

PRODUCT DATA

COMPACT P - CTS602 HMI BY NILAN



Domestic



Passive
Heat Recovery



Active
Heat Recovery



Ventilation
< 300 m³/h



Comfort
Heating



Comfort
Cooling



Sanitary
Hot Water
Production



Heating

Nilan England & Wales
Old Bank Court
Morocco Street
London SE1 3HB
Tel: +44 (0)208 142 9373
sales:ronan.bourke@nilan.uk.com
technical: mark.pearce@nilan.uk.com
www.nilan.uk.com



THE VENTILATION AND HEATING SOLUTION OF THE FUTURE

Compact P is developed for future homes. The system can be used in all types of low-energy and passive buildings, but can also ensure low energy consumption in any home or flat.

Top-class efficiency

Compact P is equipped with the latest technology, comprising a highly-efficient counterflow heat exchanger, as well as a specially designed heating pump that utilises the residual energy in the extracted air.

Overall, the system yields top-class performance. The counter flow heat exchanger has a temperature efficiency of up to 95%, combined with a heat pump that ensures a high supply air temperature and very low costs to production of sanitary hot water.

Many benefits

The compact design and numerous functions combined in one unit ensures minimum installation, space requirements, as well as rapid and easy installation. The latest technology and high-quality components not only provide an optimum indoor climate, but also low annual operating costs, making this a sound investment in every respect.



THE COMPACT P SOLUTION

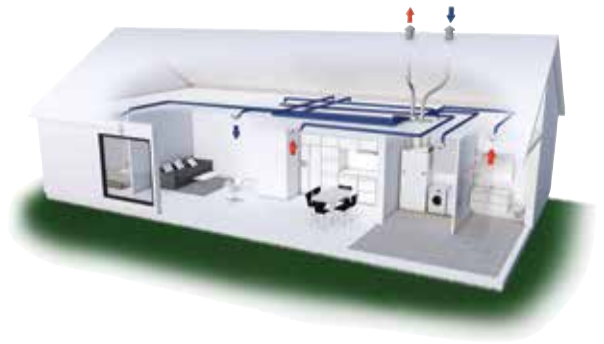
COMPACT P BY NILAN

Compact P

The Compact P can ventilate up to 300 m³/h and recovers more than 100 % of the energy from the extracted air via a counter flow heat exchanger that is combined with a heat pump.

The heat pump produces hot water and contributes to heating the supply air.

The heat pump has a reversible cooling circuit, so that in the summer it can cool the intake air while it also producing hot water.



COMPACT P

Product description

Compact P is an energy-efficient total indoor climate solution for all types of low-energy buildings, single-family homes, flats and small office areas in commercial leases with a ventilation requirement of up to 300 m³/h.

Compact P recovers the energy from the extracted air using a highly efficient counter flow heat exchanger. The remaining energy that is not utilised by the counter flow heat exchanger is used by the heat pump to produce hot water, and to further heat the supply air.

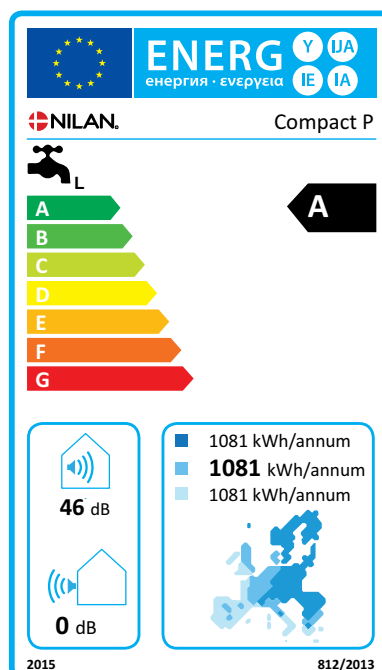
The heat pump has a reversible cooling circuit, which means that, in the summer, the unit can cool the supply air by up to 10 °C. Due to the low air exchange, the cooling does not function as an air conditioning system. On cooling, the supply air is dehumidified, which gives a more pleasant indoor climate than is possible with an ordinary ventilation unit without a heat pump.



Future-proof system

Compact P hot water production fulfils the most stringent requirements in the ecodesign regulation and thereby achieves the highest energy labelling.

The system is tested by an independent testing institute and has achieved the demanding Passive Building Certificate, as further confirmation that this is a highly energy-sustainable solution.



Time-controlled filter change alarm.
Easy filter access by opening the top front panel with the help of two finger screws.

There is plenty of space to replace filters and to vacuum clean the filter space.

Intelligent humidity control.
Adapts ventilation to the home's current humidity level.

CO₂-sensor can be purchased, for further demand management.



A clear, user-friendly HMI Touch panel is included.
The modern CTS 602 control runs Modbus communication.

Heating pump with hermetically sealed cooling circuit, for production of hot water and active heat recovery. Can raise the air intake temperature up to 34 °C.

Reversible cooling circuit that can also cool the air intake in the summer up to 10 °C, with simultaneous hot water production.

The USB cable is led down, so that the control can be easily accessed without using tools.

Electrically monitored sacrificial anode and corrosion protection.

On any need for replacement, an alarm is activated in the operating panel.

180 l hot water tank.
2 layers of glass enamelling to ensure a long lifetime.

Attractive white-painted front with large front panels, giving easy access to service the system.

The cabinet has holes for pipes and tubes for water and heating installations.

Low-energy EC-ventilators with B-wheel, adjustable from 20 to 100%.



Counterflow heat exchanger in polystyrene, with a temperature efficiency ratio of up to 94%.

Automatic bypass function that carries the air past the counterflow heat exchanger when heat recovery is not required.

A powder-coated condensation tray prevents the formation of "acid water", leading out the condensation water.

