COSMOGAS®
MADE IN ITALY

AGUAdens T™

potable water heaters from
199,000 to 1,000,000 Btu/hr

The new generation of commercial gas condensing water heaters

AGUAdens T from 199 to 1,000 MBtu/hr is the new range of modulating commercial gas condensing water heaters, completely patented and assembled by Cosmogas.

INNOVATIVE DESIGN, COMPACT, POWERFUL, LIGHTWEIGHT
AGUAdens T are designed to be "space-saving"; thanks to their vertical structure they allow space saving in both new and retrofitted thermal power plants. They continuously supply water up to 160 l/min (43 GPM) rise 25°C (45°F). Thanks to their light weight they are easy to carry and easy to place inside thermal power plants.

"MONOBLOCK" MODULARITY AND CONTINUITY
Each commercial water heater is composed of 1 to 4 R.V.C. 250,000 Btu/hr heat exchangers: a "monoblock" system that optimizes the supplied output according to real D.H.W. needs ensuring maximum efficiency. The presence of more heat exchangers always guarantees continuity of service in case of maintenances or breakdowns.

WIDE TURNDOWN RATIO UP TO 20:1
The perfect synchronization of the heat exchangers, the cascade sequence control and "heat exchangers rotation", combined with COSMOMIX air/gas mix system, allow a wide turndown ratio of 20:1 for **AGUAdens 1000 T**

AISI 316 Ti (Titanium) STAINLESS STEEL HEAT EXCHANGER
This product is the only primary heat exchanger able to work in direct contact with a chlorinated water supply. Each R.V.C. heat exchanger is made without weld joints and it is able to bear a working pressure of up to 160 PSI.

ECOLOGIC PREMIX BURNER
The whole range of commercial water heaters is equipped with ecological premix burners made of Fecralloy metal fiber.

PVC/CPVC POLYPROPYLENE AND STAINLESS STEEL VENT APPROVED
From the factory the unit can be connected to PVC/CPVC pipes. Adapters for polypropylene and stainless steel venting are available.

AGUAdens T™

floor standing
750 and 1,000 MBtu/hr

Approvals:

AHRI CERTIFIED® www.ahridirectory.org

ASME HLW

DESIGN CERTIFIED

CERTIFIED

CSA® LLC

CSA® C US

floor standing
199 to 500 MBtu/hr

Why choose AGUAdens T:

Savings and efficiency
- Condensing technology
- Total flame modulation
- Certified efficiency up to 98%
- Cascade sequence control and heat exchanger "rotation"

Comfort
- Silent
- Easy installation and maintenance
- Reduced size and weight

Construction quality
- Modern, innovative and attractive design
- AISI 316 Ti stainless steel R.V.C. heat exchanger
- Turndown ratio up to 20:1

Ecology
- Fecralloy fiber premix burner
- Reduced gas emissions in the atmosphere

Up to 160 PSI WORKING PRESSURE

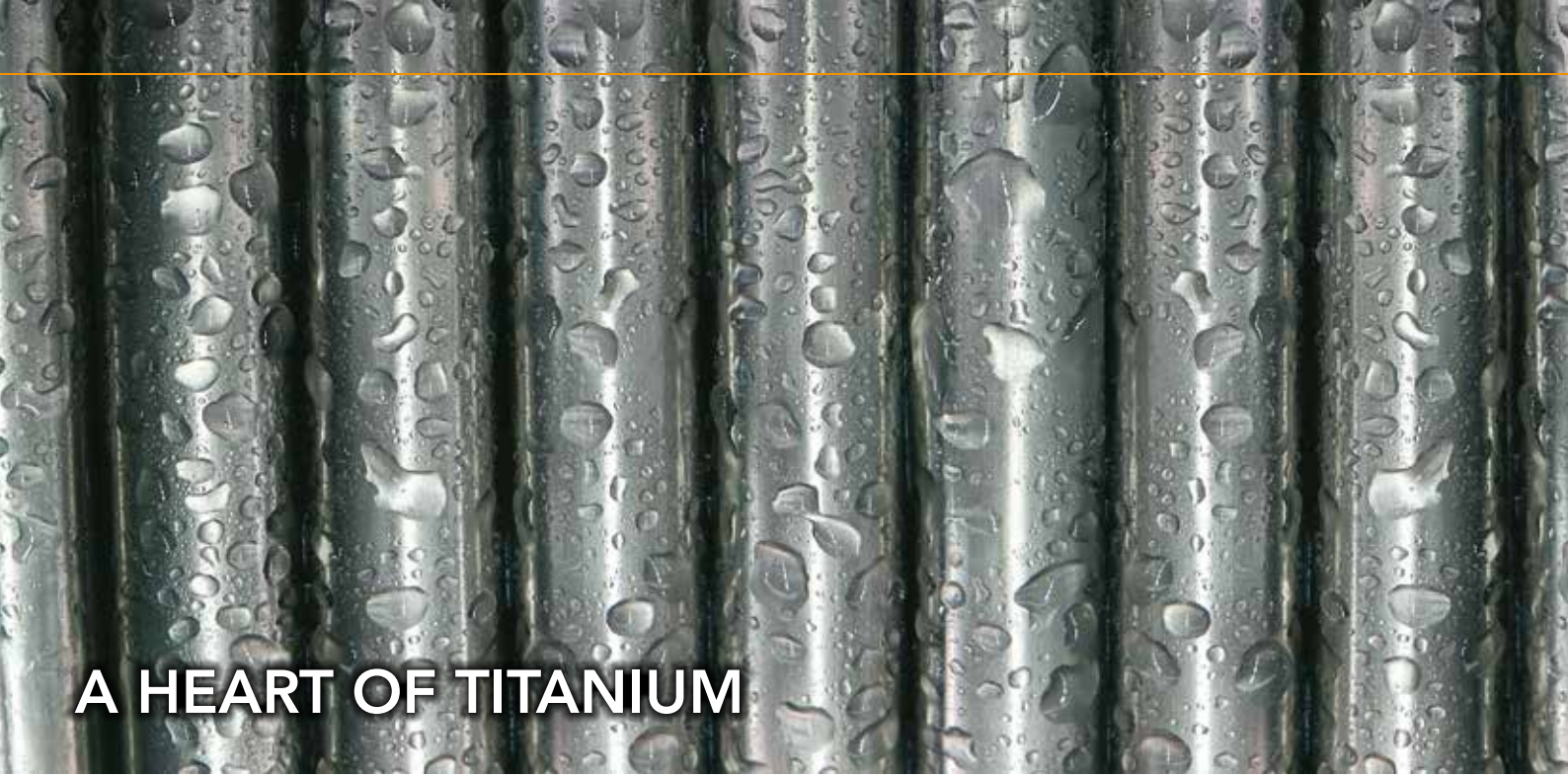
AISI 316 Ti TITANIUM

D.H.W. 100% CONDENSING

up to 20:1 TURNDOWN RATIO

CO_2 LOW EMISSIONS

NOx LOW EMISSIONS



A HEART OF TITANIUM

Patented AISI 316 Ti (titanium) stainless steel R.V.C. primary heat exchanger

PATENTED EXCLUSIVE DESIGN - The R.V.C. (Radiant Variable Circulation) heat exchanger is the heart of **AGUAdens T** system, and is the result of focused research and intensive testing. With over 50 years of Cosmogas experience, and design we have patented superior heating and domestic hot water production systems.

