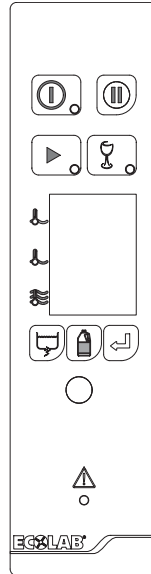




SERVICE MANUAL

COMPACT ECOLAB USA

RACK-TYPE DISHWASHERS



CONTENTS: This document contains all the parameters and information for programming the electronic boards.

EDITION: 07.2009

Valid for firmware versions:

- 7.05 COMPACT ECOLAB USA.

WARNING:

All the safety regulations and procedures to be followed by the Specialised Technician/Technical Assistance performing electrical, mechanical or electronic maintenance operations are contained in the instruction manual supplied with the machine: refer to this document before operating. This applies for anyone carrying out operations using these documents. The specialised technician must wear personal protection equipment suitable for the work being performed (e.g. gloves, safety glasses and shoes, suitable clothing, etc.) and use appropriate tools, equipment and auxiliary means.



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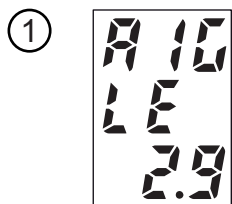


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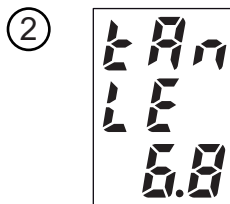
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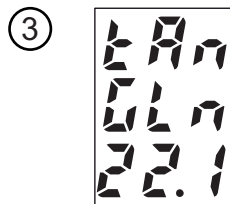
Press the Start button - "E" (Figure 1) - and relief blue button - "D" (Figure 1) - at the same time for a few seconds to access the first screen; press the drain button - "A" (Figure 1) - to access the subsequent screens. The following screens are displayed (in order) :



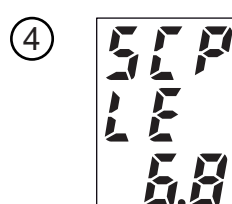
Air Gap level
[Inches if par. *UMU* = 1; *
mm if par. *UMU* = 0]



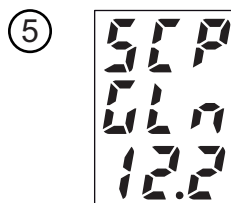
Wash tank level
[Inches if par. *UMU* = 1; *
mm if par. *UMU* = 0]



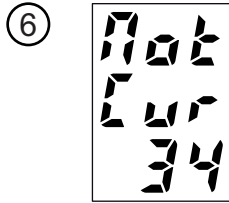
**Volume of water contained
in the wash tank**
[Gallons if par. *UMU* = 1; *
Litres if par. *UMU* = 0]



**Prewash tank level
(significant only for
machines with prewash)**
[Inches if par. *UMU* = 1; *
mm if par. *UMU* = 0]



**Volume of water contained
in the prewash tank
(significant only for
machines with prewash)**
[Gallons if par. *UMU* = 1; *
Litres if par. *UMU* = 0]



**Gear motor current
[dec Amperes]**

To return to the standard display, wait 30 seconds or press the Confirm button - "C" (Figure 1).

* The parameter *UMU* (Usa Measurement Unit) is not available on the user interface, but only on the PC.

A2 ACCESSING THE USER MENU

From the normal machine operation mode it is possible to access the machine consumption display and reset menu (Figure 3).

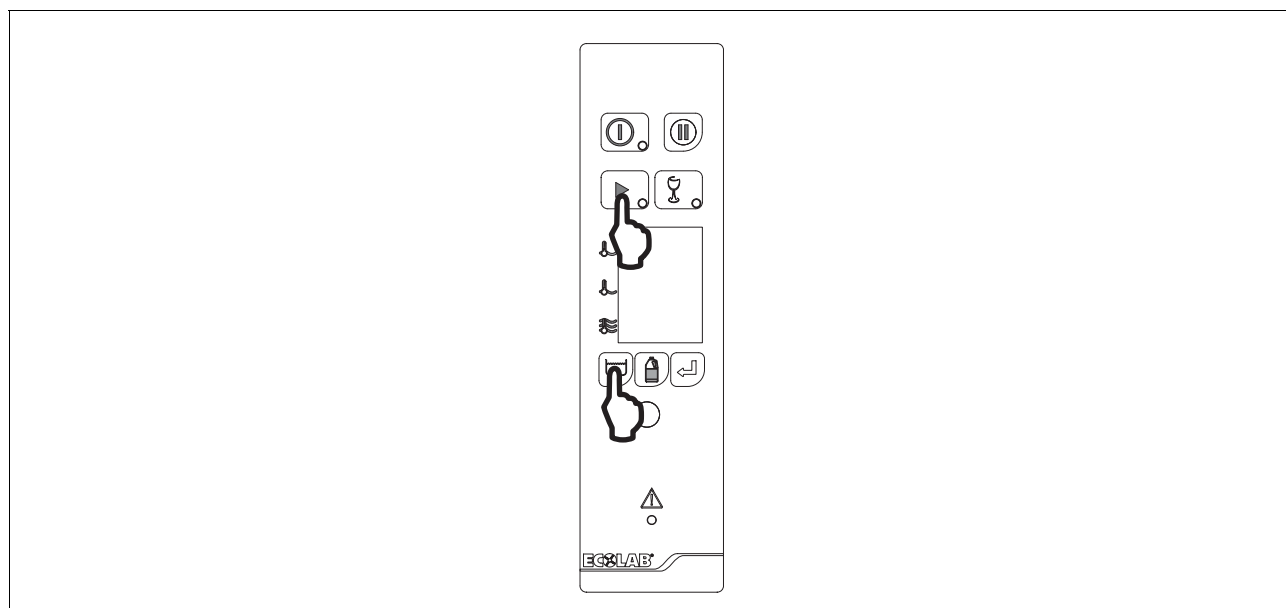




Figure 3 Accessing the USER MENU

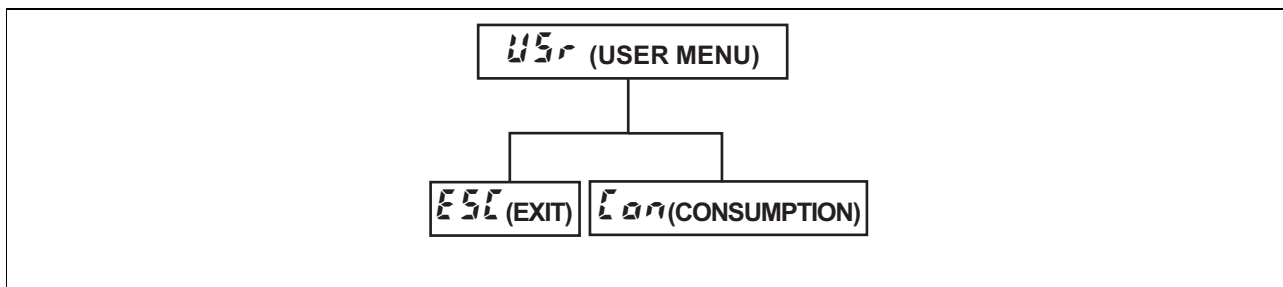
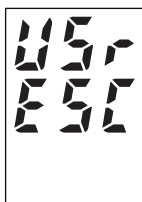


Figure 4 Consumption menu chart

Press the relief blue button (“D” - (Figure 1)) and the drain button (“A” - (Figure 1)) at the same time for several seconds to access the USER MENU.

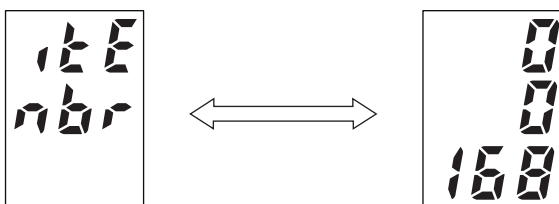


The various USER MENU items can be selected by using the drain (“A” - (Figure 1)) and de-lime (“B” - (Figure 1)) buttons.

A2.1 EXIT

Press the confirm button (“C” - (Figure 1)) when the display indicates the item EXIT (*E5E*) to return to normal machine operation.

Press the confirm button (“C” - (Figure 1)) when the selection arrow indicates the item *Con* (CONSUMPTION) and the display will show the counter of the racks processed by the machine.



The number of racks processed and the item to which the number shown refers are displayed alternately. To obtain the total number of processed racks, form the numbers displayed as follows:

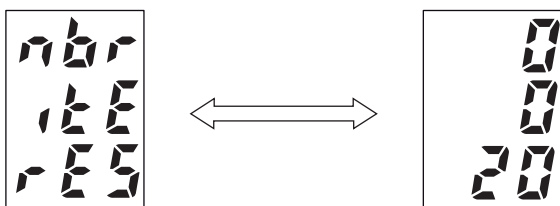


number of racks = 2059165

The display shows the number of racks starting from the date of machine installation. The number of racks processed starting from a reset operation can also be displayed.



Press Enter to display the resettable counter; in this way the “CONSUMPTION RESET” mode is accessed.



Press the confirm button again to reset the resettable rack counter.

The rack counter is reset.

Press the relief blue button to exit “CONSUMPTION RESET” mode.

