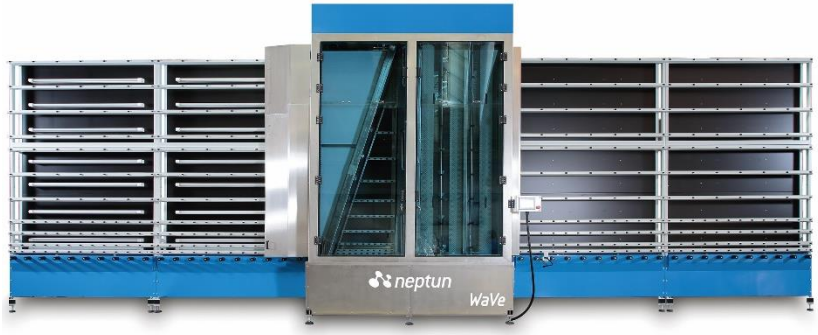
Messrs.
HAMILTON ERSKINE LTD.
17 Moss Road
Ballygowan, Co Down, BT23 6JQ
IRELAND
Att.: Mr. Roger Cleave

Rovello Porro, May 14, 2019

Off. Nr. 311-19

Wave HP 2862-80 HD is the series of vertical high-automation glass washers manufactured by Neptun.



It is designed for an intensive use, and special attention has been dedicated to the choice of materials for components that are subject to wear as corrosion, with a wide use of stainless steel INOX AISI 304.

Wave HP 2862-80 HD is the version with Heavy Duty execution, which can carry glass sheets with an important weight, thickness up 80mm and weight of 300 Kg/lm.

CONFIGURATION

Suitable for washing and drying of the following glass types:

- Float glass
- Acid edged glass
- Coloured glass
- Printed glass
- Pyrolytic glass

Inlet conveyor



Consisting in a roller conveyor with motorized rubber rollers equipped with a transmission system by means of gear pair with bevel gears for all the rollers. The transmission shaft and all the transport roller's shafts are made in stainless steel.

The inlet conveyor houses the sensors for the automatic detection of:

- Thickness of the incoming glass
- Dimensions of the glass sheet

This information is then sent to the PLC for the management of the machine.

The inlet conveyor is equipped with an independent motorization from the rest of the machine which allow the automatic management of the different glass thicknesses without having to verify each time that in the drying or washing section there is a glass sheet with an incompatible thickness.

If a particular glass thickness is being processed and a different one is put on the inlet conveyor, the transport of the inlet conveyor stops it and attends the evacuation of the first thickness and the machine regulation for the new one, before restarting and introducing the second glass.

It also allows to load heavy glass sheets while the conveyor is holding and the machine is running, in this case the conveyor can be activated and deactivated by the operator by means of a comfortable pedal.

The inlet conveyor has a length of 3200mm.

External prewashing section

The external prewashing section consists in a separated module with length 400mm which contains the tank with nozzles, in order to keep the water of the prewashing circuit well separated from the washing water. If this section is not supplied with a tank and pump with closed circuit, the consumption of the water to be considered is 1200÷2400 l/hr.

With frame and transmission entirely made in stainless steel, it is engineered to work in aggressive environments.

Washing section

The washing section is composed of three circuits for washing.

The washing section is completely made of stainless steel INOX AISI 304 or of anyway materials resistant to corrosion: structure and internal mechanical components.

The washing circuits are composed of three pairs of brushes with Ø 160mm, with bristle Ø 0.30mm The rotation speed of the front brushes is controlled by inverter and can be set on the control panel.

The front brushes are made with high density bristle, to ensure an enhanced cleaning of the upper side, which is more sensible in case of lamination and printing processes.

The brushes are driven by two motors, one for the front brushes and one for the ones at the back. The motorization itself is positioned on top of the machine.

Each circuit of the brushes is equipped with a tank with:

- Filter of 900µm to avoid the entrance in the tank of dirt particles with bigger dimensions
- Cartridge filter of 300µm or 150µm Mesh depending on the circuit (see the circuits scheme) for the separation of the dust before the water is sent to the nozzles
- Immersion pump with suction turbine in INOX
- Outlet valve for tank cleaning

The tank of the second circuit has a heating device with temperature adjustment up to 50°C by means of a resistance of 12Kw, which can be set

from the control panel.

