COSMOGAS®
MADE IN ITALY

Condensing commercial pool heaters

CO2 LOW EMISSIONS

up to 11 bar WORKING PRESSURE

AISI 316 Ti TITANIUM

up to 1:20 TURNDOWN RATIO

POOLdens™

gas fired condensing commercial pool heaters from 35 to 280 kW

POOLdens™

Gas fired condensing commercial pool heaters

POOLdens from 34 to 280 kW is the range of patented floor standing modulating gas condensing commercial pool heaters made entirely in Cosmogas.

Eco-friendly and already set to operate with up to 20% hydrogen blend.

POOLdens are designed to be 'space-saving'; thanks to their vertical structure they allow to save space in both new and retrofitted thermal power plants.

A monobloc system that streamlines power and instantaneous hot water production according to actual pool needs.

Each **POOLdens** is composed of 1 to 4 R.V.C. heat exchangers of 70 kW, each made of Titanium and without weld joints

The inner piping, connections and manifolds are made fully of stainless steel, which allows considerable resistance to highly chlorinated water.

Thanks to these features, the pool water flows directly into **POOLdens** without interposed heat exchangers.


MADE IN
ITALY
MADE IN

Direct heating, pure efficiency: the future of swimming pools

The **POOLdens** range of pool heaters is ready to bring a breath of power and saving to pool heating, exploiting the principle of condensation, which is not yet widespread, and to operate with eco-friendly gases, green methane and blends of up to 20% hydrogen.

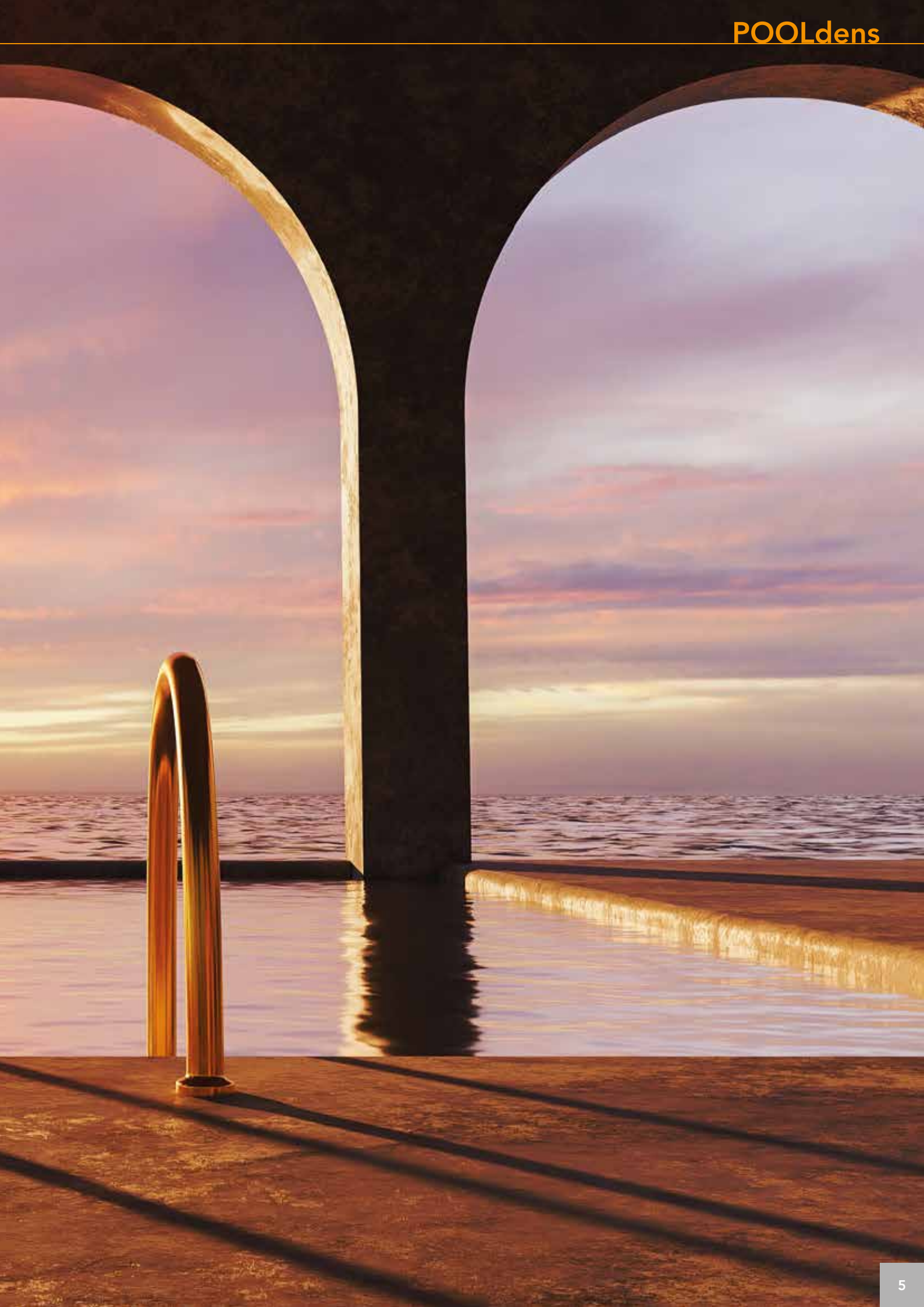
An innovation that will allow the water heating system for the pool to be switched on, even a few hours before the pool is to be used: without having to spend hours or days, when the output applied is small, waiting for it to be used.

In the same way, it will be easier and cheaper to keep the water at temperature.

Higher performance, advanced technology, comfort guaranteed

POOLdens systems designed by Cosmogas have the following advantages:

- High load speeds thanks to **POOLdens** output (34 to 280 kW) and the absence of interposed heat exchangers
- Heating of water only when needed by means of the multi-burner system to adapt to system loads
- High flow rates guaranteed by R.V.C. heat exchangers
- Minimal heat loss during idle operation
- Compact dimensions for minimum floor space
- Energy saving with condensing technology that reduces gas consumption

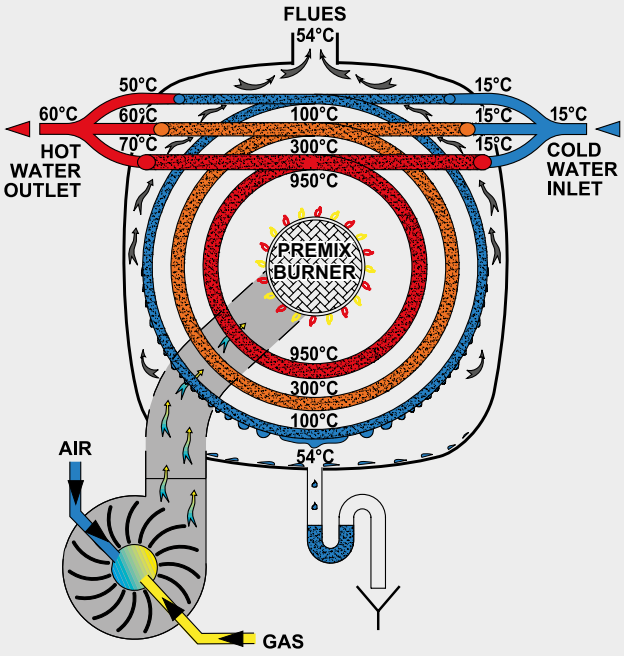


R.V.C. high saving the principle of Radial Variable Circulation

The 'variable' circulation of the fluid allows flue gas/water heat exchange in countercurrent, resulting in high efficiency that quickly brings flue gas to condensing.

