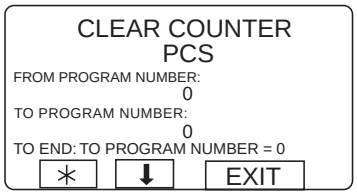


4044

You can reset program in both timer and the memory card (if inserted).

Press ⬇ so that CLEAR WASH PROGRAM COUNTER IN PCS or CLEAR WASH PROGRAM COUNTER IN SMC will be marked.

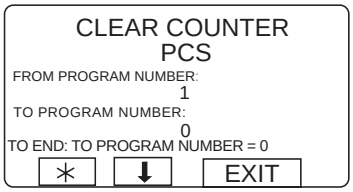
Press SELECT.



4045

Write from which program number you want to clear wash programs.

Press ⬇.



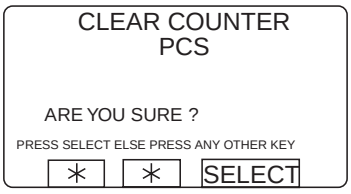
4046

1 2 3
4 5 6
7 8 9
0

Enter digits corresponding to the program number (inclusive) up to which you wish to clear the total counter.

ERASE

Press ERASE.



4043

First you have the chance to change your mind.

If you **do not want to** reset the register:

Press any key other than SELECT.

If you do want to reset the register:

SELECT

Press SELECT.

Now the totals of the program numbers you have specified will be cleared.

If you wish to change any numbers you have entered:

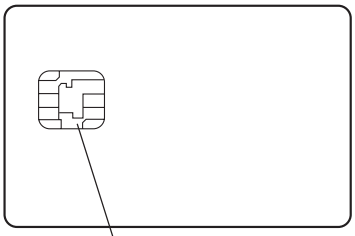
Press ⬆ if you want to change the first number entered. Enter the new number.

If you change your mind:

Press ↩.

Memory card

General introduction



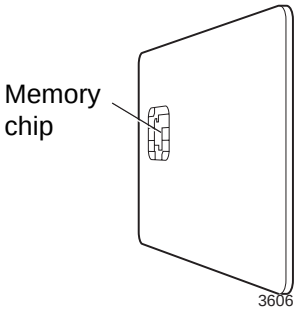
A memory card is a plastic card, the size of a credit card, with an electronic memory chip inside it. This memory card is capable of storing 10 to 15 wash programs of normal size. If the programs are mostly small ones, more of them can be stored, whereas larger programs will reduce the number which can be held by the memory card. Memory cards of this type can be used to:

- transfer wash programs from one machine to another
- run wash programs straight from the memory card
- transfer wash programs from a PC to a memory card and from a memory card to a PC (these procedures, and how to write a wash program on a PC, are described elsewhere)

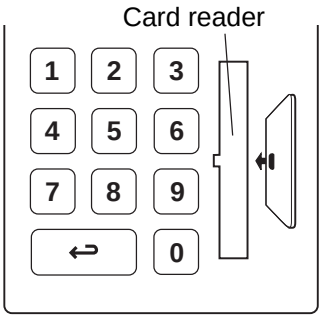
A program stored on a memory card may be given restricted-use status. This means that:

- The program cannot be deleted or copied to the program control unit of a washer extractor.
- You cannot alter the program or inspect the way it is written.
- To run the program you have to have the memory card and to insert it into the program control unit when the program is to be started.

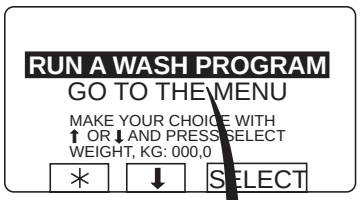
To select the ”Memory card” function



Turn the memory card so its memory chip is at the far end, and on the left of the card...



...then insert the memory card into the program control unit.

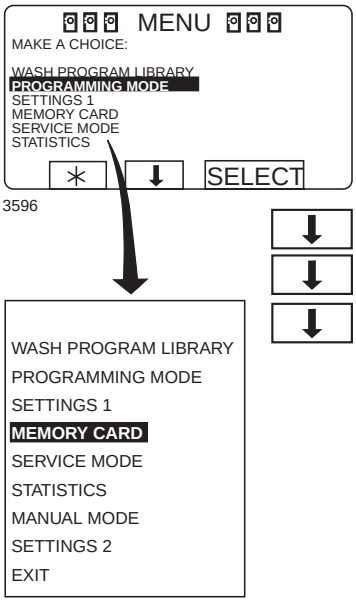


If this menu is not currently displayed:

Press ⮌ repeatedly.

Press ⬇ to highlight ”GO TO THE MENU”.

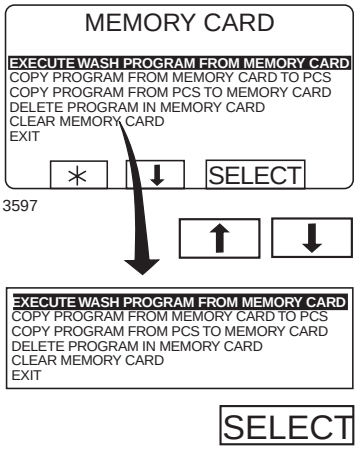
Press SELECT.



Press ⬇ three times...

...to highlight ”MEMORY CARD”.

SELECT **Press SELECT.**



Select the function required using the cursor keys.

SELECT **Press SELECT.**

"The "Memory card" functions

Run wash program straight from memory card (see section "To run a wash program straight from a memory card")

A wash program can be run from the memory card, without first being copied to the washer extractor. The memory card may be removed from the card reader after the program has started.

Programs on memory cards may have "restricted-use" status, which means that they can only be run straight from the memory card, not copied or modified.

Copy program from memory card to PCS (see section "To copy a program from a memory card to the machine´s program control unit")

One or more wash programs can be copied from the memory card to the memory chip in the machine's program control unit. Note that programs on the memory card with "restricted-use" status cannot be copied to the machine memory chip.

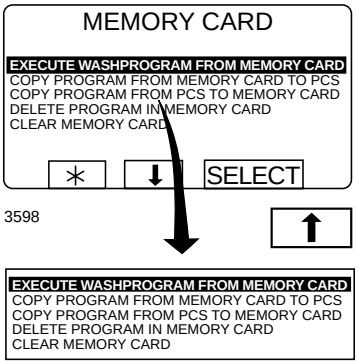
Copy program from PCS to memory card (see section "To copy a program from the program control unit to a memory card")

One or more wash programs can be copied from the memory chip in the machine's program control unit to the memory card. The memory card can hold 10 to 15 wash programs of normal size.

Delete program on memory card (see section "To delete a program on a memory card")

Clear memory card (see section "To delete all programs on a memory card")

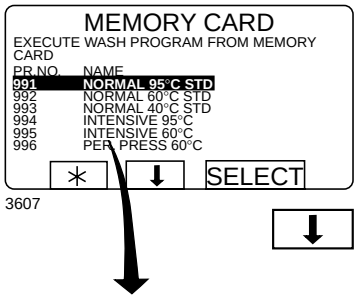
To run a wash program straight from a memory card



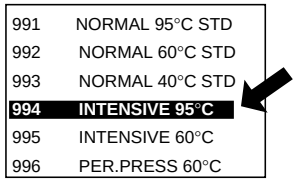
To access this menu, follow the instructions in section "To select the "Memory card" function".

Highlight ”EXECUTE WASH PROGRAM FROM MEMORY CARD” (press ⬆ if necessary).

SELECT **Press SELECT.**

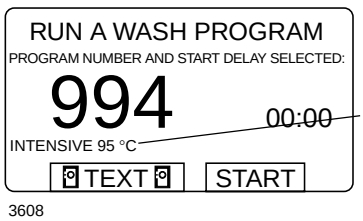


⬇ **If necessary, use ⬇ to...**



... highlight the wash program required.

SELECT **Press SELECT.**



Program name

If you want to see the description of the program (where available):

TEXT **Press TEXT.**

START To start the program:

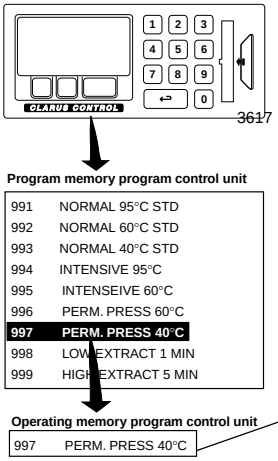
Press START.

Once the program has started, the memory card may be removed from the card reader.

To run a program from the memory card

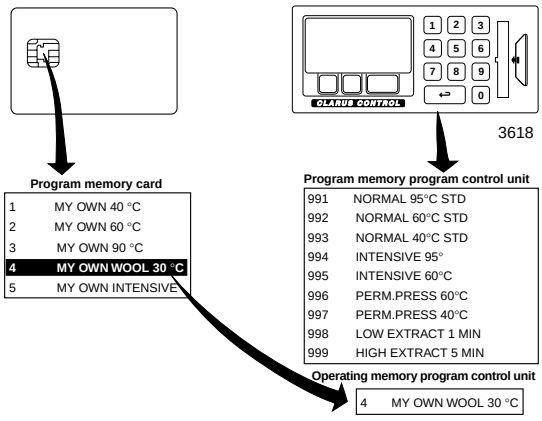
In broad terms, the program control unit has two different memories. One is a ”**program memory**” where all its wash programs are stored, the other is an ”**operating memory**”, which is used to hold the program currently in use. The program control unit takes the instructions it needs to run the program from the operating memory.

When a wash program is started, the correct program is retrieved from the program memory and copied into the operating memory.



Program currently being used

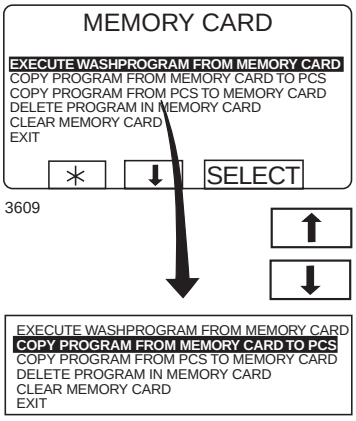
A parallel process takes place when a program is started from a memory card. In other words, the program is copied from the memory card into the operating memory, and the machine runs the program entirely from the set of instructions in the operating memory.



That is why you may remove the memory card from the card reader once the program has started.

Once the program has ended it is erased from the operating memory.

To copy a program from a memory card to the machine's program control unit

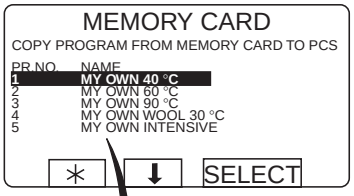


To access this menu, follow the instructions in section "To select the "Memory card" function".

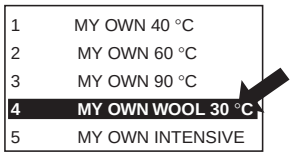
Note that restricted-use programs on a memory card cannot be copied.

Highlight "COPY PROGRAM FROM MEMORY CARD TO PCS" (press ⬇ or ⬆ if necessary).

SELECT **Press SELECT.**



If necessary, use ⬇ to...



... highlight the wash program required.

SELECT **Press SELECT.**

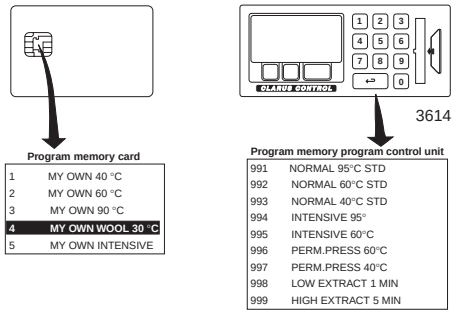
What is a restricted-use program?

A wash program which has been created on a PC can be made a "restricted-use" program. This means that:

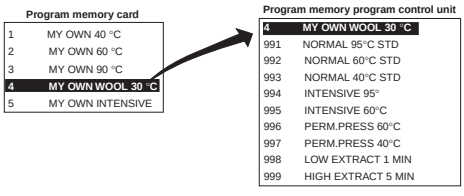
- The program cannot be deleted or copied to the program memory of a washer extractor.
- You cannot modify the program or examine its structure.
- To run the program you must have access to the memory card, and insert it into the card reader when the program is to be started.

What happens when a program is copied?

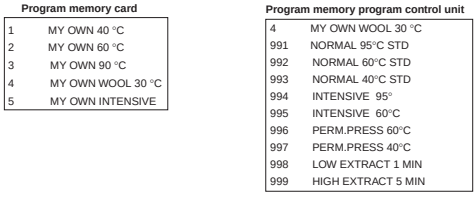
Both the memory card and the program control unit have memory chips capable of storing wash programs. The chip on the card can hold about 10 to 15 programs of normal size, while the chip in the program control unit has a capacity of several hundred programs.

