
## Installation - Maintenance - Use

( IU-0003-EN-201306 )

# GAS FIRED WATER ACCUMULATION

## TRG type gas hot water heater

# HYDROGAZ®

## APPLIANCE TYPE: B 23

## CATEGORY: $I_{2Esi}$, $I_{3P}$ (France)

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**90/396/EEC "Appliances burning**

## CE TYPE CONFORMITY DECLARATION

LACAZE ENERGIES hereby certifies that the following gas fuelled hot water production appliance

- Commercial brand: Hydrogaz
- YEAR 2008
- Model TRG
- Type **B23 / TRG-NP**
- Power 32 - 90 kW

complies with the requirements of directive

and

the type described in one of the following CERTIGAZ certificates:

| *TYPE* | ***CE** CERTIFICATE No.* |
|---|---|
| TRG 51- N – TRG 51-P – TRG 32-P – TRG 32-N<br>TRG 90-P – TRG 90-N – TRG 60-P – TRG 60-N | **1312BT5189** |

## ⚠ WARNING

**Brand**
HYDROGAZ® is a registered trademark belonging to Lacaze Energies.

***Statement relating to the writing and publishing of this manual:***

This manual was written and published under the direction of Lacaze Energies.
It restates the most recent descriptions and characteristics of the product.
The contents of this manual and the characteristics of the product may be changed without notice.
Lacaze Energies reserves the right to make changes to the specifications and to the elements in this manual, without prior notice. Lacaze Energies cannot be held responsible for any losses (including consecutive damages) caused by trusting this manual, and this comprises, but is not limited to, typographic and other errors linked to publication.



**Please read carefully.**

- This instruction manual is an integral part of the product and it must be handed over to the user.
- The appliance was made to store hot or cold water, used in a closed circuit. Any other kind of random use must be considered as improper and hazardous.

- The appliance should not be installed in damp environments (R.H. ≤ 80%). Protect the appliance from splashing water or other liquids to avoid damage to components.
- The installation should be performed in line with applicable standards or regulations, in compliance with the manufacturer's instructions, by someone who is professionally qualified.
- This manual should accompany the equipment should it come to be sold or transferred to a different user, so that the latter and the installer can refer to it.
- Should the appliance remain unused during a period of freezing weather, we ask users to drain it completely. The manufacturer cannot accept any liability for damage caused by freezing.
- We recommend carefully reading the instructions provided and using only spare parts supplied by the manufacturer to ensure the best service and warranty cover for the appliance.
- Always be aware of the warnings and warranty limits stated in this manual prior to setting the appliances into service.

## MANUFACTURER'S WARRANTY APPLICATION TERMS

Our warranty only applies by exchange, supply or repair of parts recognised as defective by our technical department. Any replacement, repair or modification of parts during the warranty period cannot have the effect of extending the warranty duration.
The Lacaze Energies water heater is covered by a warranty from the date of delivery. The warranty covers tank perforation and lasts for the period specified on the warranty certificate issued with the equipment sold.

**Warranty limits:**
The warranty cover excludes appliances that are damaged due to:

- Incorrect electrical connections and especially:
  - An absence or insufficient cut off capacity of the contactors used.
  - Incorrect connection of the remote controls and operating switches.
  - Overvoltages.
  - Incorrect earthing and/or insulation faults.
- A water supply pressure level in excess of the rated service pressure.
- Any incorrect action (especially setting into service without first filling the water circuit).
- Overpressure resulting from the use of safety equipment that is set for a pressure level in excess of the service pressure.
- Overpressure due to any absence, insufficiency, poor operation or incorrect installation of the safety equipment.
- Over pressure due to the use of pressure safety units not compliant with standards NFD36-401 or NFE29-410 (and later) and recommendations made by Lacaze.
- Vacuum resulting from a lack of air into the tank when draining.
- A lack of maintenance of the heating elements or safety components.

- Insufficient water quality, ***especially the presence of large amounts of scale on the surface of the heat exchanger*** (not compliant with DTU60.1).
- Corrosion affecting the water inlet or outlets, resulting from a faulty or inappropriate connection (sealing defect / steel-copper contact).
- Corrosion due to not degassing or failing to do so properly.
- A failure to maintain the one or more consumable anodes (failure to replace them before they are fully worn).
- Normal body wear.
- Accessories removed or separated outside of our factory.
- Poor water connection: the cold water inlet below the heat exchanger.

The stipulations of this warranty certificate do not exclude the purchaser from the benefits of the legal warranty covering faults and hidden defects, under the terms of Article 1641 and subsequent articles of the French Penal Code.

## FOREWORD

Thank you for choosing a HYDROGAZ® heat generator for producing the hot water you need.

This generator is a gas fired hot water tank. Its highly flexible operation lets you access hot water at constant temperature and at the required flow rate, at any time (within the capacity limits of the appliance).

A ***Hydrogaz®*** unit comprises:

- A vertical standing tank with a rated capacity of 750, 1000, 1500, 2000, 2500, 3000, 4000, 5000 or 6000 litres (depending on the appliance), made from first quality steel or **316L** stainless steel (**304L** available on request).

- A ***removable*** heating element with a power of ***32, 51, 60 or 90 kW***.

- A forced air burner and its gas feeder rail.

- A dual safety and regulator thermostat.

The HYDROGAZ® system works under pressure for ***Sanitary hot water*** or ***Stainless steel*** tanks, with a service pressure of 7 bar max. (standard tanks with a capacity of ≤ 10,000 litres).

On request and for industrial process applications, the HYDROGAZ® system may operate under low pressure for Heating type tanks with a service pressure of 3 bar max.

The ***Sanitary hot water*** type tanks are protected against corrosion. A type **RC851** epoxy resin base coating suited to the maximum tank operating temperature is used

[except in the case of Stainless Steel tanks] in combination with a consumable magnesium anode for cathodic protection.

On request, the HYDROGAZ® unit may have a higher capacity, may be installed outdoors, may operate at atmospheric pressure for ***open air*** tanks or be equipped with an electrical command and protection cabinet.

This manual describes the procedures for making the water, electrical, gas fuel connections as well as how to exhaust combustion by-products.

It is essential that an awareness of this documentation be gained prior to setting into service. If requested, our after sales service department may proceed to set the burner into service (optionally).

Phone: **+33 (0)5 65 39 39.**

# GENERAL INFORMATION

## CATEGORY

These heat accumulators are category $I_{2Esi}$ and $I_{3P}$ appliances.

Category $I_{2Esi}$ means that these appliances may be used with the second family of group E gasses and work under pressure.

Category I3p means that these appliances use the third family of gasses (Propane) and work under pressure.

## TYPE

These appliances are type **B23** units, appliances designed for connection to an exhaust stack, with the comburant air taken directly from the area where the appliance is installed. A fan is located ahead of the combustion chamber.

## Packaging

Indoor models of the Hydrogaz appliance are packed entirely in plastic film. For outdoor models, the hot water tank is covered in a film coated aluminium sheet finish and the burner is wrapped with plastic film.

***After unpacking the Hydrogaz appliance, make sure that its integrity is complete.***
***Packaging components should be sorted and collected by type for***

***Warning!*** ***environmental protection reasons.***

## Transport/storage

The packed appliance must be solidly attached to the carrier vehicle to avoid any movement that may cause mechanical impacts and to limit any vibration affecting the heat exchanger during transportation.

The appliance must be transported and stored in its original packaging until it reaches its installation location. This appliance must not be stored in a damp and/or corrosive environment.

## Handling

When loading or unloading a Hydrogaz appliance, it is essential to limit the appliance swinging phenomena to avoid vibration in the Hydrogaz heat exchanger.

## TYPE rating plates:


# CHARACTERISTICS

## Calorific value Qn (kW):

| Equipment reference | Exchanger reference | Burner reference | Qn (kW) | Power (kW) | Gas |
|---|---|---|---|---|---|
| TRG32-N | H26-C | WG5 N/ 1-A LN ½" | 34 | 32 | Natural gas |
| TRG51-N | H44-C | WG10 N/ 1-D Z LN ¾" | 54 | 51 | Natural gas |
| TRG60-N | H52-C | WG10 N/ 1-D Z LN ¾" | 63 | 60 | Natural gas |
| TRG90-N | H78-C | WG10 N/ 1-D Z LN ¾" | 95 | 90 | Natural gas |
| TRG32-P | H26-C | WG5 F/ 1-A LN ½" | 34 | 32 | LPG |
| TRG51-P | H44-C | WG10 F /1-D Z LN ¾" | 54 | 51 | LPG |
| TRG60-P | H52-C | WG10 F/ 1-D Z LN ¾" | 63 | 60 | LPG |
| TRG90-P | H78-C | WG10 F/ 1-D Z LN ¾" | 95 | 90 | LPG |