EXCEPTIONAL RESISTANCE AGAINST CORROSION - The series of 3 **AISI 316 Ti (TITANIUM)** stainless steel round tubes, which the R.V.C. heat exchanger is made of, are fastened **without weld joints.** As a result we keep the stainless steel characteristics unaltered and grant the highest resistance against corrosion from water sources that sometimes contain a high percentage of chlorine, necessary for water purification.

HIGH EFFICIENCY - R.V.C. has been designed to reach the optimal exchange along the entire length of the heat exchanger and grants exceptional **efficiency up to 98%.**

R.V.C. - Technology
Made in Cosmogas

The R.V.C. heat exchanger is made of a series of 3 round tubes (0.71" and 0.63" diameter), to grant:

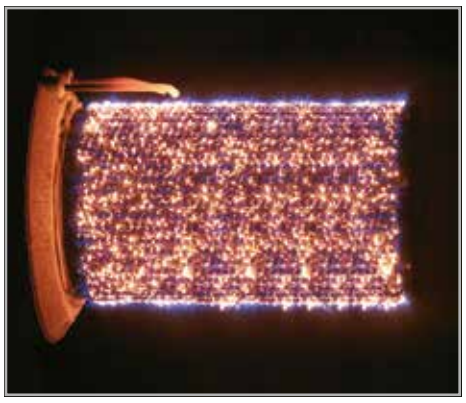
- LARGE VOLUME WATER FLOW
- GREAT EXCHANGE SURFACE
- LOW PRESSURE DROPS
- HIGH WORKING PRESSURE (up to 160 PSI)

Ecologic premix
burner "H2 ready"

Ecologic premix commercial water heaters have a constant air/gas ratio at each point of the turndown range of the burner, decreasing emissions and optimising efficiency. The premix burner is made of "Fecralloy" a special metal fibre and has a round shape.
The **Cosmogas ecologic premix burners** spread short and perfectly nourished flames.

Advantages:

- **High-efficiency combustion**
- **Low emissions**
- **Natural gas, LPG and Natural gas/20% Hydrogen blend operating**

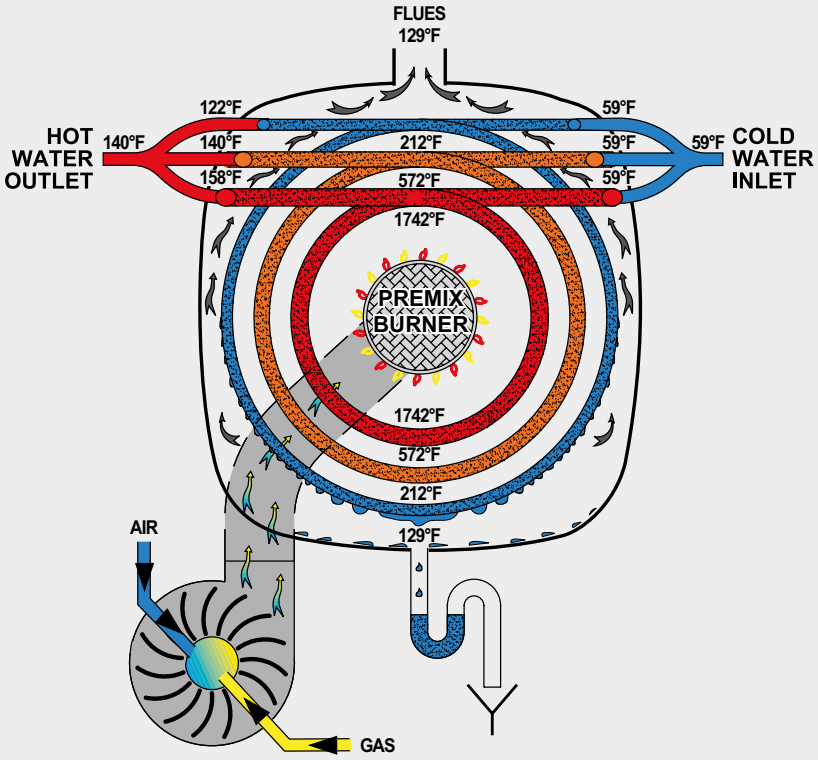


Cosmomix patented
premix system

The innovative premix system employed in **AGUAdens T condensing** commercial water heaters allows an exceptional turndown ratio up to 20:1 (**AGUAdens 1000 T**)

The primary heat exchanger able to work
in direct contact with municipal water

Cosmogas is the only manufacturer who can offer a Titanium primary heat exchanger that can guarantee a greater resistance to the corrosion and the aggressiveness of chlorinated and treated water.
Thanks to low inlet temperatures the R.V.C. boosts the condensing effect and supplies D.H.W. even at high temperatures, with maximizing savings and reducing the thermal inertia to a minimum.



The "variable" circulation of the fluid allows a flue gas/water thermal exchange, which creates high efficiency that quickly leads to flue gas condensing. During operation, the input of cold water is distributed through a series of Ø16 mm (0.63") and Ø18 mm (0.71") mm round tubes. The advantage of such a system is to utilize the condensing effect and get better output.

Efficiency always guaranteed
in continuous and peak periods

The innovative design of the **AGUAdens T**, instantaneous commercial water heater, combined with storage tanks constitutes a perfectly rapid system that can provide hot water exactly when needed.

AGUAdens T, produces continuous D.H.W. which can feed a storage tank, and allows the production of D.H.W. availability during peak periods. All the advantages of a commercial instantaneous water heater combined with all the benefits of the storage to meet any water need.

AGUAdens T added to a storage tank
Perfect rapid system

D.H.W. constant and stable temperature even in case of small water withdrawals

Higher availability of domestic hot water during peak period withdrawals

Limited ignition of the burner in the presence of small withdrawals, protecting the environment and guaranteeing advanced savings

The system satisfies both peak periods and continuous D.H.W. needs.

Condensing D.H.W.
the actual energy saver

New energy saving legislation and modern residential and commercial building insulation techniques have significantly reduced heating needs, and it will continue to be reduced. With the introduction of high performance showers, cascade showers, Jacuzzis, wellness and fitness centres, **hot water usage is increasing** as much as fuel consumption for its production. If we consider that **hot water is used 365 days a year in unlimited applications, saving on hot water production has become a priority**, above all in the sectors with high water needs.

