

KEN DW 412



From machine No.:59.480
To machine No.: xx.xxx

GB

INSTRUCTION MANUAL DISH WASHER

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Changes to Manual

No.	Date	Changes on page numbers	Importance	Initials
On	17/09-2013	New software introduced	+	KEN A/S - AHE
01	10/08-2014	8.2, 8.3	+	SJA/SFM
02				
03				
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Introduction

KEN Machines are developed and tested in cooperation with hospitals and laboratories to ensure optimal functionality and reliability of operation, as well as to ensure that personal safety and environmental protection are given pride of place.



To attain this goal it is important that you follow the factory instructions concerning installation, start-up and use of the machine.

We therefore ask you to read these instructions carefully before you start using the machine.

If you contact us concerning the use of the machine, available baskets, servicing and ordering of spare-parts, please state the following information:

Machine type:

Machine No.:

Information on the EU Declaration of conformity is available in section 13.

This instruction manual

This instruction manual has been made to cover the widest possible range of combinations, which means that features may be described herein that are not found on the machine you have acquired; conversely, a few of the details on your machine may not be described in this manual.

If you need more information about any such detail, please do not hesitate to contact our service department.

Safety, general



This machine range has been designed in accordance with the prevailing EU directives. A list of these directives is given on the EU Declaration of conformity, section 14.



Wherever this manual explains matters that may be of danger to the staff or others, this icon will be found against the section in question.

Personal safety

This machine range uses electricity, hot water and chemicals for the cleaning process. In addition to the directives mentioned above, the design of the machine also ensures that the daily user is not exposed to any danger if the machine is used normally - or, indeed, if it is used inappropriately.

Below follows a list of situations where danger may arise if the machine is not used in accordance with the instructions:

Scalding:

The machine offers protection against scalding if the door is opened unintentionally.

Chemicals/caustic effect:



NB! When chemical canisters are exchanged, precautions must always be taken against chemicals getting sprayed into eyes or on skin, protective glasses must be used together with gloves. In addition, the instructions from the chemical supplier must be complied with at all times.

Electrical shock:

All live components that may represent a danger are placed behind screens that can only be removed by the use of tools.

NB! These screens must only be removed by specially trained technical staff.

Inhalation of vapours:

If generally recognized chemicals are used for washer/disinfectors, there will normally be no health problems involved in using the machine.



NB! If chemicals are used for which the manufacturer or the health authorities state that inhaling the vapours in question may involve a danger, a direct exhaust system must be established from the machine, or, if this is not possible, from the room, near the machine.

-personal safety, continued

Transport:

In transit and when the machine is handled, common sense and good practice must be applied. See also section 4.

Installation/connection:

Installation of the machine must be carried out using the good practice. See also section 4 - Installation instructions



NB! Connection of the machine to the electricity and water supply and to the drains must only be carried out by persons duly authorized to do so.

The environment

Environmental protection has been promoted to the greatest possible extent.

The low water consumption of the machine ensures that also the consumption of energy and the necessary chemicals for the cleaning process are kept to a minimum.

The machine is made from materials - mainly stainless steel - which can be recycled to a very large extent.

Disposal

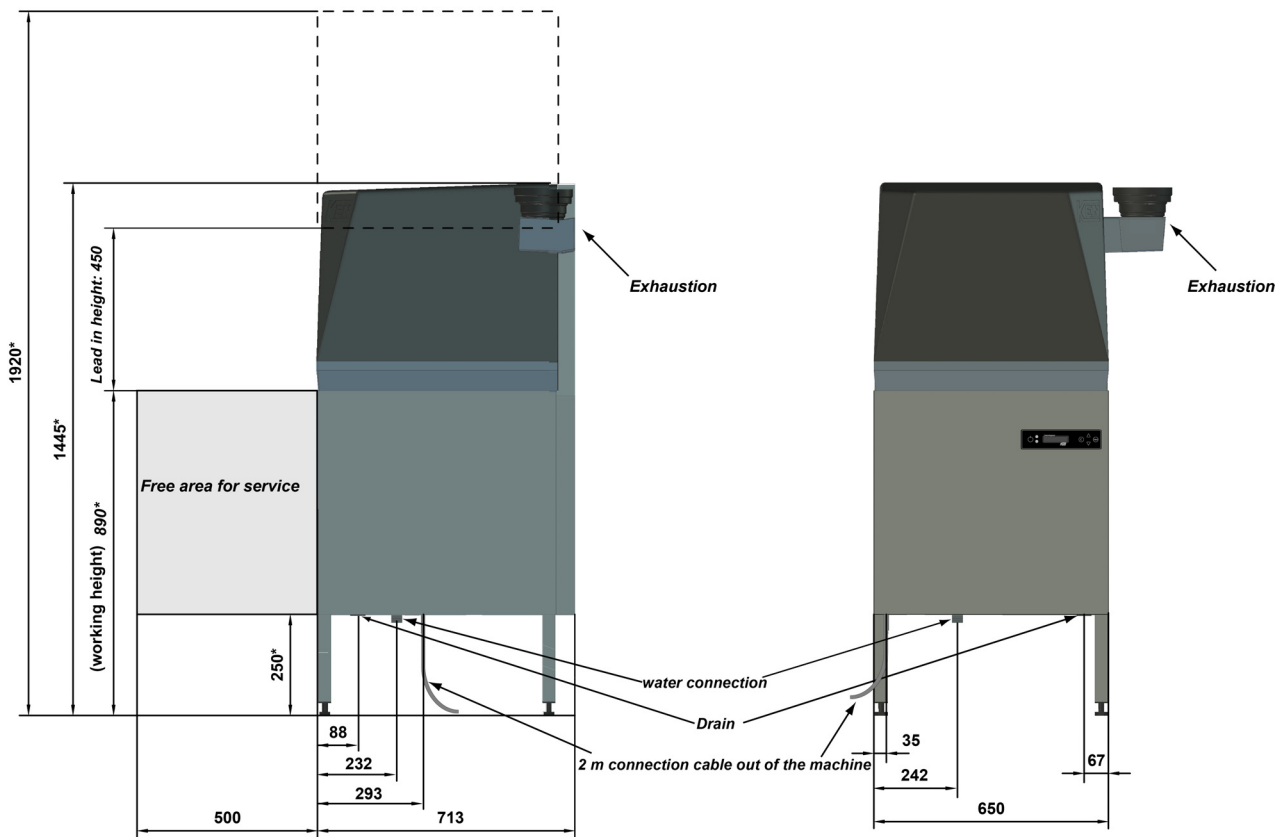
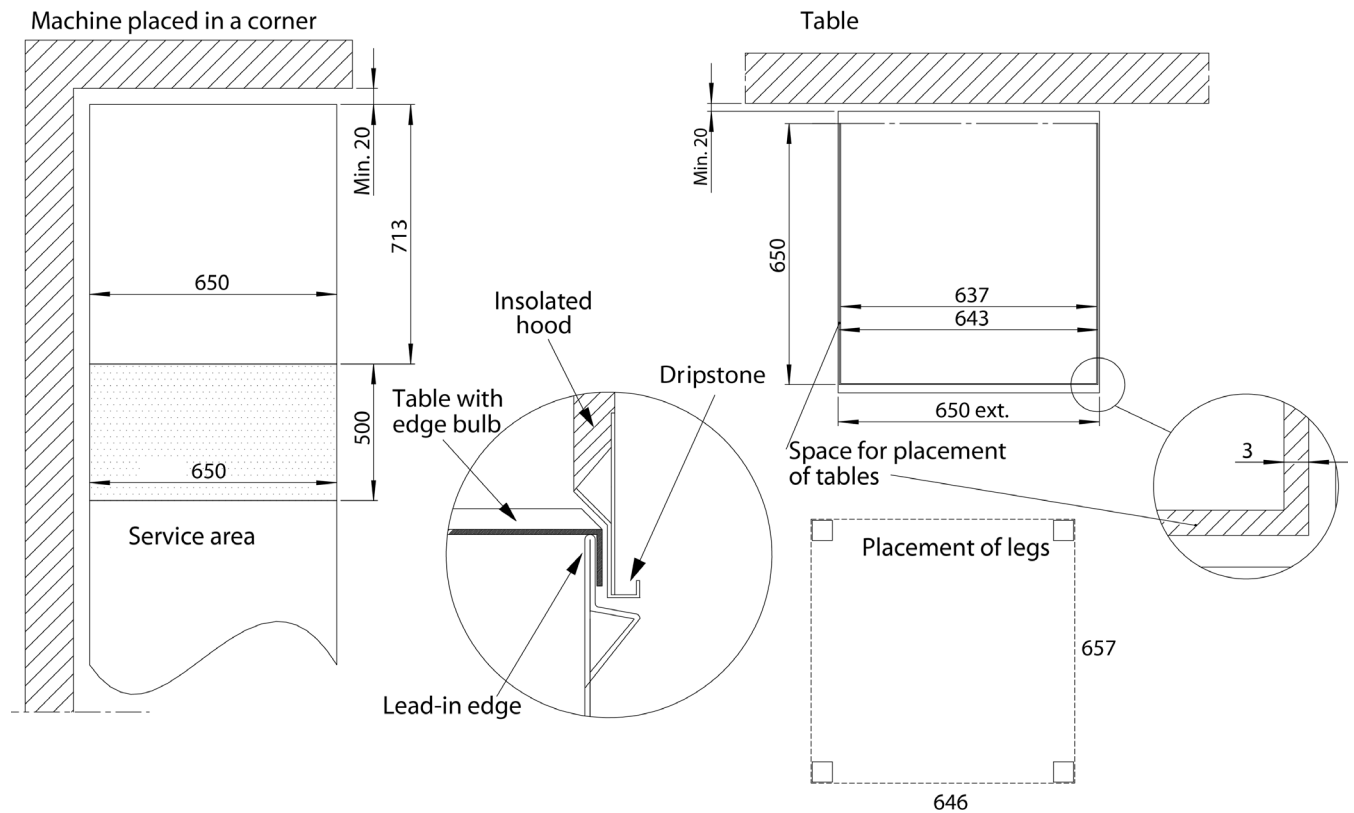
When the machine is to be disposed, the computer control and the chemicals canisters with their hoses must be removed and treated as chemical waste, in accordance with local/national provisions on waste disposal.