***Table = Caloric output***

## Gas type and flow rate (m3/h [kg/h], 1013.25 mbar, 15°C)

| Equipment reference | Qn (kW) | Gas | Gas pressure (mbar) | PCI * (kWh/m$^3$) | PCI (MJ/m$^3$) | Flow rate (m$^3$/h) |
|---|---|---|---|---|---|---|
| TRG32-N | 34 | G20<br>G25 | 20/300<br>20/25/300 | 9.45<br>8.13 | 34.02<br>29.25 | 3.60<br>4.18 |
| TRG51-N | 54 | G20<br>G25 | 20/300<br>20/25/300 | 9.45<br>8.13 | 34.02<br>29.25 | 5.71<br>6.64 |
| TRG60-N | 63 | G20<br>G25 | 20/300<br>20/25/300 | 9.45<br>8.13 | 34.02<br>29.25 | 6.67<br>7.75 |
| TRG90-N | 95 | G20<br>G25 | 20/300<br>20/25/300 | 9.45<br>8.13 | 34.02<br>29.25 | 10.05<br>11.69 |
| Equipment reference | Qn (kW) | Gas | Gas pressure (mbar) | PCI (kWh/kg) | PCI (MJ/kg) | Flow rate (kg/h) |
| TRG32-P | 34 | G31 | 37/50 | 12.87 | 46.34 | 2.64 |
| TRG51-P | 54 | G31 | 37/50 | 12.87 | 46.34 | 4.20 |
| TRG60-P | 63 | G31 | 37/50 | 12.87 | 46.34 | 4.90 |
| TRG90-P | 95 | G31 | 37/50 | 12.87 | 46.34 | 7.38 |

***Table = Gas flow rate***

## New air flow required (m$^3$/h, 1013.25 mbar, 15°C)

| Equipment reference | Qn (kW) | Gas | Air flow rate (m$^3$/h) |
|---|---|---|---|
| TRG32-N,P | 34 | G20, G25, G31 | 50 |
| TRG51-N,P | 54 | G20, G25, G31 | 75 |
| TRG60-N,P | 63 | G20, G25, G31 | 90 |
| TRG90-N,P | 95 | G20, G25, G31 | 130 |

***Table = New air flow rate***

******LCV = Lower calorific value.***

## Performance

### Rated capacity:

| TANK | RATED CAPACITY | | | |
|---|---|---|---|---|
| reference | (litres) | | | |
| | TRG32 | TRG51 | TRG60 | TRG90 |
| 750 | 693 | 693 | | |
| 1000h | 970 | 970 | | |
| 1000b | 1027 | 1027 | 1019 | |
| 1500h | 1417 | 1417 | 1409 | |
| 1500b | 1429 | 1429 | 1421 | |
| 2000h | 1952 | 1952 | 1944 | |
| 2000b | 2085 | 2085 | 2077 | 2057 |
| 2,500 | 2417 | 2417 | 2409 | 2389 |
| 3,000 | 2815 | 2815 | 2807 | 2789 |
| 4,000 | 3911 | 3911 | 3903 | 3883 |
| 5,000 | 5007 | 5007 | 4999 | 4979 |
| 6,000 | 5890 | 5890 | 5882 | 5862 |

***Table = Indicative rated capacity***

### Definition of the buffer volume:

The buffer volume is defined as the volume of hot water located right above the heating element, in line with the following table:

| TANK | BUFFER VOLUME | | | |
|---|---|---|---|---|
| reference | (litres) | | | |
| | TRG32 | TRG51 | TRG60 | TRG90 |
| 750 | 400 | 400 | | |
| 1000h | 676 | 676 | | |
| 1000b | 578 | 578 | 578 | |
| 1500h | 968 | 968 | 968 | |
| 1500b | 792 | 792 | 792 | |
| 2000h | 1315 | 1315 | 1315 | |
| 2000b | 1141 | 1141 | 1141 | 1141 |
| 2,500 | 1473 | 1473 | 1473 | 1473 |
| 3,000 | 1871 | 1871 | 1871 | 1871 |
| 4,000 | 2595 | 2595 | 2595 | 2595 |
| 5,000 | 3691 | 3691 | 3691 | 3691 |
| 6,000 | 4574 | 4574 | 4574 | 4574 |

***Table = Indicative buffer volume***

**Temperature rise time (ΔT = 45 K):**

| TANK reference | HEATING TIME (mn) | | | |
|---|---|---|---|---|
| | TRG32 | TRG51 | TRG60 | TRG90 |
| 750 | 56 | 35 | | |
| 1000h | 84 | 52 | | |
| 1000b | 83 | 52 | 44 | |
| 1500h | 121 | 76 | 64 | |
| 1500b | 115 | 72 | 61 | |
| 2000h | 166 | 104 | 88 | |
| 2000b | 166 | 104 | 88 | 58 |
| 2,500 | 198 | 124 | 105 | 69 |
| 3,000 | 237 | 149 | 126 | 83 |
| 4,000 | 324 | 203 | 172 | 114 |
| 5,000 | 432 | 271 | 230 | 153 |
| 6,000 | 518 | 325 | 276 | 183 |

***Table = Temperature rise time (as an indication)***

⚠ ***N.B.***

To calculate the temperature rise time Tm for a ΔT value other than 45 K, use the following formula:

$$T_m = T_m[45] * \Delta T / 45$$

**Rational energy usage:**
The above dimensions are an indication only but they generally allow obtaining the rated power while retaining an efficiency in excess of 94% of LCV, in line with standard prEN89.

**Continuous water draw (L/mn):**

The continuous flow rate value is obtained after drawing 1.5 times the tank's total capacity so that the duty cycle is a constant one:

| Equipment reference | Continuous flow rate (L/mn) ΔT=30°C | Continuous flow rate (L/mn) ΔT=50 °C |
|---|---|---|
| TRG32-N,P | 15.3 | 9.2 |
| TRG51-N,P | 24.4 | 14.6 |
| TRG60-N,P | 28.7 | 17.2 |
| TRG90-N,P | 43.0 | 25.8 |

***Table = Continuous water draw (as an indication)***

**Water draw first hour / Water draw over two hours:**

The following table shows the amount of water obtained from continuous drawing during the first hour or two hours, under the following conditions:

Storage temperature = 85°C
Cold water temperature = 15°C
Usage temperature = 45°C

| TANK | WATER DRAW 1st hour | | | | WATER DRAW over 2 hours | | | |
|---|---|---|---|---|---|---|---|---|
| reference | (L) | | | | (L) | | | |
| | TRG32 | TRG51 | TRG60 | TRG90 | TRG32 | TRG51 | TRG60 | TRG90 |
| **750** | 1306 | 1738 | | | 2078 | 2942 | | |
| **1000h** | 1731 | 2207 | | | 2562 | 3513 | | |
| **1000b** | 1555 | 2001 | 2208 | | 2339 | 3232 | 3646 | |
| **1500h** | 2259 | 2612 | 2839 | | 2964 | 3933 | 4386 | |
| **1500b** | 1848 | 2304 | 2517 | | 2640 | 3552 | 3977 | |
| **2000h** | 3068 | 3085 | 3315 | | 3436 | 4416 | 4876 | |
| **2000b** | 2662 | 2786 | 3004 | 3718 | 3121 | 4051 | 4486 | 5915 |
| **2,500** | 3437 | 3437 | 3499 | 4245 | 3616 | 4581 | 5034 | 6525 |
| **3,000** | 4366 | 4366 | 4366 | 4837 | 4366 | 5176 | 5642 | 7180 |
| **4,000** | 6055 | 6055 | 6055 | 6055 | 6055 | 6159 | 6630 | 8189 |
| **5,000** | 8612 | 8612 | 8612 | 8612 | 8612 | 8612 | 8612 | 9777 |
| **6,000** | 10673 | 10673 | 10673 | 10673 | 10673 | 10673 | 10673 | 11012 |

***Table = Water draw 1st Hour and over 2 Hours (as an indication)***

## WATER CONNECTION

Please refer to Figure 90.2094.01 below to visualise the layout drawings for the connections to be made.

The following points especially will be noted (Standard sanitary hot water type):

- Safety valve, not adjustable, set to **7** ± 20% bar, unless specific appliance specifications apply (volume, type of operation, etc.). To avoid tank explosions, the safety valve setting cannot exceed the maximum water tank service pressure level.
- No-return valve on the cold water inlet.
- Pressure limiter and regulator (ΔP<1 bar) on the cold water inlet.
- System allowing expansion (4% in volume between 10 & 90°C). A membrane type expansion tank should be sized to match the installation (total volume, pressure levels, etc.).
- Tank protection against vacuum (e.g. with a vacuum-breaker).
- Effective degassing system sized large enough.
- Condensate draining.