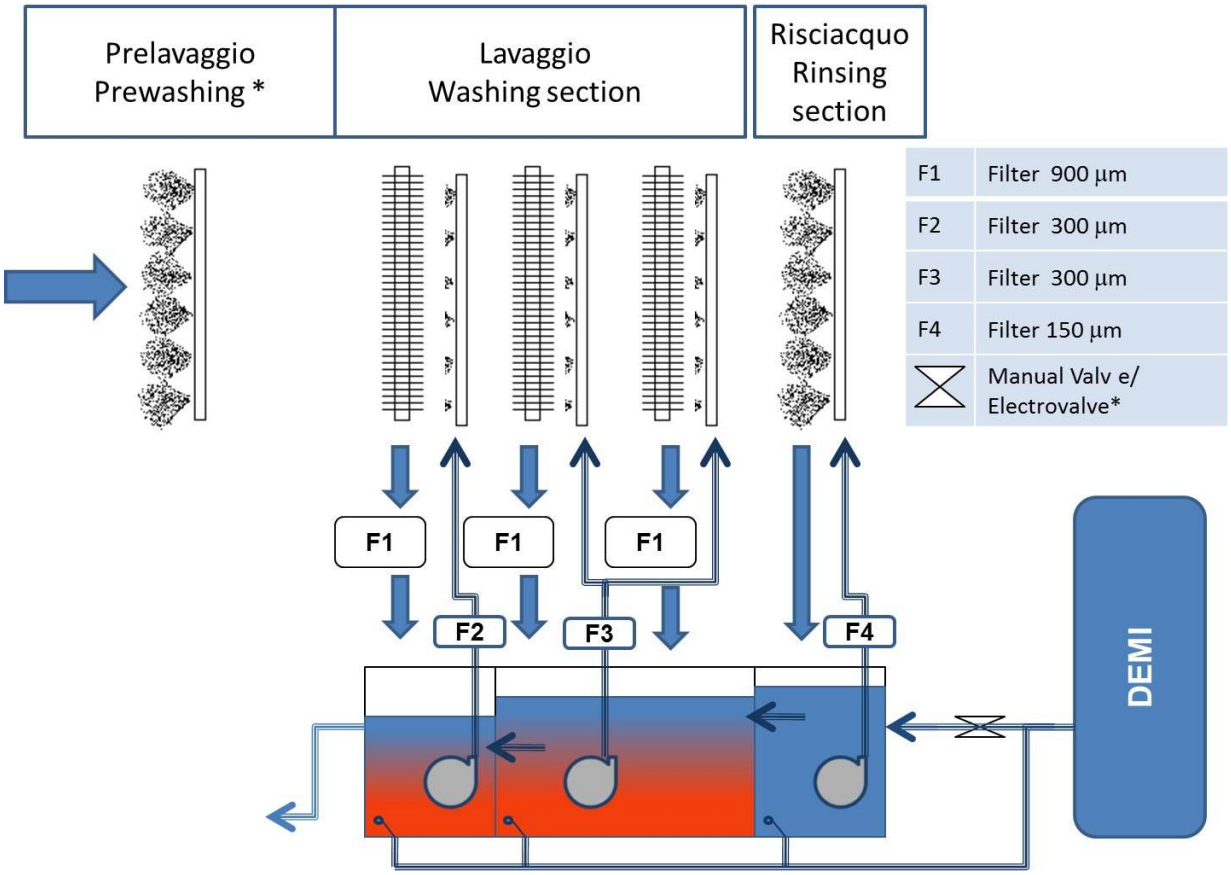
Also the first circuit is equipped with a similar heating system with independent management. In this way, the water can be heated up to a temperature of 50°C.

The **rinsing circuit** is composed of a series of nozzles rinsing both sides of the glass and it is separated from the washing circuit and it is complete with:

- Immersion pump with suction turbine in INOX
- Outlet valve for cleaning

Water circuits

The water flow in the tanks goes from the last circuit to the first one, the water comes from the demineralisation unit of from the net and flows towards the first tank.