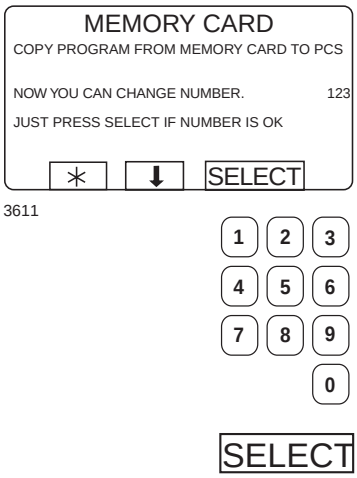


When a program is copied from a memory card to the machine's program control unit, it is copied, not moved (not deleted from the card). A copy is transferred from the chip on the memory card to the storage chip of the machine program control unit.



The program remains on the memory card, but another copy of it has now been stored in the program control unit.





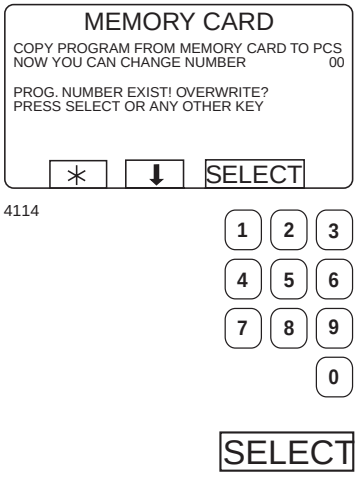
Choose 1 or 2:

1 If you want to give the program a different program number (from the one it had on the memory card):

Use the numeric keys to enter the new program number, then press SELECT.

2 If the existing number is suitable:

Press SELECT.



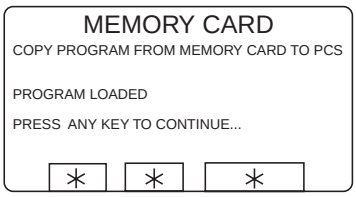
If the number you have choosen is already used:

1 Select another number.

Enter the new number and press SELECT.

2 Erase the old program number.

Press SELECT.

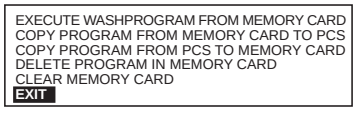


3612

After the program has been copied (it takes only a few seconds) the menu will look like this:

If you want to copy more programs:

Press any key to continue.



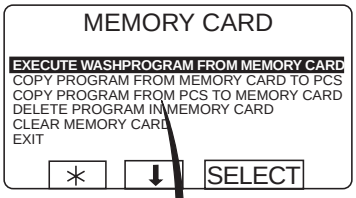
4210

When you have finished:

Press ⬇ repeatedly tohighlight "EXIT".

SELECT **Press SELECT.**

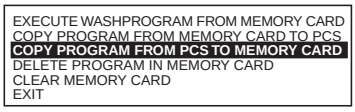
To copy a program from the program control unit to a memory card



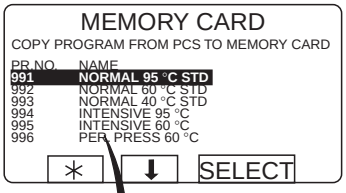
3619

To access this menu, follow the instructions in section "To select the "Memory card" function.

Highlight "COPY PROGRAM FROM PCS TO MEMORY CARD" (press ⬇ or ⬆ if necessary).



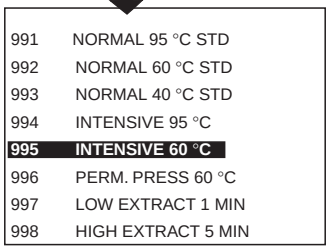
SELECT **Press SELECT.**



3620

If necessary, use ⬇ to...

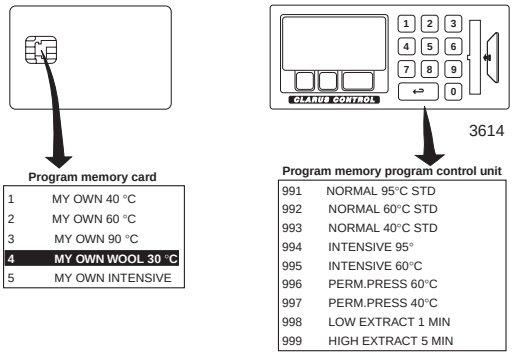
... highlight the wash program required.



SELECT **Press SELECT.**

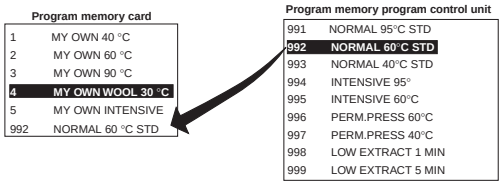
What happens when a program is copied?

Both the memory card and the program control unit have memory chips capable of storing wash programs. The chip on the memory card can hold about 10 to 15 programs of normal size, while the chip in the program control unit has a capacity of several hundred programs.



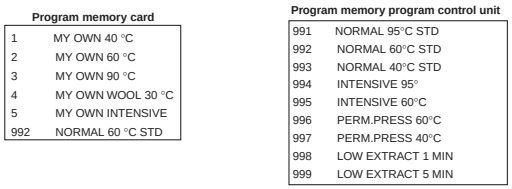
3614

When a program is copied from the machine's program control unit to a memory card, it is copied, not moved (not deleted from the machine). A copy is transferred from the storage chip of the machine program control unit to the chip on the card.

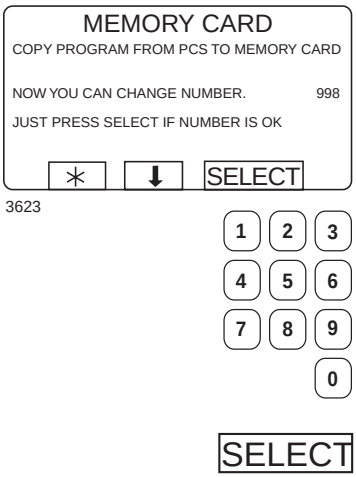


3621

The program remains in the program control unit, but another copy of it has now been stored on the card.



3622



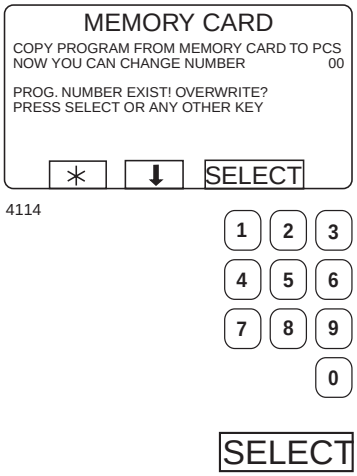
Choose 1 or 2:

1 If you want to give the program a different program number (from the one it had on the machine):

Use the numeric keys to enter the new program number, then press SELECT.

2 If the existing number is suitable:

Press SELECT.



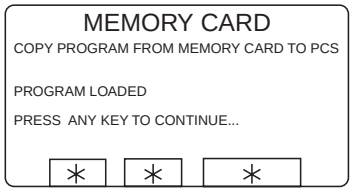
If the number you have choosen is already used:

1 Select another number.

Enter the new number and press SELECT.

2 Erase the old program number.

Press SELECT.

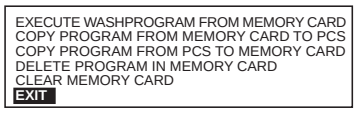


3612

After the program has been copied (it takes only a few seconds) the menu will look like this:

If you want to copy more programs:

Press any key to continue.



4210

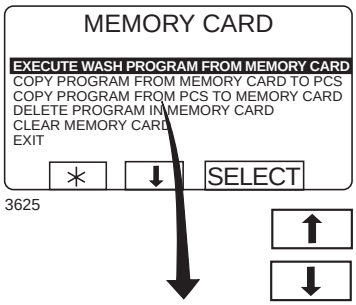
When you have finished:

Press ⬇ repeatedly to highlight "EXIT".

SELECT

Press SELECT.

To delete a program on a memory card



To access this menu, follow the instructions in section "To select the "Memory card" function

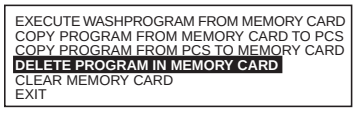
Note that restricted-use programs on a memory card cannot be deleted.

What is a restricted-use program?

A wash program which has been created on a PC can be made a ”restricted-use” program. This means that:

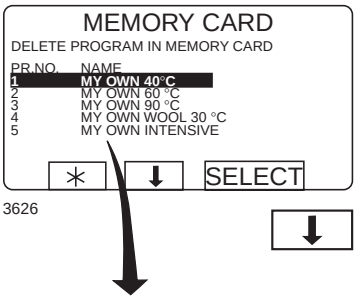
- The program cannot be deleted or copied to the program memory of a washer extractor.
- You cannot modify the program or examine its structure.
- To run the program you must have access to the memory card, and insert it into the card reader when the program is to be started.

Highlight ”DELETE PROGRAM IN MEMORY CARD” (press ⬆ or ⬇ if necessary).

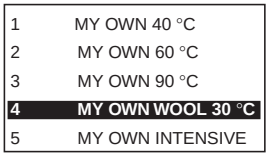


Press SELECT.

SELECT



If necessary, use ⬇ to...



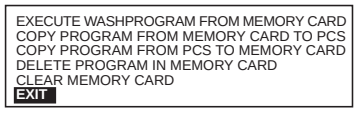
.... highlight the wash program required.

SELECT **Press SELECT.**

The program will now be deleted from the memory card. This takes between 5 and 15 seconds.

If you want to delete more programs:

Continue in the same way as described above.

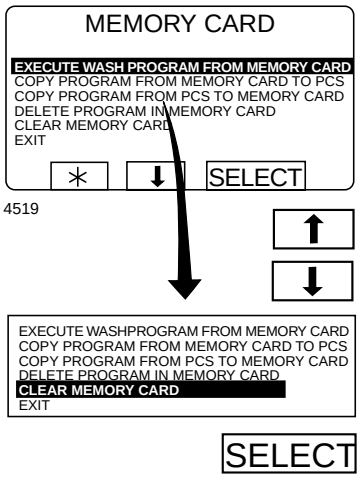


When you have finished:

Press ⬇ repeatedly to highlight "EXIT".

SELECT **Press SELECT.**

To delete all programs on a memory card



To access this menu, follow the instructions in section "To select the "Memory card" function

Note that restricted-use programs on a memory card cannot be copied or deleted.

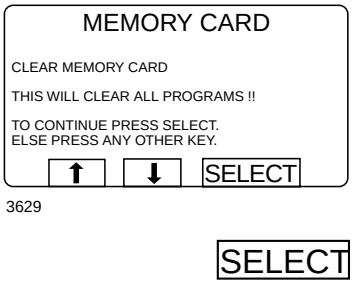
Highlight "CLEAR MEMORY CARD" (press ⬇ or ⬆ if necessary).

Press SELECT.

What is a restricted-use program?

A wash program which has been created on a PC can be made a "restricted-use" program. This means that:

- The program cannot be deleted or copied to the program memory of a washer extractor.
- You cannot modify the program or examine its structure.
- To run the program you must have access to the memory card, and insert it into the card reader when the program is to be started.



If you change your mind and do not want to delete the entire memory card:

Press any key <u>other than</u> SELECT.

If you want to delete all programs on the memory card (with the exception of any restricted-use programs):

Press SELECT.

Error code, error message	Fault-finding	Cause/Action

01, NO WATER

Water level has not reached set level with 10 minutes.

Check that the manual water valves (taps) are open.

Taps turned on. / Taps turned off.

Taps turned off → Open taps. Restart program.

Taps turned on → Check that there is a water option (function) in the program.

Yes / No

No → Make changes in program.

Yes → Access the service program and activate the water valves which should open in program in question. Check whether machine is filling.

Machine filling / Machine not filling

Machine not filling → Measure the feed voltages on the relevant water valve. Check that the I/O PCB is supplying voltage to the relevant valve.

Voltage(s) not correct / Voltage(s) correct

Voltage(s) correct → Faulty valve. Check function and rectify problem as described in manual for relevant machine.

Voltage(s) not correct → On I/O PCBs check that the red LEDs are lit distinctly and without flashing.

LEDs OK / LEDs not OK

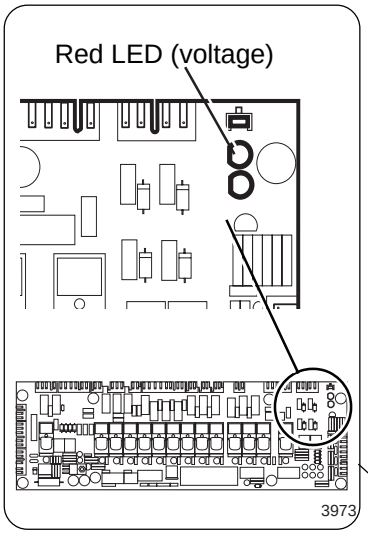
LEDs not OK → Fault in voltage feed to I/O PCB. Check voltage at X3:1-2 (16 V=). If wrong, continue tracing fault in voltage feed as described in manual for relevant machine.