Apart from this it is not necessary to take any special measures when disposing of the machine.

As stated above the greatest majority of the materials can be recycled, and the machine contains no hazardous or environmentally toxic substances that require special treatment.

Technical description

Dimensional sketch:



Heights marked * indicates height adjustment from the factory
Adjustment of working height: from 840 - 950 mm

Technical description

Technical data

Basket dimensions:	Square, max 500 x 500 mm Round, max. ø540
Washing area (W x D x H):	600x540x450 (inside volume)
Washing and rinsing system:	Rotary washing and rising system
Rinse water consumption per wash:	2,4 litres
Nozzle pressure washing system:	5/9 (low/high) mVc
Wash tank capacity:	30 litres
Water intake at refill:	25 litres
Minimum water pressure (flow pressure):	200 kPa at 15 litres/min
Maximum water pressure:	800 kPa
Electrical connection:	Standard 3x400 V-N-earth 50 Hz Special voltage on assignment
Connecting power / fuse:	Standard: 9,9 kW / 16Amp.
Heating elements:	Standard: Wash tank 9kW-Rinse tank 9kW.
Water connections:	3/4" pipe thread, temperature: standard 50° C, max. 60°C. Connection to cold water possible
Drain:	Ø32 mm
Drainage flow:	Max. 0,5 L/sec.
Programs:	P1: 1min. 42sek., P2: 2min. 42sek. P3: 4min. 42sek. P4: 10min. 42sek.
Hood material:	Moulded polyurethane integral foam
Colour, standard:	RAL 7021 antracite grey
Colour, alternatives:	On assignment
Hood lifting:	Automatic. Locked during program.
Noise level:	65,5 dB(A) (high wash pressure)
Surface temperature:	Hood max. 45°C
Rinse aid dosage:	Integrated pump
Automatic detergent dosage:	Integrated pump and control for all types of detergent
Solid detergent:	Prepared
Steam heating:	Optional equipment.
Steam condenser:	Optional equipment.
Exhaustion, connecting branch and electric control:	Standard at right side of machine. Ventilation pipe ø100 - ø160 mm.
VA-approval:	No. VA 3.44 / 17123
Operation panel:	Pushbutton panel
Control:	Microprocessor : Program cycle, rinse temperature and error text appear on the display Optional customer adapted programs
Height adjustable system	Optional equipment
NetCom	Optional equipment

Installation instructions

Receipt/transport/unpacking

Check immediately whether the machine has been damaged in transit. If so, complain to the carrier immediately.

Total machine weight:	Excl. packaging	Incl. packaging
KEN DW 412	102 kg	116 kg

Disposal of packaging

The easiest way of transporting the machine is by means of a pallet forklift.

Packaging is separated into: Wood, cardboard and plastic, and is disposed of in accordance with local/national rules on waste disposal.

Installation/connection

Table connection:

Lead the entry edge on the table into the machine; the table finishes with a 15 mm entry edge to be placed on the machine edge. Install the tables with a slope towards the machine to allow the water to run into the machine. If the machine is to be placed in a corner, do not place any underneath shelves closer than 500 mm to the machine front plate to allow service.

Water connection:

Connect the machine to cold or hot water, min. 5°C and max. 65°C.

It is important to keep the flow pressure at 15 l/min. at min. 200 kPa and to never let the static pressure exceed 800 kPa.

Measure the pressure at the machine entry hose.

The coupling line to the machine must be fitted with a blocking valve and a non-return valve, possible combined as a settable non-return valve.

If the machine is equipped with a rinse aid system or a dosage system, this must be protected against backflow in line with the VA approval of the equipment concerned.

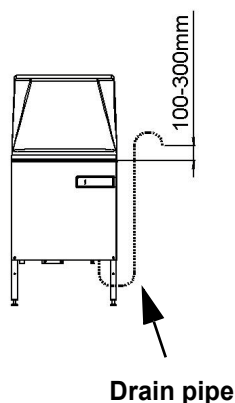
The machine must be connected to the water installation with the accompanying hose or another VA-approved hose.

Poss. decalcifying filter/softening system:

See special instructions for installation, but be aware that the filter may be connected to max. 65°C hot water as regards KEN filter types TB and MB.

Drain:

The machine can be connected to a floor drain, a sink drain or directly to the downpipe. In the two last-mentioned cases, a ø50 mm watertrap is required. The drain pipe may be horizontal, but may not be taken more than 5 m away from the machine. The water must be able to run off the machine of its own accord. If required, fit a drain pump to the machine. In such case, remember that the drain pipe must be lifted to the level shown at illustration.



Installation instructions

-installation/connection, continued

Electricity:

Voltage 3x400V 50Hz. Connect the machine with a 2.5 mm², 5-wire cable (3 phases, neutral and earth). The fuse size for a 9kW heating element is 16 Amp. Heating elements in wash and rinse tank cannot be engaged at the same time. For places where a neutral wire does not exist, the machine must be equipped with a transformer. The machine must be earthed in accordance with regulations. A main switch must be installed, which is only to be operated for service. The water connection must be ready before the power to the machine is turned on.



NB! Check the direction of rotation of the pump before starting up the machine. If the direction of rotation is wrong, exchange two phases.

Rinse aid:

The integral rinse aid pump has been preset to approx. 2 ml per 10 l. If this is to be changed, see section 9 - Rinse aid pump, adjustment.

Detergent:

If a detergent dosage unit is built in it has been reset from the factory. The setting is to be made via computer, see section 8.3 - Detergent consultant menu.

Front plate.

To loosen the front plate by releasing 2 screws in the bottom of the machine. The front plate can now be pulled out and released.

Adjustments of leg height:

There are 2 setting options + fine adjustment by adjusting screws. New height area is obtained by moving the pin (see illustration) Remember to fasten the screw on the back of the leg.

The indicated measurements are from floor to lead-in edge of the machine.

Adjustment from factory: 890 mm

Adjustment/lower hole: 840-890 mm

Adjustment/upper hole: 890-950 mm

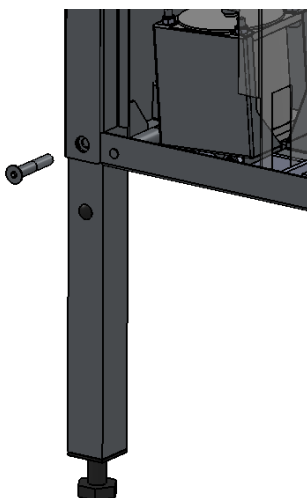
Total adjustment: 840-950 mm.

Aligning of machine:

When the machine is placed and the wanted height is obtained, it must be aligned to be level by the adjusting screws. This is measured on the edges.

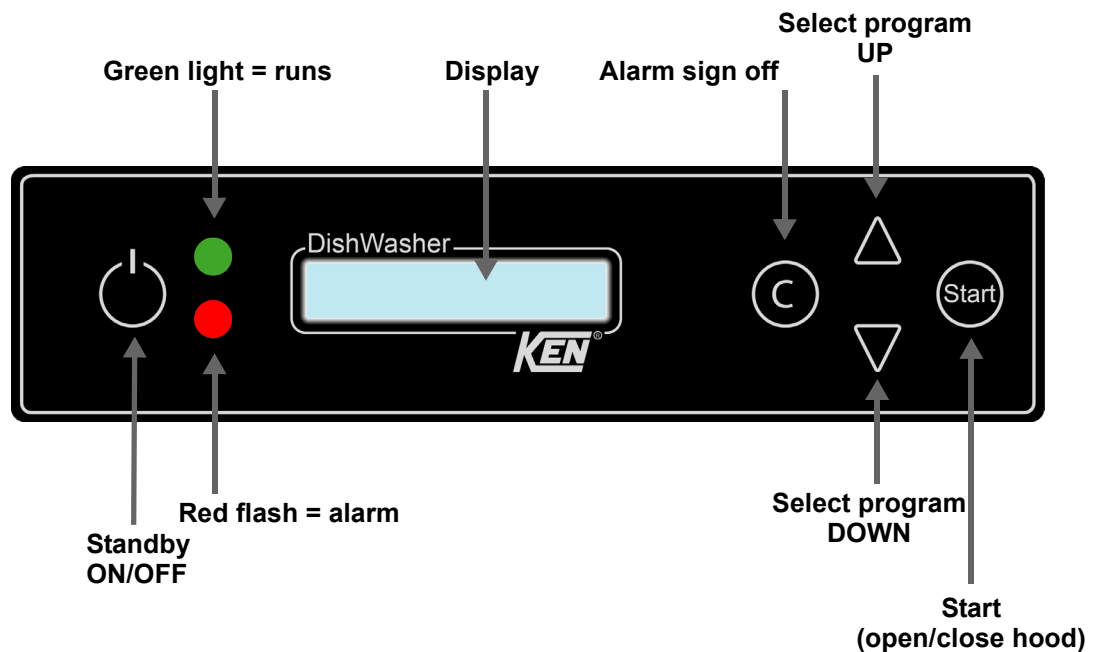
Adjustment of working height for automatic raise/lower:

From 800 mm to 1000 mm. (option)



User instructions

Operation panel



Start-up

1. Check that the filter has been cleaned, the standpipe is in place and closes tightly.
2. Press the **ON/OFF** key. Follow the guidelines on the display.
3. When the machine is ready the hood is opening; a program can now be selected.