As the washing quality depends greatly on the quality of the water, for conventional washing needs it is necessary to use water with the minimum following requirements:

Conductivity	<150 µS	(Microsiemens)
Salt quantity	< 80 mg/l	
Chlorides	< 30 mg/l	
Hardness	< 6°f	(French degrees)
Iron	0	(absent)

In absence of the above mentioned values, or in case of insulating glass production, to reach the best results, it is necessary to provide a water demineralization system to feed the water tanks.

The water circuits are equipped with a system to manage the activation time of the heating system.

Thanks to this function, the operator can set a time for pre-activation of the water heating in order to have the machine ready for working at the beginning of the work shift.

The water tanks also have a management system for the automatic exchange of the water while the machine is not running.

At a preset time, which can be set on the control panel, for example at night when the machine is not working, the CN activates the automatic emptying of the tanks, after which the tanks are filled again so that there is fresh water available at the beginning of the shift . The function can be set on alternate days (for example every day, every two, etc.).

Water quality control system

Wave is also equipped with a control and management system of the water quality in the rinsing tank; the operator can set the desired level of conductivity on the touch screen of the control panel of the machine and the PLC manages the flow of the water from the demineralising system, in order to maintain the required level of purity in order to guarantee a good cleaning and, at the same time, reduce the consumption of demineralised water.

Control system for water filters and nozzles

Each water circuit is equipped with a flowmeter monitoring in real time the amount of water that goes through in order to guarantee a constant quality of the washing.

The information is managed by the PLC which graphically shows the current flow level on the control panel by means of a histogram.

When the flow falls below a preset limit, an alarm informs that the filters and/or the spray nozzles must be cleaned.

Drying section

The drying section consists in one set of air knives, and this whole section is soundproof by means of sound absorbent material.

The blowers in the drying section are adjusted automatically in function of the thickness of the glass which is being processed, so as to assure the optimal position of the air knives for a perfect drying, also at high speed.

The conveying system in this section is made with a belt, so no rollers are touching the glass after the rinsing phase.

The speed performances that are indicated in the technical features, are referred to fixed speed (Smartspeed not enabled), thickness up to 10mm without holes and notches; in case of processing of thicker glass or glass with holes and notches, the drying speed might be lower.

Wave HP 2862-80 HD is also equipped with the exclusive function **SmartSpeed** for the optimization of the speed, which allows to set, with an exceptional precision, different speeds according to the processing phase:

- One for washing and drying
- One for the final drying phase (queue of the glass), which is generally the most critical one and the one that has the biggest impact of the global performances.

In this way, the processing speed can be improved up to superior levels, while always respecting the maximum washing and drying quality.

The high pressure drying is powered by a fan with an air filter input and the whole drying section is entirely made in stainless steel INOX AISI 304: structure, blowers and water collecting slides.

Ecosave®

Ecosave is the innovative energy saving system patented by Neptun.