During the operating, the inlet cold water is distributed over the three heat exchangers and the series of coils, Ø16 and Ø18 mm.

The advantage of such a system is to enhance condensing and achieve better outputs.



Three heat exchangers in one patented Titanium heart

The R.V.C. (Radial Variable Circulation) heat exchanger, heart of **POOLdens** system, **is the result of research and intensive testing together with Cosmogas experience** that, for over 50 years, has been designing and patenting heating and domestic hot water production systems.

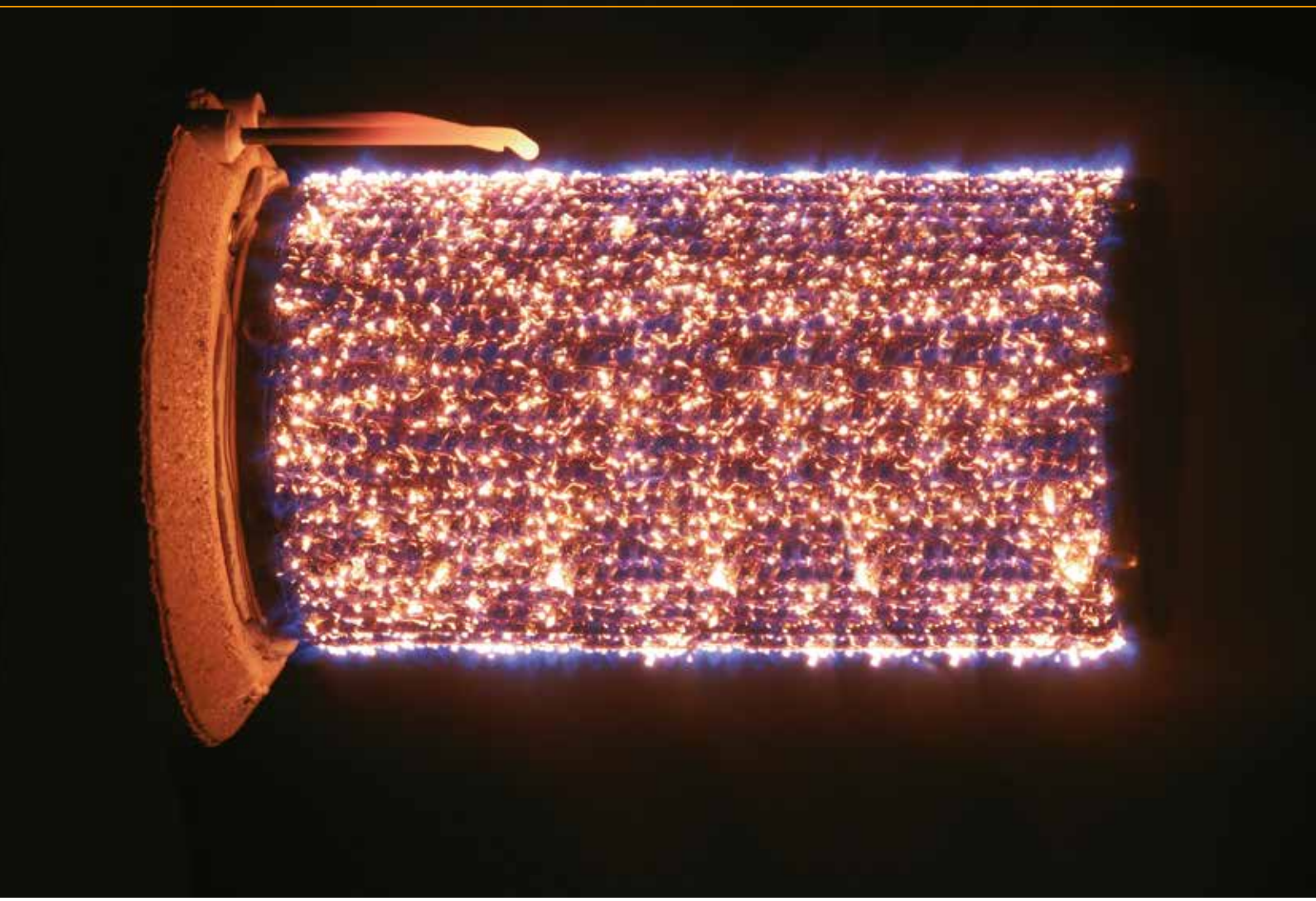
The 3 series of **Titanium** round tubes, which the R.V.C. heat exchanger is made of, are fasten **without weld joints** to keep Titanium stainless steel characteristics unaltered.
The R.V.C. heat exchanger is housed inside a strong, self-supporting, insulating composite monobloc casing.

Cosmogas is the only manufacturer who can offer a **Titanium primary heat exchanger** that guarantees a great resistance to the corrosion and the aggressiveness of chlorinated waters.

Thanks to low inlet temperatures the R.V.C. exalts the condensing effect and supplies hot water even at high temperatures maximising saving and minimising thermal inertia.

The only heat exchanger that works directly with chlorinated swimming pool water

- **Patented exclusive design**
- **Exceptional resistance against corrosion**
- **High efficiency**
- **Large water flow**
- **Great exchange surface**
- **Low pressure drops**
- **Working pressure up to 11 bar**