Use the drain and de-lime buttons to display the screens relevant to (in order):

- racks number
- rinse time [minutes]
- wash time [minutes]
- sanitisation (or drain or cleaning) cycles counter
- de-lime cycles counter
- machine water consumption [gallons or litres]
- rinse module water consumption [gallons or litres]
- wash module water consumption [gallons or litres]
- prewash module water consumption [gallons or litres]
- machine power absorption [KWH].

All these screens provide for 2 counters, one resettable and the other non-resettable, usable as described above.

In this way it is possible to reset the counters and subsequently check the various counts starting from the date of the last reset.

A3 SERVICE MENU

From normal machine operation mode all the parameters and information can be accessed for programming the electronic boards by pressing the combinations of buttons displayed in (Figure 3) and in (Figure 5).

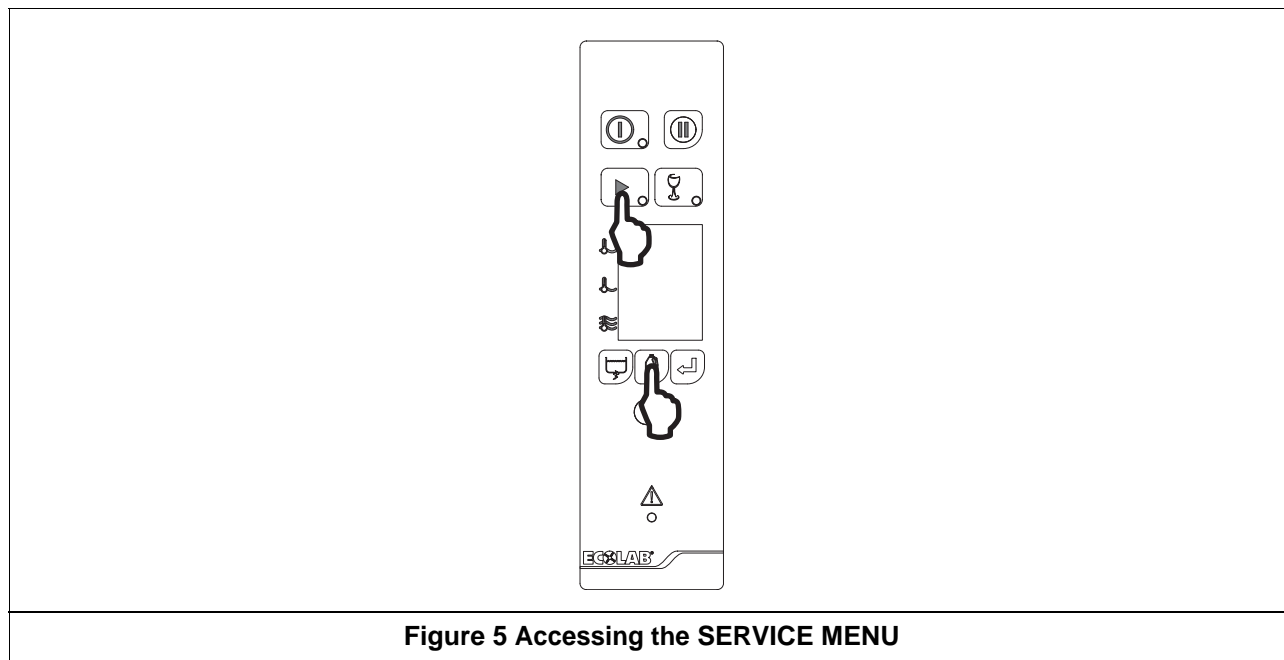


Figure 5 Accessing the SERVICE MENU

From the SERVICE MENU it is possible to access the following parameter families and information see (Figure 5) and (Figure 6) using the drain (“A” - (Figure 1)) and de-lime (“B” - (Figure 1)) buttons to select the object, the confirm button (“C” - (Figure 1)) to access the selected object and the relief blue button (“D” - (Figure 1)) to exit the object.

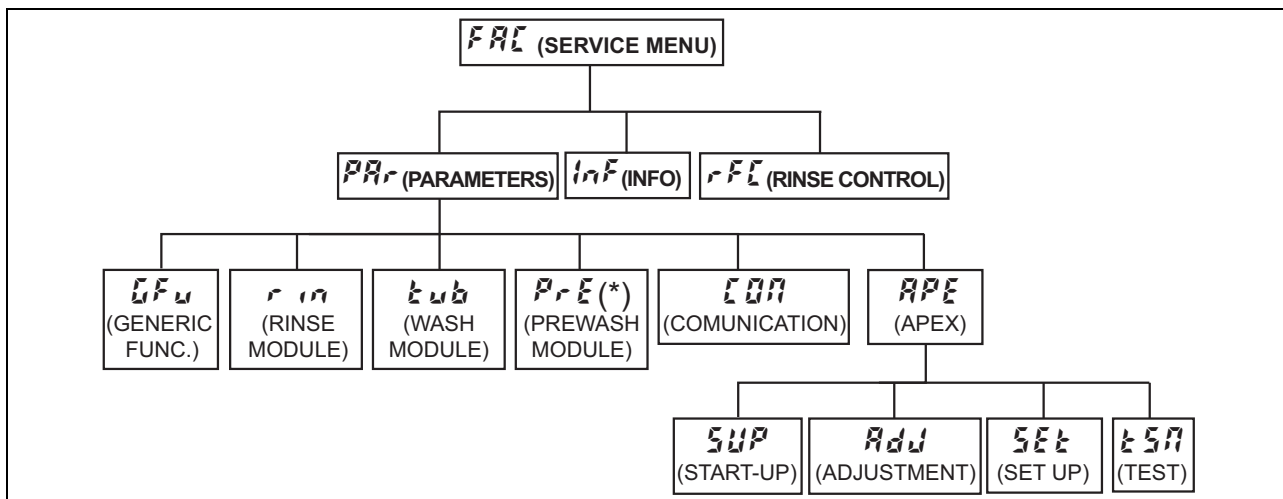
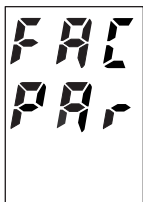


Figure 6 Parameter and function access menu chart

(*) Only for prewash machines.

Press the relief blue button (“D” - (Figure 1)) and the de-lime button (“B” - (Figure 1)) at the same time for several seconds to access the SERVICE MENU.



Inside the SERVICE MENU it is possible to:

- display and edit all the machine parameters;
- display information of a general nature, such as the machine software versions;
- adjust the rinse flowrate cock (just for atmospheric rack type).

WARNING:

After entering the SERVICE MENU switch the machine off and then on again to return to normal operation.

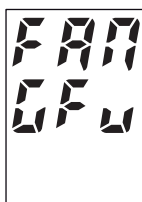
The various SERVICE MENU items can be selected by using the drain (“A” - (Figure 1)) and de-lime (“B” - (Figure 1)) buttons.

A3.1 PARAMETERS

Press the confirm button (“C” - (Figure 1)) when the display indicates the PARAMETERS item (PAR) and the display will show the first family of parameters.

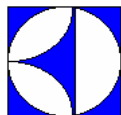
A3.1.1 GENERIC FUNC. (GFU)

The GENERIC FUNC. family contains parameters that identify several general machine characteristics.

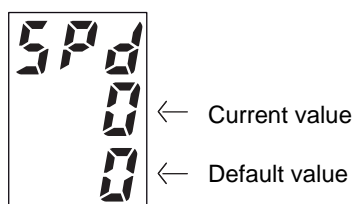


Use the drain and de-lime buttons to select the other parameter families.

Press the relief blue button (“D” - (Figure 1)) to display the SERVICE MENU again.



Press the confirm button ("C" - (Figure 1)) to access the first parameter of the GENERIC FUNCTION family.



Press the relief blue button ("D" - (Figure 1)) to display the GENERIC FUNCTION family again. Use the drain and de-lime buttons to select the other parameters of the GENERIC FUNCTION family. Press the confirm button to edit the selected parameter: the parameter value starts flashing.

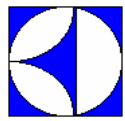
Use the drain (to increase) and de-lime (to decrease) buttons to modify the parameter value. Press the confirm button to save the new set value. Press the relief blue button to exit without saving the new setting.

