VULCATHERM

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VULCATHERM® USING THERMAL OIL WITH COOLING BY SUPERPOSITION AND ATMOSPHERIC EXPANSION

Water cooling, type 10803

Cooling by chilling unit, type 10823

Cooling by air cooler, type 10833 / 10843

RANGE 180°C to 350°C

READ THIS MANUAL CAREFULLY AND FULLY BEFORE INSTALLING THE UNIT
THIS MANUAL IS AN INTEGRAL PART OF THE PRODUCT AND WILL ACCOMPANY IT THROUGH TO DISASSEMBLY.

EN

1 WARNING FOR VULCATHERM TYPE 10823,10833 AND 10843

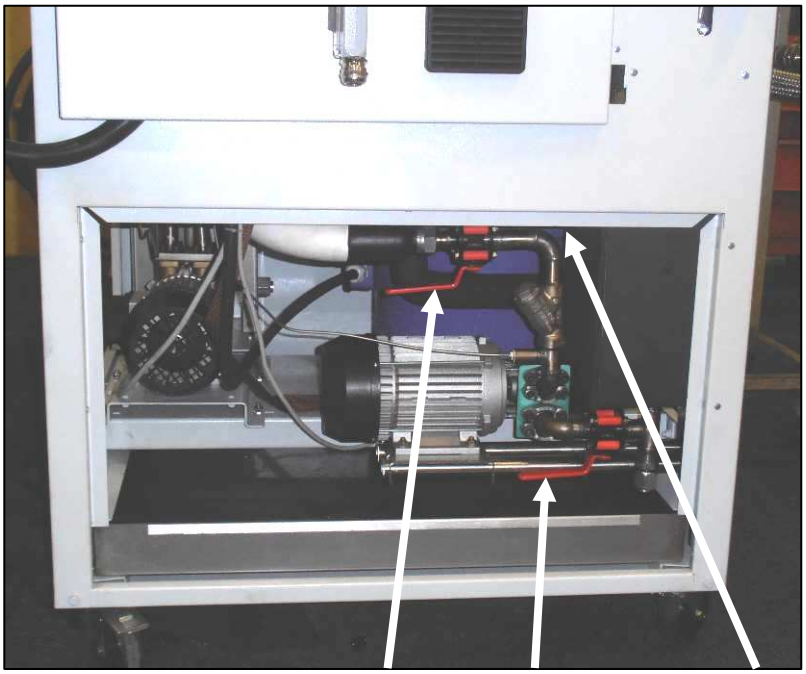
DANGER: RISK OF EXPLOSION!

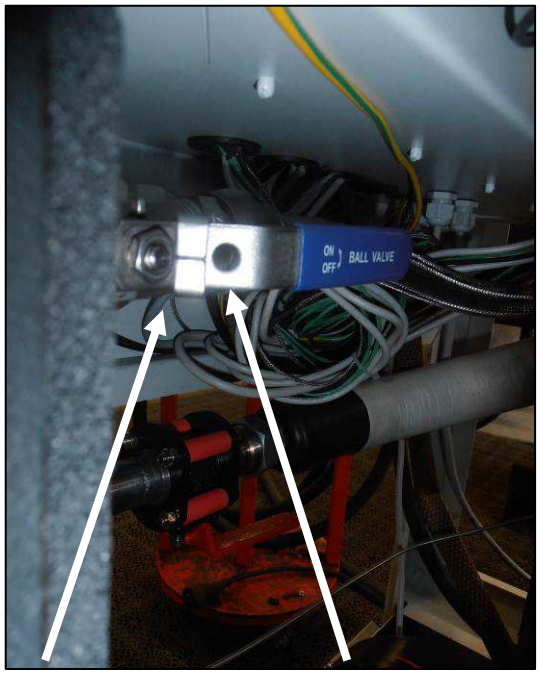
The replacement of the heating element in the upper reservoir ABSOLUTELY MUST be replace by a heating element with an ATEX certified heater equipped with a probe thermo fuse identical to the original (ref Vulcanic: 4605102.00).

NO-COMPLIANCE WITH THIS RULE CAN CAUSE MAJOR DAMAGE TO PROPERTY AND PEOPLE

DANGER: RISK OF EXPLOSION!

Maintenance valves R71, R72 and R73 are required to remain open when the vulatherm work (pump and / or heating)
NO-COMPLIANCE WITH THIS RULE CAN CAUSE MAJOR DAMAGE TO PROPERTY AND PEOPLE





R72 R71 R73 (Located below the electrical box)

For avoided the malicious closing of the valve R73. It is possible to congeal the valve in the open position to the help with a padlock.

2 CAUTION

- Use the rating plate to check that the reference number for the commercial specification of the equipment actually corresponds to the present manual. Check also that the device frequency and the nominal voltage is the same as your electrical communication.
- Make you sure that you got the SGC manual instruction “UT30789”.
- If existing, please read in priority the annex dedicated to your Vulcatherm.
- If your Vulcatherm® is class 2, please read the DESP user manual “UT_DESP_CATII”.

3 CHARACTERISTICS, DOMENSIONS ANS HANDLING

3.1 Characteristics

Thermal fluid:

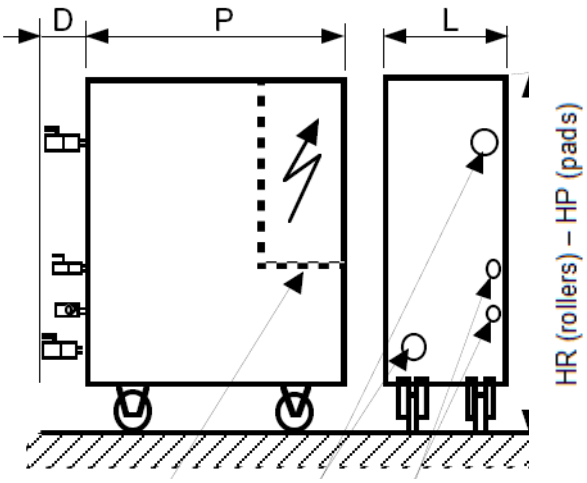
- Mineral heating oil ISO VG 32 withstanding 300°C in density (for minimum 10°C to maximum 250°C) type SERIOLA ETA 32.
- Synthetic heating oil withstanding 350°C in density (for minimum -20°C to maximum 260°C) type MARLOTHERM LH or equivalent
- Synthetic heating oil withstanding 350°C in density (for minimum -30°C to maximum 260°C) type JARYTHERM BT06 or equivalent
- Synthetic heating oil withstanding 370°C in density (for minimum -10°C to maximum 350°C) type JARYTHERM DBT or MARLOTHERM SH or equivalent

 **DANGER: RISK OF EXPLOSION !**

For type 10823 only, the heating fluid must not have an auto-inflammation temperature under 440°C. This in order to prevent any risk of explosion due to the presence of an anti-condensation electric immersion heater placed in the upper tank.

Usage temperature:	Range 180°C or 250°C or 300°C or 350°C maximum, see identification plate.
Power supply voltage:	230 to 500 VAC tri + T - 50/60 Hz, see identification plate
Heating power:	Standard 4 to 150 kW -5 +10%
Cooling power: temperature	Depends on the set point temperature and the water inlet or cooling air
Temperature regulator:	SGCEco, SGC.v2, SGC.v3 and SGC.v3Twin
Temperature probe:	Internal on the fluid outlet, or external (option).
Pumps:	See hydraulic nomenclature
Noise level:	Less than 75 dB(A)
Vibrations level:	Frequency of weighted quadratic average acceleration less than 2.5 m/s2

3.2 Dimensions



Electric connection Use Electric cooling

The table given opposite provides the different standard formats.

Notes:

(1) See hydraulic nomenclature
(2) Approximate values; depending on the options
(3) From the size R2, the length D of the tapping points of CR versions is to be added to L, and not to P (the tapping points are lateral).
(4) Format 34 will be available in 2012 only. Till then, format 5 is used.
(5) Format 34AR will be available in 2012 only. Till then, format R0CR is used.
(6) The formats whose reference ends with G (sheath) are designed to evacuate the cooling air by blowing in a sheath.