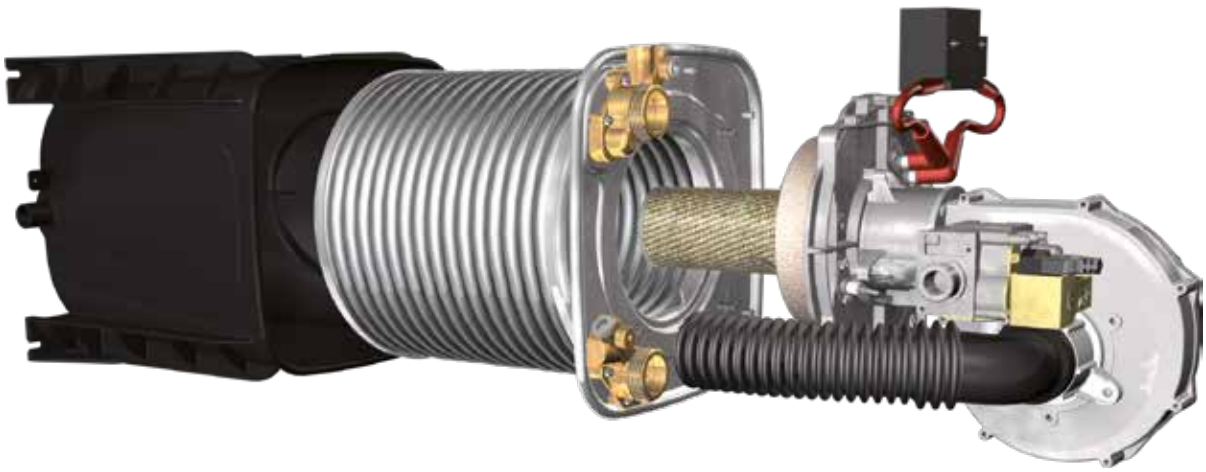


Eco-friendly premix burner made of Fecralloy metal fiber

Eco-friendly premix commercial pool heaters have a constant air/gas ratio in each point of the turndown range of the burner, decreasing polluting emissions and optimising efficiency. The premix burner is made of "Fecralloy" a special metal fibre and has a round shape.
Cosmogas eco-friendly premix burner spreads short and perfectly nourished flames and offers:

- **High-efficiency combustion**
- **NOx low polluting emissions and CO_2 low greenhouse effect**
- **Natural gas, LP gas and Natural gas/20% Hydrogen blend operating**

The innovating premix system **Cosmomix** employed in **POOLdens** allows an exceptional turndown ratio up to 1:20 (**POOLdens 280 T**).



Standard control device for perfect operating of the installation

The control board of the commercial pool heater allows the management of:

- Sanitary circuit pump
- Output proper modulation
- Pump unlock system
- Antifreeze device
- Low water flow protection
- Low water pressure protection
- Flue blocked pressure switch
- Condensate blocked drain switch
- Auto diagnostic via control display, with automatic switch-off (Save Energy) after 5 minutes of inactivity, of all components and functions: visualization of errors and lockouts, temperature sensors, ionisation current, fan rotation speed, water flow rate, water pressure.

It gets through a 65 cm wide door

POOLdens represents the best balance between power, weight and size. Being extremely compact it gets through a 65 cm wide door, allowing easy access into thermal power plant. Thanks to its light weight it is possible to easily handle it even in case of difficult installations.

Plug&Play cascade sequence compact and complete

POOLdens comes standard with a single flue gas manifold and cold water inlet and hot water outlet manifolds.
All pre-assembled and tested in Cosmogas to minimize risk and installation time, with minimal floor space requirements (0,42 sqm).

Standard full stainless steel

POOLdens is composed of R.V.C. heat exchangers made of Titanium and AISI 316 Ti stainless steel and inner piping, connections and manifolds fully made of stainless steel.

Easy electrical connections

POOLdens is equipped with a pre-wired terminal box with connectors and clear symbols, ready for an easy connection to each installation component like sensors, pumps and control boards. Next to the terminal box there is the 885IF interface that allows a 0-10V input.

Standard condensate acidity neutralizer

Condensing water produced during the combustion process react to combustion products turning into acid water. To put down acidity, each **POOLdens** is standard equipped with a condensate acidity neutralizer, sized to restore the pH to tolerable values.
Content: 10 kg of limestone.

Standard condensate blocked drain switch

A special inner condensate cup, collects condensate and makes it flow freely to the drain; in the condensate cup is connected a blocked drain switch that cuts off the commercial boiler if the level of condensate exceeds the permitted limit.

ntages of Ldens

Standard air filter

POOLdens is equipped with a standard air filter to protect the burner, the combustion chamber and the heat exchanger from dust and impurities, ensuring a better efficiency of the combustion circuit.

Standard Vortex water flow meter to prevent small flows

Each heat exchanger inside **POOLdens** is equipped with a standard Vortex water flow meter to guarantee a more accurate management of water flow rates and to make the system operate in a more efficient way.

Standard adjustable feet for proper alignment

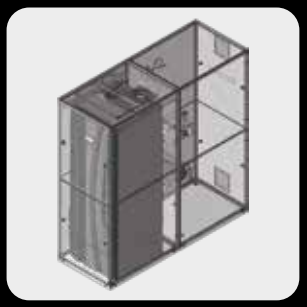
POOLdens is standard equipped with a series of adjustable feet for proper alignment of the commercial water heater. The height of the feet varies from 0 to 10 mm.

Standard integrated flue back preventer

Each premix burner, inside **POOLdens**, has been standard equipped with a flue back preventer, on the combustion circuit, to prevent the possible flue gas recirculation among different heat exchangers.

COVER-BOX T safe against bad weather on demand

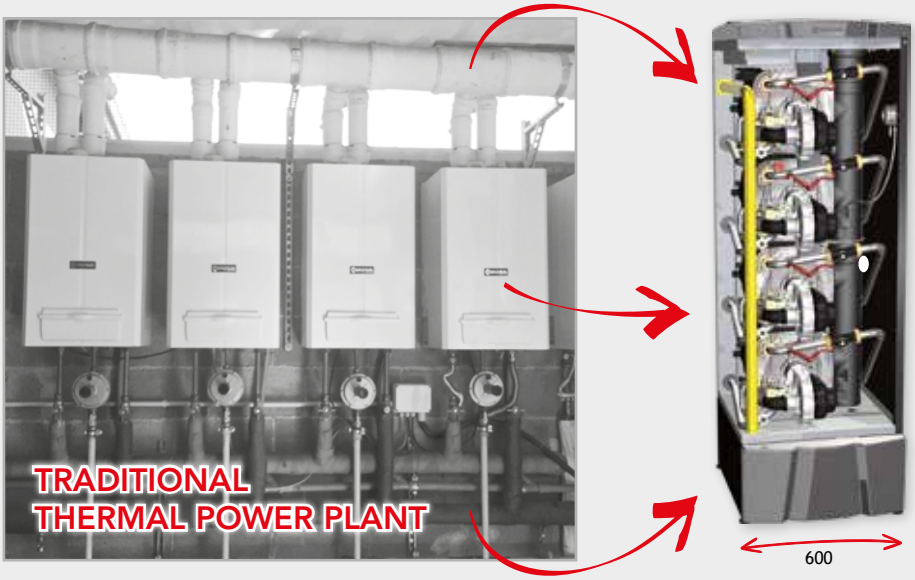
The **POOLdens** is available for use outdoors with the additional COVER-BOX T, the CE certified, fireproof, weather resistant cover made of anodized aluminium that provides an IP X5D electric protection degree.
Its reduced size and elegant design make its placement easy.



Unique set of spare parts for the entire range

Spare parts are the same for the entire range of **POOLdens** commercial pool heaters. Service Centres can service with a very limited number of spare parts: fan, gas valve, main board, display, spark generator, sensors, etc...
A case kit containing the main ones is available.

