



## INDEX

### WASHING MACHINES

WM90

WM100

WM110

WM120

WM200

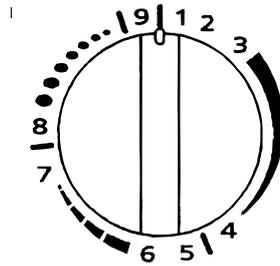
WM220

**Asko Cylinda AB / After Sales**

Box 344 • Axvallagatan 3 • SE-532 24 SKARA

# Content

	<b>Page</b>
<b>Washing machines</b>	
WM90A	1-5
WM100A	6-10
WM110A	11-14
WM120A	15-19
WM200A	20-25
WM220A	26-32



## PROGRAMS AND ELECTRICAL FUNCTIONS. WM 90A

### PROGRAMS

- 1 **Normal wash with prewash**  
Prewash, long main, 3 rinses, short intermediate spin, 2 rinses and long spin.
- 2 **Normal program**  
As program 1, but without prewash.
- 3 **Quick wash**  
Short main wash, 3 rinses, short spin, 2 rinses and long spin.
- 4 **Long spin**
- 5 **Synthetic wash**  
Long main wash, 3 rinses and short spin.
- 6 **Synthetic wash**  
Long main wash, 3 rinses and short spin.
- 7 **Short spin**
- 8 **Wool program**  
Short main wash, 3 rinses, short spin.  
Gentle action and high water level.
- 9 **Pumping out**

## PUSH BUTTONS



### Main switch

Interrupts the line (L1) and neutral connections.



### No Spin

Omits the intermediate and the terminal spin. In programs 1-3 is the water pumped out after the last rinse. In program 5, 6 and 8 the machine stops with the last rinse water in the cylinder.



### Door opening

The door can be opened when the power is turned on, the water is pumped out, and the timer is in one of the two positions, which are marked with a dot.



### Economy

Extends the main wash by 22 minutes.



### Half load button

Omits the intermediate spin and two rinses in program 1-3. In program 5 and 6 reduces one rinse.



### 800-button

Reduces spin speed to 800 rpm. With the button up, spin speed is 1000rpm.

 **Normal rinse**

 **Super rinse**

### Rinse level

In position  you get high rinse level. In position  you get normal rinse level.

## **ELECTRICAL FUNCTIONS**

### **Level controlled pumping out**

Pumping out is made to the return level for the normal level, plus additional 30 seconds, max. 1,5 minutes

Advantages:

\*By installations with reduced drain flow, the pumping out is prolonged to prevent the machine to go on washing with "old" water" left in the machine.

\* By normal drain flow there will be no noise by pumping of mixture water-air.

### **Temperature block**

In the wool program, the temperature Stop step has been maximized to 24 minutes. This means that if the temperature by mistake is set on, say 90°C, the temperature still will not be higher than good 40°C (can vary a little depending on the temperature of incoming water, the size of the load etc.). In Whites wash/Cotton programs and in the synthetic programs the time for the temperature stop is maximized to 80 min. This prevents among other things the water to cook by broken thermostat (if the capillary tube is broken) or that the machine goes on "for ever" by broken heater.

### **Out-of-balance-control by spin**

The spin sequence consists of a short spin-up to 500 rpm, a so called "peak", distribution and a longer spin. A tacho generator, placed on the motor, measures the speed difference between the "up-hill and down-hill" before the spin. The greater the difference, the greater the un-balance. If the unbalance is too large, the spin is interrupted and the machine distributes the washing and tries again.

By the peak maximal 9 start attempts are made, where the unbalance must be below 0,8 kg for spin-up. If this is failed, additional max. 6 start attempts are made with max 1,2 kg unbalance permitted. If the unbalance is still too high, machine will pass the spin step.

If the machine has made the "peak", the washing is distributed again, start attempts to spin are made. Hereby max. 9 start attempts are made with max. 0,7 kg permitted unbalance to reach 1000 rpm. After that further 6 start attempts are made on unbalance level 0,7 and 1,2 kg: If the unbalance is less than 0,7 kg, the spin is made by 1000 rpm, if it is 0,7-1,2, the spin is by 800 rpm.

If the unbalance is still too high, the machine passes the spin step.

## **ELECTRICAL COMPONENTS**

### **1 Timer**

The timer has an electro-mechanical unit and an separate electronic unit. The electronic unit controls the motor, the timer motor and some of the program features.

The mechanical unit among others controls inlet valves, outlet pump and heater.

### **2 Thermostat**

The temperature can be set stepless 0-90° C.

### **3 Motor**

The motor is an universal motor The rotation speed is stepless controlled by a tacho generator on the motor which measures the rotation speed.

Maximal speed is 1000 rotations.

### **4 Outlet pump**

The outlet pump is combined with a integral button trap, which can be cleaned by the customer.

### **5 Inletvalve**

The outlet pump is combined with a integral button trap, which can be cleaned by the customer

### **6 Heater element**

1800 W heater element. Machines Singel-phase 16 A or 3-phase 10 A do also have an 1200 W heater element Machines with heater contactor have elements with fuse.

### **7 Level switch**

There are two level switches with two levels each :

- Normal level for wash. The return level ofthe normal ofthe normal level is used to control the length of the pumping out and decides if the machine shall spin or not, and cut out the heat.
- Normal level for rinse
- High level for Super rinse, wool programme and cool-down
- Overfilling level, breaks the current to the inlet valves and starts the outlet pump.