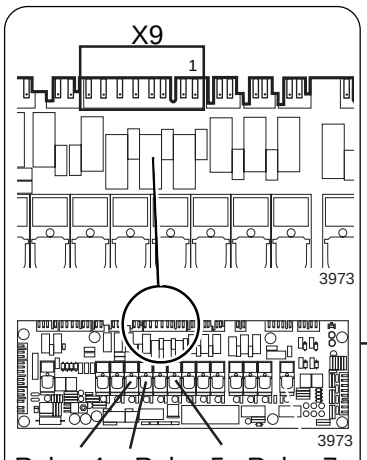
LEDs OK → Check on I/O PCBs that the LEDs for the relays you have activated are lit. Check also feed voltages at PCB connector X9 to the water valves you have activated.

LEDs and voltages OK / LEDs and/or voltages not OK

LEDs and/or voltages not OK → Cause of voltage fault may be because feed to I/O PCB 2-3 is not OK, or because neutral from door lock PCB is absent. If an I/O PCB is faulty, replace according to instructions in “To replace an I/O board”.

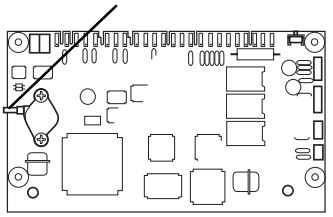
LEDs and voltages OK → Faulty wiring between I/O PCB and water valve. Check wiring and replace as required.





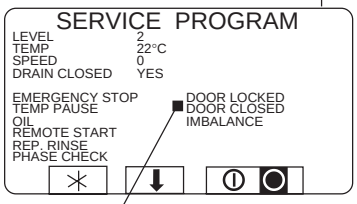
Function	I/O PCB	Relay	Output
Hot water	1	4	X9:7
Cold water	1	7	X9:4
Cold hard water	2	4	X9:7
From tank 1	2	5	X9:6
From tank 2	3	4	X9:7
Common earth	1,2,3		X9:8

Continued on next page.

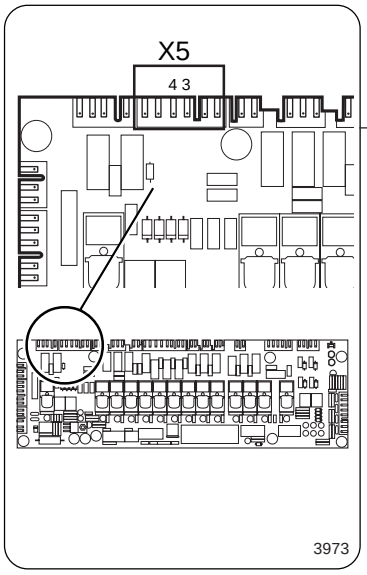
Error code, error message	Fault-finding	Cause/Action
01, NO WATER	**Continued from previous page.**	
Connection, level tube  3972	Close the drain valve via the service program and check that it really is closed, i.e. that water level is rising in drum. Drain valve closed. Drain valve open. ↓ →	Trace drain valve fault as described in manual for relevant machine.
	Check that level tube is sound, not kinked, not blocked and has not come loose from mother board. Level tube OK ↓ Level tube not OK →	Fit tube properly or replace it.
		Level detection function on CPU PCB faulty. Replace PCB according to instructions in “To replace the CPU board”.

Fault-finding

Error code, error message	Fault-finding	Cause/Action
02, DOOR OPEN Door status switch open during wash.	Press ↩. Error message returns	No error message → Transient fault in door lock, CPU PCB or I/O PCB.
	Access service program to view indicator for “DOOR CLOSED”. Remove door lock cover. Press door status switch inwards by hand and check whether this change is indicated on display.	
	No indicator	Indicator appears → Check function of door status switch in door lock. See description of door lock in manual for relevant machine.
	Remove connector X5 on I/O PCB 1. Short-circuit inputs 3 and 4.	
	No indicator	Indicator appears → Door lock switch or wiring to switch faulty. Check and replace faulty components according to description of door lock in manual for relevant machine.
		Poor contact or continuity fault to X6 on I/O PCB 1 may generate error code 02. Faulty I/O PCB. Replace PCB according to instructions in “To replace an I/O board”.

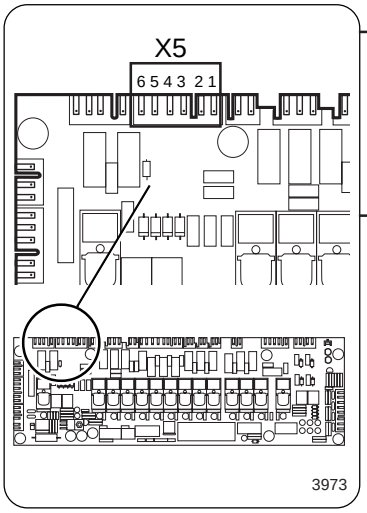


Door status switch indicator



Please note:

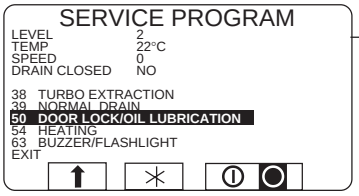
If the feed to X6 on I/O PCB 1 has intermittent loss of contact during a wash, error code 02 or 03 may be activated intermittently!

Error code, error message	Fault-finding	Cause/Action
03, DOOR UNLOCKED Acknowledgement signal from door lock switch absent at program start or during program.	Test whether door is really unlocked. Door not locked / Door locked	
	Check voltage (= feed voltage to machine) on I/O PCB 1, PCB connector X5 between terminals 1 and 5. Voltage correct / Voltage not correct	Fault in voltage feed to I/O PCB. Trace fault as described in manual for relevant machine.
	Check voltage (= feed voltage to machine) on I/O PCB 1, PCB connector X5 between terminals 2 and 6. Voltage correct / Voltage not correct	Fault in door lock switch or in wiring to I/O PCB. Trace fault and replace wiring or door lock as appropriate.
	Press ⏎. Error message returns / No error message	Poor contact or continuity fault to X6 on I/O PCB 1 may generate error code 03. If input on I/O PCB faulty, replace I/O PCB 1 according to instructions in “To replace an I/O board”.
	Continued on next page.	Transient fault in door lock, CPU PCB, I/O PCB or feed to I/O PCB.

Error code, error message	Fault-finding	Cause/Action

03, DOOR UNLOCKED

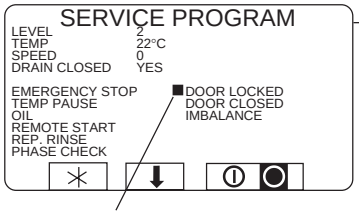
Continued from previous page.



Access the service program and activate the door lock.
Does it lock?

No ↓

Yes ↓



Door status switch indicator

Check inputs by pressing 1.
"Door locked" indicated?

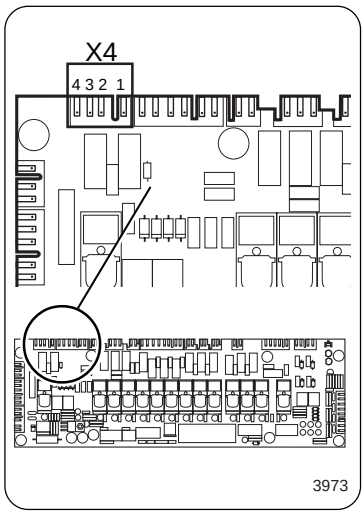
Yes → Probably poor contact in door lock system. Check the feed to X92 in MCU and power supply to whole machine. Check also for intermittent loss of contact to door status switch S4.

No → Look for fault in wiring of door lock system and MCU.

Does relay 1 on I/O PCB 1 react?
Is there voltage at X4:1-2?

Yes ↓

No → Probably fault on I/O PCB 1. Replace I/O PCB according to instructions in "To replace an I/O board".

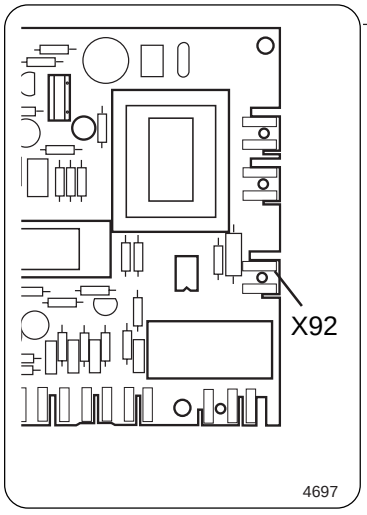


Is there voltage at X92 on door lock PCB?

Yes → Check the door lock system with the aid of Chapter 23, "Program control unit".

No → Probably fault in wiring to door lock PCB.

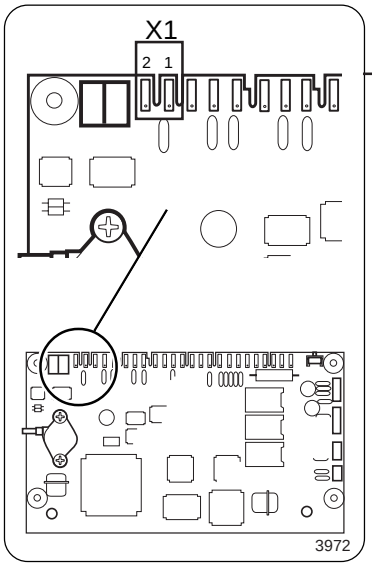
1



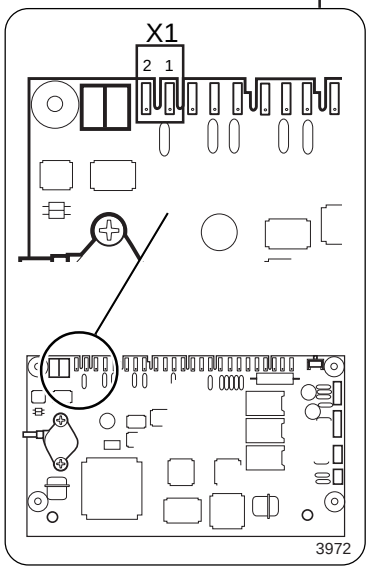
Please note:

If the feed to X6 on I/O PCB 1 has intermittent loss of contact during a wash, error code 02 or 03 may be activated intermittently!

Error code, error message	Fault-finding	Cause/Action
04, NTC LOW TEMPERATURE Temperature sensor indicating a temperature below lowest allowable value. This suggests open circuit (continuity fault) in sensor or wiring.	Use ⏎ to reset. Start a program.	
	Error message returns	No error message → Transient fault.
	Short-circuit the temperature sensor by the sensor. Use ⏎ to reset. Start a program. Check whether the display now shows NTC LOW TEMP. or NTC HIGH TEMP.	
	LOW	HIGH → Temperature sensor faulty. Replace sensor.
	Disconnect PCB connector X1 on CPU PCB. Short-circuit inputs 1 and 2. Use ⏎ to reset. Start a program. Check whether the display now shows NTC LOW TEMP. or NTC HIGH TEMP.	
	LOW	HIGH → Fault in wiring to temperature sensor. Check wiring and replace if necessary.
	→	Fault in temperature sensing device on CPU PCB. Replace PCB according to instructions in “To replace the CPU board”.



Error code, error message	Fault-finding	Cause/Action
05, NTC HIGH TEMPERATURE Temperature sensor indicating a temperature above highest allowable value. This suggests short-circuit in sensor or wiring.	Use ⏎ to reset. Start a program. Error message returns	No error message → Transient fault.
	Disconnect PCB connector X1 on CPU PCB. Use ⏎ to reset. Start a program. Check whether the display now shows NTC LOW TEMP. or NTC HIGH TEMP.	
	LOW	HIGH → Fault in temperature sensing device on CPU PCB. Replace PCB according to instructions in “To replace the CPU board”.
	Reconnect PCB connector X1. Disconnect the link between wiring and sensor by the temperature sensor. Use ⏎ to reset. Start a program. Check whether the display now shows NTC LOW TEMP. or NTC HIGH TEMP.	
	LOW	HIGH → Fault in wiring to temperature sensor. Check wiring and replace if necessary.
		Temperature sensor faulty. Replace sensor.



Error code, error message	Fault-finding	Cause/Action

06, WATER IN DRUM

The water level is higher than the EMPTY level at start of program.