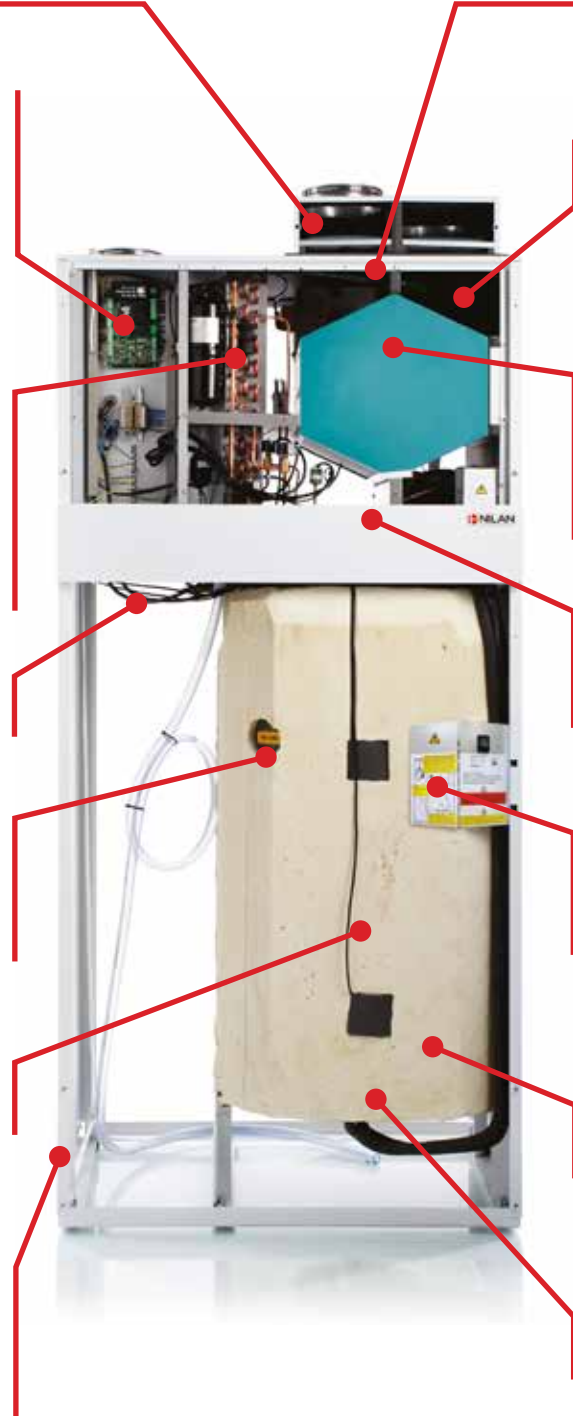
Compact P has an integrated water lock.

1.5 kW electrical completion.
For high hot water consumption where the heating pump cannot cope.

Emergency operation.

The hot water tank is foam-insulated, giving good insulation and saving energy.

Automatic anti-legionella.



TECHNICAL DATA

Compact P

Dimensions (W x D x H)	900 x 610 x 2065 mm
Weight	202 kg
Plate type casing	Aluzinc steel plate, white powder coating RAL9016
Heat exchanger type	Polyethylenterephthalat counterflow heat exchanger
Fan type	EC, constant rotation
Filter class	ISO Coarse >90% (G4)
Duct connections	Ø 160 mm
Condensate drain	PVC, Ø 20x1,5 mm
Refrigerant	R134a
Refrigerant filling	2 kg
Capacity SHW tank	180 L
Supplementary electrical heating (sanitary hot water)	1,5 kW
Connection dimension	3/4"

Supply voltage	230 V (±10 %), 50/60 HZ
Max. input/power (*1)	2,2 kW/ 9,6 A
Max. input/power (*2)	3,4 kW/14,8 A
Tightness class	IP31
Standby power	3 W
Ambient temperature	-20/+40 °C
External leakage (*3)	< 1,4%
Internal leakage (*4)	< 1,1%

Hot water production

Consumer profile, water heater	L (large)
Energy efficiency class	A
Energy efficiency for water heating - average climate	94 %
Annual electricity consumption - average climate	1081 kWh/annum
Temperature settings on the thermostat	10 - 65 °C
Sound power level L _{WA}	46 dB(A)
The water heater can function outside peak load periods (Smart-grid)	No
Guidelines for assembly, installation and maintenance	See installation instructions
Energy efficiency for water heating - cold climate	94%
Energy efficiency for water heating - warm climate	94%
Annual electricity production - cold climate	1081 kWh/annum
Annual electricity consumption - warm climate	1081 kWh/annum

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NILAN Compact P

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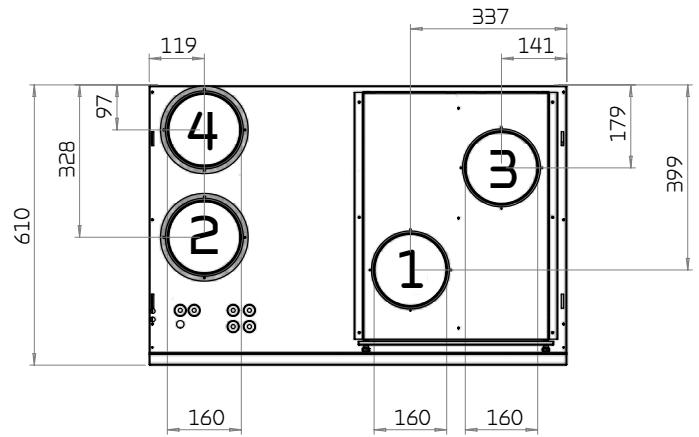
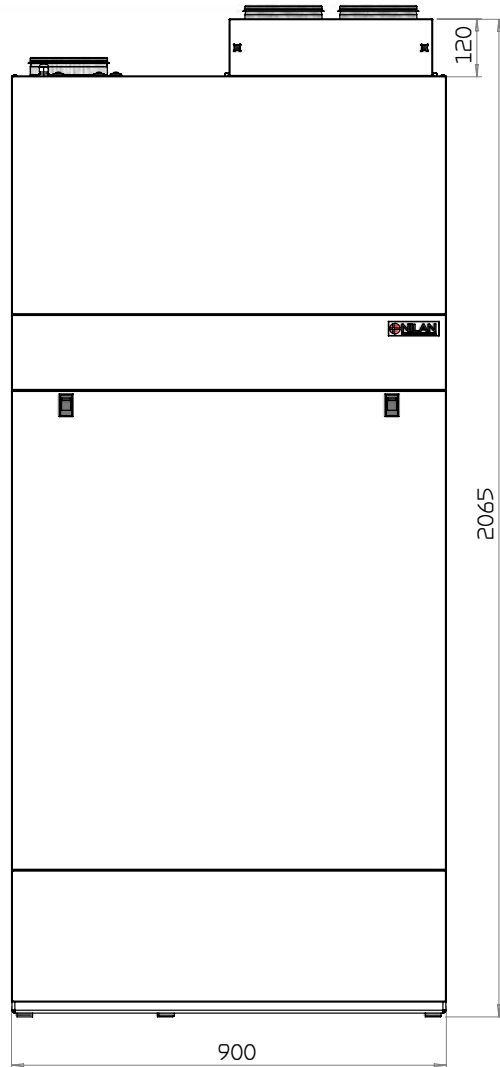
46 dB

0 dB

1081 kWh/annum
1081 kWh/annum
1081 kWh/annum

2015 812/2013

Dimensional Drawings



Connections

- 1: Fresh air
- 2: Supply air
- 3: Extract air
- 4: Discharge air

MULTI-FUNCTIONAL



100 % heat recovery

Compact P ventilates the home, ensuring a good indoor climate. While also producing hot water.

