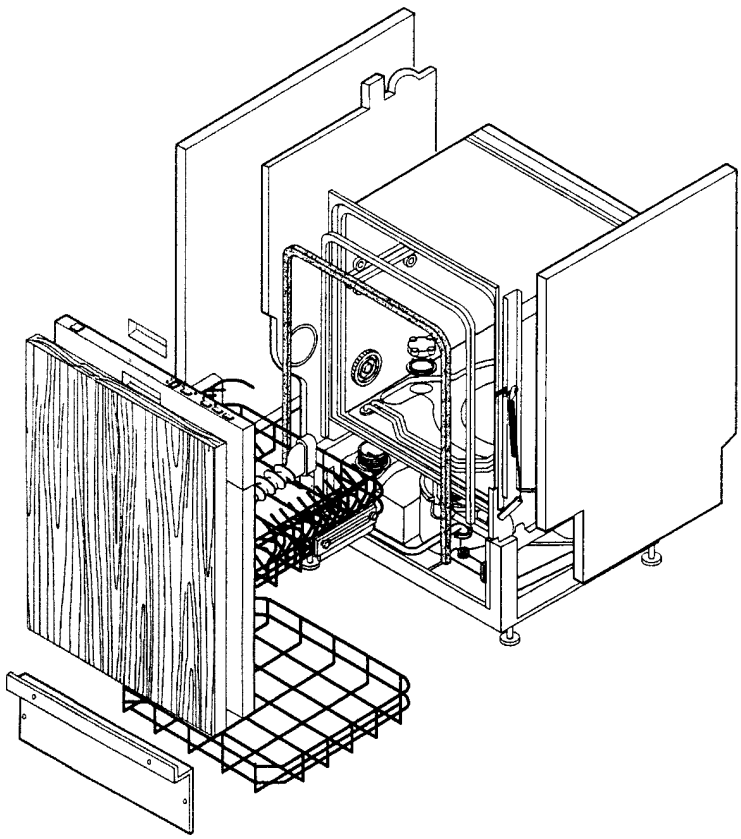

ITRONIC Dishwashers
New Structure

IGV 658.0
IGV 658.1
IGV 458.3

Küppersbusch
THE HEART OF A GOOD KITCHEN

GB

Service Manual: H7-410-03-02-B

Responsible: D. Rutz
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Contents

1. Introduction

ITRONIC is the designation of a new, fully-integrated dishwasher generation with electronic control and monitoring system.

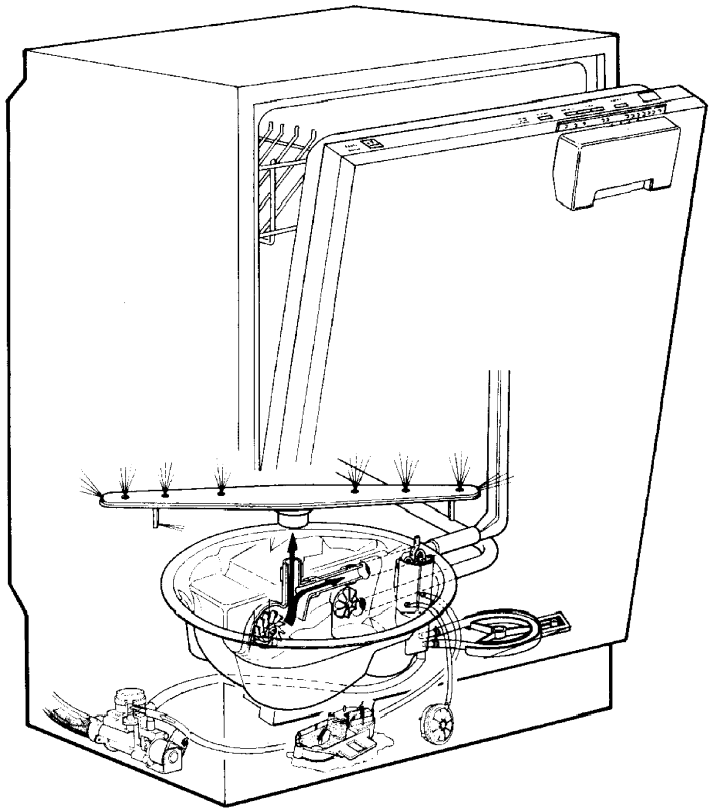
This is a hybrid dishwasher with an electronic control unit to control, store, monitor and safeguard the individual appliance functions as well as a traditional hydraulic circuit (TCR); a modern appliance which clearly has more to offer in terms of performance.

This appliance can be provided with the standard built-in front and integrated into any kitchen furniture range. The individual design and refined aesthetics of the simple and modern control panel offers the user maximum convenience of control.

This dishwasher type is available in two different widths, 45 cm and 60 cm, and in two models:

- ITRONIC «HL» - LUXURY class series - IGV 689.1
- ITRONIC «LL» - MIDDLE class series - IGV 658.0 / IGV 458.3

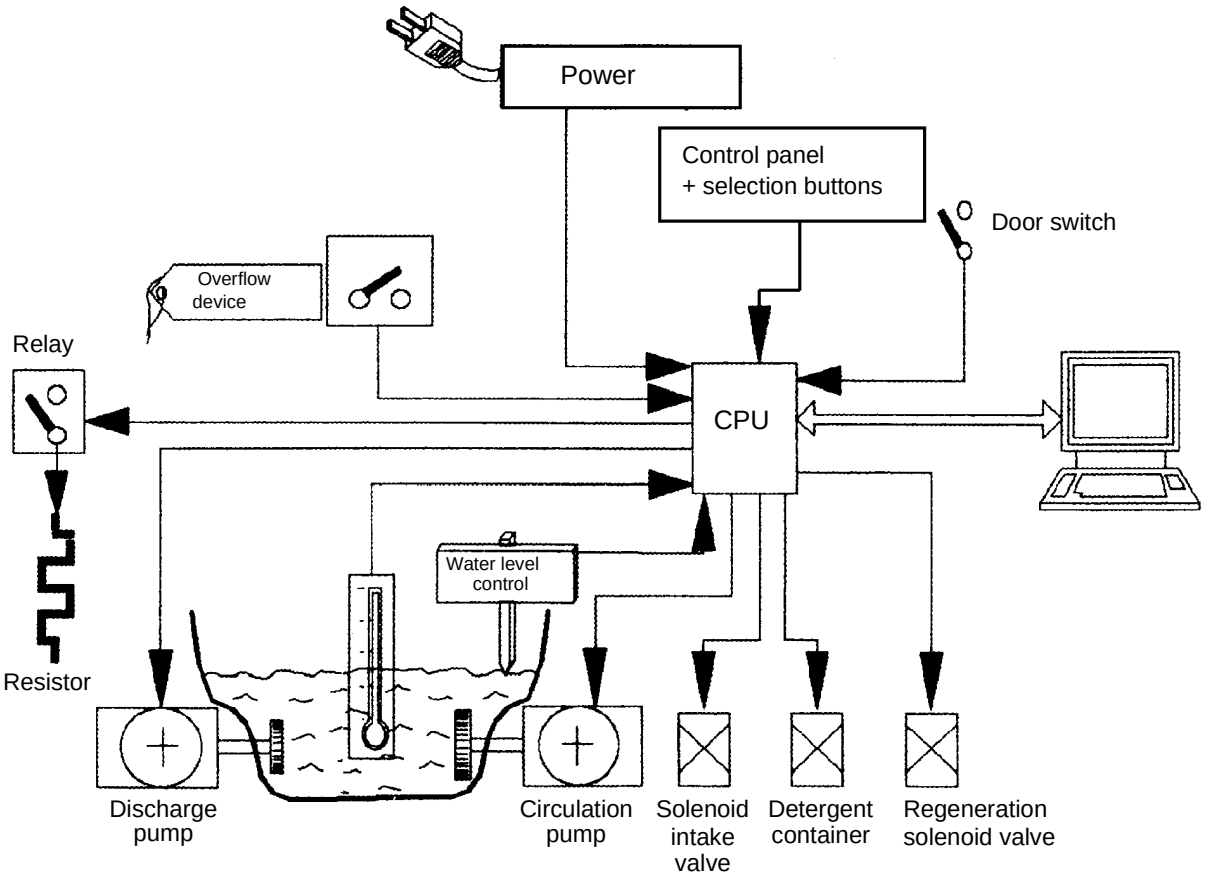
The model ITRONIC «LL» is dealt with in this service manual.



2. Technical features

The use of a microprocessor control system and electronic sensors represents a major innovation in the technical and function features of the appliance as it can therefore be designed using a computer-aided system to suit the specific sales markets and users.

The user-specific data which characterise the different dishwasher types are entered in the microprocessor with a PC and stored in a permanent memory.



2.1 Innovative technical features

ITRONIC is the innovative dishwasher generation which has been specially developed for demanding consumers as the following major functions have been refined and improved:
PERFORMANCE, ECOLOGY, SAFETY

PERFORMANCE

Wash programmes

The electronic plug-in pc card, in which a package of various wash programmes ensuring an excellent wash result regardless of the kind of dishes and dirt is stored, permits great flexibility of programme application.

User-friendliness

The individual aesthetics of the easy-to-understand and uncomplicated control elements with digital displays creates an all-round, user-friendly appliance.

ECOLOGY

Sound insulation

Major progress ensuring maximum convenience of use has been achieved in terms of sound insulation thanks to the use of new technologies and materials.

User-friendly washing

Special technical and functional measures permit the consumption of energy, time, detergent and salt to be reduced and thus achieve not inconsiderable “energy savings”.

SAFETY

High-tech mechanical, hydraulic and software-controlled (electronic) devices ensure absolute safety of use.

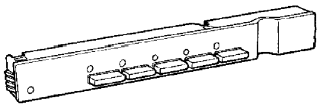
Another innovation is the use of modular cabling (as is already used in washing machines) with appropriate modification of the points of consumption which have been specially prepared for the use of the new connections.

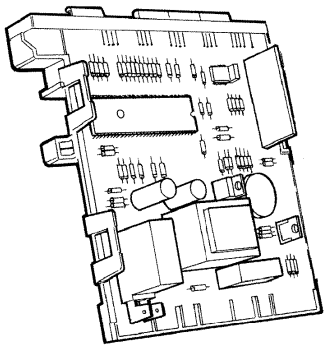
Technical features and arrangement of the individual components have remained unchanged. Some of them differ from the components used in traditional dishwashers merely due to the cable connections. However, others such as the temperature sensor and electronic pc card are new in their use.

2.2 Features of the components

Electronic control unit

Pc card/display pc card module



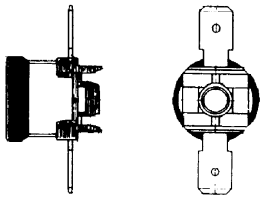


- The pc card/display pc card module is the most important electronic component and serves to control and display all appliance functions.
- It is the interface between the user and the appliance.
- The programmes are selected or the preset programme cancelled by pressing the various buttons.
- The LEDs which come on when the buttons are pressed indicate the programme functions which have been selected and set.
- Each time a button is pressed, this is indicated by an acoustic display instrument, the BUZZER, with tones of various frequencies.
- The pc card/display pc card module is a unique component which is accommodated in a container attached behind the control panel inside the appliance.

Microprocessor

- The microprocessor is integrated into the pc card module.
- The microprocessor controls all the appliance functions entered in the permanent memory (programmes, monitoring and safety devices etc.).

Temperature sensor



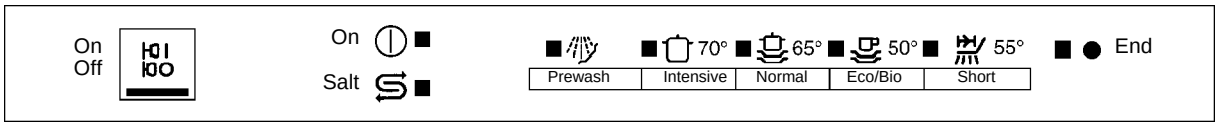
- This is a water temperature measuring instrument of the type NTC with variable resistance (the resistance value falls as the temperature rises).
- It is electrically connected to the pc card module.
- It is in direct contact with the appliance inside door. The thermal conductivity between the sensor housing and the inside door is ensured by a thin layer of heat-conductive silicone mass.

Comparison of the resistance values (ohm) in relation to the temperature (°C)

T (°C)	Resistance (ohm)	T (°C)	Resistance (ohm)
0	160.760	45	20.310
5	125.100	50	16.540
10	97.970	55	13.495
15	76.770	60	11.070
20	60.545	65	9.135
25	48.410	70	7.575
30	38.550	75	6.300
35	31.010	80	5.260
40	25.060	85	4.410

3. Functions and controls IGV 458.3

3.1 Control panel IGV 458.3



Button ON/OFF

- Electric switching ON and OFF of the dishwasher.