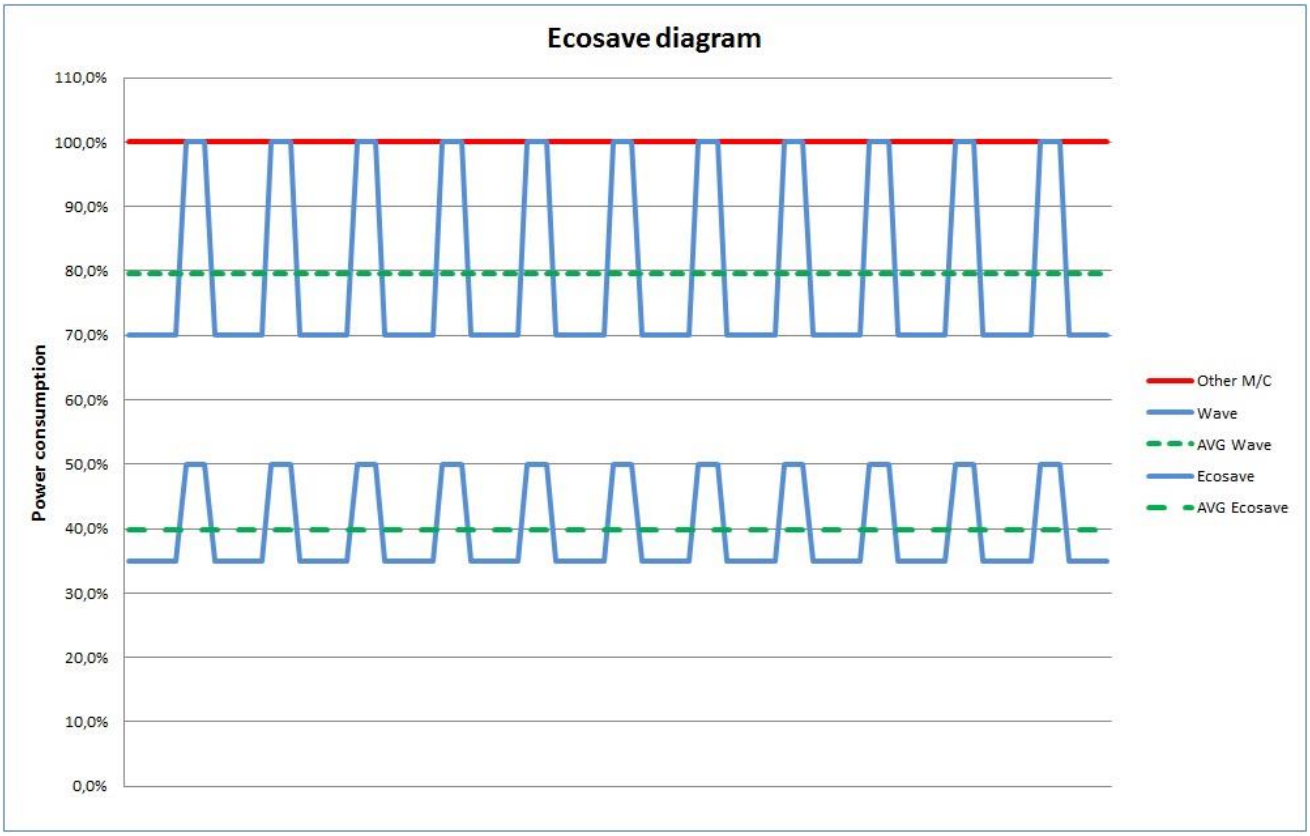
The working principle of Ecosave consists in applying the energy required for drying, which is the highest energy requirement for a washer, only when the glass is present.

This result is achieved thanks to the automatic partialization of the air flow through the air-knives and thus of the used energy.

This depression system **allows to reduce the energy consumption with up to -41% compared to the normal machines on the market**.

The effect can be resumed as follows, with the example of a washer Wave HP 2862-80 HD:

A. Traditional washers (other manufacturers): constant consumption of approx. 24Kw but often also more [Other M/C]
B. Wave HP 2862-80 HD with Ecosave, processing glass sheets positioned at a distance of two lengths (example: glass sheets with length 1m at a distance of 2m one from the other), with the energy reducing system by depression, when no glass is present in the drying system, the average consumption is 21% compared to the maximum power and compared to the traditional washers [AVG Wave].
C. With Ecosave full, when processing glass sheets with a width smaller than half of the usefull width, and placed at a distance as explained in case B: with a consumption oscillating between 6,7 Kw and 9,5 Kw and an average consumption of 7,6 Kw [AVG Ecosave], -60% compared to traditional washing machines.



The huge energy saving makes Ecosave not only environmentally friendly but also economically convenient with a short payback of the investment, which becomes a real reduction of the production costs after a short period: up to 110000 kW when considering a 10 years period on one shift.