Compact P is an untraditional ventilation unit that, in contrast to other ventilation units, recovers 100% of the heat in the extracted air.

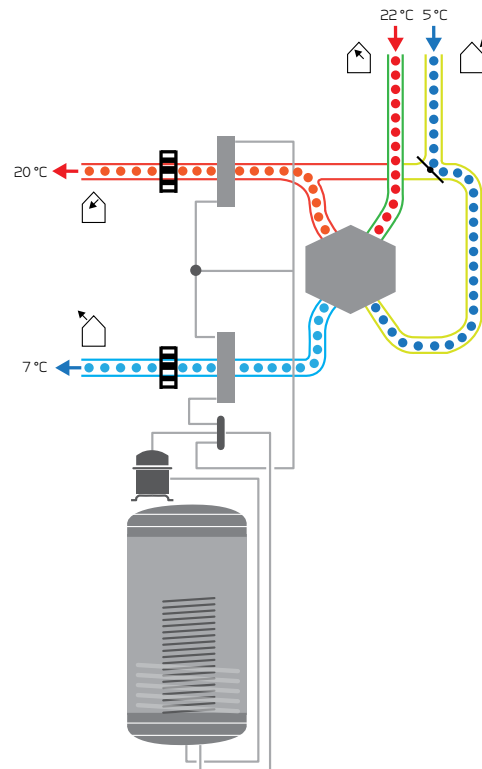
Via a counter flow heat exchanger, up to 95 % of the energy in the extracted air is used to heat the supply air.

The built-in heat pump uses the remaining energy to further heat the supply air, while also producing hot water.

Cooling the home is the challenge of the future

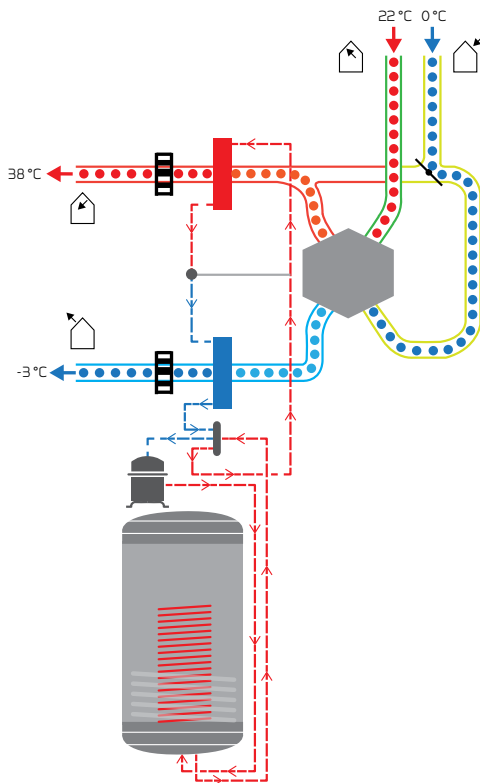
New homes are well-insulated and therefore easy to heat. On the other hand, outdoor temperatures do not need to be very high before getting rid of the heat in the home becomes problematic.

Compact P has a reversible cooling circuit, to cool the supply air. Due to the low air exchange, it will not function as an air conditioning system. When cooling the supply air will be dehumidified, which contributing to a pleasant climate in the home.



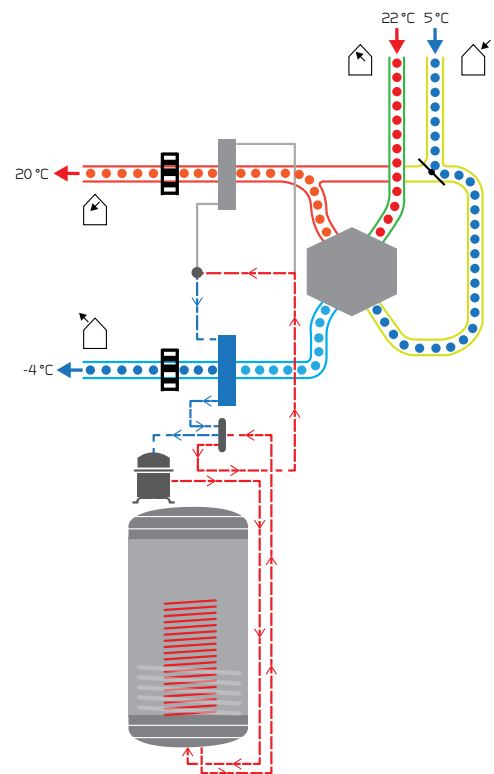
Passive heat recovery

Passive heat recovery takes place via a counter flow heat exchanger with a high temperature efficiency, whereby the supply air is heated by the extracted air.



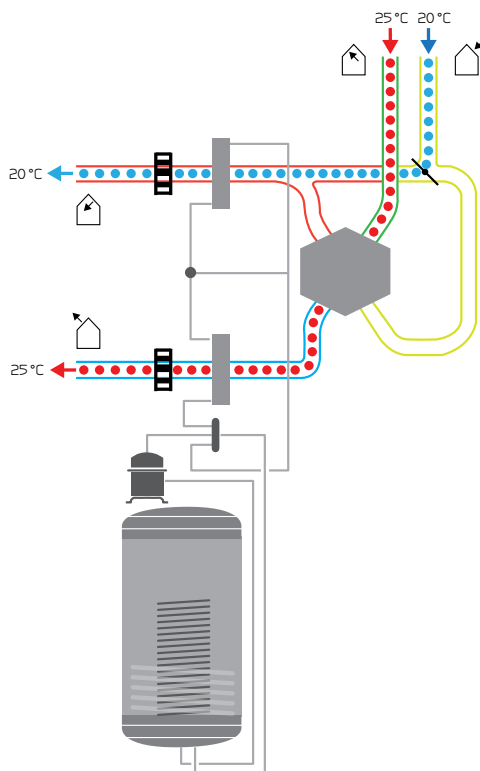
Passive and Active heat recovery

Utilising the residual energy that the counterflow heat exchanger does not use, the heat pump further heats the supply air.