All the advantages of direct exchange:
AGUAdens T works always in condensing mode

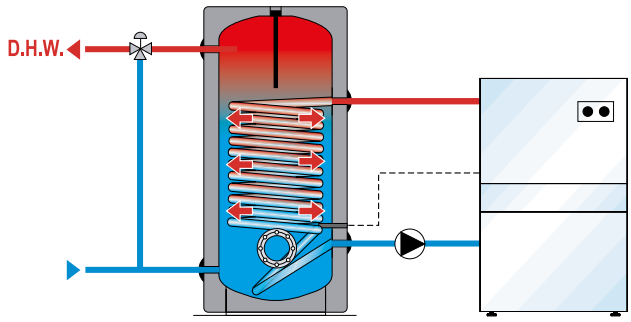
If we compare any D.H.W. production system, from the traditional semi-rapid system to that with both internal and external heat exchangers, it can be said that thermal exchange always happens in two phases. Firstly hot water heating in the primary heat exchanger of the water heater and, secondly, further thermal exchange between the water of the primary circuit and the sanitary water (fig. 1).

When **AGUAdens T** is connected to a storage tank, D.H.W. heating directly happens inside the primary heat exchanger (fig. 2). Therefore there are no heat exchangers inserted and the exchanged output is always provided by **AGUAdens T**. This sets very fast charging and recovery times.
For all these reasons the storage tanks, that are part of the **AGUAdens T,** are **50% smaller** on average than the size of storage tanks with coil or tank in tank, etc..

Water tank with internal heat exchanger system

1

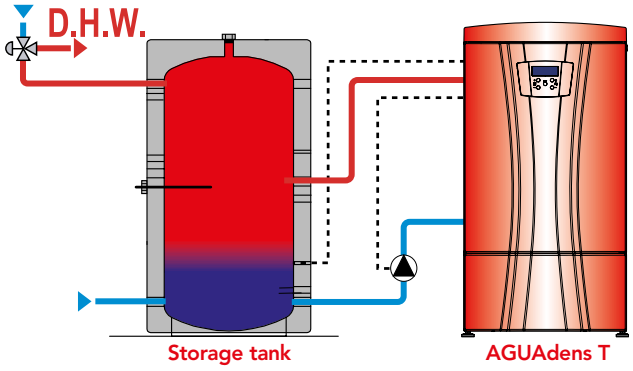
- No condensing
- High recovery times
- Efficiency of the system bound to the coil surface
- Larger footprint occupied
- Higher thermal loss
- Bigger tank needed



Advantages of Cosmogas rapid system

2

- It works always in condensing mode
- D.H.W. direct heating
- D.H.W. production uses all the power of **AGUAdens T**
- Reduced volume of the storage tank
- Reduced recovery times
- Smaller footprint occupied

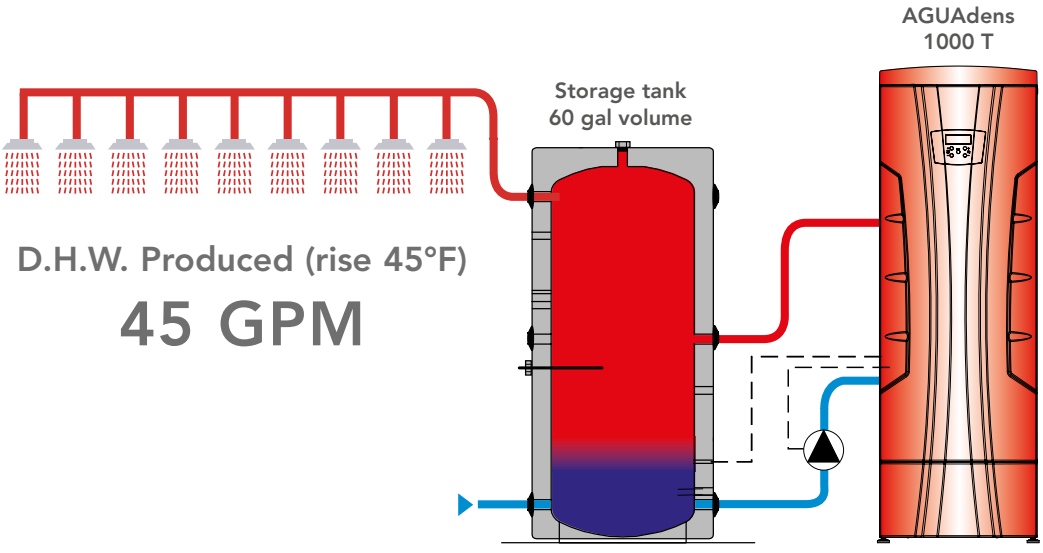


EFFICIENCY AND VERSATILITY

Suitable for new and retrofitted thermal power plants

In many applications, D.H.W. production systems consist of large indirect water heaters that, as well as promote the proliferation of bacteria, they occupy a lot of space and are characterized by relevant energy loss and waste. According to actual needs of the users, the Cosmogas rapid system, always allows a proper balance between output and storage.

AGUAdens T with a storage tank rapid heating system guarantees high performance even with extremely reduced storage (1 gal each 15,000 Btu/hr). Thanks to its multi-burner setting, it will heat only the water needed without any waste, reducing consumption to a minimum.