The GENERIC FUNC. / EFC family parameters are described below:

Parameter name Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting [for WT44]
Set default par.	<i>SPd</i>	1	0	It allows all the parameters to be set to their default value. The set parameters are those of a WT44. The parameter set to "Yes" (1) automatically returns to "No" (0).	-	No/0	Yes/1	No/0
Speed nr. 1	<i>SP1</i>	1	3	Indicates racks/hour processed at low speed.	racks/h	24	300	100
Speed nr. 2	<i>SP2</i>	1	4	Indicates gear motor operation frequency at speed 2.	racks/h	24	300	200
Cleaning mode	<i>EN</i>	1	8	Selects the type of machine drain. If the parameter is set to 0 the machine carries out airgap and tank drain; if set to 1 (default value) it carries out sanitisation; if set to 2 it carries out the drain and cleaning cycle.	-	0	2	1

Phase	Loads				Event to evolve to the next phase	Phase duration [min,sec]	Phase duration [sec]	Total Time [sec]	Total Time [min,sec]
	Wash tank draining valve	Air gap loading valve	Rinse pump	Prewash tank draining valve					
initial pause					Fixed time (3 seconds)	0,03	3,00	3	0,03
load the air gap until the working level is reached (to avoid pump cavitation)		X			The air gap level is equal or higher than the air gap working level (parameter "Work lev. airgap")	0,00	0,00	3	0,03
drain the air gap			X		The air gap is completely emptying	1,00	60,00	63	1,03
empty completely the tanks	X			X	Wash tank is completely emptying	1,18	78,00	141	2,21

Table 1: Drain cycle: Cleaning mode ($\text{EN} = 0$)



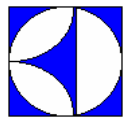
Phase	Loads											Event to evolve to the next phase	Phase duration [min,sec]	Phase duration [sec]	Total Time [sec]	Total Time [min,sec]	Water consumption (only wash)	Water consumption (with prewash)
	Wash tank draining valve	Wash tank loading valve	Wash pump	Wash heaters	Air gap loading valve	Rinse pump	Boiler heaters	Prewash tank draining valve	Prewash tank loading valve	Prewash pump	Prewash heaters							
initial pause												Fixed time (3 seconds)	0,03	3,00	3	0,03		
load the air gap until the working level is reached (to avoid pump cavitation)					X							The air gap level is equal or higher than the air gap working level (parameter "Work lev. air gap")	0,00	0,00	3	0,03		
drain the air gap and in the same time drain the tanks	X					X	X					The air gap is completely emptying	1,46	106,00	109	1,49		
empty completely the tanks	X						X					The tanks are completely emptying	0,11	11,00	120	2,00		
reload the tanks until the correct tank level is reached (parameters "Drain max. level"); when the tank working level (parameters "Working level") is reached the heating of the wash tank starts		X		X ²					X			The tanks level is equal or higher than the tanks filling level (parameter "Drain max level")	4,04	244,00	364	6,04	81,33	118,33
the wash tank is heating until set point (parameter "Sanit. temper.")		X ⁵		X								Wash temperature set point is reached (parameter "Sanit. temper.")	13,43	823,00	1187	19,47		
wash tank sanitization phase		X ⁵	X	X								Fixed time (parameter "Wash san. duration")	1,00	60,00	1247	20,47		
drain the wash tank; in the same time start the prewash tank heating	X										X	Wash tank is completely emptying	2,12	132,00	1379	22,59		
the prewash tank is heating until set point (parameter "Sanit. temper.")											X	Prewash temperature set point is reached (parameter "Sanit. temper.")	10,05	605,00	1984	33,04		
prewash tank sanitization phase									X ⁵	X	X	Fixed time (parameter "Prew san. duration")	1,00	60,00	2044	34,04		
drain the prewash tank							X					Prewash tank is completely emptying	1,05	65,00	2109	35,09		

Table 2: Drain and "sanitisation" hot cleaning cycle: Cleaning mode (E) = 1 → default

2: the wash tank heatings elements are switched on during this phase only when the wash tank level reached the "Working level"

5: the rinse pump and the tanks loading valve are switched on during these phases only if the tanks level becomes lower than "Drain max. level" - "Max. lev. hister."

Phases duration and water consumption are referred to the following set up: Rinse flow = 7,2 lit/min (1,872 gln/min) and Tank loading valve flow = 20 lit/min (5,2 gln/min)



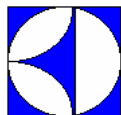
Phase	Loads										Event to evolve	Phase duration [min,sec]	Phase duration [sec]	Total Time [sec]	Total Time [min,sec]	Water consumption (only wash)	Water consumption (with prewash)
	Wash tank draining valve	Wash tank loading valve	Wash pump	Wash heaters	Air gap loading valve	Rinse pump	Boiler heaters	Prewash tank draining valve	Prewash tank loading valve	Prewash pump							
initial pause											Fixed time (3 seconds)	0,03	3,00	3	0,03		
empty completely the tanks	X							X			The tank are completely emptying	1,19	79,00	82	1,22		
load the tanks with fresh water		X			X ¹				X		The tanks level is equal or higher than the tanks filling level (parameter "Drain max level")	4,03	243,00	325	5,25	81,00	118,00
clean the tanks with fresh water		X ⁵	X		X ¹	X				X	Fixed time (15 seconds)	0,15	15,00	340	5,40		
pause between two tanks cleaning											Fixed time (5 seconds)	0,05	5,00	345	5,45		
clean the tanks with fresh water		X ⁵	X		X ¹	X				X	Fixed time (15 seconds)	0,15	15,00	360	6,00		
pause between two tanks cleaning											Fixed time (5 seconds)	0,05	5,00	365	6,05		
clean the tanks with fresh water		X ⁵	X		X ¹	X				X	Fixed time (15 seconds)	0,15	15,00	380	6,20		
load the air gap until the working level is reached (to avoid pump cavitation)					X						The air gap level is equal or higher than the air gap working level (parameter "Work lev. airgap")	0,00	0,00	380	6,20		
drain the air gap						X					The air gap is completely emptying	0,45	45,00	425	7,05		
empty completely the tanks	X							X			The tank are completely emptying	1,13	73,00	498	8,18		

Table 3: Drain and cold cleaning cycle: Cleaning mode (E: R) = 2

1: the air gap loading valve is switched on to refill the air gap when the level is lower than "Max. lev. Airgap" - "Max. hist. Airgap"

5: the rinse pump and the tanks loading valve are switched on during these phases only if the tanks level becomes lower than "Drain max. level" - "Max. lev. hister."

Phases duration and water consumption are referred to the following set up: Rinse flow = 7,2 lit/min (1,872 gln/min) and Tank loading valve flow = 20 lit/min (5,2 gln/min).



The table given below indicates the delay between transit of the rack on the autorinse lever and stopping of the rinse phase.

E.g. in a WT44 working at high speed (200 racks/h) the rinse pump keeps operating for 3 seconds after the last rack has released the autorinse lever.

	Capacity speed nr. 1 (racks/hour)	Delay speed nr. 1 (sec)	Capacity speed nr. 2 (racks/hour)	Delay speed nr. 2 (sec)
WT44	100	6	200	3
WT66	100	6	200	3

A3.1.2 RINSE MODULE (r in)

The RINSE MODULE family parameters are selected and edited by using the buttons in the same way as that described for the GENERIC FUNCTION family.

The RINSE MODULE family contains the parameters that identify the rinse module characteristics



The RINSE MODULE / r in family parameters are described below:

Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting [for WT44]
Boiler temper.	h a t	2	4	Boiler temperature set point.	°C / °F	10/50	99/211	86/187

A3.1.3 WASH MODULE (t u b)

The WASH MODULE family parameters are selected and edited by using the buttons in the same way as that described for the GENERIC FUNCTION family.

The WASH MODULE family contains the parameters that identify the wash module characteristics



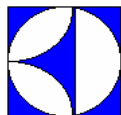
The WASH MODULE / t u b family parameters are described below:

Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting [for WT44]
Tank temper.	t u t	3	45	Tank temperature set point.	°C / °F	5/42	90/194	75/167
Autom. drain del.	R t d	3	10	Number of racks passing between two automatic water changes. If this parameter is set at zero the function is disabled.	Racks	0	600	200

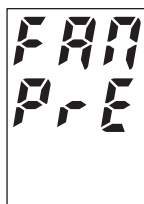
A3.1.4 PREWASH MODULE (P r E)

Available only on WT66 with prewash.

The PREWASH MODULE family parameters are selected and edited by using the buttons in the same way as that described for the GENERIC FUNCTION family.



The PREWASH MODULE family contains the parameters that identify the prewash module characteristics



The PREWASH MODULE / *PrE* family parameters are described below:

Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting [for WT44]
Tank temper.	<i>PrE</i>	4	5	Tank temperature set point.	°C / °F	5/41	90/194	10/50
Autom. drain del.	<i>APd</i>	4	11	Number of racks passing between two automatic water changes. If this parameter is set at zero the function is disabled.	Racks	0	600	170

A3.1.5 COMMUNICATION (*COA*)

The COMMUNICATION family parameters are selected and edited by using the buttons in the same way as that described for the GENERIC FUNCTION family.

The COMMUNICATION family contains the parameters that identify the COMMUNICATION connection characteristics.



The COMMUNICATION/ *COA* family parameters are described below:

Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting [for WT44]
Enable Apex Communic	<i>ACo</i>	5	2	Enables communication with Apex; to enable communication with an external control PC it must be set to 0; set to 1 to re-enable communication with Apex.	-	0	1	1

WARNING:

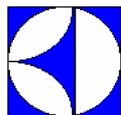
If the parameter *ACo* is set to *0*, management of detergent and rinse aid dosing is completely inhibited. Set the parameter to *1* to enable communication with the control PC, remembering to set the parameter to *1* again for normal machine operation.

A3.1.6 APEX PARAMETERS

The Apex family contains the parameters that manage correct dosing of rinse aid and detergent.

The Apex parameter family is divided into 4 subfamilies: Start-up, Adjustment, Set-up and Test. Each subfamily contains several parameters.

Press the confirm button to access the first subfamily of the Apex family ("C" - (Figure 1)



Use the drain and de-lime buttons to select the other parameter families. Press the blue button (in relief) to return to the display of the Apex family.

Press the confirm button ("C" - (Figure 1) to access the first parameter of the subfamily selected.



Press the blue button (in relief) to return to the display of the subfamily.

To move through the parameters and to edit them, use the same procedures indicated in the GENERIC FUNCTION family.