Type (1) Format	OBSTRUCTION in mm					Mass (2) (kg)
	HR	HP	L	P	D(2)(3)	
1	570	530	300	500	150	40
2	670	630	320	550	180	50
34(4)	780	730	400	830	200	90
34AR(5)	980	930	400	830	200	110
5	1170	1080	500	900	280	240
5 B	1370	1280	600	1000	280	280
6	1570	1480	600	1280	300	325
6B			800		300	
6BL			800		300	
R0					180	
R0CR					180	
R0CRG(6)					180	TBD
R1					180	
R1CR					180	
R1CRG(6)					180	
R2AR	ND	2200	1000	760	300	TBD
R2CR	ND	2200	1000	1560	300	
R2CRG(6)	ND	2125	1000	2060	300	
R4AR	ND	2200	1000	1520	300	TBD
R4CR	ND	220	1000	2320	300	
R4CRG	ND	2125	1000	3000	300	1300
R6AR	ND	2200	1000	2280	300	TBD
R6CR	ND	2200	1000	3080	300	TBD
R8AR	ND	2200	1000	3040	300	TBD
R8CR	ND	2200	1000	3840	300	TBD

ND : option not available TBD: to be determined

3.3 Handling

VULCATHERM can be handled with forklift trucks, or by slinging when it has lifting bands.

4 PRINCIPLE OF OPERATION

4.1 Particularities of the thermal regulators with fluid superposition

This manual concerns all the Vulcatherm thermal regulators said to have "fluid superposition". The fluid superposition cooling system consists in cooling the heating fluid, not by direct exchange of heat with the cooling water, but by injection of cold fluid in the heating circuit.

There are three cooling modes for these machines:

- The model 10803 is water cooled. It is the simplest, most economical and most compact model.
- The model 10823 is cooled by a chilling unit (air or water condensation). This model allows cooling the heating fluid at a temperature less than that of the cooling fluid (water or ambient air).
- The model 10833 is air-cooled, i.e. cooled with ambient air. Thus, it does not require cooling water. It is available in "compact" or "split" model. In the latter case, the air-cooling unit is separated from the thermal regulator itself, so as to be placed outside, for example. The air-cooled model generates its maximum power if the heating fluid is hotter than the ambient air by at least 65°C and if the ambient air is not hotter than 35°C. Its cooling power becomes null when the heating fluid temperature is greater than that of ambient air by 5 to 10°C only.

The fluid superposition Vulcatherm is paraticularly suitable in the following cases:

- Very high temperature,
- Great difference between the minimum and maximum temperatures, and particularly in case of use of a chilling unit (type 10823) or an air cooler (type 10833).
- High cooling dynamic (requiring oversized tank),
- Minimum cooling water consumption.

The fluid used for cooling injection is maintained under the temperature of the heating circuit through an auxiliary circuit integrated into Vulcatherm®. This circuit includes essentially:

- The fluid tank and its level detector. In the models 10823 & 10833, the tank is divided into two communicating stacked volumes. In the model 10823 only, the two volumes are thermally insulated.
- In the model 10823 only, a heating device associated with a TCJAC temperature probe, is fitted in the upper volume. This device eliminates the risk of water condensation in the heating fluid.
- A TCJR tank temperature probe allowing regulation of its temperature. When the tank has two volumes, the probe is placed in the lower volume.
- In the model 10833 only, a TCJB temperature probe allowing regulation of the fluid temperature at the air-cooled battery outlet.
- A TH2 safety thermostat. This thermostat is located:
  - In the models 10803, on the unique volume of the tank
  - In the models 10823, on the upper volume of the tank, so as to ensure the safety of the anti-condensation electric immersion heater.
  - In the models 10833, on the lower volume of the tank, so as to ensure the safety of the air-cooled battery.
- The auxiliary pump P2,
- A CPPA pressure probe, placed in the discharge of the auxiliary pump P2. This probe allows checking the flow of the pump as well as the absence of clogging of the filter given below.
- Various insulation valves facilitating actions, particularly cleaning of the filter,
- A filter,
- A motorised valve controlling the injection flow rate.
- A cooling device. According to the models, this can be:
  - For type 10803, a heat exchanger placed on the fluid return to the tank, its solenoid valve for cooling water supply, and a device checking the cooling water flow (Rotoflow flow meter).
  - For type 10823 (hot/cooled Vulcatherm®), the exchanger is an evaporator placed in the auxiliary pump discharge. This evaporator is associated with the regular components of a chilling system (compressor, condenser, relief valve, ...).
  - Finally, for type 10833 (air-cooled Vulcatherm®), the exchanger is an oil/air battery, placed in the auxiliary pump discharge. This battery is associated with a 3-way all-or-nothing motorised valve allowing by-passing the battery during operation in water separation mode. A fan provides the air flow required for cooling. A temperature probe allows limiting the discharged air temperature to 60°C on average.

4.2 Hydraulic principle diagram and nomenclature

See attached pages.

5 ELECTRIC PRINCIPLE DIAGRAM AND NOMENCLATURE

See attached pages.

6 HYDRAULIC AND ELECTRICAL CONNECTIONS

Check on the identification plate that the reference of the device corresponds to that of this manual and that the rated voltage, the frequency and the total power are compliant with your network.

6.1 Hydraulic connection

- Check the closure of the drain valves (dismantled levers) or drain plugs generally located at the lower points of the circuits (see hydraulic diagram) as well as, eventually, the closure of manual drain valve(s).
- Connect the device hydraulically:
  - To the receiver with 2 pipes withstanding, continuously, the maximum temperature indicated on the identification plate. The presence of a sieve filter on the retur of usage is not generally required, the 108x3 series Vulcatherm being systematically fitted with a filter on the auxiliary circuit. However, in case of a first start on a receiver known to be very polluted, the provisional installation of such a filter is recommended.
  - For the water-cooled models (10803 & 10823 with water condenser), to the cooling circuit with 2 pipes fitted with joins adapted to the device (min. pressure difference between the 2 pipes and minimum cooling water flow as per requirement of the hydraulic diagram). Check the presence of a sieve filter on the cold water inlet. The internal diameter of the tapping connection must not be less than that of VULCATHERM®. Finally, for the type 10803 only, the return pipe must permanently whithstand water at 95°C, and occasionally, steam at the saturating steam temperature corresponding to the counter-pressure of the return circuit.

When several VULCATHERM are connected in parallel on the same cooling circuit, the piping must be balanced to avoid preferential passages, which could generate regulation instabilities. It is then recommended to oversize the diameter of the evacuation pipes and to install a water-hammer arrester expansion vessel on the inlet header.

- In the case of a 10833 "Split" (i.e. with separate air-cooling unit) connect the air-cooling unit with Vulcatherm. This link must be able to withstand 130°C and 12 bars continuously. It is not essential to insulate it, but, since its temperature often exceeds 60°C, it is necessary to protect it in order to avoid risks of burns. Since some synthetic heating fluids can be chemically agressive, exclusively use:
  - Carbon steel (for rigid pipes)
  - Stainless steel (for flexible and rigid pipes)
  - Teflon (for flexible pipes)

If the distance between Vulcatherm and the air-cooling unit does not exceed 10 m, use a pipe of the same diameter as the Vulcatherm tapping points. If the distance between Vulcatherm and the air-cooling unit falls between 10 and 25m, use a pipe of larger size. If the distance exceeds 25m, use a pipe 2 sizes larger.

- Check the full opening of all the taps placed in the auxiliary circuit (in general 3: one at the suction of the auxiliary pump, one at the discharge of the pump, one after the filter).

If the receiver has lower points located below the VULCATHERM®, a tap must be installed there to ensure the possible full draining of the circuit.

 CAUTION:

The cold water supply networks must be free of particles greater than 100 µm.