The quality of the cold water supply must meet DTU 60.1 recommendations (see ANNEX/A2 below), namely:

***pH >7.20;  8°F<TH<15°F;  Cl-< 3F°***

***$Mg^{++}$<TH/5;  $SO_4^{--}$ < 5F°;  $NO_3$<0.5F°***

***6 mg/l < dissolved $O_2$ < 9 mg/l ;***

***free CO2 < 10 mg/l;  10F°<TAC<20F°;***

***4500 Ω.cm < resistivity < 2200 Ω.cm***

⚠ ***N.B. 1:***

*Generally, always ensure that no scale or other types of deposits (e.g. $CaSO_4$) are deposited on the tubular heat exchanger at the usage temperature.*

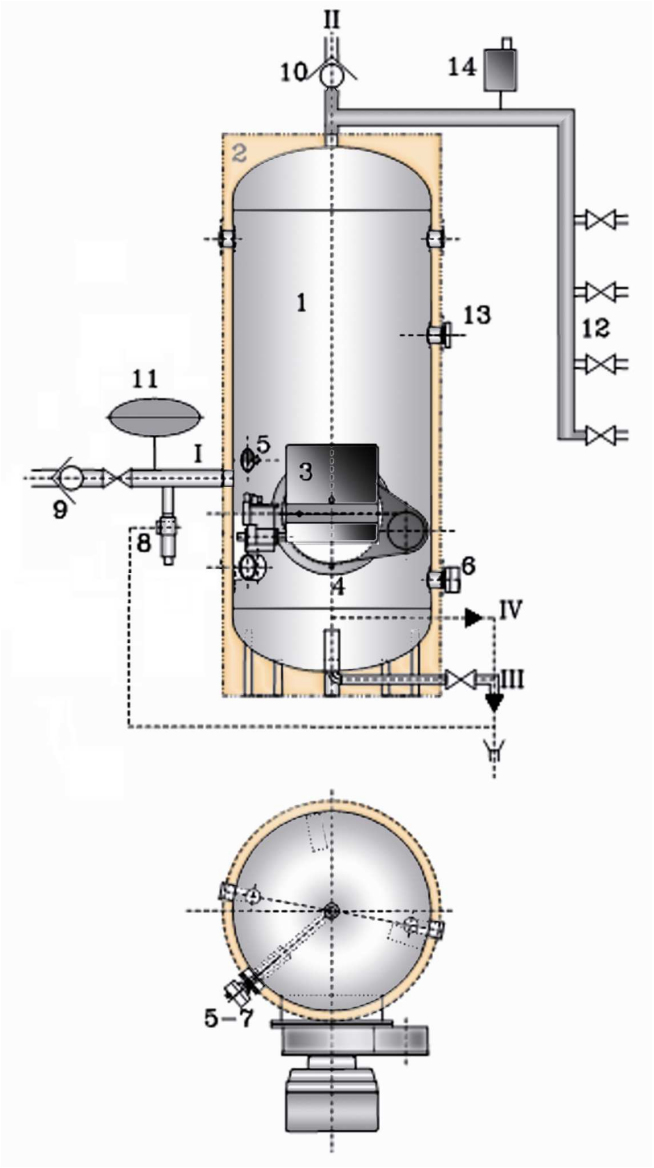
⚠ ***N.B. 2:***

When installing the appliance, ***it is essential to provide space for removing the heating element*** that is at least as long as the tank diameter (Figure 3123.12), and space for removing the magnesium consumable anode that is 900 mm long.

⚠ ***N.B. 3:***

We should draw your attention to the fact that the presence of organic matter in the water (measured by the chemical oxygen demand, expressed as COD) may cause the appearance of precipitates (flocculation) under the effect of water heating.

**Layout diagram:**




***PARTS LIST:***

1- TANK
2- HEAT INSULATION
3- GAS TRG EQUIPMENT
4- CONDENSATE OUTLET
5- THERMOSTATS
6- LOW WATER PRESSURE SWITCH
7- THERMOMETER
8- SAFETY VALVE
9- NON RETURN VALVE
10- VACUUM-BREAKER
11- EXPANSION SYSTEM
12- DISTRIBUTION NETWORK
13- MAGNESIUM ANODE
14- DEGASSER

I- COLD WATER INLET (**EF**)
II- HOT WATER OUTLET
III- DRAIN
IV- CONDENSATE DRAIN
V - VALVE DRAIN

***Figure 90.2094.01: Indicative connection principle diagram***

*Warning!*

***The cold water inlet (EF) must be located on the top of the heat exchanger.***

The drawings for the ***standard*** tanks are covered by the following two figures and the table of dimensions below.

## Condensate draining:

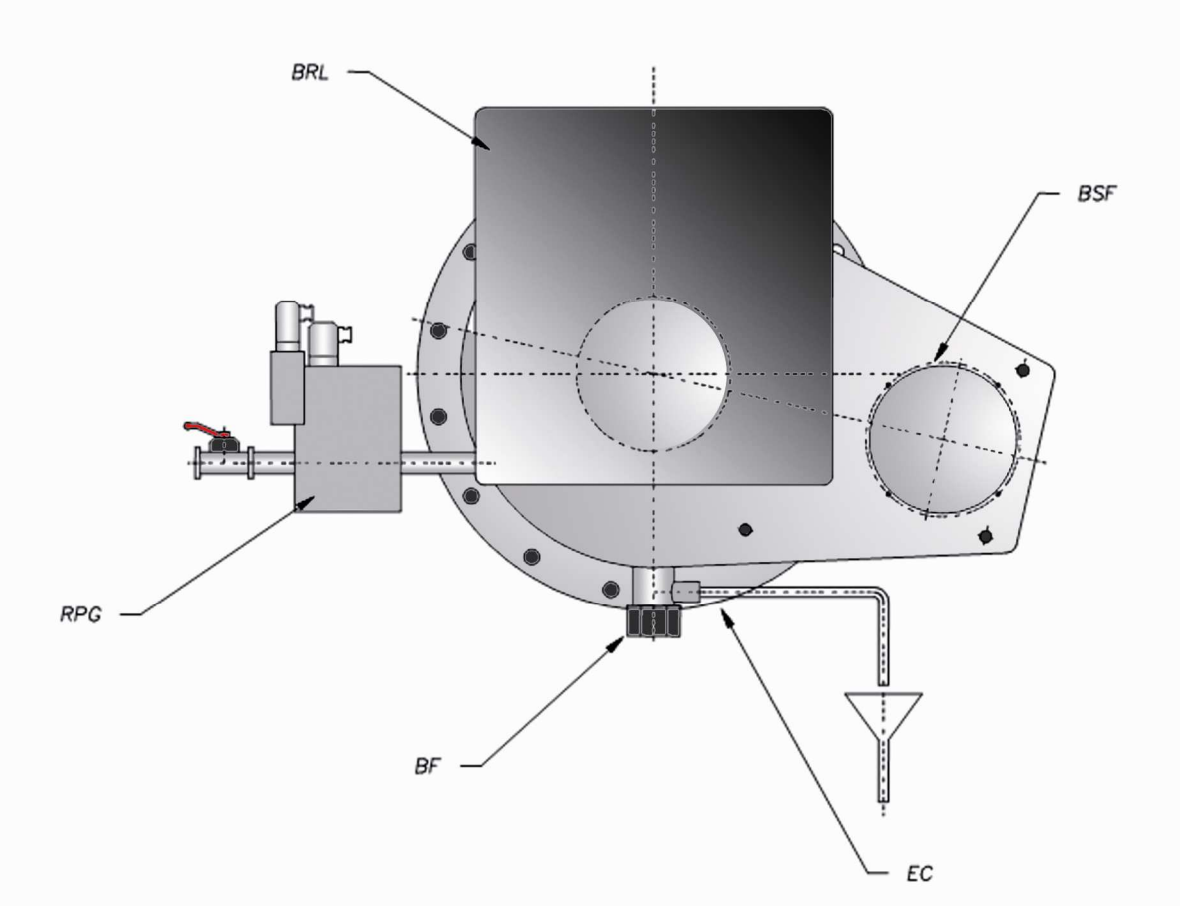



***Figure 4181.01: Condensate connection***

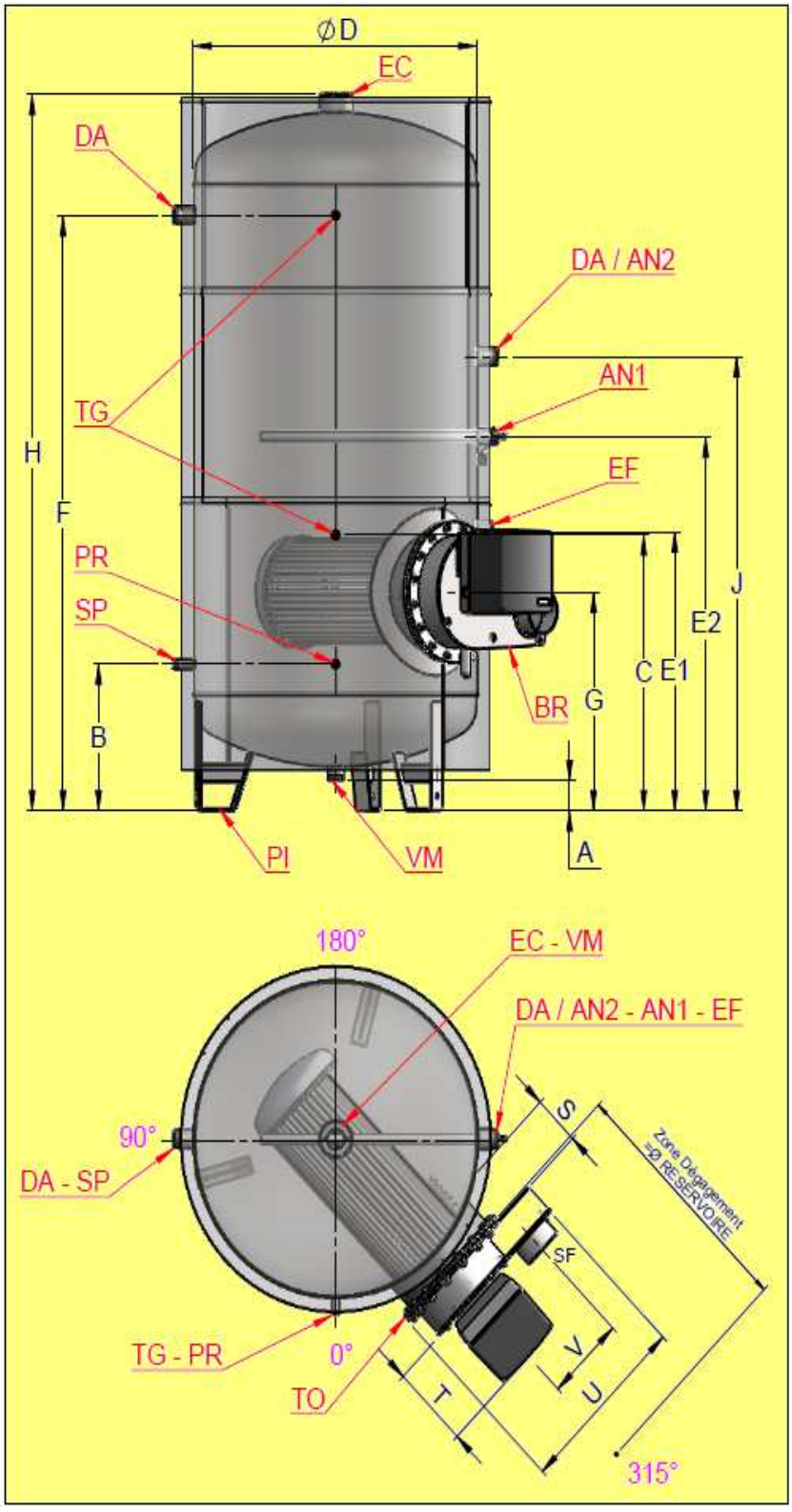
Parts list:
RPG: Gas feeder rail
BRL: WG burner
BSF: Smoke exhaust stainless steel nozzle
BF: 1" female cap
EC: 3/8" condensate drain