Hot water

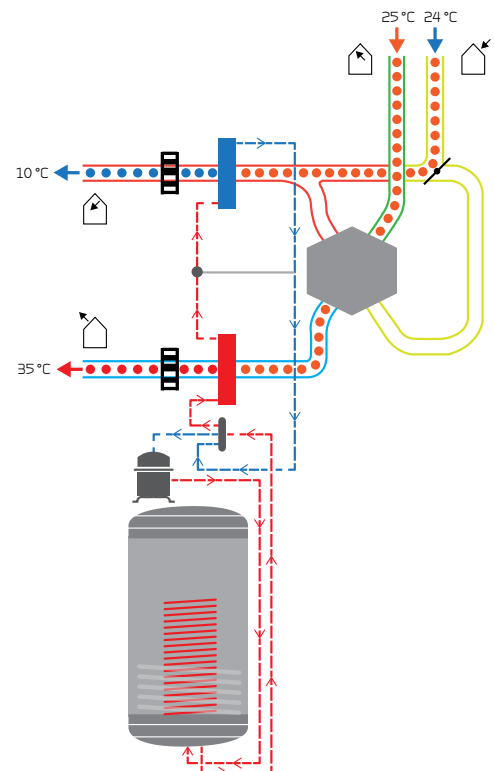
Utilising the residual energy that the counterflow heat exchanger does not use, the heat pump produces hot water.



100% bypass function

If heat recovery is not required, the bypass damper closes off 100% and leads the outdoor air past the heat exchanger.

Hot water can be produced at the same time. Hot water is produced with a high efficiency (COP).



Active cooling

The heat pump has a reversible cooling circuit and can cool the supply air during hot periods.

This function does not affect the production of hot water, which takes place with high efficiency (COP).

PLANNING DATA

Capacity

Capacity of standard unit as a function of q_v and $P_{t,ext}$.

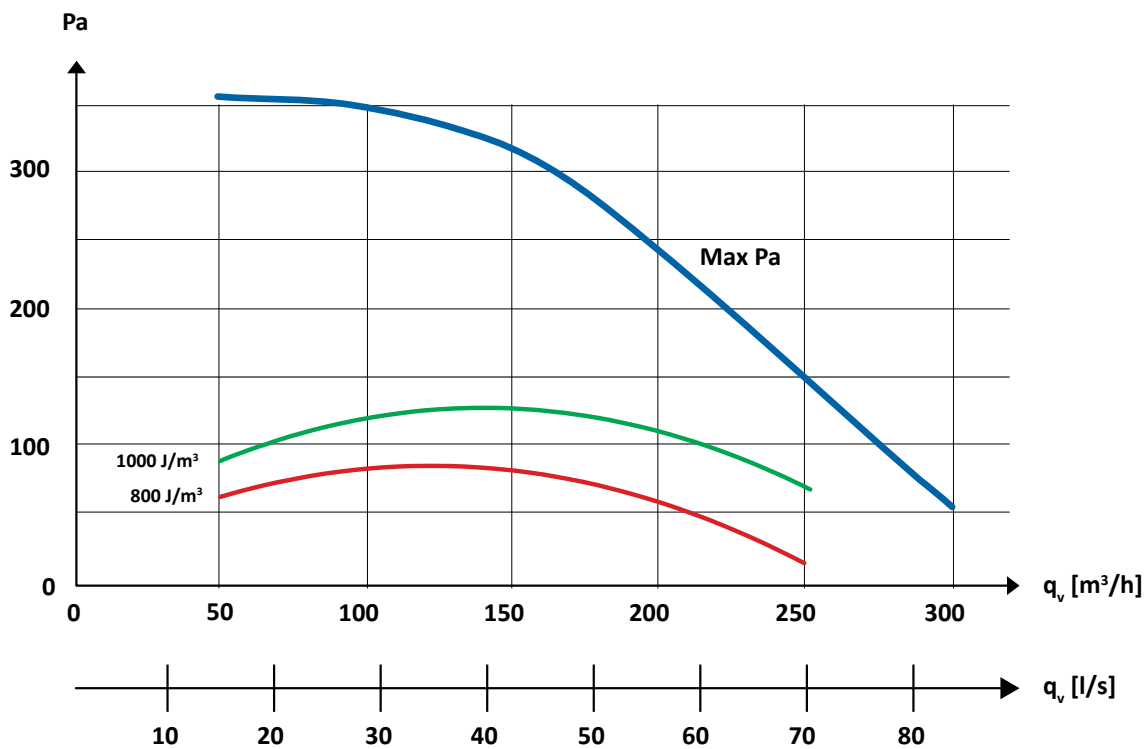
SEL values according to EN 13141-7 are for standard units with ISO Coarse >90% (G4) filters and without heating element.

SEL values comprise the unit's total power consumption incl. control.