The hydraulic connections for external use of this device are brought to the maximum temperature indicated on the identification plate. Prevent risks of burns to the personnel through suitable protection at the time of installation (thermal insulation, protection grid, hood).

6.2 Electrical connection

 DANGER:

- Connect the power supply cable to the R, S, T terminals or to the general switch. This connection must be carried out according to the good engineering practices and applicable regulations, particularly for the cable diameter to use. The power supply line must be able to withstand, in steady state, the maximum current shown on the electric diagram and the identification plate. It will be properly protected upstream, with distributed earthing.

 IMPORTANT:

- If necessary, connect the connecting cables between VULCATHERM and the automatic control device or remote control: See electric diagram.
- In the case of a 10833 "Split" (i.e. with an air-cooling unit separate from Vulcatherm) connect the air-cooling unit with Vulcatherm. Two cases are possible:
  - If the air-cooling unit has its own switch/disconnecting switch, connect the unit to the network (single or three-phase voltage as per the case, check the identification plate of the air-cooler), then connect the link RS485 between Vulcatherm and its unit (1 sheathed pair).
  - If the air-cooling unit does not have its own switch/disconnecting switch, individually connect the sub-systems: Fan(s), by-pass valve, thermocouple probe of the air temperature. See the electric diagram for the connection details.
- After having checked there is an appropriate voltage on the power supply terminal, close the door of the electric cabinet.

7 CONTROL OF THE SGC.V2

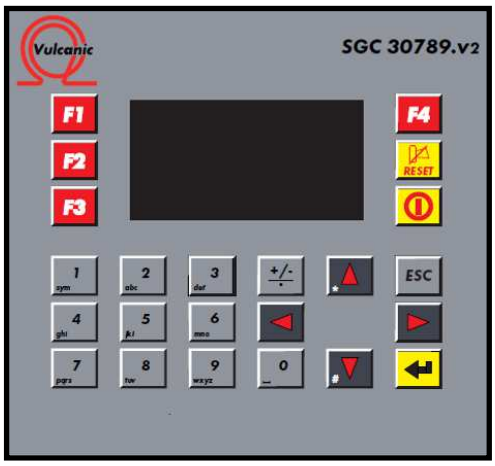
Caution: These instruction sheets explain how works Vulcatherm® equipped with a Centralised Management System SGC.v2. However, THE SGC.v2 has close to a SGCEco operation, a SGC.v3 or SGC.v3Twin. For more details, please refer to the manual of SGC "UT30789" instruction.

This chapter presents the mains screens of SGCs, which are the start-up page and the elementary control, and fluid superposition screens. For the others screens this manual crossrefers to the instructions manual."UT30789".

Moreover, in a continuous improvement approach, Vulcanic frequently updates the SGCs' software. If you observe a difference between the software available in this manual and the screens of your SGC, consult the instructions manual."UT30789".

7.1 General presentation

7.1.1 Machine interface



The interface is composed of:

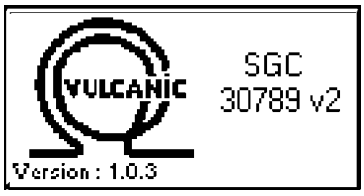
- A Start/Stop button: Start/Stop of the thermal regulator.
- A Reset/Stop Horn button RESET: to stop the horn and reset the defaults.
- Buttons F1...F4: main navigation buttons.
- Alphanumeric keypad.

Four direction keys.

- Up arrow: Increase the set point
- Down arrow: Decrease the set point
- Left arrow: Go to the previous page
- Right arrow: Go to the next page
- An ESC button: allows cancelling the current action.
- A Validate button: allows saving each modification.

7.1.2 Energising

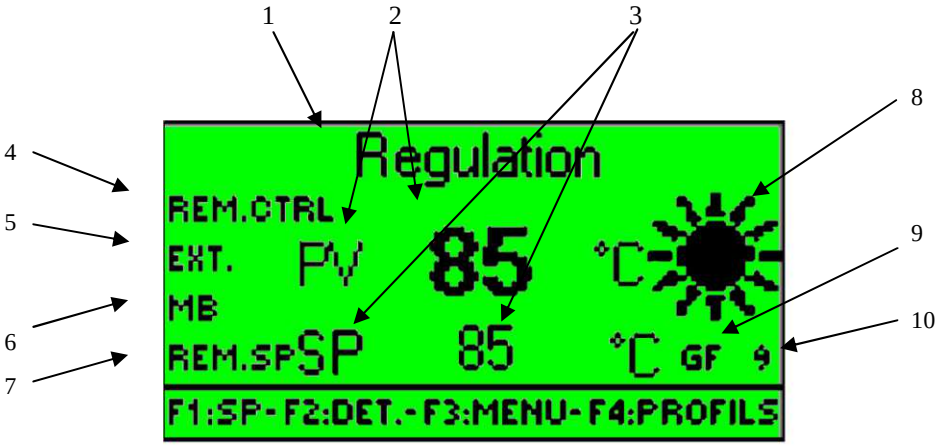
The first page upon energising the machine displays the programme version number.



7.1.3 Home

The home page presents the summary of the main information. It also allows entering the set point.

In case of fault detection, SGCv2 automatically returns to this page.



Information and set point input area:

1 -Machine status indicator, "Regulation" in the example given above (see the Sgcv2 manual for the list of possible messages).

2 -PV (Process Value): indicates the current measurement, in °C.

3 -SP (Set Point): indicates the current set point. Adjustable digital value.

4 -Indicator of remote or programmed operation:

a. Indicator unlit: local operation only.

b. REM.CTRL (Remote Control): indicates that the thermal regulator is remote controlled.

c. PROG (Programmer) : indicates that the thermal regulator operates on program alone..

d. PRG/MAN: indicates that the thermal regulator accepts manual and programmed off and on orders.

5 -Regulation mode indicator:

a. Indicator unlit: internal probe regulation.

b. EXT: indicates that external probe regulation is active.

c. CASC.: indicates that cascade regulation is active.

6 -Digital links (fieldbus or Ascii frames);

a. Indicator unlit: no bus or digital link activated.

b. DP: indicates that the Profibus DP link is active.

c. MB: indicates that the Modbus (RTU or IP) link is active.

d. 2.0A: indicates that the CanBus 2.0A link is active.

e. 2.0B: indicates that the CanBus 2.0B link is active.

f. V485: indicates that the proprietary Vulcanic link (ASCII frame on RS485) is active.

g. ENG: indicates that the ENGEL proprietary link (ASCII frame on current loop) is active.

7 -Set point origin indicator:

a. Indicator unlit: local set point modifiable on the keyboard.

b. REM.SP (Remote Set Point): indicates that the remote set point is activated. In this case, the set point cannot be entered on the keyboard.

c. PROFILE: The profile generator (as an option) is in use (the set point cannot be entered on the keyboard).

d. HOLD: The profile generator is held (the set point cannot be entered on the keyboard).

e. DISEN.: The profile generator is disengaged (the set point can be entered on the keyboard).

f. HL/DIS: The profile generator is held and disengaged (the set point can be entered on the keyboard).

8 - Heating/cooling/limitation indicator:

Heating

Cooling

Heating power limitation

The limitation indication appears in the following cases:

a. The surface temperature of the heating elements has reached a maximum

b. The flow rate is momentarily too low.

c. The heating fluid temperature has reached a maximum

d. The maximum delta T has been reached (only if management of delta T is active).

9 - Special operation indicator of the cooling system:

a. Indicator unlit: no special indication. If a chilling unit is installed it is off.

b. GF: the chilling unit is in use.

c. AP: the chilling unit is stopped forcibly.

d. PE: Vulcatherm® operates in mode without cooling water (Vulcatherm 10803 only).

e. TC:For vulcatherm type 1080x a overheating message of the refrigeration unit (Vulcafroid) associated was received, therefore, the Vulcatherm do not provided cooling power.

10 - Segment number: in the case where the "Profile Generator" option is taken, indicates the current segment number.