The condensate drainage: Through a siphon that is connected to the drain via a funnel type connection, at the 3/8" (12x17) connection level on the right hand side.

This pipe must be installed with a slope of approx. 3% and with no reverse slope. Only use materials suited to condensates.

Make sure that this drain is never obstructed so that the burner will operate correctly.

## Tank dimensions:




***Key:***

**EF**: Cold water inlet (a screw-in 50/60 connection)

**EC**: Hot water outlet (a screw-in 50/60 connection)

**DA**: Loop outputs/returns (a screw-in 50/60 connection)

**VM**: Drain (a screw-in 50/60 connection)

**TG**: Thermostat / thermometer (a screw-in 15/21 connection)

**AN1**: Anode (a screw-in 40/49 connection)

**AN2**: Second anode for ≥ 4000 litre tank (a screw-in 40/49 connection)

**TO**: Manhole, 400 mm int. diameter

**SP:** DN25 safety valve

**PR:** Low water pressure switch - ***Optional*** (a screw-in 15/21 connection)

**PI**: Support feet

**BR:** Hydrogaz burner / heat exchanger

**SF**: Smoke outlet

***Indicative drawing of 750 to 6,000 litre tanks (Preference Range)***

**Table of dimensions (mm):**

| type | D | A | B | C | E1 | E2 | F | G | H | J | *Weight* (tank) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 750 | 800 | 110 | 440 | 890 | 900 | 1080 | 1450 | 690 | **1,820** | 1200 | ***155 kg*** |
| 1000H | 800 | 110 | 440 | 890 | 900 | 1230 | 2000 | 690 | **2,370** | 1510 | ***175 kg*** |
| 1000B | 950 | 110 | 475 | 925 | 935 | 1110 | 1485 | 725 | **1,890** | 1235 | ***172 kg*** |
| 1500H | 950 | 110 | 475 | 925 | 935 | 1150 | 2035 | 725 | **2,440** | 1545 | ***215 kg*** |
| 1500B | 1100 | 110 | 510 | 960 | 970 | 1145 | 1520 | 760 | **1,960** | 1270 | ***268 kg*** |
| 2000H | 1100 | 110 | 510 | 960 | 970 | 1300 | 2070 | 760 | **2,510** | 1580 | ***349 kg*** |
| 2000B | 1300 | 110 | 560 | 1010 | 1020 | 1200 | 1570 | 810 | **2,060** | 1320 | ***380 kg*** |
| 2500 | 1300 | 110 | 560 | 1010 | 1020 | 1250 | 1820 | 810 | **2,310** | 1430 | ***435 kg*** |
| 3000 | 1300 | 110 | 560 | 1010 | 1020 | 1350 | 2120 | 810 | **2,610** | 1630 | ***480 kg*** |
| 4000 | 1500 | 140 | 630 | 1060 | 1070 | 1550 | 2185 | 860 | **2,715** | 1805 | ***680 kg*** |
| 5000 | 1500 | 140 | 630 | 1060 | 1070 | 1875 | 2805 | 860 | **3,335** | 2155 | ***790 kg*** |
| 6000 | 1500 | 140 | 630 | 1060 | 1070 | 2125 | 3305 | 860 | **3,835** | 2485 | ***890 kg*** |

## GAS equipment dimensions:

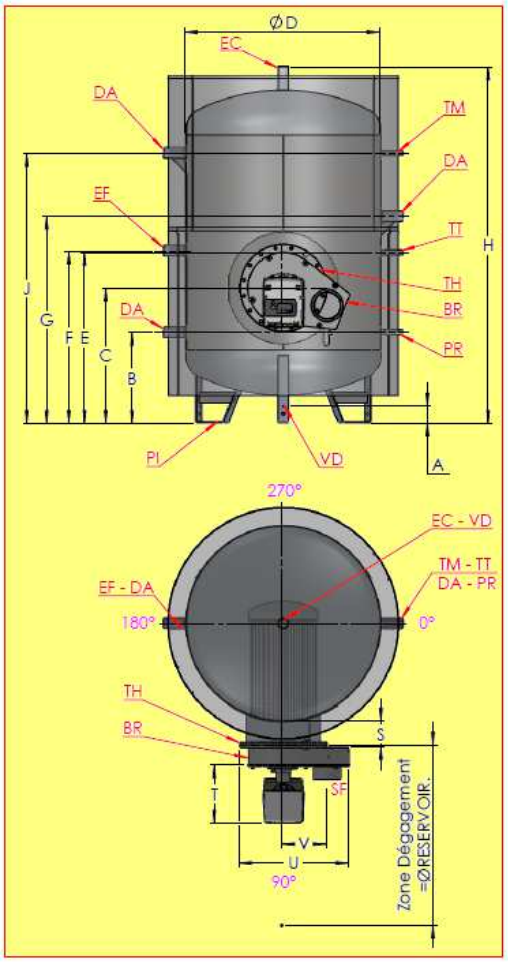
| Type équipement gaz (référence) | Ø alim. gaz (DN) | Ø sortie fumées (mm) SF | Ø sortie conden-sats (DN) | Poids (kg) | Ø du trou d'homme (mm) | Encombrement brûleur | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | S | T | U | V |
| TRG 32 N/P | 15 | 153 | 10 | 82 | 400 | 215 | 305 | 660 | 300 |
| TRG 51 N/P | 20 | 153 | 10 | 91 | 400 | 215 | 305 | 660 | 300 |
| TRG 60 N/P | 20 | 153 | 10 | 96 | 400 | 215 | 305 | 660 | 300 |
| TRG 90 N/P | 20 | 153 | 10 | 110 | 400 | 215 | 305 | 660 | 300 |

## Connection specifications:

| Capacité (litres) | TM-TT-PR (Taraudés G) | EC | EF (taraudé G) - DA-VD (Filetés G) |
|---|---|---|---|
| **750** | DN15 | DN50 taraudé | DN50 |
| **1000 H** | DN15 | DN50 taraudé | DN50 |
| **1000 B** | DN15 | DN50 taraudé | DN50 |
| **1500 H** | DN15 | DN50 taraudé | DN50 |
| **1500 B** | DN15 | DN50 taraudé | DN50 |
| **2000 H** | DN15 | DN50 taraudé | DN50 |
| **2000 B** | DN15 | DN50 taraudé | DN50 |
| **2500** | DN15 | DN50 taraudé | DN50 |
| **3000** | DN15 | DN50 taraudé | DN50 |
| **4.000** | DN15 | DN50 taraudé | DN50 |
| **5.000** | DN15 | DN80 bride plate | DN50 |
| **6.000** | DN15 | DN80 bride plate | DN50 |

Note: TO : Heat exchanger mounting flange: Φi 405 / Φe 490
: 16 M14 bolts on Φ455, Class 10-9.

