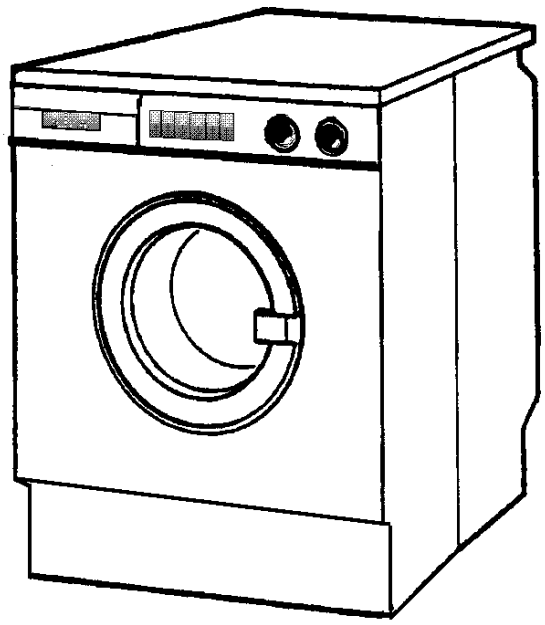
KÜPPERSBUSCH
AFTER-SALES SERVICE



Repair Manual
Washing machine
IW 1409

GB

VKS-H	Repair Manual IW 1409	H6-400-02-01

Responsible: Rutz	Phone: (0209) 401-733	Fax: (0209) 401-743	Date: 21.04.1998

Contents

Küppersbusch

THE HEART OF A GOOD KITCHEN

1. Safety Notes

Disconnect the device from the mains before attempting any repairs.

When performing tests which must be done under power, a fault current protection switch must be used.

Before beginning troubleshooting, perform a safety check per VDE 0701.

Observe EGB notes!

After repairs are complete, a function and seal test as well as the safety test per VDE 0701 must be performed.

Connect the water supply.

Activate the test program:

- Set program select switch to new selection.
- Turn on the mains switch while pressing the PREWASH and START buttons.
- If test program is activated, the START button flashes.
- Activate the safety test program (Easy-care 60°C). Water fills to Level 1.
- When heating current flows, perform safety test.
- After completing the safety test, check whether the window is still lokked. If not, repeat test procedure!

2. Operation

1. On/Off button

- For turning the appliance on and off (2-pole main switch).

2. Window button (optional)

- With Bowden cable for opening the fill window through a PTC locking relay.

3. Program selector

- The program selector is a rotary switch with 24 positions for dividing the cycles into Boil/Colours, Easy-Care, Delicate, Wool and special cycles with varying wash temperatures.

4. Speed selector

- The speed selector is an 8-position rotary switch. Six speeds, IVS (interval spin) and rinse stop can be selected.

5. Pre-wash

- Pre-wash can be selected optionally. For wool, pre-wash is not carried out even if it is selected.

6. Time save

- The wash time is reduced om the main wash cycle.

7. Water plus

- For increasing the water level when washing and activating an additional rinse cycle.
- Spin rinse with reduced speed for boil-fast/coloured wash.
- No spin rinse with wool.

8. Heavy

- For extending the active wash time for heavily soiled laundry. For adding the powdered bleach/spot remover at the optimum time. Functions only with no pre-wash!

9. Start time and time remaining (optional)

- The program time can be delayed up to 19 hours. Time remaining display in minutes.

10. Start

- For program start.

11. Program display

- LED's are used to display the corresponding program status.

3. Consumption/Energy Requirements

3.1 Consumption values

Wash program	Load capacity (kg)	Energy consumption (kwh)	Water consumption (l)	Maximum program duration (min.)
Boil-fast 90°C	**5.0**	**1.7**	**59**	**137**
Boil-fast 60°C Eco	**5.0**	**1.3**	**55**	**140**
Colours 40°C	**5.0**	**0.6**	**55**	**115**
Easy-care 40°C	**2.0**	**0.4**	**50**	**83**
Delicates 30°C	**2.0**	**0.5**	**65**	**64**
Wool 30°C	**2.0**	**0.5**	**55**	**58**

The consumption values are derived by the test program in accordance with IEC456/IEC59(CO)37. The indicated times are based on an average load. They may, depending on local conditions, vary (e.g., water inlet temperature, batch size, etc.).

4. Function Description/Technical Notes

4.1 General

The ME2/ME3 control is based on a simple electronic controller. The control consists of:

- control and display module, mounted in the panel,
- control and power module, ounted on a sheet metal panel beneath the sill plate.

4.1.1 Control and display module N1

Located on the control and display module are the program selector, the speed selector, as well as various button switches and the associated LEDs. Jumpers are used to code the variants.
Optionally available is a start and time remaining display.

4.1.2 Control and power module N7

The control and power module contains all the important components like the microcontroller and the required switching elements for controlling and sensing the motor, pump, valves temperature sensor, etc.

Along with the drive functions, the control/power module assumes complex functions such as wash sequences, rinse and spin functions, temperature and speed regulating, safety functions, keypad monitoring, determining parameters (load size, misbalance, etc.), and jumper-determined variant coding.

The electronic functions can be divided into the following groups:

- Reading and processing incoming signals (speed, temperature, mains voltage, frequency, phase, control elements, etc.).
- Logical relating of all the information provided with the help of the stored program.
- Speed control of the motor.
- Load sensing for various load sizes with the help of fuzzy logic functions for washing, rinsing and spinning.
- Fault detection (short-circuit in motor triac, tacho fail, NTC fault, synchronisation failure).
- Sensing excessive times (pumping, heating, water fill).
- Currentless reversing using two relays, triac short-circuit for power-off.
- Field reversing of the motor using a relay (optionally available).
- Temperature regulation.
- Serial interface for testing and checking purposes.
- Integrated test program for function and customer service checks.
- Reading the RAM and EEPROM for diagnostic purposes.

4.1.3 Power failure

When power is lost the selected program stays in memory. When power is restored, the program is resumed from that point. However, all wash times are set to zero, full load is recognized, and the suds detector is reset.

4.2 Motor Control

The motor is controlled by means of triac phase-control. A speed signal makes speed control possible. The actual speed value is compared with the setpoint in the electronics.

Direction changing is currentless, using two reversing relays controlled by the electronics.

An integrated protector in the motor winding shuts the motor off upon overload.
The control does not switch off based on a speed signal fault, but rather keeps trying to restart the motor.
A motor fault is only displayed at the end of the program.

Optionally, for spin speed 800 rpm, a field reversing relay is actuated above 600 rpm. This switches off a part of the motor field winding and thus increases the rpm.

The following speeds apply to a washing machine with empty drum:

Wool	27 rpm +/-5%
Wetting:	35 rpm +/- 3%
Rinsing:	50 rpm +/- 3%
Washing:	50 rpm +/- 3%
Spin:	all spin numbers +/- 2.5%
Measuring rpm (imbalance):	100 rpm +/-1%

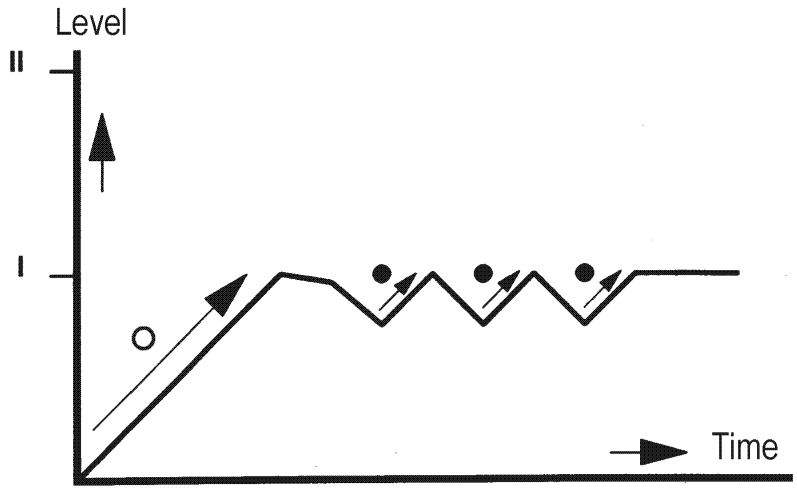
4.3 Washing technique

Through use of asymmetrical catches together with fuzzy logic control, delicate or powerful washing can be selected depending on the type of clothing and the program chosen.
This is controlled through the up to 16 different reversing rhythms and the turning direction of the washing drum. For this reason the left- and right-handed rotation times of the wash drum are different.