Conversion factor: $\frac{J/m^3}{3600} = W/m^3/h$

Attention! The SEL values are measured and stated as a total value for both fans

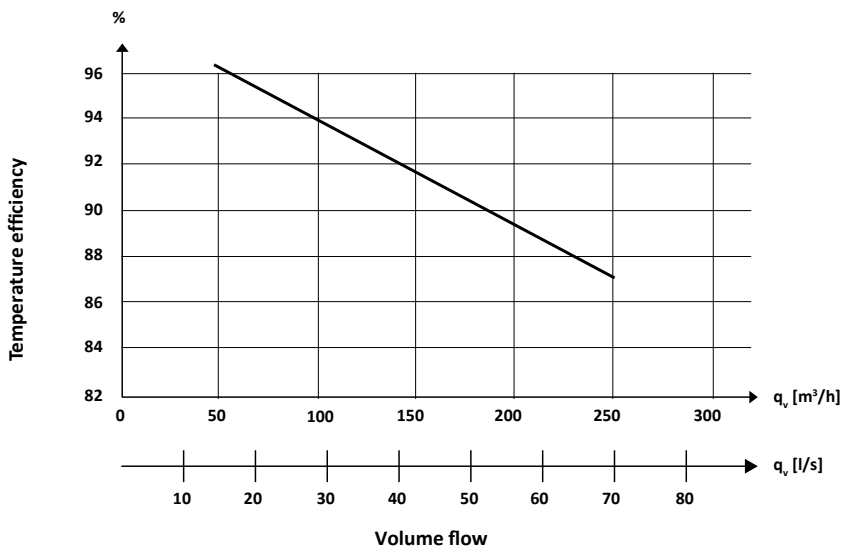
Compact P is also available in a XL-version, which can provide an air volume of 430 m³/h at 100 Pa



Temperature Efficiency

Temperature efficiency as a function of volume flow q_v [m^3/h] for unit with counterflow heat exchanger. Temperature efficiency according to EN13141-7 (2°C / 20°C).

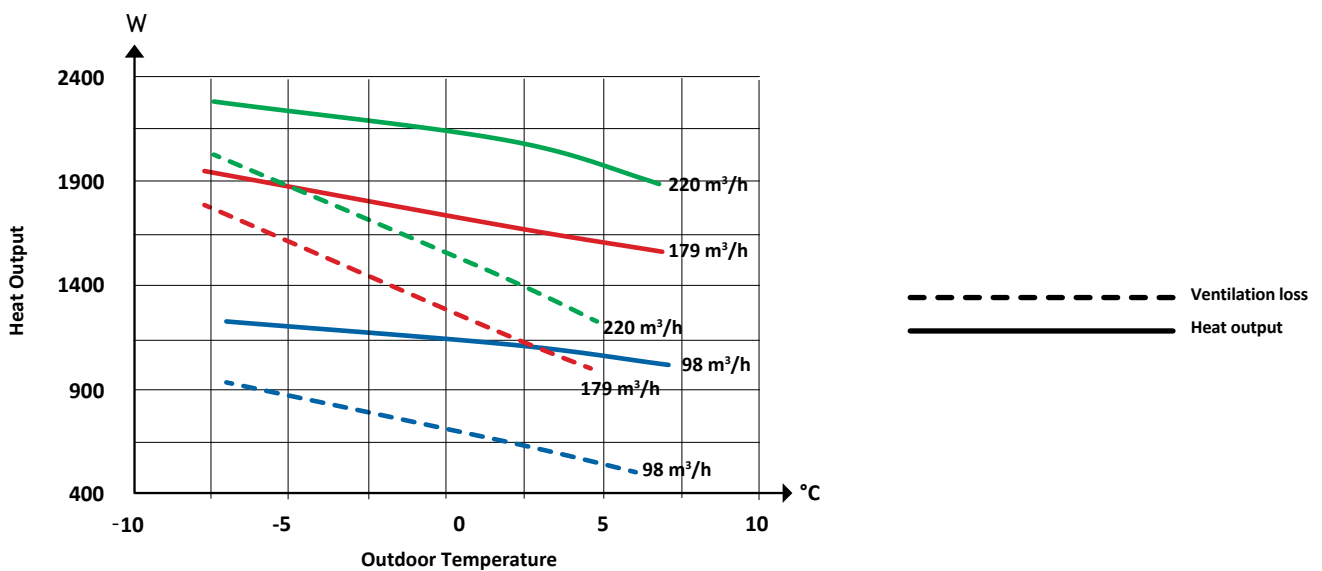
NB! The temperature efficiency, is for the heat exchanger only (without heat pump operation).



Heat Output supply air

Heat output Q_c [W] as a function of q_v [m^3/h] and outdoor air temperature t_{21} [°C]. In accordance with EN 14511, $t_{11}=21^\circ C$ (extract air) Heat output is the contribution to room heating added to the fresh air via Compact P to the supply air.

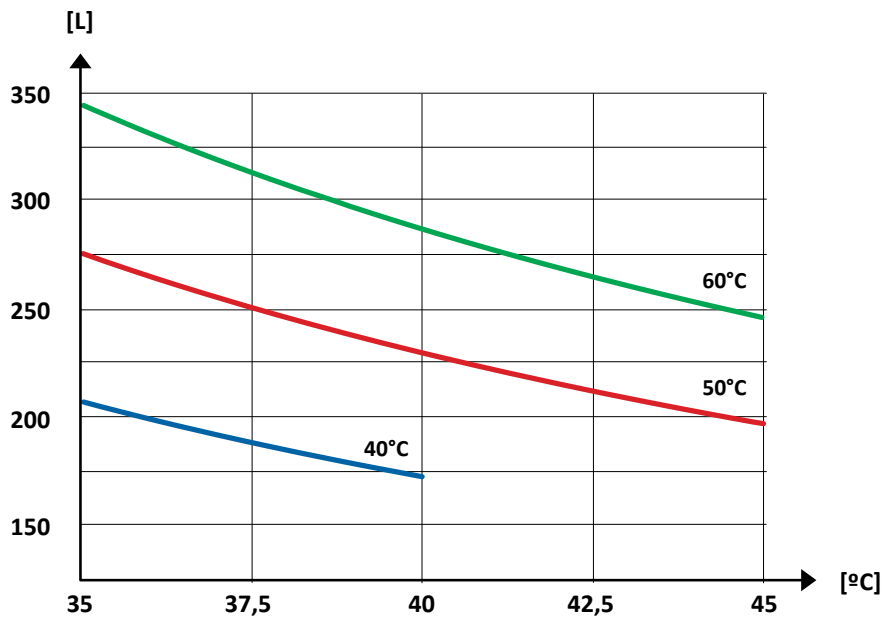
The ventilation loss is the heat output that is lost without heat recovery at the given volume flow air.