7.1.4 Navigation keys:

F1 Key : is used for modifying the current set point using the digital keypad and for validating any modifications (it is inactive if the remote set point is active).

F2 Key : is used for changing over to the details screen.

F3 Key : is used for changing over to the running modes & menus screen.

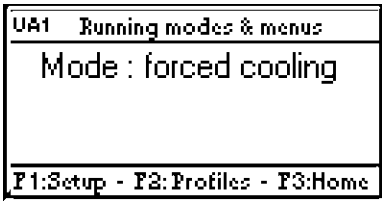
F4 Key : the F4 key can be used in the following cases:

- If the "Profile Generator" option is available, the F4 key allows changeover to the Profile Generator management screen.
- If the "Profile Generator" option is not available, the F4 key can be set up to select the measurement probe (internal or external probe). Setting up uses the External Measurement page R4 (see chapter 5.4.8).

7.2 Running mode and menus access:

This user menu subsection includes two screens.

7.2.1 UA1 Running modes & menus:



To open the running modes action page, press the F3 key from the homepage.

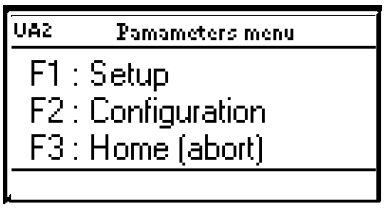
The running modes are:

•Regulation: the pump or pumps are operating and Vulcatherm® regulates them to the set point temperature.
•Pump alone: the pump (or pumps) is or are operating alone without heating or cooling, for instance, to start a process or to check the flow rate and pressure.
•Forced cold: maximum cooling power is applied
•Degassing/Forced cold: (option in replacement of the mode given above on some thermal regulators). The circuit evacuates the air that can remain in the circuit and maximum cooling is applied.
•Filling: (option available in some models only). The auxiliary pump works alone, it fills the heating fluid circuit.
•Regulation + cont. degassing: regulation and continuous degassing (option available in some models only). Regulation associated with the evacuation of air trapped in the circuit.
•Water separation: (option available only the thermal regulators 10803 with fluid superposition). This mode allows evacuating the liquid in emulsion state in the heating fluid following a circuit pollution from a fluid (for instance water or alcohol) with a lower boiling point The use of this mode is subjject to special conditions (see chapter 8.3).

The navigation keys are:

- F1 Key :is used to change over to the menus selection screen (see chapter 5.2.2).
- F2 Key :is used to change over to the profile generator menu (in option).
- F3 Key :return to home.

7.2.2 UA2 Change of menu:



It can be accessed from the homepage, by pressing on the F3 Running modes & menus key then on the F1 settings key (see above).

This page gives access to three available menu levels:

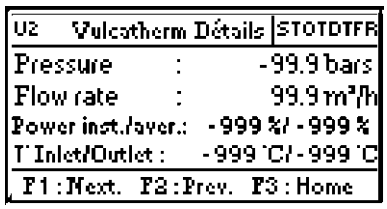
- [F1]: Setup: accessible to qualified personnel only.
- [F2]: Configuration menu: Accessible to authorised personnel only (Caution: access by password).
- [F3]: Home (abort) : return to the current menu (user menu).

7.3 Other screens of the setting menu

7.3.1 U1 Next programmed starting or stopping time

See the corresponding chapter of the Sgcv2 manual.

7.3.2 U2 Details Vulcatherm®:



In the upper right hand zone, there are heater limitation reason indicators. These reasons can be:

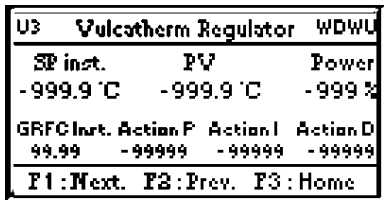
- ST (Surface Temperature): the surface temperature of the heating elements has reached a maximum
- OT (Outlet Temperature): The temperature of the heating fluid has reached a maximum
- DT (DeltaT): the maximum delta T has been reached (only if management of delta T is active).
- FR (Flow Rate) : The flow is momentarily too low.

In the central zone, is displayed:

- Pressure: output pressure (in bar).
- Flow rate: output flow rate (in m3/h).
- Instant/average power : instant and average powers (in %). The average power is calculated for 2 sliding minutes. The power (instant and average) is positive when Vulcatherm® is heating and negative when Vulcatherm® is cooling.
- Element/Output T°: indicates the heating element and start temperatures of Vulcatherm®. The indicated heating element temperature is the average temperature of the heating element thermocouples in the heater. This indication is only available on thermal regulators with instrumented heating elements. The starting temperature is the outgoing heating fluid temperature (in °C). If Vulcatherm® is regulating on an internal probe, this value equals PV (process value).

7.3.3 U3Regulator operation

It allows viewing the operation of the regulator:



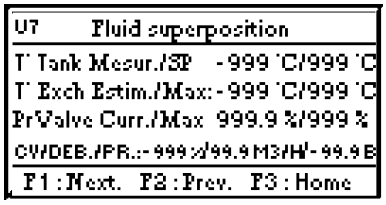
- Inst. SP (Set Point): The instant set point in °C, which can be different from the set point displayed on the Homepage, which indicates only the final set point.
- PV (Process Value): Temperature in °C measured on the internal or external probe, depending on the selection.
- Power: Power generated by the thermal regulator in % of the rated power. It is negative if the thermal regulator is cooling.
- Instant GRFC (Instant Heat Cold Relative Gain) : A way of adapting the cold outlet gain with respect to the heat outlet gain (and therefore modifying the respective value of the cold proportional band with respect to the heat proportional band). It is all the lower as the cooling is considerable. This value depends on the GRFC at 65°C (entered on page C5 Cooling law) and on the instant temperature difference between the main circuit and auxiliary circuit.
- Action of the PID: Displays Proportional, Integral and Derived actions. The sum of the three actions is 10 times the applied power in %

7.3.4 Digital link status

If applicable, see the corresponding chapters of the Sgcv2 manual.

7.3.5 U7 Description of the page "Fluid superposition":

In the central zone, from top to bottom, is displayed:

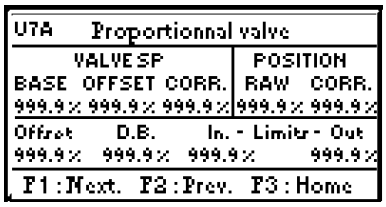


- **T° Res.Mes./ Cons**: temperatures of the measured tank and maximum authorised.
- **Estim./Max. Exchanger T°**.: the inlet temperatures of the exchanger, estimated thanks to the position of the valve and the maximum authorised temperature.
- **Pos.Vp Cou/Max**: current and maximal positions of the authorised proportional valve.
- **CV/DEB./PR**.: the power required by the temperature regulator of the tank, the cooling water flow rate and the discharge pressure of the auxiliary pump.

In the case of type 10823 (cooling by chilling unit), the last line is replaced with:

- **CV/T°INE./PR**.: the power required by the refrigerated tank temperature regulator, the expansion tank inerting temperature and the auxiliary pump discharge temperature.

7.3.6 U7A Description of the page "Proportional valve position.":



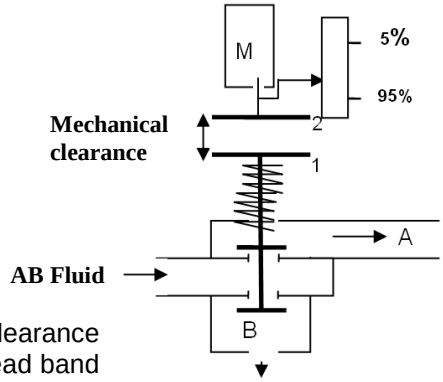
This page appears only if the coolant circuit uses a proportional valve. This valve exists only on the air cooled models 1083y (10831, 10832, 10835, and 10836). Or on the 10806 which can reach 160°C.

From top to bottom and left to right, the display is:

- **VALVE SP**: Because of the difference between the electric setpoint and the mechanical setpoint and also the possible presence of a mechanical clearance, corrections have to be made to the requested position (setpoint) for the proportional valve.