Clockwise rotation: The water runs later out of the catches, the wash rather slides off, i.e., the clothes are washed delicately.

Counter-clockwise rotation: The water runs out of the catches sooner, the wash is raised higher, i.e., the clothes are washed with more force.

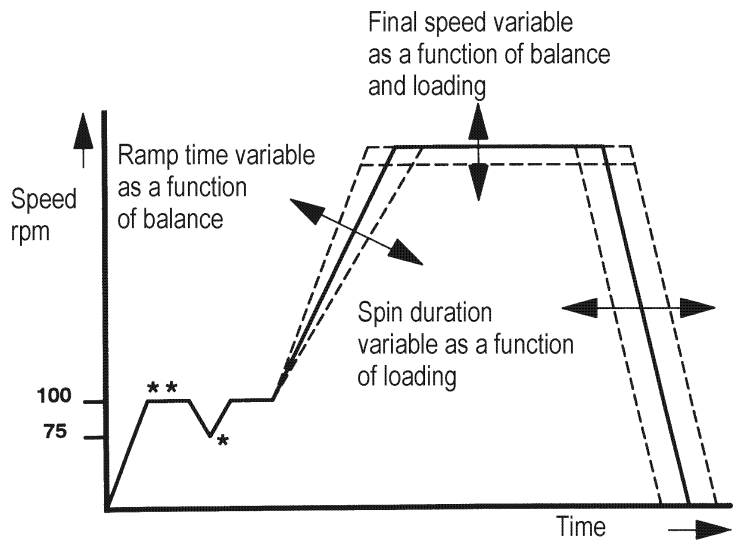
4.4 Fuzzy logic quantity sensing



○ Flow quantity measurement — Time after program start until level 1 is reached

● Load sensing — Valve opening times until level 1 is added

4.5 Fuzzy logic in the spin cycle



**** Imbalance sensing** The measurement is made at 100 rpm. If the imbalance is too great, the cycle is interrupted and restarted up to 11 times.

*** Load sensing** If the 100 rpm can be held without large fluctuations in speed, the speed is reduced to 75 rpm and the load quantity is detected.

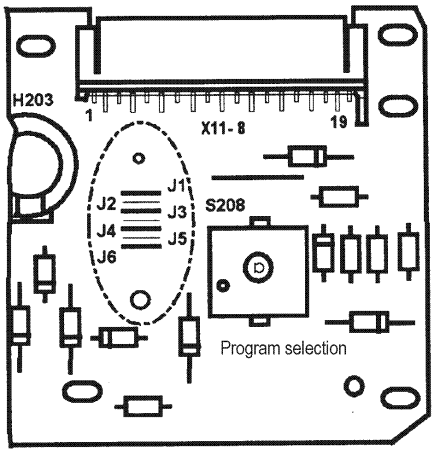
The ramping and the final spin speed is determined by the degree of imbalance:

High imbalance	steep ramp	low rpm
Low imbalance	flat ramp	high rpm

5. Maintenance

5.1 Variant coding: Service modules

Sectional view



For the service modules used in series production models, the variant coding is done by punching out certain conductor paths.

For customer service there is a special service module where the conductor paths are replaced by wire jumpers (Jumpers J1-J6). In addition, the CS service module is equipped with a beeper.

When repairs are done, the service module must be correctly set by the CS technician according to the model/type.

This means wire jumpers (Jumpers J1-J6) must be removed according to the diagram.

Variant coding

x Jumper set

- Open jumper or cut through!

J1	J2	J3	Max. speed/deselect steps (rpm)	
X	-	X	1400, 1200, 1000, 800, 600, 400	Motor with 7 connections
-	X	X	1300, 1200, 1000, 800, 600, 400	
X	X	X	1200, 1100, 1000, 800, 600, 400	
-	-	X	1100, 900, 800, 600, 500, 400	
X	X	-	1200, 1000, 1000, 800, 600, 400 ◪	Motor with 6 connections
-	-	-	1100, 900, 800, 600, 500, 400 ◪	
-	X	-	1000, 900, 800, 600, 500, 400 ◪	
X	-	-	900, 800, 700, 600, 500, 400 ◪	

◪ For models without field reversal

J4	Warm water
X	without
-	with

J5	Time remaining
X	without
-	with

J6	Wash type
X	Standard
-	Export

Setting the beeper signal

The signal sounds at the end of the program, at the end of a rinse cycle, or when there are operating faults. The volume may be varied.

- Turn on appliance.
- Hold down PREWASH button.
- The signal goes from loud, medium, soft, to off.
- Release the PREWASH button when the desired volume level is reached.

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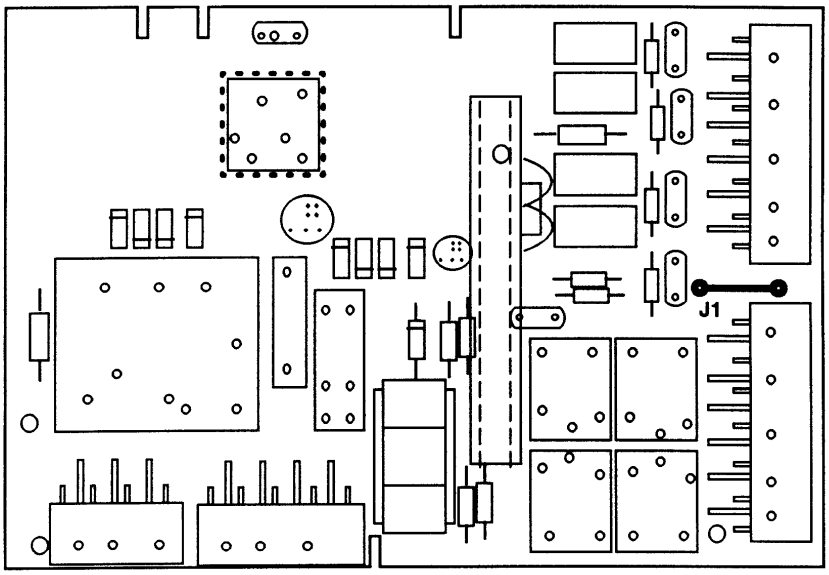
5.2 Variant coding: Control and power module

There is only one wire jumper (Jumper 1) on the control and power module which needs to be noted.

Wire jumper J1 remains in only for warm water variants.



Note: Remove wire jumpers carefully in order to avoid short-circuits with adjacent jumpers or components.

Use side-cutters designed for electronics!

If a jumper is advertently cut, it may be soldered in again.

For soldering, use a small gas soldering appliance with solder wick or vacuum solder remover. Only in this way can the electronics be protected from damage.

6. Supplement

Grease-resistant window seal

A grease-resistant window seal is available under spare parts number 29 61 40.

For use only when unusually high amounts of grease or oil are present, e.g., children's ward (salves) in a hospital.