## Tank dimensions (DPX version):




***Key:***

**EF**: Cold water inlet (a screw-in 50/60 connection)

**EC**: Hot water outlet (a screw-in 50/60 connection)

**DA**: Loop outputs/returns (a screw-in 50/60 connection)

**VD**: Drain (a screw-in 50/60 connection)

**TM/TT**: Thermostat (or PT100 probe) / thermometer (a screw-in 15/21 connection)

**TH**: Manhole, 400 mm int. diameter

**PR:** Low water pressure switch - ***Optional*** (a screw-in 15/21 connection)

**PI**: Support feet

**BR:** Hydrogaz burner / heat exchanger

**SF**: Smoke outlet

## Table of dimensions (mm):

| Capacité (litres) | A | B | C | ØD | E | F | G | H | J | TM-TT-PR (Taraudé G) | EC-EF-DA-VD (Fileté G) | POIDS (KG) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 750 | 90 | 440 | 690 | 790 | 890 | 900 | 1.060 | 1.880 | 1.450 | DN15 | DN50 | 175 |
| 1000 H | 90 | 440 | 690 | 790 | 890 | 900 | 1.390 | 2.430 | 2.000 | DN15 | DN50 | 210 |
| 1000 B | 90 | 475 | 725 | 950 | 925 | 935 | 1.105 | 1.960 | 1.485 | DN15 | DN50 | 235 |
| 1500 H | 90 | 475 | 725 | 950 | 925 | 935 | 1.425 | 2.510 | 2.035 | DN15 | DN50 | 280 |
| 1500 B | 90 | 510 | 760 | 1.100 | 960 | 970 | 1.165 | 2.020 | 1.520 | DN15 | DN50 | 290 |
| 2000 H | 90 | 510 | 760 | 1.100 | 960 | 970 | 1.460 | 2.570 | 2.070 | DN15 | DN50 | 345 |
| 2000 B | 90 | 560 | 810 | 1.250 | 1.010 | 1.020 | 1.225 | 2.110 | 1.570 | DN15 | DN50 | 400 |
| 2500 | 90 | 560 | 810 | 1.250 | 1.010 | 1.020 | 1.510 | 2.660 | 2.120 | DN15 | DN50 | 430 |
| 3000 | 90 | 560 | 810 | 1.250 | 1.010 | 1.020 | 1.640 | 2.880 | 2.340 | DN15 | DN50 | 470 |

Note: **TH** : Heat exchanger mounting flange: Φi 405 / Φe 490
: 16 M14 bolts on Φ455, Class 10-9.

| TOLERANCES (mm) | | |
|---|---|---|
| ON HEIGHT H | ON (G-C) | GENERAL |
| ± 60 | ± 5 | ± 30 |

***Table = Tolerances***

## Burner / Heat exchanger dimensions:

Refer to the following figure No. 3123.12 which sets out the overall dimensions of the heat exchanger and the burner.

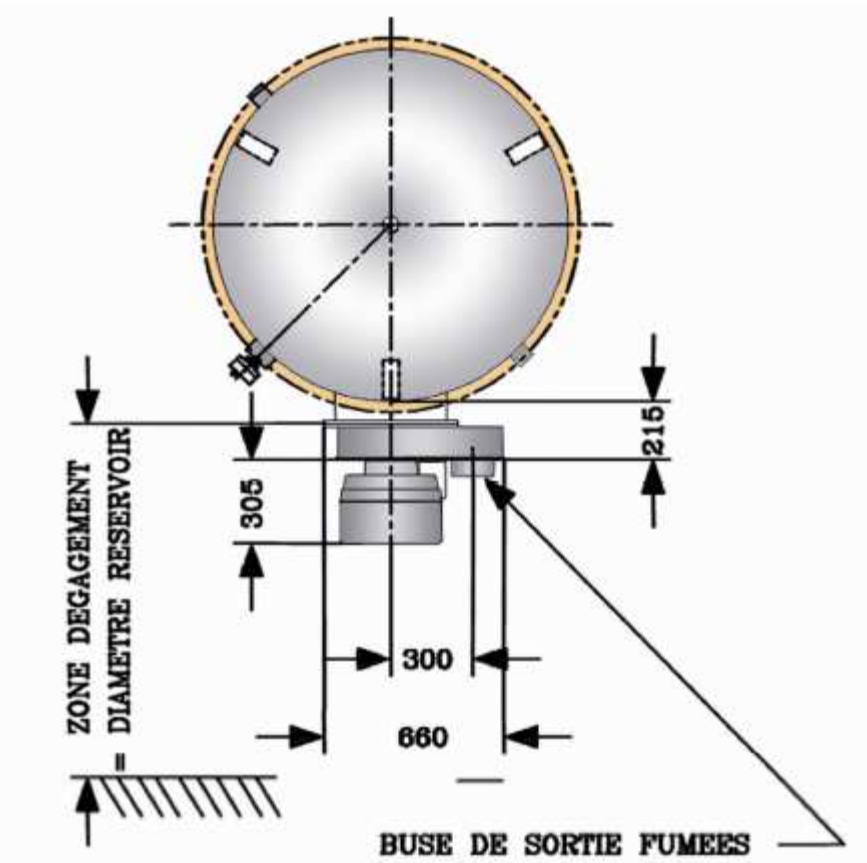


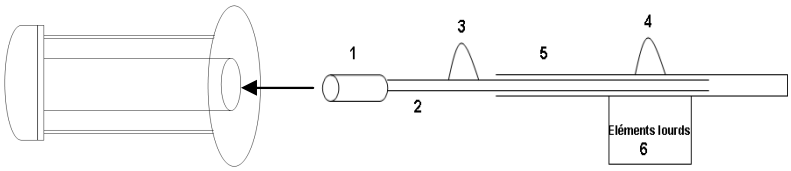

***Figure No. 3123.12: Indicative figure showing the Burner / Heat exchanger dimensions***

## Fitting and removing the HYDROGAZ heat exchanger

When a Hydrogaz® heat exchanger is fitted to, or removed from, a hot water tank, absolutely avoid damaging the heat exchanger's tubular arrays as there is very little distance between these tubes and the edge of the manhole. It is therefore essential to fit and remove the Hydrogaz® heat exchanger using suitable tools so as to hold the heat exchanger horizontally level and in balance, without touching the edge of the manhole, so as to avoid creating any stress that will affect the tubular arrays (e.g. directly fitting the tubular arrays through the manhole or on a support).

*Models of tools used by LACAZE ENERGIES:*

The figures below show us a tool used to balance Hydrogaz TRG units:




First of all, insert Part 1 into the fire tube, Mount 3 allows fitting the exchanger with a ring, then Tube 5 is moved by Mount 4 so as to adjust the system to achieve a horizontal balance. As soon as the heat exchanger is properly horizontally adjusted, it can be inserted into the hot water tank or removed without any risk of touching the sidewalls.

## ELECTRICAL CONNECTION

Mount the WG5 or WG10 burner on the heat exchanger (refer to the burner technical instructions at the end of this document):

- First the mounting flange (four M8 studs) and its seal.
- Then the burner body (two studs + nuts)

Fit the feeder rail into its housing.

Connect the three multiple pin connectors (a 7-pin connector, pressure switch and magnetic valve).

Supply the connection box (mounted on the insulating jacket) with a 230 V supply, using the terminals provided for this purpose, always taking care to match the Phase and Neutral polarity. Protection should be provided for this line matching applicable standards.

If there is no neutral, provide for an insulating transformer (400 VA) and create an artificial neutral connecting one of the transformer's secondary outputs to ground.

⚠ ***Reminder:***

***This appliance must be connected to earth in line with applicable regulations.***

**Voltage: 230 V - 50 Hz**

# GAS CONNECTION

It is important to properly check the supply pressure and where necessary, to provide a gas pressure regulator if the pressure exceeds 300 mbar. The minimum values required on the way into the gas feeder rail are the ones shown in the following table.

| TYPE OF GAS | MIN. PRESSURE (mbar) | MAX. PRESSURE (mbar) |
|---|---|---|
| G20, G25 | 20 | 300 |
| G31 | 37 | 300 |

***Table = Gas pressure***

## Gas feeder rail diameter:

| Equipment reference | Burner reference | Gas feeder dia. |
|---|---|---|
| TRG 32-N | WG5N/1-A | ½" |
| TRG 51-N<br>TRG 60-N<br>TRG 90-N | WG10N/1-D | ¾" |
| TRG 32-P | WG5F/1-A | ½" |
| TRG 51-P<br>TRG 60-P<br>TRG 90-P | WG10F/1-D | ¾" |

***Table = Gas feeder rail diameter***

## Pipe cross section:

The pressure loss caused by the gas flow depends on:

- The kind of gas
- The piping (type, length, diameter)
- The breaks in the pipe run (bends, tees, etc.)

The breaks in the run may be taken to represent additional straight line pipe section length. These distances must be added to the true pipe length, thereby obtaining a fictitious pipe length used for calculation purposes. Every break in the pipe run (in the first approximation) is equivalent to a fictitious straight line length of ***0.80 metres.***

The table below gives, as an indication, for the necessary gas flow rate, the pressure loss (in mbar/m) depending on the pipe diameter and type of gas:

| Diameter | G20 natural gas (density = 0.555 ) | | | | G25 natural gas (density = 0.612 ) | | | | G31 LPG (density = 1.550 ) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 kW | 51 kW | 60 kW | 90 kW | 32 kW | 51 kW | 60 kW | 90 kW | 32 kW | 51 kW | 60 kW | 90 kW |
| 1/2" | 0.179 | 0.404 | 0.536 | 1.091 | 0.251 | 0.567 | 0.754 | 1.532 | 0.096 | 0.217 | 0.288 | 0.585 |
| 3/4" | 0.043 | 0.098 | 0.130 | 0.264 | 0.061 | 0.137 | 0.183 | 0.371 | 0.023 | 0.052 | 0.070 | 0.142 |
| 1" | 0.015 | 0.033 | 0.044 | 0.089 | 0.020 | 0.046 | 0.061 | 0.125 | 0.008 | 0.018 | 0.023 | 0.048 |
| 1"1/4 | 0.004 | 0.009 | 0.012 | 0.024 | 0.005 | 0.012 | 0.016 | 0.034 | 0.003 | 0.005 | 0.006 | 0.013 |
| 1"1/2 | 0.002 | 0.004 | 0.006 | 0.012 | 0.003 | 0.006 | 0.008 | 0.016 | 0.001 | 0.002 | 0.003 | 0.006 |
| 2" | 0.001 | 0.001 | 0.002 | 0.004 | 0.001 | 0.002 | 0.003 | 0.005 | 0.001 | 0.001 | 0.001 | 0.002 |

***Table = Pressure loss in mbar/m***

Then connect the gas fuel supply, with a sufficient diameter, onto the threaded cut-off valve on the gas feeder rail. Check the sealing of the entire gas circuit including the gas feeder rail, prior to setting into service.