Operation

1. Select a program. Settings can be changed with the assistance of a KEN service technician.
2. Press start. The hood closes and green light indicates the machine is in operation.
3. When the program is completed the hood opens and the green light turns off.

User instructions



Water change

Change the water when required. In the service menu it is possible to set the machine to give an automatic warning if a change of water has not been made, for example after 50 wash cycles. The operator must accept the warning before the machine can be started up again.

Water change without drain pump:

To make a water change without a drain pump, lift up the standpipe and the water will run out of the machine. When the water is out, clean the filter and put the standpipe back in.

Water change with drain pump:

To make a water change with a drain pump press both arrow keys   simultaneously when the display shows **"SELECT PROGRAM"**, to drain the water from the machine.

Water change is also possible by using the Main Menu, see section 8.2 - Adjustments by computer control.



NB! The machine has to be turned off before draining the water.

The start-up procedure is repeated - see page 5.1.

Replacing the detergent can

When the detergent can is empty it must be replaced.

If the detergent can is completely empty, air bubbles possibly arise in the hoses. To avoid this and to gain correct dosing of detergent at first wash cycle after replacing the detergent can, use the **"MAIN MENU / DETERG.CONSULT."** to dose the detergent for up to 10 seconds. See section 8.2 - Adjustments by computer control.

Operating disturbances

In case of operating disturbances, the red lamp at the display will flash and an error text is shown on the display.

KEN microprocessor control is able to diagnose a number of errors in machine installation, operation or components errors that have given or are about to give operating disturbances.

Significant and insignificant errors are distinguished.

In case of a significant error the process stops immediately; the display shows the cause of the error and the red lamp flashes.



NB! You must sign for the error before the machine can operate again by pressing the C key.

A detailed overview of error codes and error possibilities is located in section 12 - Trouble shooting/error codes.



NB! Only try to remedy an error if the cause has been clearly identified and if no intervention in the technical components of the machine is required.

OTHERWISE, CALL A TECHNICIAN!

User instructions

Wash-up tips

Pre-rinse:

The easiest way to remove large particles and food leftovers from the tableware is by rinsing it; possibly, a rubber scraper could be used. Use cold or tepid water, never hot water. If the water is warmer than 35°C, the dirt will get stuck.

Wash:

If you wash mixed cutlery, you may want to place it in the special holds with the shaft down; only a handful in each. Put the cutlery in the machine and press the Start key. If the cutlery is not entirely clean after the wash, choose a program of longer duration. Place the cutlery in the wash basket. Place cups, glasses, bowls, etc. with the bottom up.

Dishes are washed most easily in the cup basket. Make sure there is space between the individual items.



NB! Do not wash items made from regular iron, as it may result in fly corrosion.

Working Procedure:

While the machine is washing a load, the procedure should be that the previous load is air-drying for as long as it takes to fill up the machine with the next load. Glasses and cutlery should be wiped off while still warm.

The machine can wash 20 - 40 cycles depending on the quality of the pre-rinse, without changing the water.

When the work is finished, lift up the standpipe and the water will run out of the machine.



NB!! Remember to turn off the machine before the draining the water.

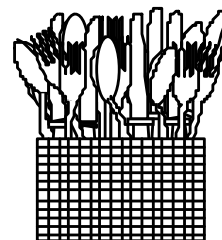
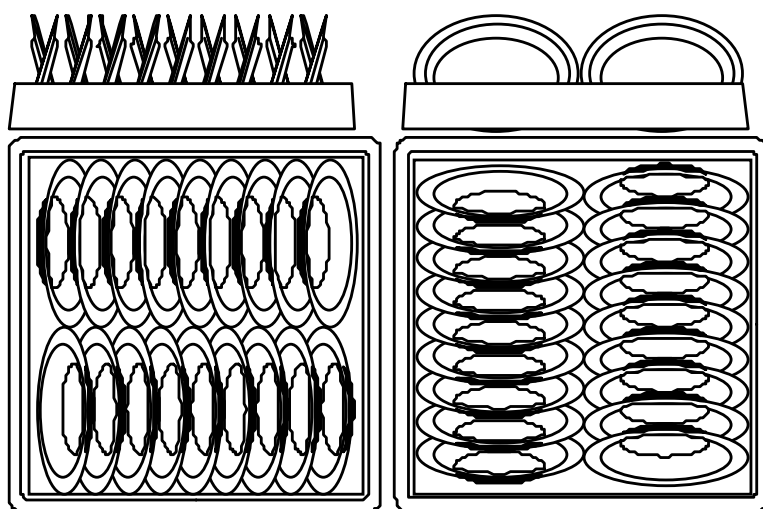
Clean and wipe off the filter and wash tank every day.

It is important to leave the machine overnight with the hood open to ventilate the machine.

Placement:

To gain optimal washing properties it is important to place the tableware appropriately in relation to the washing arms. Place plates to ensure that the washing water from the upper washing arm hits the front of the plates.

See drawing.



Program built-up

Wash programs

KEN DW410 has 4 programs.

A program consists of:

Wash incl. detergent dosage

Pause

Rinse

Pause

Opening

The programs can be adjusted individually, see section 3.2 - Technical data.

Adjustment of the programs requires specially trained staff and can only be carried out by knowledge of the special codes required.

These codes are handed out in connection with courses at **KEN**.

KEN's dishwasher's are adjustet from the factory to wash at 57°C and rinse at 80°C. If the right temperature has not been reached, the program will be terminated and a warning is shown on the display.

Wash pressure

KEN DW412 has 2 wash pressures:

- high pressure used for pots and pans.

- low pressure applied to glass, cups and other service.

Wash pressure's can be set individually for each program and there is a opportunity to select programs with high pressure, low pressure or high/low pressure.

Low pressure:

The program can only be startet with low washing pressure.

The display shows "L".

High pressure

The program can only be startet with high washing pressure.

The display shows "H".

High/low wash pressure:

Both wash pressure can be selected for the program, the display shows "L/H".

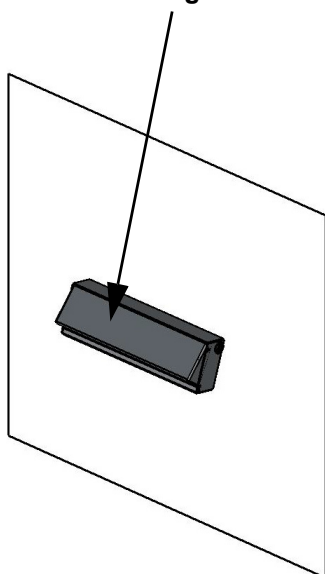
For high pressure press down the start button until the hood starts to go down - the display change to "H". For low pressure press down shortly on the start button - the display change to "L".

Low/high wash pressure:

Both wash pressure can be selected for the program, the display shows "L/H".

For high pressure press down the start button until the hood starts to go down - the display change to "H". For low pressure press down shortly on the start button - the display change to "L".

Enclosed a start key which can be placed on the wall under a table og similar.



Maintenance

Daily maintenance

Regular cleaning:

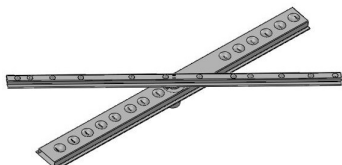
Clean the outer surfaces of the machine with a moist cloth, possibly using a polishing agent for stainless steel.



NB! Never use a water hose, pressure rinser or similar.

Chemicals:

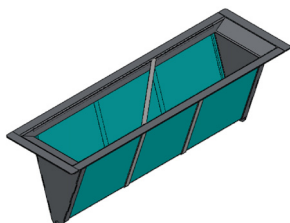
Check daily the level of detergent and any other chemicals used in the cans.



Wash and rinse arms:

Check and secure that the wash and rinse arms can rotate freely and that the nozzles are not clogged.

If a clogged nozzle is unable to be cleaned from the outside, the arms has to be dismantled and rinsed.



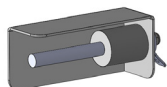
Filter:

Empty the machine for water.



NB!. The machine has to be turned off before draining the water.

Lift up the filter from the wash tank and clean it.



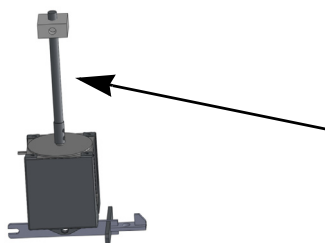
Clean the upper level sensor.

Clean the bottom tank underneath the filter for broken glass, lint, toothpicks or similar and re-install the filter. Remember to place the standpipe.



NB! Be careful when cleaning the filter and the bottom tank, as there may be sharp objects.

Preventive maintenance



In addition to the daily maintenance described, it is recommended to carry out regular inspections to ensure that the machine functions optimally at all times.

The spindle for the lifting motor must be lubricated after 50.000 washes or once a year. Use approximately 1 ml of Super Lube (corresponding to 1 cm on the tube). Do **only** use the lubricant which is specified by KEN, Super Lube (spare part No.: 7604545)



NB! All preventive service and maintenance, which require removal of the machine cladding plates by the use of tools, may only be carried out by specially trained technical staff.

General information about stainless steel

Stainless steel is often chosen because of its attractive appearance more than on the basis of a wish for long service life and low maintenance costs, while in fact those are the most prominent qualities of this material. However, all materials including stainless steel, are discoloured after a time due to dirt, oil, grease, soap or pollution of the water, etc.