BASE: position of valve requested by regulator.
OFFSET: basic setpoint corrected for mechanical clearance of valve.
CORR.: above setpoint offset to allow for position of mechanical travel ends.

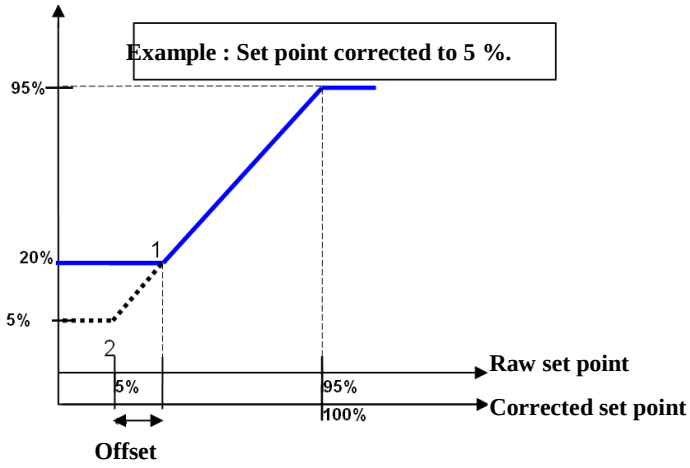
- **VALVE POSITION:** current valve position.
- **Offset**: compensation for mechanical clearance as set out in the configurations menu in the table “CF proportional valve positioner”.
- **B.M.**: Positioner dead band.
- **Limits**:
  - **Inl.**: extreme position reached on inlet,
  - **Outl.**: extreme position reached on outlet.
- **Position** :
  - **RAW** : Raw valve position
  - **CORR** : Valve position with correction



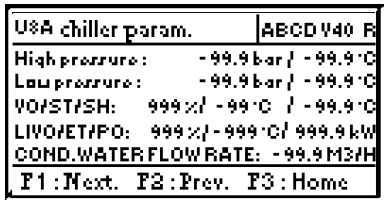
By construction, some valves have a mechanical clearance between valve pusher 1 and motor pusher 2, creating a dead band in which the valve no longer moves although the motor is running. This clearance generates non-linearity, which could be detrimental to correct operation of the Vulcatherm®. It has to be corrected. The principle of correction explained below in the case of a distribution valve used to control cooling.

In the figure opposite, when motor pusher 2 is not in contact with valve pusher 1, the spring released and the valve comes to the high position. All the fluid from AB runs through circuit A (no cooling).

After compensation for the clearance when pusher 2 presses against pusher 1, the spring is compressed, the valve drops to the low position and liberates into circuit B an amount of fluid proportional to the descent of the valve.



7.3.7 Description of the page "Chilling parameters":



This screen is displayed only in the case of type 10823 (Vulcatherm® fitted with a chilling unit).

In the top left zone, we find the operation indicators of the chilling components:

- **A**: is displayed when the compressor N°. 1 is operating
- **B**: is displayed when the compressor N°. 2 is operating
- **C**: is displayed when the compressor N°. 3 is operating
- **D**: is displayed when the compressor N°. 4 is operating
- Ventilator operation indicators:
  - **VLS** (Ventilator low speed): the ventilators operate at slow speed
  - **VMS** (Ventilator medium speed): the ventilators operate at medium speed
  - **VHS** (Ventilator high speed): the ventilators operate at high speed
  - **V10 to V100**: variable speed ventilators. % of speed from 10% to 100%.
- **R**: is displayed when the electronic relief valve valve operates at reduced power.

In the central zone, is displayed:

- **HIGH PRESSURE**: chilling fluid pressure on discharge of the compressor. It is expressed in bars as well as in saturating steam temperature.
- **LOW PRESSURE**: chilling fluid pressure on suction of the compressor. It is expressed in bars as well as in saturating steam temperature.
- **OD/TA/SC:** Opening of the main relief valve/suction temperature/ over heating:
  - Opening of the relief: expressed in percentage.
  - Suction temperature: temperature measured by the probe positioned at the suction of the compressor. It is used to monitor the solenoid valve for injection of liquid. It is also used to calculate the over heating of the drawn in gases.
  - Over heating: it is the difference between the suction temperature and the saturating steam temperature on suction. In order to ensure that the compressor does not draw in liquids, this parameter must remain positive.
- ODIL/**TE/PU**.: Opening of the liquid injection relief valve, Evaporator output temperature / Power.
  - Opening (in %) of the liquid injection relief valve (used to cool the gases drawn in by the compressor)
  - Evaporator output temperature: heating fluid temperature at the outlet of the evaporator. This value is used to start the anti-icing safety.
  - Power: conventional power of the compressor according to the Asercom standard.
- **COND. WATER FLOW**: (Is displayed only in case of water cooled condenser). Cooling water flow of the condenser.

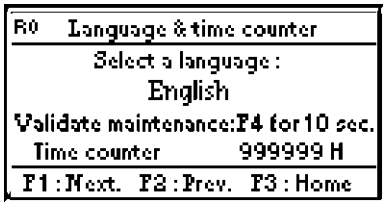
7.3.8 Profile generator

If applicable, see the corresponding chapters of the Sgcv2 manual.

7.4 Adjuster menu

The adjuster menu allows basic thermal regulator settings. The pages of this menu are described in the following paragraphs. It is available in several languages.

7.4.1 R0 Languages and time counter:



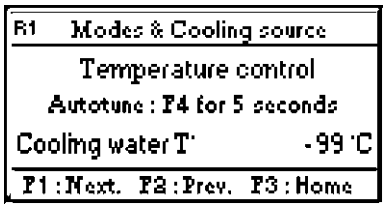
From top to bottom it displays

- The language selector. Used for choosing the display of operator and adjustment menus from among:
  - French (by default).
  - English.
  - German (Deutsch).
  - Espagnol (Español).
  - Portugueuse (Português).
- Hourly meter: Indicates the number of running hours of the main pump.

If maintenance validation is necessary the indication “Maintenance validation: F4 for 10s” appears. To validate the maintenance, hold the F4 key down for 10 seconds.

7.4.2 R1 Temperature regulation / Power proportioning:

From top to bottom, is displayed:

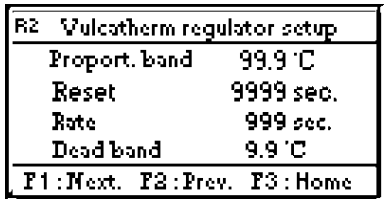


- Mode selection:
  - Temperature regulation: normal regulation operation.
  - Power proportioning: a way of establishing a constant heating or cooling power factor. Essentially, this mode is intended for regulation testing and development. Without surveillance, the outlet temperature of the Vulcatherm® can reach the temperature limits (maximum temperature if the sum of the power is positive, otherwise minimum temperature).
- Cold water T°: the cold water temperature is a digital value on which the cooling power calculation is based.

If the conditions for starting a self-adjustment cycle are fulfilled, the indication "For self-adjustment: F4 for 5s" appears.

To start the self-adjustment cycle, hold the F4 key down for 5 seconds.

7.4.3 R2 Vulcatherm® regulator set-up:



In the central zone, we find:

- **Prop. band**.: proportional band. Digital value adjustable between 0.1°C and 99.9°C.
- **Integral**: digital value adjustable between 1 and 9999 seconds. The integral time cannot go below 4 times the rate time (See below). In some cases, decrementation of the integral time can result in automatically decrementing the rate time...
- **Rate**: digital value adjustable between 0 and 999 seconds, with a maximum of quarter of the integral time (See above). The display "0" means " rate time zero = no correction of rate". In some cases, decrementation of the integral time can result in automatically decrementing the rate time...
- **Dead band**: digital value adjustable between 0 and 30% of the proportional band.

7.4.4 R2A. Process regulator

See the corresponding chapter of the Sgcv2 manual.