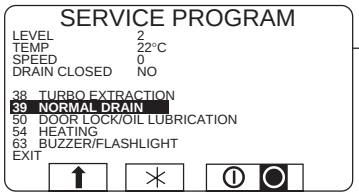
Is there any water in the drum? (Even if no water is visible in the inner drum, check for presence of water in outer drum by inserting suitable object through inner drum perforations.)

Yes → No

Disconnect the level tube from the CPU PCB. Turn the machine's wall switch off and on again. Restart the program.

"WATER IN DRUM" message returns. → Level tube probably blocked. Clean or, if necessary, replace tube.

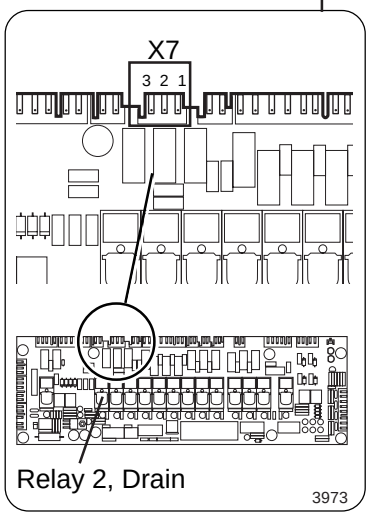
"NO WATER" or no message displayed. → Level sensing device on CPU PCB probably not working or incorrectly calibrated.



Access service program and open drain valve. Is water being discharged?

Yes → No

Check on I/O PCB 1 that the LED on relay 2 for drain is not lit.

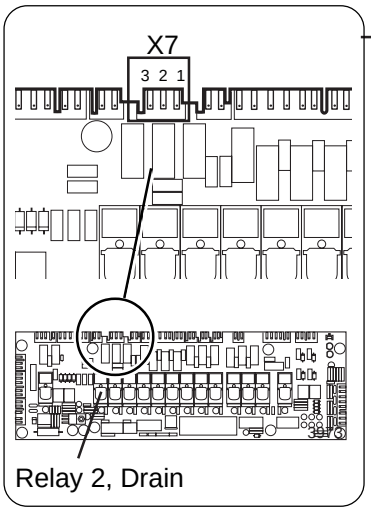


LED is not lit → **Continued on next page.**

LED is lit → Check that the red LED on the I/O PCB is lit.
LED OK: I/O PCB probably faulty. Replace PCB according to instructions in "To replace an I/O board".
LED not lit: Trace fault in voltage feed to I/O PCB as described in manual for relevant machine.

Error code, error message	Fault-finding	Cause/Action

06, WATER IN DRUM



Continued from previous page.

Check voltage (= feed voltage to machine) on I/O PCB 1, X7: 1 - 2.
Voltage present No voltage

Probably faulty drain valve or wiring to drain valve. Check whether the valve is blocked, clear it if necessary. Check functioning and rectify problem as described in manual for relevant machine.

I/O PCB probably faulty. Replace PCB according to instructions in “To replace an I/O board”.

Restart and run the program.
Error message
No error message

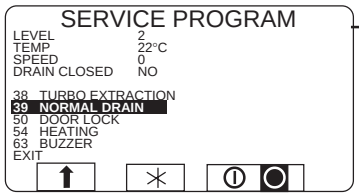
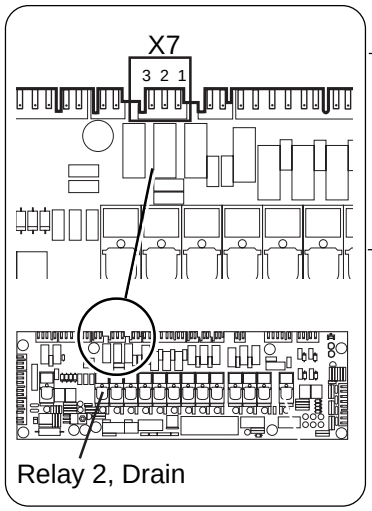
Transient fault. No action required.

Check to see if drain valve is partially blocked or not opening fully.
Drain valve OK
Drain valve not OK

Check valve functioning and take action required according to description in manual for relevant machine.

Access the programming function. Check that the drain valve is programmed correctly.

Error code, error message	Fault-finding	Cause/Action
07, MACHINE OVERFILLED The water level is above the set safety level during program operation or manual operation.	Turn the machine's wall switch off so that the water empties from the machine. Turn on the wall switch and start a program. Error message returns → ↓ No error message → →	Transient fault or water has been added manually.
	Is there a valve continuously drawing water? Drawing water → ↓ Not drawing water → →	Probably a fault in level sensing equipment or program. Check level sensing equipment before replacing the CPU PCB according to instructions in "To replace the CPU board".
	Remove connector for valve voltage feed. Valve stops drawing water. → ↓ Valve still drawing water. → →	Faulty water valve. Clean or replace valve as described in manual for relevant machine.
	→ →	Faulty I/O PCB. Replace PCB according to instructions in "To replace an I/O board".

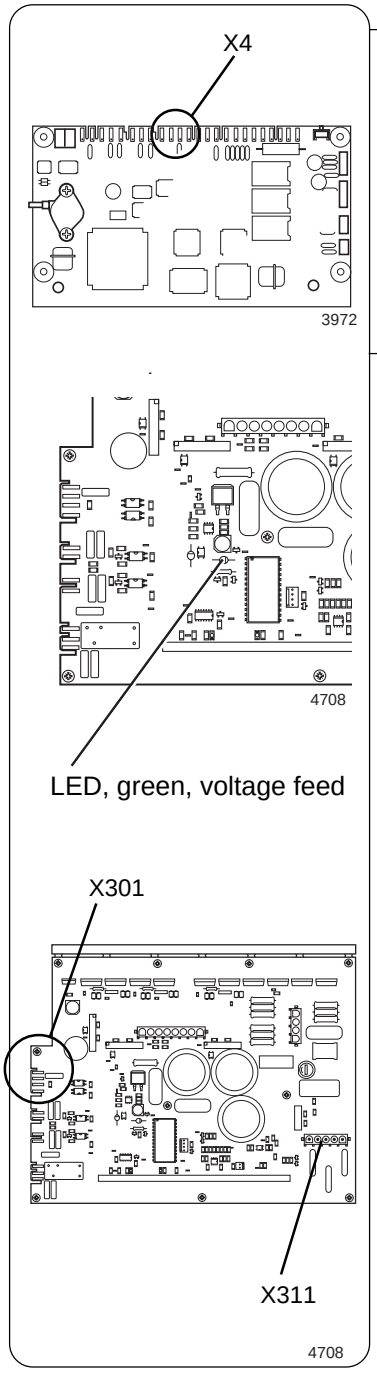
Error code, error message	Fault-finding	Cause/Action
10, NOT DRAINED The water level is higher than the EMPTY level after drain sequence.	Is there any water in the drum? (Even if no water is visible in the inner drum, check for presence of water in outer drum by inserting suitable object through inner drum perforations.) Yes / No Disconnect the level tube from the CPU PCB. Turn the machine's wall switch off and on again. Restart the program. "WATER IN DRUM" or "NOT DRAINED" message displayed / "NO WATER" message or no message displayed	Level tube probably blocked. Clean or if necessary replace tube. Level sensing device on CPU PCB not working or incorrectly calibrated.
	Access service program and open drain valve. Is water being discharged? Yes / No Check on I/O PCB 1 that the LED on relay 2 for drain is lit. LED(s) not lit / LED(s) lit Check voltage (= feed voltage to machine) on I/O PCB 1, X7: 1 - 2. Voltage present / No voltage	Check that the red LED on the I/O PCB is lit. LED OK: Faulty I/O PCB. Replace I/O PCB according to instructions in "To replace an I/O board". LED not lit: Trace fault in voltage feed to I/O PCB as described in manual for relevant machine. Probably faulty drain valve or wiring to drain valve. Check whether the valve is blocked, clear it if necessary. Check functioning and rectify problem as described in manual for relevant machine. I/O PCB probably faulty. Replace PCB according to instructions in "To replace an I/O board".
		

Continued on next page.

Error code, error message	Fault-finding	Cause/Action
10, NOT DRAINED	**Continued from previous page.** Restart and run the program. Error message → Check to see if drain valve is partially blocked or not opening fully. No error message →	Transient fault. No action required.
	Drain valve OK →	Access the programming function. Check that the drain valve is programmed correctly.
	Drain valve not OK →	Check valve functioning and take action required according to description in manual for relevant machine.

Fault-finding

Error code, error message	Fault-finding	Cause/Action
13, NO MOTOR COMM. Communication between PCU and motor control unit interrupted or disturbed	Turn the machine's wall switch off and on again. Start a program. Error message returns → No error message → Transient fault.No action required.	
	Check that the green LED on the MCU is lit distinctly and without flashing. LED OK → LED not lit → Trace fault in voltage feed to MCU PCB as described in manual for relevant machine. If the voltage feed is OK, replace the MCU.	
	Check wiring from X4 on CPU PCB to X301 on motor control unit. Use an ohmmeter to check that the four conductors are sound as follows: X4: X301: 1 - 4 2 - 3 3 - 2 4 - 1 Measure also between the four connections in X4 to eliminate possibility of short-circuits between two conductors. Wiring sound → Wiring faulty → If the wiring has connectors, disconnect these one by one and continue fault tracing to identify the section of wiring where the fault is. Replace faulty wiring.	
	Check input voltage (230 V 50 Hz) to the motor control unit on contact X311 (measure on rear of PCB). Wrong voltage → Trace fault in voltage feed to MCU PCB as described in manual for relevant machine. Voltage OK → Replace motor control unit. Fault persists → Probable fault in CPU PCB communications circuits. Refit the original motor control unit and replace the CPU PCB according to instructions in "To replace the CPU board". Transient fault. → Function normal → Fault in motor control unit communications circuits. Replace MCU.	



Error code, error message	Fault-finding	Cause/Action
14, LEVEL CALIBRATION Level system not calibrated at factory.	If the level system has not been calibrated at the factory the error message will appear for five seconds immediately after every program start-up. The machine can be operated, but the levels will be slightly wrong, mostly too low.	

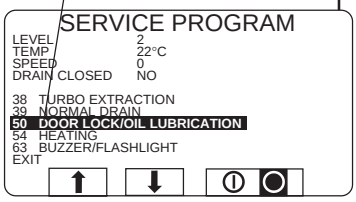
Error code, error message	Fault-finding	Cause/Action
15, EMERGENCY STOP The emergency stop button has been pressed.	After the problem which caused the emergency stop has been put right, you can reset the emergency stop button by turning it until it pops back out. Reset using ⏎.	

Error code, error message	Fault-finding	Cause/Action

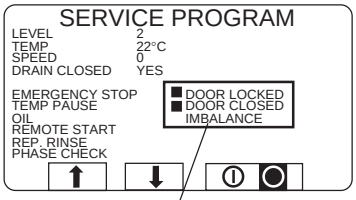
17, DOOR LOCK

No signal from door status switch, although door is locked.

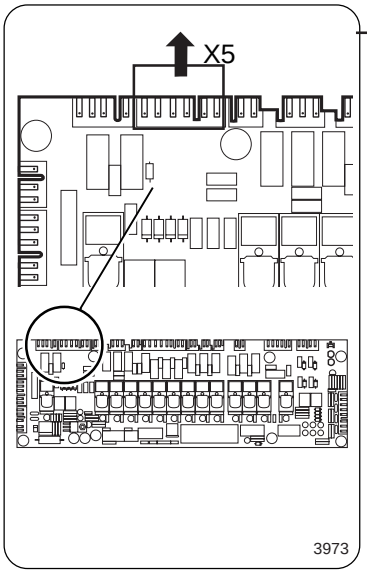
Use this function to lock the door.



Use (1) to switch between these.



Indicators for switch(es) in door lock.



Turn the machine's wall switch off and on again.
Start a program.
Error message returns

No error message → Transient fault. No action required.

Access the service program and check the door lock function. Carry out three different tests as shown in this table:

Door	Indicator should be:	
	DOOR LOCKED	DOOR CLOSED
1. open	not activated	not activated
2. closed, not locked	not activated	activated
3. closed and locked	activated	activated

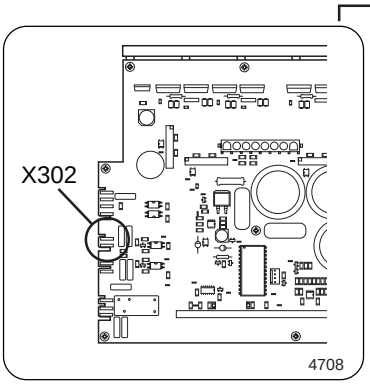
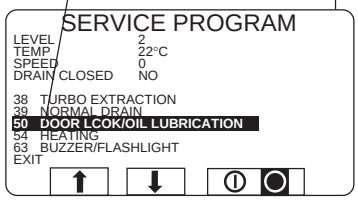
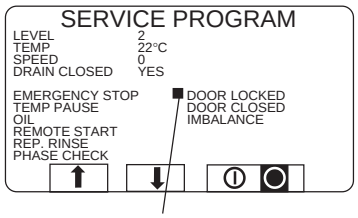
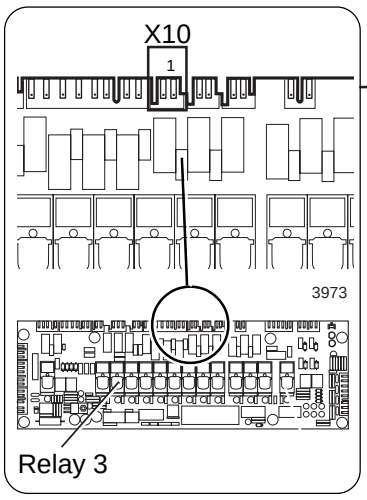
DOOR LOCKED activated when door is not locked

DOOR CLOSED **not** activated when door is closed → Trace fault as described under "**DOOR OPEN**".