Stainless steel - description

Stainless steel is a general designation covering a large group of materials which share the property of containing minimum 13% chromium (Cr), which makes them resistant to rust attack. The chromium in the steel reacts with the oxygen in humid conditions to form a very thin chromium-oxide film that protects the material against corrosion.

If this film is attacked, either mechanically or chemically, it is reformed spontaneously if or when the surface gets into contact with oxygen, even in such low concentrations as exist in normal water. The higher the chromium content, the better the corrosion resistance of the steel. This good property is further reinforced with increased molybdenum content (Mo).

At particularly exposed spots, sheets and pipes with a content as high as 2.7% are used. In addition to chromium and molybdenum, nickel content has been added, primarily to give the steel a structure (austenitic) that makes the material easy to shape and weld.

Conventional types of stainless steel have a chromium content of approx. 18 % and a nickel content of approx. 8-9% and are called 18/8 steel or "ordinary stainless".

These types of steel are used primarily for kitchen utensils, the food industry and other indoor purposes. In particularly aggressive environments, as in a dishwasher for industrial purposes, it is necessary to use molybdenum alloy steel at exposed locations to ensure adequate resistance to corrosion. The occurrence of chlorine, acid, moisture and high temperature are all parameters that generate an environment that is aggressive to stainless steel.

That is why KEN A/S uses stainless steel with molybdenum content at exposed locations in machines subject to particularly harsh environments.



Warning! In this context, we must warn you against using soap with high chlorine content (higher than 5%) and a low pH value (lower than 10). Such a composition is highly aggressive to even the best steel qualities, like the ones we use.

In special cases, the guarantee against corrosion of the steel may be lost completely.

Discoloration may occur:

1. If the steel is exposed to an environment that is more aggressive than the steel is intended to handle, i.e. highly polluted air, saline solutions or large residue or concentration cleaning agents containing chlorides.
2. If the surface is polluted by iron particles from cleaning sponges, defective baskets or other iron items from which small particles may "drip" down into the machine.
3. If the machine is connected to extraction ducts that are not corrosion-proof.
4. If the water contains a lot of iron and/or silicates.
5. Another kind of discoloration may also occur as a set-off from copper piping used in connection with the installation connecting the machine.

Maintenance

-general information about stainless steel, continued

The risk of harmful corrosion in the first case is considerably reduced or entirely eliminated if molybdenum alloy stainless steel is used. In case 5, the surface will become brownish, which does not mean anything to the surface of the steel apart from the cosmetic appearance. In cases 2, 3 and 4, the surface of the stainless steel will be discoloured. This occurrence of rust will occur most frequently on horizontal surfaces in the machine and may often be felt with the tips of ones fingers. Small particles will set off a small rust spot that will not normally harm the steel. Larger items (hair needles, roasting chucks, coins, capsules, etc.) also set off rust colour on the surface of the plate, but also makes it possible for a very aggressive environment to develop between the item and the plate. Under these unfavourable conditions, strong hydrochloric acid forms that is always harmful to the material. It is thus important to clean the machine every day of deposits of any type. If necessary, cleaning can be done with a sponge (not one containing iron) and foam powders, etc.

Instructions -keep the good corrosion resistance of the steel

1. Make sure any water treatment facility is always ok. A defective facility may segregate salt to the machine and thus harm the machine.
2. Make sure the machine is cleaned daily and aired. Soap residue, food residue, iron particles, etc., may damage the machine in the longer term.
3. Never wash items soiled with iron particles without cleaning the machine immediately after.
4. Make sure to make correct soap dosage, particularly if you do it manually. If the machine has an automatic system, the soap dosage should be checked regularly. The check should be made by the soap supplier when he is there anyway, or you can do it yourself by making a simple pH measurement (litmus paper). Ask your soap supplier.
5. Use only types of soap that are intended for machine washing and preferably types with material-protecting substances added.
6. Always comply with the dosing regulations and safety rules. See the soap suppliers datasheet.
7. Never try to decalcify or clean the machine with hydrochloric acid, etc., without expert assistance. Use products approved for the purpose. Ask your soap supplier.

Preventive washing with water.

Daily cleaning with water removes dirt and prevents corrosion attacks from getting a foothold. Washing is best done with a sponge and hot water or with a mild cleaning agent, followed by washing with cold water. Remember to clean the bottom of the wash tank in particular.

The appearance of the surface can be further enhanced if you use a wrung piece of cloth or chamois at the end.

There are also a number of oil products on the market for surface treatment of stainless steel. Ask your soap supplier.

Maintenance

Removal of stains and discoloration on stainless surfaces.

If the stain or discoloration of the stainless surface is of such a serious nature that they cannot be removed by normal water wash as previously described, the following cleaning methods can be recommended.

Fingerprints:

Wash with ethyl alcohol, thinner or acetone, rinse with clean cold water and wipe off.

Oil and grease:

Wash with an organic solvent of the above-mentioned type, wash again with soapy water or a mild detergent, rinse with clean cold water and wipe off.

Difficult stains and discoloration:

Wash with an abrasive cleaning agent and rub in the same direction.

Oxidation colours and more serious stains:

Wash with an abrasive cleaning agent or polish with a Scotch-Brite (yellow/green) sponge along the surface structure, rinse with clean cold water and wipe off.

Discoloration as a result of corrosion:

If necessary, wash with an abrasive cleaning agent as previously described.

Paint:

Wash with a lacquer remover (or use a soft nylon brush or sponge), rinse with clean cold water and wipe off.

Scratches on polished or brushed surfaces:

Polish with a rotating polish disc (also use an iron-free polisher). Polish along the surface structure; wash with soapy water or a mild detergent; rinse with clean cold water and wipe off.

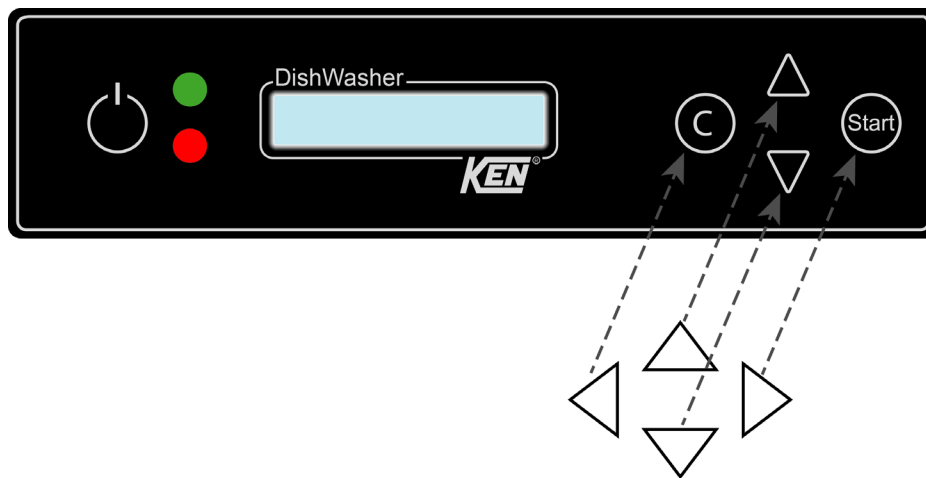
Warning!



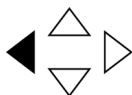
Use only the methods described above. Follow safety regulations for such work and wear rubber gloves and protective goggles. Make sure there is good ventilation.

Adjustments by computer control

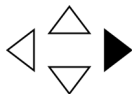
Access to computer control



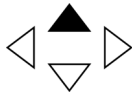
Functions of Main/service menu keys are as follows:



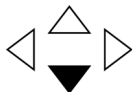
1. Return to previous menu. To be used as well to exit the Main Menu/Service program.



2. Enter. To select/save the menu displayed/next menu selection.



3. Scroll up/increase value.



4. Scroll down/decrease value.

A number of service programs are available for specially trained technicians, and to minimise the malfunction of the machine these programs are only accessible through special codes.

The special codes are usually handed out in connection with a KEN service course.