7.4.5 R2B. Ramps

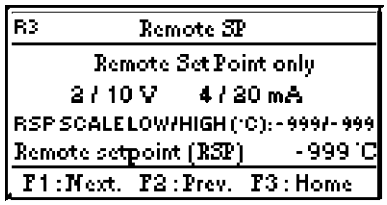
See the corresponding chapter of the Sgcv2 manual.

7.4.6 R2C. Delta T

See the corresponding chapter of the Sgcv2 manual.

7.4.7 R3 Remote set point:

In the central zone, we find:

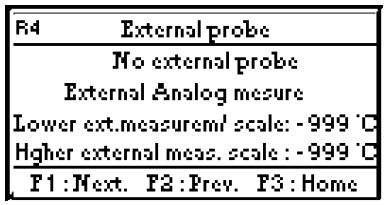


- The remote set point for choosing between:
  - **Local set point only:** The set point can only be input on the home page.
  - **Remote set point only:** the set point used comes from the external signal (digital or analog). It cannot be modified on the home page.
  - **Remote set point on input I14:** an external on/off signal allows switching between the 2 previous modes.
  - **Remote set point controlled by BUS:** A BIT from the digital link allows passing in remote set point mode. This option is functional only if a digital link of type modBUS or profiBUS is used.
  - **Remote set point on remote control:** Vulcatherm automatically switches to remote set point mode as soon as the remote monitoring is active.

The selection of the remote set point displays:

- The selector of the analog input scale allows selecting between:
  - **2/10V 4/20mA:** select this mode if your signal has a offset origin of 20%. This is particularly the case for the analog current loops 4/20 mA.
  - **0/10V 0/20mA remote only:** select this mode if your signal does not have a offset origin. This is particularly the case for the analog signals 0/10 volts.
- **HIGH/LOW SETPOINT SCALE (°C)**: Low and high set point scale. For the lower limit, digital value adjustable between -100°C and the top of the remote set point scale. If this parameter is less than the lower limit of the local set point scale, the SGC v2 will be limited to this value (lower limit of the local set point scale). For the upper limit, digital value adjustable between the lower limit of the remote set point scale and 600°C. If this parameter is greater than the top of the remote set point scale, the SGC v2 will be limited to this value (top of the local set point scale).
- **Remote set point Instant. :** instant value of the remote set point, according to the scales given above.

7.4.8 R4 External probe:



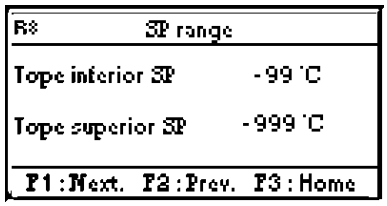
In the central zone, from top to bottom and from left to right, we find:

- Selection of the external probe
  - -External probe deactivated: the external probe is not used, regulation is carried out on the internal probe of Vulcatherm®.
  - -Activated external probe
  - -Active external probe on condition
  - -Activated cascade regulation (option, see description of cascade regulation in the SgcV2 manual).
  - -Cascade regulation at inlet I16/32. Same remark as above.
- Choice of measurement source:
  - -Analog measurement external analog measurement,
  - -External T° per bus: external measurement by digital link (option).
- Choice of measurement selection:
  - -Select by contact: selection by electric contact,
  - -Selection by F4: selection by the F4 key on the homepage (only if the profile generator option is not available),
  - -Selection by bus: selection by digital link.
- Bottom external measurement scale: digital value adjustable between -100°C and the top scale of analog measurement. If this parameter is lower than the bottom of the local set point scale, the SGC v2 will be unable to use the measurements located beneath the bottom of the local set point scale.
- Higher external measurement scale: digital value adjustable between the bottom of the analog measurement scale and 600°C. If this parameter is higher than the local set point scale top, SGC will be unable to use measurements located above the top of the local set point scale.

7.4.9 Temperature alarm

See the corresponding chapter of the Sgcv2 manual.

7.4.10 R8 Set point scale

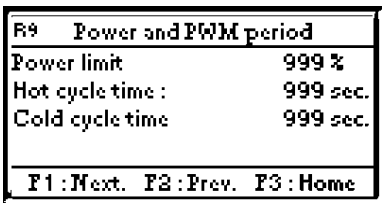


Defines the range for the SP set point (local or remote) :

- Tope inferior SP: Digital value adjustable between the bottom of the set point scale and the tope superior SP
- Tope superior SP: Digital value adjustable between the tope inferior SP and the top of the set point scale.

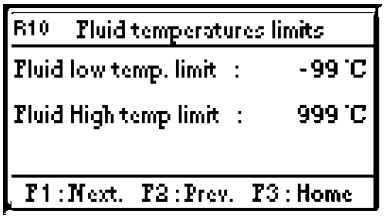
7.4.11 R9 Power and PWM period

In the central zone, we find:



- **Maximum power**: It is possible that the heating efficiency is over-abundant. The heating power can be controlled by displaying a maximum power percentage of less than 100% (Example: a 20 kW VULCATHERM only dissipates 12 kW when its MAX POWER parameter is set to 60%).
- **Hot cycle time**: Digital value which must be adjusted at max. 1 second. In the case of Vulcatherm having an individual heating control for each heating element, this parameter is inoperable and the cycle time is of 1.11 second.
- **Cold cycle time**: Digital value adjustable between 10 and 120 seconds. Normally adjusted to 30 seconds. Evidently, this parameter is inoperable in the case of air-cooled Vulcatherm (10823 with air condensation and 10833). Sometimes, it can also be inoperable in the case of 10823 with water condensation (according to the type of cooling water flow control valve).

7.4.12 R10Fluid temperature limits



Fluid low temp. limit: Digital value adjustable between the bottom of the set point scale and 90°C, exclusively when the measurement probe is external. Allows limiting the minimum output temperature, independent of any other condition.

Fluid high temp. limit: Digital value adjustable between 0°C and the high set point scale, exclusively when the measurement probe is external. Allows limiting the maximum output temperature, independent of any other condition.

If the 2 values are overlapping, the low limit is aligned on the high limit.

7.4.13 R11 - Digital link

See the corresponding chapter of the Sgcv2 manual.

7.5 Configuration menu

The screen pages shown in this chapter are reserved exclusively to users having all the skills needed for setting up a thermal regulator. The input of an incorrect parameter can cause extensive damage to properties and persons.

Caution:

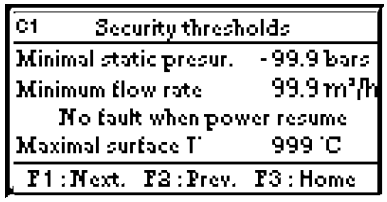
This menu is exclusively bilingual in French and English.

Access requires a password, using the following procedure

- Go to the homepage (See chapter 5.1.3),
- Press the F3 key to switch to the running mode and menu screen.
- Press the F1 key to open the menu selection screen.
- Press the F2 "Configuration menu" key (see chapter 5.2.2),
- Input the password to log on to the configuration menu. If you don't have it, please contact the Vulcanic's after-sales service.

7.5.1 C1. Safety thresholds

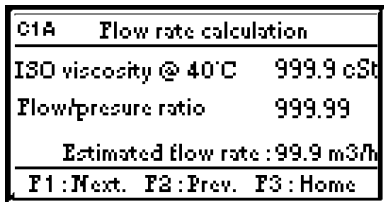
In the central zone, we find:



- **Minimal static pressure**: Minimum static pressure of the heating fluid, measured on CPP.
- **Minimum flow** : Flow rate beneath which the "No flow rate" error message appears.
- **Fault / no fault when power resumes** : Activate or deactivate the "Power return" message on energising.
- **Maximum surface T°** : Maximum authorised surface temperature of the heating elements.