## ELECTRICAL COMPONENTS

### 8 **Contactor ( only 3-phase machines)**

The heater contactor is controlled by the level switch, and interrupts the line connections to the heaters.

### 9 **Door lock**

The door lock is electric and the power must be turned on. The timer must also be in one of the four positions for opening, on the scale. No water in the cylinder and the cylinder must have stopped. Pressing the pushbutton operates a solenoid which releases the door catch. The door can be opened in an emergency. By inserting a screwdriver about 1 cm into the hole to the left of the glassdoor and pressing upwards. A microswitch fitted beside the door-opening solenoid interrupts the power supply to the machine when the door is open.

### 10 **RFI suppression**

RFI suppressions are fitted in accordance with international requirements.

### 11 **Wiring**

The internal wiring in the machine is 1,5 mm<sup>2</sup> for heater connections, 1,0 mm<sup>2</sup> or 18 AWG for earth connections and 0,5 mm<sup>2</sup> or 0,75 mm<sup>2</sup> for others.

### 12 **Supply cord**

The supply cord must be an RKK 3x1,5 mm<sup>2</sup> or 5x1,5 mm<sup>2</sup> cable

Wiring diagram and timer diagram are provided with the machine.

## **Power supply alternatives**

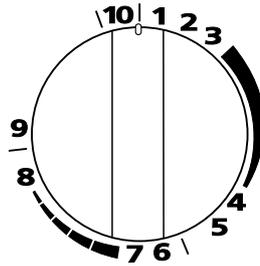
Power alternative are:

1 phase, 230 V 10 A

1 phase, 230 V 16 A

3 phase, 400 V 10 A

The necessary changes are made directly on the terminal block. See the instructions.



## PROGRAMS AND ELECTRICAL FUNCTIONS. WM 100A

### PROGRAMS

- 1 **Normal wash with prewash**  
Prewash, long main, 3 rinses, short intermediate spin, 2 rinses and long spin.
- 2 **Normal program**  
As program 1, but without prewash.
- 3 **Quick wash**  
Short main wash, 3 rinses, short spin, 2 rinses and long spin.
- 4 **One rinse with spin**
- 5 **Long spin**
- 6 **Synthetic wash**  
Long main wash, 3 rinses and short spin.
- 7 **Synthetic wash**  
Long main wash, 3 rinses and short spin.
- 8 **Short spin**
- 9 **Wool program**  
Short main wash, 3 rinses, short spin.  
Gentle action and high water level.
- 10 **Pumping out**

## PUSH BUTTONS



### Main switch

Interrupts the line (LI) and neutral connections.



### No Spin

Omits the intermediate and the terminal spin. In programs 1-3 is the water pumped out after the last rinse. In program 5, 6 and 8 the machine stops with the last rinse water in the cylinder.



### Door opening

The door can be opened when the power is turned on, the water is pumped out, and the timer is in one of the two positions, which are marked with a dot.



### Economy

Extends the main wash by 22 minutes.



### Half load button

Omits the intermediate spin and two rinses in program 1-3. In program 6 and 7 reduces one rinse.



### 800-button

Reduces spin speed to 800 rpm. With the button up, spin speed is 1200rpm.

 **Normal rinse**

 **Super rinse**

### Rinse level

In position  you get high rinse level. In position  you get normal rinse level.

## **ELECTRICAL FUNCTIONS**

### **Level controlled pumping out**

Pumping out is made to the return level for the normal level, plus additional 30 seconds, max. 1,5 minutes

Advantages:

\*By installations with reduced drain flow, the pumping out is prolonged to prevent the machine to go on washing with "old" water" left in the machine.

\* By normal drain flow there will be no noise by pumping of mixture water-air.

### **Temperature block**

In the wool program, the temperature Stop step has been maximized to 24 minutes. This means that if the temperature by mistake is set on, say 90°C, the temperature still will not be higher than good 40°C (can vary a little depending on the temperature of incoming water, the size of the load etc.). In Whites wash/Cotton programs and in the synthetic programs the time for the temperature stop is maximized to 80 min. This prevents among other things the water to cook by broken thermostat (if the capillary tube is broken) or that the machine goes on "for ever" by broken heater.

### **Out-of-balance-control by spin**

The spin sequence consists of a short spin-up to 500 rpm, a so called "peak", distribution and a longer spin. A tacho generator, placed on the motor, measures the speed difference between the "up-hill and down-hill" before the spin. The greater the difference, the greater the un-balance. If the unbalance is too large, the spin is interrupted and the machine distributes the washing and tries again.

By the peak maximal 9 start attempts are made, where the unbalance must be below 0,8 kg for spin-up. If this is failed, additional max. 6 start attempts are made with max 1,2 kg unbalance permitted. If the unbalance is still too high, machine will pass the spin step.

If the machine has made the "peak", the washing is distributed again, start attempts to spin are made. Hereby max. 9 start attempts are made with max. 0,7 kg permitted unbalance to reach 1200 rpm. After that further 6 start attempts are made on unbalance level 0,7 and 1,2 kg: If the unbalance is less than 0,7 kg, the spin is made by 1200 rpm, if it is 0,7-1,2, the spin is by 800 rpm.

If the unbalance is still too high, the machine passes the spin step.