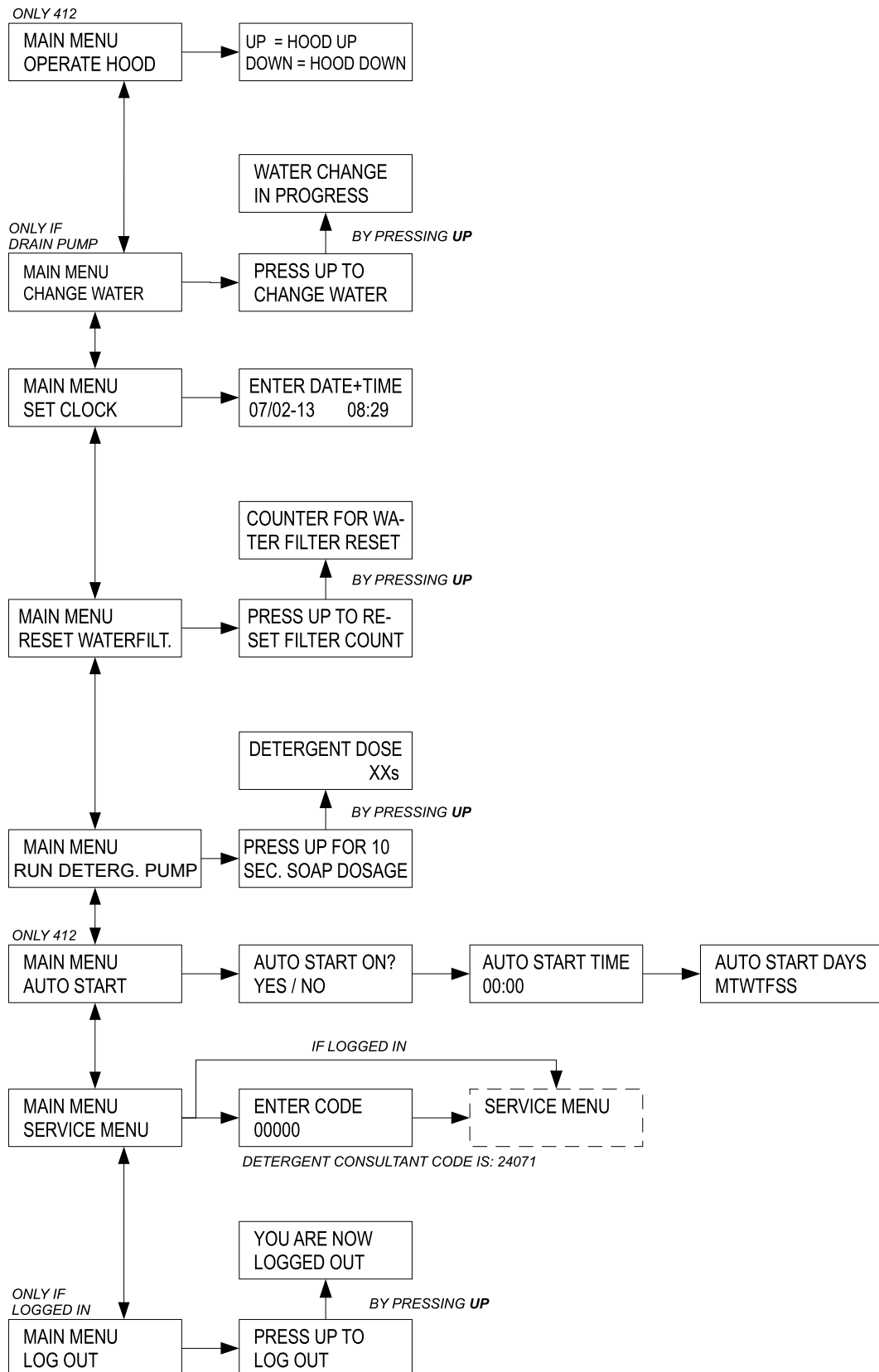


NB! We recommend that only specially trained technicians use the service menus.

Adjustments by computer control

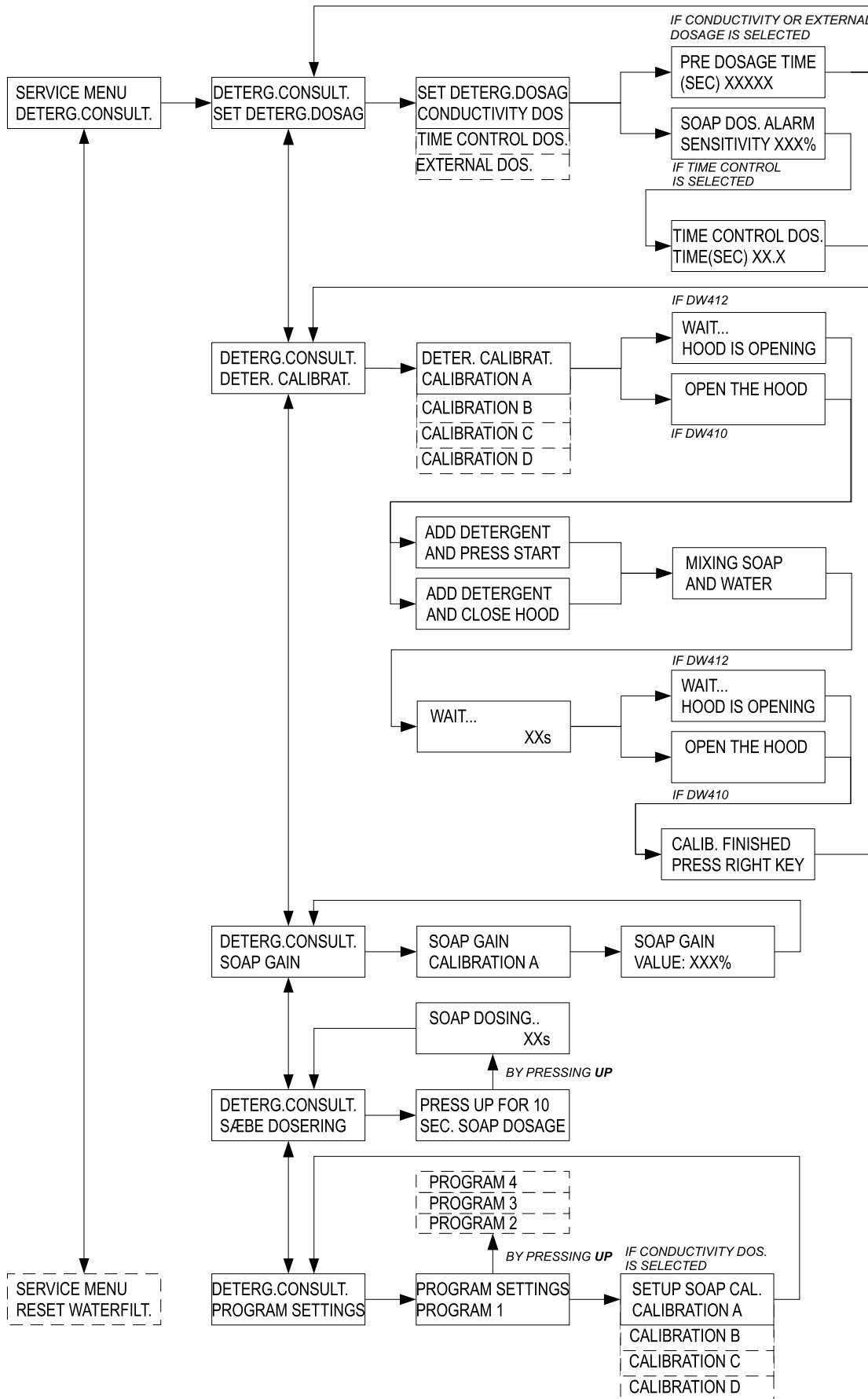
Main Menu

Press the **C** key and hold for 5 seconds to enter the Main Menu.



Adjustments by computer control

Service Menu - detergent consultant menu



Other adjustments/inspection

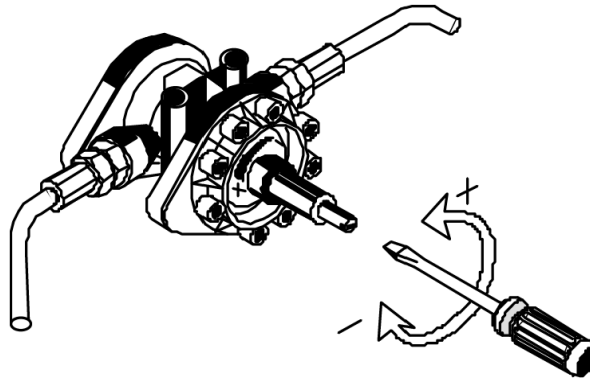
Adjustment of Rinse aid pump

If few drops of water or stripes occur on the tableware, the dosing of rinse aid is either too low or too high.

The rinse aid pump is placed to the left behind the front plate and can be adjusted with a screwdriver.

Clockwise: Less rinse aid.

Counterclockwise: More rinse aid.



Do not adjust more than 1/4 turn at a time. The result of the adjustment can be seen on the tableware after the 5th wash.

A control of the dosing quantity can be made by removing the suction hose from the rinse aid can behind the rinse aid pump. When the machine has rinsed, you can see how many cm the rinse aid sinks in the hose.

1 cm corresponds to about. 0.5 ml. per 10 liter water. Air in the hose can be pumped out by pressing with the screwdriver on the adjustment screw.

Detergent consultant

Calibrating detergent by conductivity dosing



1. Turn on the machine.
2. Press and hold key **4** for 5 seconds until the display shows **"ENTER CODE"**
3. Enter the detergent consultant code in the main menu: **24071** to enter the **"DETERG.CONSULT."** in the **"SERVICE MENU"**.
4. The machine must be drained for water and the wash tank should be cleaned before calibration. To make a water change, lift up the standpipe, the water will now run out of the machine. When the water is out, clean the filter and wash tank and put the standpipe back in.
If a drain pump is installed in the machine it is emptied by the menu **"CHANGE WATER"**.

The machine allows up to 4 different detergent settings, named A, B, C and D, which can be attached to the programs individually.

5. Select **"DETER. CALIBRAT."** in **"DETERGENT CONSULTANT"**.
6. Select **"CALIBRATION A,B,C or D"**.
7. Press key **2**. The hood is opened.
8. Add the wanted quantity of detergent in the wash tank.

At only one detergent setting, normally 60-80 ml detergent is added, see section 3 - Technical data.

9. Press key **2**. The hood is closed.

The machine adds water and starts the detergent calibration.
The hood is opening when the calibration is ended.

10. Press key **2** to end.
13. The calibration is ended and key **2** is pressed to leave the detergent consultant menu.

If more than one detergent setting is wanted, repeat point 4-10 after switching between A,B,C and D. (point 6)

Detergent consultant

-calibrating detergent by conductivity dosing, continued

11. To attach the different detergent adjustments to the programs, please enter "**PROGRAM SETTINGS**" in "**DETERG.CONSULT.**".
12. Select program1-4.
13. Press key **2**.
14. Select "**CALIBRATION A,B,C or D**".
15. Press key **2**.

Repeat point 11-15 until the wanted number of detergent adjustments are reached.

When calibrating is ended leave the "**DETERG.CONSULT.**"-menu by pressing key 4 repeatedly.
The machine is now ready for use.