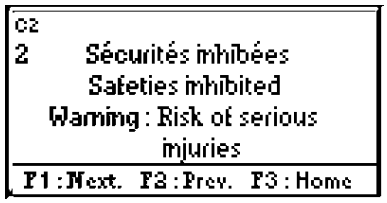
7.5.2 C1A. Flow meter parameters

In the central zone, we find:



- **ISO Viscosity**: Allows setting the kinematic viscosity of the fluid. The parameter is used by the flow activation algorithm.
- **Coeff. Flow rate/Pressure**: Allows calibrating the flow display panel in m3/h

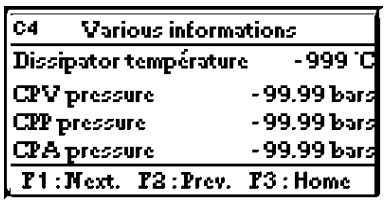
7.5.3 C2. Safety devices



Allows deactivating most of the safety devices (By default, the safety devices are activated).

CAUTION: INHIBITING THE SAFETY DEVICES CAN CAUSE MAJOR DAMAGE TO PROPERTY AND PERSONNEL.

7.5.4 C4. Various information

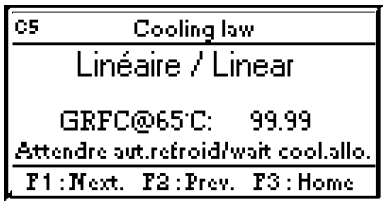


This screen shows, in read only, various useful information to check the correct operation of the thermal regulator.
In the top right zone we find the temperature of the heat sink. This value is valid only if an electronic power card having a thyristor heat control is used.
In the central zone, from top to bottom and from left to right, we find:

- **Rotoflow**: Cooling water flow rate measured by the Rotoflow flowmeter.
- **CPV pressure**: Used for the calculation of the flow rate and for the display of the effective pressure present on the usage outlet pipe.
- **CPP pressure**: Used for calculating the flow rate.
- **CPPA pressure**: Used to check the flow of the auxiliary pump P2 and the absence of clogging of the filter.
- **Delta P**: indicates the clear pressure difference (corrected with the measurement offset) between CPV and its reference probe (CPP, CPA or the atmosphere) according to the Vulcatherm model. This value is valid only if the main pump is operated (else the value displayed is the last delta P before stopping of the pump).
- **Var**.: Variance. Indicates the variance (sample difference square) of the Delta P signal above. The unit is kPa².

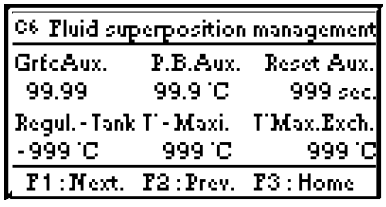
7.5.5 C5 Cooling law

In the central zone, we find:



- Display (without possibility of modification) of the cooling law:
  - **Superposition (liquid/liquid).** Case of type 10803.
  - **Superposition (chilling).** Case of type 10823.
  - **Superposition (air-cooled).** Case of type 10833.
- **GRFC @ 65°C**: Adjustable digital value between 0.05 and 20.0. This is the ratio between the heating and cooling power, under a temperature difference between the cold source and the hot source of 65°C. For a Fluid superposition Vulcatherm, the main heating circuit is the hot source and the auxiliary circuit is the cold source.
- **Select authorization cooling:** Only for vulcatherm 1080 x equipped with an ethernet card.
  - **Wait authorization cooling**: For vulcatherm type 1080x a overheating message of the refrigeration unit (Vulcafroid) associated was received, therefore, the Vulcatherm do not provided more cooling power
  - **Don't wait authorization cooling**: The vulcatherm has no refrigeration unit associated.

7.5.6 C6 Fluid superposition management



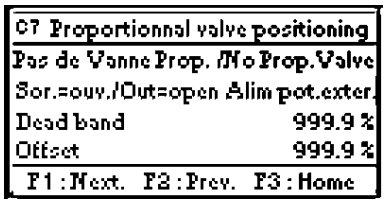
In the central zone, from top to bottom and from left to right, we find: In general, the cold fluid is from the thermal regulator tank. An auxiliary regulator (PI) allows maintaining the tank at the correct temperature.

- **Grfc Aux**.: GRFC for the tank temperature regulator
- **BP.Aux.**: proportional band of the tank temperature regulator.
- **Int.Aux.**: integral of the tank temperature regulator.
- **Tank T°**.: tank temperature
  - **Reg**.: maximum regulation set point
  - **Max**.: authorised maximum
- **T°Max.éch**.: maximum authorised temperature at the inlet of the exchanger.

7.5.7 C7-Proportional valve positioning :

This page C7 concerns the general usage positioner, used for the cold fluid injection valve in the main circuit. If your machine has a water-cooled chilling unit and condensation pressure

From top to bottom and from left to right, we find:

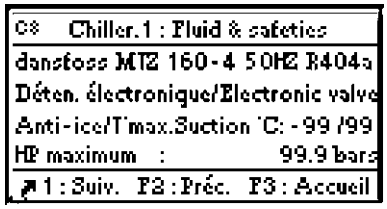


- Types of Valve:
  - **No Prop. Valve** .: no proportionate valve. Never select this option.
  - **Regular valve:** proportional valve with standard coupling (without clearance).
  - **Samson K valve:** K type clearance valve.
  - **JCI:** JCI valve (Johnson control) with clearance in the copy potentiometer.
- Direction of action:
  - **Out=open/Out=Open:** The motor output corresponds to the increase in cooling**.**
  - **Out=Close/Out=Close**: The motor output corresponds to the reduction in cooling
- Position copy potentiometer polarisation. This power supply can be:
  - **External potentiometer power supply:** use of an external power supply
  - **Potentiometer power supply AN1**: use of the no. 1 analogue outlet (this outlet is then no longer available).
- **Dead band**: range wherein the motor does not correct the error (1 to 3% according to the motor) : if the value is too small, the motor never stops, which reduces its life cycle; too high a value can interfere with the regulation.
- **Offset**: mechanical clearance compensation (in % of the total electric travel). Appears only if valve K is selected.
- **Period/course clearance**: Appears only if JCI valve is selected. Mechanical clearance compensation of the copy potentiometer. The two parameters are:
  - Duration: time (in seconds) required to compensate for the clearance of the potentiometer**.**
  - Travel: The mechanical clearance of the potentiometer expressed in % of the electric travel.

CAUTION:

THE CHOICE OF THE VALVE IS FACTORY-ADJUSTED. IT MUST NOT BE MODIFIED. CHOOSING ANOTHER LAW CAN CAUSE MAJOR DAMAGE TO PROPERTY AND PEOPLE.

7.5.8 C8 Chilling 1: Fluid & safety devices:

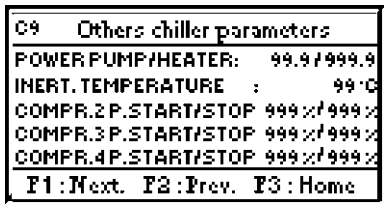


This page is displayed only in the case of model 10823 (with chilling unit).

In the central zone, from top to bottom and from left to right, we find:

- The type of compressor used and the associated chilling fluid. In the example here, it is a Danfoss compressor of the MTZ160-4 type designed to run on 50 Hz with chilling fluid R404a (display only).
- Choice of the relief type (display only). The possible values are:
  - **Th.expan. valve:** mechanical relief valve.
  - **Electronic relief valve:** Electronic relief valve controlled by stepper motor.
  - **Electronic relief valve:** Electric relief valve (relief solenoid valve supporting a 6 second pulse wave modulation and having a calibrated orifice.
- **Anti-icing threshold:** temperature threshold below which the machine stops, to prevent the freezing of the heating fluid in the evaporator.
- **Maximum suction T°**: If this threshold is exceeded for too long, the SGC switches to "Compressor suction over heating"error. In case of thermostatic relief, it is also the threshold of the suction temperature limiter. When the temperature of the gases drawn in by the compressor exceeds this threshold, the SGCv2 immediately controls the opening of the liquid injection solenoid valve in order to bring this temperature down to a value acceptable by the compressor.
- **Maximum HP**: maximum high pressure threshold above which the machine stops in order to avoid deterioration caused by overpressure.