The real alternative
to traditional installations



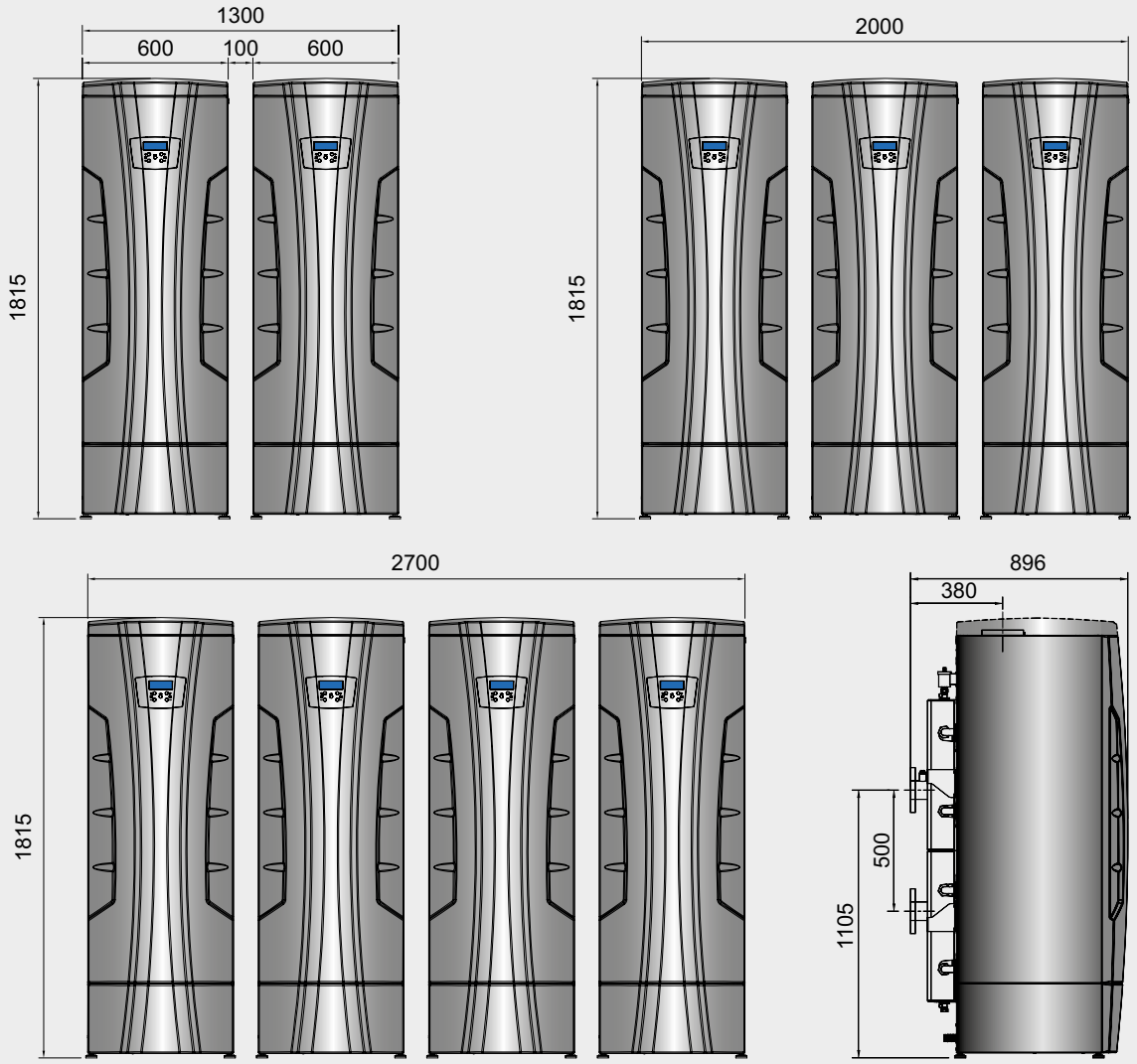
A lot of hot water
in only 0,42 sqm

POOLdens is ideal for new and retrofittings works in thermal power plants with limited space and represents the best ratio between output, weight and footprint (600x700 mm footprint), allowing easy manoeuvrability even with difficult installations.

- **Easily gets into the lift**
- **It gets through a 65 cm wide door**
- **Built-in single flue gas manifold**
- **Built-in supply/return/gas manifold**

NEW SPACE SAVER
POOLdens
THERMAL POWER PLANT

Cascade sequence
possible arrangements



Cascade sequence control 885HC (on demand)

POOLdens cascade sequence is controlled by a 885HC sequencer that manages the rotation and the sequence of the burners.
Up to 8 **POOLdens** pool heaters can be sequenced with a 885HC sequencer.

POOLdens cascade sequence output up to 2374 kW

POOLdens commercial pool heaters can be connected in cascade sequence up to 8 units to achieve a maximum output of 2374 kW.
One unit operates as "Manager" and the others as "Dependents" modulating to get the requested output.

Units can be connected to each other in cascade sequence with a minimum distance of 10 cm.
They have been conceived to have access to both front and rear side, to facilitate any type of maintenance.

Cascade sequence is recommended in all installations where it is necessary to ensure continuity of operation and where it is necessary to get high output for starting and low output for operation.

Each commercial pool heater is equipped with a 0-10V MODBUS 885IF interface.
POOLdens cascade sequence is possible through a simple daisy-chain wiring connection.

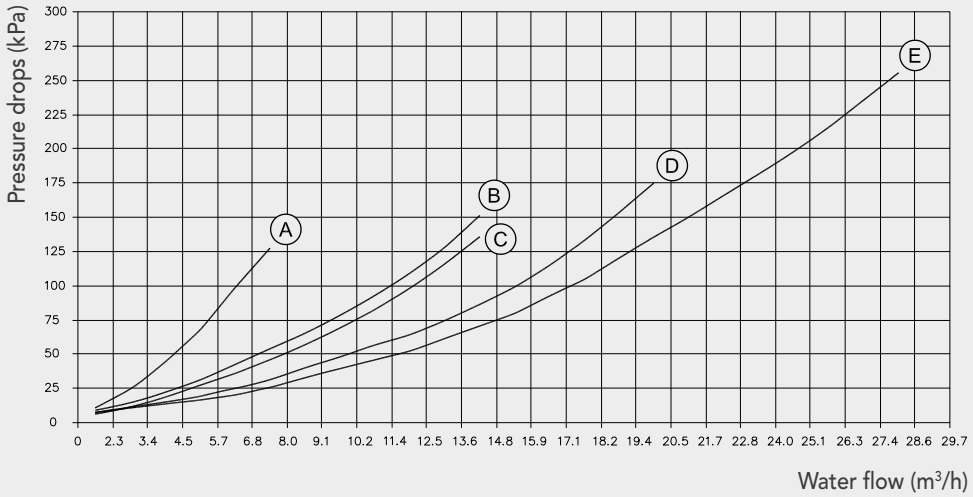
POOLdens in cascade sequence can be connected to remote management systems with communication protocols such as LonWorks, BACnet and MODBUS.