LED ON (green light)

- When this LED comes on, it indicates that the appliance is being supplied with electricity.

LED salt (red light) (salt refill display)

- When this LED comes on, this means that the regeneration salt must be replenished (if the water softener is set to hardness level 1, this LED always remains off as no regeneration salt is required).

Programme buttons | Prewash | Intensive | Normal | Eco/Bio | Short |

- Function only when the door is open.
- Each time a button is pressed lightly, it transmits a signal to the pc card which triggers a specific pre-programmed function.
- Each button is linked to a certain programme.
- Each time a button is pressed, a programme can be set or deleted.
- The relevant programme display LED is arranged above each single button.

Programme LEDs (green light) 70° 65° 50° 55°

- Its function is linked to the programme button located underneath it.
- Each LED comes on individually (two LEDs never come on the same time).
- Slow flashing of the LED (standard frequency) indicates the relevant programme has been set.
- If the LED remains on permanently, this means that the set programme is running.
- Rapid flashing of the LED (twice the standard frequency) means that there is fault and therefore an alarm is indicated.
- When the LED goes off, this means that the programme is over or has been cancelled and therefore no function has been entered.

LED END (green light)

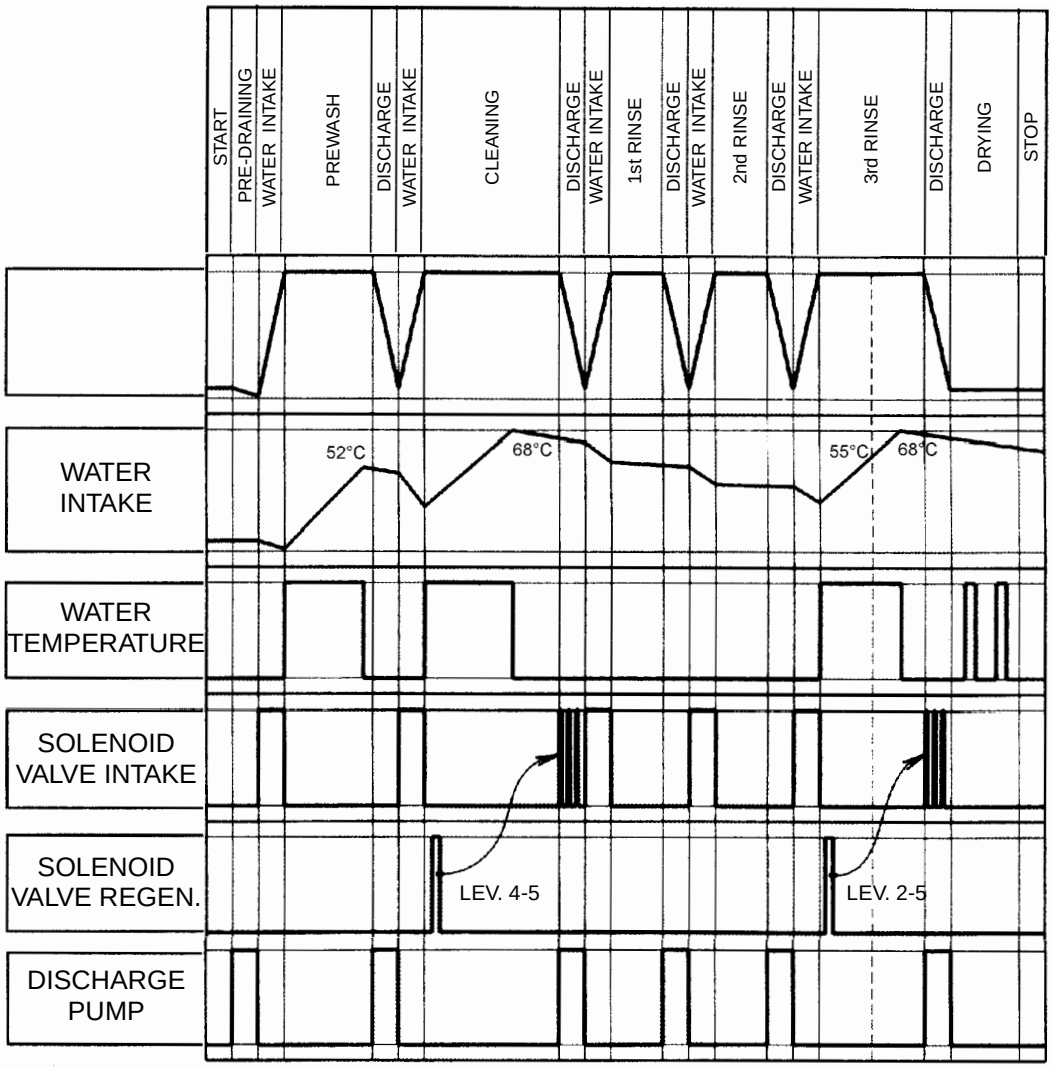
- When it goes off, this means that the set programme is running or that the appliance is in the programme setting phase.
- Slow flashing of this LED (standard frequency) means that the wash programme is over.

*Not available on all models

ITRONIC LL - Programme designations

Prog. No.	Programme	Prewash		Wash	1st Rinse	2nd Rinse	3rd Rinse	Drying
		°C	Min.	°C	Min.	Min.	°C	Pause/ Heating
1	Prewash		8					
2	Intensive 70°	52°		68°	5	5	68°	90°+270° 45" + 30"
3	Normal 65°		8	65°	5		68°	90°+270° 45" + 30"
4	ECO 55°		8	55°	5		55°	90°+270° 45" + 30"
5	Short			55°	5		55°	

Diagram Itronic

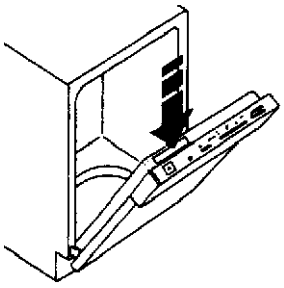


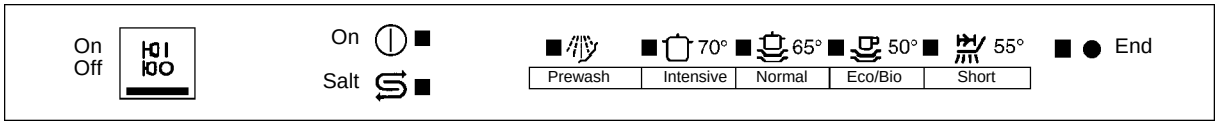
3.2 Function features of the control elements

The appliance functions are divided into three phases:
SETTING – PROGRAMME EXECUTION – PROGRAMME END

During these phases acoustic BUZZER signals of various frequencies are emitted which indicate the preset switching operations and the corresponding functions.

The control panel is located on the top of the door; therefore the door must be opened slightly to set and check the programmes.

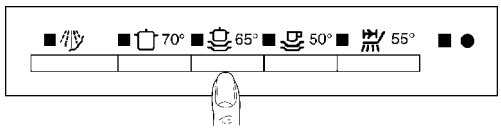




SETTINGS

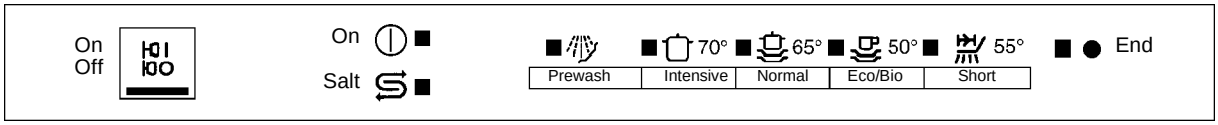
Switching on

- When the ON/OFF button is pressed, the dishwasher is supplied with electricity and switches into the setting phase.
- At the same time, the corresponding LED on the display comes on.
- The symbol LED may also come on.



Programme selection

- Five different programmes can be set with the relevant programme buttons.
- The desired programme is set by pressing a programme selection button.
- Each time a button is pressed, a short acoustic signal is emitted, confirming the programme entry.
- At the same time, the corresponding LED flashes.



Salt storage display

- Flashing of the relevant LED indicates that salt has to be refilled.
- The LED remains off if the water hardness has been set to level 1 (as no regeneration salt is required).

Acoustic display (BUZZER)

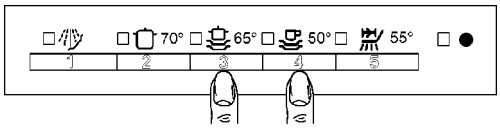
- The buzzer function is activated as a standard feature in all relevant phases.
- The buzzer function can be activated and deactivated at any time by pressing two buttons at the same time (also during the programme run).

BUZZER function deactivated

- Press the programme buttons (3 + 4) NORMAL + ECO/BIO simultaneously for about 3 seconds.
- 3 short acoustic signals indicate that the buzzer function has been switched off.

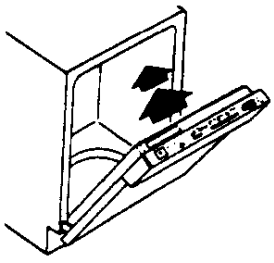
BUZZER function activated

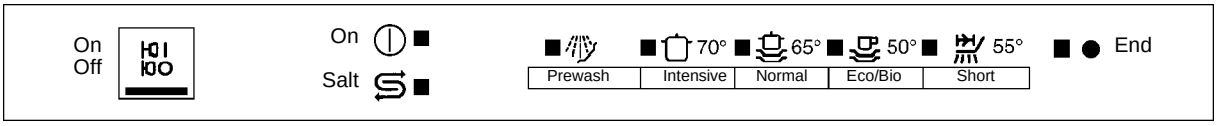
- Press the programme buttons (3 + 4) NORMAL + ECO/BIO simultaneously for about 3 seconds.
- An intermittent acoustic signal indicates that the BUZZER function has been switched on.



Starting a programme

- After the door has been closed, the preset programme starts automatically; the programme setting phase is over and the programme run begins.
- A short acoustic signal confirms the programme has started.

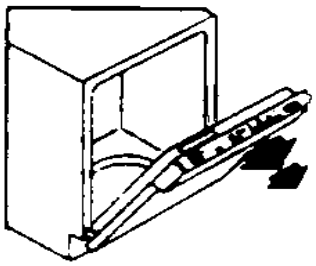




SETTINGS

When the door is opened:

- The programme is interrupted and the current programme phase is stored.
- The LED corresponding to the programme comes on (permanently).
- The programme selected is stored and the set functions cannot be changed (the programme can only be cancelled or reset).

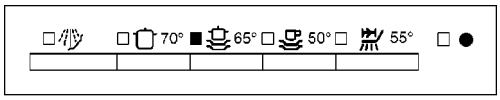


When the door is closed:

- The programme run is continued where it was interrupted.

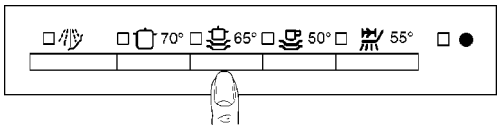
Programme interruption

- Open door, the programme LED comes on.
- If the ON/OFF button is pressed, the current programme is interrupted and the corresponding programme LED goes off.
- If the button is pressed again, the same programme LED comes on again and, after the door is closed, the programme run is continued where it was interrupted.



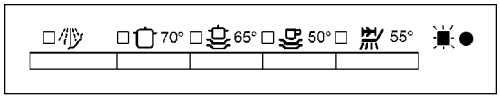
Cancelling/resetting programme

- Open door; the programme LED comes on.
- Press the corresponding button for about 2 seconds, the LED goes off and a short acoustic signal confirms that the programme has been cancelled.
- The dishwasher switches over to the programme setting phase.



Programme end

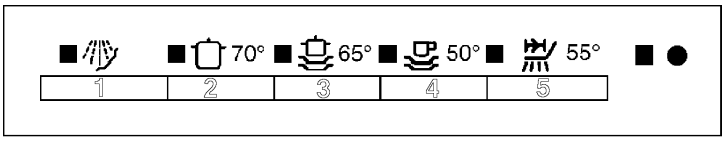
- An intermittent acoustic signal lasting about 5 seconds indicates the end of the programme.
- Open door.
- The corresponding LED END flashes, confirming that the programme is over.



3.3 Setting of the water softening unit

The water softening unit is set with the 5 corresponding programme selection buttons. Each individual button corresponds to a regeneration level programmed in the microprocessor.

Matching of regeneration level/programme button



Regeneration level	Programme button
1	PREWASH
2	INTENSIVE
3	NORMAL
4	ECO/BIO
5	SHORT

Selection of the REGENERATION LEVEL

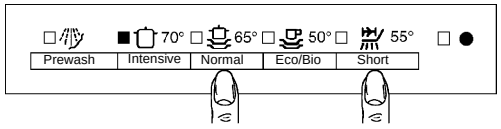
Important: It is only possible to select a regeneration level in the programme setting phase (before the start of a wash programme).
With the door opened: Turn the appliance into the programme setting phase.