7. Activate test program

Activate test program:	• Program select switch to New Selection • Press PREWASH + START keys, • and turn the unit on	Display: • Start LED flashes • optional, 7-segment display: - Level (e.g. n0) or - Last stored error (only at 1st activation)
Set test program:	• Set progam switch to test program	• Start LED flashes
Start test program:	• Press START button	• Start LED stays on • Error display neutral
Abort test program:	• Press START button or • change program selector	• Start LED flashes
Test program ended:		• Start LED flashes
Error in test program:		• Error number in test sequence

8. Select test program

Note program select switch function!

Function:		Test program
Whites/Colours 30°	→	Motor
Whites/Colours 40°	→	Solenoids, W-regulator, heater
Whites/Colours 60°	→	Keys, speed selector, program selector
Whites/Colours 60°e	→	Model display (LED's sequence)
Whites/Colours 90°	→	Display elements (LED's and 7-segment display)
Whites/Colours	→	Consumer test (for CS and Rep test)
Easy-Care 60°	→	Safety test
Wool 40°	→	Demo program
Wool	→	For HES appliances: coupling module

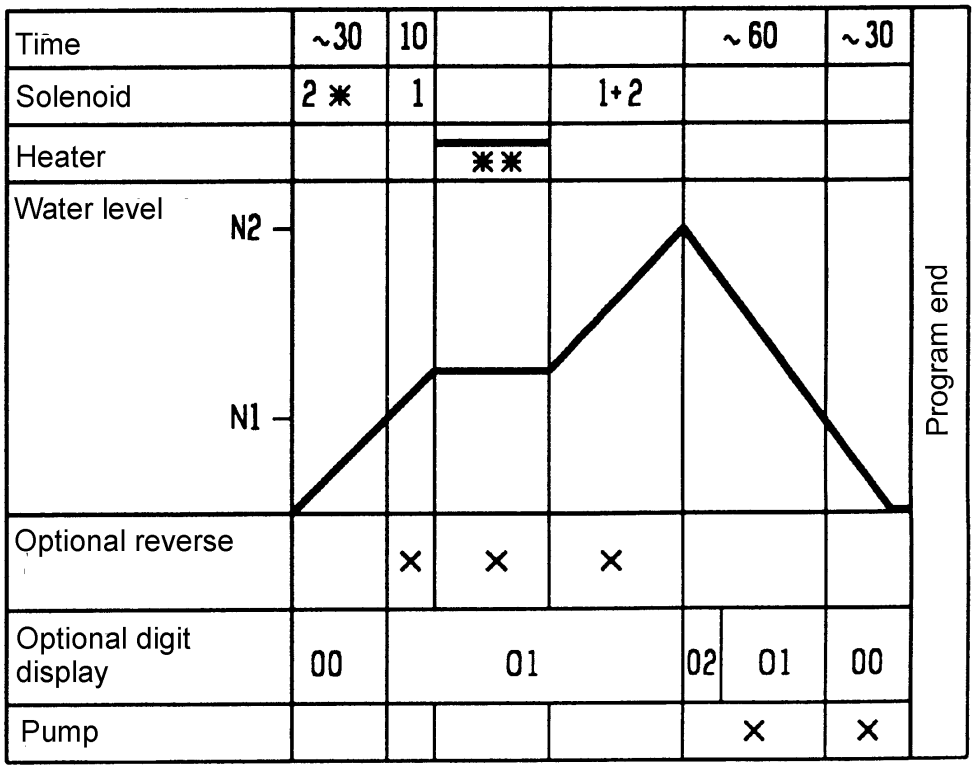
8.1 Test program - motor

"Whites/Colours 30°C"

Test:	Sequence:	Time:
Reverse	• CW at 50 min^{-1}	5 sec.
	• Pause	5 sec.
	• CCW at 50 min^{-1}	5 sec.
	• Pause	5 sec.
Spin/ pump	• continuous rise to n_{max} after imbalance (100 min^{-1})	
	• Catastrophe check only	
	• Field reversal (Relay K7) at 600 min^{-1} depending on model	
	• Spin at n_{max}	10 sec.

8.2 Test program - solenoids, W-regulator, heater

"Whites/Colours 40°C"



✱ For warm water variant through warm water valve, pulsed

✱✱ Heater raises temperature by approx. 3°C (for heating to 60°C, press WATER PLUS)

8.3 Test program - keys, speed and program selector

"Whites/Colours 60°C"

(Window optionally locked)

Exit the program by pressing the START button

		LED over On/Off button*
Buttons	Pre-wash	X
	Time save	X
	Water plus	X
	Heavy	X
	Start time	X**

* Switching state changes as long as held

** Here the 7-segment display shows 1.8.8

	Option 7-segm. display	LED keys			Sequence display		
		Pre-wash	Time save	Water plus	Wash	Rinse	Spin
Speed selector	0	X					X
	1	X				X	
	2	X				X	X
	3	X			X		
	4	X			X		X
	5	X			X	X	
	6	X			X	X	X
◕	7	X		X			

◕ In this position the buzzer (option) is also activated

Set volume (in normal mode):

The buzzer sounds at the end of a cycle, at rinse stop or under fault conditions. Its volume can be set.

- Turn appliance on.
- Hold down PRE-WASH key.
- The volume changes from loud to medium to soft to off.
- Release PRE-WASH key when desired level is reached.

				LED keys			Sequence display		
			option 7-segm. display	Pre-wash	Time save	Water plus	Wash	Rinse	Spin
Program selector	Whites/ Colours	90	1			X			X
		eco 60	2			X		X	
		60	3			X		X	X
		40	4			X	X		
		30	5			X	X		X
		⟳	6			X	X	X	
	Easy-Care	60	7			X	X	X	X
		50	8		X		X		
		40	9		X				X
		30	10		X			X	
		cold	11		X			X	X
		⟳	12		X		X		
	Delicates	40	13		X		X		X
		30	14		X		X	X	
		cold	15		X		X	X	X
		⟳	16		X	X			
	Wool	40	17		X	X			X
		30	18		X	X		X	
		cold	19		X	X		X	X
		⟳	20		X	X	X		
	Extra rinse		21		X	X	X		X
	Add softener		22		X	X	X	X	
	Drain		23		X	X	X	X	X
	New selection		24	X		(X)	(X)	(X)	(X)

(X) Display status depends on respective setting of speed selector

8.4 Test program - variant display

"Whites/Colours 60°e"

(Window optionally locked)

LED	Drain LED flashes, if	jumper (J...) is open
Key	Water plus	J6
	Time save	J5
	Pre-Wash	J4
	Heavy Frequency sensor 60 Hz	
Program	Wash	J3
	Rinse	J2
	Spin	J1

Variant coding
x Jumper in
- Jumper out or cut

J1	J2	J3	Max. speed/deselect steps (min^{-1})
X	-	X	1400, 1200, 1000, 800, 600, 400
-	X	X	1300, 1200, 1000, 800, 600, 400
X	X	X	1200, 1100, 1000, 800, 600, 400
-	-	X	1100, 900, 800, 600, 500, 400
X	X	-	1200, 1000, 1000, 800, 600, 400 ◪
-	-	-	1100, 900, 800, 600, 500, 400 ◪
-	X	-	1000, 900, 800, 600, 500, 400 ◪
X	-	-	900, 800, 700, 600, 500, 400 ◪

◪ For models without field reversal

J4	Warm water
X	without
-	with

J5	Time remaining
X	without
-	with

J6	Wash type
X	Standard
-	Export

8.5 Test program - Display elements

"Whites/Colours 90°C"
(Window optionally locked)

Check display elements by:

- LED flashing

in half-second intervals

	LEDs	7-segment display
LEDs program	Wash Rinse Spin	1.1. 2.2. 3.3.
LEDs keys	Start Pre-Wash Time save Water plus Heavy Start time	4.4. 5.5. 6.6. 7.7. 8.8. 1.8.8.