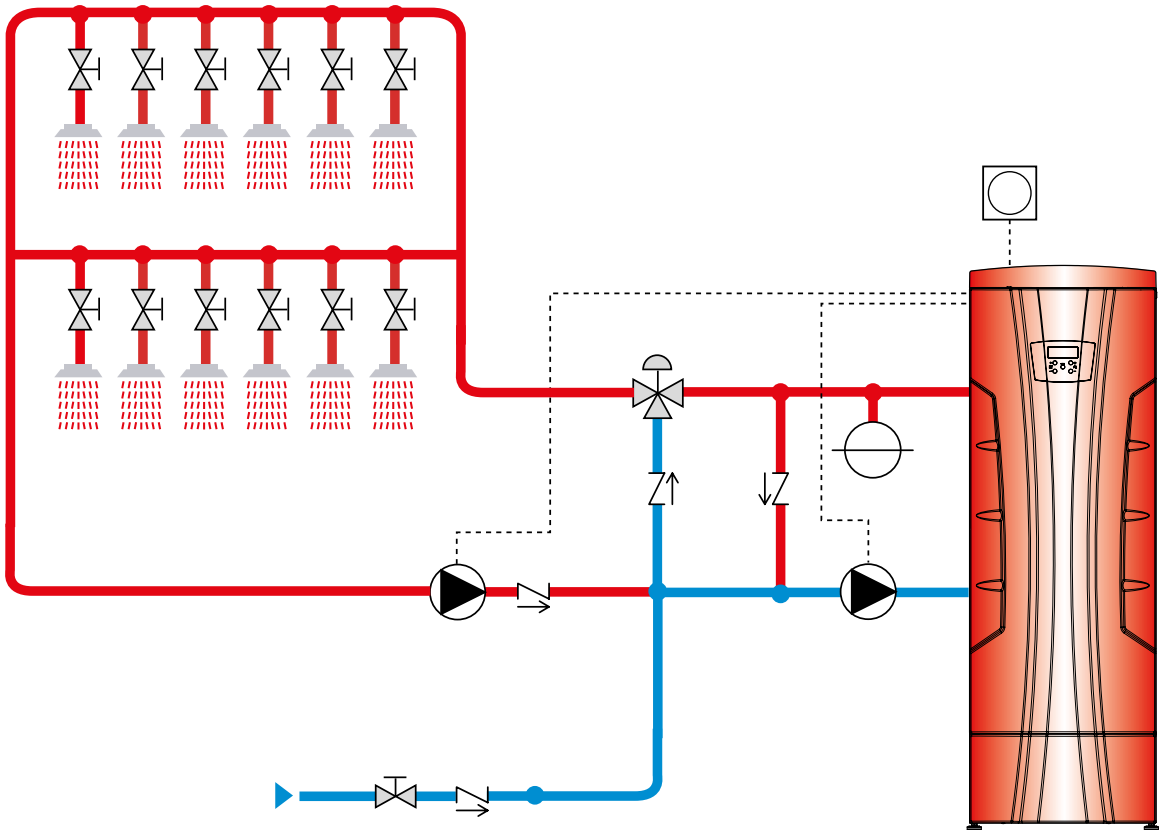


Wherever there is the need for a lot of D.H.W.

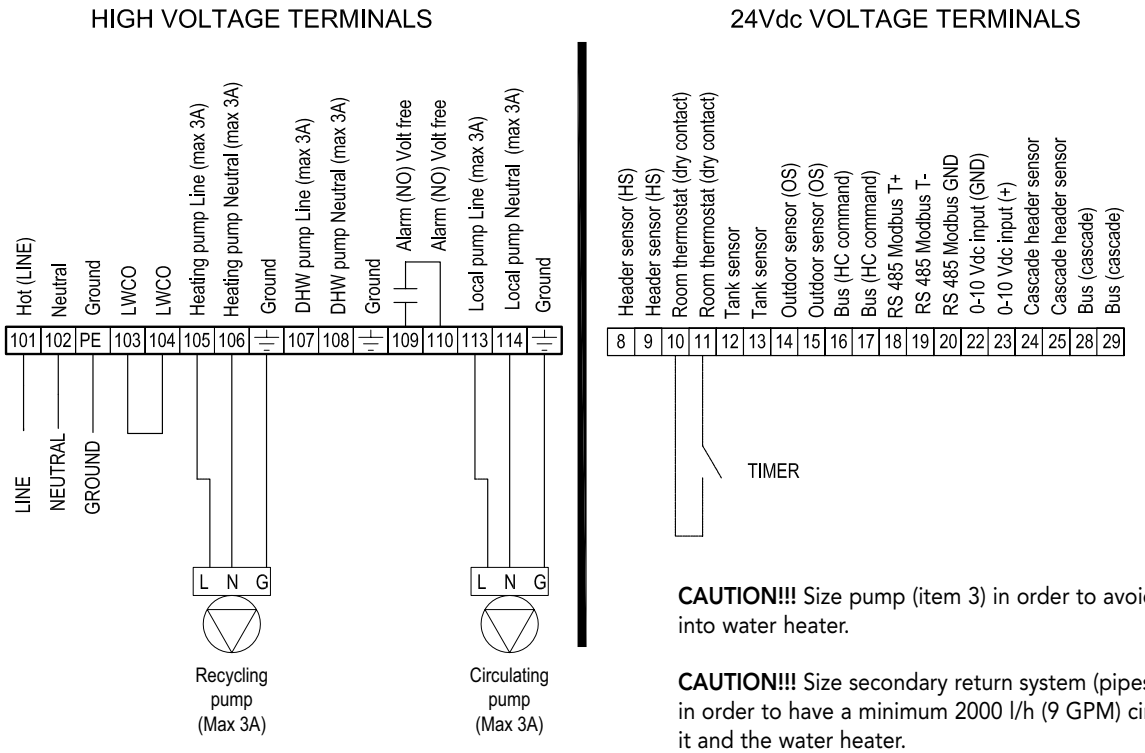
AGUAdens T plus a storage tank rapid system is simply perfect for any industrial or tertiary installation with high domestic hot water needs:

- Hotels
- Camp Grounds
- One storey buildings
- Restaurants and Cafeterias
- Schools
- Sport centers
- Wellness centers
- Hospitals
- Car washes
- Malls
- Distilleries
- Tanneries
- Factories
- Farms

Examples
of application



Wiring
diagram



CAUTION!!! Size pump (item 3) in order to avoid scale form into water heater.

CAUTION!!! Size secondary return system (pipes and pump) in order to have a minimum 2000 l/h (9 GPM) circulating on it and the water heater.

CAUTION!!! Use a mixing valve brand Caleffi model 523 or with equivalent performance.

Standard details that make the difference

Standard condensate acidity neutralizer

Condensed water produced during the combustion process react to combustion products turning into acid water. To decrease acidity, each **AGUAdens T** is standard equipped with a condensate acidity neutralizer, sized to restore the pH to tolerable levels: 10 kg (22 lb) of limestone

Condensate blocked drain switch

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

Integrated Back-draft preventer

Each burner, inside **AGUAdens T**, has been standard equipped with a back-draft preventer, at the combustion circuit, to prevent the possible flue gas recirculation amongst different exchangers, in the application of cascade sequence installations.

Simple and intuitive control panel

The control panel has a digital back-lit display for easy and intuitive operation of, boiler phases, error messages, and electronic temperature control. Display back-lighting turns off after 5 minutes of inactivity (SAVE ENERGY)..

Standard water flow meter against small flows

Each heat exchanger inside AGUAdens T is equipped with a standard flow meter to guarantee a more accurate water flow, and to make the system operate more efficiently.

