Installation - Maintenance - Use

PRODUCING FACILITY HOT WATER FOR INDUSTRY

HYDROGAZ®

Rated power 32 - 810 kW

(IU-0004-FR-201306)

CONTENTS

FOREWORD

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

This generator is a gas fired hot water accumulator tank. Its highly flexible operation lets you access hot water at constant temperature and at the required flow rate, at any time.

A HYDROGAZ® unit comprises:

- A vertical tank with a capacity of 750 to 110,000 litres, made from first choice steel or 316L grade (304L on request) stainless steel.
- A removable heating element made from stainless steel and comprising a tube burner and a multitubular heat exchanger array with a unit power of 32 to 810 kW depending on the type.
- A CE forced air burner fuelled by gas (Natural gas type H or L, LPG or other) as well as a gas feeder rail that is ready assembled at the factory.
- A casing to protect the burner against the weather comprising four pieces (top + two sides, mounting frame), used to install the system outdoors.
- A burner control cabinet directly mounted on the tank.
- Its safety and regulation accessories such as valves, level controllers or pressure switches, safety thermostats, regulation thermostats or digital PID regulators, etc.

Depending on the case, HYDROGAZ® works as follows:

- Under pressure for sanitary hot water or stainless steel type tanks, with a variable service pressure level depending on the model (up to 4 or 7 bar).
- Under low pressure for heating hot water tanks, with a service pressure level of up to 3 bar.
- At atmospheric pressure for air vented hot water tanks.

Sanitary hot water or air vented tanks are protected against corrosion by an epoxy resin based coating suited to the max. usage temperature of the hot water tanks, except in cases of stainless steel tanks.

Depending on the application, the HYDROGAZ® unit may be fitted with electric immersion heater units for bi-energy use, in this case with an additional electrical cabinet required for controlling the electric power and the choice of energy used.

These instructions describe how the heat generators work when gas fired as well as the water, electrical and gas fuel line connections.

⚠ 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. 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.
- Be sure to be aware of the warnings and warranty limits contained in this manual prior to setting into service and make sure that all of the conditions are met for doing so.

MANUFACTURER'S WARRANTY
TERMS OF APPLICATION

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 major and excessive variation in the water supply pressure (ΔP >1 bar).
- A water supply pressure level in excess of the rated service pressure.
- Any incorrect action (especially powering up 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 (±5%).
- Overpressure due to any absence, insufficiency, poor operation or incorrect installation of the safety equipment, especially the one or more valves.
- Vacuum resulting from a lack of air into the tank when draining (vacuum breaker).
- A lack of maintenance of the heating elements or safety components.
- Insufficient water quality, ***especially large build-ups of scale on the heat exchanger surface*** (TH > 15°F) (see paragraph Water quality page 17 and the **Annex** below).
- 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.
- Corrosion due to organic and/or metal deposits from the hot water (loop) or cold water distribution networks.
- 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 of the French Civil Code and those relating to liability due to faulty products.

GENERAL INFORMATION

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.

Warning!

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

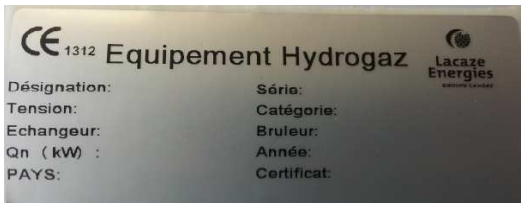
The appliance must be transported and stored in its original packaging until it reaches its installation location. This appliance must not be stored in a damp and/or corrosive environment.

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.

Refer to the Annex for the proposed solutions relating to handling and setting industrial type hot water tanks into place.

TYPE rating plates



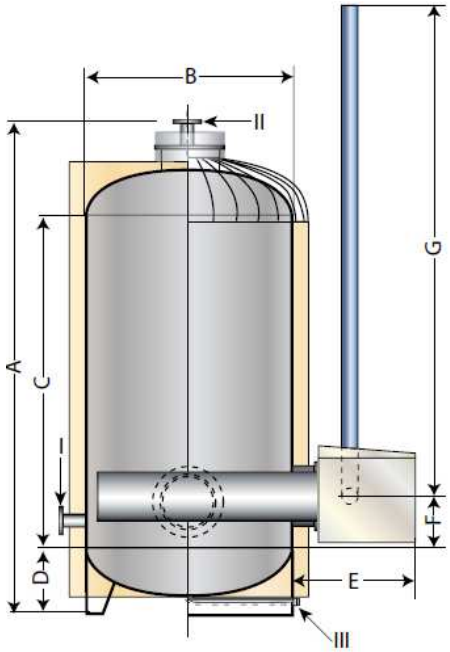
PRIOR CONNECTIONS AND HANDLING

Tanks and Dimensions

For information purposes, the table and drawing below offer some examples of the overall dimensions of HYDROGAZ systems, depending on capacity:

Capacité cuve (L)	A (mm)	B (mm)	C (mm)	D (mm)	I / II*	III*	Poids (kg)
4.000	3.110	1.500	2.000	460	DN 50	DN 32	890
5.000	3.710	1.500	2.500	460	DN 50	DN 32	980
6.000	4.310	1.500	3.000	460	DN 50	DN 32	1.100
8.000	3.830	1.900	2.500	530	DN 50	DN 32	1.425
10.000	4.430	1.900	3.000	530	DN 50	DN 32	1.650
12.000	5.030	1.900	4.000	530	DN 80	DN 32	1.900
15.000	6.030	1.900	5.000	530	DN 80	DN 32	2.200
20.000	5.390	2.500	3.500	750	DN 80	DN 50	2.750
25.000	6.390	2.500	4.500	750	DN 80	DN 50	3.250
30.000	7.390	2.500	5.500	750	DN 80	DN 50	3.750
35.000	8.390	2.500	6.500	750	DN 80	DN 50	4.300
40.000	6.770	3.000	5.000	860	DN 100	DN 50	4.800
50.000	8.170	3.000	6.000	860	DN 100	DN 50	5.100
60.000	9.770	3.000	8.000	860	DN 100	DN 50	6.000
70.000	11.770	3.000	10.000	960	DN 150	DN 80	7.000
80.000	12.770	3.000	11.000	960	DN 150	DN 80	7.800
100.000	15.770	3.000	14.000	960	DN 150	DN 80	9.200

Nota : DN ≤ 50 = piquages filetés - DN ≥ 65 = piquages à bride plate PN 16



Water systems

For pressurised ***heating*** or ***sanitary hot water*** type tanks:

Fit the safety valves, ***always taking care to comply with the mounting direction*** (arrow on the valve pointed ***away*** from the hot water tank). For tank diameters of 1900 and 2500, we deliver a valve whereas for the 3000 diameter model we deliver two safety valves.

Placing any mechanism or appliance between the tank and the one or more valves is prohibited.

Provide a connection to a waste water drain via a funnel type link.
As standard, the safety valves are set to the maximum tank service pressure (3, 4 or 7 bar ± **20%** as the case may be) unless otherwise stated.

Note:
The valves do not pour and they are not intended to handle the expansion that results from the water heating. The installation must comprise at least two safety valves. Always provide an expansion system (for 4 - 6% if the installation volume).

It is ***essential to provide a system for protecting the tank against vacuum by a safety mechanism like a vacuum-breaker***, at the installation high point. Its cross section must match the cross section of the openings used to drain the tank (whether deliberately or accidentally). Its sizing is the result of a calculation that takes into account the air flow levels needed given the admissible pressure loss (see Section 6).

For ***air vented*** type tanks at atmospheric pressure:

Fit the ***vent***, a U shaped pipe, that is high enough to avoid any overflow through this opening, as it vents the tank into the open air.

Connect the ***overflow*** to a waste water drain, making sure however that it cannot become obstructed at its end, especially by water from another circuit.

⚠ ***Warning! The overflow must never substitute for the vent.***

Part that is common to all types of sanitation type tanks:

Supply the tank with cold water taken from after the water treatment. Fit a pressure limiter and no-return valve on this supply.

Note: The water must be compliant with DTU 60.1 (see Annex below), namely:

pH >7.20 _ 6°F<TH<15°F _ Cl^-<3F°_

Mg++<TH/5 _ SO_4^{--}<5F°_ NO_3^- <0.5F°

_ 6 mg/l<O_2 dissolved<9 mg/l

_ free CO_2 < 10 mg/l

_ 10F° < TAC < 20F°

_ 2500 < Resistivity < 3000Ω.cm (20°C)

Connect the hot water output to the network that uses it. This output should include an effective and sufficiently sized degassing system for ***sanitary hot water*** or ***heating*** type tanks.

Filling the tank while making sure that the air is properly vented from the tank by the water. For ***air vented*** hot water tanks, the tank is never completely full as a sufficient volume is provided to allow the water to expand. In this case, filling is controlled by a level regulator.

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

Gas

Mount the burner body, generally delivered in a box, onto the combustion head that is mounted on the front plate.

Fit the weather proofing cover by mounting it on the frame that is fitted onto the flange at the factory.

Fit the gas feeder rail that is ready assembled at the factory and align it with the burner (***and not on the sides***). The cut off valve will then be located on the left hand side. No gas feeder rail transformation is possible without our prior permission, as malfunctions may result. The casing never interferes with mounting the gas feeder rail.