8.6 Test program - consumer

Only for models with 7-segment display
"Whites/Colours"
- Controlled by keys:

Press key once — Consumer ON
Press key again — Consumer OFF

Pre-Wash	Valve 1(up to max. level 2)
Time save	Valve 2 (up to max. level 2)
Water plus	WW-valve pulsed
Heavy	Heating ✱
Time select	Lye pump
Speed monitor	Motor runs at 27 rpm

✱ Let water in through one valve to level 1, press HEAVY key,
→ Displays relative temperature changes in degrees Celsius
(0°C → 1°C: about 1 min.).

Press HEAVY key again: test step for heater ended.

8.7 Safety-check

"Easy-Care 60°C"

The "Easy-Care 60°C" program is used for preparing the washing machine for the safety test.

- Start test program
  - Fill with water to level 1
  - Heater current flows for 20 sec.
- Plug mains connector into safety tester.
- Activate test program of safety tester.
- Let test program start.
- After test has been carried out, check to be sure window is still locked, otherwise repeat test sequence.

8.8 DEMO-Program

"Wool 40°C"

Simulation of a Whites/Colours with time select in fast cycle.
Where:

- no water fill
- no motor operation

Activate Demo-Program:	• Turn program switch to the New Selection position • Press PRE-WASH + START keys and turn unit on	• Start LED flashes
Setup Demo-Program:	• Set cycle selector to Wool 40° setting • Press START Key	
Demo-Program Sequence:	1. 3-times repeated flashing of all sequence LEDs and all LED keys (except Start)	
	2. Count down of the start time from 19h to 0h in half-second intervals *	
	3. Steady on: LED Start key	
	4. Simulation: sequence via program sequence LED, display time remaining (counted down in half-second intervals) *	
	5. Restart at point 1	

* Only for models with 7-segment display

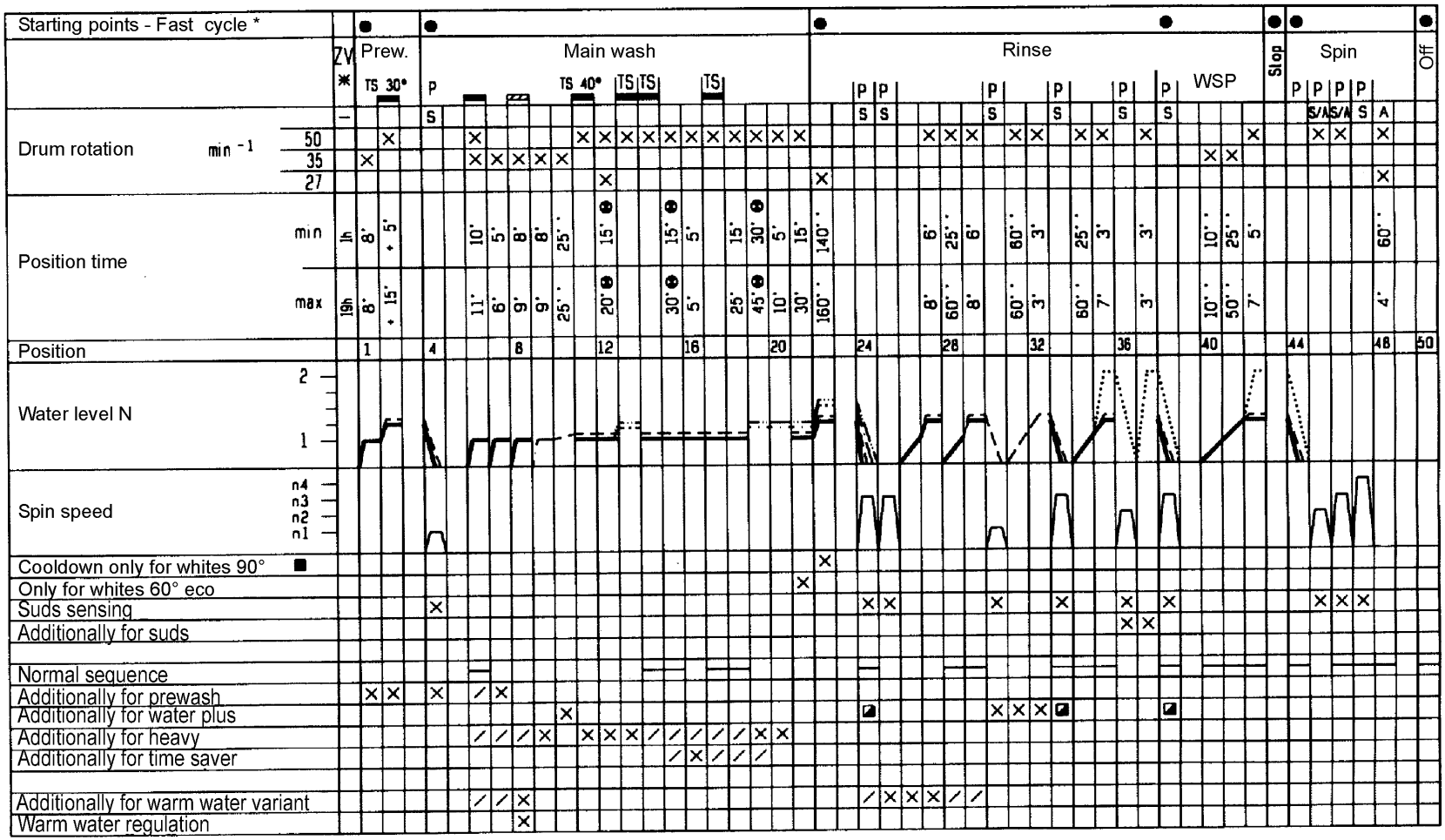
8.9 HES - Coupling module

Only for HES models

"Wool"

- Error output 14 is displayed if no communication with coupling module can be established.

9. Circuit diagrams



Heating
Heating for warm water variant
Normal program sequence
While pressing water plus button
While pressing heavy button
While pressing heavy and water plus button
After suds sensing
TS Thermostop
WSP Gentle rinse
P Pump

× is executed
/ is not executed
—— Included in sequence
✱ Optional
ZV Time pre-select
SPS Spin-rinse
◪ SPS with reduced rpm
A Separate
S see spin sequences