POOLdens
minimum water flow rate

Model	Minimum water flow rate l/min	Minimum water flow rate m³/h
POOLdens 34 T - 60 T - 70 T	75	4,5
POOLdens 100 T - 115 T - 140 T	150	9,0
POOLdens 180 T - 210 T	225	13,5
POOLdens 280 T	300	18,0

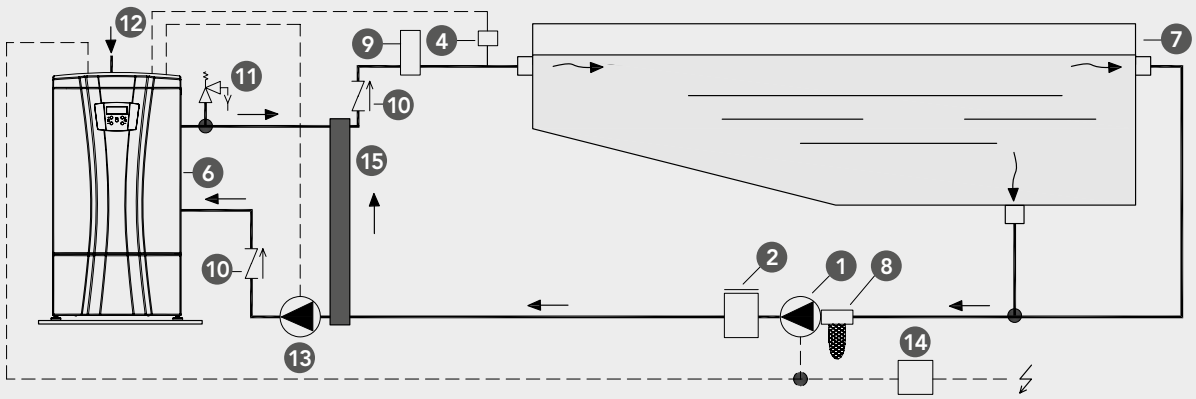
Pressure
drops

POOLdens requires circulation flow rates as indicated in the table 'Minimum water flow rate'.
To identify the appropriate circulator, consider the pressure drops of **POOLdens** added to the pressure drops of the system.



Ⓐ POOLdens 34 T - 60 T - 70 T
Ⓑ POOLdens 100 T - 115 T
Ⓒ POOLdens 140 T
Ⓓ POOLdens 180 T - 210 T
Ⓔ POOLdens 280 T

Possible
arrangements



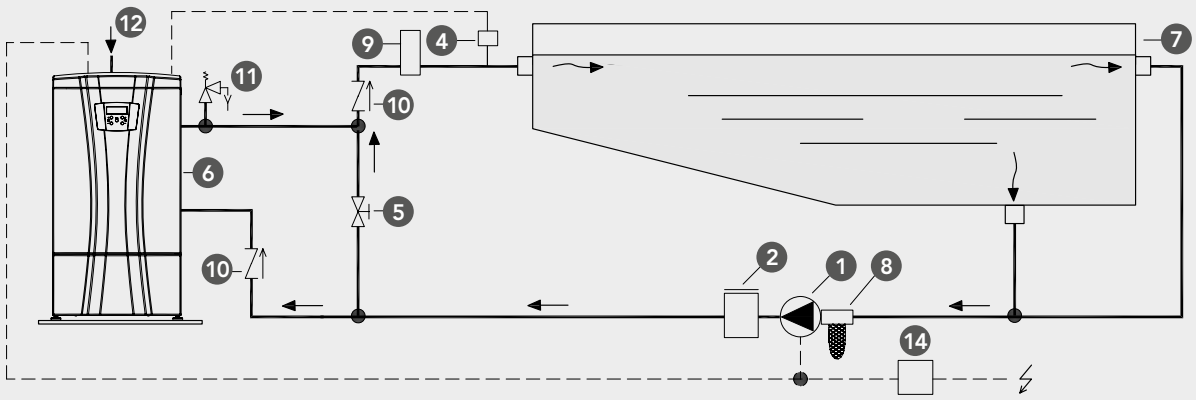
1 · Pool water circulating pump
2 · Pool filter
4 · High limit thermostat
5 · By-pass control valve
6 · POOLdens
7 · Pool
8 · Circulating pump filter
9 · Water treatment equipment

The examples reported are merely indicative

Swimming pools
heating requirements

The table shows the heat requirements of swimming pools calculated using the following parameters:
- surrounding ground temperature: 12°C
- air temperature around indoor swimming pool: 26°C
- swimming pool water pre-heating temperature: from 14 to 24°C

Swimming pool size		Surface in m²		kW dispersion of the swimming pool water surface			Water pre-heating time	Water pre-heating from 14°C to 24°C	Total capacity in kW permitted when fully operational		1 recycling in 8 hours. Recycling water flow rate	NOTE
Capacity	Length x width	Water surface in contac with air	Wet side walls	Walls + bottom	Indoor swimming pool	Outdoor swimming pool. Wind speed: 1m/s			Indoor swimming pool	Outdoor swimming pool. Wind speed: 1m/s		
m³	m	m²	m²	kW	kW	kW	hours	kW	kW	kW	l/h	
30	7 x 3	21	28	4	3	8	12 24 48	29 14,5 7,5	36 21,5 14	41 26,5 19	3750	Attention: for large swimming pools, (25 x 15 m and upwards) in municipal pools are required:
50	9 x 4	36	36	6	5	13,5	12 24 48	48,5 24 12	59 35 23	67,5 43,5 31,5	6250	
70	10 x 5	50	42	7,5	6,5	18,5	12 24 48	67,5 34 17	82 48 31	94 60 43	8750	for adults: 1 recycling every 6 - 4 hours
100	12 x 6	72	50	10	9,5	23	12 24 48	96,5 48,5 24	116 68 44	133,5 85 61	12500	
150	15 x 7	105	63	13,5	14	26,5	12 24 48	145 72,5 36	172,5 100 64	168 198 89	18750	for children: 1 recycling every 4 - 2 hours
200	16 x 9	144	70	17,5	19	53,5	12 24 48	193,5 96,5 48,5	230 133 85	264 167,5 119	25000	
300	20 x 11	220	85	25	29,5	82,5	12 24 48	290 145 72,5	344 199 126.5	396,5 251,5 179	37500	for therapeutic pools: 1 recycling every 2 - 1 hours
500	27 x 13	351	114	38	47	130,5	12 24 48	482,5 241,5 120,5	657 326 204	651 401 289	62500	
700	31 x 16	496	132	51	66	184	12 24 48	677,5 338,5 169,5	795 456 286,5	913 574 289	87500	exchanger flow rate 20 ÷ 30% with respect to pool capacity
1000	38 x 19	722	158	71,5	96,5	268	12 24 48	967,5 546,5 242	1134 651,5 409,5	1306 822,5 581	125000	