## ELECTRICAL COMPONENTS

### 1 **Timer**

The timer has an electro-mechanical unit and an separate electronic unit. The electronic unit controls the motor, the timer motor and some of the program features.

The mechanical unit among others controls inlet valves, outlet pump and heater.

### 2 **Thermostat**

The temperature can be set stepless 0,2-90 C.

### 3 **Motor**

The motor is an universal motor The rotation speed is stepless controlled by a tacho generator on the motor which measures the rotation speed.

Maximal speed is 1200 rotations.

### 4 **Outlet pump**

The outlet pump is combined with a integral button trap, which can be cleaned by the customer.

### 5 **Inletvalve**

The outlet pump is combined with a integral button trap, which can be cleaned by the customer

### 6 **Heater element**

1800 W heater element. Machines Singel-phase 16 A or 3-phase 10 A do also have an 1200 W heater element Machines with heater contactor have elements with fuse.

### 7 **Level switch**

There are two level switches with two levels each :

- Normal level forwash. The return level ofthe normal ofthe normal level is used to control the length of the pumping out and decides if the machine shall spin or not, and cut out the heater.
- Normal level for rinse
- High level for Super rinse, wool programme and cool-down
- Overfilling level, breaks the current to the inlet valves and starts the outlet pump.

## ELECTRICAL COMPONENTS

### 8 **Contactor ( only 3-phase machines)**

The heater contactor is controlled by the level switch, and interrupts the line connections to the heaters.

### 9 **Door lock**

The door lock is electric and the power must be turned on. The timer must also be in one of the four positions for opening, on the scale. No water in the cylinder and the cylinder must have stopped. Pressing the pushbutton operates a solenoid which releases the door catch. The door can be opened in an emergency. By inserting a screwdriver about 1 cm into the hole to the left of the glassdoor and pressing upwards. A microswitch fitted beside the door-opening solenoid interrupts the power supply to the machine when the door is open.

### 10 **RFI suppression**

RFI suppressions are fitted in accordance with international requirements.

### 11 **Wiring**

The internal wiring in the machine is 1,5 mm<sup>2</sup> for heater connections, 1,0 mm<sup>2</sup> or 18 AWG for earth connections and 0,5 mm<sup>2</sup> or 0,75 mm<sup>2</sup> for others.

### 12 **Supply cord**

The supply cord must be an RKK 3x1,5 mm<sup>2</sup> or 5x1,5 mm<sup>2</sup> cable

Wiring diagram and timer diagram are provided with the machine.

## **Power supply alternatives**

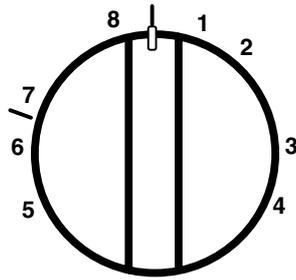
Power alternative are:

1 phase, 230 V 10 A

1 phase, 230 V 16 A

3 phase, 400 V 10 A

The necessary changes are made directly on the terminal block. See the instructions.



---

## PROGRAMS AND ELECTRICAL FEATURES WM 110A

### PROGRAMS

- 1 **Normal wash with prewash :**  
Prewash, long main wash, 3 rinses, short intermediate spin, 2 rinses and long spin.
- 2 **Normal program**  
As program 1, but without prewash
- 3 **Quick wash**  
Short main wash, 3 rinses, short spin, 2 rinses and long spin.
- 4 **Wool program**  
Short main wash, 3 rinses, short spin.  
Gentle action and high water level.
- 5 **One rinse with spin**
- 6 **Pumping out**
- 7 **Spin**
- 8 **Pumping out**

## PUSH BUTTON



### Door opening

The door can be opened when the power is turned on, the water is pumped out, and the timer is in one of the two positions, which are marked with a dot.



### Gentle action, high water level

This button gives three rinses instead of five. It also gives short terminal spin. The gentle action means: motor on 3 seconds - off 42 sec - on 6 sec - off 39 sec - on 3 sec - off 42 sec etc.



### No spin

Omits the intermediate and the terminal spin and the machine stops with the last rinse water in the cylinder.

By starting program 7 with this button pressed in, you get a short terminal spin.



### Economy

Extends the length of the main wash by 22 minutes.



### 1/2-load

Omits the intermediate spin and two rinses.



### 900-button

Reduces the spin speed to 900 rpm. With the button up the spin speed is 1400 rpm.



### Rinse level

In position  you get high rinse level. In position  get normal rinse level.

## ELECTRICAL COMPONENTS

### 1 **Timer**

The timer has a preselecting facility. Only the eight starting points can be set, after which the timer mechanism steps the cams to the correct position that has been selected.

### 2 **Thermostat**

The thermostat is combined with the main on/off switch. A manual safety catch, which can be disengaged, must be pressed in, when turning the thermostat to higher temperatures.

### 3 **Motor**

The motor is a 8-pole combined capacitor motor and a commutator motor. The 8-pole section drives the motor at normal wash speed with reversing, while the commutator section produces the 900 rpm and 1400 rpm spin speeds. The motor is protected by a built-in thermal overload cutout.

### 4 **Outlet pump**

The outlet pump is combined with an integral button trap, which can be cleaned by the customer.

### 5 **Inlet valve**

The inlet valve provides three-way control of the water to direct it to the appropriate inlets for 1) prewash and rinses, 2) main wash and 3) fabric conditioner. A fourth inlet valve can be fitted for machines intended for use with hot water supplies.