Connect the gas feeder rail to the gas fuel supply via the threaded cut-off valve and using an easily removable "union-connector" part. Calculate the pipe diameters depending on the distance and the layout between the supply point and the gas feeder rail to avoid any loss in pressure. The required pressure levels are:

- 200 to 300 mbar for H or L natural gas
- 150 to 300 mbar for Liquid Petroleum Gas (LPG)

type	burner	heating element	Burner power kW	Useful power kW	Nat. gas m3/h	Propane m3/h
TRG120	WG20	H120	135	120	10.6	4.4
TRG140	WG20	H120	155	140	12.2	5.0

maximil-160	WG40	H150	190	170	14.9	6.1
HDZ250	WG40	H215	280	250	22.0	9.0
maximil-240	WG40	H230	295	265	23.2	9.5
maximil-320	WG40	H300	385	345	30.3	12.4
maximil-420	G5	H380	490	440	38.5	15.8
maximil-480	G5	H460	595	535	46.8	19.2
maximil-810	G7	H700	900	810	70.8	29.0

Table = Gas power and flow rate levels (300 mbar, 15°C)

To avoid any pumping phenomena on the fuel supply line, provide it with a buffer volume of 1/1000th of the maximum flow rate.

	Buffer volume (litres)	
type	nat. gas	propane
TRG120	12	5
TRG140	14	6
maximil-160	17	7
HDZ250	24	10
maximil-240	26	11
maximil-320	34	14
maximil-420	45	18
maximil-480	52	21
maximil-810	87	36

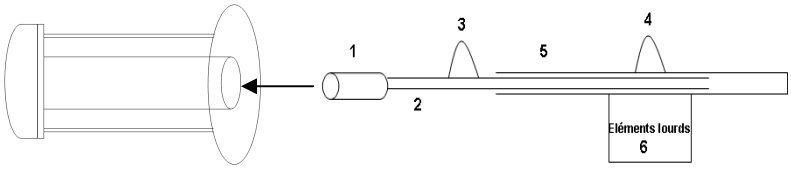
Table = Buffer volume without the pipe (300mbar, 15°C)

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).

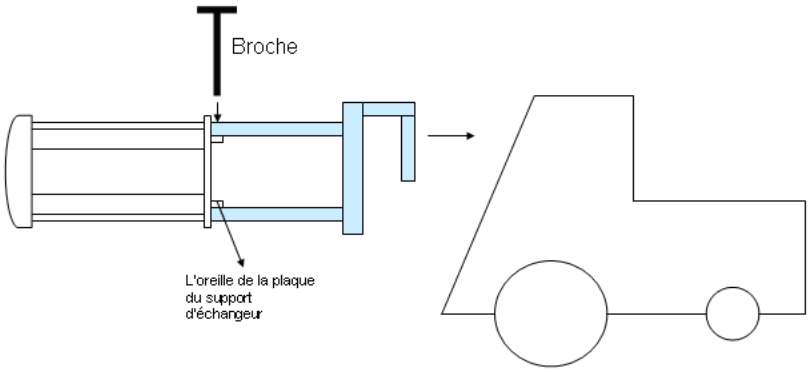
Models of tools used by LACAZE ENERGIES:

The figures below show us a tool used to balance Hydrogaz TRG120 and TRG140 units:



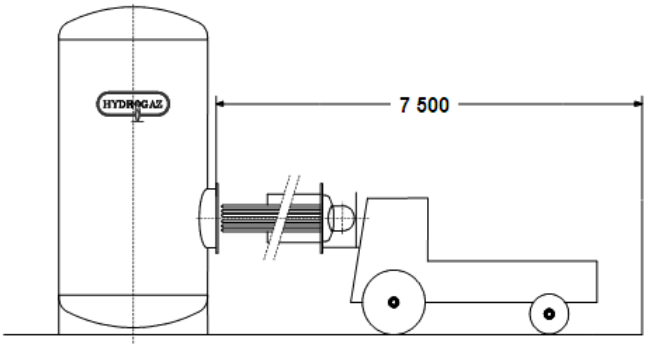
First of all, insert Part 1 into the fire tube, Mount 3 allows fitting the exchanger with a ring, then Tube 5 is moved by Mount 4 so as to adjust the system to achieve a horizontal balance. As soon as the heat exchanger is properly horizontally adjusted, it can be inserted into the hot water tank or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

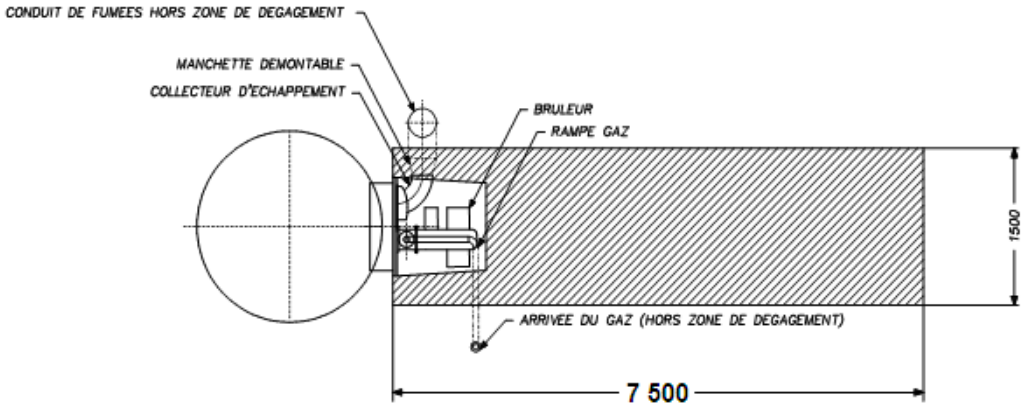
The figures above show a tool that is used for the large Hydrogaz units (maximil and HDZ250 series). On these large Hydrogaz units, Lacaze Energies provided two lifting rings on the heat exchanger support, and the pin on this tool can pass through these two rings to attach the heat exchanger to this tool. This tool is fitted onto a forklift used to adjust the heat exchanger height so as to insert the heat exchanger into the manhole, or remove it.



Location

It is essential to release a clear space for the heat exchanger.





Layout diagram = clear space to be complied with

Handling

Warning!

The appliance will be unloaded and handled with care using suitable lifting equipment and by qualified staff using the equipment provided for this purpose by the manufacturer, and especially (see Annex below):

- ***Smooth crane lifting while retaining the appliance during its rotation until it is in the upright position on the ground (pay attention to stability!)***
- ***By the lifting rings using an overhead gantry or a crane that is compatible with the load to be lifted. If necessary, the handling slings must be suitable for the load and in good condition.***

The appliance must be handled "EMPTY" and with no additional accessories not delivered and mounted by the manufacturer.

Once the appliance is upright on the ground, it must be chocked over its entire ground pressure surface if it is necessary to chock one foot to keep all three feet level (when the ground is not flat).

When handling it, avoid any manoeuvre that may cause lateral impact against the appliance.

Gently lower the appliance onto the ground.

Unloading and handling on-site will be performed by the customer.

Electricity

Supply the electric control cabinet with a cable with a cross section suited to the power used (230V single phase or 400V three phase + earth).

type	Voltage	power used (kW)
TRG 120	1*230 V – 50 Hz	0.55
TRG 140	1*230 V – 50 Hz	0.55
maximil-160	1*230 V – 50 Hz	1.0
HDZ250	1*230 V – 50 Hz	1.0
maximil-240	1*230 V – 50 Hz	1.0
maximil-320	1*230 V – 50 Hz	1.0
maximil-420	3*400 V – 50 Hz	2.0
maximil-480	3*400 V – 50 Hz	2.0
maximil-810	3*400 V – 50 Hz	3.2

Table = Electric power used (as an indication)

Re-establish the link, ready wired at the factory, between the electric control cabinet and the terminal block on the burner.

Electrically connect the electrical accessories for the gas feeder rail:

- Magnetic valve to the burner terminal block
- Travel switch, min. and max. gas pressure pressure switches wired to the cabinet

⚠ ***N.B.:*** It is possible to remotely control burner starting or stopping by connecting to the terminals provided for this purpose in the cabinet.

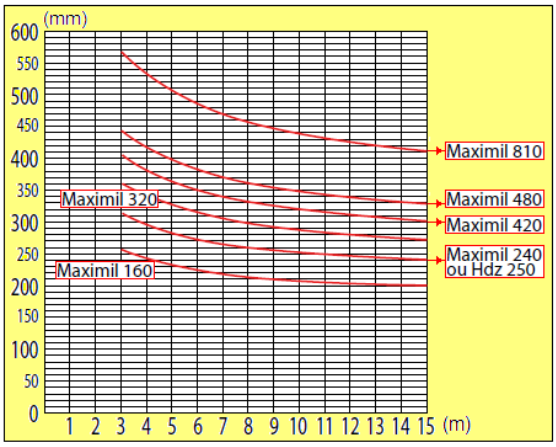
In all cases, refer to the specific electrical diagram supplied with the appliance.