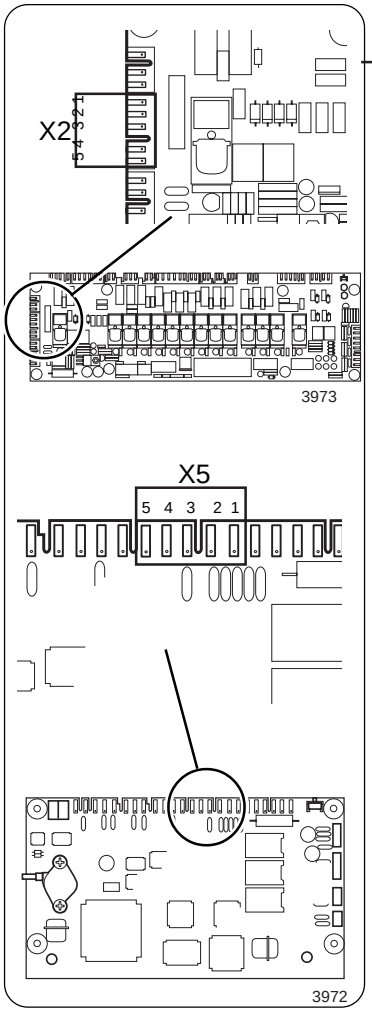
Disconnect PCB connector X5 from I/O PCB 1.
DOOR LOCKED still activated

DOOR LOCKED not activated → Faulty door lock or wiring between door lock and I/O PCB. See description of door lock for relevant machine.

Poor contact or continuity fault to X6 on I/O PCB 1 may generate error code 17. If I/O PCB 1 is faulty, replace PCB according to instructions in "To replace an I/O board".

Error code, error message	Fault-finding	Cause/Action
20, INTERLOCK STATUS MCU not receiving interlock signal during program operation.	Turn the machine's wall switch off and on again. Start a program. Error message returns — No error message	Transient fault. No action required.
	Check the voltage between terminals 1 and 2 at PCB connector X302 on motor control unit. The voltage should be the same as the power supply to the machine when the door is closed and locked. Voltage wrong — Voltage correct	Faulty signal detection on motor control unit. Intermittent poor contact in the MCU can cause this error code without the MCU being faulty. Look for site of intermittent poor contact and if necessary replace the MCU.
Use this function to lock the door. 	Close the door. Access the service program and lock it. Check that the DOOR LOCKED switch is activated. Activated — Not activated Check whether the door is locked. Door is locked — Door not locked	Trace fault as described under "DOOR UNLOCKED".
 Indicators for switch(es) in door lock.		Faulty door lock switch or fault in wiring between door lock and I/O PCB 1. Check and remedy problem as described in manual for relevant machine.
	Check the voltage between terminals 1 and 2 at PCB connector X10 on I/O PCB 1. The voltage should be the same as the power supply to the machine when the door is closed and locked. Voltage wrong — Voltage correct	Fault in wiring between I/O PCB 1 and MCU. Check wiring and replace if required. If neutral is absent from door lock PCB, interlock acknowledgement disappears and therefore I/O PCB 1 is OK. A faulty I/O PCB should be replaced according to the instructions in "To replace an I/O board".

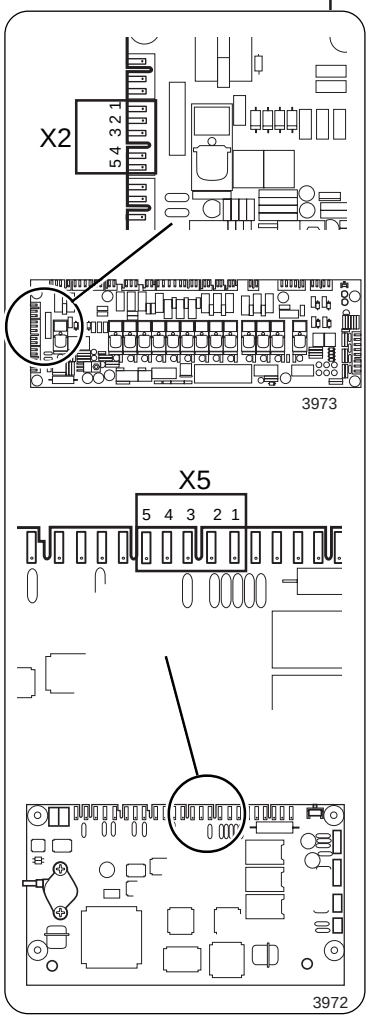
Error code, error message	Fault-finding	Cause/Action
21, I/O COMMUNICATION Communication between the CPU board and one of the I/O boards disturbed or lost, or incorrect configuration of an I/O board.	Turn the machine's wall switch off and on again. Start a program. Error message returns → No error message → Transient fault. No action required. Check the red LEDs on all I/O PCBs. All LEDs lit → On every CPU and I/O PCB there is an LED which provides some indication of the functioning of the board's microprocessor. These LEDs should normally flash rapidly (CPU: green LED, I/O PCB: red). Check the LEDs on each of the boards (CPU and I/O) present in the particular machine. All LEDs flashing. → Check the wiring from X5 on the CPU PCB to X2 on I/O PCB 1. If the machine has more than one I/O PCB, similarly use a meter to check the wiring between X1 on I/O PCB 1 and X2 on the next I/O PCB. Use an ohmmeter to check that the four conductors are sound as follows: X5 1 - X2 5; X5 2 - X2 4; X5 3 - X2 3; X5 4 - X2 2; X5 5 - X2 1 X1 1 - X2 5; X1 2 - X2 4; X1 3 - X2 3; X1 4 - X2 2; X1 5 - X2 1 **Continued on next page.**	One of LEDs not lit → Probably internal fault in I/O PCB's voltage feed or the communications cables to the I/O PCBs. One of the LEDs lit without flashing or not lit at all. → Replace the PCB with the probable fault according to the instructions in "To replace an I/O board".



Error code, error message	Fault-finding	Cause/Action

21, I/O COMMUNICATION

Continued from previous page.



Measure also between the four connections in X5 and X2 respectively, to eliminate possibility of short-circuits between two conductors.

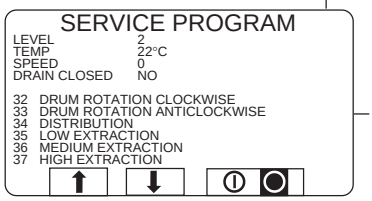
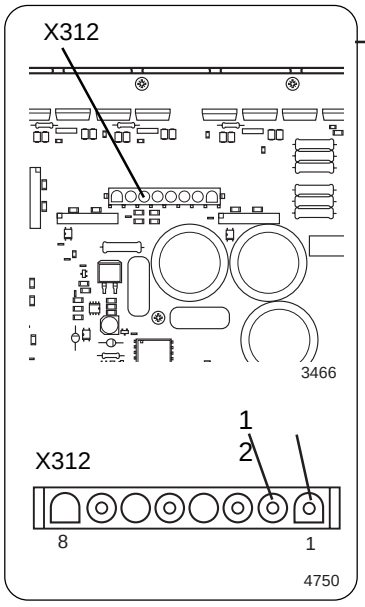
Wiring sound

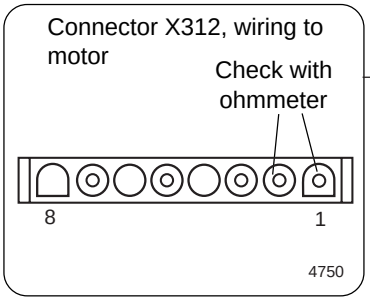
Wiring faulty → If the wiring has connectors, disconnect these one by one and continue fault tracing to identify the section of wiring where the fault is. Replace faulty wiring.

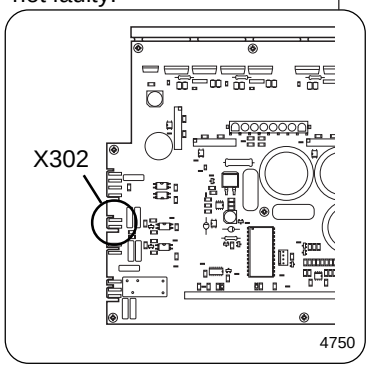
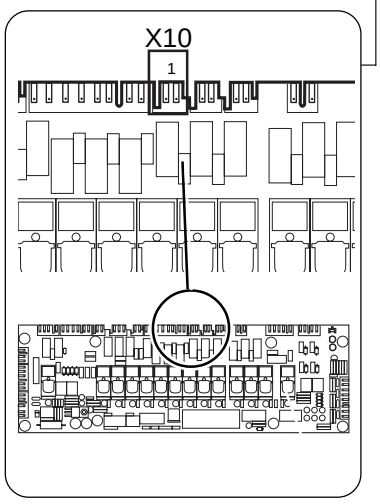
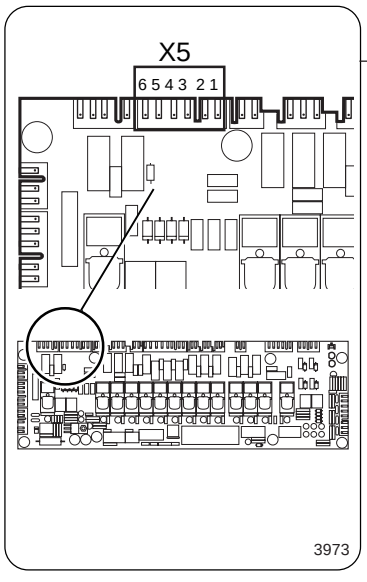
→ Internal fault in program or communications circuits on CPU or I/O boards. Continue fault tracing as follows:

1. If there is more than one I/O PCB: re-program the addressing sequence for the existing I/O boards, as described in the section “To replace an I/O board”.
2. First try replacing I/O PCB 1 as described in the section “To replace an I/O board”. Check functioning.
3. If the error message returns, try replacing the other I/O PCBs.
4. Try replacing the CPU PCB as described in “To replace the CPU board”.

Error code, error message	Fault-finding	Cause/Action
23, PHASE Error message from equipment for monitoring mains power supply.	An input on I/O PCB 1 (X16:7-8) can be connected to external equipment for monitoring the mains power supply (for voltage levels, loss of phase etc.) If this input is activated, the error message will appear. Investigate the causes of the error being flagged by checking the power supply monitoring equipment. For more detailed troubleshooting instructions, refer to the separate manual supplied with the particular type of power supply monitoring equipment used.	

Error code, error message	Fault-finding	Cause/Action
31, HEAT SINK TOO HOT Temperature of MCU heat sink too high.	This error message can occur if the ambient temperature has been extremely high. If so, lower the temperature, e.g. by opening a window. Check that the vanes on the MCU heat sink are not clogged and that the fan is working. Heat sink vanes and fan OK ↓ / Heat sink vanes or fan not OK →	Clean the heat sink vanes. Check fan functioning by seeing if the fan starts every time the power supply to the machine is switched on. Replace the fan if faulty.
	Turn off the machine's wall switch. Wait at least 10 minutes for the heat sink to cool, then switch on the machine power supply again. Check that the drum and motor rotate smoothly. Drum/motor OK ↓ / Drum/motor not rotating smoothly →	Bearing failure in drum or motor, or objects between inner and outer drum. Investigate and remedy.
	Start a wash program and (if appropriate) use rapid advance to get to extraction. Check for any abnormal noise from drum/motor. Drum/motor OK ↓ / Drum/motor not rotating smoothly →	
	Start a wash program which includes high-speed or turbo extraction. If appropriate use rapid advance to get to extraction. Error message returns ↓ / No error message →	Transient fault. No action required.
	Turn off the machine's wall switch and wait 10 minutes. Disconnect connector X312 on MCU. Short-circuit X312:1 and 2 as illustrated and reconnect X312. Switch on machine power supply, start a wash program with high-speed or turbo extraction. Error message returns ↓ / No error message →	Fault in wiring between MCU and motor, or fault in motor. First check the wiring for short-circuits or continuity faults. If wiring is OK, replace the motor.
		Internal fault in MCU. Replace MCU.