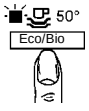
Level	°F (°TH)	°G (°dh)
1	0 - 14	0 - 7
2*	15 - 39	8 - 21
3	40 - 50	22 - 28
4	51 - 70	29 - 39
5	71 - 90	40 - 50

* The dishwasher has been set at the works to level 2

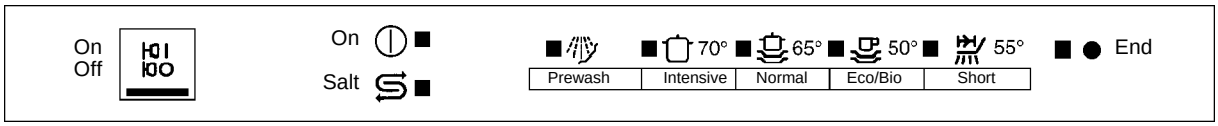
Appliance switched on

- If necessary, press ON/OFF button.
- Press the programme buttons (3 + 5) NORMAL + SHORT at the same time and keep them depressed (5 seconds) until the display LED (2) corresponding to the INTENSIVE programme flashes.
- To change the regeneration level (within 5 seconds), press the programme button corresponding to the level you want (e.g. for regeneration level 4 press the ECO/BIO button).
  The corresponding LED flashes indicating that the new value has been set.
- 5 seconds after any button has been pressed for the last time, the new setting is stored and the appliance automatically switches back to the programme setting phase.





3.4 Safety/Alarm systems



Activation of the following safety systems involves a corresponding alarm code which is displayed by flashing at twice the frequency of the programme LED.

The flashing of an LED during a wash programme run is equivalent to the activation of an alarm code.

The dishwasher stops (the programme run is interrupted), all functions are cancelled and the buttons, with exception of the ON/OFF button, are not operative.

Alarm codes		**Operative safety systems**	
1 ■		Time-Out	Water intake
2 ■	70°	Time-Out	Water refilling
2 ■	70°	Time-Out	Pressure monitor EMPTY position (heating time)
3 ■	65°	Time-Out	Temperature sensor
4 ■	50°	Time-Out	Water heating
5 ■	55°	Time-Out	Pressure monitor EMPTY position (draining end)

Resetting/Cancelling

To reset/cancel any alarm situation which arises, switch the appliance off with the ON/OFF button.

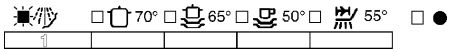
If this button is pressed again, the appliance reverts to the programme setting phase in which the programme can be repeated or a new cleaning programme selected.

Should the operational fault continue, the alarm display appears again on the display panel.

Time-out Water intake

- To reach the appropriate water level, a maximum intake time of 5 minutes is allowed for.
- The time-out counting begins at the start of each water intake phase and ends when the pressure monitor filling limit (1-3) has been reached (FULL signal).
- Should the water intake time required for reaching the pressure monitor filling limit (FULL signal) exceeds 5 minutes, an alarm is displayed.
- The LED corresponding to the current programme goes off.

Identification



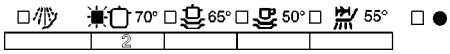
Dishwasher switched off
When door open, display shows:

LED No. 1
(flashes at twice the frequency)
Remaining LEDs go off

Time-out Water refill time

- After the pressure monitor has been reset, a water refill time of max. 45 seconds is allowed for.
- The time-out safety system is operative from the moment the corresponding water level has been reached (pressure monitor at FULL/ 1-3) and remains active until the subsequent water discharge.
- The time-out counting begins when the pressure monitor is reset to EMPTY (1-2) and ends when the FULL signal (1-3) returns.
- If the time necessary for the pressure monitor filling limit (FULL signal) (1-3) to be reached again exceeds 45 seconds, an alarm is displayed.
- If, as a result of several resets of the pressure monitor to EMPTY (1-2), several refills of water are to be made, the total sum of the water refill times must not exceed 45 seconds; otherwise the alarm is displayed.
- The LED corresponding to the current programme goes off.

Identification



Dishwasher switched off
When door open, display shows:

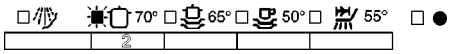
LED No. 2
(flashes at twice the frequency)
Remaining LEDs go off

Time-out Pressure monitor EMPTY

(heating time)

- **Conditions**: This safety system is only operative in the heating period (water heating), drying phase excluded.
- If the pressure monitor is reset to EMPTY (1-2), a waiting time of 2 minutes is allowed for up to the pressure monitor FULL signal (1-3).
- If the pressure monitor does not revert to FULL (1-3) within this period of time (2 min.), the programme run is interrupted and the alarm is displayed.
- During the entire heating time the pressure monitor can be reset several times to EMPTY (1-2); this operation (resetting) can be repeated a maximum of three times.

Identification



Dishwasher switched off
When door open, display shows:

LED No. 2
(flashes at twice the frequency)
Remaining LEDs go off

Another resetting of the pressure monitor results in the final interruption of the programme run and the alarm is displayed.

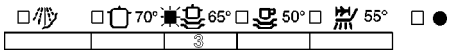
- The LED corresponding to the current programme goes off.

Time-Out Temperatur sensor

(interrupted/short-circuited)

- The correct functioning of the temperature monitoring circuit is checked during the entire duration of the wash programme.
- There are two activation thresholds established:
  a lower activation threshold corresponding to a temperature of -5 °C and an upper activation threshold of about +85 °C.
- If the temperature measured is outside the temperature range limited by the two activation thresholds, the alarm is displayed.
- The LED corresponding to the current programme goes off.

Identification



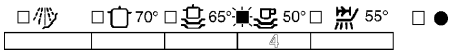
Dishwasher switched off
When door open, display shows:

LED No. 3
(flashes at twice the frequency)
Remaining LEDs go off

Time-out Water heating

- A time of max. 45 minutes is allowed for heating the water (independent of the temperature of the wash programme selected).
- The time-out counting starts at the beginning of each water heating phase and ends when the preset temperature has been reached.
- If the time required to heat the water exceeds 45 minutes, the alarm is displayed.
- In the final drying phase (after the draining of the last rinse with warm water) this safety system is not operative.
- The LED corresponding to the current programme goes off.

Identification



Dishwasher switched off
When door open, display shows:

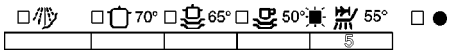
LED No. 4
(flashes at twice the frequency)
Remaining LEDs go off

Time-out Pressure monitor EMPTY

(end of draining)

- At the end of each water draining phase the pressure monitor is checked. It must be in the EMPTY position (1-2).
- If the pressure monitor is in the FULL position (1-3) at the end of the draining phase, the alarm is displayed.
- The LED corresponding to the current programme goes off.

Identification



Dishwasher switched off
when door open, display shows:

LED No. 5
(flashes at twice the frequency)
Remaining LEDs go off

3.5 Tests on activation of the alarm systems

If a fault which could impair operational safety occurs, this is indicated on the control panel with illuminated symbols and the display of an error code (ALARM) on the display panel.
The list below represents an aid to detect the most important possible causes for the alarm display and for remedying the fault which has occurred:

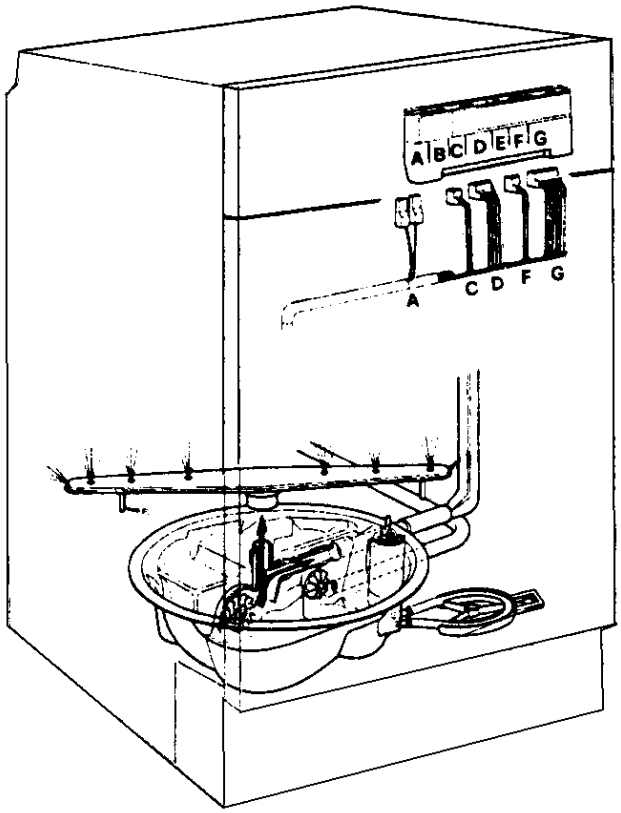
Alarm display	Activation Time-Out safety system	Causes
1 ■	**Water intake** Time available for each water intake phase: max. 5 min.	♦ water cock closed ♦ water pressure too low ♦ filter in intake hose clogged ♦ solenoid valve defective ♦ discharge hose siphon activated ♦ activation of the overflow protection ♦ activation of the leak protection ♦ pc card module defective
2 ■ 70°	**Water refilling** Max. time allowed: 45 seconds even if several fillings take place **Pressure monitor EMPTY (heating time)** Time allowed: 120 secs. for max. three times.	♦ water emerging from the water collector or other connections ♦ discharge hose siphon activated/ circular filter clogged ♦ dishes fallen over ♦ pressure monitor defective ♦ pressure monitor ♦ connection hose leaking ♦ pc card module defective
3 ■ 65°	**Temperature sensor** Immediate activation during the entire programme run: Activation thresholds: -5°C / +85°C	♦ temperature sensor disconnected or outside the activation range ♦ sensor wiring defective/interrupted ♦ temperature below -5°C ♦ temperature sensor short-circuited ♦ temperature above +85°C ♦ pc card module defective
4 ■ 50°	**Water heating** Time allowed max. 45 min. drying phase excluded	♦ heating element disconnected ♦ wiring interrupted ♦ safety thermostat disconnected ♦ temperature sensor not calibrated or badly positioned (thermal contact defective) ♦ circular filter clogged ♦ water level too low ♦ upper spray arm blocked ♦ pc card module defective
5 ■ 55°	**Pressure monitor EMPTY (end of draining)** Immediate activation each time drainingf ends.	♦ wash water pump defective ♦ water discharge hose bent or clogged ♦ chamber emptying siphon defective ♦ circulation hose clogged or badly positioned ♦ pressure monitor blocked at FULL (1-3) ♦ pc card module defective

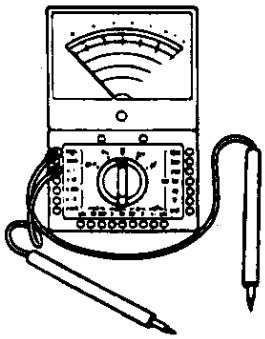
3.6 Component check

The two plug-in connectors mounted on the pc card module are provided for troubleshooting purposes. With these connectors you can, after disconnecting them, check the perfect condition of the components of this electronic dishwasher using a normal test instrument by means of the resistance values measured.

To quickly determine the component to be checked, a TEST PROCEDURE has been established providing appropriate signs for connecting the test instrument pins as well as the theoretical values for the components to be checked.