Smoke stacks

It is ***necessary to provide a burnt gas exhaust pipe*** made from stainless steel for reasons of ***safety and proper operation***. This is not supplied by us.

We recommend making a smoke stack with a height that is based on the height of the tank = the smoke stack must stand above the upper part of the heat insulated dome.

As an *indication, here are the curves for determining the diameter of the smoke stack depending on height*:



To mount the smoke stack, use the tabs provided for this purpose and attached to the tank (DN 32 tubes).

The interface part between the smoke stack and the exhaust manifold

(supplied with a collar and turning flange) must be easily removable, to facilitate maintenance work on the equipment.

Condensates

All of the equipment has an opening for draining condensates. This outlet must be connected to a waste water drain and it must never let any burnt gasses laden with steam escape towards the burner's fresh air inlet, as this would automatically trigger the burner's failsafe mode and immediately shutdown the installation due to lack of air. This opening is located on the lower part of the smoke box. During operation, ensure that this opening is ***never*** blocked off.

GAS EQUIPMENT DESCRIPTION

Details of the parts supplied

A one-piece equipment assembly that can be ***disassembled***comprising:

- A type G (WG) forced air gas burner
- A CE screw-in gas feeder rail:
  - Dual magnetic valve
  - Pressure regulator
  - Gas filter
  - Ball valve
  - Min. pressure switches
- An AISI 316L stainless steel heat exchanger mounted on the elliptical face plate made from high elasticity E36-4 steel
- A fire pressure take-off
- A steel exhaust manifold (øcol)
- A steel condensate outlet (øcd)
- A flange seal, type: ELL- or TH-
- HM class 8-8 bolts for
  - Elliptical flanges on Maximil 160, 240, 320, 420, 480, 810 and HDZ250
  - TH500 for TRG 120 et 140
- Protection against the weather

Dimensions

type	seal	Φcol	Φcd	bolts	Gas feeder rail	Weight (kg)
TRG-120	TH-500	200	1"	24 x HM16	1"	151
TRG-140	TH-500	200	1"	24 x HM16	1"	151
maximil-160	ELL-123	168	1"	24 x HM20	¾"	235
HDZ250	ELL-123	168	1"	24 x HM20	¾"	235
maximil-240	ELL-123	168	1"	24 x HM20	¾"	280
maximil-320	ELL-456	219	1"	28 x HM24	¾"	400
maximil-420	ELL-456	219	1"	28 x HM24	¾"	400
maximil-480	ELL-456	273	1"	28 x HM24	¾"	470
maximil-810	ELL-810	324	1"	32 x HM24	1"	685

Table = Main dimensions (300 mbar)

ELECTRICAL CABINET - OPERATION

Electrical cabinet description

- A sealed external IP55 polyester casing for outdoor operation.
- Cut-off or general switch
- A 400/230V isolation transformer
- Burner motor control and protection systems
- Single phase circuit-breaker
- Control and safety box
- Three-position "CMD. LOC./0/CMD. DIST." switch
- Two-position "1st. SPEED/2nd. SPEED" switch
- An "UNLOCK BURNER" push button for resetting
- Indicator lights "POWER ON" "GAS ON" "SPEED 2" "NO GAS" "NO WATER" "FAILURE" "EXCESS WATER PRESS."

Accessories – Spare parts

- All electrical components in line with parts list (see electrical diagram)
- Control and safety box for the burner in intermittent service (at least one regulator triggered stop every 24 hours)

Reference: ***See burner documentation.***

- Burner accessories: Ionisation sensor, lighting electrodes, starter transformer (see burner technical manual)

Switch positions

To achieve burner operation, proceed as follows:

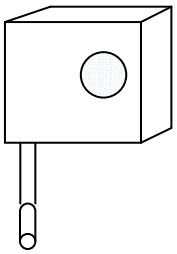
- Power up the cabinet (I)
- Set the three-position switch to the "CMD. LOC." position for local control or to the "CMD. DIST." position for remote control cases.
- Set the two-position switch to "1st SPEED" to force the burner to the low flow rate or to "2nd SPEED" to let the regulator system work freely.

Presets

Safety features

- Water temperature setting thermostat:

This thermostat is used to adjust the setting temperature and control burner on/off action depending on the desired temperature in the hot water tank.
Tc = Setting temperature



The resettable safety thermostat can be set between 90 and 110°C. It should be set to a temperature of approx. **Tc** + 10°C, but without ever exceeding 105°C for a stainless steel hot water tank and 90°C for an RC851 water tank.

- Safety pressure switch:

For sanitary hot water or heating type hot water tanks, the lack of water safety pressure switch will be set to approx. 1 bar (relative pressure) with the differential setting at the minimum position. The "Excess water pressure pressure switch" is set to "Service pressure + 0.5 bar".

- Safety valve:

The safety valve is a pressure limiter installed on water tanks or pipes connected directly to the hot water tank. When the water pressure exceeds that of the valve setting, the valve will open and release water from the hot water tank.

Regulation

The operating thermostat will be set to the desired setting temperature **Tc** (°C), but without ever exceeding 105°C for heating hot water tanks and 95°C for sanitary hot water tanks and for vented hot water tanks.

The normal operating thermostat will be set to a LOWER value than the setting temperature, approximately to **Tc** - 5°C.

Indication:

light	burner status	meaning	action
gas on	on	low power burner	
speed 2	on	full power burner	
low gas	wait	low gas pressure	check fuel
low water	wait	low water pressure	water circuit
failure	locked	burner locked by safety box	identify the cause by referring to the box index before resetting
excess pressure	wait	water pressure too high	water circuit (valve)

Table 3.5 = indication

Note: This table is only valid for models Maximil, HDZ 250 and the outdoor versions of TRG 120, 140.

SETTING INTO SERVICE

Conditions for setting into service

The final step for setting the burner into service can only take place once all of the operations described in the "**PRIOR CONNECTIONS**" part have been performed, namely:

- Water connections and tank filling
- Electric cabinet, burner and gas feeder rail connections
- Gas fuel connection
- Condensate drain line connection and fitting the smoke stack

All of these actions are performed by the customer who, once they are completed, will contact our after sales service department (at least 72 hours ahead of time) so as to bring the burner into service.

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

The burner warranty and Hydrogaz system adjustment 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.

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.
The tightening torque should be checked approximately 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 recommenced torque level.

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

Type TH	ELL-123	ELL-456	ELL-810	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)	4	4	4	7	4
*Cs (Nm)	373	493	539	169	150
**Csm (Nm)	471	809	809	232	232

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

***** C_{sm}: Max. tightening torque (washer on the nut side + dry fitting)***

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

Rated values for combustion settings

Burners are designed to work with an excess of air of 20 to 25%.

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.*

Combustion efficiency

The average combustion efficiency is approx. 92% of the net calorific value. It varies with the temperature of the water input (EF) and operating conditions.

N.B.: Setting into service must be done by qualified staff. Always refer to the burner's technical manual.

SERVICING

Hydrogaz® system servicing is reduced wherever possible but the minimum maintenance schedule described below is ***mandatory***. The equipment warranty implies compliance with the few stipulations set out below (and especially a monitoring of water quality).

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

After setting into service:
During the month that follows setting into service, we request checking the:

- Tightness of the electrical connections
- Sealing of the gas and water parts

Periodically:

- Extracting sludge through the drain valve by suddenly opening it for approximately 3 to 4 seconds. Renew this action 2 or 3 times in succession. The frequency depends on the water quality.

⚠ ***Important: To perform this action, leave the cold water valve in the open position to avoid any vacuum forming in the tank.***

- Move the safety valves (by opening them all the way and then closing them) to ensure that they work. At least once a month.

Water quality:

The sanitary hot water tanks are suitable for storing or producing sanitary hot water. Consequently, the water will meet the minimum quality levels stated in European Directive 98/83/EC of 3 November 1998, relating to the quality of water destined for human consumption.

Additionally, to benefit from the manufacturer's warranty, additional water supply treatment is required if it is affected by one or more of the following conditions (measurements made at 20°C) – for details, please refer to the Annex below:

- ***resistivity < 2200 Ω.cm***
- ***resistivity < 4500 Ω.cm***
- ***TAC < 6°F or TAC > 25°F***
- ***_ free CO_2 > 15 mg/l***
- ***pH < 7.2***
- ***Ryznar index > 8.5***
- ***TH < 6 °F or TH > 15°F***
- ***Sulphates (SO_4^{2-}) > 96 mg/l***
- ***Chlorides (Cl-) > 71 mg/l***

⚠ ***N.B.*** *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.*

At least once a monthly, ensure that the degassing system works properly.

Check combustion and check the useful power so as to preserve the environment and save energy. The check values must be recorded in a maintenance log. Correct the adjustments where necessary. At least twice a year, by a specialist technician.

A gas burner must not emit black smoke.

Get the adjustments corrected as soon as such a condition occurs to keep the heating element in perfectly clean condition.

Check that condensates drain off, making sure that the drain is not obstructed. At least once a quarter.

Check the condition of the inside of the tank and of the heating element (heat exchanger) to extend their service lives (existence of scale deposits...). For air vented type hot water tanks, monitor the condition of the level sensors that work poorly when they are covered with deposits. Clean if necessary. At least once a year.