PLANNING DATA

Tapped water

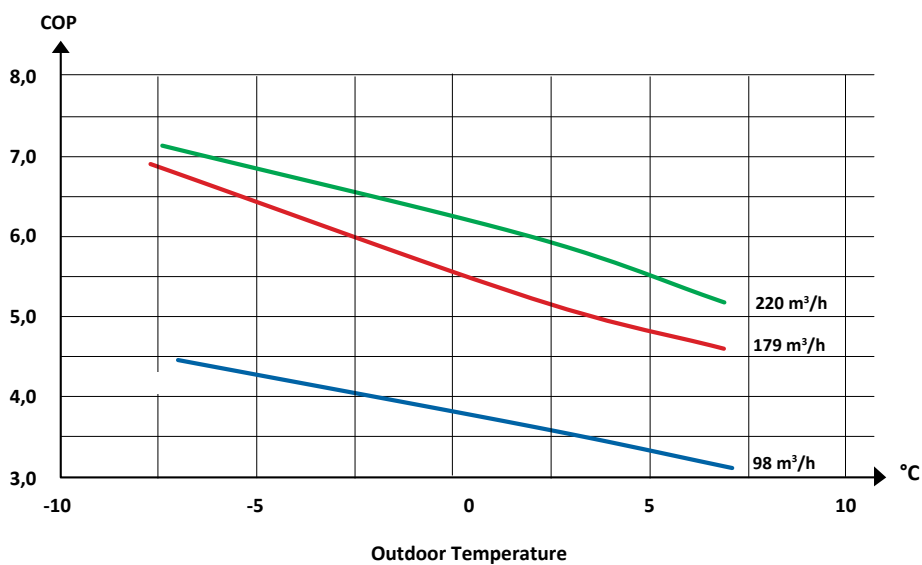
Tapped volume in litres V_{\max} [L] from Compact P tank as a function of tapped temperature t [°C] and tank temperature at 40°, 50° and 60°C



COP (air-air)

Heat output factor COP [-] supply air as a function of outdoor temperature t_{21} [°C] and volume flow q_v [m³/h] in accordance with EN14511 at a room temperature $t_{11} = 21^\circ\text{C}$

COP according EN14511 is calculated for the heat pump and counter flow heat exchanger combined.



Sound data

Sound data is for $q_v = 210 \text{ m}^3/\text{h}$ and $P_{t, \text{ext}} = 100 \text{ Pa}$ in accordance with EN 9614-2 for surface and EN 5136 for ducts. Sound output level

L_{WA} drops with falling air volumes and falling back-pressure.

At a given distance, the sound pressure level L_{pA} will depend on the acoustic conditions at the installation site.

Sound output level (L_{wa})

Octave band Hz	Surface dB(A)	Supply air dB(A)	Extract air dB(A)	Discharge air dB(A)	Outdoor air dB(A)
63	-	46	32	43	34
125	-	54	39	52	38
250	-	63	50	61	46
500	-	59	42	58	40
1.000	-	54	34	53	34
2.000	-	54	29	49	27
4.000	-	46	18	38	12
8.000	-	36	4	25	2
Total ± 2	46	66	51	64	48

AUTOMATION

CTS 602 Control



The Compact P is controlled using its CTS 602 HMI touch panel, featuring a wide range of functions, e.g., menu-control-led operation, weekly programme settings, filter monitor with timer, fan speed adjustment, summer bypass, supply-heating element control, error messages etc.

The CTS 602 comes with factory settings, including a default setting which can be customised to operational requirements to achieve optimum operation and utilisation of the system.

There is an option for selecting between 2 front page images for the main screen.

Operating instructions for the CTS 602 can be found in a separate user manual supplied with the unit.

Nilan User APP

A Nilan gateway is fitted as standard on the Compact S, where the user can gain access to the unit via a Nilan User APP. The APP enables the user to access and monitor the current operation, also from the outside of the property.

The APP allows you to adjust the default settings of, for instance, room temperature, fan speed level and the humidity control system.

The APP shows when filter change is next due. This is an important function, and you are automatically notified when filters need changing or an alarm is triggered.

It also provides you with useful trend curves so you can follow the operation of the unit for the previous week with regards to, for instance, room temperature or humidity level.

Using a LAN connector, you connect the gateway to the Modbus of the unit and then to the user's internet router via a LAN or a WiFi connection. This creates a secure cloud connection between the unit and the smartphone.



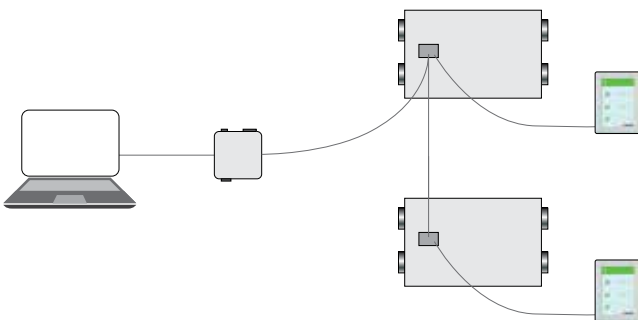
External communication

The CTS 602 control unit communicates by default with Modbus RTU RS485 communication. A CTS system using this form of communication can easily be connected to the unit.

Nilan units have an open Modbus communication, i.e. not only can the unit be monitored, but its operation can also be set in the same way as it can via the operating panel.

The protocol is set up by default for a Modbus RTU 30 address, but can be set to a value between 1 and 247.

A Modbus converter allows you to connect one or more units to a computer to monitor and control the unit.