A3.1.6.1 Start-up menu (*SUP*)

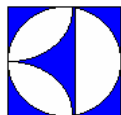
The Startup menu accesses preset formulas to automatically program the dispenser for most common installations. Typically, no further programming is required after setting up the dispenser in the Startup menu.

The Startup menu/ *SUP* family parameters are described below:

Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting [for WT44]
Operation mode	OPN	7	0	Specifies if the type of control for detergent dosing is carried out by means of a conductivity probe or by time. "0": Inductive probe detergent control; "1": Time detergent control.	-	0	1	0
Product	Prd	7	1	Specify the product type. "1": GPRPI, Solid Power, Solid Power with Glass Guard. "2": GPRPII, Apex Power. "3": GPRPIII, Apex Power Plus, Apex Ultra, Solid Fusion. "4": GPRPIV, Solid Metal Fusion. "5": GPRPV, Solid Metal Pro. "6": GPRPVI, Solid Endurance.	-	1	6	2
Soil level	Sol	7	2	Specify the crockeries soil level. "0": Light. "1": Normal. "2": Heavy.	-	0	2	1
Water hardness	Hrd	7	3	Specify the water hardness. "0": Soft. "1": Medium. "2": Hard.	-	0	2	1

A3.1.6.2 Adjustment menu (probe) (*Rdu*)

The Adjustment Menu is determined by the Operation Mode chosen in the Startup Menu. Only the Adjustment Menu appropriate to your system (your default Adjustment Menu) will appear on your screen. This is the "Inductive probe" adjustment menu.



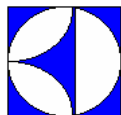
Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting [for WT44]
Detergent set point	dSP	8	0	It indicates the wash tank detergent set point. The default value of the detergent set point parameter is based on the combinations of the following "Start-up family" parameters: "Product" (Prd), "Soil level" (SoL) and "Water hardness" (Hrd). See Table 4: Default Set Points .	ecounits	10	310	27*
Fast conveyor rinse pump speed	FrS	8	1	It indicates the rinse aid peristaltic pump speed when the conveyor is working at higher speed (parameter: Speed nr. 2). See Table 5: Estimated Rinse Volume .	rpm	3,6	36	20
Slow conveyor rinse pump speed	SrS	8	2	It indicates the rinse aid peristaltic pump speed when the conveyor is working at lower speed (parameter: Speed nr. 1). See Table 5: Estimated Rinse Volume .	rpm	3,6	36	15
Detergent alarm delay	dAd	8	3	This setting delays the out-of-product alarm from sounding on an initial fill or wash tank change for the number of seconds set. It allows the controller to reach set point before the alarm is activated. The default value of the detergent set point parameter is based on the combinations of the following "Start-up family" parameters: "Product" (Prd), "Soil level" (SoL) and "Water hardness" (Hrd).	sec	1	999	360 *

(*) The default values are variables and calculated according to the values set in the parameters "Product" (*Prd*), "Soillevel" (*SoL*) and "Water hardness" (*Hrd*).

A3.1.6.3 Adjustment menu (time) (*AdJ*)

The Adjustment Menu is determined by the Operation Mode chosen in the Startup Menu. Only the Adjustment Menu appropriate to your system (your default Adjustment Menu) will appear on your screen. This is the "time" adjustment menu.

Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting [for WT44]
Detergent initial charge	dtC	9	0	This setting determines the amount of time that the detergent will feed on the initial fill of the dish machine.	sec	1	999	47
Detergent dose	dds	9	1	It indicates the time it takes to feed detergent into the dish machine, on a preset interval (as set in the ddi menu). This setting determines the quantity of detergent is dispensed every rack, every second rack, or every third rack, according with the value stored in the <i>ddi</i> parameter.	sec	1	25,4	4,8
Fast conveyor rinse pump speed	FrS	9	2	It indicates the rinse aid peristaltic pump speed when the conveyor is working at higher speed (parameter: Speed nr. 2). See Table 5: Estimated Rinse Volume .	rpm	3,6	36	20
Slow conveyor rinse pump speed	SrS	9	3	It indicates the rinse aid peristaltic pump speed when the conveyor is working at lower speed (parameter: Speed nr. 1). See Table 5: Estimated Rinse Volume .	rpm	3,6	36	15
Detergent dose interval	ddi	9	4	The range of adjustment is 1 to 3 racks, in increments of 1 rack. Detergent is then dispensed every rack, every second rack, or every third rack. One rack interval is the time the rinse signal is on for conveyor mode, based on <i>rtM</i> parameter in Setup family.	racks	1	3	1



A3.1.6.4 Setup menu (SEt)

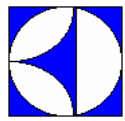
The Setup menu contains dispenser configuration settings that are typically not often reset after initial startup of the dispenser.

Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting [for WT44]
Detergent manager	dtM	10	0	Detergent Manager monitors the probe controlled detergent feed time to reach set point. When the detergent feed time exceeds 150% of the setup feed time during a 12 hour period, Detergent Manager automatically disables probe detergent control and enables timed detergent control. This function is only available when Probe detergent control is chosen in "Operatinion mode" (OPM) parameter on Startup Family. "0": Detergent manager off. "1": Detergent manager on.	-	0	1	1
Rinse manager	rtM	10	1	Rinse Manager shuts off the rinse pump when the rinse signal is "unqualified." An rinse signal is "unqualified" if no detergent signal occurred within 90 seconds prior to the rinse signal. "0": Rinse manager off. "1": Rinse manager on.	-	0	1	1
Rack time	rtN	10	2	It indicates the amount of time the conveyor takes to travel one rack length. The value is automatically updated when the conveyor speed is changed.	sec	1	99	18

A3.1.6.5 Test menu (tSM)

The Test menu contains Prime/Test Pump and other diagnostic test functions.

Parameter name	Display visualization	Family Nr.	Parameter Nr.	Parameter description	Unit of measure	Min	Max	Factory setting[for WT44]
Total dissolved solids	tdS	11	0	This parameter displays the current total dissolved solids.	ppm	0	9999	-
Detergent setpoint offset	OFS	11	1	This parameter displays the conductivity offset of the supply water. Reset Water Conductivity Offset Reading The Apex Controller allows you to reset the water conductivity offset reading. To reset: 1. Fill the detergent tank with fresh water (with no detergent or rinse agent). 2. Select "Detergent Setpoint Offset" (OFS) parameter from "Apex Family" (APE) --> "Test" sub-family (tSM); push one time the "ENTER" push button: the value start to blink. Press the "ENTER" button again: the new offset is calculated, stored and shown.	ecounits	0	310	-
Raw conduttivity	CrA	11	2	This parameter shows raw (not temperature compensated) probe conductivity readings.	ecounits	0	310	-
Compensated conductivity	CAc	11	3	This parameter shows temperature compensated probe conductivity readings.	ecounits	0	321	-
Wash temperature	tth	11	4	This parameter shows dish machine wash temperature readings (conductivity probe temperature sensor).	°F (or °C)	32	212	-
Rinse Test	rtS	11	6	This parameter is used to manually turn on the rinse aid peristaltic pump. Pump stops automatically after 10 seconds. "0": No actions. "1": Rinse test (programmed speed). "2": Rinse test (max speed).	-	0	2	0
Detergent Test	dtS	11	5	This parameter is used to manually turn on the detergent valve. The valve stops automatically after 10 seconds. "0": No actions. "1": Detergent test.	-	0	1	0
ESP address	Adr	11	7	It is used to set the Ecolab Simple Protocol ESP Network Address ID number.	-	32	127	48
Firmware version	Fir	11	8	This parameter shows the APEX firmware version number.	-	0	FFFF	-
Check sum	CSN	11	9	It indicates the six-digit hexadecimal checksum stored in the APEX flash memory.	-	-	-	-



The following table shows the default set points for all product groups across all combinations of soil loads and water conditions. It also gives an estimated relation between Ecounits and drops for all product groups.

	GRP I		GRP II		GRP III (See NOTE below)			GRP IV		GRP V		GRP VI	
SOIL LEVEL / WATER QUALITY	Solid Power, Solid Power w/Glass Guard		Apex Power		T1* = Apex (Power Plus & Ultra) Geo** = Fusion (Solid, Balanced, Power)			Solid Metal Fusion		Solid Metal Pro		Solid Endurance	
Light / Soft	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	*T1 drops	**Geo drops	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	T1 drops
	27	12	18	8	15	6	12	15	6	18	12	17	7
Light / Medium - OR - Normal / Soft	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	*T1 drops	**Geo drops	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	T1 drops
	30	13.5	21	9	18	7	13.5	17	6.5	22	13	19	8
Normal / Medium - OR - Light / Hard	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	*T1 drops	**Geo drops	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	T1 drops
	33	15	24	11	21	8.5	16	18	7	26	14	21	9
Normal / Hard - OR - Heavy / Medium	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	*T1 drops	**Geo drops	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	T1 drops
	36	16.5	27	12	24	10	19	20	7.5	30	15	23	10
Heavy / Hard	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	*T1 drops	**Geo drops	Ecounits	T1 drops	Ecounits	T1 drops	Ecounits	T1 drops
	40	18	30	14	27	12	24	21	8	34	16	25	11

Table 4: Default Set Points

All estimated volumes in the following table assume that the standard 1 cc squeeze tube is used. If a larger tube is used, scale up by changing this formula:

Volume (mL) = Squeeze Tube size (cc/rev) x Rinse Speed (rev/min) x rack rinse time (sec) x 1 min/60 sec.