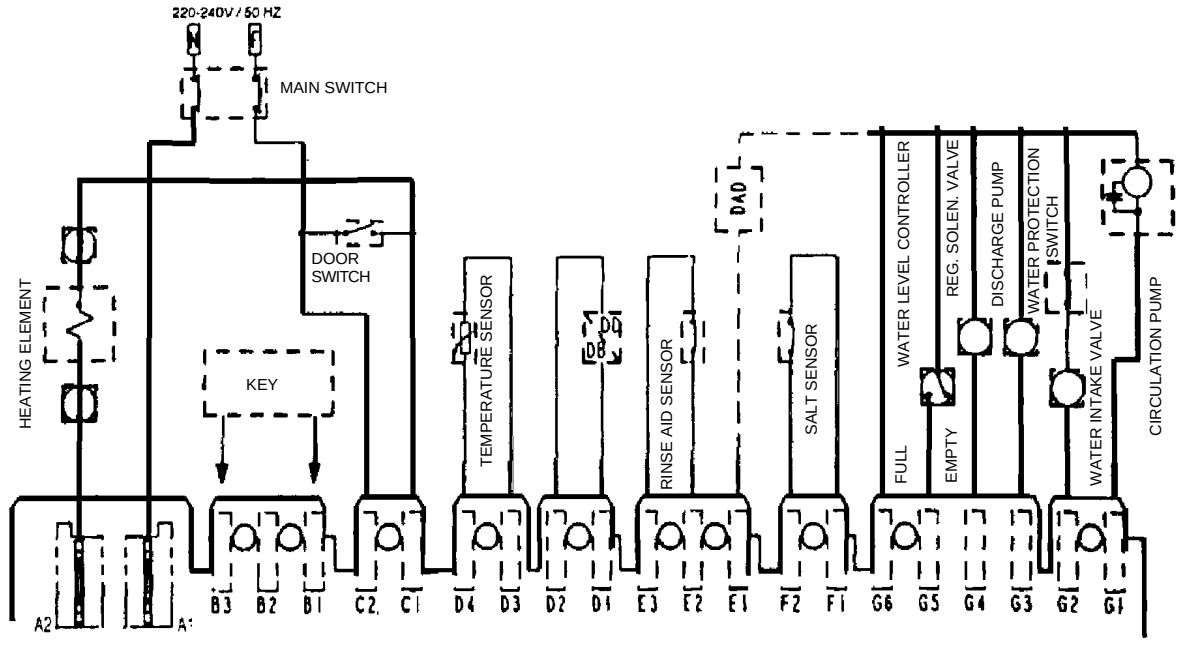
Letters (A-B-C-D-E-F-G) are printed on the pc card module housing for the detection and correct positioning of the relevant connectors.





Test procedure: Connect the pins of the test instrument to the points listed in the table and compare the readings obtained.

COMPONENTS	PINS ON	CORRECT MEASUREMENT
Mains connection cable + main switch	L - C2 N - A1	button not pressed = open button pressed = short circuited
Heating element + safety thermostat	A2 - C1	at 20 °C 1900W = 25 Ω 1900W = 18 Ω
Door microswitch	C2 - C1	door open = open door closed = short circuited
Temperature sensor	D4 - D3	at 20 °C = 60.545 Ω at 50 °C = 16.545 Ω at 65 °C = 09.135 Ω
Integrated dosing chamber	D2 - D1	1300 Ω
Rinse aid sensor	E2 - E3	with rinse aid = open without rinse aid = short-circuited
Salt sensor	F2 - F1	with salt = open without salt = short-circuited
Water level controller	G6 - G5	empty (1-2) = open full (1-3) = short-circuited
Regeneration solenoid valve	G6 - G4	3600:4400 Ω
Wash water pump	G6 - G3	170 Ω
Intake solenoid valve + protection against leaks	G6 - G2	3600:4400 Ω
Circulation pump	G6 - G1 The measurement is taken directly on the motor between the leads (B1 and MA-GR)	primary winding = 24 Ω auxiliary winding = 65 Ω



3.7 Setting of the ITRONIC additional functions

The dishwashers of the ITRONIC model series have an electronic pc card in which all basic functions and basic programmes are entered inside the microprocessor.

During production, it is possible to configure the basic pc card during the appliance equipment phase; this card can be designed and programmed to suit the specific requirements of each sales market by entering additional functions.

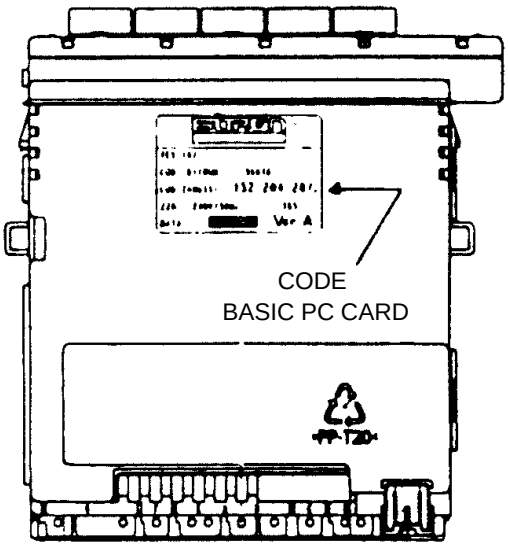
Pc card identification

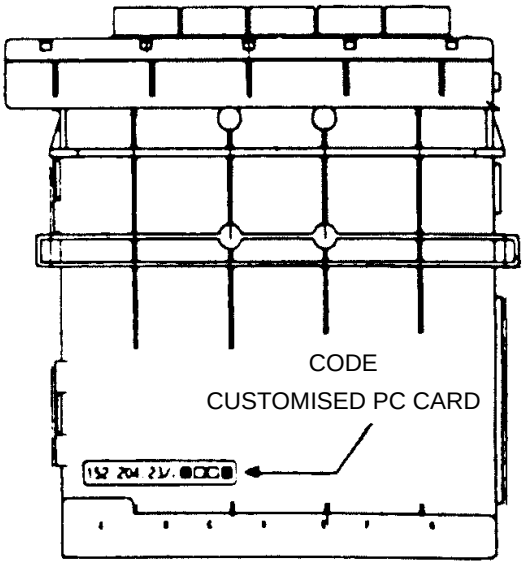
A sticker with all the technical data of the pc card and a code (e.g. 152.204.20/.) which serves to identify the basic pc card is located on the pc card housing.

If the pc card has been programmed to suit the specific user at the works, a second sticker with a code (e.g.: 152.204.23/.) to identify the pc card specifically programmed for this dishwasher model is to be found on the pc card housing (on the other side).

The possibility of being able to programme the pc card to suit the requirements of the customer and sales market offers the advantage that only one, the basic pc card, has to be used and considered as a spare part, and that, if required, any necessary additional functions can be entered directly in the pc card on the appliance.

Note: If there is an identification sign for a customised pc card on the pc card housing, this means that the basic pc card has to be installed in this appliance model without additional functions.





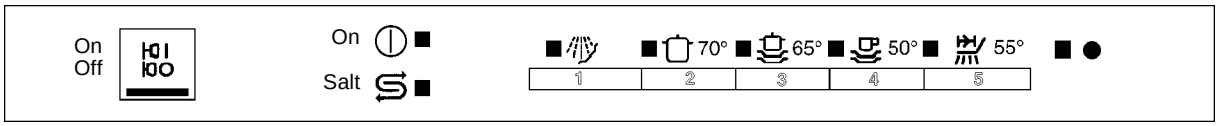
3.8 Pc card configuration

The functions of each dishwasher model are established to suit the requirements of the specific sales market. Therefore, additional functions (options) can be entered in the basic pc card so that the appliance satisfies the particular requirements.

The appliance is programmed to suit the customers and sales market (entry of the various additional functions) with the standard pc card installed in the dishwasher model. This special operation may only be performed by technical personnel authorised to do so.

The electronic basic pc card can have various configurations if it has been programmed to suit the customer.

The actual configuration of the additional functions is obtained by comparing the identification code attached to the pc card housing with the various ways in which the four LEDs light up (constantly on or flashing).



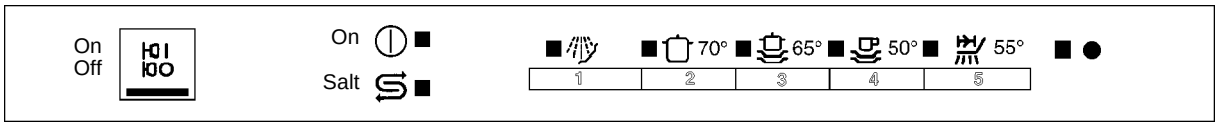
Code PC basic card	Code customised pc card	LEDs 1 2 3 4	Option A ■	Option B ■ 70°	Option C ■ 65°	Option D ■ 50°
152.204.20/.		L L L L	—	—	—	—
	152.204.21/.	L L L **A**	—	—	—	X
	152.204.22/	L L **A A**	—	—	X	X
	152.204.23/	**A** L L **A**	X	—	—	X
	152.204.24/	**A** L **A A**	X	—	X	X
	152.204.25/	L **A** L L	—	X	—	—
	152.204.26/	L **A** L **A**	—	X	—	—
	152.204.27/	L **A A A**	—	X	X	X
	152.204.28/	**A A** L **A**	X	X	—	X
	152.204.29/	**A A A A**	X	X	X	X

Legend: LEDs **A** = light up continuously
LEDs L = flashing

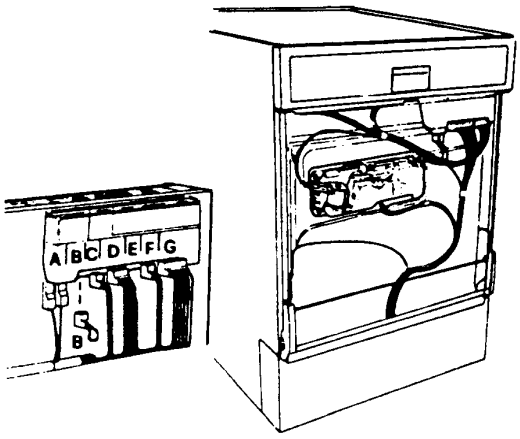
Option/additional function A: Specific wash programme for the French sales market
Option/additional function B: Additional rinse with cold water (2 instead of 1)
Option/additional function C: Rinse at 65°C for BIO/ECO programme
Option/additional function D: Rinse with warm water 55°C for short programme

3.9 Customised programming of the basic pc card

Forword:
This operation only relates to a small proportion of the dishwasher models as most appliances are fitted with a basic pc card without any additionally stored functions.

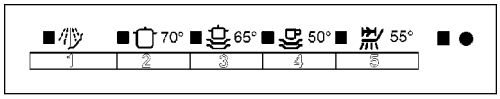


Customised programming is performed with the door removed and using the appropriate two-lead plug-in connector (spanner) which is included in the pc card scope of delivery (code 152 28 56-00/2)

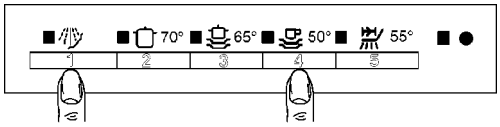


Proceed as follows in line with the programming code attached to the pc card housing:

- Insert the connector (spanner) into sector B of the pc card.
- Switch the appliance on. You are now in the customised programming phase.
- The programme LEDs 1 – 2 – 3 – 4 flash (an indication that no additional function has yet been entered in the basic pc card).
- Press the programme button(s) corresponding to the specific programming code (see table on page 21)



- The LED corresponding to the depressed button stays on permanently while the remaining LEDs continue to flash (e.g. for the code 152.204.23/. press the buttons 1 and 4 – the corresponding LEDs stay on permanently).

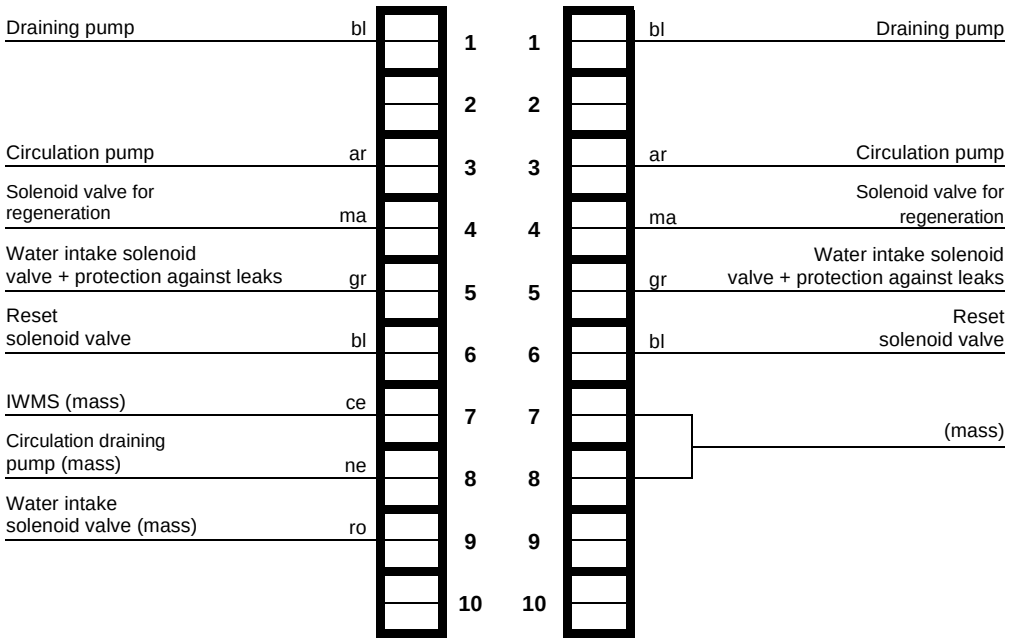


- Switch the appliance off. The additional functions set are now stored.
- Remove the connector (spanner) from the pc card and mount the door again.
- The electronic pc card has now been programmed to suit the customer.