If an external detergent supplier or time controlled detergent dosage is wanted, see section 8 -
"DETERGENT CONSULTANT/SET DETER.DOSAGE".

KEN is willing to inform about supplier of detergent which is to be used in the machine.

Exhaustion

Description

The machine exhaustion consists of a channel made from stainless steel, fitted on the back plate attached to the machine. The channel leads to the right side of the machine and ends up in a nozzle intended for connection to a separate fan.

There is also an option of a left side exhaust nozzle.

Connecting joint for exhaustion

The connecting joint which is placed in the nozzle is for fitting an exhaust pipe. The joint is adapted to fit the used exhaust pipe, see illustration below.



Improved working environment

By connecting of an exhaust directly from the dishwasher an efficient exhaust is ensured and the working environment improved.

When the machine finishes washing a large volume of air will be sucked out through the outlet when the hood is opened.

When the machine is washing only relatively little steam is released from the machine, and therefore the tableware is not cooled down.

Ventilation data

The exhaust air contains saturated steam, which to some extent will condense in the pipe system. Therefore, the pipe system must be designed with a drain or gradient towards the machine. The pipe system should be made of stainless steel or plastic.

	Effective volume of air per hour:
By Machine exhaustion:	200-300 m ³
By corner cooker hood::	600 m ³
By cooker hood (machine + preshower):	750 m ³

Trouble shooting/error codes

General comments concerning error codes

KEN microprocessor controls are able to diagnose a number of errors by the machine installation, operation or components; errors that have already resulted in - or are about to result in - operational failures.

In such cases the red LED on the control panel will flash, and the error indication will appear on the display.

The control distinguishes between essential and unessential errors.

By an essential error the process is immediately discontinued at the program stage at which the error occurred.

By unessential errors the error name will not appear until the door is opened after the program cycle has been completed.

Error codes short list

#20 WATER PRESSURE TOO LOW

#25 MISSING WATER PRESSURE

#30 SLOW HEATING WASH TANK

#31 SLOW HEATING RINSETANK

#35 NO HEATING WASH TANK

#36 NO HEATING RINSE TANK

#38 LEVEL FAULT CLEAN SENSOR

#39 LOW LEVEL MISSING

#40 MISSING RINSE AID

#50 MISSING DETERGENT

#53 CHANGE WASH WATER

#54 CHANGE WATER STRAINER

#55 DRAIN FAULT

#65 HOOD FAULT

#76 DEF. THERMOSENSOR WASH TANK

#77 DEF. THERMOSENSOR RINSE TANK

#85 HOOD SECURITY ENABLED

#86 HOOD BLOCKED

#200 INT. SW FAULT

Trouble shooting/error codes

Display/error #20 - #35	Cause	Remedial action
#20 WATER PRESSURE TOO LOW The water filling has lasted too long according to the programmed time, which corresponds to a water pressure of 1-2 bar in the connection to the machine. This pressure is too low to ensure an acceptable rinse.	1. Stand-pipe is not in proper position; water is running out of the tank. 2. Strainer in water softener is choked up. 3. Strainer on the inlet of the solenoid valve is clogged. 4. Too low pressure in installation.	Stand-pipe to be placed in the right position. To be cleaned. To be cleaned. To be repaired, a pressure increase pump may be installed.
#25 MISSING WATER PRESSURE The water filling has lasted too long according to the programmed time, which corresponds to a water pressure of 0-1 bar in the connection to the machine. The rinse system is unable to function at this pressure.	1. Stop cock in installation closed. 2. Verify that no sequences 1,2,3 and 4 at #20 are present. 3. Defective solenoid valve. 4. Missing electrical connection to solenoid valve. 5. Missing signal from level sensor in wash tank.	Open the stop cock. See 1 - 2 - 3 - 4 at #20. To be replaced. Repair connection to solenoid valve. Repair connection to level sensor. Adjust level sensor if necessary.
#30 SLOW HEATING WASH TANK The heating element in wash tank has been coupled in for longer than a normal period, without reaching the correct wash temperature.	1. Defective heating element VL1.	To be replaced.
#31 SLOW HEATING RINSE TANK The heating element in rinse tank has been coupled in for longer than a normal period, without reaching the correct rinse temperature.	1. Defective heating element VL2.	To be replaced.
#35 NO HEATING WASH TANK The heating element in wash tank has been coupled, without reaching the correct wash temperature.	1. Automatic cut-out T1 disconnected. (placed under the machine, right side) 2. Defective heating element VL1. 3. Defective contactor C1. 4. Missing connection from output Activate output and measure wire to C1.	Try max. once to reconnect. (The cause of the cut-out must be found) To be replaced. To be replaced. Activate output and measure wire connection.



NB! Remedying an error that requires the use of tools to remove the machine cover plates may only be carried out by specially trained, technical staff.

Trouble shooting/error codes

Display/error #36 - #54	Cause	Remedial action
#36 NO HEATING RINSE TANK The heating element in rinse tank has been coupled, without reaching the correct rinse temperature.	1. Automatic cut-out T2 disconnected. (placed under the machine, right side) 2. Defective heating element VL2. 3. Defective contactor C2. 4. Missing connection from output Activate output and measure wire to C2.	Try max. once to reconnect. (The cause of the cut-out must be found) To be replaced. To be replaced. Activate output and measure wire connection.
#38 LEVEL FAULT CLEAN SENSOR When the machine has been emptied, the level sensor "level too high" is stuck after the level sensor "level too low" has been deactivated.	1. Dirt on sensor or plane filter.	Clean sensor for upper level. Clean plane filter and basket filter. The error cannot be reset, until the sensor and the filter has been cleaned.
#39 LOW LEVEL MISSING Lower level has been missing for more than 5 seconds during wash.	1. Missing standpipe. 2. Leakage on wash system.	Check that stand-pipe is inserted. Check the machine for leakages.
#40 MISSING RINSE ADDITIVE Level control in rinse additive tank gives no signal on control input.	1. Missing rinse additive. 2. Error at level sensor. 3. Missing signal on control input.	Add rinse additive. Adjusted / replaced. Repair the wire connection.
#50 MISSING DETERGENT The control has activated the detergent pump, without reaching the wanted detergent concentration in the wash tank.	1. Detergent is missing. 2. Detergent sensor in wash tank is dirty. 3. Connection to detergent sensor is poor. 4. Detergent pump defect. 5. Connection to detergent pump is poor.	Add detergent. To be cleaned. To be cleaned or replaced. To be replaced. To be repaired.
#53 CHANGE WASH WATER	Maximum number of washes is set in mashine settings (0 - 99 where 0 is = no alarm) 0 is the default value. At code #53, stop the machine, discharge the water and clean before the next start. The counter is automatically reset when the tank is emptied.	
#54 CHANGE WATER STRAINER	Maximum number of liters is set in mashine settings (0 - 50000 where 0 is = no alarm) 0 is the default value. The counter must be reset when the filter is changed, see section/page 8.2 - Adjustment by computer control.	



NB! Remedying an error that requires the use of tools to remove the machine cover plates may only be carried out by specially trained, technical staff.

Trouble shooting/error codes

Display/error #55 - #200	Cause	Remedial action
#55 DRAIN FAULT (only if drain pump is installed)	1. Drain blocked. 2. Defective drain pump.	To be cleaned. To be repaired.
#65 HOOD FAULT Input has at a time during the wash/ rinse period been without signal.	1. Poor wire connection/contact 2. Reed contact defect or wrongly adjusted.	To be repaired. To be replaced or adjusted to make sure that it does not break e.g. by an untimely attempt to open the hood.
#76 DEF. THERMOSENSOR WASH TANK Thermal-sensor in wash tank short-circuited or disconnected.	1. Error in connection between thermal-sensor TS1 and input. 2. Defective thermal-sensor TS1.	Wire to be repaired. To be replaced.
#77 DEF. THERMOSENSOR RINSE TANK Thermal-sensor in rinse tank short-circuited or disconnected.	1. Error in connection between thermal-sensor TS2 and input. 2. Defective thermal-sensor TS2.	Wire to be repaired. To be replaced.
#85 HOOD SECURITY ENABLED	1. Some is preventing for automatic closing of hood. 2. Error at microswitch for security. 3. Error at lift motor.	Checked. Adjusted / replaced. Repaired / replaced.
#86 HOOD BLOCKED	1. Some is preventing for automatic closing of hood. 2. Error at microswitch for security. 3. Error at lift motor.	Checked. Adjusted / replaced. Repaired / replaced.
#200 INT. SW FAULT Defective control module.	1. Control module is broken.	Call in a service technician.



NB! Remedying an error that requires the use of tools to remove the machine cover plates may only be carried out by specially trained, technical staff.

KEN NetCom (Optional equipment)

Installation

Cf. separate instructions.

Operating statistics

Display from 1 to infinite number of days.
15000 program runs logged with the service log.
For each program, the number of runs in the period is shown.
Total number of program runs in the period.
Total number of water changes in the period.
Calculated use of chemicals in the period in ml.
Opening time for water value in minutes (multiply by 15 to get approx. water consumption in litres for the period).
Calculated power consumption in kWh.

Operating status

Current temperature:
In wash tank in °C
In rinse tank in °C
Total no. of washes
Total operating time

Technician log

Electronic log with space for 200 characters per log
Contains 100 logs, following which it is "zeroed".
Daily check contains information about the last 200 checks, following which it is "zeroed".
Time is logged.

Service log

Contains the last 15000 information items together with the operating statistics (cf. the statistics).
Warnings are logged, such as missing chemicals, low water pressure, etc.
Errors are also recorded in this log.
The logged data are the following:
Batch no.
Time of run.
Date of run.
Which program has been run.
Error code.
Error text.