Standard air filter

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

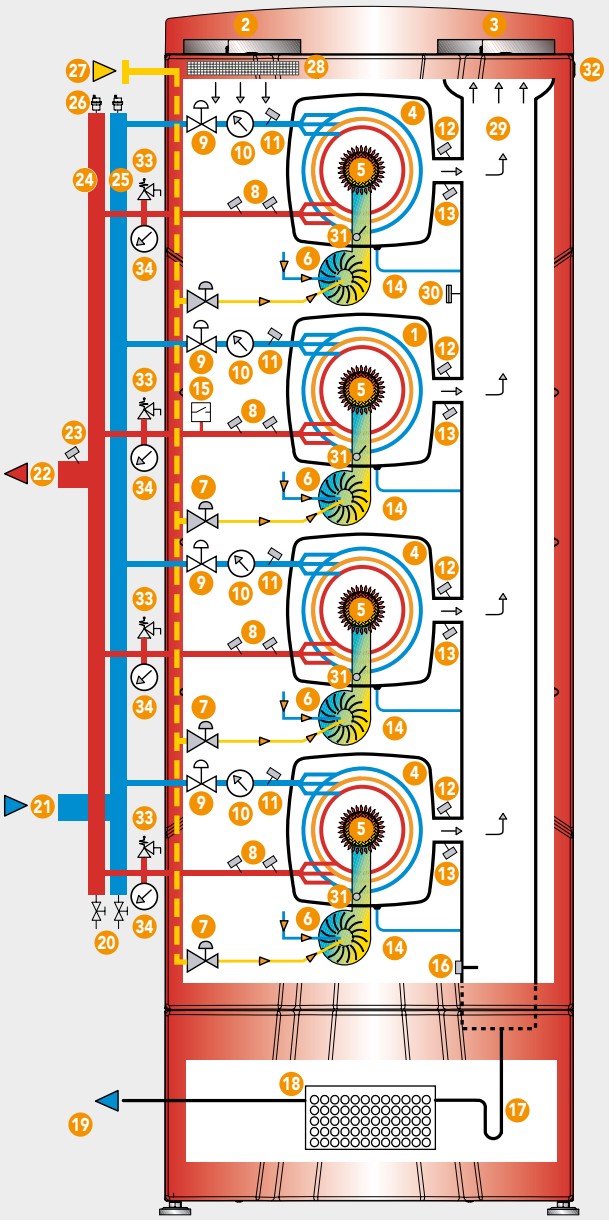
Easy electric connections

AGUAdens T is equipped with a pre-wired terminal box with connectors and symbols clearly labeled for easy connection to each installation component like sensors, pumps and control boards. Next to the terminal box there is the 885IF interface set-up that allows a 0-10V input.

Adjustable feet for proper alignment

AGUAdens T is equipped with a series of adjustable feet for proper leveling of the commercial water heater. The height of the feet vary from 0 to 10 mm (0,4”).

Operating schemes



1 · Manager thermal unit
2 · Air intake
3 · Flue gas outlet
4 · Dependent thermal unit
5 · Fecralloy metal fibre premix burner
6 · Fan
7 · Gas valve
8 · Hot water supply and safety temperature switch
9 · 2-way motorized valve (on demand)
10 · Water flow meter
11 · Cold water temperature sensor
12 · Flue gas temperature sensor
13 · High limit flue gas temperature switch
14 · Thermal unit condesate drain
15 · Water pressure sensor
16 · Blocked drain switch
17 · Condensate drain siphon
18 · Condensate acidity neutralizer
19 · Condensate drain
20 · Drain valve
21 · Cold water inlet
22 · D.H.W. outlet
23 · D.H.W. temperature sensor
24 · D.H.W. supply 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 · Back-draft preventer
32 · Main switch
33 · ASME pressure and temperature relief valve rated at 125 PSI 210°F
34 · ASME pressure and temperature gauge
35 · Dependent thermal unit (not present on model 750)

Spare parts kit available

Spare parts are the same for the complete output range of Cosmogas products, from 199 to 1,000 models. The after sale and maintenance can be done on all appliances with one spare parts kit that contains:

- Fan
- Gas valve
- Control board
- Display
- Spark generator
- Water pressure sensor
- Water flow sensor
- Temperature sensor
- Ignition electrodes
- Detection electrodes
- Modbus board

It gets through a 65 cm (26”) wide door

AGUAdens T represents the best balance between power, weight and size. Being extremely compact it can fit through a 65 cm (26”) wide door, allowing easy access into thermal power plant. Thanks to its light weight it is possible to easily handle, even in difficult installations.

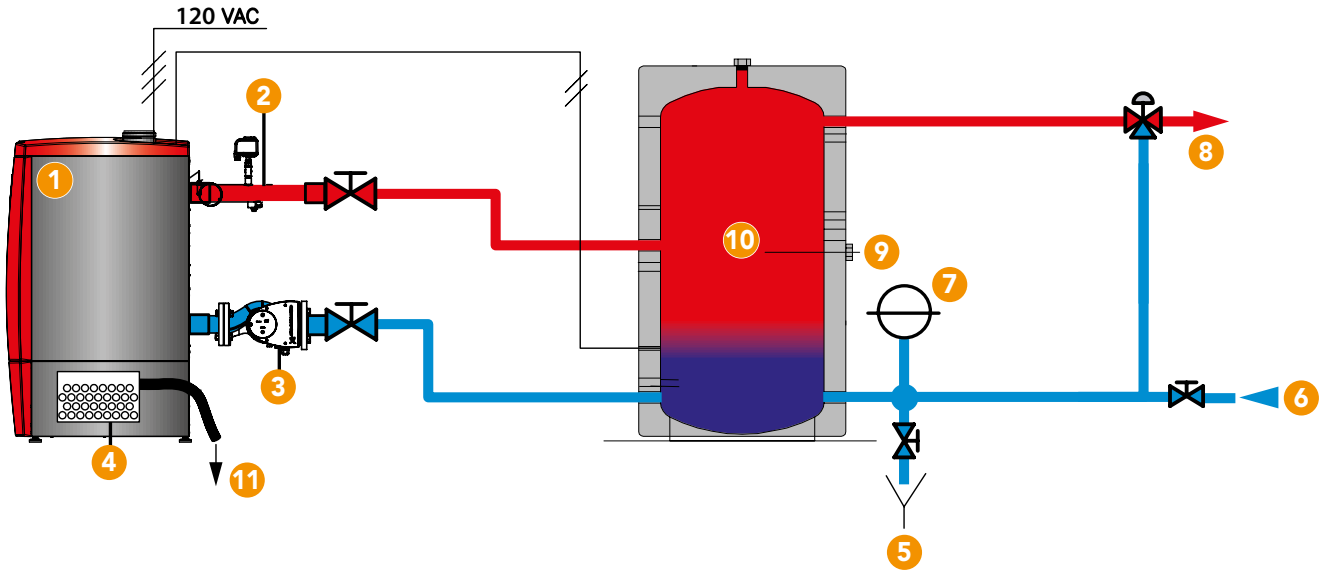
EVERYTHING UNDER CONTROL

Standard control device for perfect operation

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

- Sanitary circuit pump
- Output proper modulation
- Pump unlock system
- Auto diagnostic of all components and functions: visualization of errors and lockouts, temperature sensors, ionisation current, fan rotation speed, water flow rate, water pressure
- Antifreeze protection
- Low water pressure protection
- Flue blocked pressure switch
- Condensate blocked drain switch

AGUADENS INSTALLATION DIAGRAM



1 · AGUAdens commercial water heater
2 · LWCO (if needed)
3 · Circulating pump
4 · Condensate acidity neutralizer
5 · Storage tank drain
6 · Cold water inlet
7 · Expansion vessel
8 · D.H.W. supply
9 · Anodic protection
10 · Storage tank
11 · Condensate drain

The examples reported are merely indicative

Tutorbit: thermoregulator for remote control and cascade sequence management

TUTORbit is a thermoregulator that in addition to managing the cascade sequence also allows remote control and management of the installation via cloud.