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*.

SIZING THE VACUUM BREAKER

H: Max. water column height

Dv: Opening diameter

Qi: Max. instantaneous flow rate = $\frac{\pi}{4} * D_v^2 * \sqrt{2 * g * H}$

ΔP: Admissible vacuum

Tank diameter	ΔP (mbar)
1900	130
2500	94
3000	40

Admissible vacuum depending on tank diameter

⚠ ***N.B.*** The protection mechanism must have a pressure loss, for an air flow of Qi, that is less than the admissible vacuum **ΔP**.

This calculation must be made for normal tank drainage cases, or accidental ones (when a cold water pipe fails).

For lesser diameters and in some special cases, like when hot water tanks are installed high up (on a roof) with a direct water feed below them (e.g. in the basement), hot water tanks that are well insulated, where a pressure booster is provided downline, then a vacuum-breaker may need to be placed into service. Please inform us and consult with us.

OTHER HEATING EQUIPMENT (32 - 140 kW)

The appliance may be delivered with one or more heating units, type TRG32, TRG51, TRG60, TRG90, with unit power levels of 32, 51, 60, 90 kW. The details on these models are stated in the TRG IU-0003-FR-201306 or

TRGV IU-0019-FR-201306 technical manuals.

The essential differences (compared with the Maximil series) are as follows:

● The heating element is mounted on a round 400 flange, like a manhole for models TRG32, TRG51, TRG60, TRG90.

● The heating element is mounted on a round 500 flange, like a manhole for models TRG120 or TRG140.

● The gas rail is a 1/2", 3/4" or 1" unit. It comprises a cut-off valve, a gas unit with built-in filter and pressure regulator. The gas input pressure (on the valve) is 300 mbar max.

● 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 that must be installed without any reverse slope, regardless of what it is made from (copper, PVC, stainless, etc.), so long as it is resistant to the natural aggressivity of the condensates (with a pH between 3 and 5) and a temperature of 60°C.

● The electric control cabinet must be supplied with single phase 230V (be sure to properly match the Phase and Neutral polarities). The power absorbed by each appliance is 400 VA up to 90 kW and 800 VA for the

TRG120 and TRG140 models. This is a simplified cabinet compared with that of larger unit power appliances (e.g. the Maximil series), comprising *(outdoor version only)*:

- Status indicators (Power on - On - Fault)

- On/Off switch

- Burner reset push button

All models up to 90 kW have only one heating speed. There are two heating speeds for the TRG120 and TRG140 models.

ELECTRICAL DIAGRAMS

As an example, the electrical diagrams presented below correspond to application cases with TRG and Maximil models (Diagram 1 for TRG120 and 140 models – indoor version, Diagrams 2, 3 and 4 for Maximil series 420 – 480 – 810 models – outdoor version only).

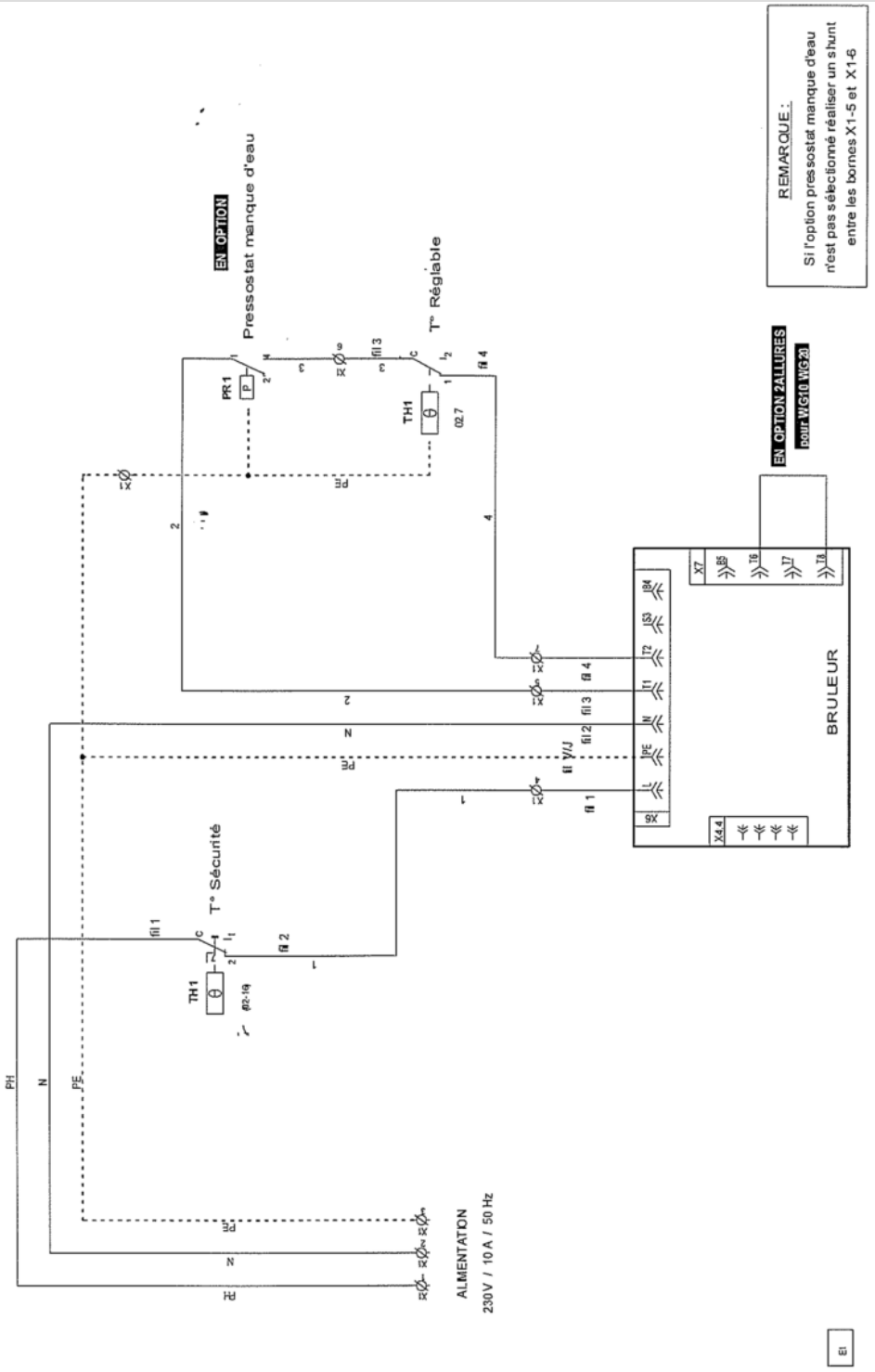

REMARQUE :
Si l'option pressostat manque d'eau n'est pas sélectionné réaliser un shunt entre les bornes X1-5 et X1-6
EN OPTION
Pressostat manque d'eau
T° Réglable
EN OPTION 2ALLURES
pour WG10 WG20
PR1
TH1
T° Sécurité
BRULEUR
ALIMENTATION
230V / 10 A / 50 Hz
PH
N
PE