EU certificate of compliance

KEN A/S

Brobyværk, DK 5672 Broby, telefon 62 63 10 91, telefax 62 63 16 07

www.ken.dk, e-mail: ken@ken.dk

-hereby certifies that

KEN Dishwasher, type:

KEN DW 412

Machine No.:

a) Has been manufactured in accordance with the following directives:

1. Council Directive 2006/42/EC (The Machinery Directive).

2. Council Directive 2004/108/EC (EMC-Directive).

3. Council Directive 2006/95/EC (Low Voltage Directive).

b) Furthermore, they have been manufactured on the basis of the following national and international standards and technical specifications:

Title:

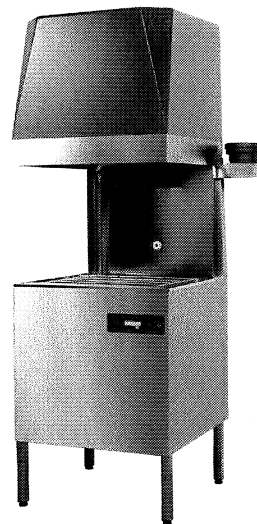
Subject:

Country:

1. IEC 335-2-58

Electrical safety

International



Brobyværk d.: 28/2 2011

KEN A/S

Per Juul Nielsen
Managing Director

KEN DW 412

Subject to alterations

Section/page:14.1

17/2/2011

Warranty/Service

Extent

12 months of factory-guarantee is given. This covers all defects caused by wrong manufacturing or defects in the used materials.
The guarantee only includes exchange of defect components.
The guarantee does not include compensation by loss of profits, loss as a consequence of delayed delivery, injuries, property damages or the like.

Repeal of guarantee

- by connecting another mains voltage than stated on the machine.
- by reparations done by others than the specially trained technical staff at KEN (including technicians trained at KEN training centre)
- if the machine has suffered from damages caused by wrong treatment, violence, fire or influence of chemicals.

Note that any damage of the machine during transportation is to be reported to the carrier/shipping company immediately at receipt of the machine.

Machine failure

If any faults or errors occur to your KEN machine, please contact our service department (service@KEN.dk or phone No: 0045 70 10 20 91) in order to get skilled guidance.

In case of an essential error call in one of our technicians, as unskilled guidance or unnecessary repairs can be very expensive.

Parameters

Adjustments of the machine

Description	Adjustments from factory	Possible adjustments	User adjustments
Machine Number			
Type of machine	DW412	DW410, DW412	This adjustment must ALWAYS be DW412 for this type of machine.
Language	English	English Danish German Swedish Norwegian	
Condenser or exhaustion <i>This adjustment indicates whether the machine is connected to exhaustion, condenser or none.</i>	Exhaustion	Exhaustion Condenser None	
Drain pump <i>This adjustment indicates whether the machine is fitted with drain pump or not.</i>	Not installed	Installed Not installed	
Water change <i>This adjustment indicates whether water change is done automatically or manually. The machine must be fitted with a drain pump to do automatically water change.</i>	Manual	Manual Automatic	
Water change interval (Number of washes) <i>Indicates number of washes between each water change. If the machine is adjusted to do automatical water change, the machine will empty the water tank after the selected number of washes. If the machine is adjusted to manual water change an alarm will go after the selected number of washes.</i>	0	0-999	
Re-electing program <i>Re-elect of the program which the machine runs. When the machine is turned on and after each wash the machine will be adjusted to this program. The operator can then just press the start key or select another program if needed.</i>	No re-election	Program 1 Program 2 Program 3 Program 4 No re-election	
Heating wash tank effect (W) <i>Indicates the size of the heating element in the wash tank. This adjustment is used for estimating the consumption of energy and validation of heating time, and by that deciding if the heating element is defect.</i>	9000	0-99999	

Parameters

-adjustments of the machine, continued

Description	Adjustments from factory	Possible adjustments	User adjustments
Heating rinse tank effect (W) <i>Indicates the size of the heating element in the rinse tank. This adjustment is used for estimating the consumption of energy and validation of heating time, and by that deciding if the heating element is defect.</i>	9000	0-99999	
Pump effect (W) <i>Indicates the size of the wash pump. This adjustment is used for estimating the consumption of energy.</i>	850	0-99999	
Detergent pump capacity (ml/min) <i>Indicates the capacity of the dosing pump. This adjustment is used for estimating the consumption of detergent.</i>	100	0-999	
Standby time (min) <i>Indicates how many minutes it takes before the machine automatically turns to standby mode if it is not in use. When the machine is not in standby mode, it will keep the wash tank and rinse tank heated. When the machine turns to standby mode, it will turn off the heat and the display light. If the time for standby is set to 0, the machine will never automatically turn to standby mode.</i>	0	0-999	
Alarm for changing filter (l) <i>An alarm will go when the machine has consumed more water than the set parameter, on condition of this value is larger than 0.</i>	0	0-99999	
Time for pressing key, high pressure (sec) <i>Indicates how long the start key has to be pressed to make the machine wash at high pressure. This applies to both start key on the keyboard and external start key.</i>	0,5	0-99,9	
Level sensor, low level <i>Sensitivity of the level sensor for measuring the low water level. This parameter is as a standard set to 50% and can be changed if detecting the low level is causing problems.</i>	50%	0-100%	
Level sensor, high level <i>Sensitivity of the level sensor for measuring the high water level. This parameter is as a standard set to 50% and can be changed if detecting the high level is causing problems.</i>	50%	0-100%	

Parameters

-adjustments of the machine, continued

Description	Adjustments from factory	Possible adjustments	User adjustments
Sensor for chemical, rinse aid <i>Sensitivity of the level sensor for measuring the rinse aid. This parameter is as a standard set to 50% and can be changed if detecting the rinse aid is causing problems.</i>	50%	0-100%	
Communication, NetCom <i>Indicates whether the machine is connected to TCP/IP network.</i>	No	Yes No	
IP Address <i>IP address to TCP/IP network.</i>	000.000.000.000		
Daily check? <i>Indicates whether a daily procedure for checking the machine is to be carried out.</i>	No	Yes No	
Time for daily check <i>Number of hours when daily check is to be carried out.</i>	0	0-23	
Slow water filling <i>Indicates how long (in minutes) a water fill can last before a warning is displayed.</i>	4	0-99	
No water filling <i>Indicates how long (in minutes) a water fill can last before an error is displayed.</i>	5	0-99	
Adjustment of detergent dosing	Conductivity	Conductivity Time control External	
Hood motor <i>Indicates type of the hood motor.</i>	230 V	12 V 230 V	
Eco-adjustment	Yes	Yes No	
Drain after low level <i>When a machine with drain pump is emptied, this parameter indicates how long (in seconds) the drain pump must run after the low level sensor is activated.</i>	30	0-999	
Autostart <i>Indicates whether if autostart of the machine is on.</i>	No	Yes No	
Autostart time <i>Indicates time for autostart.</i>	00:00	00:00 - 23:59	
Autostart days <i>Indicates which weekdays the machine is to do autostart.</i>	No days	All weekdays	

Parameters

Program parameters

Description	Possible adjustments	Adjustments from factory				User adjustments			
		Prog. 1	Prog. 2	Prog. 3	Prog. 4	Prog. 1	Prog. 2	Prog. 3	Prog. 4
Program active <i>A program must be active to be chosen and started.</i>	Yes/no	Yes	Yes	Yes	Yes				
Wash time (sec) <i>Length of the "wash phase". If this setting is 0, the "wash phase" and "pause before rinse" is skipped.</i>	0-999	60	120	240	600				
Pause before rinse (sec) <i>Length of the pause between "wash phase" and "rinse phase" in seconds.</i>	0-999	15	15	15	15				
Rinse time (sec) <i>Length of "rinse phase".</i>	0-999	12	12	12	12				
Pause after rinse (sec) <i>Length of the pause after rinse (in seconds).</i>	0-999	15	15	15	15				
Wash temperature <i>The wanted temperature in °C for washing.</i>	1-99	57	57	57	57				
Min. wash temperature <i>The lowest temperature in °C a wash can be started at.</i>	1-99	49	49	49	49				
Rinse temperature <i>The wanted temperature in °C for rinsing.</i>	1-99	80	80	80	80				
Detergent dosing calibration	A-B-C-D	A	A	A	A				
High/Low wash pressure	Low High, Low/High, High/Low	Low	Low	Low	Low				
Exhaustion during...	None Wash Rinse Wash+Rinse	Wash+ Rinse	Wash+ Rinse	Wash+ Rinse	Wash+ Rinse				
Exhaustion after rinse (sec) <i>Indicates number of seconds the exhaustion must run after the rinse phase.</i>	0-999	300	300	300	300				
Condensing after rinse (sec) <i>Indicates number of seconds the condensator must run after the rinse phase.</i>	0-999	0	0	0	0				