### 6 **Heater element**

The heater elements are of 1200 W and 1800 W respectively. Machines with heater contactor have elements with fuse.

### 7 **Capacitor**

The capacitor is of 16  $\mu$ F, and is mounted together on the electrical component tray.

### 8 **Level switch**

There are two level switches with two levels each:

- Normal level for wash and rinse and high level for Super rinse, wool program and cool down.
- Spin protection level, advances the timer over the spin, if the water is not pumped out. Overfill level; cuts the current to the inlet valves and starts the outlet pump.

## ELECTRICAL COMPONENTS

### 9 **Contactor**

The heater contactor is controlled by the level switch, and interrupts the line connections to the heaters.

### 10 **Door lock**

The door lock is electric and the power must be turned on. The timer must also be in the door opening position in order to be able to open the glass door in the normal manner.

Pressing the pushbutton operates a solenoid which releases the door catch. The door can be opened in an emergency by removing the lower panel, unscrewing the emergency ring and pulling it. A microswitch fitted beside the door-opening solenoid interrupts the power supply to the machine when the door is open.

### 11 **RFI suppression**

RFI suppressors are fitted in accordance with international requirements.

### 12 **Wiring**

The internal wiring in the machine is 1,5 mm<sup>2</sup> for heater connections, 1,0 mm<sup>2</sup> or 18 AWG for earth connections and 0,5 mm<sup>2</sup> or 0,75 mm<sup>2</sup> for others.

### 13 **Supply cord**

The supply cord must be an RKK 3x1,5 mm<sup>2</sup> or 5x1,5 mm<sup>2</sup> cable.

Wiring diagram and timer diagram are provided with the machine.

## **Power supply alternatives**

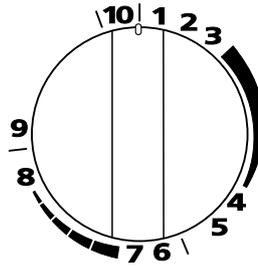
Power supply alternatives are:

1-phase, 230 V 10 A

1-phase, 230 V 16 A

3-phase, 400 V 10 A

The necessary changes are made directly on the terminal block. See the instructions.



## PROGRAMS AND ELECTRICAL FUNCTIONS. WM 120A

### PROGRAMS

- 1 **Normal wash with prewash**  
Prewash, long main, 3 rinses, short intermediate spin, 2 rinses and long spin.
- 2 **Normal program**  
As program 1, but without prewash.
- 3 **Quick wash**  
Short main wash, 3 rinses, short spin, 2 rinses and long spin.
- 4 **One rinse with spin**
- 5 **Long spin**
- 6 **Synthetic wash**  
Long main wash, 3 rinses and short spin.
- 7 **Synthetic wash**  
Long main wash, 3 rinses and short spin.
- 8 **Short spin**
- 9 **Wool program**  
Short main wash, 3 rinses, short spin.  
Gentle action and high water level.
- 10 **Pumping out**

## PUSH BUTTONS



### Main switch

Interrupts the line (LI) and neutral connections.



### No Spin

Omits the intermediate and the terminal spin. In programs 1-3 is the water pumped out after the last rinse. In program 6, 7 and 9 the machine stops with the last rinse water in the cylinder.



### Door opening

The door can be opened when the power is turned on, the water is pumped out, and the timer is in one of the two positions, which are marked with a dot.



### Economy

Extends the main wash by 22 minutes.



### Half load button

Omits the intermediate spin and two rinses in program 1-3. In program 6 and 7 reduces one rinse.



### 5h-delayed start

Gives 5 hour delayed start.

 Normal rinse

 Super rinse

### Rinse level

In position  you get high rinse level. In position  you get normal rinse level.

### Knob Spin speed

Choice spin between 600-1400 rpm alt. 700-1500 rpm.  
Every step 100 rounds.

## **ELECTRICAL FUNCTIONS**

### **Level controlled pumping out**

Pumping out is made to the return level for the normal level, plus additional 30 seconds, max. 1,5 minutes

Advantages:

\*By installations with reduced drain flow, the pumping out is prolonged to prevent the machine to go on washing with "old water" left in the machine.

\* By normal drain flow there will be no noise by pumping of mixture water-air.

### **Temperature block**

In the wool program, the temperature Stop step has been maximized to 24 minutes. This means that if the temperature by mistake is set on, say 90°C, the temperature still will not be higher than good 40°C (can vary a little depending on the temperature of incoming water, the size of the load etc.). In Whites wash/Cotton programs and in the synthetic programs the time for the temperature stop is maximized to 80 min. This prevents among other things the water to cook by broken thermostat (if the capillary tube is broken) or that the machine goes on "for ever" by broken heater.

### **Out-of-balance-control by spin**

The spin sequence consists of a short spin-up to 500 rpm, a so called "peak", distribution and a longer spin.

A tacho generator, placed on the motor, measures the speed difference between the "up-hill and down-hill" before the spin.

The greater the difference, the greater the un-balance. If the unbalance is too large, the spin is interrupted and the machine distributes the washing and tries again.

By the peak maximal 15 start attempts are made, where the unbalance must be below 1,2 kg for spin-up. If the unbalance is still too high, the machine will pass the spin step.

If the machine has made the "peak", the washing is distributed again, and new start attempts to spin are made.