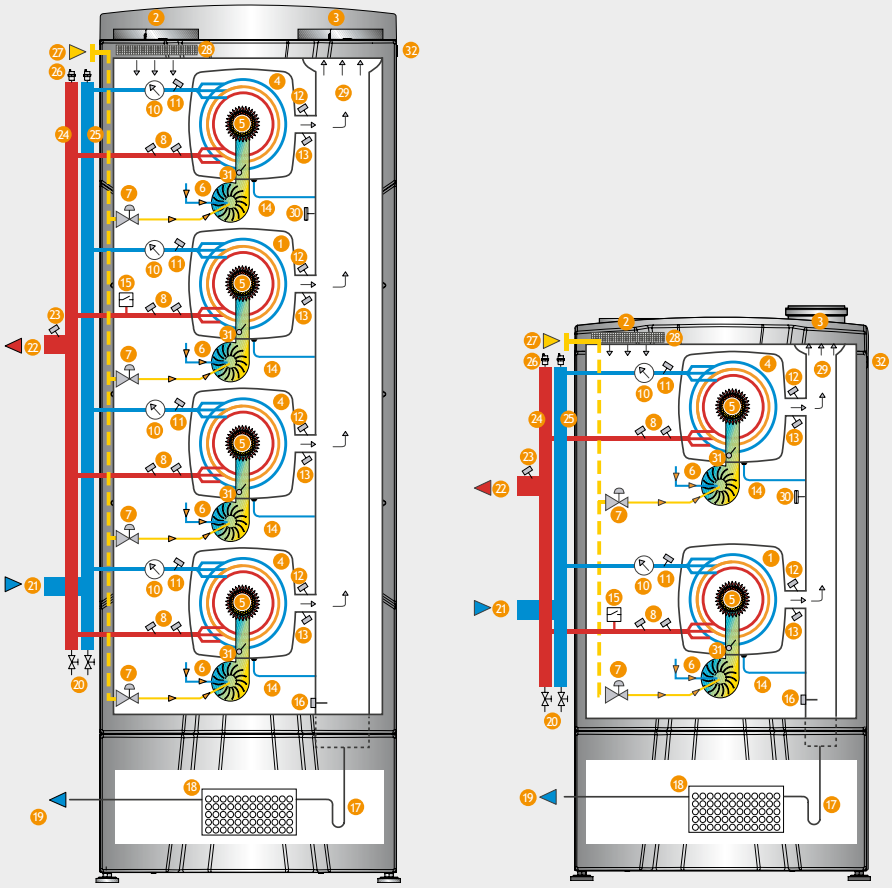
10 · Backflow preventer
11 · Safety relief valve
12 · Gas inlet
13 · Pump for primary circuit (if needed)
14 · Main switch
15 · Low loss header

Technical data

POOLDENS		MU	34 T	60 T	70 T
Type (Type of exhaust flue gas/air intake)				B23 ; B23P	
Category			II2H3P	II2H3P	II2H3P
EU type approval certificate (PIN)			0476CR1272	0476CR1272	0476CR1272
Maximum heat input "Qn" LHV (HHV)		kW	34,8 (38,6)	57,8 (64,2)	69,9 (77,6)
Heating minimum heat input "Qm" LHV (HHV)		kW	12,0 (13,3)	12,0 (13,3)	14,7 (16,3)
Maximum heat output "Pn"		kW	37,0	60,7	74,1
Efficiency at maximum heat output LHV (HHV)		%	106,4 (95,9)	105,0 (94,6)	106,0 (95,5)
Minimum heat output "Pm"		kW	13,1	13,1	16,0
Efficiency at minimum heat output LHV (HHV)		%	109,5 (98,6)	108,8 (98,0)	108,9 (98,1)
Gas flow rate	G20	m^3/h	3,68	6,11	7,39
	G31	kg/h	2,70	4,49	5,43
Gas supply pressure	G20	mbar	20	20	20
	G31	mbar	37	37	37
Gas supply minimum pressure	G20	mbar	10	10	10
	G31	mbar	10	10	10
Gas supply maximum pressure	G20	mbar	45	45	45
	G31	mbar	45	45	45
Primary heat exchanger water content		l	4,6	4,6	5,7
Minimum operating water flow		l/h	4500	4500	4500
Supply temperature adjustment range		°C	20 - 50	20 - 50	20 - 50
Maximum temperature for safety intervention		°C	95	95	95
Sanitary circuit minimum pressure		bar	1	1	1
Sanitary circuit maximum pressure		bar	11	11	11
Rated power supply voltage		V~	230	230	230
Rated power supply frequency		Hz	50	50	50
Absorbed electrical power		W	80	110	150
Electrical protection rating			IP 21	IP 21	IP 21
Burner electrical power		W	80	110	150
Flue gas exhaust pipe diameter		mm	110	110	110
Flue gas exhaust pipe maximum length		m	10	10	10
Equivalent length of a 90° bend		m	4	4	4
Weighted CO (0% O2) (EN 26:2015)	G20	ppm	13	19	19
Weighted NOx (0% O2) (EN 26:2015) HHV	G20	mg/kWh	20	28	27
CO2 (%) at minimum output	G20	%	8,5	8,5	8,5
	G31	%	9,8	9,8	9,8
CO2 (%) at maximum output	G20	%	8,8	8,7	8,7
	G31	%	9,9	10,2	10,2
O2 (%) at minimum output	G20	%	5,8	5,8	5,8
	G31	%	6,0	6,0	6,0
O2 (%) at maximum output	G20	%	5,2	5,4	5,4
	G31	%	5,8	5,4	5,4
Maximum recirculation of flue gas permitted in windy conditions		%	10	10	10
Minimum flue gas temperature at boiler outlet		°C	30	30	30
Maximum flue gas temperature at boiler outlet		°C	80	80	80
Mass flow of exhaust flue gas at minimum power		g/s	5,8	5,8	7,1
Mass flow of exhaust flue gas at maximum power		g/s	16,2	27,1	32,9
Available head at outlet		Pa	110	110	110
Maximum temperature of the combustion agent air		°C	40	40	40
Maximum CO2 content in the combustion agent air		%	0,9	0,9	0,9
Maximum exhaust flue gas temperature for overheating		°C	95	95	95
Max. negative pressure allowed in the exhaust flue gas/air intake system		Pa	110	110	110
Condensate maximum flow rate		l/h	4,4	7,3	8,8
Condensate average acidity		pH	4	4	4
Operating room temperature		°C	0,5 ; + 50	0,5 ; + 50	0,5 ; + 50
Boiler weight (empty)		kg	96	96	98