Diagram 1

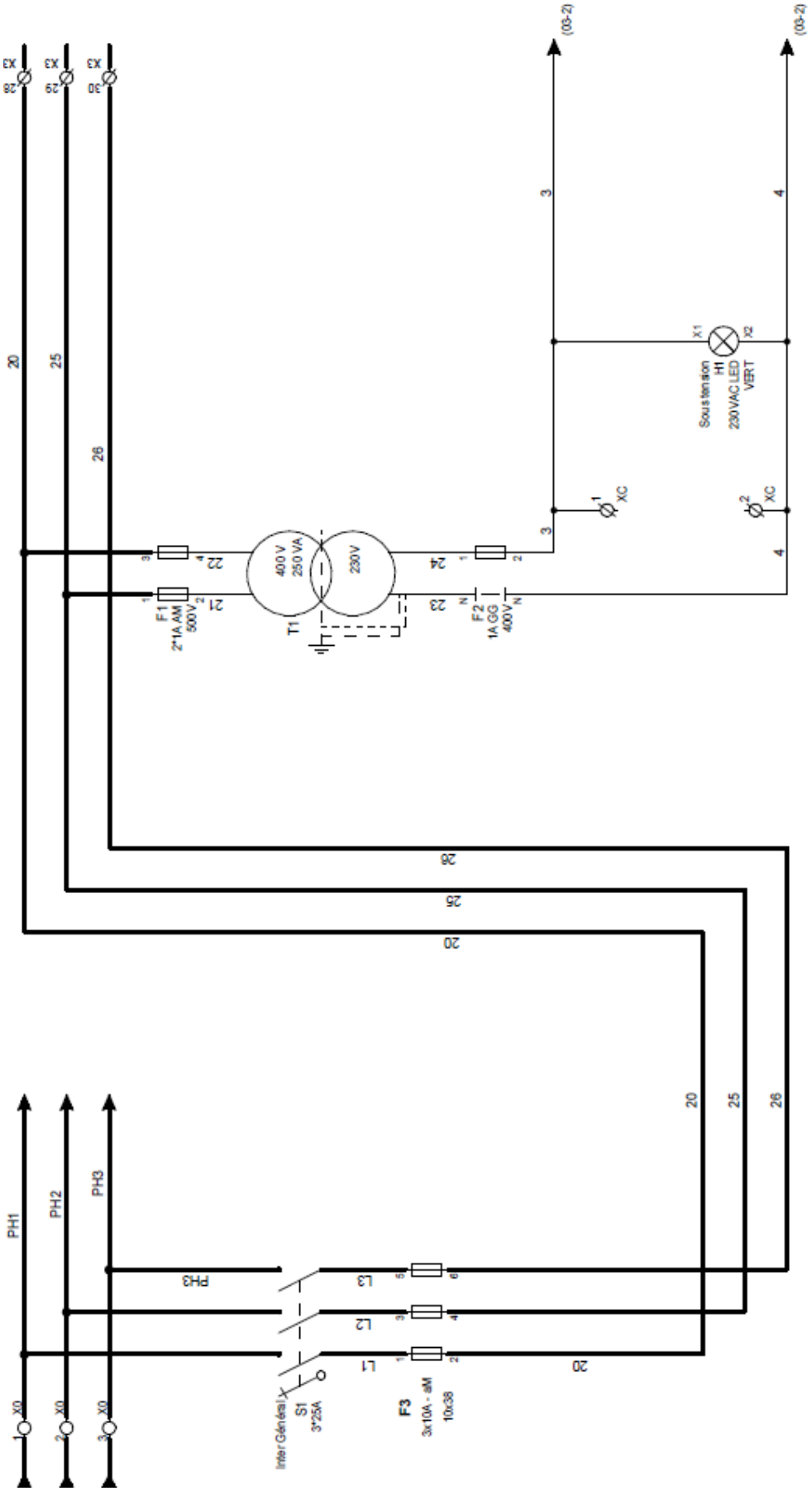

(03-2)
(03-2)
X3
X3
X3
28
29
30
20
25
26
3
4
X1
X2
Sous tension
H1
230VAC LED
VERT
XC
XC
400 V
250 VA
230V
T1
F1
2*1A AM
500V
F2
1A GG
400V
PH1
PH2
PH3
X0
X0
X0
L1
L2
L3
F3
3x10A - aM
10x38
S1
3*25A
Inter Général

Diagram 2

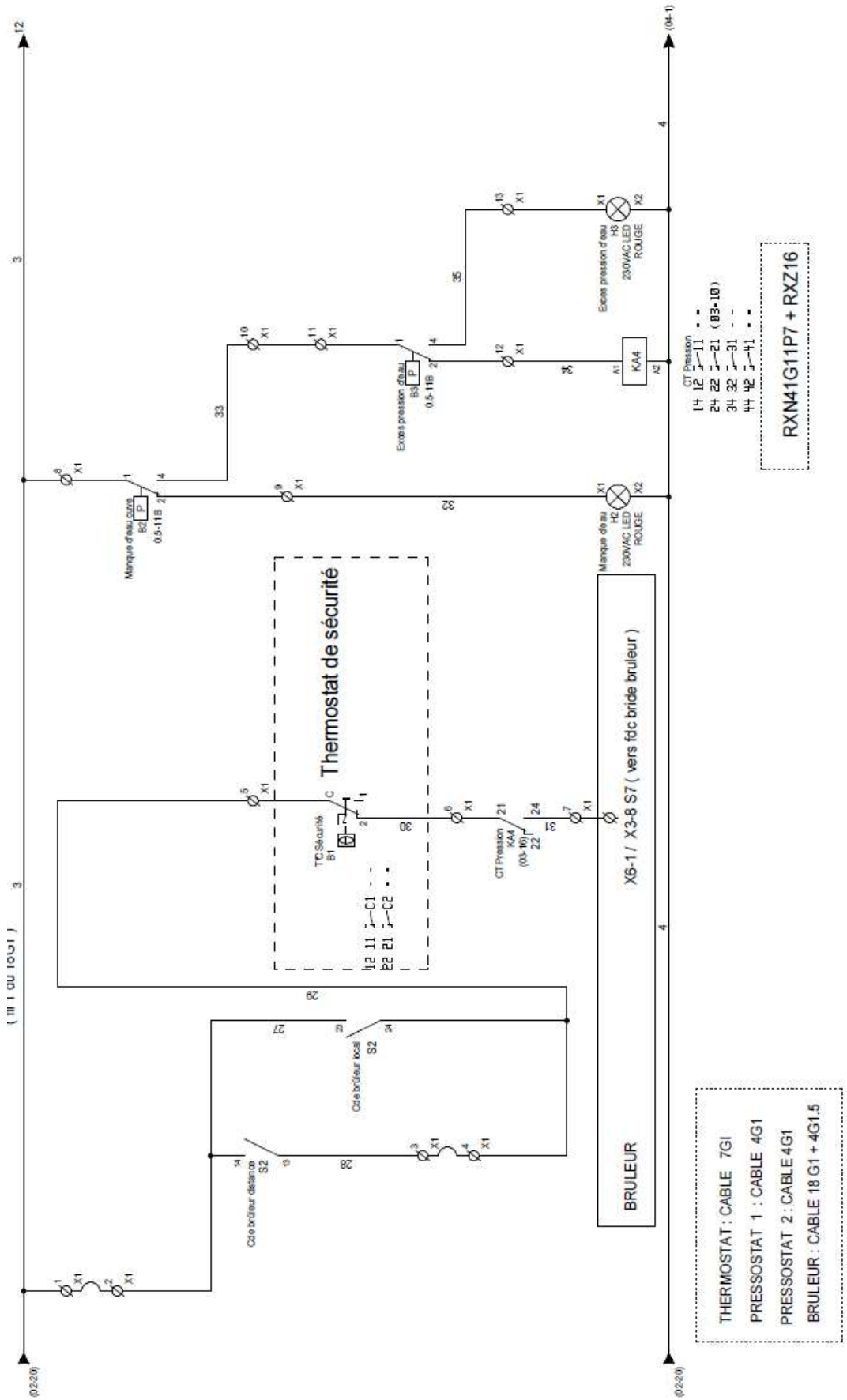

Thermostat de sécurité
BRULEUR
X6-1 / X3-8 S7 (vers fdc bride bruleur)
RXN41G11P7 + RXZ16
THERMOSTAT : CABLE 7GI
PRESSOSTAT 1 : CABLE 4G1
PRESSOSTAT 2 : CABLE 4G1
BRULEUR : CABLE 18 G1 + 4G1.5

Diagram 3

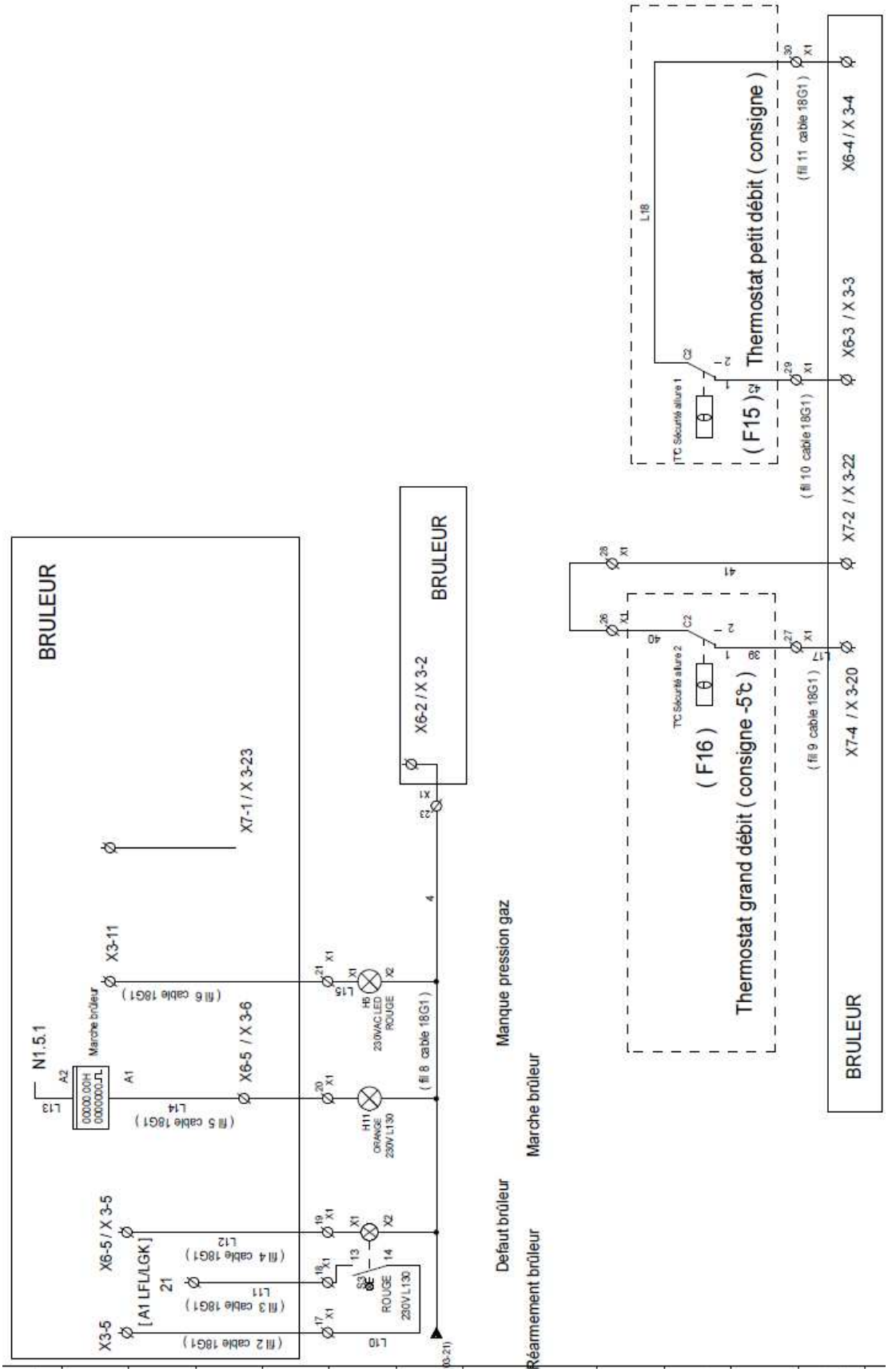


Diagram 4

⚠ ***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 materials that make up the flange system (including seals, mounts, nuts, washers), the settling 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 to their rated torque value at least once, 24 hours after 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 to at most 30%