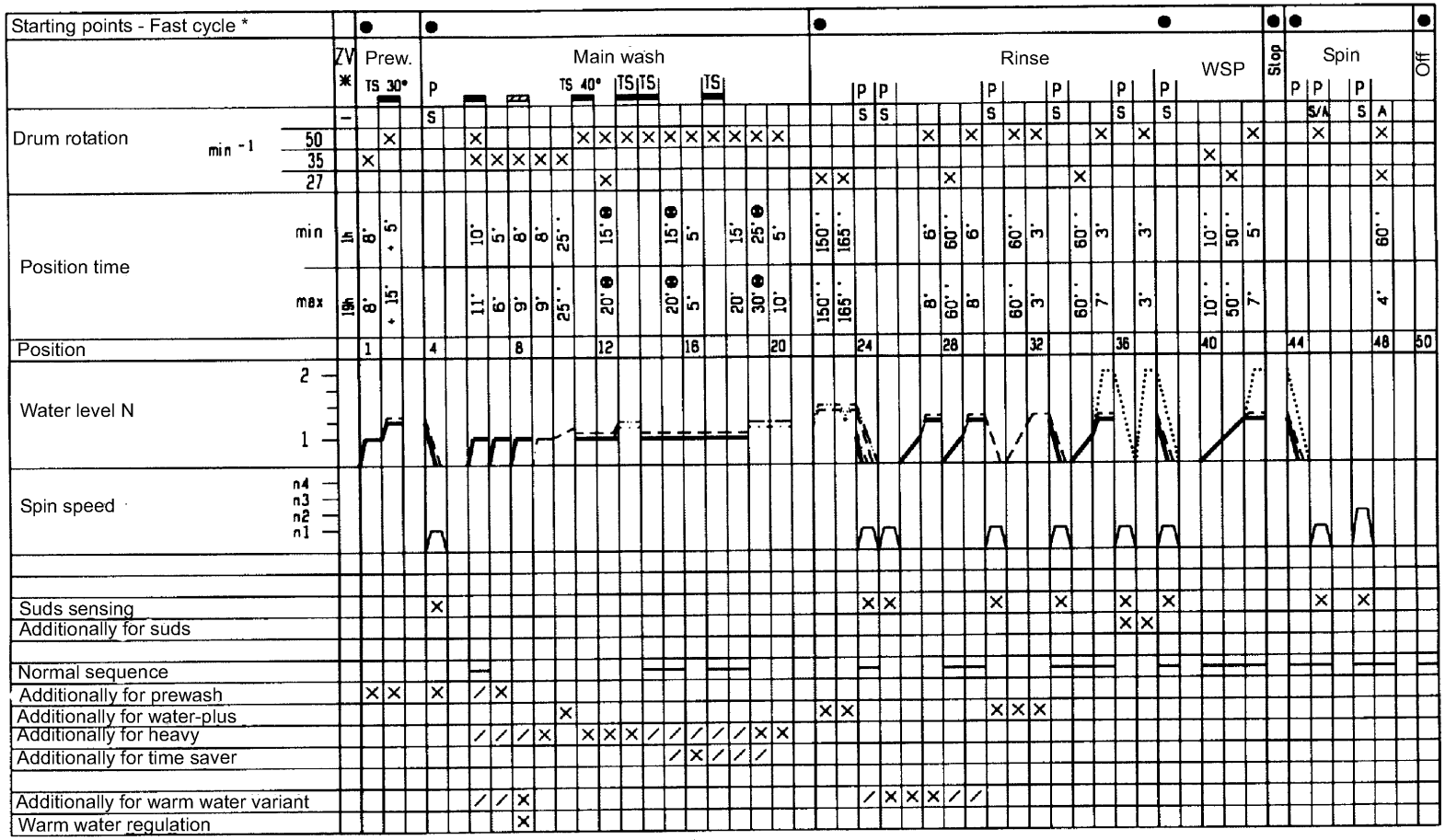
■ For models with 2 whites 90°C programs only with setting