3.10 Component check

For troubleshooting, the internal resistance of the various components installed in the appliance can be measured using the modular connector (after removing the plug from the socket), which is mounted on the bottom section of the appliance, and thus their functionability checked. For this purpose a normal multimeter is used.
In order to be able to identify the components to be checked, a verification procedure has been developed; the measuring points to which the measuring cables of the measuring instruments are to be applied for each component are described in the following together with the correct resistance values.

Electromechanical switch mechanism **Electronic control**



	Measuring points	Correct value	Measuring points	
Draining pump	1 - 8	70 +/- 7%	1 - 8	Draining pump
Circulation pump	3 - 8	48 +/- 7%	3 - 8	Circulation pump
Solenoid valve for regeneration	4 - 7	2450 +/- 8%	4 - 7	Solenoid valve for regeneration
Water intake solenoid valve + protection agianst leaks	5 - 9	3800 +/- 8%	5 - 8	Water intake solenoid valve + protection agianst leaks
Reset solenoid valve	6 - 7	4850 +/- 8%	1 - 8	Reset solenoid valve

Note: If the resistance between the contacts 1 – 8 and 3 – 8 is the same (roughly 28 ohm), the condenser is short-circuited.

LEGEND ar = orange bi = white bl = blue ce = light blue
ne = black ro = pink vi = violet ma = brown

3.11 Circuit diagrams IGV 458.3 - 9117470 - 08

Legend

PLUG-IN CONNECTORS

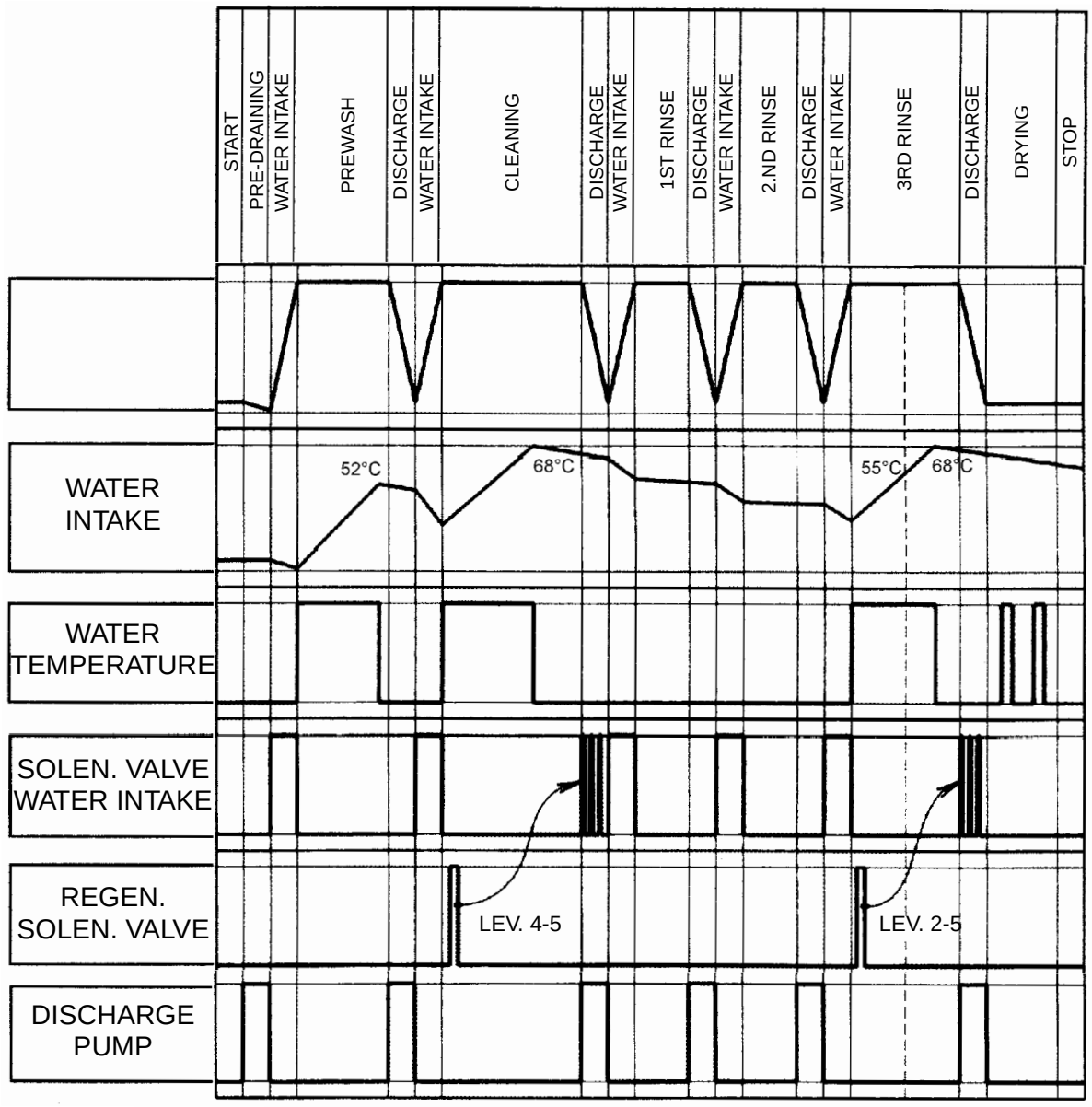
ar	=	orange
bi	=	white
bl	=	blue
ce	=	light blue
gi-ve	=	yellow/green
gr	=	grey
ma	=	brown
ne	=	black
ro	=	pink
vi	=	violet

AA	=	Overflow protection device
CO	=	Capacitor
DA	=	Protection against leakage
DB	=	Container - rinse aid
DD	=	Detergent dispenser
EC	=	Solenoid valve for the water intake
ER	=	Solenoid valve for the regeneration
ES	=	Reset solenoid valve
GA	=	Radio interference suppression
IP	=	Door switch
KM	=	Electromagnet
LS	=	Control lamp
MR	=	Terminal board
MT	=	Motor of the programme controller
MV	=	Fan motor
PL	=	Circulating pump
PL/S	=	Circulating pump/drainage pump
PS	=	Drainage pump
PU	=	Buttons on the control panel
RA	=	Overflow protection device
RE	=	Programme controller relay
RL	=	Pressure switch
RP	=	Time switch
RR	=	Heater
SB	=	Rinse aid sensor
SD	=	Detergent sensor
SS	=	Salt sensor
ST	=	Temperature detector
TA	=	Thermostat H.T.
TAC/T	=	Tacho-generator
TB	=	Thermostat L.T.
TM	=	Thermostat M.T.
TS	=	Safety thermostat

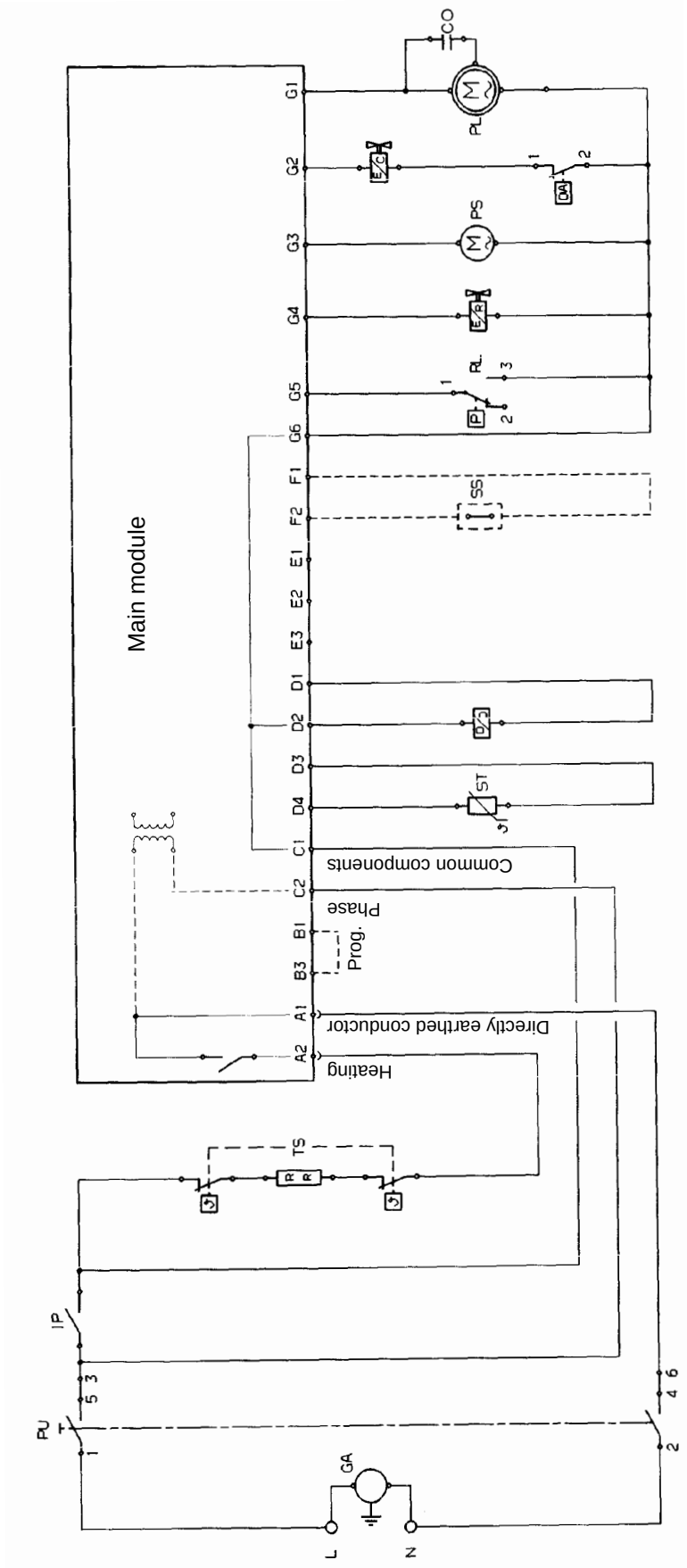
Technical data IGV 458.3

General features		
Operating voltage	V	230
Dimensions: (H x W x D)	cm	82x45x57
Capacity (standard place settings)	N	9
Total power consumption	W	3000
Water volume in base pan (approx.)	l	5,1
Water pressure (max./min.)	N/cm²	80/5
General features - discharge pump		
Max. head	cm	100
Delivery rate	l/min	20
Power consumption	W	30
Coil resistance	ohm	170
Detergent/rinse aid dispenser		
Dosage range	cm³	1.2-5.0
Resistance	ohm	1500
Solenoid valve		
Coil resistance	ohm	2500
Water intake valve		
Delivery rate	l/min	2.5 - 4
Coil resistance	ohm	2500
Heating resistor		
1st heating rod - power consumption	W	2800
Resistance	ohm	17
Safety thermostat		
Temperature	°C	75
Colour coding		violet/orange
Circulation pump		
Performance		continuous operation
Insulation		F
Starting capacitor	V/µF	450/5
Power consumption	W	160
Speed	rpm	2700
Current consumption	A	0.7
Resistance working coil	ohm	36.2
Resistance auxiliary coil	ohm	61.6
Control pc board	N	152 204203
Temperature sensor		
Resistance at 25 °C	ohm	48400
Resistance at 50 °C	ohm	16550
Resistance at 70 °C	ohm	7575