# EXHAUSTING COMBUSTION BY-PRODUCTS

## Facility ventilation:

**It is essential to provide ventilation openings in the facility to ensure the air supply needed to operate the burner. In all cases, comply with the standards or regulations applicable at the installation facility.**

## Smoke stack:

It is essential to provide a burnt gas exhaust pipe made from stainless steel for reasons of safety and proper operation. This pipe must be made from a "Specially for Gas" material that is condensation resistant, as given the low smoke temperatures, water vapour may condense in the pipe. We therefore recommend fitting a drain tee with a siphon at the base of the smoke exhaust pipe.

The smoke outlet is always from the right.

In all cases, we require installation contractors to refer to the regulation requirements applicable at the installation facility.

## Dimensions of the smoke outlet nozzle:

Φ 153 [Female socket]

## Smoke mass flow:

(to determine the smoke stack needed on the basis of full combustion with an **30% excess air**)

| Equipment reference | Calorific flow rate Qn (kW) | Temperature °C | Smoke flow (kg/h) |
|---|---|---|---|
| TRG32-N | 34 | 110 | 57 |
| TRG32-P | 34 | 110 | 58 |

| | | | |
|---|---|---|---|
| TRG51-N<br>TRG51-P | 54<br>54 | 110<br>110 | 91<br>92 |
| TRG60-N<br>TRG60-P | 63<br>63 | 110<br>110 | 106<br>107 |
| TRG90-N<br>TRG90-P | 95<br>95 | 120<br>120 | 160<br>162 |

***Table = Indicative smoke flow rate (30% excess air)***

***Note:*** Smoke temperature obtained during continuous drainage.

## SETTING INTO SERVICE

***This must be done by qualified staff. No burner presetting has been performed prior to delivery.***

***The burner warranty and Hydrogaz system CE marking validation are conditional on providing Lacaze Energies with the service introduction report, performed by a person who is qualified by an approved body and/or by the burner's manufacture.***

Our after sales service department can organise this or perform it (optionally, selected at time of order). Before making any request for setting into service, make sure that the installation is correct (see previous chapters) and especially:

- The water connections are complete
- The tank is full of water and under pressure
- The burner is in place along with the gas feeder rail
- Electrical connections
- Gas connection (type and pressure are correct)
- Smoke stack in place.
- Condensate drain connected.

### Tightening the nuts and bolts on the Hydrogaz® mount:

Fitting the mounting nuts and bolts (plate/flange back) for the ***Hydrogaz*** system is performed at the factor in line with a previously defined process (tightening in a cross pattern with 3 to 5 steps, with a well determined tightening torque).
Nevertheless, during transport and/or during handling, the nuts and bolts may well slacken through the effects of vibration and various stresses (temperature, pressure, etc.). It is therefore necessary to check the tightening torque prior to filling with water (filling the hot water tank).
Then you need to check for leaks on setting into service (ensuring that the pressure levels and setting temperatures are reached). Where necessary, tighten down the nuts and bolts to the recommended torque level.
It is necessary to recheck the tightening torque approx. one month after setting into service, to ensure that the (plates-bolts-washers-seal) assembly is fully in place (with an even distribution of stress levels). Where necessary, tighten down the nuts and bolts to the recommended torque level.

As an example, here are some recommended torque levels (μ = 0.2):

| Type TH | TH400 | TH400 | TH400 | TH500 | TH500 |
|---|---|---|---|---|---|
| Seal (3 mm) | m=2.5; y=12 | m=2.5; y=12 | m=2.5; y=12 | m=2.5; y=12 | m=2.5; y=12 |

| | | | | | |
|---|---|---|---|---|---|
| Ps (bar) | 7 | 6 | 4 | 7 | 4 |
| *Cs (Nm) | 148 | 143 | 133 | 169 | 150 |
| **Csm (Nm) | 155 | 155 | 155 | 232 | 232 |

**** Cs: Recommended tightening torque (washer on the nut side + dry fitting)***
**** Csm: Recommended tightening torque (washer on the nut side + dry fitting)***

We strongly recommend replacing the worn seal when refitting the manhole every time the hot water tank is opened.

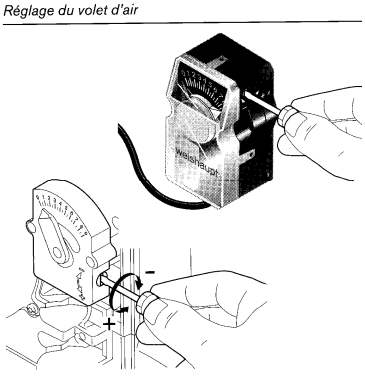
## Adjustments to make:

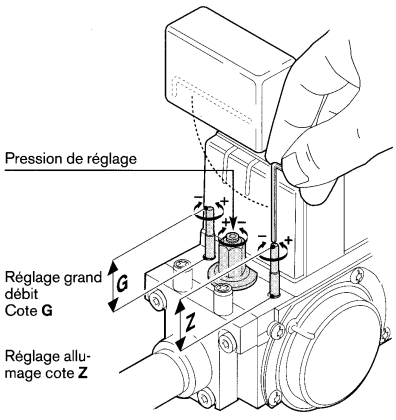
- ***For the WG5 burner (model TRG32):***

● Position the air flap to mark 7 (as shown in the figure below).
● Position the deflector on position X = 2 mm.
● Adjust the gas pressure and other parameters in line with the table:

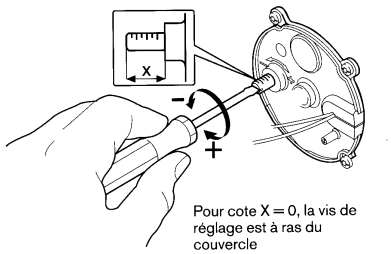
| Equipment reference | Burner reference | Gas | Firebox pressure (mbar) | Pressure adjustment (mbar) | Adjustment G (mm) | Adjustment Z (mm) |
|---|---|---|---|---|---|---|
| | WG5 N / 1-A | G20 | 0.5 | 6.5 | 19.0 | 20.5 |
| TRG32 | WG5 N / 1-A | G25 | 0.5 | 8.0 | 19.0 | 22.5 |
| | WG5 F / 1-A | G31 | 0.5 | 5.8 | 19.0 | 17.5 |

*Réglage du volet d'air*






*Réglage du déflecteur (cote X)*




- ***For the WG10 burner (models TRG51, TRG60 & TRG90):***

● Adjust the gas pressure and other parameters in line with the following table:

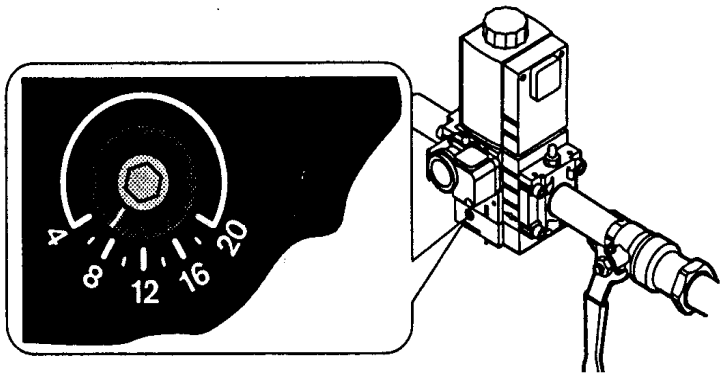
| Equipment | Burner | Gas | Firebox | Pressure | Adjustment | Air flap |
|---|---|---|---|---|---|---|

| reference | reference | | pressure (mbar) | adjustment (mbar) | screw Deflector X (mm) | (*) |
|---|---|---|---|---|---|---|
| | WG10N/1-D 3/4" | G20 | 0.8 | 7.2 | 0.0 | 40° |
| TRG51 | WG10N/1-D 3/4" | G25 | 0.8 | 8.9 | 0.0 | 40° |
| | WG10F/1-D 3/4" | G31 | 0.8 | 5.1 | 0.0 | 40° |
| | WG10N/1-D 3/4" | G20 | 1.1 | 7.5 | 0.0 | 70° |
| TRG60 | WG10N/1-D 3/4" | G25 | 1.1 | 8.7 | 0.0 | 70° |
| | WG10F/1-D 3/4" | G31 | 1.1 | 6.0 | 0.0 | 70° |
| | WG10N/1-D 3/4" | G20 | 1.3 | 8.6 | 8.0 | 80° |
| TRG90 | WG10N/1-D 3/4" | G25 | 1.3 | 10.3 | 8.0 | 80° |
| | WG10F/1-D 3/4" | G31 | 1.3 | 8.2 | 8.0 | 80° |