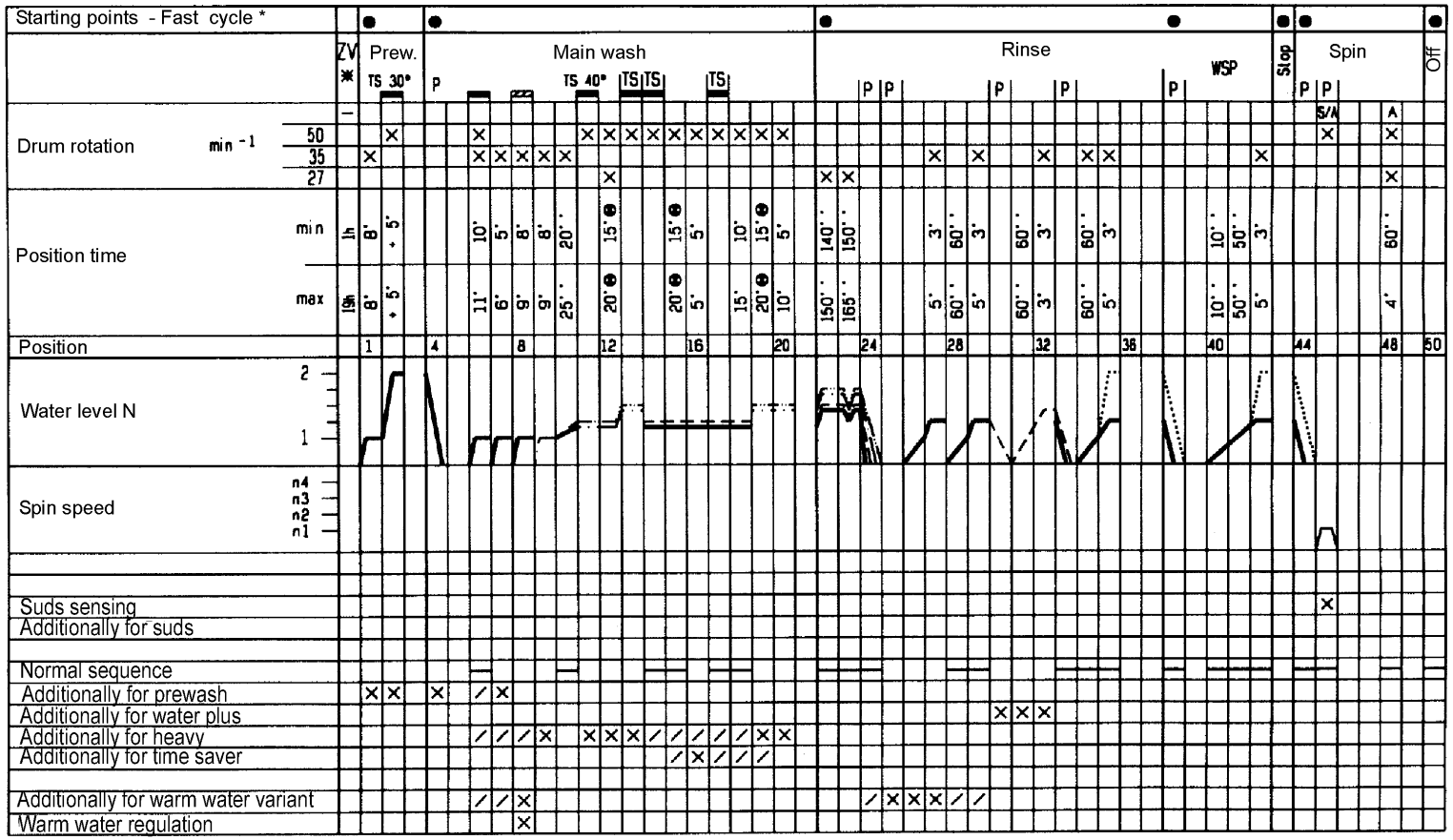
● Position time minus TS time

Whites / Colours
30° . . . 90°

GB

B30 5028 AA6.1	Ed.: 2 01.97
M 61	S0-20/ 0681





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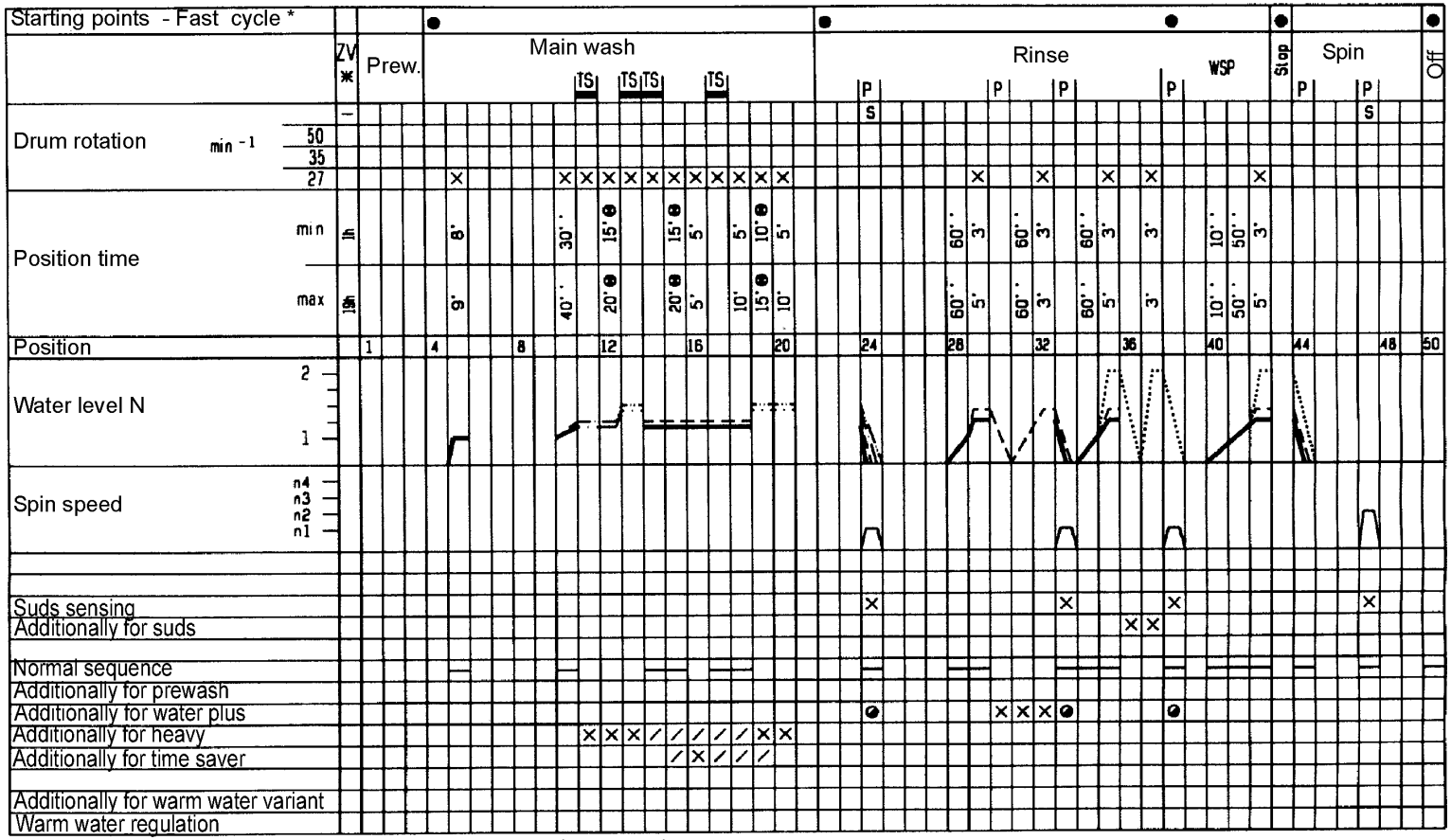
B30 5028 AA6.3	Ed.: 2 01.97
M 61	S0-20/ 0683



- Heating
- Heating for warm water variant
- Normal program sequence
- While pressing water plus button
- While pressing heavy button
- While pressing heavy and water plus button
- ..... After suds sensing
- TS Thermostop
- WSP Gentle rinse
- P Pump

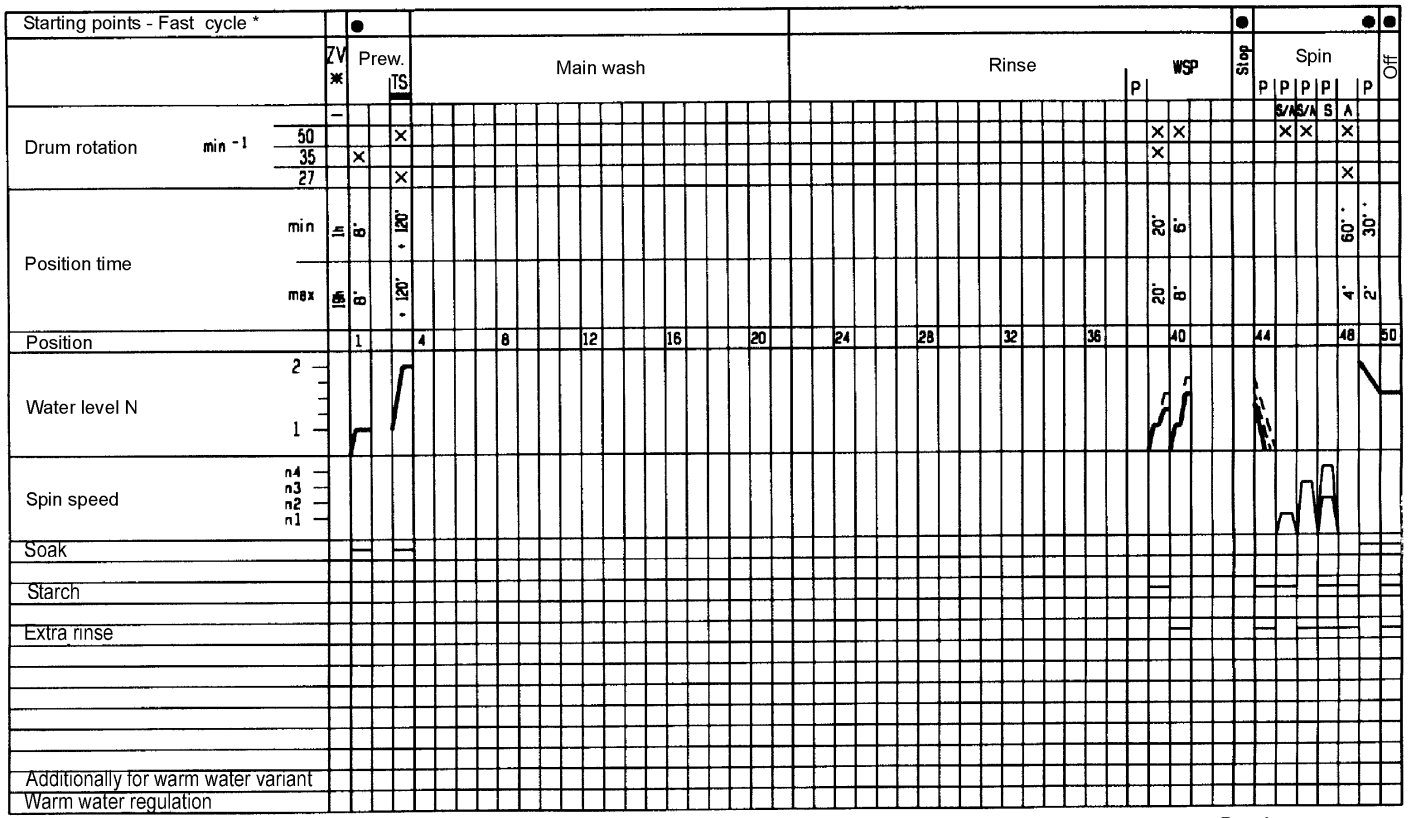
- × is executed
- / is not executed
- —— Included in sequence
- * Optional
- ZV Time pre-select
- SPS Spin-rinse
- ◕ For water-plus no spin rinse
- A Separate
- S see spin sequences

◕ Position time minus TS time

Wools
cold . . . 40°

GB

B30 5028 AA6.4	Ed.: 2 01.97
M 61	S0-20/ 0684



Heating
Heating for warm water variant
Normal program sequence
While pressing water plus button
While pressing heavy button
While pressing heavy and water plus button
After suds sensing
TS Thermostop
WSP Gentle rinse
P Pump