Easy to calculate…

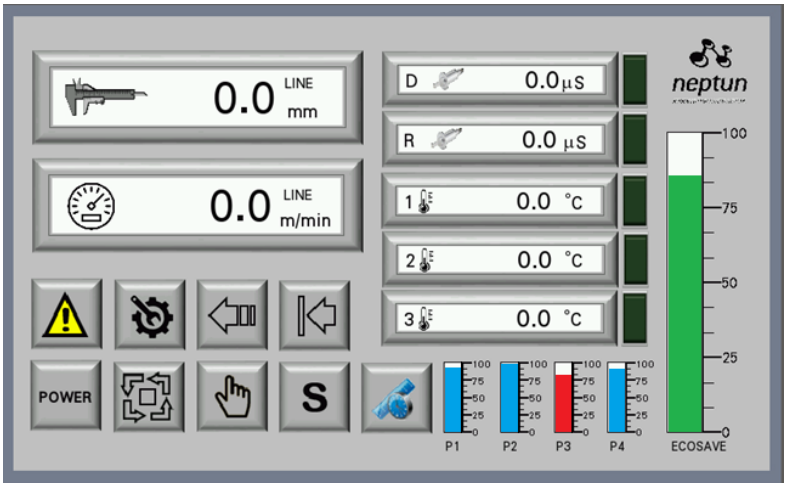
Outlet conveyor

Consisting in a roller conveyor with motorized rubber rollers equipped with a transmission system by means of gear wheels with bevel gear pair and pinions for all the rollers, the transmission shaft and all the transport roller's shafts are made in stainless steel.

It is provided with a security exit sensor with bypass function for the processing of big glass sheets.

The outlet conveyor is supplied with a lighting panel on black background for a perfect cleaning of the glass and has a length of 3200mm.

Electric system and control panel



Electrical installation conform to the CE norms.

Control panel with touch screen, with PLC for an advanced management of the machine and allowing interfacing with other machines when the washer is installed in-line, with exchange of signals like:

- Reception of working speed
- Reception thickness of processed glass
- Integration of alarms and consensus of machines before and after

Ergonomic control panel with the following functions:

- Adjustment conveyor speed
- Adjustment thickness
- Counters: meters, total and partial pieces
- Warning for programmed maintenance according to the number of hours worked
- Start and stop, water circuits, brushes, blowers
- Management of the water temperature

- Activation bypass for the processing of big glass sheets
- Management Ecosave system for optimisation of energy consumption
- Start and stop prewashing circuit
- Water quality control and management system in the rinsing circuit

Quick Service Kit for Remote Assistance (optional)

The optional kit Quick Service, (if included in the supply), consists of a hardware device which allows the remote communication between Neptun's service centre and the machine, with a priority service level.

This package does not only allow the remote control of the screen, but also grants Neptun's technicians full access to all mechatronic functions of the machine or of the line (programs, PC, PLC, CNC, drivers, I/O, etc.); it also includes possible software updates when available, with no extra cost.

Safety and quality compliance

All our machines are compliant with the compulsory Machine Regulations 2006/42/CE, 2006/95/CE and 2006/108/CE, as well as with the following Harmonized Norms:

Type A – General

UNI EN ISO 12100-1:2005: Safety of machinery. Basic concepts, general principles for design

UNI EN 14121-1:2007: Safety of machinery - Risk assessment - Part 2: Principles

Type B – Safety aspects and safety devices

UNI EN 953:2000: Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards

UNI EN 1037:1997: Safety of machinery. Prevention of unexpected start-up

UNI EN 1088:2007: Safety of machinery. Interlocking devices associated with guards. Principles for design and selection

UNI EN ISO 13849-1:2007: Safety of machinery - Safety-related parts of control systems - Part 2: Validation (ISO 13849-2:2003

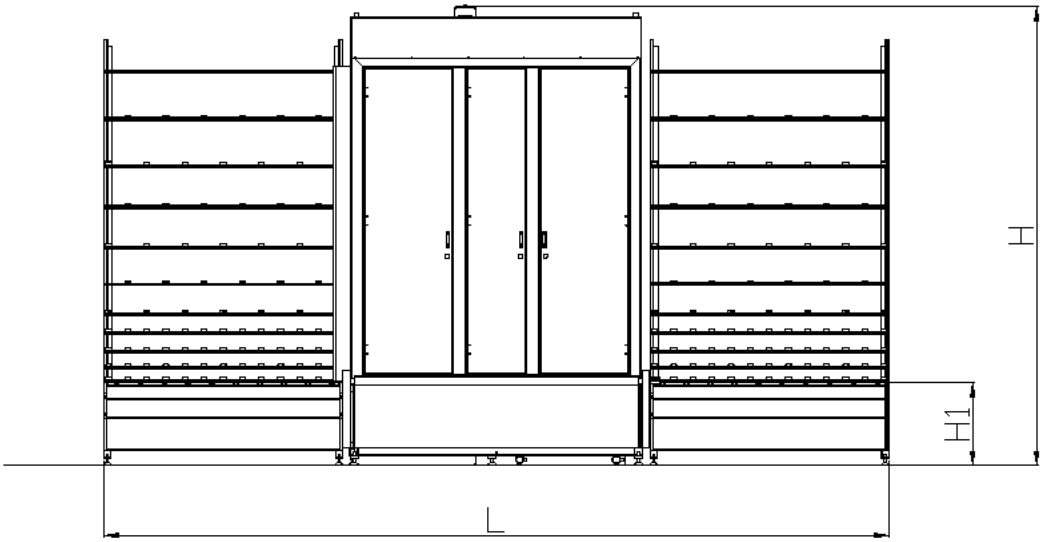
UNI EN ISO 13850:2007: Safety of machinery – Emergency stop – General principles for design