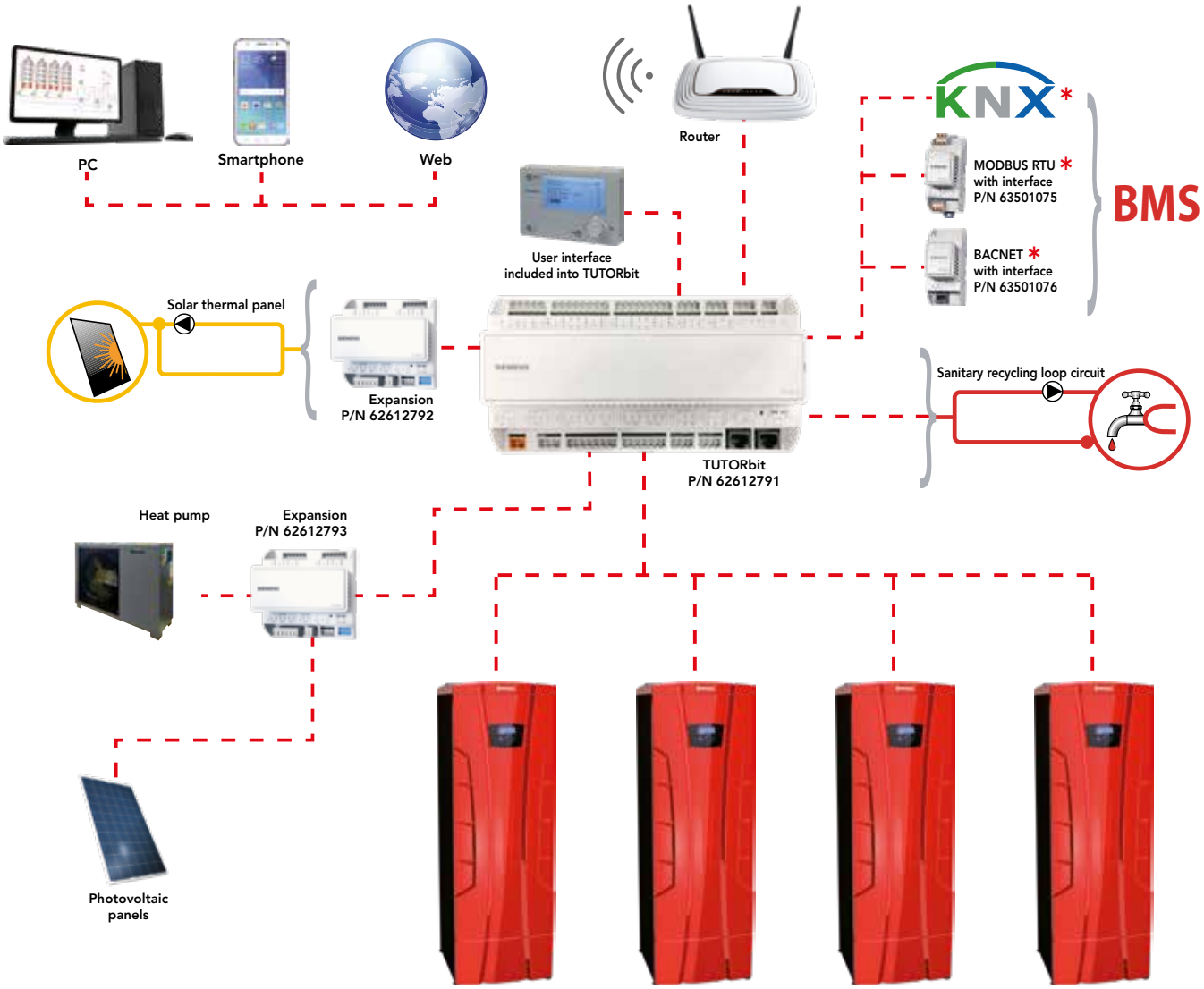
CASCADE SEQUENCE CONTROL - TUTORbit regulates the operation of up to 4 **AGUAdens T** water heaters in cascade sequence, managing a sequenced igniting and modulating from the lowest output of one single water heater to the highest output of 4 water heaters working at full output, guaranteeing equal operation, for an equal life span.

SOLAR ADJUSTMENT - TUTORbit can simultaneously manage a solar circuit with the possibility to set the following parameters:
Storage minimum and maximum temperature, solar panel temperature, water storage tank load pump Δt function, anti stagnation function, anti freeze function, eat transferring pump/ anti legionella

SOLAR PHOTOVOLTAIC INPUT - TUTORbit is able to manage a photo-voltaic panel input in order to exploit the operation of the heat pump in a manner in which its efficiency is reduced. The function is also optimized for when the heat pump produces domestic hot water.

SANITARY ADJUSTMENT
In sanitary mode, **TUTORbit** gives the opportunity to:
- Set 2 operating modes (water storage tank sensor and water storage tank thermostat)
- Manage the anti legionella function
- Water transfer pump
- Storage minimum and maximum temperature
- D.H.W. circulating pump

WEB-BASED REMOTE SERVICE SYSTEM
TUTORbit is compatible with main browsers and allows cloud remote control of the system via PC, tablet and smartphone, offering the following possibilities
- Management of user-customized settings
- Forcing of inputs and outputs
- Alarms visualization
- Control input from 0-10V signal
- Monitoring through the synoptic panel of parameters and operating temperatures



* The connection to possible BMS system can be chosen from one of the three proposed solutions:
1) KNX direct, 2) Modbus RTU via interface P/N 63501075, 3) Bacnet via interface P/N 63501076.

GUARANTEED EFFICIENCY

Water flow and anti-scale function

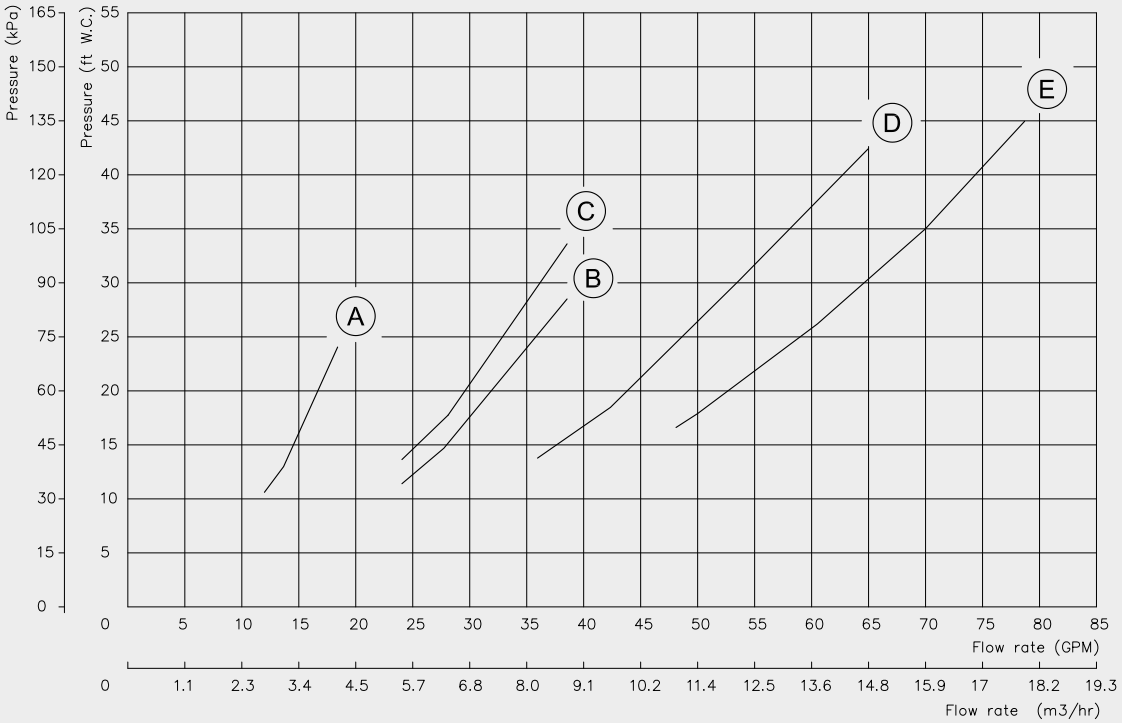
The water used in sanitary circuits contains many dissolved minerals (hardness) and in different quantities, depending on the geographical distribution areas. These minerals tend to settle in the heat exchanger (forming scale), reducing their efficiency and causing irreparable damages.
Maintaining an adequate water flow inside the water heater, will prevent scale from forming.