***Table = Burner adjustments***

***(*): Air flap = servo motor position (cam ST2).***

*Réglage de la pression gaz*

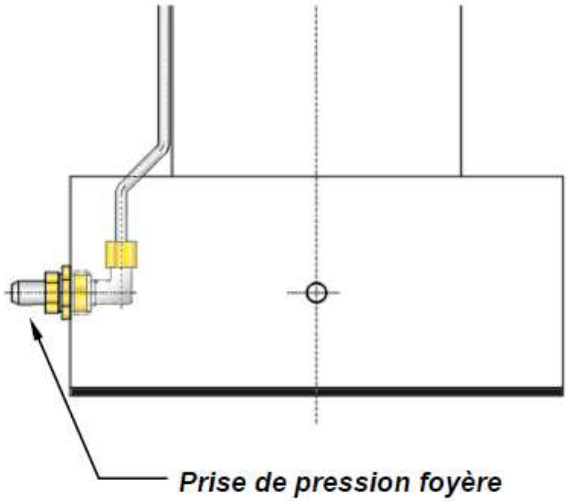



***DANGERS!***

- ***CO formation due to bad burner adjustment,***
- ***CO formation comprises a poisoning hazard,***
- ***Optimise combustion values when CO forms. The CO content should not exceed 50 ppm.***

***N.B.*** These values are only an ***indication***. Setting into service must be performed by staff who are qualified on gas fired appliances and who know the method used to adjust burners. Only the gas flow measurement (using a flow measurement device or a meter) and a knowledge of the characteristics of the gas used can give the true burner power value. ***Always refer to the burner's technical manual.***

A pressure take off Φ9, located on the burner flange, on the left side, is available for testing and checking the firebox pressure if necessary. The detailed description refer to the drawing and photograph below:




Make the burner adjustments by following the indications in the technical instructions that come with it.

Check the combustion values ($O_2$, CO, NOx, etc.) using a combustion analyser, adjust the air and gas flow rates to obtain optimal values.

### Heat generator adjustments and checks

The operating thermostat on the burner must be adjusted and its operation checked. It should be stated that the value displayed on the thermostat is an indicative one. If a precise temperature setting is required, refine the adjustments by making successive attempts to achieve the desired hot water temperature.

If an (optional) "Low water" pressure switch is fitted, make sure that it is working correctly. The latter is intended to check for the presence of water in the heat generator, by measuring the pressure inside it.

***Warning:***
The operating thermostat is adjustable between 0 and 90°C. We do however recommend that you limit the setting temperature to a value between:

**40 and 85°C.**

⚠ ***Warning:***

***Due to water expanding when it is heated up, the water pressure in the appliance must not exceed the value shown on the accumulator's rating plate. If no water expansion system is fitted, the excess water is released by the safety valve. It is therefore normal to see water draining from this safety mechanism.***

## SERVICING

***Hydrogaz*®** system servicing is reduced wherever possible but the minimum maintenance schedule described below is **mandatory**. The equipment warranty implies compliance with these stipulations.

**Once a month (at least, depending on the water quality):**

- Extract sludge through the drain valve by suddenly opening it for approximately 3 to 4 seconds. Renew this action 2 or 3 times in succession.
- Move the safety valves (by opening them all the way and then closing them) to ensure that they work.
- Prevent the hazards of scale build-up and corrosion affecting the heating element and the tank by checking the quality of the water supply.

***Reminder: Water that is compliant with DTU 60.1:***

***pH>7.20 – 8°F<TH<15°F –***

***10F°<TAC<20F° – Cl-<3F°–***

***Mg++<TH/5 –$SO_4$--< 5F° –$NO_3$-<0.5F°***

**Once a year (at least):**

***– 6 mg/l<dissolved $O_2$<9 mg/l***

***– free $CO_2$<10 mg/l .***

- Make sure that the degassing system works properly.
- Make sure that the condensate drain is not obstructed.

**Twice a year:**

- Check the quality of the combustion to preserve the quality of the environment and save energy.

⚠ ***A gas burner must never emit black smoke.***
***Have the adjustments corrected to keep the heating element clean.***

***We recommend that every user regularly service their installation. Regular servicing ensures fuel savings by maintaining efficiency.***

- Check the condition of the heating element (existence of scale deposits, etc.) and clean it if necessary. Depending on the kind of water, it may be possible to significantly step up the frequency of checks.
- Check the condition of the consumable anode. Replace it before it is completely worn out. Make sure that the anode is in perfect electrical contact with the tank (with an equipotential link ensured by the ground braid).
- If necessary, proceed to sweep the tubular array clean. To access it, removing the cover to the smoke box is necessary. When refitting the seal, always coat its surface on both sides with "Blue self-sealant" type paste resistant to temperatures of 250°C in continuous service, to avoid any condensate seepage.

For all of the points covered in this manual, our after sales service department remains available to you by calling: ***+33 (0)5 65 40 39 39***

# INSTRUCTIONS FOR USERS

**Installation:**

Usual practice means calling on a qualified gas-fired appliance

installation specialist for the installation and servicing of this appliance. To change the gas used, there are two possible cases:

Using natural gas in place of propane (and vice-versa): Replace the current burner with a suitable burner (refer to the "Characteristics" chapter).

Using another kind of natural gas: In this case, simply change the current burner adjustments (refer to the "Setting into Service" chapter).

⚠ ***N.B.*** In both of these cases, call on a qualified gas-fired appliance installation specialist to perform this transformation.

As soon as the appliance is correctly installed and it is filled with water and the burner has been adjusted in line with our recommendations, perform the following operations:

Power up the appliance from the electrical box mounted on the heat insulation.
Open the fuel valve.
Adjust the desired operating temperature on the adjustment thermostat.

***Warning:***
The operating thermostat is adjustable between 0 and 90°C. We do however recommend that you limit the setting temperature to a value between:

**40 and 85°C.**

**To set the appliance into service:**

⚠ ***Warning:***
***The appliance must not operate with the door to the air inlet casing in the open position.***

**To remove the appliance from service:**

Perform the following operations:

- Close the fuel supply valve
- Power down the appliance

If the shutdown is a prolonged one and/or there is a risk of freezing, we recommend that you completely drain the appliance. LACAZE ENERGIES cannot in any way be held liable for damage that occurs as a result of freezing.

***Warning:***
***The appliance must never be operated without water. If it has been drained, make sure it has been properly refilled before making any attempt to return it to service.***

LACAZE ENERGIES is not liable for damage that occurs as a result of operating without water, even for a short duration!

**Regular servicing:**

Be aware of the "Servicing" chapter.

**Service intervention:**

***It is absolutely prohibited to change the limit values of safety equipment like the resettable temperature limit thermostat, the safety valve, the air pressure or firebox pressure safety pressure switches (located in the burner).***

⚠ ***Warning:***

***Due to water expanding when it is heated up, the water pressure in the appliance must not exceed the value shown on the accumulator's rating plate. If no water expansion system is fitted, the excess water is released by the safety valve. It is therefore normal to see water draining from this safety mechanism.***

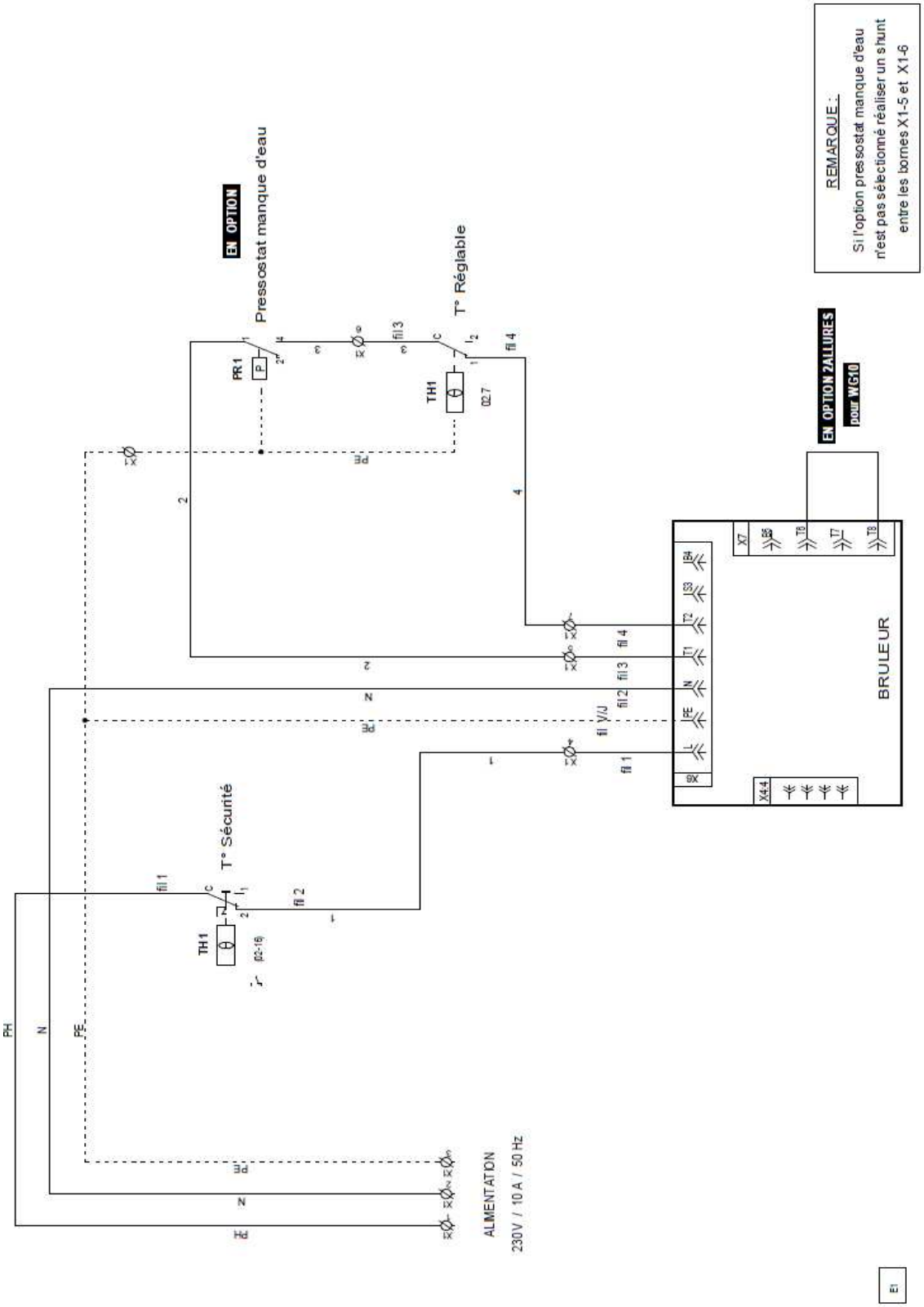
If the burner sets itself to failsafe more, reset it by pressing on the light up button located to the lower left of the burner (see the "Setting into Service" chapter, paragraph 2). To access it, open the casing door. After resetting, close the latter back up. If failures are frequent, contact your after sales service department so that they can identify and correct them.