Functional overview		+ Standard - Accessories
Filter monitor	Filter monitor with timer notifies when it is time to change filters. Can be set between 30 and 180 days.	+
Operating mode	Can be set to Auto according to set values or set to heating or cooling mode.	+
Stepless regulation	The four ventilation steps can be set steplessly 20-100%, with various values for supply air and exhaust air.	+
Humidity control	Built-in humidity control can be set to high ventilation operation at high humidity (when in the shower) and low ventilation operation if the humidity in the home becomes too low.	+
Active cooling	The unit can be set to cool the supply air in the summer, should the need arise. When the heat pump cools, the heat is deposited in the hot water tank, so that you get "free" hot water when the unit is in cooling mode.	+
Low outdoor temperature	It is possible to lower the ventilation at low outdoor temperature, to avoid the indoor humidity becoming too low.	+
CO ₂ control	It is possible to control the ventilation level according to the CO ₂ level in the home.	-
Temperature settings	The temperature settings are used by the controller to regulate the operation of the entire system.	+
Frost protection	The control has an automatic function for defrosting the heat exchanger to prevent formation of ice.	+
Pause domestic hot water	It is possible to set the hot water production on pause e.g. if no one is at home. In that way, energy is saved.	+
Frost protection domestic hot water	To protect the hot water tank, it is fitted with a frost protection function.	+
Supplementary electrical heater domestic hot water	If the need for domestic hot water increases and the heat pump cannot keep up, a supplementary electrical heater can be activated to heat the domestic hot water.	+
Anti-scald protection	The control has a built-in scalding protection, which prevents scalding of the users when the hot water tap is opened.	+
Anti-Legionella	The control has an Anti-Legionella treatment of the domestic hot water that can be activated manually or automatically.	+
Anode	Electronically monitored anode. Notifies when it is time to replace it to ensure a long service life of the hot water tank.	+
Week program	A week program can be made with various settings depending on the use of the home.	+
User selection program 1	A user selection program enables you to use special settings that override the standard operating settings via a potential-free signal. Used e.g. if a cooker hood is connected to the system.	+
User selection program 2	Used as user selection 1, but at the same time has an output signal that can be used e.g. to control a damper.	+
Datalog	Data logging as well as error messages and warnings.	+
Output data	All current values in the system operation. Most often used for troubleshooting.	+
Emergency stop ventilation	Do not turn off the ventilation, as this may damage the unit, duct system and in the worst case the home. But it may be necessary to briefly turn off the ventilation e.g. due to an emergency notification.	+

OPERATION

Intelligent humidity control

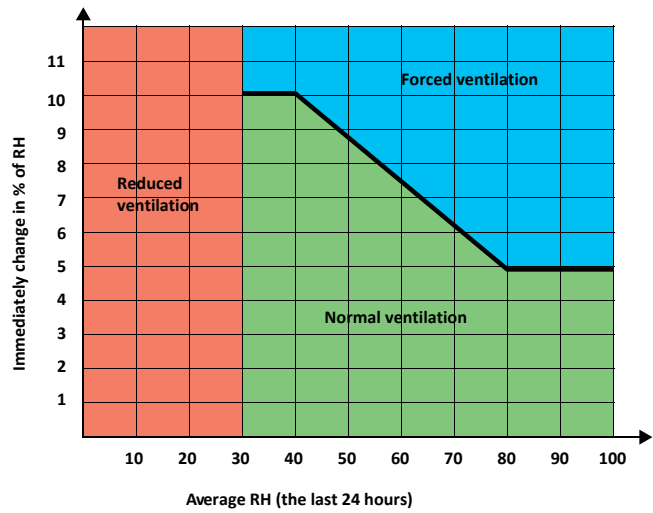
Nilan's humidity control feature automatically adapts to the needs of the family or the building.

The intelligent CTS 602 control unit does not need to have a set level input for air humidity (RH) to control the air exchange. By using the integrated humidity sensor, the control unit calculates the average level itself for the last 24 hours. The average level provides a basis for deciding whether to change the air exchange if the air humidity fluctuates.

This ensures that the unit always runs at its most efficient, based on the actual air humidity level and not on a theoretical one.

This helps save energy because it automatically adapts to the requirements in the home. Whether a large family or a single person is living in the building has a considerable influence on how much humidity is produced.

The unit also adjusts automatically to summer and winter level.



If the air humidity changes by more than 5-10% in relation to the average level, the unit responds with a higher rate of air exchange accordingly.

At an air humidity below 30% is reduced ventilation stp activated (adjustable between 15 and 45%)

Compact P is one of few compact ventilation and heat recovery units in the world to gain the internationally recognised passive building certification – in definitive recognition of the environmental benefits due to its high efficiency.

This certification means that Compact P is pre-approved for passive buildings, so that no further documentation is required.

The German Passivhaus Institut (PHI), which is behind passive building certification, is a key player in the low-energy construction industry, especially because the institute created the passive building concept.

In other words, PHI sets the standard for houses constructed as passive buildings due to their low energy consumption. The institute is thus also the trendsetter for coming EU requirements of low-energy construction.

Compact P is passive house certified via two certificates, according to efficiency and heating area. The certificates specify the following values for Compact P to certify the system's ability to provide a passive building with ventilation.

See or download the certificates at www.nilan.dk

Zertifikat

Passivhaus geeignete Komponente
Für kühl-gemäßigtes Klima, gültig bis 31.12.2021

Kategorie: **Wärmepumpen Kompaktgerät**
Hersteller: **Nilan A/S**
8722 Hedensted, DENMARK
Produktname: **Compact P (92 m³/h)**

Die Einhaltung folgender Kriterien wurden geprüft (Grenzwerte*):

Passivhaus Behaglichkeitskriterium: θ_{Zuluf} $\geq 16,5^\circ\text{C}$
 Wärmebereitstellungsgrad Lüftung: $\eta_{WRG,eff} \geq 75\%$
 Elektroeffizienz Lüftung: $P_{el} \leq 0,45 \text{ Wh/m}^3$
 Luftdichtheit (intern/extern): $V_{Leckage} \leq 3\%$
 Gesamtprimärenergiebedarf (**): $PE_{gesamt} \leq 55 \text{ kWh/(m}^2\text{a)}$
 Abgleich und Regelbarkeit (*)
 Luftfilter (*)
 Frostschutzstrategie (*)
 Schallschutz (*)

Messwerte zum Ansatz im PHPP (Arbeitspunkt 92 m³/h)
Einsatzbereich 52 bis 120 m³/h

	Prüfpunkt 1	Prüfpunkt 2	Prüfpunkt 3	Prüfpunkt 4	
Außenlufttemperatur	$T_{au\ddot{a}} -7,0$	$2,1$	$7,1$		$^\circ\text{C}$
Thermische Leistung Wärmepumpe	$P_{WP,Heiz} 0,49$	$0,62$	$0,67$		kW
Arbeitszahl WP	$COP_{WP} 2,43$	$2,55$	$2,78$		-
Maximale Zulufttemperatur der WP im Heizsfall, s. Anlage	$33,6$				$^\circ\text{C}$