The table below shows the right flow rate of water that must circulate in the water heater, depending on water hardness, to avoid scale from forming.
The designer/installer, will have to size his circuit and the related pump, to guarantee this minimum water flow.
Due to unstable raw water conditions, damages caused by limescale build-up or corrosion, are not covered by the warranty.

Minimum water flow
in relation to water hardness and water temperature

WATER HARDNESS UP TO (ppm) [gr/gal]	MAXIMUM WATER TEMPERATURE (°F)	Minimum water flow in function of the water hardness and water maximum temperature			
		Model 199 and 250	Model 399 and 500	Model 750	Model 1000
(50) [3.0]	140	12 gpm	24 gpm	36 gpm	48 gpm
(75) [4.5]	140	13 gpm	26 gpm	39 gpm	52 gpm
(100) [6.0]	140	15 gpm	30 gpm	45 gpm	60 gpm
(125) [7.5]	140	17 gpm	34 gpm	51 gpm	68 gpm
(150) [9.0]	140	18 gpm	36 gpm	54 gpm	72 gpm
Max (50) [3.0]	180	18gpm	36 gpm	54 gpm	72 gpm

Water side
pressure drops



A AGUAdens 199 T and 250 T
B AGUAdens 399 T
C AGUAdens 500 T
D AGUAdens 750 T
E AGUAdens 1000 T

Sanitary circuit
pump regulation

AGUAdens T controls the sanitary circuit pump to warrant the required flow as per table on page 14, the installer shall size the system and the circulating pump also considering the pressure drops of the water heater.

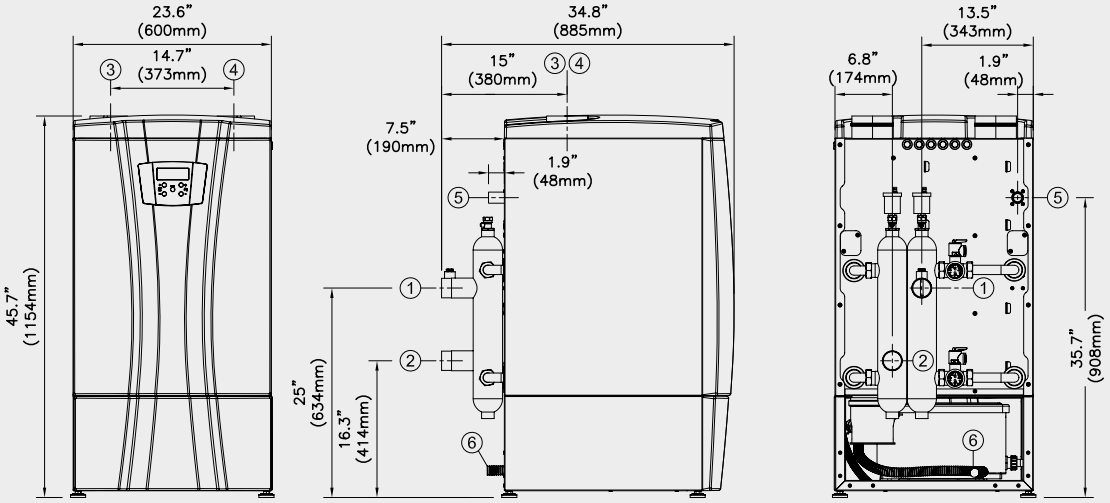
Technical data

AGUAdens	MU	199 T
Category of discharge chimney		II and IV
Maximum heat input	Btu/hr	199,500
Minimum heat input	Btu/hr	50,000
Turndown ratio		4:1
Number of burners		1
Gas flow rate (Natural gas)	ft3/hr	199.5
Gas flow rate (LP gas)	ft3/hr	80
Min / Max gas pressure (Nat. and LP)	In.W.C.	3 / 13
Min / Max water temperature	°F	68 / 180
Min / Max water pressure	PSI	8 / 160
Minimum water flow with motorized valves	GPM	11
Minimum water flow without motorized valves	GPM	11
Content of water	gal	1.7
Supply voltage / Frequence		120Vac 60Hz
Absorbed electric power (FLI) / Current (FLA)	W / A	110 / 1
Air intake / Flue gas pipes diameter	inch	3
Max. length venting system	ft	120
CO (Carbon monoxide) with Natural gas	ppm	<150
CO (Carbon monoxide) with LP gas	ppm	<250
NOx (0% O2 with Natural gas)	ppm	<30
CO2 (Carbon dioxide) for Natural gas at high fire	%	8.4 to 8.7
CO2 (Carbon dioxide) for Natural gas at low fire	%	8.4 to 8.7
CO2 (Carbon dioxide) for LP gas at high fire	%	9.5 to 10
CO2 (Carbon dioxide) for LP gas at low fire	%	10.5 to 11.5
O2 (Oxygen) for Natural gas at high fire	%	5.9 to 5.4
O2 (Oxygen) for Natural gas at low fire	%	5.9 to 5.4
O2 (Oxygen) for LP gas at high fire	%	6.4 to 5.6
O2 (Oxygen) for LP gas at low fire	%	4.8 to 3.4
Ionisation current	uA (Micro Amps)	4 to 7
Maximum flue gas temperature	°F	203
Max. negative pressure allowed in the fumes exhaust/intake system	InWC	0.2
Maximum water condensate flow	GPM	0.032
Average acidity of condensation	PH	4
Appliance weight (empty of water)	lb	211
Recovery Rating (100°F rise)	Gal/hr	227
DHW delivery (75°F rise)	GPM	5