100 T	115 T	140 T	180 T	210 T	280 T
		B23 ; B23P			
II2H3P	II2H3P	II2H3P	II2H3P	II2H3P	II2H3P
0476CR1272	0476CR1272	0476CR1272	0476CR1272	0476CR1272	0476CR1272
99,0 (109,9)	115,6 (128,3)	140,0 (155,4)	173,4 (192,5)	210,0 (233,1)	280,0 (310,8)
12,0 (13,3)	12,0 (13,3)	14,7 (16,3)	14,7 (16,3)	14,7 (16,3)	14,7 (16,3)
104,5	121,4	148,4	183,8	222,6	296,8
105,0 (94,6)	105,0 (94,6)	106,0 (95,5)	106,0 (95,5)	106,0 (95,5)	106,0 (95,5)
13,1	13,1	16,0	16,0	16,0	16,0
108,8 (98,0)	108,8 (98,0)	108,9 (98,1)	108,9 (98,1)	108,9 (98,1)	108,9 (98,1)
10,47	12,22	14,80	18,30	22,20	29,61
7,68	8,97	10,87	13,50	16,30	21,73
20	20	20	20	20	20
37	37	37	37	37	37
10	10	10	10	10	10
10	10	10	10	10	10
45	45	45	45	45	45
45	45	45	45	45	45
9,2	9,2	11,4	17,1	17,1	22,8
9000	9000	9000	13500	13500	18000
20 - 50	20 - 50	20 - 50	20 - 50	20 - 50	20 - 50
95	95	95	95	95	95
1	1	1	1	1	1
11	11	11	11	11	11
230	230	230	230	230	230
50	50	50	50	50	50
220	220	300	430	430	590
IP 21	IP 21	IP 21	IP 21	IP 21	IP 21
220	220	300	430	430	590
110	110	110	160	160	160
10	10	10	10	10	10
4	4	4	4	4	4
19	19	19	19	19	19
28	29	27	27	27	27
8,5	8,5	8,5	8,5	8,5	8,5
9,8	9,8	9,8	9,8	9,8	9,8
8,7	8,7	8,7	8,7	8,7	8,7
10,2	10,2	10,2	10,2	10,2	10,2
5,8	5,8	5,8	5,8	5,8	5,8
6,0	6,0	6,0	6,0	6,0	6,0
5,4	5,4	5,4	5,4	5,4	5,4
5,4	5,4	5,4	5,4	5,4	5,4
10	10	10	10	10	10
30	30	30	30	30	30
80	80	80	80	80	80
5,8	5,8	7,1	7,1	7,1	7,1
46,6	54,4	65,8	81,6	98,7	131,7
110	110	110	110	110	110
40	40	40	40	40	40
0,9	0,9	0,9	0,9	0,9	0,9
95	95	95	95	95	95
110	110	110	110	110	110
12,4	14,5	17,6	21,8	26,3	35,1
4	4	4	4	4	4
0,5 ; + 50	0,5 ; + 50	0,5 ; + 50	0,5 ; + 50	0,5 ; + 50	0,5 ; + 50
142	142	147	211	211	249

Operating schemes



1 · Manager thermal unit
2 · Air intake
3 · Flue gas outlet
4 · Dependant thermal unit
5 · Fecralloy metal fibre premix burner
6 · Fan
7 · Gas valve
8 · Hot water supply and safety temperature sensor
10 · Water flow meter
11 · Cold water temperature sensor
12 · Flue gas temperature sensor
13 · High limit flue gas temperature switch
14 · Thermal unit condensate drain
15 · Water pressure sensor
16 · Blocked drain switch
17 · Condensate drain siphon
18 · Condensate acidity neutralizer
19 · Condensate drain
20 · Drain valves
21 · Cold water inlet
22 · Hot water supply
23 · Hot water temperature sensor
24 · Domestic hot water manifold
25 · Cold water manifold
26 · Automatic air vent valve
27 · Gas inlet
28 · Air filter
29 · Flue gas outlet pipe
30 · Blocked flue pressure switch
31 · Backdraft damper
32 · Main switch