of the recommended torque the first time, all around the flange, in line with a cross pattern tightening approach.

Check that the flange rests uniformly on the seal.

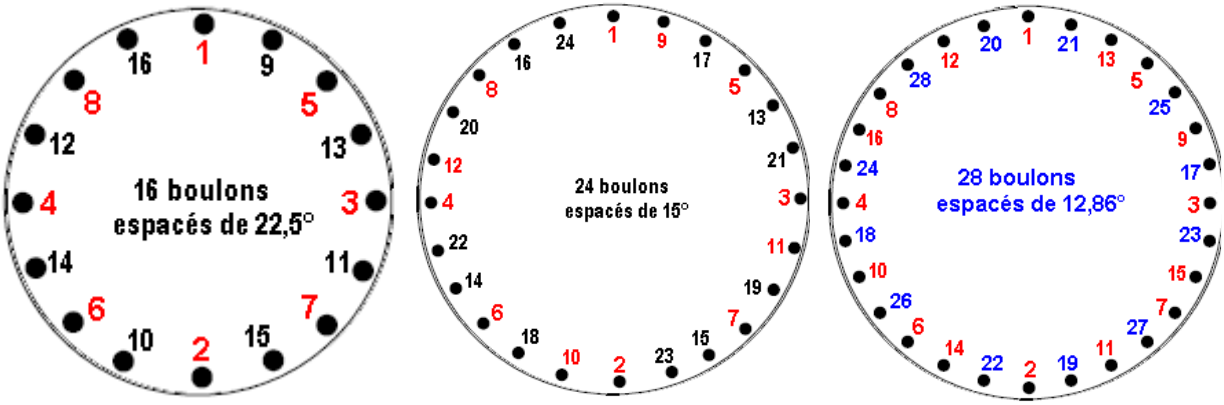
● Phase 3: Tighten to at most 60% of the recommended torque in line with a cross pattern tightening approach.

● 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)



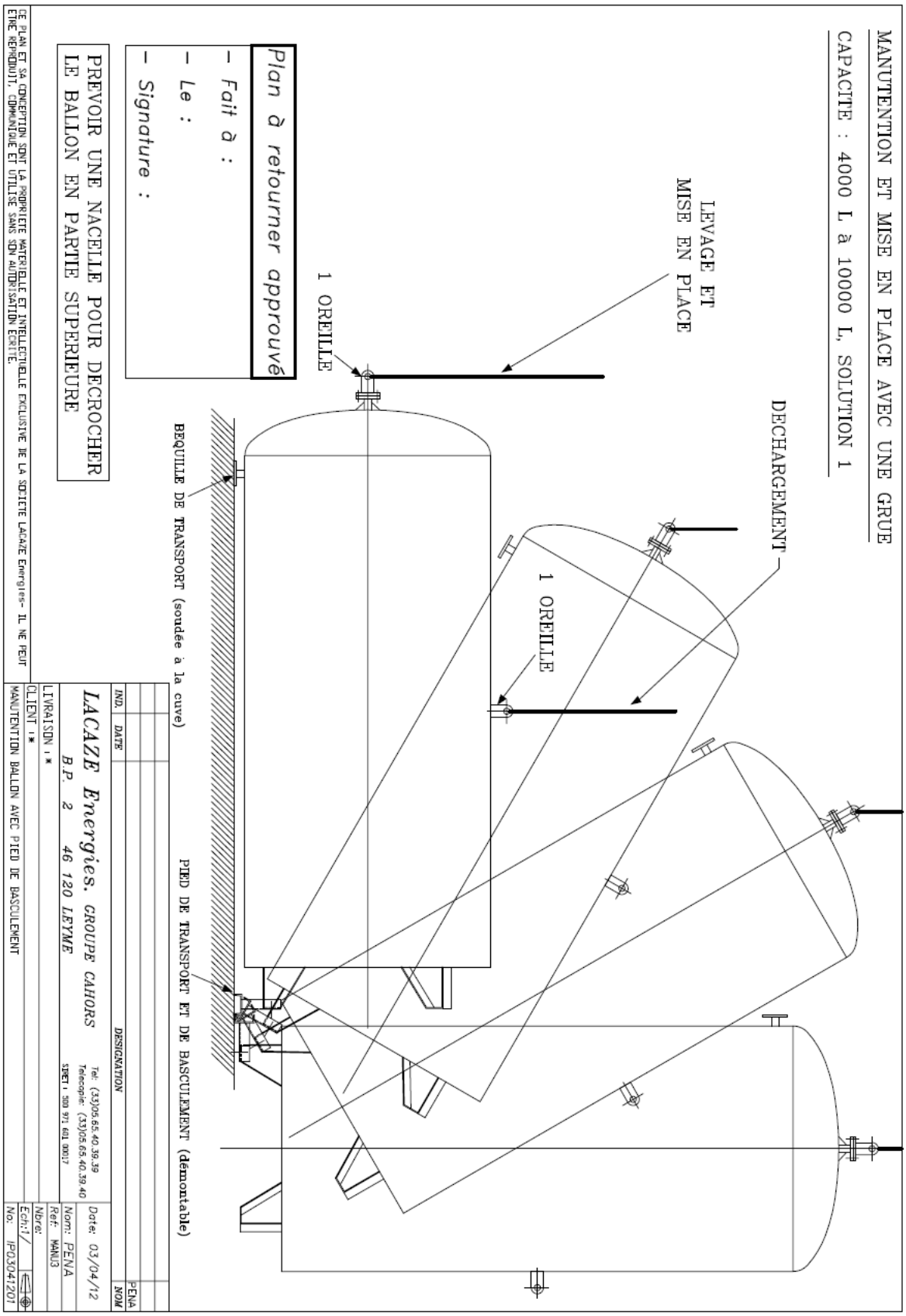
Figures showing the tightening sequence to comply with

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 or TH > 25	B C	8 to 15	
TAC	°f	TAC < 6 or TAC > 30	B 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				