Hereby max. 6 start attempts are made with max. 0,4 kg permitted unbalance to reach 1300-1400/1500 rpm. After that further 5 start attempts are made on unbalance level 0,7 kg and 4 start attempts are made on unbalance level 1,2 kg. If the unbalance is less than 0,4 kg, the spin is made by 1300-1400/1500, if it is 0,4-0,7 kg the spin is by 900-1200 rpm and if it is 0,7-1,2 the spin is by 800 rpm.

If the unbalance is still too high, the machine passes the spin step.

## ELECTRICAL COMPONENTS

### 1 **Timer**

The timer has an electro-mechanical part and an electronic part.

### 2 **Control unit. motor**

Include a micro-processor which control the motor and communicate with the timer.

### 3 **Thermostat**

The temperature can be set stepless 0-90 C.

### 4 **Motor**

The motor is an universal motor The rotation speed is stepless controlled by a tacho generator on the motor which measures the rotation speed. Maximal speed is 1400-1500 rotations.

### 5 **Outlet pump**

The outlet pump is combined with a integral button trap, which can be cleaned by the customer.

### 6 **Inletvalve**

The outlet pump is combined with a integral button trap, which can be cleaned by the customer

### 7 **Heater element**

1800 W heater element. Machines Singel-phase 16 A or 3-phase 10 A do also have an 1200 W heater element Machines with heater contactor have elements with fuse.

### 8 **Level switch**

There are two level switches with two levels each :

- Normal level forwash. The return level ofthe normal ofthe normal level is used to control the length of the pumping out and decides if the machine shall spin or not, and cut out the heater.
- Normal level for rinse
- High level for Super rinse, wool programme and cool-down
- Overfilling level, breaks the current to the inlet valves and starts the outlet pump.

## ELECTRICAL COMPONENTS

### 9 Contactor ( only 3-phase machines)

The heater contactor is controlled by the level switch, and interrupts the line connections to the heaters.

### 10 Door lock

The door lock is electric and the power must be turned on. The timer must also be in one of the four positions for opening, on the scale. No water in the cylinder and the cylinder must have stopped. Pressing the pushbutton operates a solenoid which releases the door catch. The door can be opened in an emergency. By inserting a screwdriver about 1 cm into the hole to the left of the glassdoor and pressing upwards. A microswitch fitted beside the door-opening solenoid interrupts the power supply to the machine when the door is open.

### 11 RFI suppression

RFI suppressions are fitted in accordance with international requirements.

### 12 Wiring

The internal wiring in the machine is 1,5 mm<sup>2</sup> for heater connections, 110 mm<sup>2</sup> or 18 AWG for earth connections and 0,5 mm<sup>2</sup> or 0,75 mm<sup>2</sup> for others.

### 13 Supply cord

The supply cord must be an RKK 3x1,5 mm<sup>2</sup> or 5x1,5 mm<sup>2</sup> cable

Wiring diagram and timer diagram are provided with the machine.

## Power supply alternatives

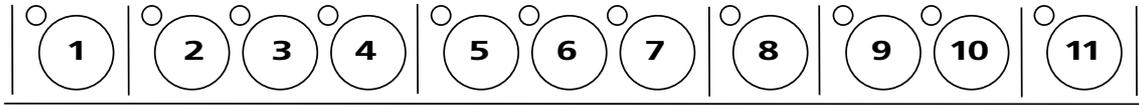
Power alternative are:

single- phase, 230 V 10 A

single- phase, 230 V 16 A

3 phase, 400 V 10 A

The necessary changes are made directly on the terminal block. See the instructions.



## PROGRAMS AND ELECTRICAL FUNCTIONS. WM 200A

### PROGRAMS

- 1 Long prewash, main wash, three rinses, short intermediate spin, two rinses and long spin. Temperature selectable, 0-95°C.
- 2 No prewash, otherwise as Program 1.
- 3 No prewash, short main wash, otherwise as Program 1.
- 4 Wool wash. Short main wash, three rinses with high water level, gentle wash action and a short final spin. Maximum temperature, 40°C.
- 5-7 Three, two or one rinses respectively, short intermediate spin, two rinses and long final spin.
- 8 Short spin.
- 9-10 Two or one rinses respectively, long spin.
- 11 Long spin

## ADDITIONAL CONTROL PUSHBUTTONS



### Gentle action

Can be activated with any program except Programs 8 and 11. High water level and gentle wash action. The intermediate spin is omitted and the program finishes with a short spin. Two rinses are also omitted in Programs 1-3.



### 1/2 load

Omits the intermediate spin and two rinses. Can be used together with Programs 1-3.



### Economy

Extends the main wash by 22 minutes. Can be used together with Programs 1-3.



### The intermediate spin

Is omitted and the program finishes with a short spin. Can be used with Programs 1-7 and 9-11.



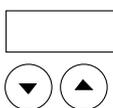
### No spin

The program finishes without pumping out. Can be used with Programs 1-7 and 9-10.



### High rinse water level

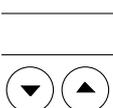
Can be used with Programs 1-3, 5-7 and 9-10.



### Spin speed

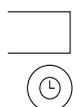
Spin speed can be selected between 600 r/min and 1500 r/min in programs with long final spins, and between 600 r/min and 800 r/min in programs with short final spins. Each press of the button increases/decreases the speed by 100 r/min.