Warmwasser

	Prüfpunkt 1	Prüfpunkt 2	Prüfpunkt 3	Prüfpunkt 4	
Außenlufttemperatur	$T_{au\ddot{a}} -6,9$	$1,9$	$7,2$	$20,2$	$^\circ\text{C}$
Thermische Leistung Speicheraufheizung	$P_{WP,Heiz} 0,51$	$0,72$	$0,89$	$1,02$	kW
Thermische Leistung Speichernachladung	$P_{WP,Nachl} 0,54$	$0,71$	$0,83$	$0,94$	kW
Arbeitszahl Speicheraufheizung	$COP_{WP,Heiz} 2,11$	$2,60$	$3,08$	$3,38$	-
Arbeitszahl Speichernachladung	$COP_{WP,Nachl} 1,94$	$2,50$	$2,80$	$3,05$	-
Mittlere Speichertemperatur	$50,5$				$^\circ\text{C}$
Spezifische Speicherverluste	$1,63$				$\text{W/K m}^3\text{h}$
Fortluftbeimischung (falls vorhanden)					m^3h

(*) Detaillierte Beschreibung der Kriterien und Kennwerte siehe Anlage
 (**) Heizung, Warmwasser, Lüftung, Hilfsstrom im Referenzgebäude, siehe Anlage

www.passiv.de 0390ch03

Passivhaus Institut
Dr. Wolfgang Feist
64283 Darmstadt
GERMANY

Effektiver Wärmebereitstellungsgrad
 $\eta_{WRG,eff} = 77\%$

Elektroeffizienz
 $0,43 \text{ Wh/m}^3$

Luftdichtheit
 $V_{Leck, intern} = 1,0\%$
 $V_{Leck, extern} = 1,1\%$

Frostschutz
bis -7°C

Primärenergiebedarf gesamt ()**
 $54,1 \text{ kWh/(m}^2\text{a)}$

Zertifikat

Passivhaus geeignete Komponente
Für kühl-gemäßigtes Klima, gültig bis 31.12.2021

Kategorie: **Wärmepumpen Kompaktgerät**
Hersteller: **Nilan A/S**
8722 Hedensted, DENMARK
Produktname: **Compact P (172 m³/h)**

Die Einhaltung folgender Kriterien wurden geprüft (Grenzwerte*):

Passivhaus Behaglichkeitskriterium: $\theta_{Zuluf} \geq 16,5^\circ\text{C}$
 Wärmebereitstellungsgrad Lüftung: $\eta_{WRG,eff} \geq 75\%$
 Elektroeffizienz Lüftung: $P_{el} \leq 0,45 \text{ Wh/m}^3$
 Luftdichtheit (intern/extern): $V_{Leckage} \leq 3\%$
 Gesamtprimärenergiebedarf (**): $PE_{gesamt} \leq 55 \text{ kWh/(m}^2\text{a)}$
 Abgleich und Regelbarkeit (*)
 Luftfilter (*)
 Frostschutzstrategie (*)
 Schallschutz (*)

Messwerte zum Ansatz im PHPP (Arbeitspunkt 172 m³/h)
Einsatzbereich 120 bis 205 m³/h

	Prüfpunkt 1	Prüfpunkt 2	Prüfpunkt 3	Prüfpunkt 4	
Außenlufttemperatur	$T_{au\ddot{a}} -3,7^\circ\text{C}$	$2,0^\circ\text{C}$	$6,9^\circ\text{C}$		$^\circ\text{C}$
Thermische Leistung Wärmepumpe	$P_{WP,Heiz} 0,61$	$0,78$	$0,92$		kW
Arbeitszahl WP	$COP_{WP} 2,65$	$3,18$	$3,58$		-
Maximale Zulufttemperatur der WP im Heizsfall, s. Anlage	$28,6$				$^\circ\text{C}$

Warmwasser

	Prüfpunkt 1	Prüfpunkt 2	Prüfpunkt 3	Prüfpunkt 4	
Außenlufttemperatur	$T_{au\ddot{a}} -4,0^\circ\text{C}$	$2,0^\circ\text{C}$	$7,0^\circ\text{C}$	$20,2^\circ\text{C}$	$^\circ\text{C}$
Thermische Leistung Speicheraufheizung	$P_{WP,Heiz} 0,60$	$0,83$	$0,99$	$1,14$	kW
Thermische Leistung Speichernachladung	$P_{WP,Nachl} 0,53$	$0,82$	$0,95$	$1,05$	kW
Arbeitszahl Speicheraufheizung	$COP_{WP,Heiz} 2,13$	$2,87$	$3,31$	$3,68$	-
Arbeitszahl Speichernachladung	$COP_{WP,Nachl} 1,81$	$2,72$	$3,05$	$3,28$	-
Mittlere Speichertemperatur	$50,5$				$^\circ\text{C}$
Spezifische Speicherverluste	$1,63$				$\text{W/K m}^3\text{h}$
Fortluftbeimischung (falls vorhanden)					m^3h

(*) Detaillierte Beschreibung der Kriterien und Kennwerte siehe Anlage
 (**) Heizung, Warmwasser, Lüftung, Hilfsstrom im Referenzgebäude, siehe Anlage

www.passiv.de 0391ch03

Passivhaus Institut
Dr. Wolfgang Feist
64283 Darmstadt
GERMANY

Effektiver Wärmebereitstellungsgrad
 $\eta_{WRG,eff} = 80\%$

Elektroeffizienz
 $0,40 \text{ Wh/m}^3$

Luftdichtheit
 $V_{Leck, intern} = 1,0\%$
 $V_{Leck, extern} = 1,1\%$

Frostschutz
bis -4°C

Primärenergiebedarf gesamt ()**
 $51,4 \text{ kWh/(m}^2\text{a)}$

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DELIVERY AND HANDLING

Transport and storage

Compact P comes in factory packaging that protects it during transport and storage.

Compact P must be stored in a dry place in its original packaging until installation. The packaging should only be removed immediately prior to installation.

Installation conditions

During installation, future service and maintenance should be taken into account. We recommend a minimum gap in front of the unit of 60 cm.

The unit must be installed level for the sake of the condensate drain.

Lifting cover

Lifting cover for Compact P makes it possible to lift Compact P off the pallet without making any heavy lifts and transport the system around in the home. Detach the filter box and the system fits under an average inner door.





Nilan England & Wales
Old Bank Court
Morocco Street
London SE1 3HB

Tel: +44 (0)208 142 9373
sales:ronan.bourke@nilan.uk.com
technical: mark.pearce@nilan.uk.com www.nilan.uk.com