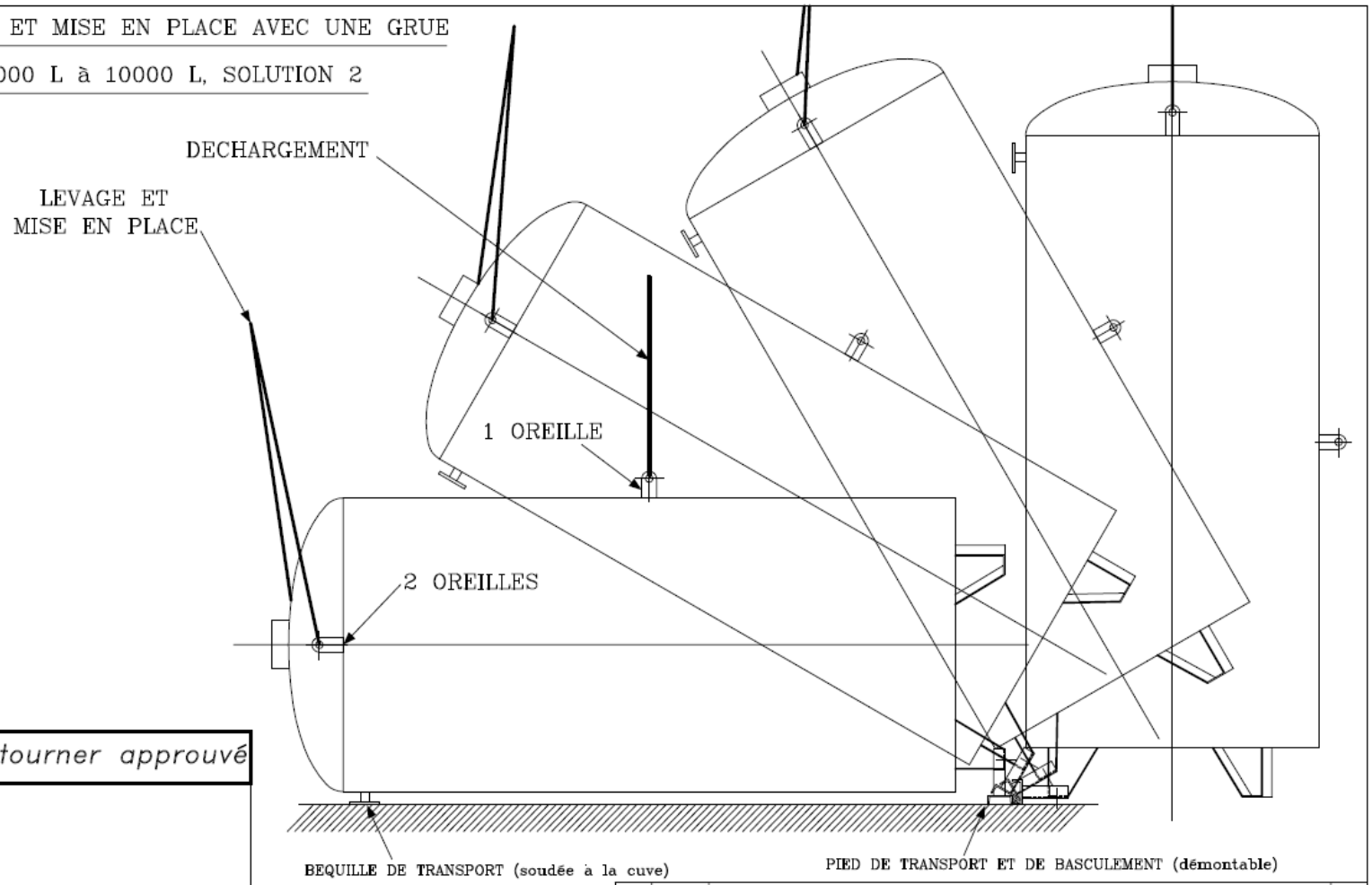
Note: 1 °f = 0.2 milli-equivalent (meq) per litre.

A3. Solutions proposed relative to fitting hot water tanks:



MANUTENTION ET MISE EN PLACE AVEC UNE GRUE

CAPACITE : 4000 L à 10000 L, SOLUTION 2



Plan à retourner approuvé

- *Fait à :*
- *Le :*
- *Signature :*

PREVOIR UNE NACELLE POUR DECROCHER
LE BALLON EN PARTIE SUPERIEURE

IND.	DATE	DESIGNATION	NOM
			PENA

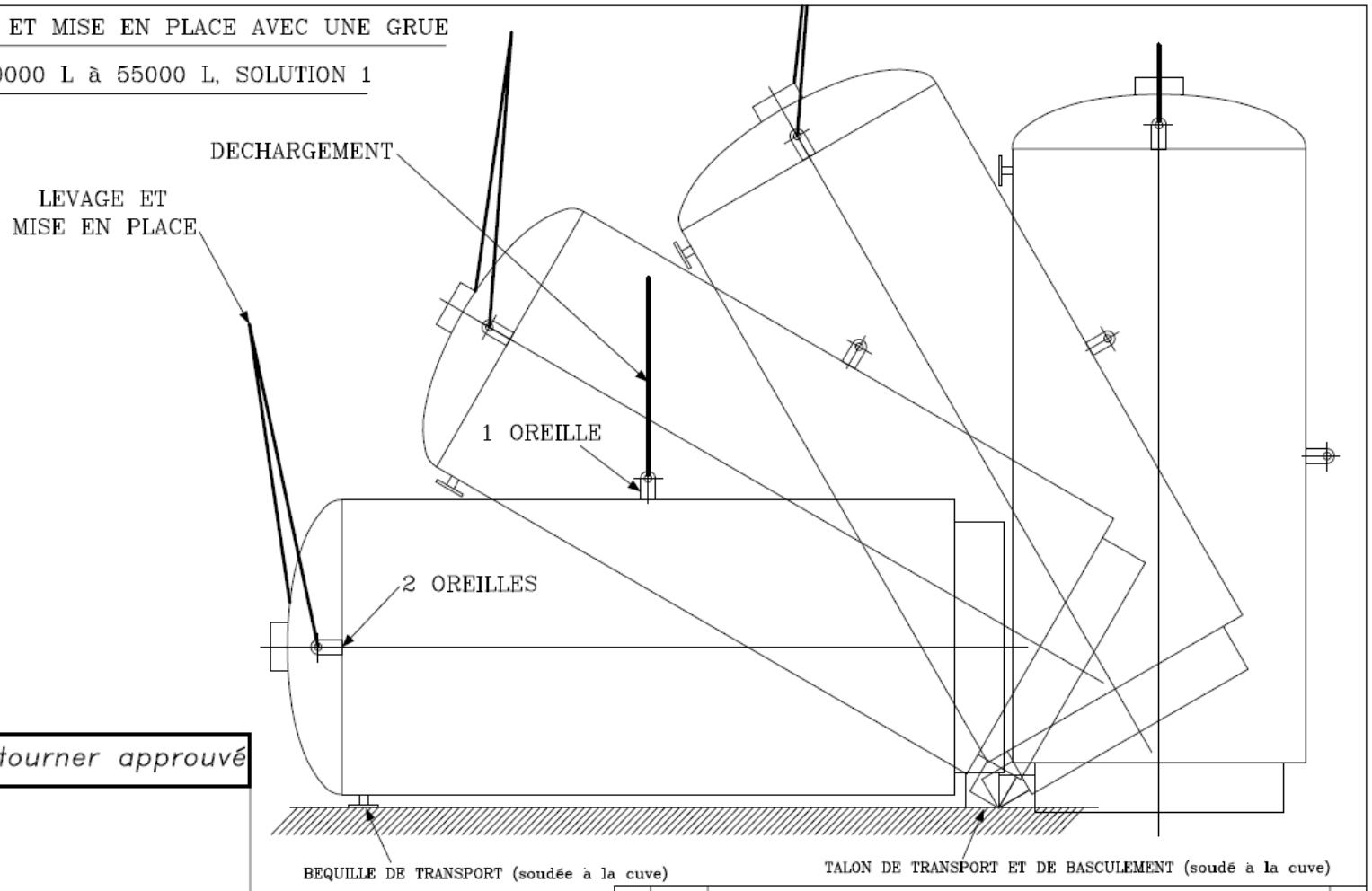
LACAZE Energies. GROUPE CAHORS
B.P. 2 46 120 LEYME
Tel: (33)05.65.40.39.39
Telecopie: (33)05.65.40.39.40
SIRET : 500 971 601 00017

Date: 03/04/12
Nom: PENA
Ref: MANU4
Nbre:
Ech:1/
No: IP03041202

LIVRAISON : *
CLIENT : *
MANUTENTION BALLON AVEC PIED DE BASCULEMENT

MANUTENTION ET MISE EN PLACE AVEC UNE GRUE

CAPACITE : 10000 L à 55000 L, SOLUTION 1



Plan à retourner approuvé

- *Fait à :*
- *Le :*
- *Signature :*

PREVOIR UNE NACELLE POUR DECROCHER
LE BALLON EN PARTIE SUPERIEURE

IND.	DATE	DESIGNATION	NOM
B	04/04/12	capacité maxi passée de 50000 L à 55000 L	PENA
A	09/09/10	Mise à jour : ajout du tampon d'approbation et de la prévision d'une nacelle	PENA