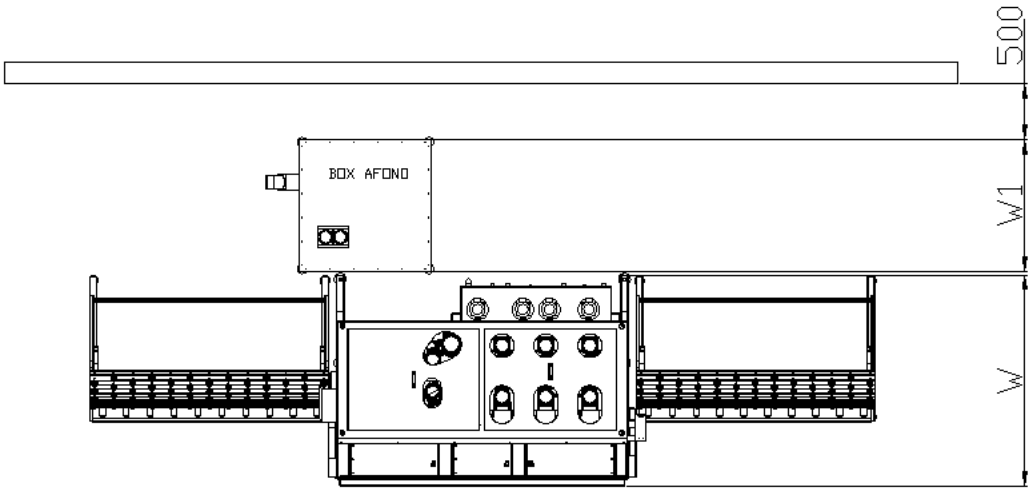
UNI EN ISO 13857:2008: Safety of machinery. Safety distances to prevent danger zones being reached by the upper and under limbs.

Type C – Safety requirements for machines or group of machines

UNI EN 13035-9:2006: Machines and Plants for the Manufacture, Treatment and Processing of Flat Glass - Safety Requirements - Part 9: Washing Installations

LAY-OUT





L = 9370mm H= 3890mm H1= 550mm

W = 2900mm W1= 1100mm

Technical specifications Wave HP 2862-80 HD	
Maximum length machine	9370 mm
Maximum width machine	2900 mm
Maximum height machine	3890 mm
Height working plane	550mm -60+30 mm
Maximum washing height	2800 mm
Minimum washing dimensions	450x190 mm
Glass thickness	3÷80 mm
Speed conveyor	1÷10 m/min
Working speed	1÷8 m/min
Number brushes ∅ 160mm	6
Number blowers	2
Number water tanks	3
Consumption washing water	100÷230 lt/hr
Total capacity water tanks	200 lt
Total length inlet conveyor	3200 mm
Total length outlet conveyor	3200 mm
Maximum weight per linear meter	300 Kg/ml
Weight	4490 Kg
Running direction	right to left
Installed power	53,5 kW
Minimum pressure water supply	2 Bar
Minimum pressure compressed air	6 Bar
Consumption compressed air	20 Nl/min
Noise level	≤ 80dB
Voltage	400V 50Hz ±10%

DEMI 190
Demineralisation unit



Demineralisation unit with reversed osmosis suitable for small and medium washing units, ensuring an optimal and constant cleaning quality of the water.
With a production capacity of 190 lt/hr, DEMI 190 can generate demineralised water to satisfy the needs of washing machines for glass dimensions up to 2000mm or 2600mm.
It is complete with a buffer tank of 500 lt with automatic maximum and minimum level control.
DEMI 190 is also equipped with an electronic control panel for automatic management, easy to use and easy to maintain; the machine is realised with a structure entirely made in stainless steel, conceived for a reliable, long-lasting and convenient functioning: the production of 190 lt/hr of demineralised water requires only 280÷300 Lt/hr (efficiency 66%).
De demineralisation units of the series DEMI are also available in the version of 130 Lt/hr.