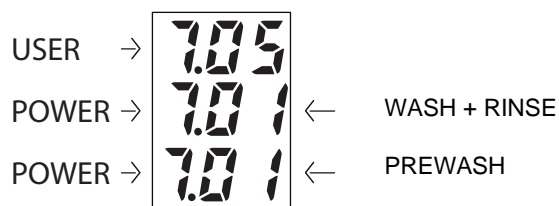
	3.6 rpm	5 rpm	7 rpm	10 rpm	12 rpm	15 rpm	17 rpm	20 rpm	22 rpm	25 rpm	27 rpm	30 rpm	32 rpm	36 rpm
7 sec.	0.4	0.6	0.8	1.2	1.4	1.8	2	2.3	2.6	2.9	3.2	3.5	3.7	4.2
10 sec.	0.6	0.8	1.2	1.7	2	2.5	2.8	3.3	3.7	4.2	4.5	5	5.3	6
12 sec.	0.7	1	1.4	2	2.4	3	3.4	4	4.4	5	5.4	6	6.4	7.2
15 sec.	0.9	1.3	1.8	2.5	3	3.8	4.3	5	5.5	6.3	6.8	7.5	8	9
18 sec.	1.1	1.5	2.1	3	3.6	4.5	5.1	6	6.6	7.5	8.1	9	9.6	10.8
20 sec.	1.2	1.7	2.3	3.3	4	5	5.7	6.7	7.3	8.3	9	10	10.7	12
25 sec.	1.5	2.1	2.9	4.2	5	6.3	7.1	8.3	9.2	10.4	11.3	12.5	13.3	15

Table 5: Estimated Rinse Volume



A3.2 INFO

Press the confirm button ("C" - (Figure 1)) when the display indicates the INFO item(*inf*) and the machine firmware (FW) versions will be displayed.



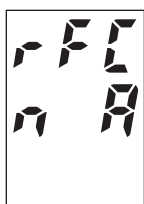
Press the confirm button to return to the SERVICE MENU.

A3.3 RINSE CONTROL

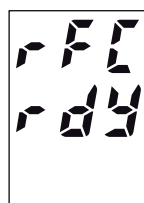
Press the confirm button ("C" - (Figure 1)) when the message *rFL* appears on the display, and the machine is going to start a rinse flow control cycle.

If there is a communication error between the rack type boards, the rinse flow control cycle cannot be carried out.

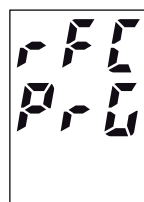
In this case the display will show:



If the communication is working correctly the display informs the user that the machine is ready to start a rinse flow control cycle:

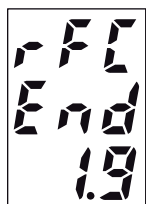


Press the confirm button ("C" - (Figure 1)) and a control cycle is started:





Wait about 2 minutes, during which the machine performs a series of air gap filling solenoid valve and rinse pump activations, until the display will show the actual rinse flow:



Compare the result obtained with the data given in the table below and if the flow is higher or lower than that indicated in the table, close or open the rinse flow regulating cock and repeat the control cycle until the optimum value is reached. [Gallons if par. UMU = 1; Litres if par. UMU = 0]

MACHINE TYPE	CORRECT FLOW (Lit/Min)	CORRECT FLOW (Gallons/Min)
WT44	7.2	1.9
WT66	7.2	1.9

WARNING:

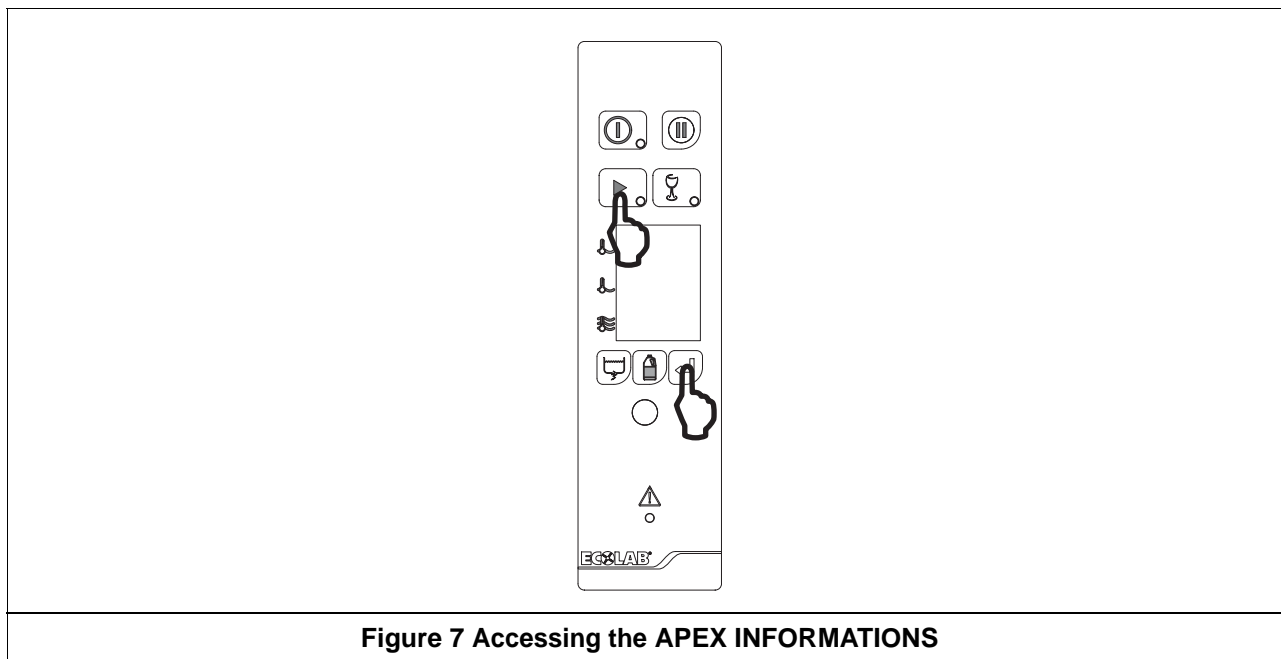
The Rack Type leaves the factory with the cock already adjusted in the optimum position.

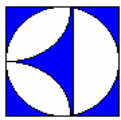
WARNING:

The indication of rinse flowrate can be subject to an error of $\pm 0,3$ litres/min.

A4 ACCESSING DATA ON THE CHEMISTRY USED IN THE MACHINE

From the normal machine operation mode it is possible to access the display of Apex low level warnings (relevant to detergent and rinse aid management) and the reading of significant values relevant to the chemistry used in the machine. To access the Apex data display mode, press at the same time the combination of buttons indicated in Figura 7.





Press the START and ENTER buttons together to display of the first Apex warning in progress. The possible Apex low level warnings are:

Probe failed:

ALr Prb FLt

The conductivity probe reading is outside the permissible reading range.

Probe missing:

ALr Prb NIS

The conductivity probe is disconnected.

Checksum error:

ALr CHS Err

There is no matching between the checksum saved in the APEX memory and that calculated by the firmware.

Rinse pump motor was shorted:

ALr rin SHr

The rinse aid peristaltic pump motor is short-circuited.

Detergent manager on:

dEt NAn On

The Detergent manager function is operational.

Rinse manager on:

r in NAn On

The Rinse manager function is operational.

Below detergent set point:

bEL dEt SEt

The concentration of detergent in the tank is lower than the set point value.

Use the drain and de-lime buttons to scroll the low level warnings. When the last warning is reached, press the drain button to display the following read-only parameters:

Total dissolved solid:

t dS

This parameter displays the current total dissolved solids.

Detergent set point offset:

OfS

This parameter displays the conductivity offset of the supply water.

Raw conductivity:

[rA

This parameter shows raw (not temperature compensated) probe conductivity readings.

Compensated conductivity:

[Ad

This parameter shows temperature compensated probe conductivity readings.