Error code, error message	Fault-finding	Cause/Action
32, MOTOR TOO HOT Thermal protection for motor has cut out.	Turn off the machine's wall switch. Check that the drum and motor rotate smoothly. Drum/motor OK / Drum/motor not rotating smoothly	Bearing failure in drum or motor, or objects between inner and outer drum. Investigate and remedy.
	Wait at least 10 minutes to let motor cool, then switch on machine power supply. Start a program. Does the error message recur immediately? Not immediately / Error message returns immediately	
	Disconnect connector X312 and use an ohmmeter on the part of the connector with wiring to the motor to check between X312: 1 - 2. Circuit open / Circuit closed	Internal fault in motor control unit detection of thermal cutout protection. Replace motor control unit.
		Continuity fault in wiring to motor or in motor thermal cutout. Check wiring up to connector by motor for faults. If the wiring is sound, replace the motor. Note! The motor may still be hot.
	Start a wash program which includes extraction and if appropriate use rapid advance to get to extraction. Check for any abnormal noise from drum/motor. Drum/motor OK / Noise from drum/motor	Bearing failure in drum or motor. Investigate and remedy.
	Start a wash program which includes high-speed or turbo extraction. If appropriate use rapid advance to get to extraction. Error message returns / No error message	Transient fault. No action required.
	Check the wiring from X312 on MCU to the connector by the motor. Use an ohmmeter to check the five conductors in the wiring. Also check between the five conductors to eliminate possibility of shorts between any two. Wiring OK / Wiring faulty	Check wiring and replace it as required.
		Internal fault in motor causing high motor temperature. Replace the motor.

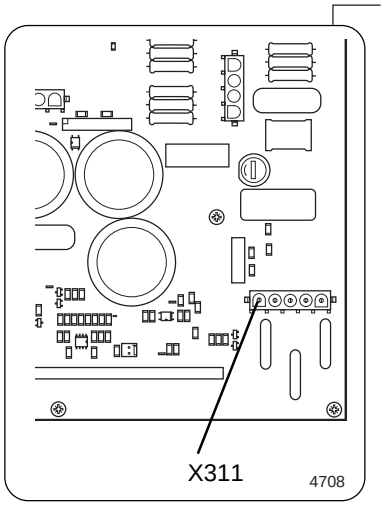
Error code, error message	Fault-finding	Cause/Action
33, NO INTERLOCK Motor control unit receiving start command from program control unit without first receiving lock acknowledgement signal. Motor control unit receiving circuitry for lock acknowledgement signal is not faulty.	Turn the machine's wall switch off, wait at least 10 seconds, then turn it on again. Check that the door is actually closed. Start a program. Error message returns →	No error message → Transient fault. No action required.
	Check voltage between terminals 1 and 2 in PCB connector X302 on motor control unit. The voltage should be the same as the power supply to the machine when door is closed and locked. Voltage wrong →	Voltage correct → Probably faulty signal detection on MCU. Intermittent poor contact in the system can also cause this error code. Look for possible cause of intermittent poor contact and replace MCU if necessary.
	Check voltage on I/O PCB 1, PCB connector X10 between terminals 1 and 2. The voltage should be the same as the power supply to the machine when door is closed and locked. Voltage wrong →	Voltage correct → Fault in wiring between I/O PCB 1 and MCU. Check wiring and replace as required.
	Check voltage on I/O PCB 1, PCB connector X5 between terminals 2 and 6. The voltage should be the same as the power supply to the machine when door is closed and locked. Voltage wrong →	Voltage correct → Probably faulty I/O PCB. Replace PCB according to instructions in "To replace an I/O board". Faulty door lock or wiring to door lock. Possibly intermittent poor contact in wiring to X5:2. Continue troubleshooting according to procedure under "DOOR UNLOCKED" earlier in this section.

Error code, error message	Fault-finding	Cause/Action
35, MOTOR SHORT Motor control unit indicating short-circuit between outputs for motor windings.	Turn the machine's wall switch off and on again. Start a program. Error message returns → No error message →	Transient fault. No action required.
	↓ Disconnect the motor connector and use an ohmmeter to check the motor windings. Information on motor winding resistance and contact (terminal) numbers can be found in the manual for the relevant machine. Resistances correct → Any resistance wrong →	Replace motor
	↓ Check the wiring between X312 on the MCU and the connector by the motor using an ohmmeter to check the conductors. Also measure between the conductors to eliminate possibility of shorts between any two. Wiring OK → Wiring faulty →	Check the wiring and replace as required.
	→	Fault in motor control unit output stage. Replace motor control unit.

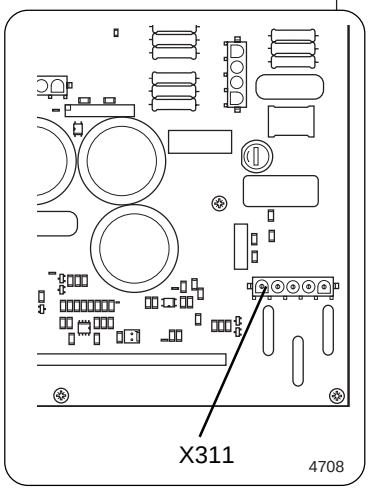
Connector X312, wiring to motor

4750

Error code, error message	Fault-finding	Cause/Action
36, INTERLOCK HARDWARE Motor control unit indicates fault in receiving circuitry for lock acknowledgement signal.	Turn the machine's wall switch off and on again. Start a program. Error message returns No error message	Transient fault. No action required. Fault in motor control unit. Replace unit.

Error code, error message	Fault-finding	Cause/Action
37, LOW DC VOLTAGE Motor control unit indicating DC voltage level too low.  	Turn the machine's wall switch off and on again. Start a program. Error message returns → No error message	Transient fault. No action required.
	Check the motor control unit input voltage at connector X311. Voltage too low → Voltage correct	This error code can occur if there are transient faults in the general power supply network. The cause may also be a fault in the motor control unit. Try replacing the unit.
	Check the input voltage on the machine's main set of connection terminals for input voltage. Voltage too low → Voltage correct	Fault in wiring or suppression circuits between machine's main set of connection terminals for input voltage and connector X311 on MCU.
	Voltage too low	Investigate cause of fault in mains power supply before the machine.

Error code, error message	Fault-finding	Cause/Action
38, HIGH DC VOLTAGE Motor control unit indicating DC voltage level too high.	Turn the machine's wall switch off and on again. Start a program. Error message returns → Check the feed voltage to the MCU (230 V) at connector X311. Voltage too high →	No error message → Transient fault. No action required. Voltage correct → Fault in motor control unit. Replace unit. Investigate cause of fault in mains power supply before the machine.



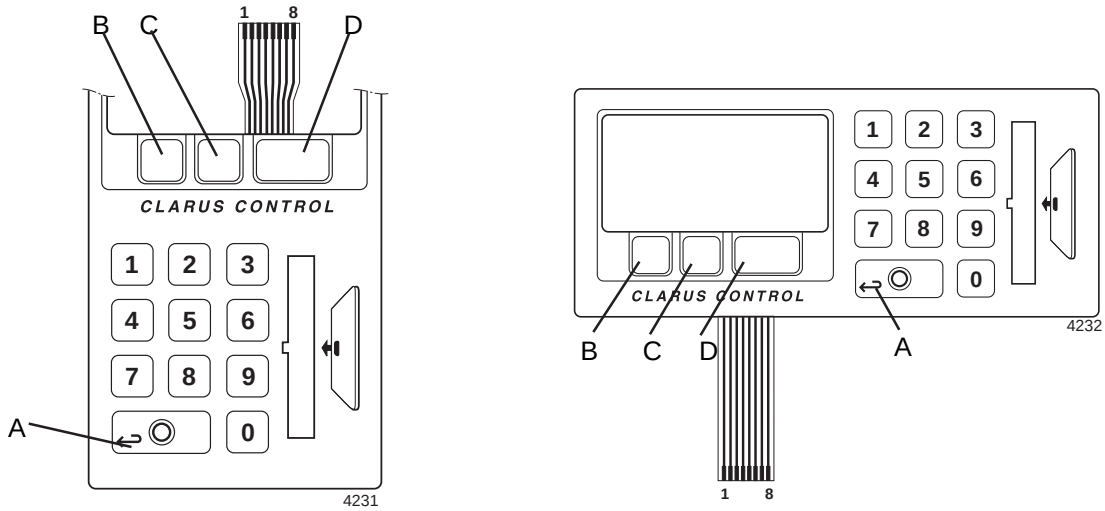
Tracing faults in display unit keys

For every press of a key in the PCU set, two of the outputs from the PCU set of keys close. To check the function of any given key in this set, disconnect the ribbon cable connecting the key set to the display circuit board, press the key you wish to check, and measure the resistance between the outputs which should be short-circuited.

Fig. 55 This table shows which outputs are short-circuited by each key:

Key	Outputs short-circuited
1	2 + 7
2	2 + 6
3	2 + 5
4	3 + 7
5	3 + 6
6	3 + 5
7	4 + 7
8	4 + 6
9	4 + 5
0	5 + 8
A	6 + 8
‘ B	1 + 2
C	1 + 3
D	7 + 8

55



To replace the CPU board

If the CPU board is faulty and has to be replaced, the correct software for the particular washer extractor will have to be downloaded onto the new CPU board. For this you need:

1. A new CPU circuit board.
2. A portable PC.
3. The correct cable for connecting the PC to the CPU board.
4. Software which is correct for the model of washer extractor the CPU board is to be installed in, to be downloaded onto that CPU board. These program files can be ordered from the machine supplier.
5. A special program called “PCS DOWNLOADING SOFTWARE”, used for converting and downloading the files onto the new CPU board. This program can also be ordered from the machine supplier.

Instructions:

1. Order the right software for your CPU board from the machine supplier. You must state the type and serial number of the machine to obtain the correct version of the program. If you do not have it already, you should order the program “PCS DOWNLOADING SOFTWARE” at the same time. The programs can be supplied on diskette or via E-mail.
2. Copy the software for the CPU board onto the PC. The software will consist of five files, which may have names like this:

   ```
   W973401
   P973401
   S973401
   M973401
   F973401
   ```

   The digits represent the year, the week and a serial number.
3. If you have not already installed it, install the program “PCS DOWNLOADING SOFTWARE” as well. Put it in the same directory or folder as the software for the CPU board(s).

Fig. 56

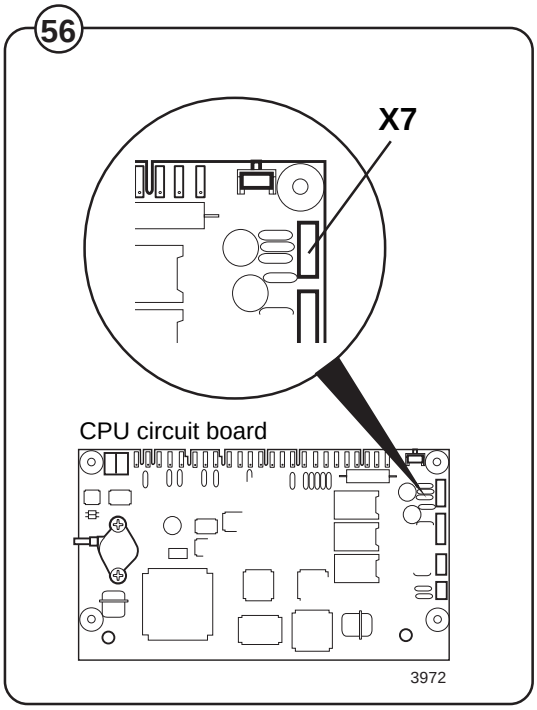
4. Switch off the machine's main power switch. Install the new CPU board and connect all the PCB connectors. Connect the correct cable between the computer (COM1 or COM2 port) and the interface connector X7 on the CPU board. Switch the machine's main power switch back on.
5. Start the "PCS DOWNLOADING SOFTWARE" by running the file (program) SLCOM1 or SLCOM2, depending on which port you have connected the cable to.
6. The computer will now ask you for the name of the first program file for the CPU board:

   ```
   PLEASE ENTER W FILE NAME, SEVEN
   CHARACTERS:
   ```

   Type the name of the file which starts with the letter "W", e.g. W973401, then press ENTER. Type the names of the other files when the computer asks for them.
7. Once you have typed all five file names and pressed ENTER, the PC will respond:

   ```
   WAIT WORKING
   ```

   The computer will now process and adapt the five files for downloading onto the CPU board. This will take a minute or so.