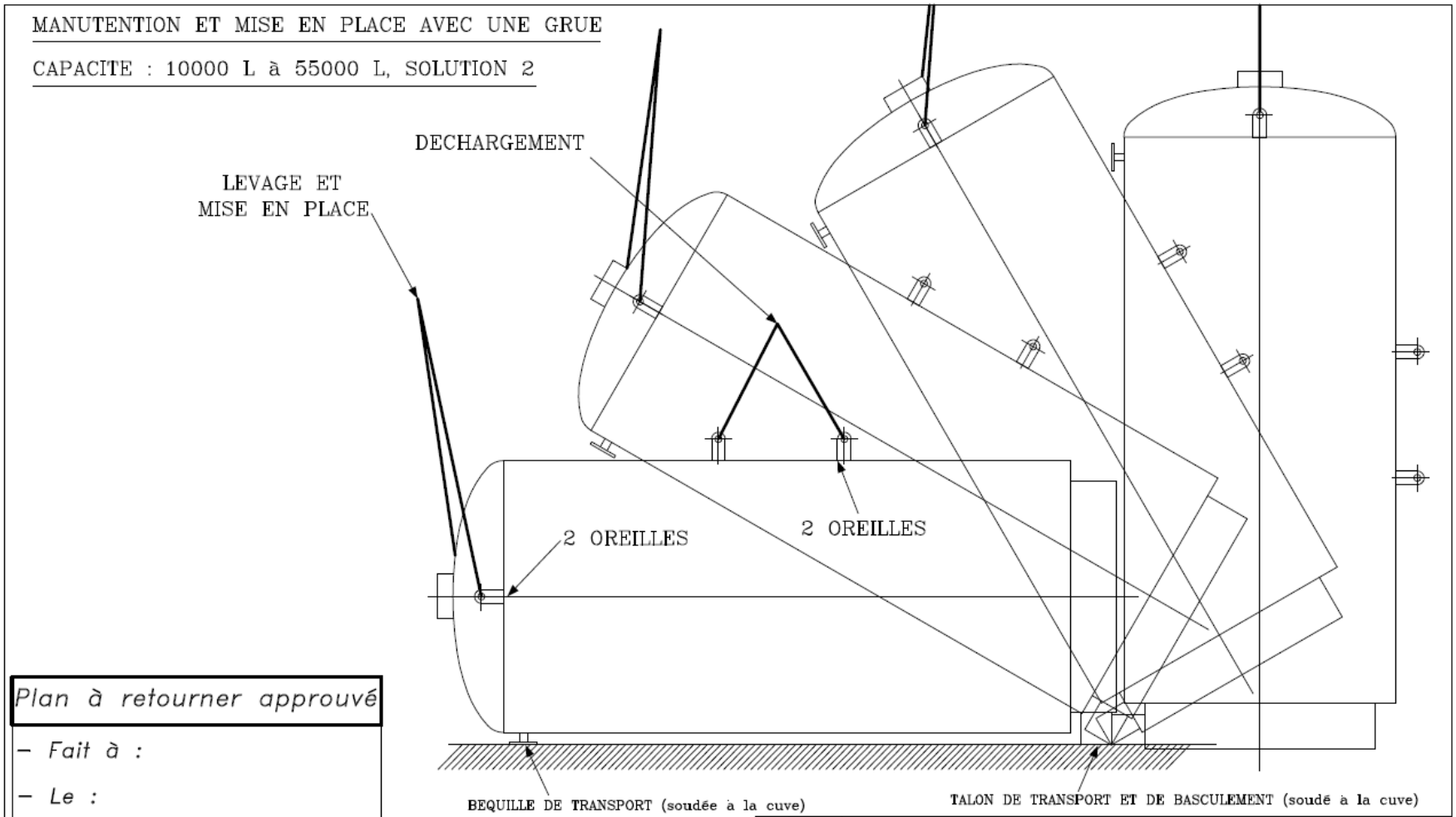
LACAZE Energies. GROUPE CAHORS
B.P. 2 46 120 LEYME
Tel: (33)05.65.40.39.39
Telecopie: (33)05.65.40.39.40
SIRET : 500 971 601 00017

Date: 15/01/08
Nom: MOULIN
Ref: MANU1
Nbre:
Ech:1/
No: D200801501

LIVRAISON : *
CLIENT : *
MANUTENTION BALLON AVEC TALON DE BASCULEMENT

MANUTENTION ET MISE EN PLACE AVEC UNE GRUE

CAPACITE : 10000 L à 55000 L, SOLUTION 2



Plan à retourner approuvé

- *Fait à :*
- *Le :*
- *Signature :*

PREVOIR UNE NACELLE POUR DECROCHER
LE BALLON EN PARTIE SUPERIEURE

IND.	DATE	DESIGNATION	NOM
B	04/04/12	capacité maxi passée de 50000 L à 55000 L	PENA
A	09/09/10	Mise à jour : ajout du tampon d'approbation et de la prévision d'une nacelle	PENA

LACAZE Energies. GROUPE CAHORS
B.P. 2 46 120 LEYME
Tel: (33)05.65.40.39.39
Telecopie: (33)05.65.40.39.40
SIRET : 500 971 601 00017

Date: 15/01/08
Nom: MOULIN
Ref: MANU2
Nbre:
Ech:1/
No: D200801502

LIVRAISON : *
CLIENT : *
MANUTENTION BALLON AVEC TALON DE BASCULEMENT

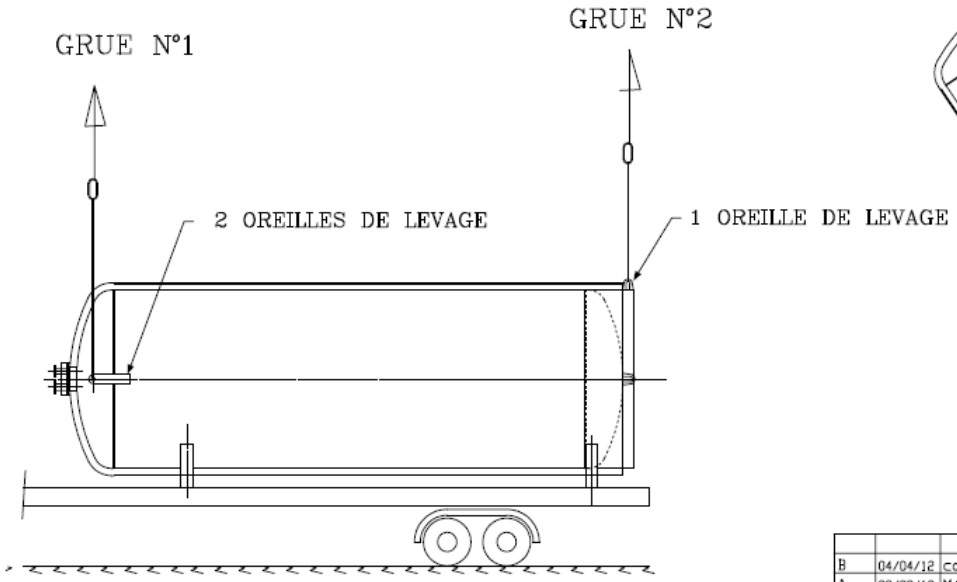
PREVOIR UNE NACELLE POUR DECROCHER
LE BALLON EN PARTIE SUPERIEURE

Plan à retourner approuvé

- *Fait à :*
- *Le :*
- *Signature :*

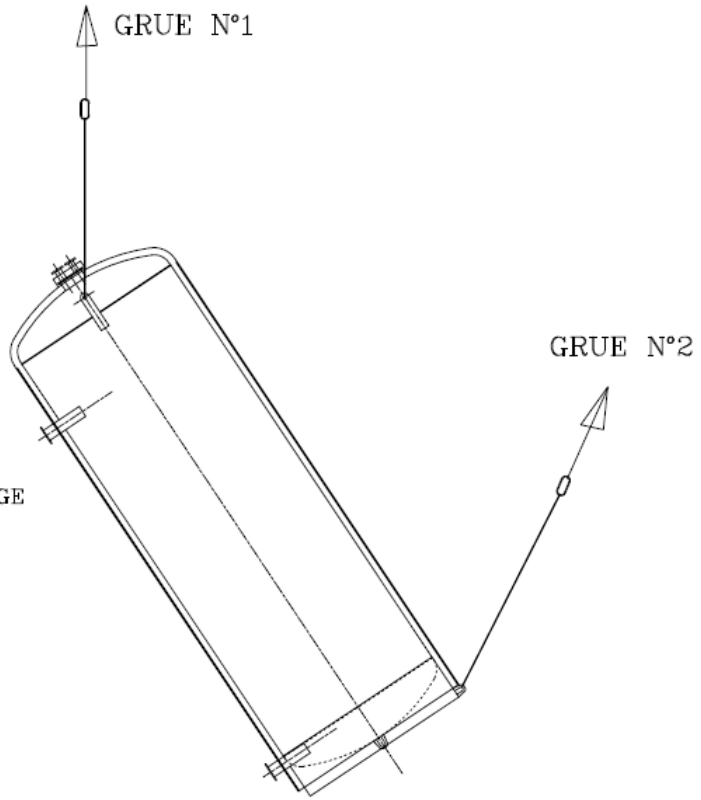
PREMIERE PHASE :

- LEVER LE BALLON AU MOYEN DE DEUX GRUES
- DEGAGER LA REMORQUE
- LEVER LE BALLON ASSEZ HAUT POUR PERMETTRE LE DEBUT DE SA ROTATION



DEUXIEME PHASE : JUSQU'A CE QUE LE BALLON SOIT VERTICAL

- LA GRUE N°1 CONTINUE A LEVER
- LA GRUE N°2 MAINTIENT SON ELINGUE EN TENSION TOUT EN PERMETTANT AU FOND DU RESERVOIR DE S'ABAISSER



IND.	DATE	DESIGNATION	NOM
B	04/04/12	capacité passée de >= 60000 L à > 55000 L	PENA
A	09/09/10	Mise à jour : ajout du tampon d'approbation et de la prévision d'une nacelle	PENA

LACAZE Energies. GROUPE CAHORS
B.P. 2 46 120 LEYME
Tel: (33)05.65.40.39.39
Telecopie: (33)05.65.40.39.40
SIRET : 500 971 601 00017

Date: 15/01/08
Nom: MOULIN
Ref: D-2GRUES
Nbre: 1
Ech:1/105
No: D200801503

LIVRAISON :*
CLIENT :*
BALLONS DE CAPACITE > 55000 litres / PRINCIPE DE MANUTENTION AVEC 2 GRUES

TECHNICAL HOT WATER PRODUCTION
FOR INDUSTRY
HYDROGAZ®

POWER 32 - 810 kW

TECHNICAL MANUAL IS AN INDICATION ONLY

(IU-0004-FR-201306)