Wash temperature:

t tH

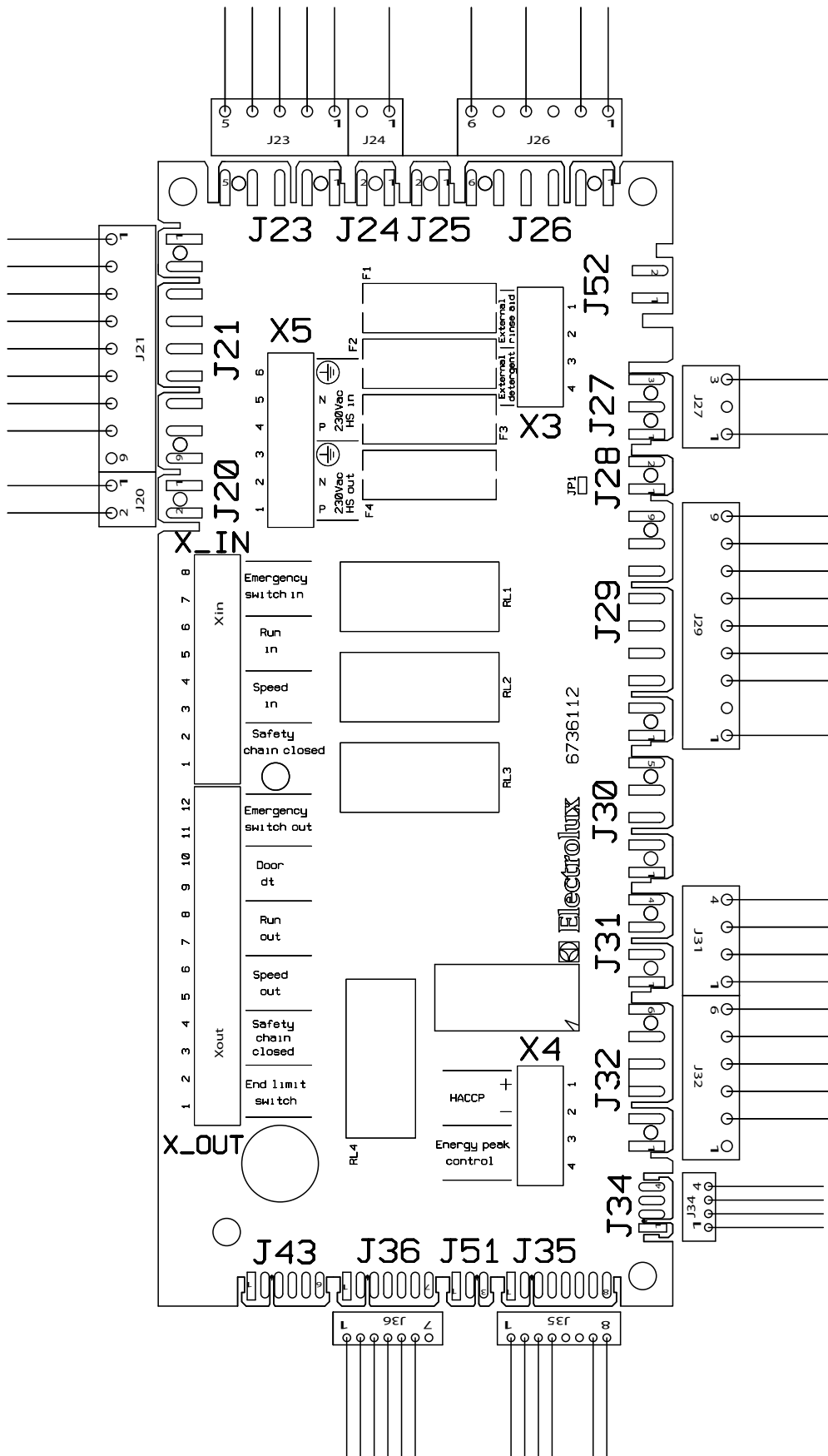
This parameter shows dish machine wash temperature readings (conductivity probe temperature sensor).

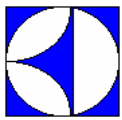
If there are no warnings in progress, the first read-only parameter appears when accessing the Apex data mode.



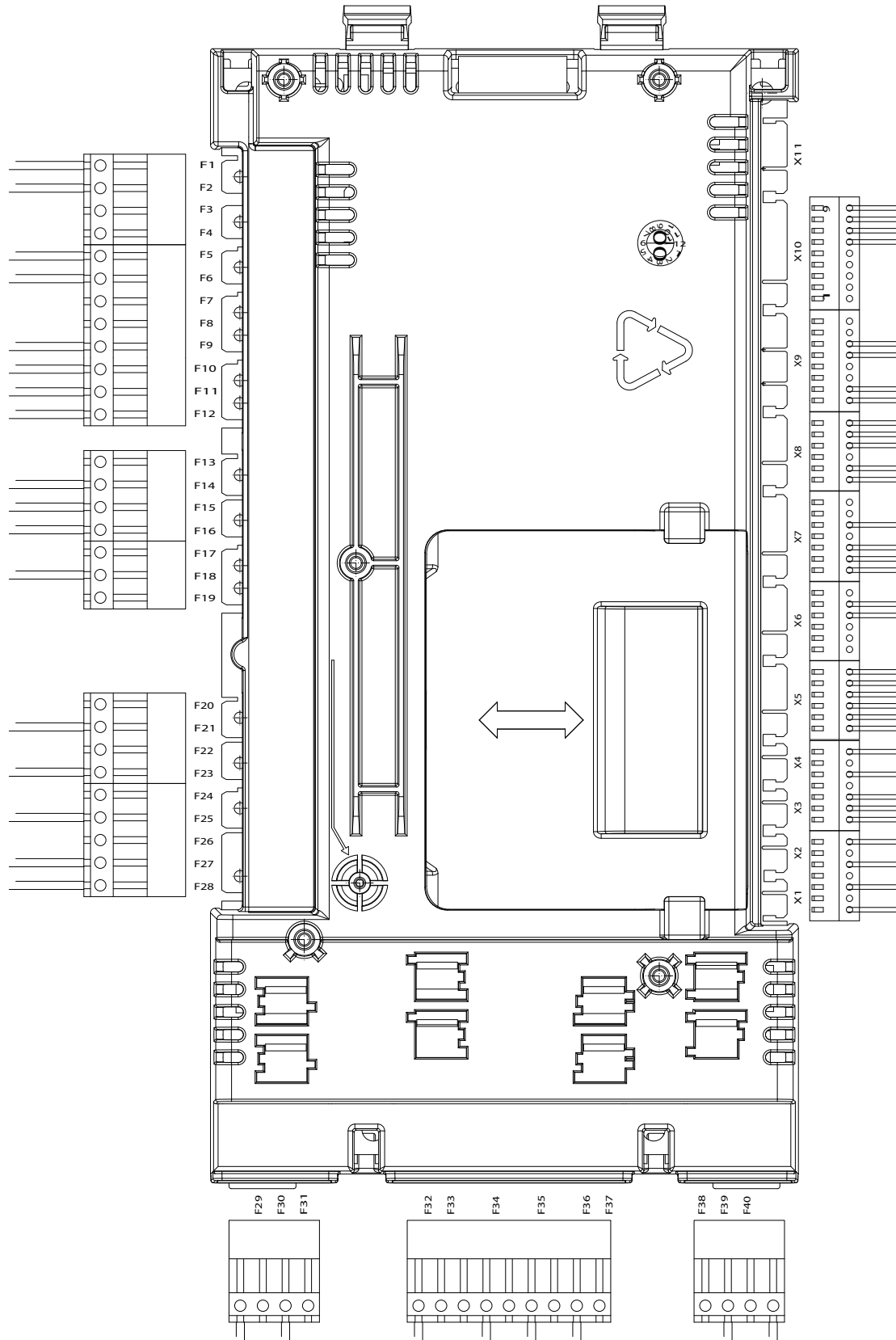
B CONNECTORS LAYOUT

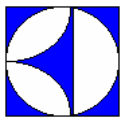
POWER BOARDS CONNECTORS LAYOUT





MULTICONNECTOR BOARDS CONNECTORS LAYOUT





B1 CONNECTORS LAYOUT LEGEND

F 1- F2	Main supply connector
F5-F6	ESD fan connector
F11-F12	Rinse pump connector
F14-F15-F16	Tank filling solenoid valve connector
F18	Tank heating elements connector
F21-F23	Door safety circuit connector
F25-F27	Wash pump connector
F28	Boiler heating elements connector
F29-F30	Drain valve connector
F32-F34	De-lime pump connector
F35-F36	Inverter connector
F39-F40	Airgap filling solenoid valve connector
x1	Temperature sensor connector
x2	Temperature sensor connector
x3	Rinse flowmeter connector
x4	Power measurer connector
x5	Inverter feedback - emergency stop and autostart connector
x6	Board identification connector
x7	Gearmotor current control - airgap pressure sensor connector
x8	Wash flowmeter - gearmotor speed signal connector
x9	Autorinse, thermal protection devices connector
x10	Door switch connector



C INVERTER PARAMETERS

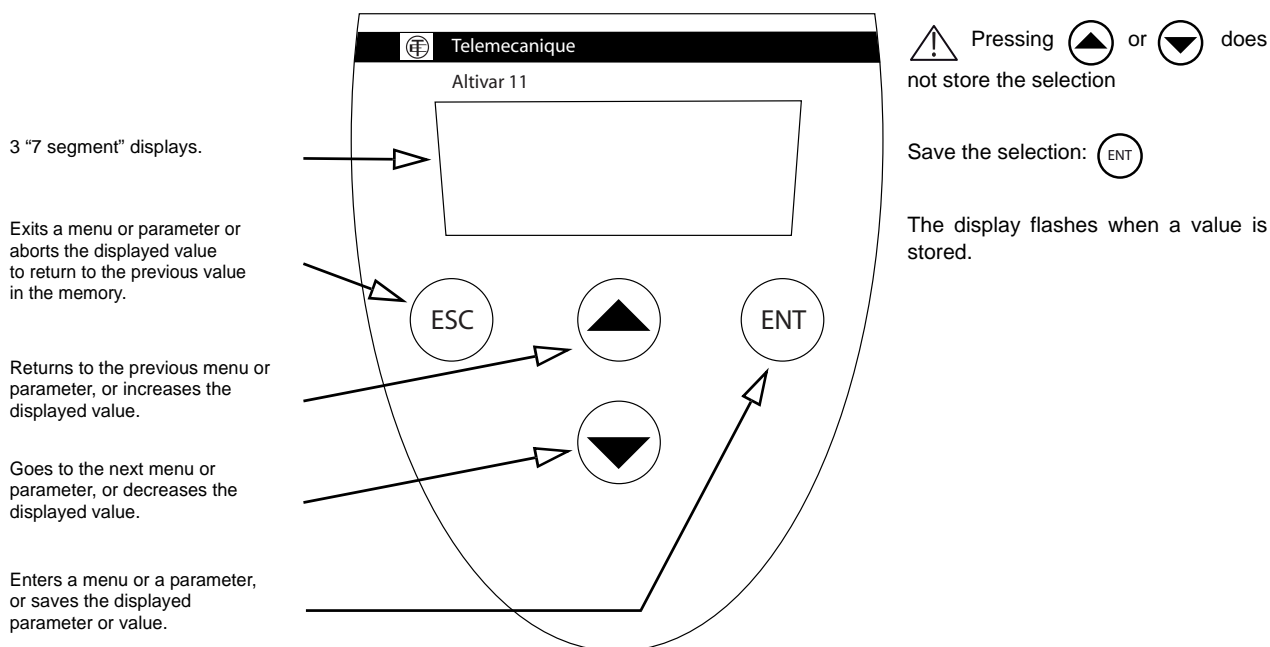
WARNING:

When replacing the inverter remove the protection label "A" on the top of the same, as indicated below (the protection rating becomes IP20).