8. Once the new program file is ready, it will start to be downloaded onto the CPU board immediately. The PC screen will show:

   ```
   DOWNLOADING PC PROGRAM
   ```

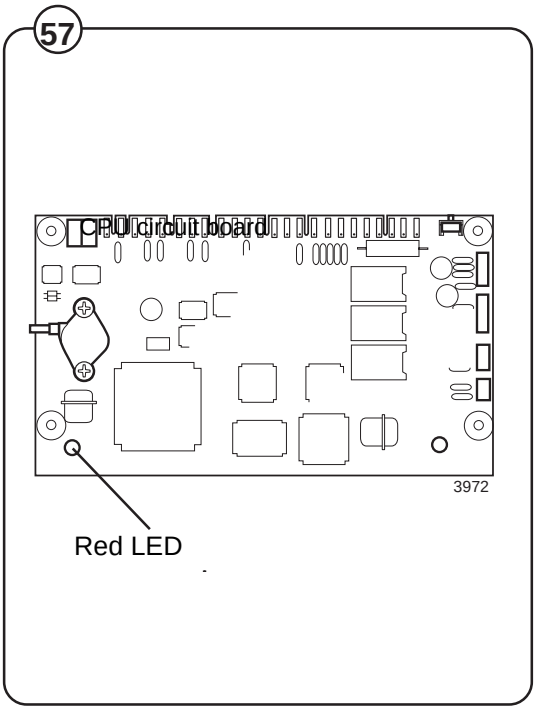
   to keep you informed. At the bottom of the screen you can see how many of the total of 1020 “pages” have been downloaded so far. You can also check the progress of downloading on the CPU board itself, by watching the red LED. This LED should flash rapidly, one flash for each “page” downloaded.

9. When downloading is finished, the PC screen will show:

   ```
   SOFTWARE WAS DOWNLOADED
   SUCCESSFULLY.
   ```

10. Switch off the machine’s main power switch. Remove the cable linking PC and CPU board. Switch the machine’s main power switch back on. The PCU will now start up with the new software.

Fig. 57



To replace an I/O board

The procedure described here is for machines with more than one I/O board. On machines with only one I/O board, that board can be replaced without any need for this procedure.

If there is more than one I/O circuit board, the processor must know whether the new circuit board is I/O board 1, I/O board 2 or I/O board 3. For this programming you need:

1. A portable PC.
2. The correct cable for connecting the PC to the CPU board.
3. A service program for the PCU which you can run on a PC. The program is called “PCS” and can be used for numbering the I/O boards correctly, amongst other things. This program can be ordered from the machine supplier.

Instructions:

1. Order a copy of the program “PCS” if you do not have it already. Programs can be supplied on diskette or via E-mail.
2. If you have not already installed it, install the program “PCS” on your computer.
3. Switch off the machine’s main power switch. Install the new I/O board and connect all the PCB connectors.

Fig. 58

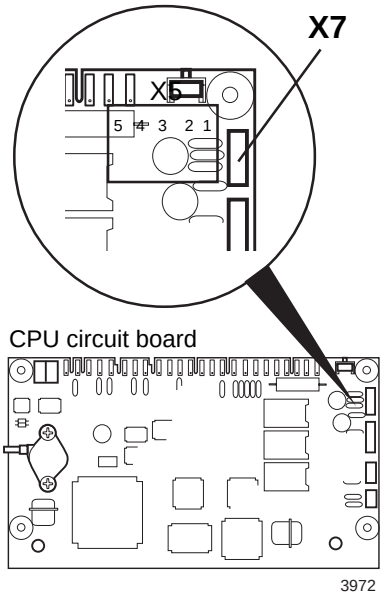
4. Switch the machine’s main power switch back on. Connect the correct cable between the computer (COM1 port) and the interface connector X7 on the CPU board.

It is important to ensure that the PCU is energised and running <u>before</u> you connect the cable to interface connector X7.

5. Start the “PCS” program by running the program file PCS.EXE. Choose the “SERVICE” option.
6. A menu will appear which allows you, using two-digit codes, to control the machine’s functions in the same way as you can in the machine’s built-in service program. The last three functions in this menu are:
   SET I/O ADDRESS 1
   SET I/O ADDRESS 2
   SET I/O ADDRESS 3

   These functions are used for programming the internal numbering (addressing sequence) of the I/O boards.

58



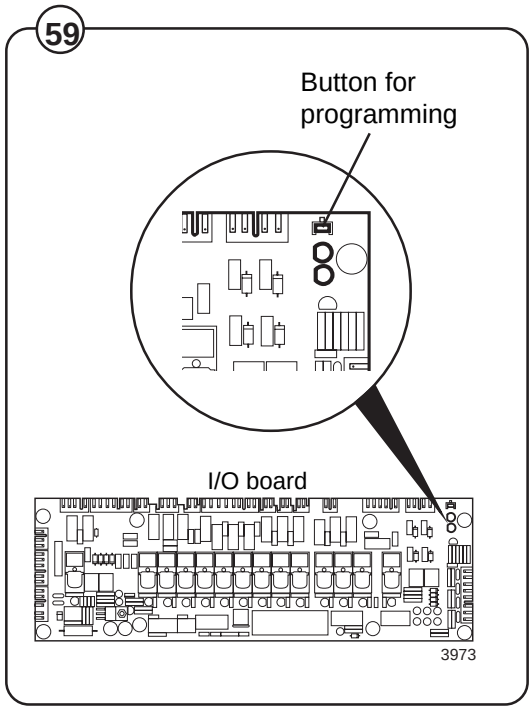
7. Enter the two-digit code for the new I/O board you wish to program (e.g. I/O board 1) and press ENTER. The PC will respond with instructions corresponding to this message:

   PROGRAMMING OF I/O BOARD

   PRESS PROGRAM BUTTON ON I/O BOARD 1

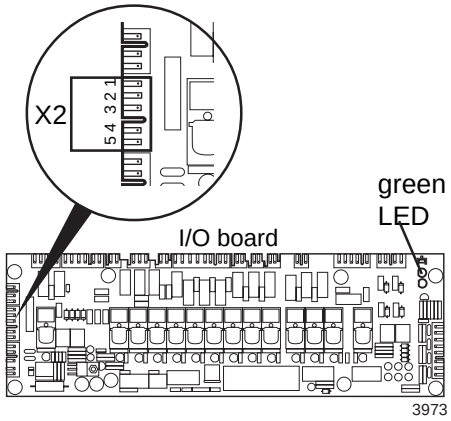
Fig. 59

8. Press the button on I/O board 1.
9. If there are other new I/O boards which have not yet been programmed, continue in the same way.
10. When you have finished, enter code 41 to exit the service program.
11. Remove the cable linking the PC and the CPU board.



Error message: I/O COMMUNICATION

Communication between the CPU board and one of the I/O boards disturbed or lost.



1. Turn the machine's wall switch off and on again. Start a program. Does the error message return?

Yes ↓ No

Transient fault. No action required.

2. Check the red LEDs on all I/O PCBs. Are all the red LEDs lit?

Yes ↓ No

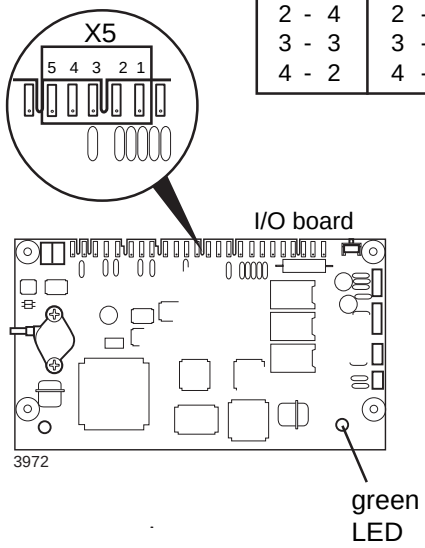
Internal fault on I/O PCB's voltage feed. Replace PCB according to instructions in "To replace an I/O board".

3. On every CPU and I/O PCB there is a green LED which provides some indication of the functioning of the board's microprocessor. Are the LEDs on the CPU and I/O boards present in this washer extractor flashing rapidly on and off?

Yes ↓ No

Replace the faulty PCB according to the instructions in "To replace an I/O board".

X5	X2	X1	X2
1	5	1	5
2	4	2	4
3	3	3	3
4	2	4	2



4. Check the wiring from X5 on the CPU PCB to X2 on I/O PCB 1. If the machine has more than one I/O PCB, similarly use a meter to check the wiring between X1 on I/O PCB 1 and X2 on the next I/O PCB. Use an ohmmeter to check that the four conductors are sound, as shown in the table (left).
Measure also between the four connections in X5 and X2 respectively, to eliminate possibility of short-circuits between two conductors.
Is the wiring sound?

Yes ↓ No

If the wiring has connectors, disconnect these one by one and continue fault tracing to identify the section of wiring where the fault is. Replace faulty wiring.

Internal fault in program or communications circuits on CPU or I/O boards. First replace I/O PCB 1 as described in the section "To replace an I/O board". Check functioning. If the error message returns, replace the other I/O PCBs and then the CPU PCB as described in "To replace the CPU board".

Maintenance

Preventive maintenance has been reduced to a minimum by the careful design of reliable components and material.

However, the following measures should be taken at regular intervals and in proportion to the hours of service.

Make certain that all electrical power to the machine is shut off before removing top or rear panels.

Daily

- Check the door lock and interlock before starting operations.
- The soap supply box should be cleaned at the end of each working day as follows:
  - Use a spatula to scrape loose any detergent which may have stuck on the inside of the dispenser.
  - Flush the loosened detergent with warm water.
  - Wipe dry and leave lid open.
- Check that the drain valve does not leak and that it opens properly.
- Check that the door does not leak. Clean residual detergent and foreign matter from the door gasket.
- Wipe the outside of the machine.
- When the machine is not in use, leave door slightly open to allow moisture to evaporate.

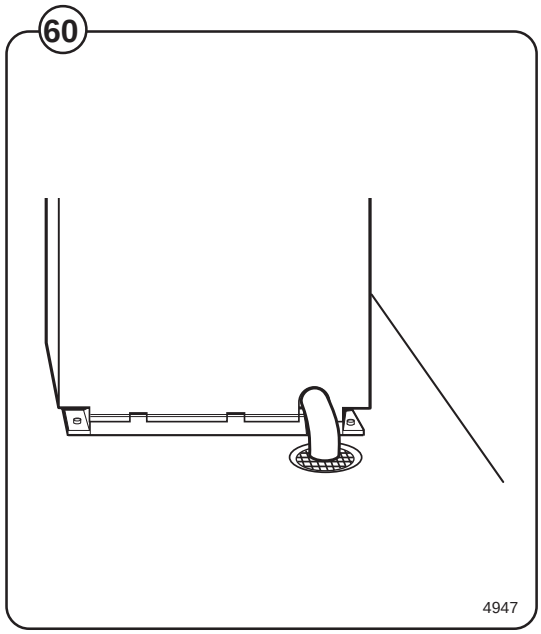


Fig. 60

Weekly

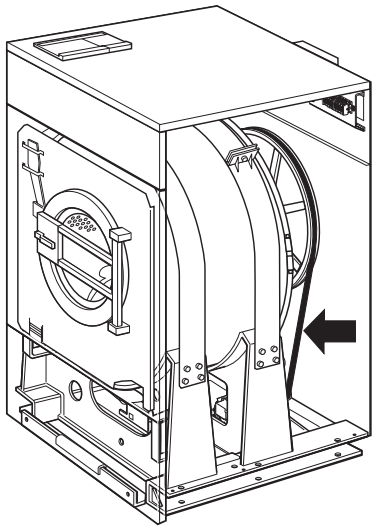
- Remove hose from drain connection and clean inside drain valve.

Every three months

Fig. (61)

- Remove the cover plates of the machine and check that the V-belt of the motor is undamaged and correctly tensioned.
- Check that all tubing, piping and connections are free from leaks.
- Wipe and clean the inside of the machine, making sure that the control components are protected from moisture and dirt during the cleaning operation.

61



4934

Trouble-shooting

The purpose of the trouble-shooting guide is to facilitate the location an correction of the most common machine problems.

Before the top panel is removed, power to the machine is to be switched off at the main source or at the separate circuit breaker.

At each trouble-shooting attempt, the plug in connectors on the control panel should be moved in and out in order to eliminate improper contact due to faulty connection.

Please note that this guide does not include all possibilities, but only those most likely to cause the symptoms listed.

In trouble-shooting electrical problems, always make certain to have the proper electrical schematic or wiring diagram at hand. Test for power using a V-O-M or similar meter on the AC voltage scale. Test for continuity with all electrical power off.

If machine does not start

Fig. (62)

A Check circuit breaker in the power feed line to the machine.

B Check door safety switches.

C Check glass cartridge fuse.