Programme run IGV 458.3

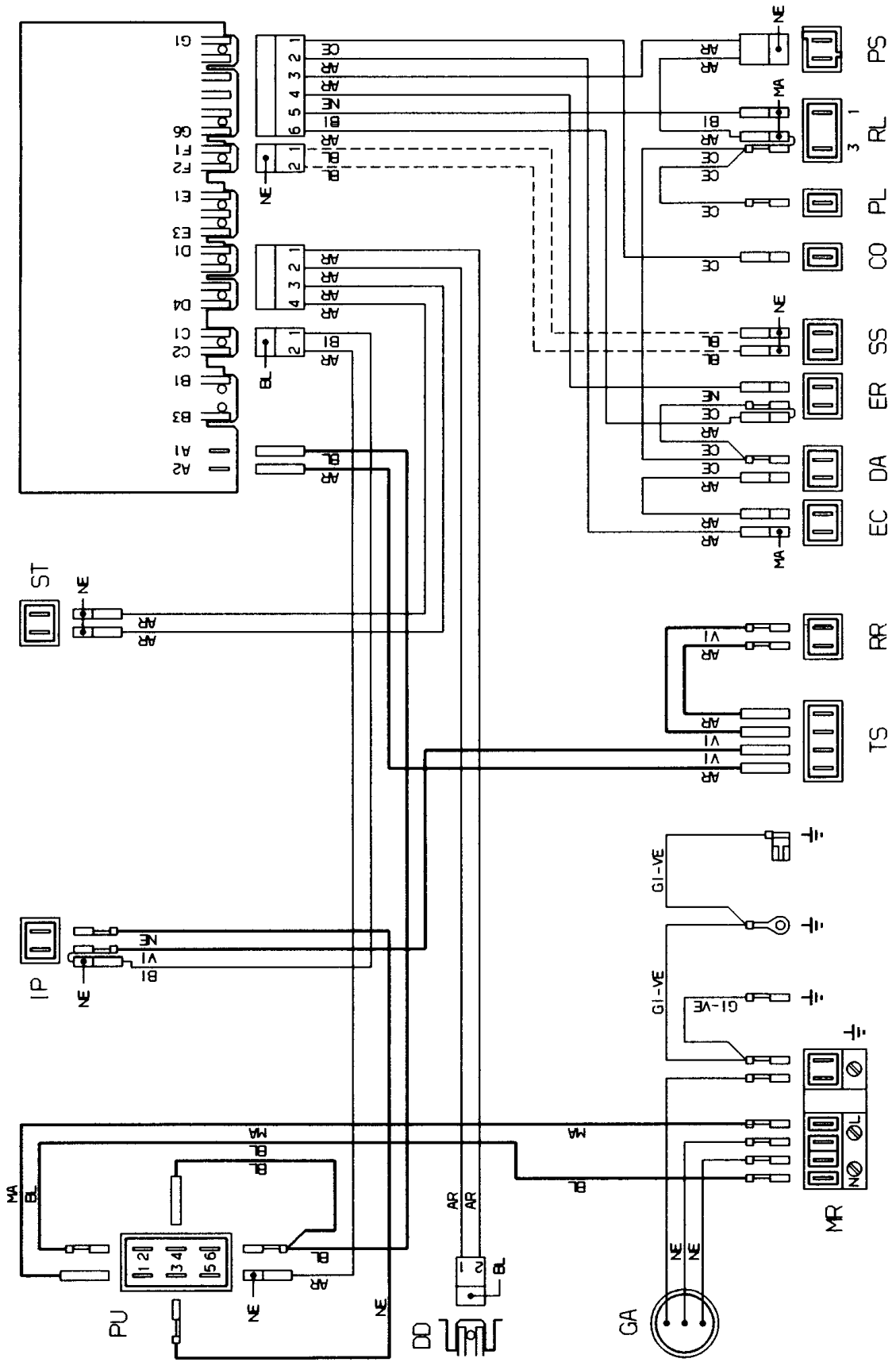


Circuit diagram IGV 458.3



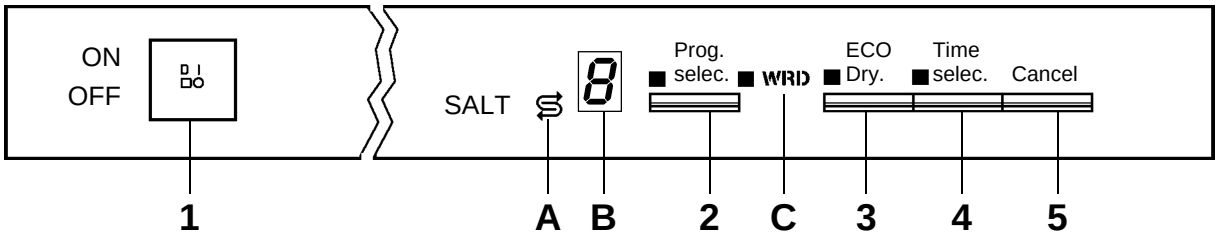
Küppersbusch
THE HEART OF A GOOD KITCHEN

Programme controller mechanism IGV 458.3



4. Functions and controls IGV 658.0

4.1 Control panel



1. ON/OFF button

- Switches the appliance on and off.
- Prepares the appliance for the selection of the wash programme.

A **SALT LED** (red)

- Comes on when the salt container has to be refilled.

B **DISPLAY window** (green)

- Indicates the programme number (1 to 9).
- Indicates the down-counting delay time in hours until the start (from 0 to 9).
- Indicates a flashing decimal point if the option DELAYED START has been selected.
- Indicates a flashing dash when the programme is over.
- Indicates the regeneration level (from 0 to 9).
- Indicates a flashing letter when an alarm occurs.
- Indicates options provided some have been selected.

C **WRD LED** (green)

- Comes on when programme 2 has been selected.
- Indicates that detergent has to be filled into the “WRD detergent chamber”.

2 **PPROGRAMME SELECTION button**

- Must be pressed to select the wash programme you want.
- The LED flashes when a programme has been selected.
- The button emits a signal which is displayed in the DISPLAY window in the form of a number (from 1 to 9).

PROGRAMME SELECTION – LED

- *Flashes* during the programme selection phase.
- *Comes on* during the programme run.
- Is *switched off* when the option DELAYED START is selected and is running.

3. **ECO-DRYING** button

- This button must be pressed to deactivate the drying function. The LED comes on when ECO-DRYING has been selected.
- To switch the appliance back to normal drying, this button must be pressed again. The LED goes off.

ECO-DRYING-LED

- ON: ECO-DRYING activated.
- OFF: ECO-DRYING deactivated.

4. **DELAYED START** button

- This button must be pressed to enter the delay time in hours to the start of the selected wash programme.
- The LED flashes when the option DELAYED START has been selected.
- The button emits a signal which is displayed in the DISPLAY window in the form of a number (from 1 to 9).

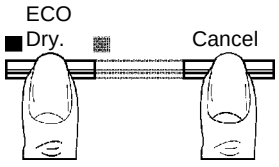
DELAYED START LED (green

- *Flashes* while the delay time is being set in hours.
- *Comes on* while the delay time is running.
- Is *switched off* during the selection and run of the wash programme.

5. **CANCEL** button

- This button only functions when the door is opened.
- It must be pressed for at least two seconds.
- In the programme selection phase all selected entries are cancelled.
- If this button is pressed during the programme run, the programme is stopped.

4.2 Entry of the degree of water hardness



Open the door and turn the appliance into the programme selection phase.
Switch the dishwasher on.
If necessary, press the **ON/OFF** button.

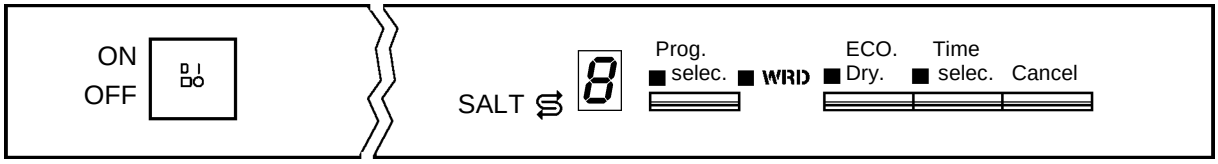
- Press the buttons **ECO DRYING** and **CANCEL** (3+5) at the same time and keep them depressed for 5 seconds until the previous degree of hardness (0 – 9) is shown in the **DISPLAY** window.
- To change the degree of hardness, you must press the button **ECO-DRYING** (3) while the corresponding LED is flashing. Each time the button is pressed, the setting increases by one level.
- 5 seconds after the last button is pressed the degree of hardness is shown in the **DISPLAY** window and stored in the memory.
  The appliance reverts automatically to the programme selection phase.

4.3 Function features of the control elements

The function features of the programme are divided into three consecutive phases:

- Programme selection
- Programme run
- Programme end

During each phase a buzzer with different frequencies sounds, thus indicating that the options selected have been taken over.
The control elements are arranged on the top edge of the door. For this reason, the door must be tilted open so that you can use or check the control elements.



Settings

Switching on

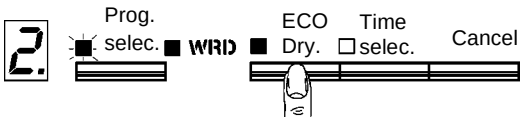
- Press the ON/OFF button to switch on the dishwasher; the appliance then goes into the programme selection phase.
- Programme No. 1 is shown in the DISPLAY window.
- The LED PROGRAMME SELECTION flashes (and if salt has to be refilled, the LED SALT also comes on).

Programme selection

- Press the programme selection button to select the wash programme you want.
  Each time you press this button, the programme number increases by one.
- The BUZZER emits a brief signal each time this button is pressed.
- At the same time, the selected programme (e.g. 2) is shown in the DISPLAY window.
- The LED PROGRAMME SELECTION continues to flash.
- If programme No. 2 has been selected, the LED WRD automatically comes on.
  With this programme it is recommended to fill detergent for the prewash phase into the appropriate chamber of the WRD feed device.

Select ECO-DRYING

- If the button ECO-DRYING is pressed, the hot air drying phase is dispensed with.
- The LED ECO-DRYING comes on and the BUZZER emits a brief signal to confirm the selection.
- If the LED is switched off, the drying phase of the respective wash programme is executed as normal.

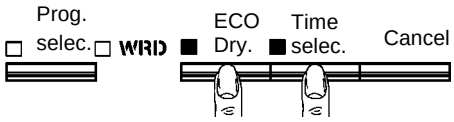


Note: If the option ECO-DRYING has been selected, the HOT rinse is automatically replaced by a COLD rinse.

SALT LED

- If the SALT LED comes on, this indicates that the salt container has to be refilled.
- If the degree of water hardness is set to “0”, this LED stays off (as no salt is required for the degree of hardness “0”).

Buzzer



- The BUZZER is programmed so that it emits signals in certain phases.
- The buzzer can be activated or deactivated at any time using a button combination (even if a wash programme is running).

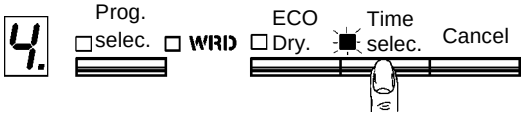
Deactivation of the buzzer

- Press the buttons ECO-DRYING and DELAYED START at the same time and keep both buttons depressed for about 3 seconds.
- Three short signals sound to confirm the deactivation of the BUZZER.

Reactivation of the buzzer

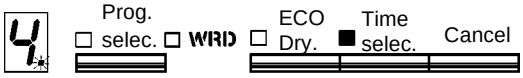
- Press the button ECO-DRYING and DELAYED START at the same time and keep both buttons depressed for about 3 seconds.
- An intermittent signal sounds to confirm renewed activation of the BUZZER.

Select DELAYED START



- Press the button DELAYED START if the selected wash programme is to start later.
- The delay time starts with 0 hours and is prolonged, when you press the button, by one hour up to a maximum delay time of 9 hours.
- At the same time the preset delay time is shown in the DISPLAY window in the form of a number (from 0 to 9).
- A brief signal sounds each time the button is pressed.
- The corresponding LED flashes to indicate that the number shown in the DISPLAY window relates to the delay time.

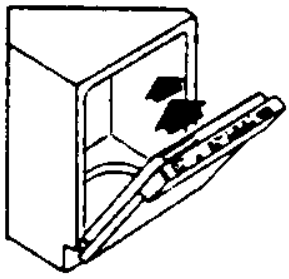
Activate delayed start



- When the door is closed, the delayed time selected starts to run backwards.
- A short signal indicates that the delay time is running.
- The delay time is not uninterrupted if the door is opened.
- A flashing decimal point in the DISPLAY window indicates that the delay time is running.
- The delay time can be interrupted by pressing the ON/ OFF button; it starts again when the ON/OFF button is pressed again.
- When the delay time has run back to zero, the dishwasher automatically starts the wash programme.
- If you press the CANCEL button, the delay time selected is cancelled and the number of the wash programme selected appears again in the DISPLAY window; the corresponding LED flashes.

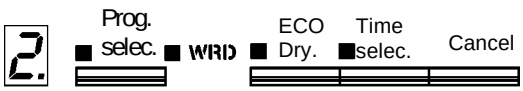
START *excludes the setting of Delayed Start*

- When the door is closed, the wash programme selected starts automatically, i.e. the appliance changes from the programme selection phase to the programme run phase.
- A short signal (1 second) confirms that the programme has started.



Programme execution

When the door is opened:



- The programme is interrupted and the programme currently selected (e.g. 2) is indicated in the DISPLAY window.
- The LED PROGRAMME SELECTION comes on (and the LEDs WRD and/or ECO-DRYING come on if this(these) option(s) has(have) been selected).
- All settings of the PROGRAMME SELECTION and the ECO-DRYING selection are stored in the memory and cannot be changed in this mode (although the programme can be cancelled or reset).

When the door is closed:

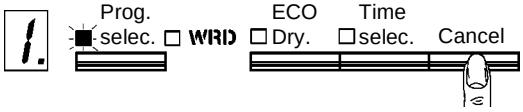
- The programme run is resumed at the point where it was interrupted.