DEMI 190 is complete with:

- Solenoid valve at the inlet
- Three filtering stages of the incoming water:
    1. Filter of 60μm to eliminate the major impurities from the incoming water
    2. Activated charcoal filter of 4Lt to eliminate chlorine rests from the incoming water
    3. Filter at the entrance of the system to eliminate micro particles of dirt, down to a dimension of 5 μm (0,005mm)
- Switch for manual activation of the plant
- Inlet for electrical drive
- High pressure pump and osmotic membranes for the production of

demineralised water.

- Manometer for the pressure check on the line
- Manometer for the pressure check on the plant
- Flow gauge to check the quantity of demineralised water that is being produced
- Flow gauge to check the quantity of eliminated water
- Conductivity meter to check the quality of the water that has been produced
- Electronic control panel with the following functions:
    - Check of the required conductivity
    - Interruption of the flow in case of not-conformity of the water quality
    - Automatic start and stop of the demineralisation unit according to the water level in the storage tank
- Spare water filter 5μm
- Spare activated charcoal filter

TECHNICAL DATA

Width	800mm
Length	380mm
Height	1300mm
Installed power:	0,45 kW
Power supply:	220V 50Hz 1 phase + neutral
Capacity production demineralised water	190 lt/hr *
Capacity tank demineralised water	500 lt
General water consumption:	200÷220 lt/hr
Minimum pressure net water:	1÷5 Bar
Working temperature:	5÷45°C

Features guaranteed conductivity	
Parameter	*Features of the produced water with water at the inlet of the Demi <600 µs/cm*
Average conductivity	5,0÷8,0
Maximum conductivity	15,0

Values of the incoming water

Ph value of the incoming water	4÷9
Salinity of the incoming water	500ppm

*referred to water with temperature 16°C and salinity 500ppm

It is advised to use a booster pump, which works like an autoclave, maintaining the pressure on the line that goes from the DEMI tank to the washing machine's tank constantly at 2Bar.

CONFIGURATION AND CONDITIONS OF SUPPLY

Article	Q	Price
Wave HP 2862-80	1	€ 94.200,00
In- and outlet modules L=3200mm instead of L=2000mm, HD version	1	€ 7.000,00
Heavy-Duty version	1	€ 14.000,00
External prewashing module	1	€ 8.000,00
High density brushes (front side)	1	€ 4.500,00
Inverter on front brushes	1	€ 1.050,00
Second heated water tank	1	700,00
Night Care for auto water exchange	1	€ 900,00
Water quality control	1	€ 1.900,00
Flowmeters	1	€ 900,00
Full Ecosave system	1	€ 4.200,00
Demineralisation system DEMI 190	1	€ 7.200,00
Booster pump for DEMI 190	1	€ 700,00
Quick service (incl. fee for 1° year)	1	€ 600,00
Subtotal		**€ 145.850,00**
Transport		€ 6.500,00
Installation		€ 5.200,00
Total amount		**€ 157.550,00**

Notes:

OFFER VALIDITY:	30 days
WARRANTY:	12 months
DOWN PAYMENT:	20% on order confirmation
BALANCE PAYMENT:	80% at notice of goods ready for shipment
DELIVERY:	DAP Ballygowan, Ireland
INSTALLATION:	included
DELIVERY TIME:	14-16 working weeks from order confirmation date (receipt of signed contract + downpayment)
WARRANTY:	12 months

Our Bank details:

CREDITO VALTELLINESE AGENZIA DI ROVELLASCA

IBAN IT 80 D 05216 51730 000000002954 - BIC SWIFT: BPCVIT2S

Yours faithfully,

Neptun Srl

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