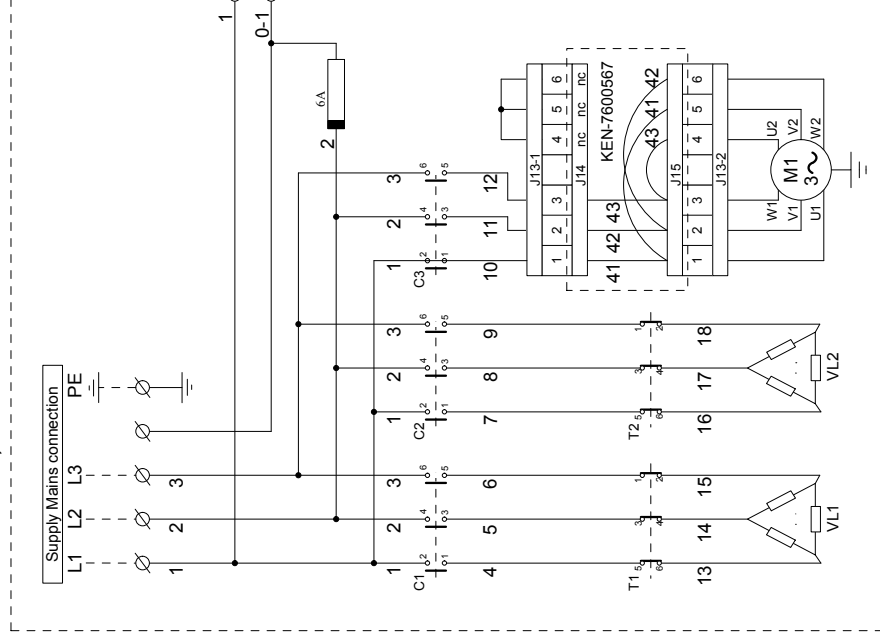
Parameters

Detergent adjustments

Description	Adjustments from factory	Possible adjustments	User adjustments
Detergent dosing	Conductivity	Conductivity Time control External	
Pre-dosing time <i>Indicates (in seconds) how long the detergent pump must run when the machine is filled with water. This only applies to conductivity dosing.</i>	30	0-99999	
Detergent dosing alarm sensitivity (%) <i>Sensitivity for when an alarm will go if the conductivity decreases during time controlled dosing. Decreasing of conductivity can be due to an empty detergent canister.</i>	85	0-100	
Time controlled dosing (sec) <i>Indicates number of seconds the detergent pump must run at each wash. This only applies to time controlled dosing.</i>	0	0-999	
Detergent increasement (%) <i>This parameter affects the conductivity based dosing. When calibration of detergent is done, the dosing can be increased or decreased by setting this parameter higher or lower than 100%. Please note that an increasement of detergent at 110% does not mean that the use of detergent is 10% higher than normal. The conductivity of the detergent is not proportional with the amount of detergent.</i>	100	0-999	

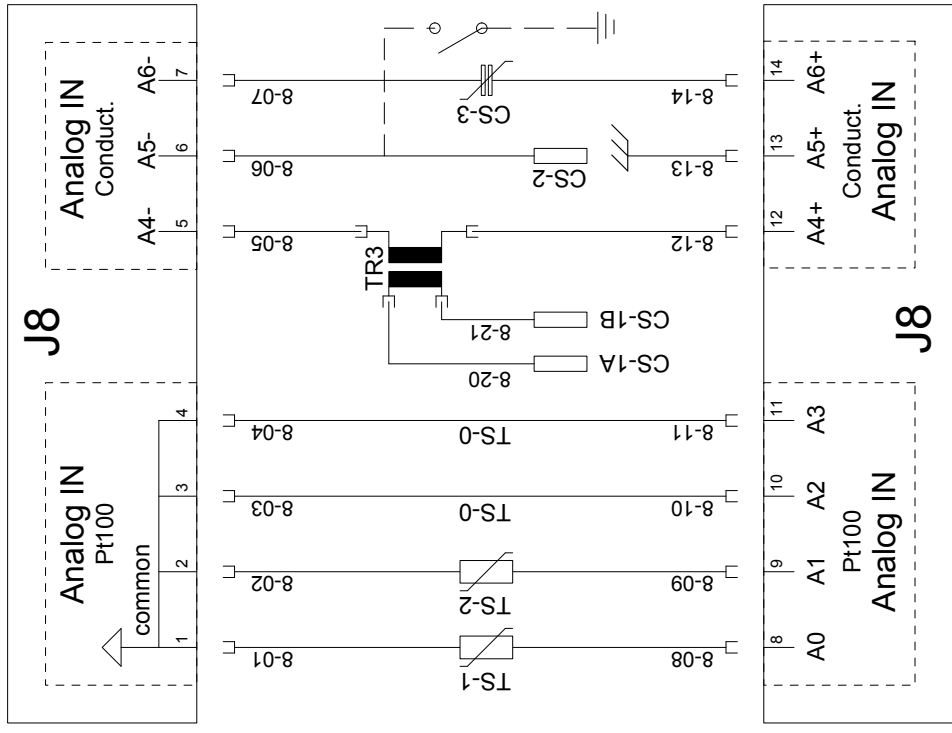
Diagrams

3 x 220-230V, 50/60Hz



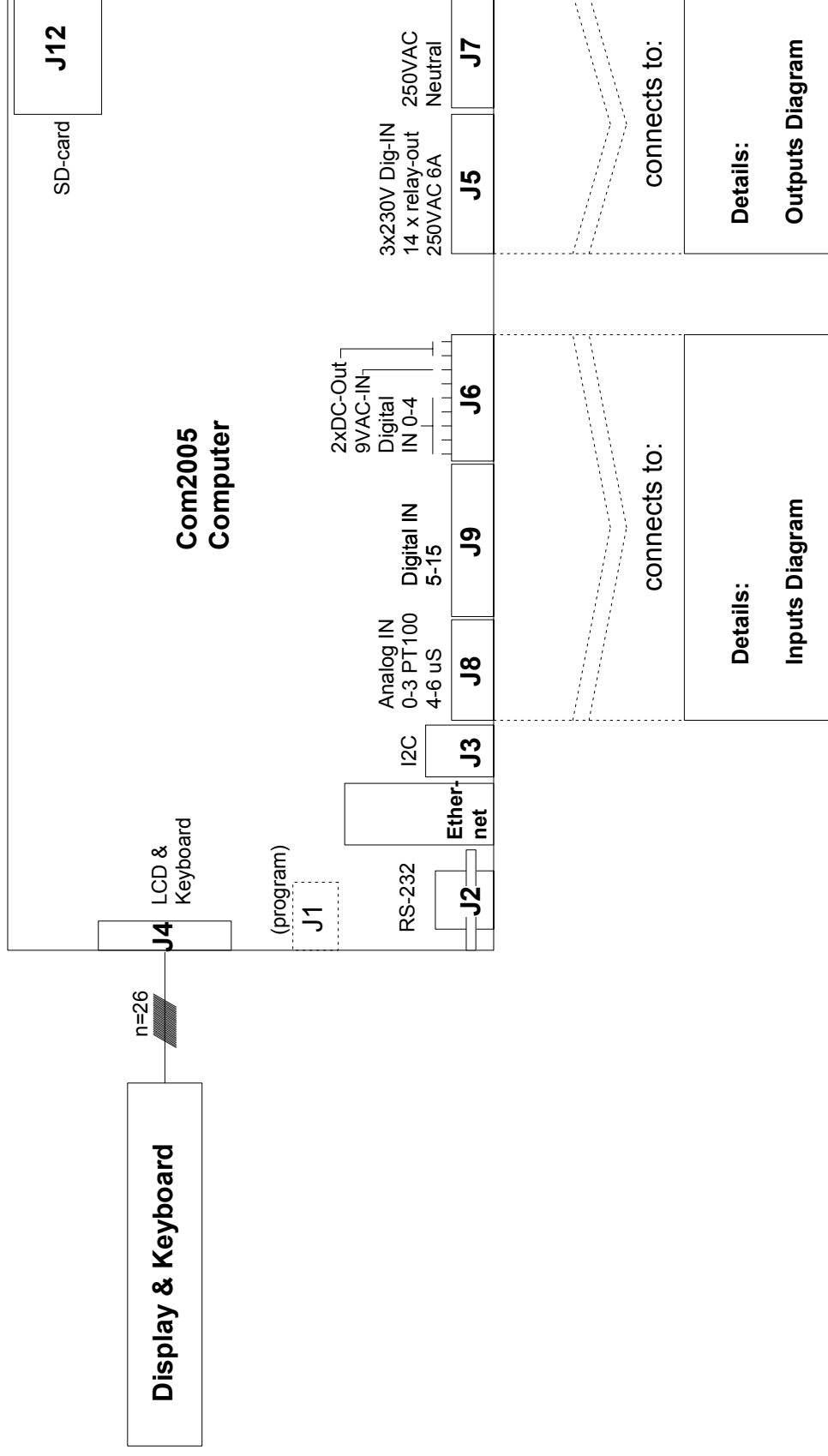
- | | |
|----|--|
| C1 | Kontaktor varmelegeme VL1 / Contactor Heating Element VL1 / Schutz, Heizstab VL1 |
| C2 | Kontaktor varmelegeme VL2 / Contactor Heating Element VL2 / Schutz, Heizstab VL2 |
| C3 | Kontaktor vaskpumpe/ Contactor, wash pump/ Schutz, Umwälzpumpe |

[illegible]



- | | | | |
|------|--|-------|---|
| V2 | Ventil højt/lavt tryk / Solenoid valve High/low pressure (412) | CS-1A | Sæbekoncentration- og minimum vandniveausensor / Detergent Concentration and Minimum Water Level Sensor |
| b3 | Hætte åben / Hood open (412) | CS-1B | Sæbekoncentration- og minimum vandniveausensor / Detergent Concentration and Minimum Water Level Sensor |
| b4 | Ekstern startknap / External start push button (412) | CS-2 | Påfyldningsniveau vasketank / Filling Level Wash Tank |
| TS-0 | Kortslutningsforbindelse / Short Circuit Connection | CS-3 | Niveausensor afspænding / Levelsensor rinse aid |
| TS-1 | Termoføler vasketank / Temperature Sensor Wash Tank | Ni 3 | Niveauswitch afløbspumpe / level switch drainage pump |
| TS-2 | Termoføler skylletank / Temperature Sensor Boiler | | |
| TR3 | Måletransformer 1/1 / Transformer 1/1 | | |

[illegible]

[illegible]