The machine incorporates an automatic out-of-balance feature, which reduces the spin speed if the load is seriously out of balance. The machine attempts to reduce the out-of-balance by stopping and making up to 20 restarts. If the load is still out of balance, the program continues without a spin. This is indicated by 0000 in the display.



### Temperature

Starting from 40°C, which is the starting temperature for all wash programs (1-4), each press of the button raises/lower the temperature by 5°C, 41°F. 0° is indicated by C (cold).



### Time-delayed start

Program start can be delayed by 1-12 hours. Press the button once for each hour's delay required. The thirteenth time the display show the time remaining that the program in use has to run.



## Door opening and pumping out

To open the door while the machine is running, press this button for 3 seconds. This interrupts the current to the motor, valves etc. but not to the controller.

If the button is pressed during the prewash or main wash periods of the program, the machine will pump out sufficient water to allow the door to be opened without water spilling out (level P1). If the button is pressed later in the program, or after the end of the program, and if the water level is normal (P2) or higher, the machine will pump out for 1,5 minutes. The door can be opened as soon as the water level has dropped to P1. If the button is pressed while the machine is spinning, there will be a delay of about one minute before the door opens.

When the door is reclosed, the program continues from where it left off.



## Program start and stop

Start the program by pushing the button once, and stop it by pushing the button and holding it in for 3 seconds.

## Fault tracing program

Access the self-diagnostic fault-tracing program by pressing this button five times. The indicating lamps respond by flashing. Press the program buttons as shown below to test the following functions:



2 Inlet valve 1 (prewash and rinse)



3 Inlet valve 2 (main wash)



4 Inlet valve 3 (only on machines connected to hot water supplies)



5 Inlet valve 4 (fabric conditioner water inlet)



6 Door solenoid



7 Heater contactor



8 Outlet pump



9 Wash motor, normal action



10 Wash motor, gentle action



11 Spinning. Indicates out-of-balance. The higher the number, the greater the out-of-balance.



## The various water levels are indicated by:



P1	Return to normal level	Indicated by 1
P2	Normal level	Indicated by 2
P3	High level	Indicated by 3
P4	Overfilled	Indicated by 4

Stop the test program by pressing the Stop button for 3 seconds.

## Faults are indicated by:



F1	Water supply (if the correct level has not been reached in five minutes).
F2	Overfilling (if the overfill level has lasted for more than 60 seconds).
F3	Fault in pumping out (if the water level above P1 after the outlet pump has run for 3 minutes).
F4	Thermistor fault.
F5	Heating pause fault (if the selected temperature has not been reached within 90 minutes).
F6	Motor fault.



Indicates that the machine has not spun i.e. to reduce serious out-of-balance.

## ELECTRICAL COMPONENTS

### 1 Control unit

Contains a microprocessor for operating the programs and controlling the powered devices, such as the motor and valves. Protected by a 6.3 A anti-surge fuse.

### 2 Push button panel

Carries the pushbuttons and indicating lamps. A microprocessor provides communication with the control unit.

### **3 Motor**

The motor is a 4-pole 3-phase asynchronous motor, powered by a variable-voltage, variable-frequency supply. It incorporates a thermal cutout for overload protection.

### **4 Outlet pump**

The outlet pump is combined with a needle trap and strainer that can be cleaned by the user.

### **5 Inlet valve**

The inlet valve provides 3-way control of the water to direct it to the appropriate inlets for 1) prewash and rinses, 2) main wash and 3) fabric conditioner. A fourth inlet can be fitted for machines intended for use with hot water supplies.

### **6 Heater element**

The heater elements are of 1200 W and 1800 W rating respectively. depends on the power supply arrangement (voltage and number of phases). See Power Supply, below. Machines with heater contactor have element with fuse.

### **7 Thermistor**

The thermistor senses and controls the water temperature, which can be between 0°C and 90°C, 32°F and 194°F. The heater is disconnected if the thermistor is short-circuited or disconnected from the circuit board. See the fault indication key (above).

The thermistor should have a resistance of between 60 kohm and 40 kohm at a temperature of 20-30°C, 68-86°F.

### **8 Level switch**

The level switch senses 3 water levels:

- Return to normal water level, P1
- Normal level, P2
- High level, P3
- Overfilled, P4

If the overfill level is detected, the level switch starts the outlet pump. If the water level has not dropped within 60 seconds, the program will be interrupted. (See fault indications, above). If the overfilling was only temporary, the program will continue as normal.

## 9 Contactor

The heater contactor is controlled by the level switch, and interrupts the line and neutral connections to the heaters.

## 10 Door lock

The door lock is electric, and power must be turned on in order to be able to open the glass door in normal manner. Press the  button to release the door catch by means of a solenoid. A microswitch interrupts the power supply to the machine when the door is open.

The door can be opened in an emergency by inserting a screwdriver about 1 cm into the hole to the left of the glass door and pressing upwards.

## 11 Thermal relay

The thermal relay interrupts the current to the door release solenoid if the output stage on the control unit fails, i.e. if it continues to supply current to the solenoid.

## 12 Suppressors

There are two RFI suppressors in accordance with IEC requirements.

## 13 Main switch

The main ON/OFF switch is a rocker switch that interrupts the line power supply to the control unit (phase L1) and the neutral.