E Check for fault indication on display (see under the heading "Fault finding").'

If water does not drain

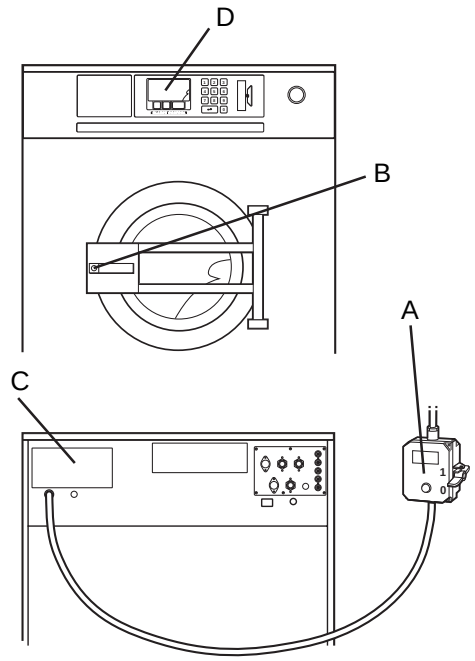
Fig. (63)

A Check for fault indication on display (see under the heading "Service information").

B Check drain valve and solenoid for proper operation.

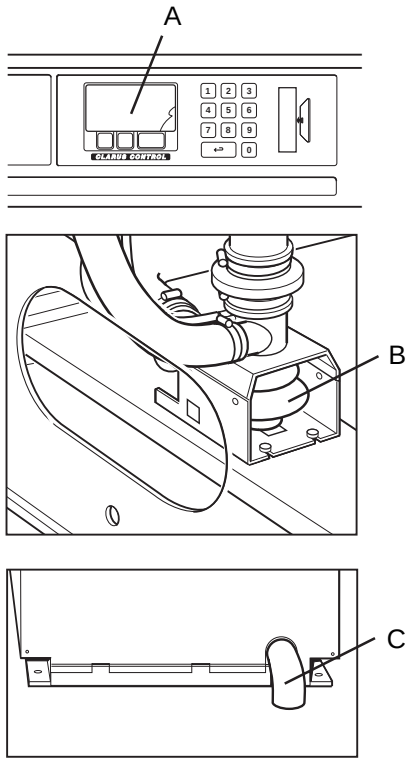
C Disconnect drain hose connected to drain line. If full flow of water comes out, the problem is in the main waste line. If water flow is slow, the problem is accumulation of foreign materials between drain valve and shell outlet of machine. Clean valve body of any foreign objects found.

62



4937

63



4938

If machine does not extract

Fig. (64) A Check for fault indication on display (see under the heading "Fault finding").

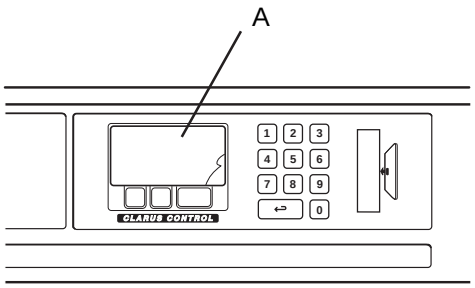
If motor does not operate at wash speed.

Fig. (65) A Check for fault indication on display (see under the heading "Fault finding").

B Check motor and V-belts.

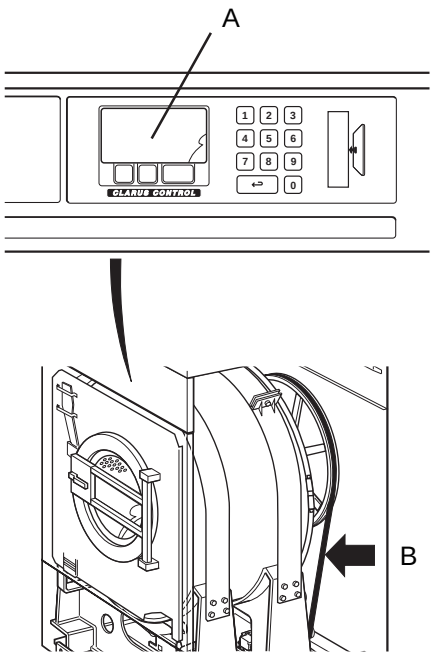
C Review procedures outlined under section "If machine does not start" above.

64



4935

65



4936

If machine runs slowly on wash speed or there is a slapping or thumping noise:

Fig. 66 Replace V-belts.

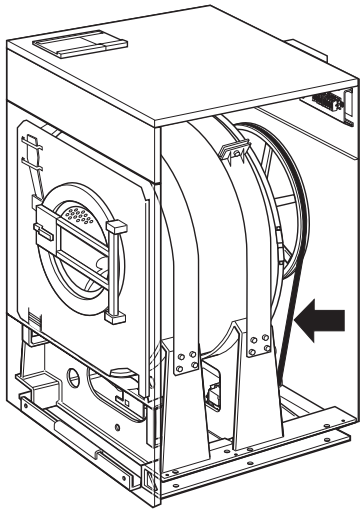
If a metallic noise can be heard at rear of machine:

Fig. 67 Tighten pulley on motor shaft.

If the door is leaking:

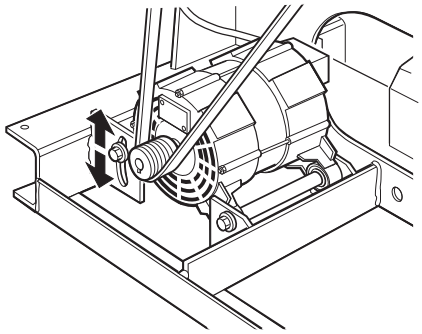
Fig. 68 Check door gasket. If gasket is in good condition check the tension, between door gasket and door frame and adjust.

66



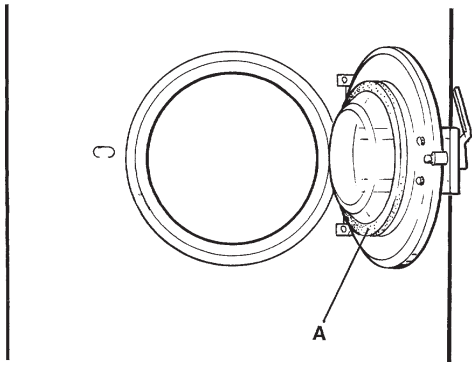
4934

67



4939

68



1777

If there is leaking around the glass.

Fig. 69

A Re-cement glass in door gasket, if worn.

B Replace door gasket if worn.

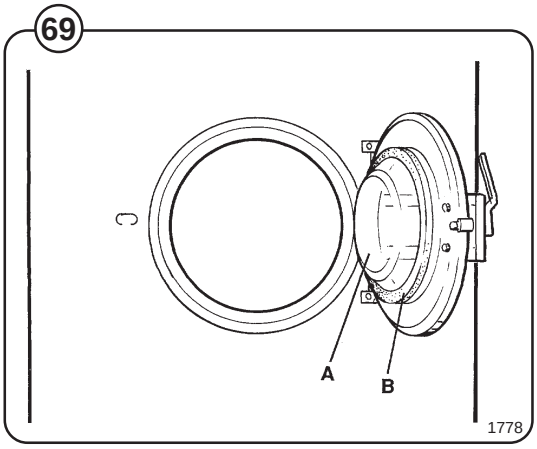
If water does not enter the machine.

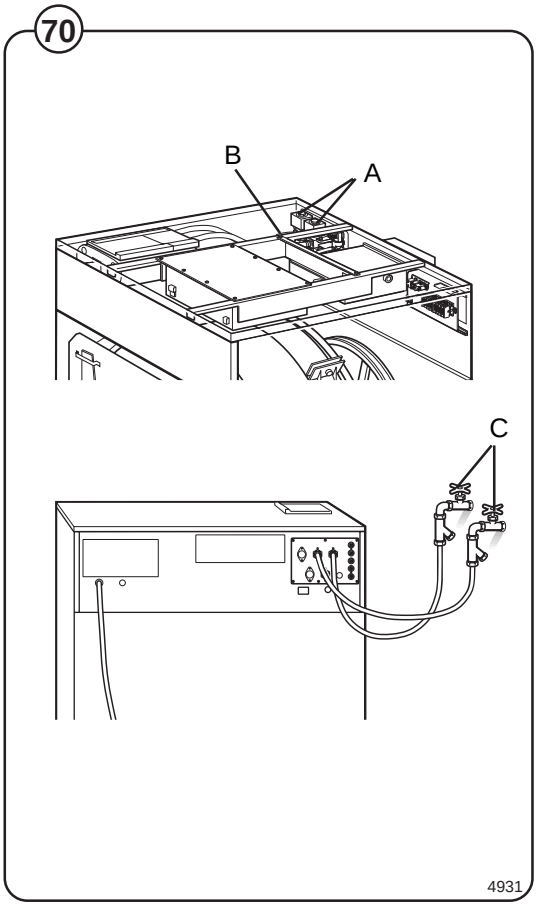
Fig. 70

A Check the valve coils on inlet valves.

B Check wires leading to electric coils.

C Be sure manual shut-off valves are in open position.





If water continues to fill without stopping.

A Check for incorrect programming.

B Check hose attached to level control unit on the printed circuit board.

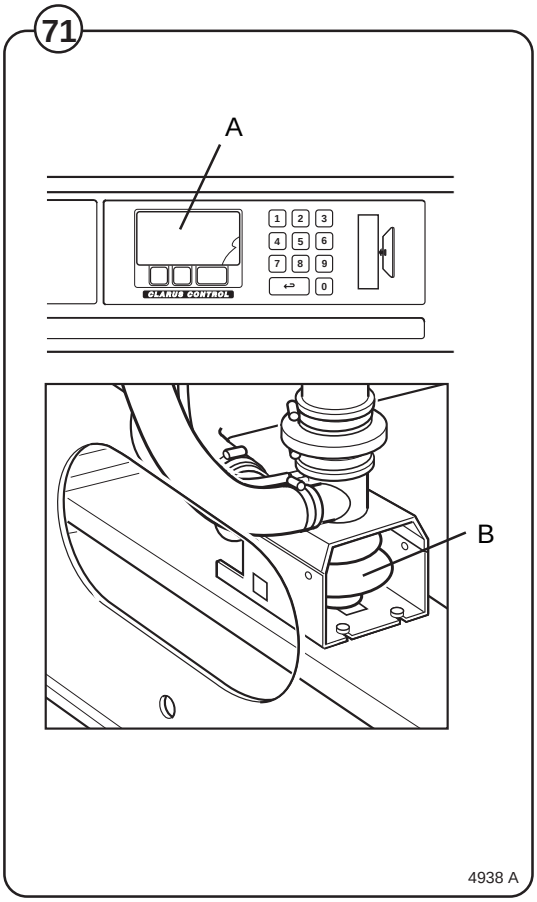
C Check inlet valves for dirt underneath the valve diaphragm. To localize, shut off power. If water continues to flow, inlet valves have foreign material in them and should be thoroughly cleaned.

If water continues to flow without filling machine.

Fig. 71

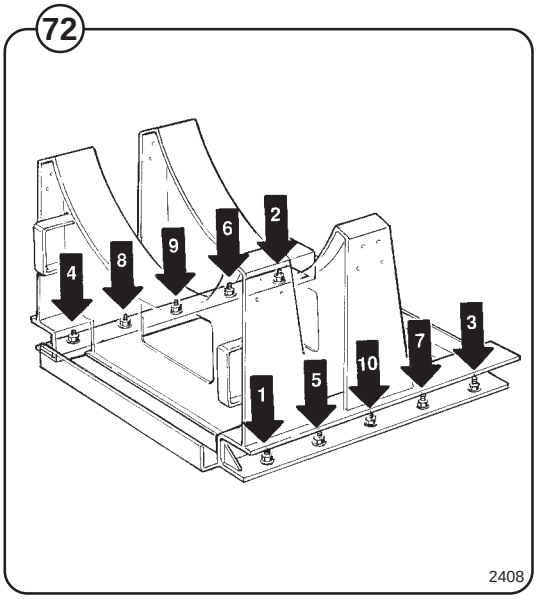
A Check for fault indication on display (see under the heading "Fault finding").

B Check seating of drain valve.



If machine vibrates excessively:

Fig. (72) A Tighten mounting bolts.



Wascomat Laundry Equipment • 461 Doughty Blvd., Inwood, NY 11096 • Tel: (516) 371-4400 • www.wascomat.com
Sales & Administration Fax: (516) 371-4204 / e-mail: sales@wascomat.com
Spare parts Tel: (516) 371-2000 / Fax: (516) 371-4029 / e-mail: parts@wascomat.com • Technical Support Tel: (516) 371-0700 / Fax: (516) 371-4029
En Mexico: Llame gratis a este numero 010-800-010-1010