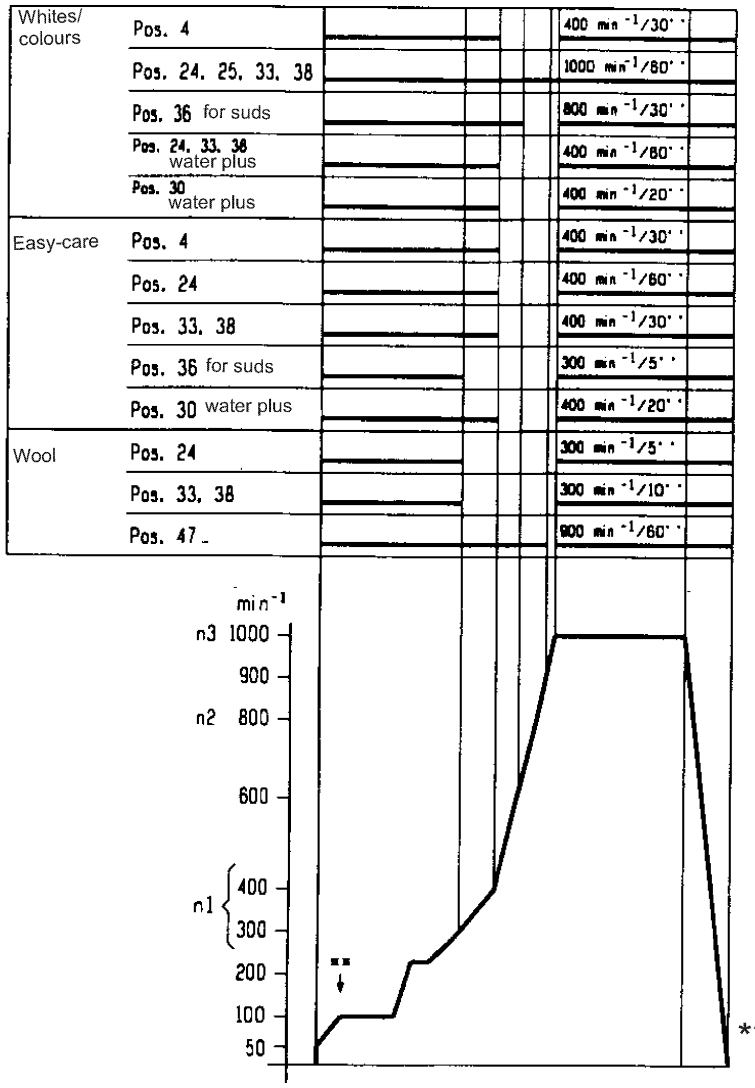
× is executed
/ is not executed
—— Included in sequence
* Optional
ZV Time pre-select

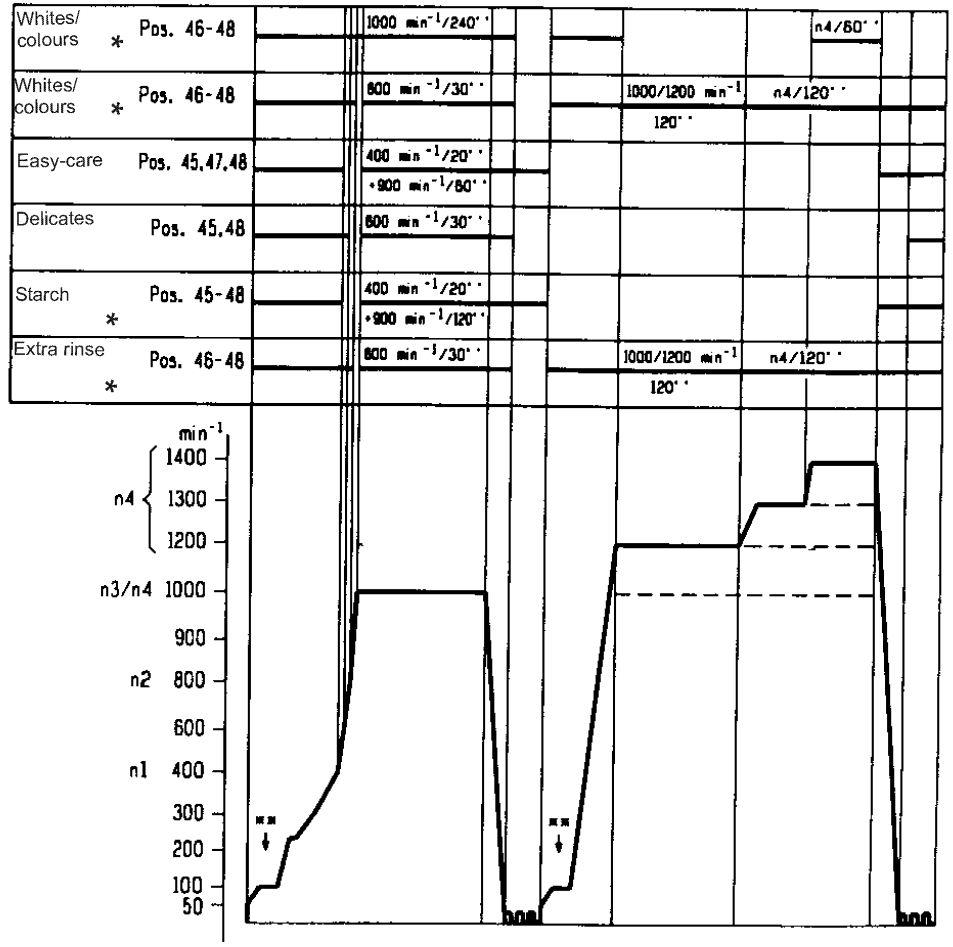
A Separate
S see spin sequences

Soak
Starch *
Extra rinse *

GB

B30 5028 AA6.5	Ed.: 2 01.97
M 61	S0-20/ 0685





n4 = model-dependent
time sequence depends on load and imbalance

** Load measurement and imbalance calculation
16 sec. at 100 rpm, for excessive imbalance and restart
(max. 11x then no spin)