## Periodic servicing:

Usual practice means calling on a qualified gas-fired appliance installation specialist to perform the preventive and ***mandatory*** maintenance described in the "Servicing" chapter.

# ELECTRICAL DIAGRAM

For the electrical connection of the standard ***Hydrogaz®*** appliance, please comply with the electrical diagram below (1 speed / Indoor version / WG5 – 10 burner):




***Indicative Electrical diagram EE3 - No cabinet***

⚠ ***N.B.***

- The low water pressure switch *is not supplied by us*, unless it is ordered optionally.
- Terminals X1-1 to X1-7 are located in the connection box.
- Comply with the Phase and Neutral line positions.

⚠ ***Reminder:***

***This appliance must be connected to earth in line with applicable regulations.***

# ANNEX

## A1: Technical instructions on tightening down nuts and bolts

It should be noted that these procedures are based on publication entitled "***Guidelines for safe seal usage – Flanges and Gaskets" by the European Sealing Association (ESA).***

### Reminder of some fundamental principles

The ideal sealing for the "flange/nuts&bolts/seal" assembly is by applying the correct assembly pressure on the seal, a pressure that is low enough to not damage the seal but high enough to avoid any seal leak. An accurate check on the force applied to the specific flange layout is of vital importance.

The order in which the bolts or threaded studs are tightened down will weigh considerably on the overall pressure applied to the seal. Poor bolt tightening may affect flange alignment. A seal will generally be able to compensate for a slight deformation of this kind, but serious difficulties may be encountered if flange alignment is seriously affected.

Whatever the tool used and also by hand, the nuts must be tightened ***in a cross pattern.***

For most of the materials that make up the flange system (including seals, mountings, nuts, washers), material stretching stabilises after a fairly short length of time. For materials used for soft seals, one of the main factors is generally the creep-settling phenomena affecting the seal. These effects are accentuated at high temperatures and their net effect is to reduce the compression force on the seal, thereby increasing the chance of a leak. We recommend tightening down the mounts once again to the nominal torque
at least once 24 hours after the initial assembly or prior to delivery.

Never retighten an elastomer based seal after it has been exposed to high temperatures.

### Simplified tightening procedure in three phases (minimum)

- Phase 1: First place the nuts on the thread by hand. This is done to check that the threads are good. Then tighten down the nuts uniformly, by hand, in line with a cross pattern tightening approach, or at least by

following the orders shown by the figures in RED (see diagrams below).

● Phase 2: Using a ratchet, tighten down to 70% of the recommended torque in line with a cross pattern tightening approach, or at least by following the orders shown by the figures in RED. Check that the flange rests uniformly on the seal [seal thicknesses should be (relatively) consistent after compression].

● Phase 3: Using a torque wrench, tighten down to the rated torque in line with a cross pattern tightening approach, or at least by following the orders shown by the figures in RED.

**Tightening procedure in five phases recommended by ESA**

● Phase 1: First thread the nuts or bolts by hand. This is used to check whether the threads are good (if the nuts cannot be threaded by hand, then there is probably a faulty thread -> try again and if necessary, replace any faulty parts). Then tighten the nuts down uniformly by hand in line with a cross pattern tightening approach (see below).

● Phase 2: Using a torque wrench, tighten down for the first time, to a maximum of 30% of the recommended torque, all the way around, following the cross pattern tightening approach. Check that the flange rests uniformly on the seal.

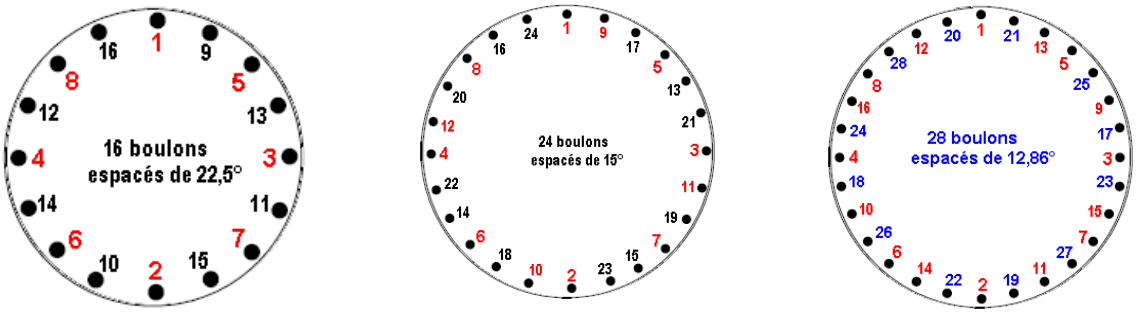
● Phase 3: Tighten to at most 60% of the recommended torque in line with a cross pattern tightening approach.

● Phase 4: Tighten to the total recommended torque in line with a cross pattern tightening approach.

● Phase 5: Tighten in a final pass, down to the total torque, by acting clockwise on the adjacent mounts.

After five basic tightening passes, it may be best to repeat pass five until no further nut rotation is observed. The final tightening must be uniform, with each of the bolts carrying the same load.

**Cross pattern tightening approach (Examples)**




***Figures showing the tightening sequence to comply with***

## A2. DTU 60.1 – Addenda 3 recommendations

| Analysis elements | UNIT | Required treatment case | Type of treatment | Desired value | Observations |
|---|---|---|---|---|---|
| Temperature | °C | - - - | - - - | - - - | |
| pH | U | < 7.2 | A | > 7.2 | |
| TH | °f | TH < 6<br>or TH > 25 | B<br>C | 8 to 15 | |
| TAC | °f | TAC < 6<br>or TAC > 30 | B<br>C | 10 to 20 | |
| Mg++ | °f | > 4 | C | < TH / 5 | |
| Ca++ | °f | * * * | C | * * * | Note (1) |
| Free $CO_2$ | mg/l | > 30 | D | < 10 | |
| $O_2$ dissolved | mg/l | > 9 | D | 6 to 9 | |
| Cl- | °f | > 7 | E | < 3 | |
| $SO_4^{--}$ | °f | > 9 | E | < 5 | |
| $NO_3^-$ | °f | > 1 | E | < 0.5 | |
| Resistivity at 20°C (ρ) | Ω x cm | < 2,000 | E | 2,500 to 3,000 | Note (2) |
| Na+ | °f | | | | Note (3) |
| Fe++ | mg/l | | | | Note (4) |
| | | | | | |
| Type Treatment: | | | | | |
| A: | - Degassing + Possibly neutral and/or Filmogeneous | | | | Note (5) |
| B: | - Neutral or similar and/or Filmogeneous | | | | Note (5) |
| C: | - Partial softening or demineralising | | | | |
| D: | - Degassing | | | | |
| E: | - Total or partial demineralisation and/or Filmogeneous | | | | Note (5) |
| Notes: | | | | | |
| (1) | - No Ca++ value stated, it may be obtained from the difference between TH and Mg++. | | | | |
| (2) | - Approximate calculation: ρ = 750,000 / Rs (Rs: Dry residues at 105°C in mg/l) | | | | |
| (3) | - Dosage of Na+ is necessary in case C | | | | |
| (4) | - Drinking quality standard: Total iron ≤ 0.2 mg/l) | | | | |
| (5) | - Filmogeneous: A silico-phosphate salt based treatment against corrosion | | | | |

***Note: 1 °f = 0.2 milli-equivalent (meq) per litre.***

# GAS WATER ACCUMULATION
# TRG TYPE GAS HOT WATER HEATER
# HYDROGAZ®

## APPLIANCE TYPE B23
## CATEGORY: I2Esi, I3P (France)

## TECHNICAL MANUAL IS AN INDICATION ONLY

**( IU-0003-FR-201306)**