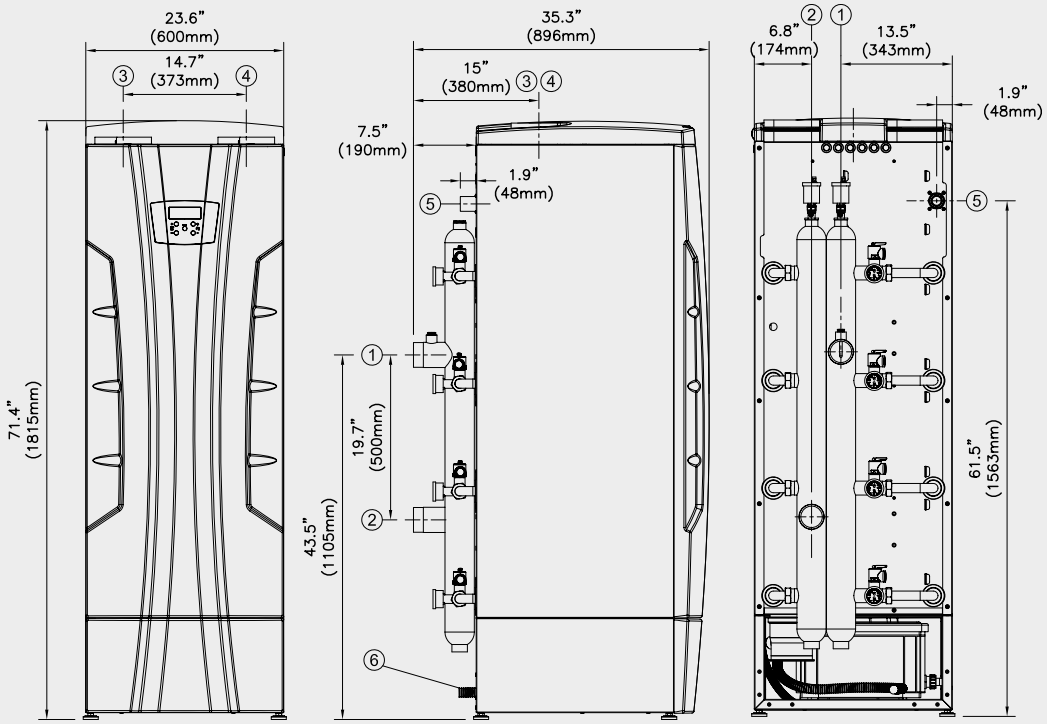
250 T	399 T	500 T	750 T	1000 T
II and IV	II and IV	II and IV	II and IV	II and IV
250,000	399,000	500,000	750,000	999,000
50,000	50,000	50,000	50,000	50,000
5:1	8:1	10:1	15:1	20:1
1	2	2	3	4
250	399	500	750	999
100	160	200	300	400
3 / 13	3 / 13	3 / 13	3 / 13	3 / 13
68 / 180	68 / 180	68 / 180	68 / 180	68 / 180
8 / 160	8 / 160	8 / 160	8 / 160	8 / 160
12	11	12	12	12
12	22	24	36	48
2	3.4	4	7	9
120Vac 60Hz	120Vac 60Hz	120Vac 60Hz	120Vac 60Hz	120Vac 60Hz
150 / 1,3	220 / 1,8	300 / 2,5	430 / 3,6	591 / 5
3	4	4	6	6
120	120	120	120	120
<150	<150	<150	<150	<150
<250	<250	<250	<250	<250
<30	<30	<30	<30	<30
8.8 to 9.1	8.4 to 8.7	8.8 to 9.1	8.8 to 9.1	8.8 to 9.1
8.8 to 9.1	8.4 to 8.7	8.8 to 9.1	8.8 to 9.1	8.8 to 9.1
9.5 to 10	9.5 to 10	9.5 to 10	9.5 to 10	9.5 to 10
10.5 to 11.5	10.5 to 11.5	10.5 to 11.5	10.5 to 11.5	10.5 to 11.5
5.2 to 4.7	5.9 to 5.4	5.2 to 4.7	5.2 to 4.7	5.2 to 4.7
5.2 to 4.7	5.9 to 5.4	5.2 to 4.7	5.2 to 4.7	5.2 to 4.7
6.4 to 5.6	6.4 to 5.6	6.4 to 5.6	6.4 to 5.6	6.4 to 5.6
4.8 to 3.4	4.8 to 3.4	4.8 to 3.4	4.8 to 3.4	4.8 to 3.4
4 to 7	4 to 7	4 to 7	4 to 7	4 to 7
203	203	203	203	203
0.2	0.2	0.2	0.2	0.2
0.039	0.064	0.077	0.116	0.154
4	4	4	4	4
216	312	323	464	548
285	455	570	855	1138
6.3	10.1	12.7	19	25.4

Size and connections

AGUAdens 199 T - 250 T - 399 T - 500 T



AGUAdens 750 T - 1000 T



MODEL	① WATER SUPPLY CONNECTION	② WATER RETURN CONNECTION	③ AIR INTAKE CONNECTION	④ FLUE EXHAUST CONNECTION	⑤ GAS CONNECTION	⑥ CONDENSATE DRAIN
199	2"	2"	3"	3"	1"	1" 1/4
250	2"	2"	3"	3"	1"	1" 1/4
399	2"	2"	4"	4"	1"	1" 1/4
500	2"	2"	4"	4"	1"	1" 1/4
750	2" 1/2	2" 1/2	6"	6"	1" 1/4	1" 1/4
1000	2" 1/2	2" 1/2	6"	6"	1" 1/4	1" 1/4

General features:

- Very intuitive control system
- Display back-lightening turns off after 5 minutes of inactivity
- Auto diagnostic of all components and functions, visualization of errors and lockouts, temperature sensors, ionisation current, fan rotation speed
- Possibility of maximum and minimum output setting
- Forcing high or low flame to facilitate combustion analysis
- Anti-blocking pump system
- 0-10Vdc input for external regulator
- Integrated MODBUS communication board to communicate with home building automation devices
- PC connection for diagnostic
- Can be connected in cascade up to 4 appliances
- Exit for alarm connection
- Low gas pressure operation up to 3" W.C.
- Zero clearances to combustible material
- Able to connect to storage water heater driven via NTC sensor or ON/OFF thermostat
- Freeze protection system
- DHW pump control
- Integrated air filter
- Integrated condensate neutralizer kit: volume of 26.4 dm3 (7 gal), content 10 kg (22 lb) of limestone
- On/off switch
- Readable on the control panel: water flow (you can see the real GPM running inside each heat exchanger), outlet temperature sensor, flue temperature sensor and tank temperature sensor
- Water pressure sensor (display shows continuously the pressure inside the water system)
- Low water pressure protection
- Flue blocked pressure switch
- Adjustable leveling feet
- Condensate trap
- Back-draft preventer (flapper)
- ASME pressure and temperature relief valve rated at 125 PSI, 210°F
- ASME pressure and temperature gauge

All Cosmogas products are designed, patented and built by us

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COSMOGAS International Certifications

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