C1 INVERTER PROGRAMMING

C1.1 DISPLAY FUNCTIONS



C1.2 INVERTER CONTROL TERMINAL ELECTRICAL CONNECTIONS

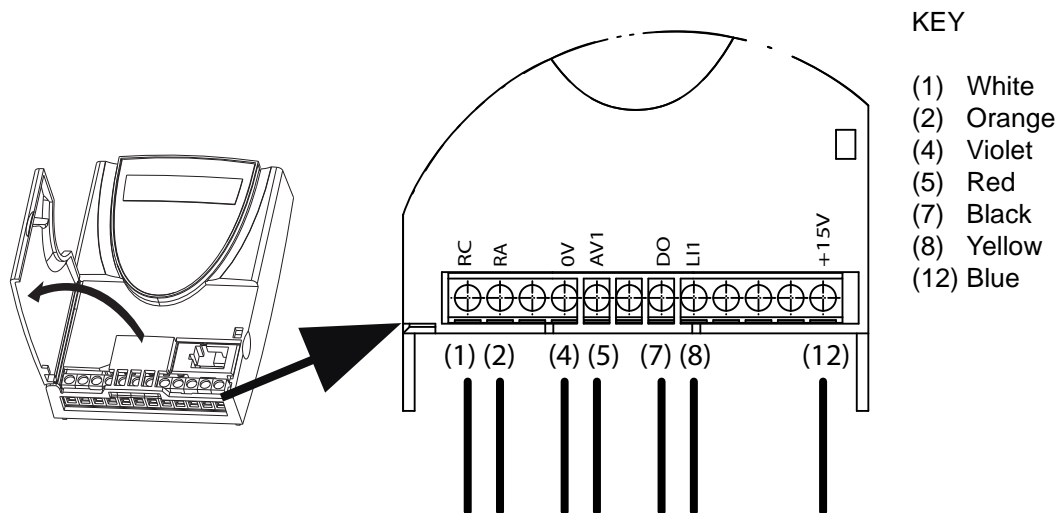
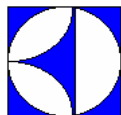


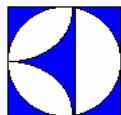
Figure 8 Inverter electrical connection

**C1.3 PARAMETRI DI CONFIGURAZIONE**

Inverter Telemecanique AH var 11 type ATV11PU12M2E380

Parameters for 110Vac gearmotor (Delta connection)

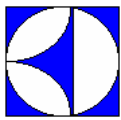
Parameter			Description	Standard machine
ACC			Acceleration ramp time	3.0
dEC			Deceleration ramp time	0.5
LSP			Low speed	0.0
HSP			High speed	100
ItH			Motor thermal current	3.6
SP2			2nd preset speed	10
SP3			3rd preset speed	25
SP4			4th preset speed	50
Alt	Act		Scale of analog input	10U
drC	UnS		Nominal motor voltage	110
	FrS		Nominal motor frequency	50
	StA		Frequency loop stability	20
	FLG		Frequency loop gain	50
	UFr		Ir compensation	50
	nCr		Nominal motor current	3.6
	CLI		Current limit	3.9
	nSL		Nominal motor slip	5
	SLP		Slip compensation	100
	COS		Nominal motor cosine	0.65
FUn	tCC	ACt	Type of control	2C
		tCt	Type of two wire control	LeI
	rrS		Reverse	nO
	Ps2	LIA	Preset speed lia	nO
		LIB	Preset speed lib	nO
	HSP	LIA	Config. input Lia	nO
		LIB	Config. input Lib	nO
	tLS			0.0
	PI	PIF		nO
	LOC		Overload threshold	90
	tOL		Time delay for overl. func.	0
	API		Hysteresis freq. reached	0.3
	LUL		Underload threshold	60
	tUL		Time delay for underl. func.	10
	rSF		Fault reset	nO
	rP2	LI	Second ramp	nO
	LC2	LI	2nd limit current	nO
	nST		Freewheel stop	nO
	StP		Controlled stop on loss of line	FST
	brA		Deceleration ramp adaptation	YES
	AdC	ACt	Automatic dc injection	YES
		tdC	Injection time on stopping	0.5
		SdC	Injection current	2.9
	SfT	ACt	Frequency range	LF
		Sfr	Switching frequency	4
	FLr		Catch on the fly	nO
	dO	ACt	Analogic output do	OCr
	Atr		Automatic restart	nO
	bFr		Motor frequency	50
	SCS		Configuration backup	nO
	FCS		Reminder of the configuration	nO



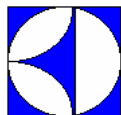
D WARNING MESSAGES AND TROUBLESHOOTING

List of possible documented machine alarms:

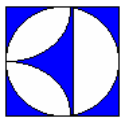
CODE	DESCRIPTION	POSSIBLE CAUSE
11	The Air Gap was not completely filled within the max. filling time.	<ul style="list-style-type: none"> - The air gap water supply cock is not open. - The water filling solenoid valve doesn't work properly. - The water feed flow is too low. - The water inlet filter is not clean. - The boiler pressure sensor doesn't work properly.
12	The pressure sensor on the air gap does not work correctly.	<ul style="list-style-type: none"> - The pressure sensor on the air gap doesn't work properly. - The pressure sensor connector on the air gap is not correctly inserted. - The X7 connector on the rinse board is not correctly inserted.
15 *	The required temperature was not reached in the boiler within the max. heating time.	<ul style="list-style-type: none"> - The rinse water flow is too high. - A heating element or a heating element branch doesn't work properly. - The CU is not clean. - The boiler temperature sensor doesn't work properly. - The boiler heating element starter controller doesn't work properly or its coil is not correctly connected to the rinse board. - The CU fan does not work properly.
16	The water temperature in the boiler is too high.	<ul style="list-style-type: none"> - The "Boil. temp. start" parameter (b t 5) or the "Boiler temper." parameter (b o t) has been changed. - The relay that activates the boiler heating elements starter controller is stuck.
17	The boiler temperature sensor is short-circuited.	<ul style="list-style-type: none"> - The boiler temperature sensor is short-circuited.
18	The boiler temperature sensor is open.	<ul style="list-style-type: none"> - The boiler temperature sensor is open or disconnected. - The boiler temperature sensor connector is not correctly inserted. - The connector on the rinse board is not correctly inserted.
23**	The rinse pump thermal protector has tripped.	<ul style="list-style-type: none"> - The rinse pump doesn't work properly. - The rinse pump impeller is blocked. - The rinse circuit is clogged. - The rinse flowmeter works properly.