## 14 Wiring

The internal wiring in the machine is 0,5 mm<sup>2</sup> or 1,5 mm<sup>2</sup>, as appropriate, with 1,0 mm<sup>2</sup> earth continuity conductors.

## 15 Supply cord

The supply cord must be an RKK 3 x 1.5 mm<sup>2</sup> or 5 x 1.5 mm<sup>2</sup> cable.

## Power supply arrangements

The machine can be supplied from:

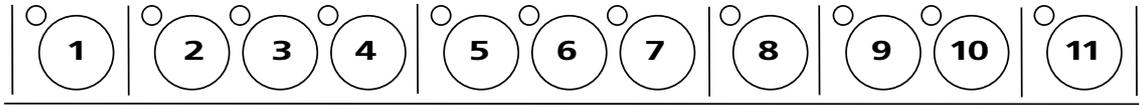
Single-phase, 220 V, 10 A or 16 A fused circuits, with 1800 W or 3000 W heater ratings respectively.

Two-phase, 380 V, 10 A fused circuit, 3000 W

Three-phase, 380 V, 10 A fused circuit, 3000 W

hree-phase, 220 V, 16 A fused circuit, 3000 W

The necessary connections are made at the supply terminals, as shown.



## Programs and electrical features Wm 220A

### Programs

- 1 Long prewash, main wash, three rinses, short intermediate spin, two rinses and long spin. Temperature selectable, 0-95°C.
- 2 No prewash, otherwise as Program 1.
- 3 No prewash, short main wash, otherwise as Program 1.
- 4 Wool wash. Short main wash, three rinses with high water level, gentle wash action and a short final spin. Maximum temperature, 40°C.
- 5-7 Three, two or one rinses respectively, short intermediate spin, two rinses and long final spin.
- 8 Short spin.
- 9-10 Two or one rinses respectively, long spin.
- 11 Long spin.

## ADDITIONAL CONTROL PUSHBUTTONS



### **Gentle action**

Can be activated with any program except Programs 8 and 11. High water level and gentle wash action. The intermediate spin is omitted and the program finishes with a short spin. Two rinses are also omitted in Programs 1-3.



### **1/2 load**

Omits the intermediate spin and two rinses. Can be used together with Programs 1-3. Program 3 can also be available with short spin.



### **Economy**

Extends the main wash by 22 minutes. Can be used together with Programs 1-3.



### **The intermediate spin**

Is omitted and the program finishes with a short spin. Can be used with Programs 1-7 and 9-11.



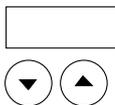
### **No spin**

The program finishes without pumping out. Can be used with Programs 1-7 and 9-10.



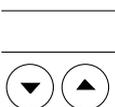
### **High rinse water level**

Can be used with Programs 1-3, 5-7 and 9-10.



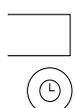
### **Spin speed**

Spin speed can be selected between 600 r/min and 1600 r/min in programs with long final spins, and between 600 r/min and 800 r/min in programs with short final spins. Each press of the button increases/decreases the speed by 100 r/min.



### **Temperature**

Starting from 40°C, which is the starting temperature for all wash programs (1-4), each press of the button raises/lower the temperature by 5°C, 0° is indicated by C (cold).



### **Time-delayed start**

Program start can be delayed by 1-12 hours. Press the button once for each hour's delay required. The thirteenth time the display show the time remaining that the program in use has to run.



## Door opening and pumping out

To open the door while the machine is running, press this button for three seconds. This interrupts the current to the motor, valves etc. but not to the controller.

If the button is pressed during the prewash or main wash periods of the program, the machine will pump out sufficient water to allow the door to be opened without water spilling out (level P1). If the button is pressed later in the program, or after the end of the program, and if the water level is normal (P2) or higher, the machine will pump out for 30 seconds. The door can be opened as soon as the water level has dropped to P1. If the button is pressed while the machine is spinning, the door can be open when the cylinder has stopped.

When the door is reclosed, the program continues from where it left off.



## Program start and stop

Start the program by pushing the button once, and stop it by pushing the button and holding it in for three seconds.

## Fault tracing program



Access the self-diagnostic fault-tracing program by pressing this button five times. The indicating lamps respond by flashing. Press the program buttons as shown below to test the following functions:



2 Inlet valve 1 (prewash and rinse)



3 Inlet valve 2 (main wash)



4 Inlet valve 3 (only on machines connected to hot water supplies)



5 Inlet valve 4 (fabric conditioner water inlet)



6 Door solenoid (only level P1)



7 Heater contactor (only level higher then P2)



8 Outlet pump



9 Wash motor, normal action



10 Wash motor, gentle action



11 Spinning. Indicates out-of-balance. The higher the number, the greater the out-of-balance



## The various water levels are indicated by:



- |    |                         |                |
|----|-------------------------|----------------|
| P1 | Return to normal level  | Indicated by 1 |
| P2 | Normal wash level       | Indicated by 2 |
| P3 | Normal rinse level      | Indicated by 3 |
| P4 | High rinse & wash level | Indicated by 4 |
| P5 | Overfilled              | Indicated by 5 |
- Stop the test program by pressing the Stop button.

## Faults are indicated by:



- F1 Water supply (if the correct level has not been reached in five minutes).
- F2 Overfilling (if the overfill level has lasted for more than 60 seconds).
- F3 Fault in pumping out (if the water level above P1 after the outlet pump has run for 3 minutes).
- F4 Thermistor fault.
- F5 Heating pause fault (if the selected temperature has not been reached within 90 minutes).
- F6 Motor fault.
- F7 Door lock release fault.