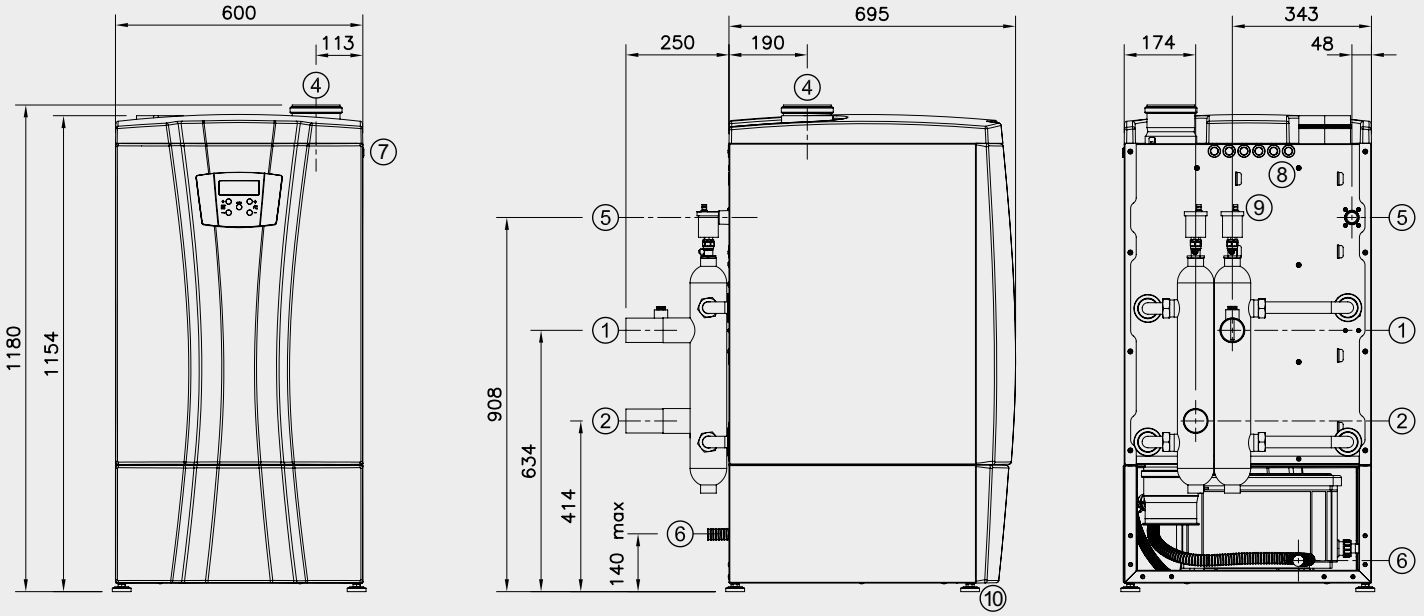
ERP product fiche

(a) Name or brand of the supplier			COSMOGAS								
(b) Reference of the model given by the supplier			POOLDENS								
			34 T	60T	70 T	100 T	115 T	140 T	180T	210 T	280 T
(c) Declared load profile			XXL	XXL	XXL	3XL	3XL	3XL	3XL	4XL	4XL
(d) Energy efficiency class			A	A	A	-	-	-	-	-	-
(e) Water heating energy efficiency	ηwh	%	87,4	86,9	86,6	86,7	86,3	86,2	86,4	87,3	86,6
(f) Daily electricity consumption	Qelec	kWh	0,16	0,18	0,19	0,35	0,37	0,36	0,39	0,51	0,54
(f) Annual electricity consumption	AEC	kWh	35	39	42	77	81	79	85	112	118
(f) Daily fuel consumption	Qfuel	kWh	27,661	27,772	27,850	53,069	53,258	53,336	53,158	105,905	106,693
(f) Annual fuel consumption	AFC	GJ	22	22	22	42	42	42	42	84	84
(g) Other load profile			-	-	-	-	-	-	-	-	-
(g) Water heating energy efficiency *		%	-	-	-	-	-	-	-	-	-
(g) Daily electricity consumption *		kWh	-	-	-	-	-	-	-	-	-
(g) Annual electricity consumption *		kWh	-	-	-	-	-	-	-	-	-
(g) Daily fuel consumption *		kWh	-	-	-	-	-	-	-	-	-
(g) Annual fuel consumption *		GJ	-	-	-	-	-	-	-	-	-
(h) Water heater thermostat temperature adjustment		°C	60	60	60	60	60	60	60	60	60
(i) Sound power level indoors	LWA	dB	70	70	70	70	70	70	70	70	70
(j) The water heater is able to work only during off-peak hours			NO	NO	NO	NO	NO	NO	NO	NO	NO
(k) Any specific precautions that shall be taken when the water heater is assembled, installed or maintained.			Read the installation, use and maintenance manual of the pool heater.								
(l) Smart control			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Emissions of nitrogen oxides	NOx	mg/kWh	20	28	27	28	28	27	27	27	27

According to commission delegated regulation (EU) No 812/2013 and No 814/2013;
* Referred to other load profile (g);
N/A = Not applicable;

Size
and connections

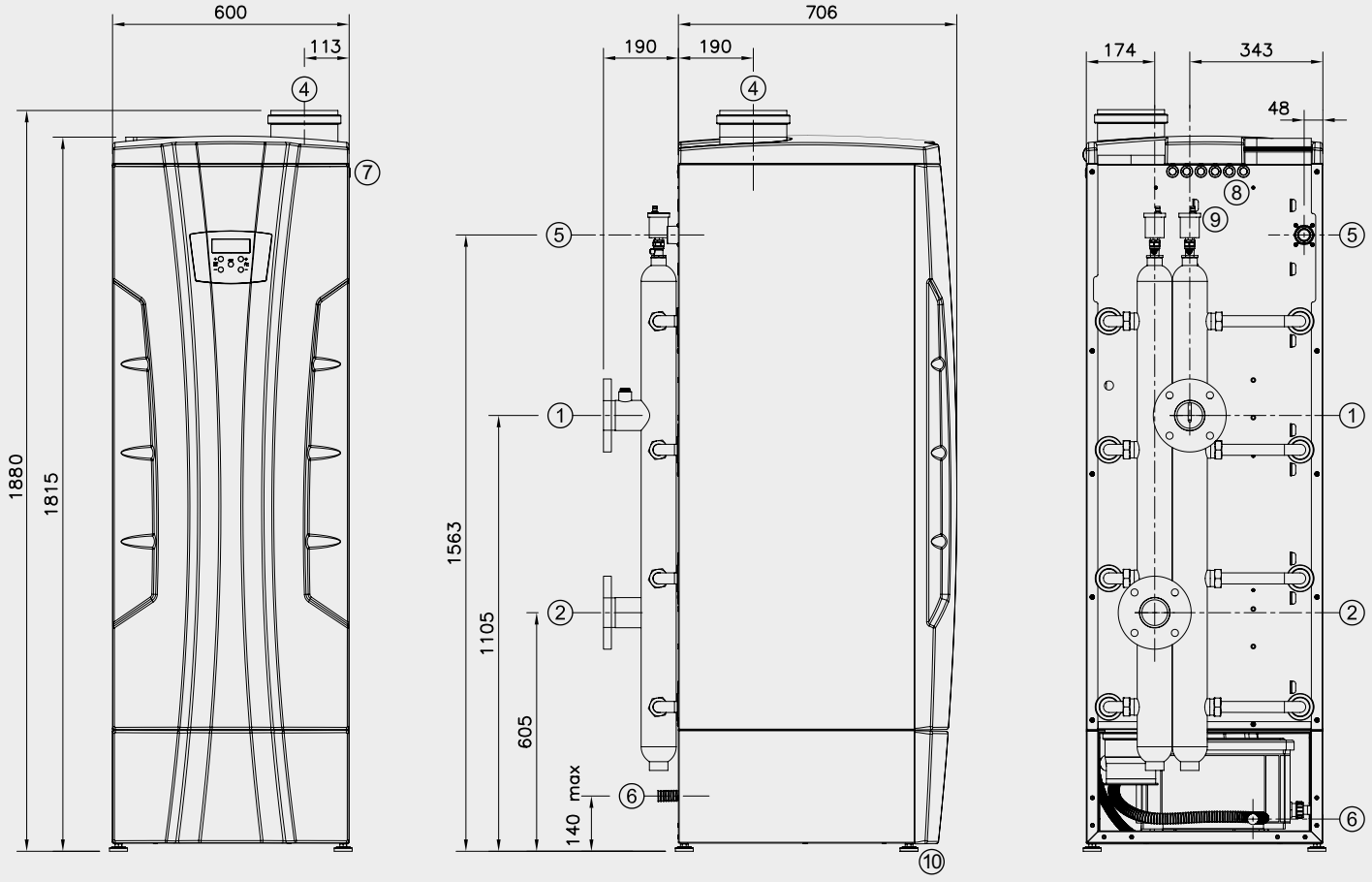
POOLdens 34 T - 60 T - 70 T - 100 T - 115 T - 140 T



1 · Hot water supply 1" 1/2 ∗
2 · Cold water inlet 1" 1/2 ∗
4 · Flue gas outlet Ø110
5 · Gas inlet 1"
6 · Condensate drain Ø28 mm
7 · Main switch
8 · Power supply and auxiliary input
9 · Intercepted air purge valves
10 · Adjustable feet

∗ · Connections and flanges are not factory mounted

POOLdens 180 T - 210 T - 280 T



1 · Hot water supply DN 65, PN 16 ∗
2 · Cold water inlet DN 65, PN 16 ∗
4 · Flue gas outlet Ø160 mm
5 · Gas inlet 1" 1/4
6 · Condensate drain Ø28 mm
7 · Main switch
8 · Power supply and auxiliary input
9 · Intercepted air purge valves
10 · Adjustable feet

∗ · Connections and flanges are not factory mounted

Massimiliano Pieraccini

All Cosmogas products are designed, patented and built by us

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