27	The gear motor inverter has generated an allarm.	- The inverter or the gear motor doesn't work properly. Possible machine alarms documented on	Possible cause	Remedy
		1) <i>OCF</i> overcurrent	- ramp too short - inertia or load too high - mechanical locking	- check the state of the mechanism.
		2) <i>SCF</i> motor short circuit	- insulation fault or short-circuit at the drive output	- check the cables connecting the drive to the motor , and the motor insulation.
		3) <i>INF</i> internal fault	- internal fault	- check the environment (electromagnetic compatibility). - send the drive to be checked/repared.
		4) <i>CCF</i> configuration fault	- The current configuration is inconsistent - some parameters in the inverter have been	- return to factory settings.
		5) <i>OSF</i> overspeed	- instability or - driving load too high - some parameters in the inverter have been modified	- return to factory settings.
		6) <i>LCF</i> internal fault	- load relay control fault or damaged load resistor	- replace the drive.
		7) <i>OHF</i> drive overload	- drive temperature too high	- check the motor load and the environment.Wait for the drive to cool down before restarting.
		8) <i>MOF</i> motor overload	- triggered by motor current too high	- check the motor load. Wait for the drive to cool down before restarting.
		9) <i>OVF</i> overvoltage	- line voltage too high - disturbed line supply	- check the line voltage. The overvoltage threshold is 415 V on the DC bus.
		10) <i>OVF</i> overvoltage during deceleration	- braking too sudden or driving load.	- increase the deceleration time.
		11) <i>PHF</i> line phase failure	- drive incorrectly supplied or a fuse blown - failure of one phase - unbalanced load	- check the power connection and the fuses. - reset.
		12) <i>UVF</i> undervoltage	- line supply too low - transient voltage dip - damaged load resistor	- check the voltage and the voltage parameter. The undervoltage threshold is 230 V on the DC bus. - replace the drive.
		13) <i>ULF</i>	Current level above the overload threshold <i>ILC</i> .	- Check the value of the parameters <i>ILC</i> and <i>ILU</i> in the menu <i>FUn</i> . - Check the mechanics (wear, mechanical stops, lubrication, obstacles, etc.).
14) <i>ULC</i>	Current level below the under-load threshold <i>ILU</i> .	- Check the value of the parameters <i>ILU</i> and <i>ILC</i> in the menus <i>FUn</i> .		
30 **	The Air gap was not completely emptied within the max. emptying time.	- The impeller rotation is wrong. - The non return valve on the air gap doesn't work properly. - The pressure sensor on the air gap doesn't work properly. - The air gap air trap is not clean.		
31	The wash tank was not completely filled within the max. filling time.	- The wash tank water supply cock is not open. - The water load solenoid valve doesn't work properly. - The water feed flow is too low. - The water inlet filter is not clean. - The pressure sensor on the wash tank doesn't work properly. - The wash tank overflow has not been inserted. - The wash tank drain solenoid valve doesn't work properly and remains open. - The pressure sensor on the wash board doesn't work properly. - The wash board doesn't work properly.		
32	The pressure sensor on the wash tank does not work correctly.	- The pressure sensor on the wash board doesn't work properly. - The wash board doesn't work properly.		



33 *	The required temperature in the wash tank was not reached within the max. heating time.	<ul style="list-style-type: none"> - A heating element or a heating element branch of the wash board doesn't work properly. - The wash tank temperature sensor doesn't work properly. - The wash tank heating element starter controller doesn't work properly or its coil is not correctly connected to the rinse board.
34	The water temperature in the wash tank is too high.	<ul style="list-style-type: none"> - The "Tank temper." parameter (t u t) or the "Sanit. temper." parameter (t 5 t) has been changed. - The relay that activates the wash tank heating elements starter controller is stuck.
35	The wash tank temperature sensor is short-circuited.	<ul style="list-style-type: none"> - The wash tank temperature sensor is short-circuited.
36 **	The wash tank temperature sensor is open.	<ul style="list-style-type: none"> - The wash tank temperature sensor is open or disconnected. - The wash tank temperature sensor connector is not correctly inserted. - The connector on the wash board is not correctly inserted.
37 ***	The wash pump thermal protector has tripped	<ul style="list-style-type: none"> - The wash pump thermal protector is not correctly set. - The wash pump doesn't work properly. - The wash pump impeller is blocked.
40 **	The wash tank was not completely emptied within the max. emptying time.	<ul style="list-style-type: none"> - The drain is blocked. - The drain solenoid valve doesn't work properly. - The wash tank air trap is not clean.
51	The prewash tank was not completely filled within the max. filling time.	<ul style="list-style-type: none"> - The prewash tank water supply cock is not open. - The water load solenoid valve doesn't work properly. - The water feed flow is too low. - The water inlet filter is not clean. - The load solenoid valve filter is not clean. - The prewash tank pressure sensor doesn't work properly. - The prewash tank overflow has not been inserted. - The prewash tank drain solenoid valve doesn't work properly and remains open. - The pressure sensor on the prewash board doesn't work properly. - The prewash board doesn't work properly.
52	The pressure sensor on the prewash tank does not work correctly.	<ul style="list-style-type: none"> - The pressure sensor on the prewash board doesn't work properly. - The prewash board doesn't work properly.
53 **	The required temperature in the prewash tank was not reached within the max. heating time.	<ul style="list-style-type: none"> - A heating element or a heating element branch of the prewash board doesn't work properly. - The prewash tank temperature sensor doesn't work properly. - The prewash tank heating element starter controller doesn't work properly or its coil is not correctly connected to the rinse board.
54	The water temperature in the prewash tank is too high.	<ul style="list-style-type: none"> - The "Tank temper." parameter (P r t) or the "Sanit. temper." parameter (P 5 t) has been changed. - The relay that activates the wash tank heating elements remote control switch is stuck.
55	The prewash tank temperature sensor is short-circuited.	<ul style="list-style-type: none"> - The prewash tank temperature sensor is short-circuited.
56 **	The prewash tank temperature sensor is open.	<ul style="list-style-type: none"> - The prewash tank temperature sensor is open or disconnected. - The prewash tank temperature sensor connector is not correctly inserted. - The connector on the prewash board is not correctly inserted.
57 **	The prewash pump thermal protector has tripped.	<ul style="list-style-type: none"> - The prewash pump thermal protector is not correctly set. - The prewash pump doesn't work properly. - The prewash pump impeller is blocked. - The "Prewash module" parameter (P t 3) is not correctly set.
58 **	The prewash tank was not completely emptied within the max. emptying time.	<ul style="list-style-type: none"> - The drain is blocked. - The drain solenoid valve doesn't work properly. - The prewash tank air trap is not clean.



76	The gear motor supplied current is higher than the maximum value allowed for the gear motor current.	<ul style="list-style-type: none"> - The wire connected from the inverter (Do terminal block) to the electronic board (X7-5) is short-circuited with the ground. - The inverter parameters are not correctly set.
77	The gear motor supplied current is lower than the minimum value allowed for the gear motor current.	<ul style="list-style-type: none"> - The wire connected from the inverter (Do terminal block) to the electronic board (X7-5) is open. - The inverter parameters are not correctly set. - The gear motor is configured with star connection and it must be configured with delta connections.
89	The temperature on the user interface is too high.	<ul style="list-style-type: none"> - Presence of steam too hot on the user interface board. - The user interface doesn't work properly.
101 **	The power absorbed by the boiler heating elements is less than the foreseen rated power.	<ul style="list-style-type: none"> - One or more branches of the boiler heating elements are disconnected. - One or more remote control switches that control the boiler heating elements do not work properly. - The relay of the MEC board that supplies the boiler heating element remote control switch coils does not work properly. - The connection wiring between the remote control switches and the boiler heating elements or between the MEC board and the boiler heating element remote control switch coils is disconnected. - The parameter Pulse/KWatt Hour (E_{nP}) is not correctly set. - The energy meter connections are not correct.
102 **	The power absorbed by the wash tank heating elements is lower than the foreseen rated power.	<ul style="list-style-type: none"> - One or more branches of the boiler heating elements are disconnected. - One or more remote control switches that control the wash tank heating elements do not work properly. - The relay of the MEC board that supplies the wash tank heating element remote control switch coils does not work properly. - The connection wiring between the remote control switches and the boiler heating elements or between the MEC board and the wash tank heating element remote control switch coils is disconnected. - The parameter Pulse/KWatt Hour (E_{nP}) is not correctly set. - The energy meter connections are not correct.
103 **	The power absorbed by the prewash tank heating elements is lower than the foreseen rated power.	<ul style="list-style-type: none"> - One or more branches of the boiler heating elements are disconnected. - One or more remote control switches that control the prewash tank heating elements do not work properly. - The relay of the MEC board that supplies the prewash tank heating element remote control switch coils does not work properly. - The connection wiring between the remote control switches and the prewash tank heating elements or between the MEC board and the prewash tank heating element remote control switch coils is disconnected. - The parameter Pulse/KWatt Hour (E_{nP}) is not correctly set. - The energy meter connections are not correct.
Com Err (compact machines)	Communication problems between machine electronic boards.	<ul style="list-style-type: none"> - The bus connection cables are not correctly connected to all the boards. - One or more boards don't work properly. - The "Appl. type" parameter (APT) is not correctly set. - Connector X6 is not correctly inserted in the MEC boards. <p>When alarm COM Err appears, the display will show the number of the electronic board that generated the communication error.</p> <p>2: wash + rinse 3: prewash</p> <p>If, after a communication error, the machine is able to re-enable the communication between the boards, the following message appears on the display:</p> <p style="text-align: center;">no Com Err</p>

* If the value of the parameter "Heat tim. enable" (HtE) is "Yes" (1), the machine stops when this alarm appears. If the parameter value is "No" (0), the machine does not shut down when this alarm appears.

** The machine does not shut down if these alarms appear. Every 8 seconds a message indicating the alarm number is shown on the display. A red LED blinks, but the machine continues to carry out the normal operations.

*** This alarm causes machine stop in versions without prewash. In prewash versions the machine continues to work.



E LACK OF DETERGENT AND RINSE AID WARNINGS

ALr rnS Out	Lack of rinse aid The lack of rinse aid warning is generated when a rinse cycle is in progress and the optical sensors (emitter and receiver) installed in the dispenser detect the absence of the cartridge.
ALr dEt Out	Lack of detergent The lack of detergent warning is generated when a wash cycle is in progress and the conductivity sensor installed in the tank detects that for 6 minutes (parameter <i>dAd</i> Detergent alarm delay) the concentration of detergent in the tank is below the set point value, and more precisely when $\text{Compensated conductivity} < \text{Detergent set point} + \text{Detergent set point offset}$. If the concentration of detergent in the tank is below the set point, the low level warning (not visible to the user) is immediately generated, but if after 6 minutes the concentration continues to remain low, the message visible to the user is generated.