Indicates that the machine has not spun i.e. to reduce serious out-of-balance.

## Temperature block

In the wool program, the temperature stop step has been maximized to 24 minutes. This means that if the temperature by mistake is set on, say 90°C, the temperature still will not be higher than good 40°C, (can vary a little depending on the temperature of incoming water, the size of the load etc.).

In Whites wash/Cotton programs and in the synthetic programs the time for the temperature stop is maximized to 80 min. This prevents among other things the water to cook by broken thermostat (if the capillary tube is broken) or that the machine goes on "for ever" by broken heater.

## **Out-of-balance-control by spin**

The spin sequence consists of a short spin-up to 500 rpm, a so called "peak", distribution and a longer spin.

A tacho generator, placed on the motor, measures the speed difference between the "up-hill and down-hill" before the spin.

The greater the difference, the greater the un-balance. If the unbalance is too large, the spin is interrupted and the machine distributes the washing and tries again.

By the peak maximal 15 attempts are made, where the unbalance must be below 1,2 kg for spin-up. If the unbalance is still too high, the machine will pass the spin step.

If the machine has made the "peak", the washing is distributed again, and new start attempts to spin are made.

Hereby max. 6 start attempts are made with max. 0,4 kg permitted unbalance to reach 1300-1600 rpm. After that further 5 start attempts are made on unbalance level 0,7 kg and 4 start attempts are made on unbalance level 1,2 kg. If the unbalance is less than 0,4 kg, the spin is made by 1300-1600 rpm, if it is 0,4-0,7 kg the spin is by 900-1200 rpm, if it is 0,7-1,2 kg the spin is by 800 rpm

If the unbalance is still too high, the machine passes the spin step.

## **ELECTRICAL COMPONENTS**

### **1 Control unit, program**

Contains a microprocessor for operating the programs.

### **2 Control unit, motor**

Include a microprocessor which controls the motor and communicate with the timer.

### **3 Push button panel**

Carries the pushbuttons and indicating lamps. A microprocessor provides communication with the control unit.

### **4 Motor**

The motor is an universal motor. The rotation speed is steepless controlled by a tacho generator on the motor which measures the rotation speed. Maximal speed is 1600 rpm It incorporates a thermal cutout for overload protection.

### **5 Outlet pump**

The outlet pump is combined with a needle trap and strainer that can be cleaned by the user.

## 6 Inlet valve

The inlet valve provides 3-way control of the water to direct it to the appropriate inlets for 1) prewash and rinses, 2) main wash and 3) fabric conditioner. A fourth inlet can be fitted for machines intended for use with hot water supplies.

## 7 Heater element

The heater elements are of 1200 W and 1800 W rating respectively, depends on the power supply arrangement (voltage and number of phases). See Power Supply, below. Machines with heater contactor have element with fuse.

## 8 Thermistor

The thermistor senses and controls the water temperature, which can be between 0°C and 90°C. The heater is disconnected if the thermistor is short-circuited or disconnected from the circuit board. See the fault indication key (above).

The thermistor should have a resistance of between 60 kohm and 40 kohm at a temperature of 20-30°C.

## 9 Level switch

The level switches has two water levels each:

Normal wash, return level	P1
Normal wash level	P2
Normal rinse level	P3
High wash- and rinse level	P4
Overfilled	P5

If the overflow level is detected, the level switch starts the outlet pump. If the water level has not dropped within 60 seconds, the program will be interrupted. (See fault indications, above). If the overflowing was only temporary, the program will continue as normal.

## 10 Contactor

The heater contactor is controlled by the level switch, and interrupts the line connections to the heaters.

## **11 Door lock**

The door lock is electric, and power must be turned on in order to be able to open the glass door in normal manner. Press the  button to release the door catch by means of a solenoid. A microswitch interrupts the power supply to the machine when the door is open. The door can be opened in an emergency by inserting a screwdriver about 1 cm into the hole to the left of the glass door and pressing upwards.

## **12 RFI suppression**

RFI suppressions are fitted in accordance with international requirements.

## **13 Main switch**

The main ON/OFF switch is a rocker switch that interrupts the line power supply to the control unit (phase L1) and the neutral.

## **14 Wiring**

The internal wiring in the machine is 1,5 mm<sup>2</sup> for heater connections, 1,0 mm<sup>2</sup> or 18 AWG for earth connections and 0,5 mm<sup>2</sup> or 0,75 mm<sup>2</sup> for others.

## **15 Supply cord**

The supply cord must be an RKK 3x1,5 mm<sup>2</sup> or 5x1,5 mm<sup>2</sup> cable.

Wiring diagram and timer diagram are provided with the machine.

## **Power supply arrangements**

The machine can be supplied from:

Single-phase, 230 V, 10 A or 16 A fused circuits, with 1800 W or 3000 W heater ratings respectively.

Two-phase, 400 V, 10 A fused circuit, 3000 W

Three-phase, 400 V, 10 A fused circuit, 3000 W

Three-phase, 230 V, 16 A fused circuit, 3000 W

The necessary connections are made at the supply terminals, as shown.

Heating time will depend on whether the machine has the heaters connected as 1800 W or 3000 W