Interruption of the programme run

- When the door is opened, the DISPLAY window shows the number of the wash programme currently selected.
- Press the ON/OFF button to interrupt the current programme.
- If you press the ON/OFF button again, the programme number is indicated again and, after the door has been closed, the programme run is continued at the point where it was interrupted.

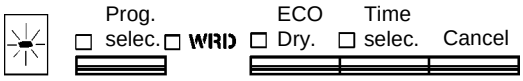
Cancellation of the programme

- When the door is opened, the DISPLAY window shows the number of the wash programme currently selected.
- Press the button CANCEL (for 2 seconds); a short signal confirms that the programme has been deleted.
- The dishwasher reverts to the programme selection phase; programme No. 1 is shown in the DISPLAY window and the corresponding LED flashes.



Programme end

- The end of the wash programme is indicated by the buzzer which sounds intermittently for about 5 seconds.
- Open the door.
- The DISPLAY window shows a dash (“–”). This confirms that the wash programme is over.
- Switch the appliance off with the ON/OFF button.



4.4. **Safety systems** (only in electronic dishwashers)

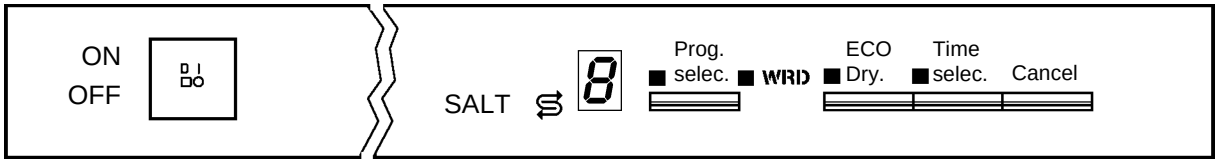
Special electronic (software) routines constantly monitor the programme run to ensure that all functions are executed correctly; the monitoring routines are automatically activated if a malfunction occurs.

In addition, the following safety systems are in operation during the programme run:

- **Programme is executed**
  After the door has been closed, the wash programme starts and the various settings can no longer be changed. This means that the unintentional activation of control elements (apart from CANCEL) has no effect.
  During the programme run only the CANCEL button is operable.

- **Power failure**
  In the event of a power failure, the settings of the currently selected programme are retained in the memory. At the end of the power failure, the wash programme continues at the point where it was interrupted.

4.5 **Alarms** (Itronic “HL”)



If one of the safety systems responds, this is also reported by an alarm code in the form of a flashing letter in the **DISPLAY** window.

If an alarm code appears in the **DISPLAY** window during the programme run, the dishwasher is stopped (i.e. the programme is interrupted) and all functions including all pushbuttons apart from the **ON/OFF** button are locked.

Safety system		**Alarm code**
Time lock	Water intake	**A**
Time lock	Additional water intake	**C**
Time lock	Pressure switch EMPTY (waiting for correct temperature)	**F**
Time lock	Temperature sensor	**L**
Time lock	Water heating	**H**
Time lock	Pressure switch EMPTY (end of draining)	**P**

Resetting/cancelling alarm

In order to reset or cancel an alarm status, you must press the **ON/OFF** button to switch off the appliance. If you press the **ON/OFF** button again, the appliance is switched on again and goes into the programme selection phase; you can now select the wash programme again.
If the fault has not been rectified, the appliance reverts to the ALARM status.

4.5.1 Water intake *Time lock*

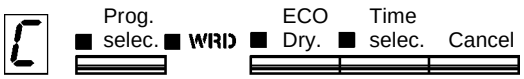
Situation

Appliance stops:
When door opened:
Display: A (flashing)
LEDs OFF

- The maximum duration of the water intake phase is 5 minutes.
- The counter of the time lock starts at the beginning of each water intake phase and ends as soon as a FULL signal is received by the pressure switch (**1-3**).
- If the period of time which the pressure switch needs to reach the FULL condition (**1-3**) is more than 5 minutes, an alarm is reported.

4.5.2 Additional water intake *Time lock*

Situation



Appliance stops:
When door opened:
Display: C (flashing)
LEDs OFF

- The maximum duration of the additional water intake phase after the pressure switch has been reset is **45 seconds**.
- The safety system with the time lock becomes active when the normal water level has been reached (pressure switch FULL (**1-3**) and remains in service until the following draining phase.
- The counter of the time lock starts as soon as the pressure switch is reset to EMPTY (**1-2**) and ends when the pressure switch reverts to the FULL status (**1-3**).
- If the period of time which the pressure switch needs to revert to the FULL status (**1-3**) is more than **45 seconds**, an alarm is reported.
- If more than one additional water intake operation is performed as the pressure switch reverts more than once to the EMPTY condition (**1-2**), the total duration of the additional water intake phases must not exceed **45 seconds**. If this period of time is exceeded, an alarm is reported.

4.5.3 Pressure switch EMPTY *Time lock*
(waiting for correct temperature)

Situation

Appliance stops:
When door opened:
Display: F (flashing)
LEDs OFF

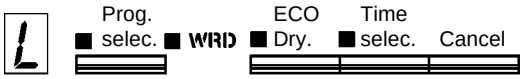
Conditions:

- This safety system is only in service while the appliance is waiting for the correct temperature to be reached (water heating phase), excluding the drying phase.
- If the pressure switch is reset to EMPTY (**1-2**), the maximum time up to receipt of the FULL signal (**1-3**) is 2 minutes.
- If the pressure switch monitor does not revert to the FULL status (**1-3**) within 2 minutes, the programme run is interrupted and an alarm is reported.
- While the appliance is waiting for the correct temperature to be reached, the pressure switch must not revert more than three times to the EMPTY status (**1-2**). Each additional resetting of the pressure switch (i.e. more than three times) causes the programme run to be interrupted and an alarm reported.

4.5.4 Temperature sensor *Time lock*
(interrupted/short-circuited)

- The perfect functioning of the temperature measuring circuit is checked during the water heating phases, which also contain a phase of waiting for the correct temperature.
- Two temperature threshold values are monitored: the lower temperature limit is -5 °C, the upper temperature limit is roughly +85 °C.
- If the temperature does not lie between these two threshold values, an alarm is reported.

Situation

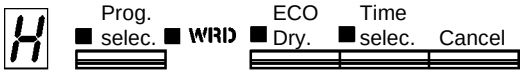


Appliance stops:
When door opened:
Display: L (flashing)
LEDs OFF

4.5.5 Water heating *Time lock*

- The maximum duration of the water heating phase is 45 minutes, regardless of the temperature for the wash programme selected.
- The counter of the time lock starts at the beginning of each water heating phase (i.e. when the heater is switched on) and ends when the correct temperature has been reached.
- If the period of time which is needed to heat the water to the correct temperature exceeds 45 minutes, an alarm is reported.
- During the final drying phase (after the last hot rinse water has been pumped out), this safety time lock is no longer in operation.

Situation

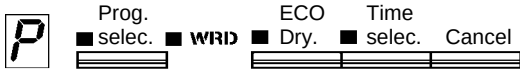


Appliance stops:
When door opened:
Display: H (flashing)
LEDs OFF

4.5.6 Pressure switch EMPTY *Time lock*
(end of the draining phase)

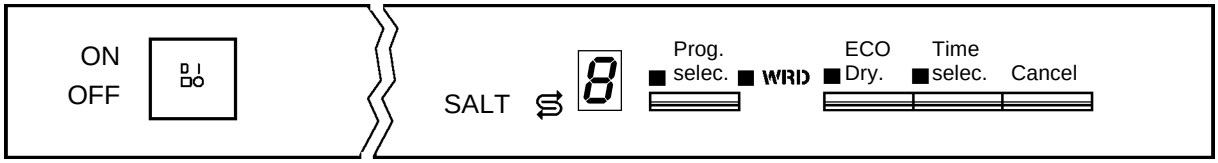
- At the end of each draining phase a check is made to see whether the pressure switch is in the EMPTY condition (**1-2**).
- If the pressure switch is in the FULL condition (**1-3**) at the end of the draining phase, an alarm is reported.

Situation



Appliance stops:
When door opened:
Display: P (flashing)
LEDs OFF

4.6 Table of alarm conditions



The following table explains the meaning of the various alarm codes which may appear in the DISPLAY window and lists the possible causes of each alarm code.

Alarm display	Activation Time-Out safety system	Causes
A	**Water intake** 5 min. max.	♦ water cock closed ♦ line water pressure too low ♦ filter in intake hose clogged ♦ solenoid valve does not open ♦ siphon effect in the waste water hose ♦ activation of the overflow protection ♦ activation of the leak protection ♦ control pc board defective
C	**Additional water intake** Total duration 45 secs max.	♦ outlet tray and connected channels leaking ♦ siphon effect in the waste water hose ♦ circulation filter clogged ♦ dishes arranged the wrong way round ♦ pressure switch defective ♦ pressure chamber leaking ♦ control pc board defective
F	**Pressure switch EMPTY** Waiting for correct temperature max. 2 min. not more than 3x	♦ outlet tray and connected channels leaking ♦ siphon effect in the waste water hose ♦ circulation filter clogged ♦ dishes arranged the wrong way round ♦ pressure switch defective ♦ pressure chamber leaking ♦ control pc board defective
L	**Temperature sensor** Immediate activation during the heating phase Operating temperature range -5°C bis 85°C	♦ temperature sensor disconnected or outside the range ♦ connections loose/interrupted ♦ temperature sensor incorrectly installed ♦ temperature sensor short-circuited ♦ connections short-circuited ♦ temperature has exceeded +85°C ♦ control pc board defective
H	**Water heating** Max. 45 min. the drying phase excluded	♦ heating element interrupted ♦ connections loose/interrupted ♦ safety thermostat opened ♦ temperature sensor incorrectly calibrated or wrongly installed (poor contact) ♦ circulation filter clogged ♦ water level too low ♦ upper spray arm damaged ♦ control pc board defective
P	**Pressure monitor EMPTY (end of draining)** Immediate activ. each time draining ends.	♦ draining pump does not work ♦ water discharge hose bent ♦ waste water siphon defective ♦ circul. hose damaged or incorrectly installed

4.7 Circuit diagrams IGV 658.0 - 9118970 - 04

Legend

PLUG-IN CONNECTORS

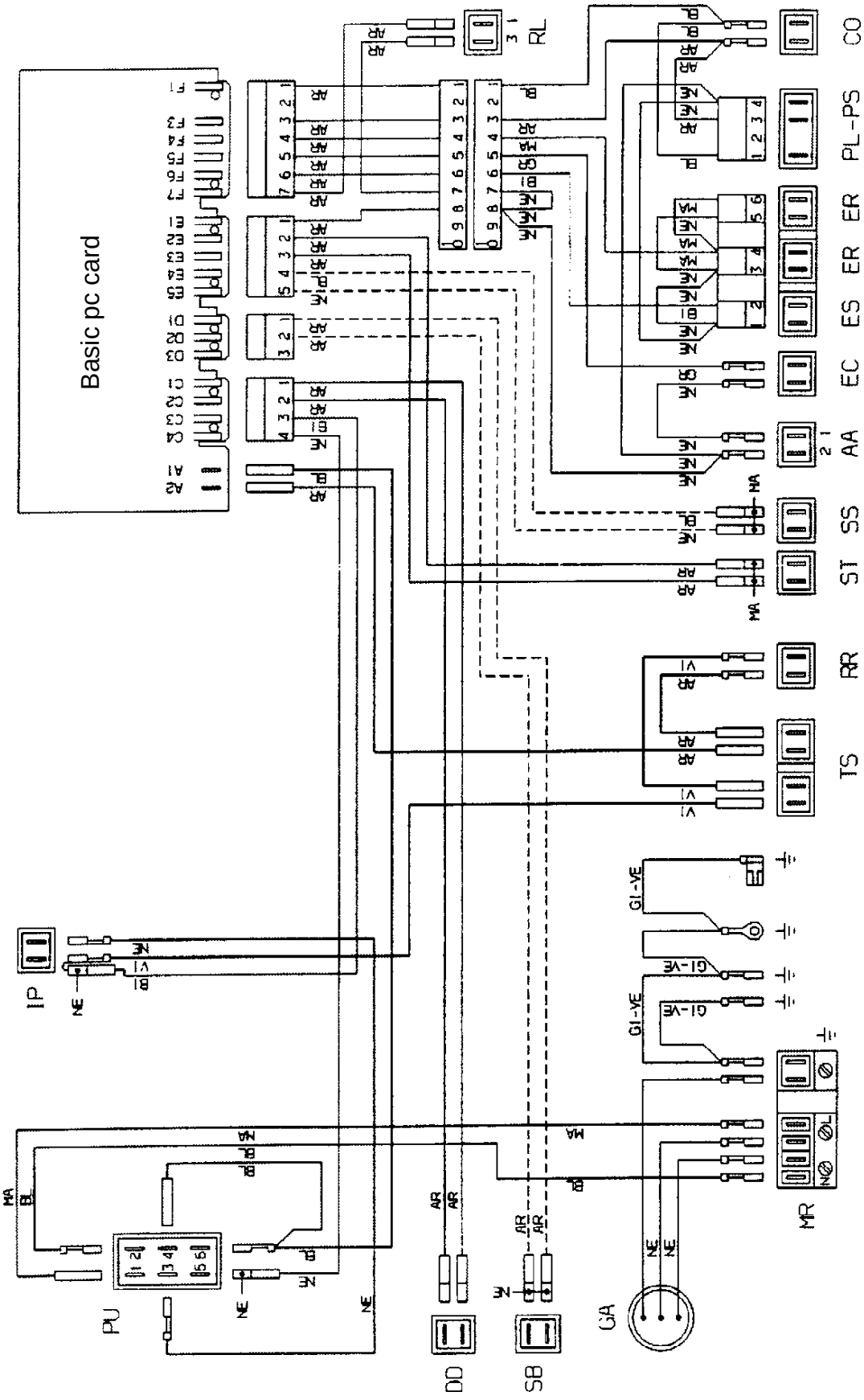
ar	=	orange
bi	=	white
bl	=	blue
ce	=	light blue
gi-ve	=	yellow/green
gr	=	grey
ma	=	brown
ne	=	black
ro	=	pink
vi	=	violet