* selectable

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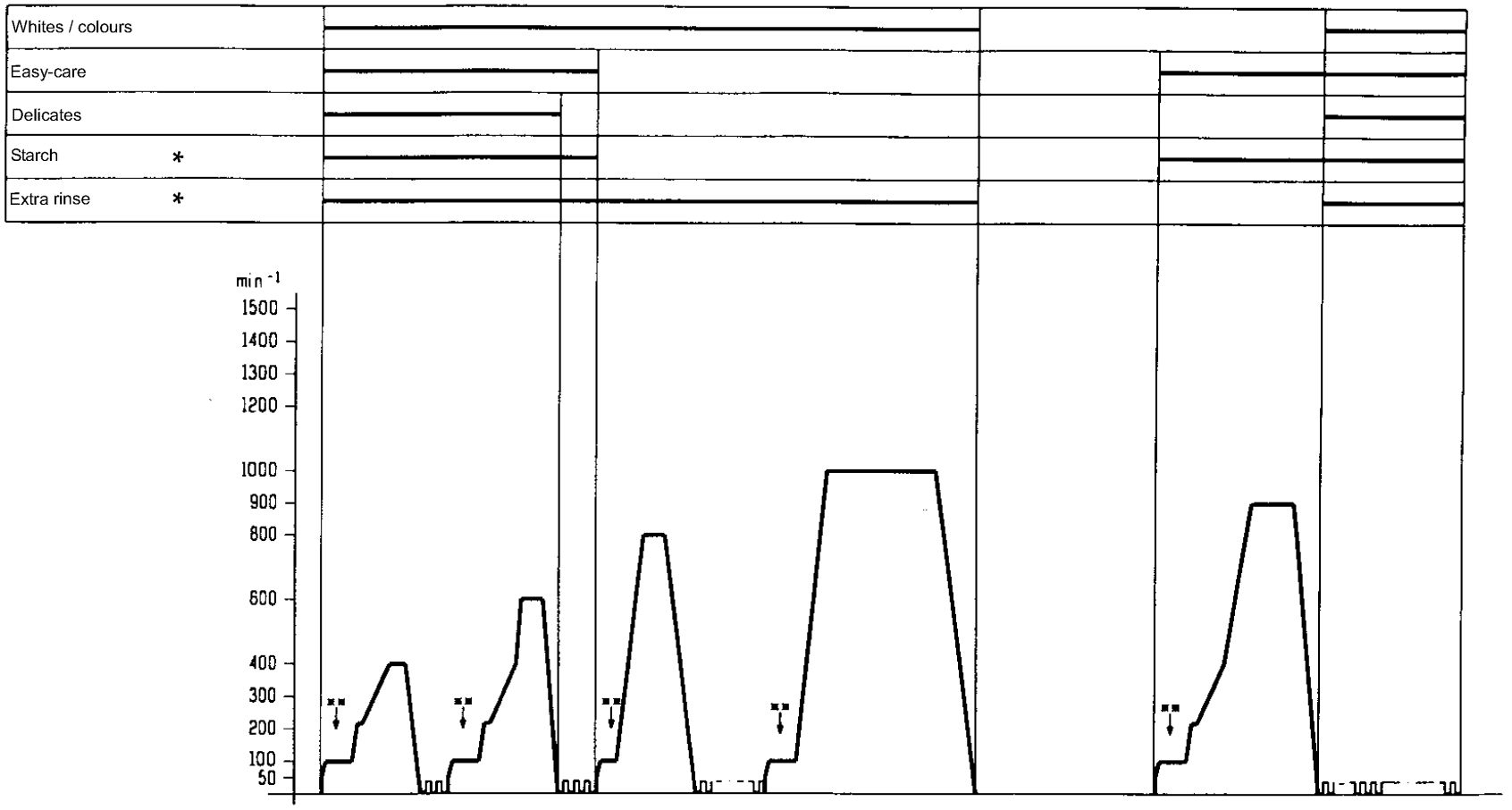
B30 5028 AA6.6	Ed.: 2 01.97
M 61	SO-20/ 0686



* selectable

time sequence depends on load and imbalance

** Load measurement and imbalance calculation:
16 sec. at 100 rpm, for excessive imbalance and restart
(max. 11 x, then no spin)

Interval spin

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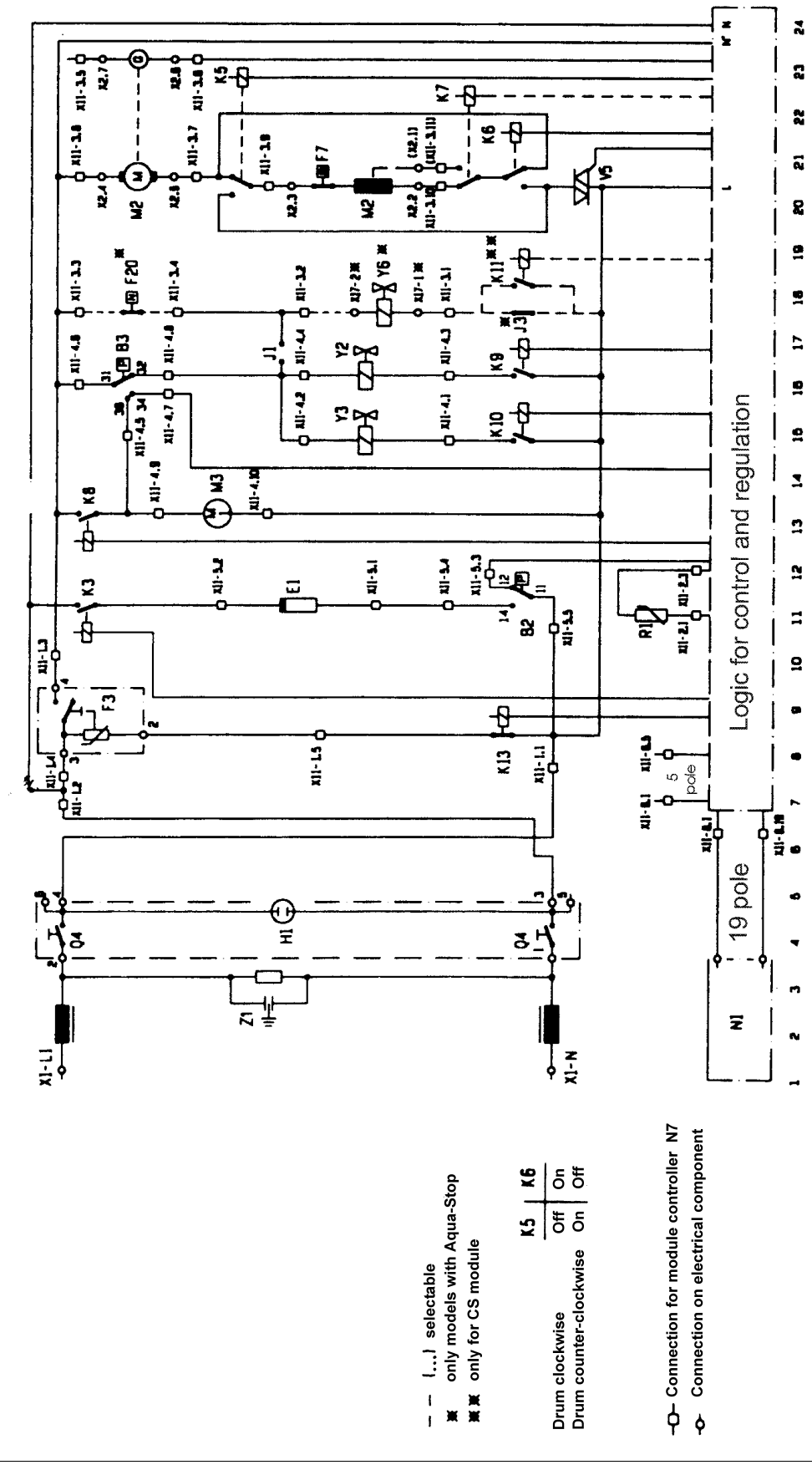
B30 5028 AA6.7	Ed.: 2 01.97
M 61	50-20/0687



Legend for circuit diagram (page 29)

Appliance list		Current path
B2	W - regulator (1st level)	11
B3	W - regulator (2nd level)	16
E1	Heater	11
F3	Switch - window with lock	9
F7	Protection switch - motor	21
F20	Switch (Aqua-Stop)	18
H1	Status indicator (operating display)	4
K3	Relay - heat	11
K5	Relay - reverse	23
K6	Relay - reverse	22
K7	Relay - field reverse	22
K8	Relay - pump	13
K9	Relay - main wash	16
K10	Relay - pre-wash	15
K11	Relay (Aqua-Stop)	18
K13	Relay - lock	8
M2	Motor - wash / spin	21
M3	Motor - pump	13
N1	Module - operation	2
N7	Module - control	
Q4	Main switch	4
R1	NTC (temperature sensor)	11
V5	Triac motor regulator	21
X1	Terminal - mains	1
X2	Connection - motor	20-23
X11	Connection - module control	6-23
X11-6	Diagnostics plug	6
X17	Connection (Aqua-Stop)	18
Y2	Solenoid (main wash)	16
Y3	Solenoid (pre-wash)	15
Y6	Solenoid (Aqua-Stop)	18
Z1	Noise suppressor - mains	3