AA	=	Overflow protection device
CO	=	Capacitor
DA	=	Protection against leakage
DB	=	Container - rinse aid
DD	=	Detergent dispenser
EC	=	Solenoid valve for the water intake
ER	=	Solenoid valve for the regeneration
ES	=	Reset solenoid valve
GA	=	Radio interference suppression
IP	=	Door switch
KM	=	Electromagnet
LS	=	Control lamp
MR	=	Terminal board
MT	=	Motor of the programme controller
MV	=	Fan motor
PL	=	Circulating pump
PL/S	=	Circulating pump/drainage pump
PS	=	Drainage pump
PU	=	Buttons on the control panel
RA	=	Overflow protection device
RE	=	Programme controller relay
RL	=	Pressure switch
RP	=	Time switch
RR	=	Heater
SB	=	Rinse aid sensor
SD	=	Detergent sensor
SS	=	Salt sensor
ST	=	Temperature detector
TA	=	Thermostat H.T.
TAC/T	=	Tacho-generator
TB	=	Thermostat L.T.
TM	=	Thermostat M.T.
TS	=	Safety thermostat

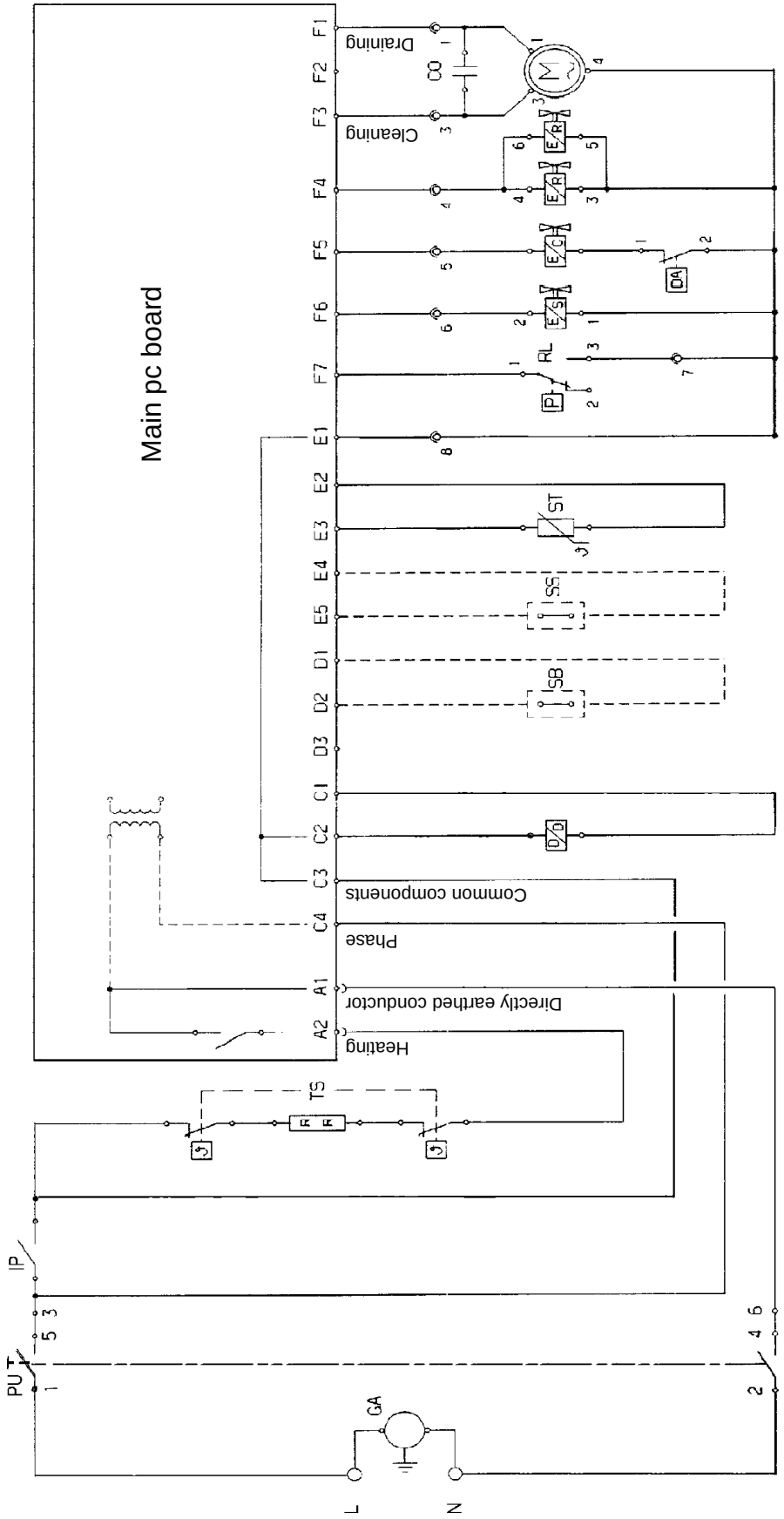
Technical data IGV 658.0

General features		
Operating voltage	V	230
Dimensions (H x W x D)	cm	82 x 60 x 57
Capacity (standard place settings)	N	12
Total power consumption	W	2300
Water quantity in base pan (approx.)	l	5
Water pressure (max./min.)	N/cm²	80/5
Dispenser - detergent - rinse aid		
Dosage range	cm³	1,2-5,0
Resistance	ohm	1500
Heater resistor		
1st heating rod power consumption	W	2000
Resistance	ohm	26
IWMS softener		
Regeneration electro valve		
Coil resistance	ohm	4950
Resin wash solenoid valve		
Coil resistance	ohm	4950
Reset solenoid valve		
Coil resistance	ohm	4950
Water intake valve		
Delivery rate	l/min	3 - 4
Coil resistance	ohm	3700
Safety thermostat		
Temperature	°C	80
Colour coding		green
Circulation pump/Discharge motor		
Insulation		F
Power consumption	W	158
Speed	rpm	2750
Current consumption	A	0.69
Circulation coil	ohm	47.5
Drainage coil	ohm	70
Starting capacitor	V/µF	450/4
Temperature sensor		
Resistance at 25 °C	ohm	48409
Resistance at 50 °C	ohm	16542
Resistance at 70 °C	ohm	7574

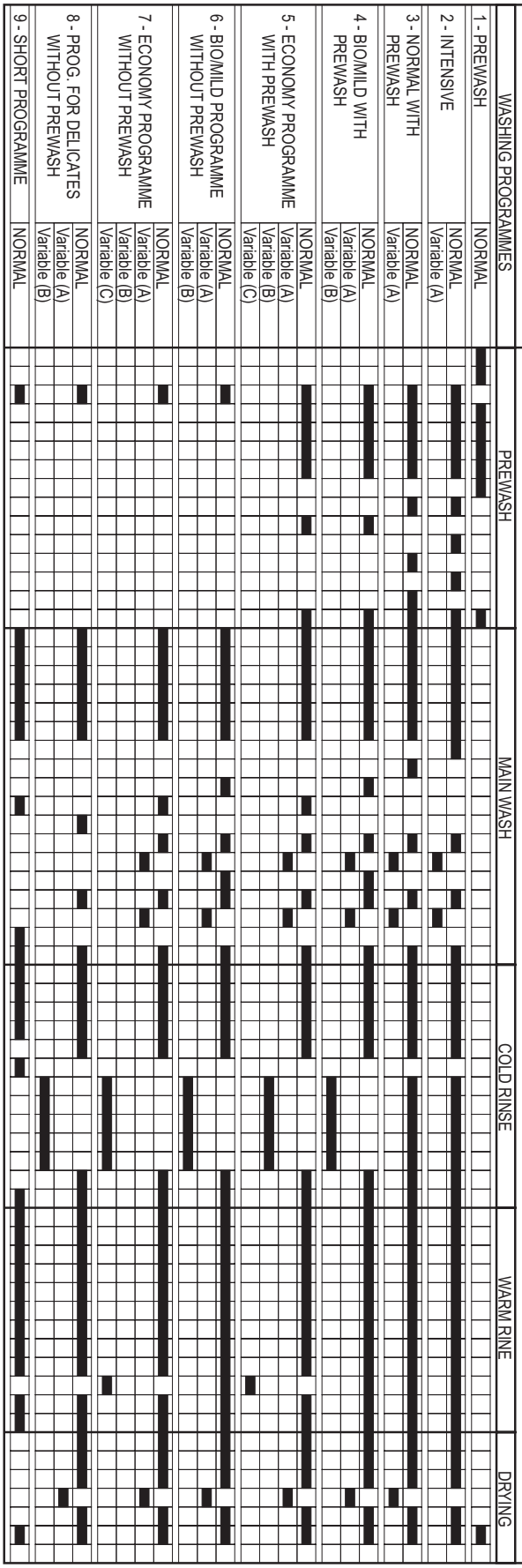
Programme controller mechanism IGV 658.0



Circuit diagram IGV 658.0



Programme run IGV 658.0



SWITCHING TIME AND TEMPERATURE FUNCTIONS

★ = TEMPERATURE SELECTION

▼ = TIME SELECTION

(P) = PRESSURE MONITOR WAITING TIME

(T) = TEMPERATURE WAITING TIME

1	Intake and drain		60"
2	Reset		60"
3	Drain and RESET		105"
4	Intake		40"
5	Intake and wash		20"
6	Intake		(P)
7	Wash		15"
8	Wash and RESET	▼	195"
8 bis	Wash and RESET	▼	130"
8 bis	Wash and RESET	▼	450"
9	Wash and heating	★	T=52°
9 bis	Wash and heating	★	T=52°
10	Wash		141"
10 bis	Wash		180"
11	Drain and RESET		105"
12	Intake		40"
13	Intake and wash and detergent		20"
14	Intake		(P)
15	Wash		15"
16	Wash and RESET		105"
17	Wash and RESET and heating		47"
18	Wash and heating	★	T=68°
18 bis	Wash and heating	★	T=65°
18 bis	Wash and heating	★	T=50°
18 bis	Wash and heating	★	T=53°
18 bis	Wash and heating	★	T=43°
19	Wash		470"
19 bis	Wash		410"
20	Wash and heating	★	T=55°
21	Wash	▼	330"
21 bis	Wash	▼	269"
21 bis	Wash	▼	94"
22	Drain		105"
23	Intake		40"
24	Intake and wash		20"
25	Intake		(P)
26	Wash		15"
27	Wash and RESET	▼	195"
27 bis	Wash and RESET	▼	130"
28	Drain		105"
29	Intake		40"
30	Intake and wash		20"
31	Intake		(P)
32	Wash		15"
33	Wash and RESET		195"
34	Drain		105"
35	Intake		40"
36	Intake and wash		20"
37	intake		(P)
38	Wash		15"
39	Wash and RESET		141"
40	Wash and heating (and regeneration)	★	T=53°
41	Wash and prewash (and regeneration)		30"
42	Wash (and regeneration)		5"
43	Wash and prewash (and regeneration)		30"
44	Wash and heating (and regeneration)	★	T=67°
45	Wash (and regeneration)	▼	(0:600")
46	Drain and RESET		105"
47	Drying (and regeneration)		120"
48	Drying and heating (and regeneration)		30"
49	Drying (and regeneration)		450"
49 bis	Drying (and regeneration)		750"
50	Drying and heating		30"
51	Water alarm buzzer		5"
52	End		