7.5.9 C9 Other chilling parameters:

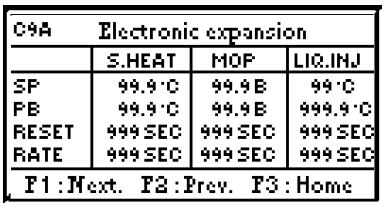


This page is displayed only in the case of model 10823 (with chilling unit).

In the central zone, from top to bottom and from left to right, we find:

- **PUMP POWER / HEATING (kW):** Rated powers of the main pump and heating pump motor. These parameters are used by the Vulcatherm® regulator in order to determine the cold/hot relative gain.
- **INERTING TEMPERATURE:** Temperature at which the expansion tank is kept, in a way as to avoid condensation of water droplets in it.
- **POWER COMPRESSOR2:** Vulcatherm having at least 2 compressors. Percentage of cooling power at which the compressor 2 is started and stopped.
- **POWER COMPRESSOR3 ON/OFF:** Vulcatherm having at least 3 compressors. Percentage of cooling power at which the compressor 3 is started and stopped.
- **POWER COMPRESSOR4 ON/OFF:** Vulcatherm having at least 4 compressors. Percentage of cooling power at which the compressor 4 is started and stopped.

7.5.10 C9A Electronic relief:



This page is displayed only in the case of model 10823 (with chilling unit).

In the central zone, from top to bottom and from left to right, we find:

- **OVER HEAT**.: superheated area (regulates the over heating at the outlet of the evaporator) :
  - CONS: over heating regulator set point
  - PB: over heating regulator proportional band
  - INT.: over heating regulator integrating constant
  - DRIFT: over heating regulator drift constant
- **MOP** (regulates the maximum pressure on suction of the compressor) :
  - CONS: MOP regulator set point
  - PB: MOP regulator proportional band
  - INT.: MOP regulator integrating constant
  - DRIFT: MOP regulator drift constant
- **INJ.LIQ**.: liquid injection zone (regulates the maximum temperature on suction of the compressor) :
  - CONS: injection regulator set point
  - PB: injection regulator proportional band
  - INT.: injection regulator integrating constant
  - DRIFT: injection regulator drift constant

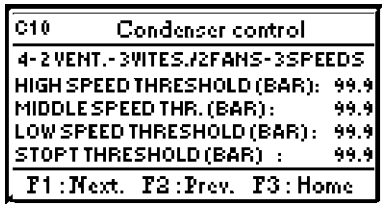
On some Vulcatherm the over heating and MOP parameters are directly set on the pilot of the electronic relief valve valve. In this case, these parameters are not visible here.

7.5.11 C10 Condensation check. (HP - high pressure):

This page is displayed in the case of models 10823 (with chilling unit), or 10833 (air-cooled).

This control is carried out by cooling the condenser to a greater or lesser extent. In this chapter, only the control of a ventilator is discussed (air condenser), but it can also relate to valve control (water condenser)

From top to bottom, is displayed:



- Choice of condensation control type. This can be:
  - **None:** the condenser pressure is not controlled by SGCv2. This is the choice generally made if Vulcatherm® has a water condenser associated with a pressure valve.
  - **On-Off**: the control is simply carried out by switching on or off the ventilator.
  - **Star - Triangle**: the three-phase ventilator has 2 speeds.
  - **2FANS-3SPEEDS:** special combination of 2 three-phased ventilators having 3 speeds.
  - **Bby regulator**: the ventilator operates at variable speed

The lower part of the page depends on the type of control.

In case of all or no control, we find:

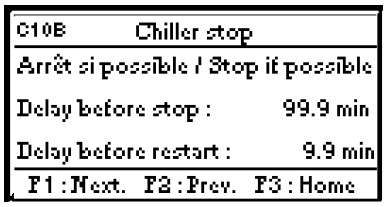
- **STARTING THRESHOLD** or **HIGH SPEED THRESHOLD**: Pressure threshold beyond which the ventilator starts or switches to high speed
- **MEDIUM SPEED THRESHOLD**: Pressure threshold beyond which the ventilator switches to medium speed (3 speed system only)
- **SLOW SPEED THRESHOLD**: Pressure threshold beyond which the ventilator starts at slow speed (2 speed system)
- **STOPPING THRESHOLD**: Pressure threshold below which the ventilator stops.

In case of control with regulator, we find:

- **SETPOINT**: Pressure regulator set point (in bar)
- **PROPORTIONAL BAND:** Pressure regulator proportional band (in bars).
- **INTEGRAL**: Pressure regulator integral (in minutes).
- **RATE**: Pressure regulator rate (in seconds).

7.5.12 C10B Stopping of cold unit:

This page is available only for Vulcatherm of type 10823 with chilling unit.



It allows defining an possible forced stopping of the chilling unit when Vulcatherm regulates at a high temperature.

From top to bottom, we find:

- Choice of stopping. This can be:
  - **Stop if possible:** If the conditions are fulfilled, the cold unit is stopped.
  - **No stop**: Irrespective of the conditions, the cold unit will not be stopped.

The lower part is visible only if stopping is possible:

- **Period before stopping**: Period (in minutes) before stopping of the cold unit whereas no cold request was made.
- **Period before restarting**: Period (in minutes) before restarting of the cold unit whereas a cold request is maintained.

7.5.13 C11 External bus status

See the corresponding chapter of the Sgcv2 manual.

7.5.14 C12 Digital link:

See the corresponding chapter of the Sgcv2 manual.

7.5.15 C13A - Input D configuration

This screen is available on all models (SGCEco, SGC.v2, SGC.v3 and SGC.v3Twin) fitted with a 30789.30 interface terminal module.

It defines the function of the input configurable (InD). The choices depend on the type of remote control selected.For input InD the possible choices are:

Cases other than the external control

If the "external control" option (see SGC instructions manual “UT30789”) has not been selected, the choices are:

- Pomp only
- Forced cooling
- Select internal/external probe
- Remote set point
- Delta T
- Rampes

Cases "External control”

If the "external control" option (see SGC instructions manual “UT30789”) has been chosen, the choices become:

- Select internal/external probe.
- Reset (reset on the rising edge).
- Reset & External validation control. The reset is active on rising edge, external control is active on the level.
- Validate external control.

In the first two cases, is permanently Vulcatherm® "external control" mode. An informational message is displayed.

8 FIRST COMMISSIONING PROCEDURE:

- Connect the measurement probe of the process if necessary (option). Then, it is necessary to set the limiter at the desired maximum temperature of the fluid (See ADJUSTMENT Menu, R10, Fluid temperature limits).
- Check the full opening of all the taps placed in the auxiliary circuit (in general 3: one at the suction of the auxiliary pump, one at the discharge of the pump, and one after the filter).
- After having checked that the drain plugs or taps are properly closed, manually fill the tank with thermal fluid up to the maximum level (drain hole).
- Some pumps for high temperature have one or several degassing screws in the upper part, which must be opened (pump stopped) until total evacuation of air.
- Ensure the opening of the insulation taps of the thermal fluid on the usage circuit (option). The possible start tap will be voluntarily choked on starting (1 opening rotation only on the taps with valve) to favour degassing by reduction of the circulation speed.
- Open the insulation taps of the cooling water circuit.
- Switch on VULCATHERM. The programme version number appears on the S.G.C. display. After a few seconds, the home page is displayed.
- If the message "Inversion of order of phases:" appears, the order of the phases must be reversed IN THE ELECTRIC INLET of Vulcatherm (on the head disconnecting switch). Or upstream of it. Any reversal in the electric cabinet itself will lead to unpredictable operation. If, after reversal, this messages continues to be displayed, check if a phase is missing.
- If other error messages appear, consult the corresponding chapter of the SgcV2 manual.
- When the home page displays "Vulcatherm ready", Press the button  The automatic filling and degassing sequence starts. During this phase, maintain high level in the tank by successive additions of thermal fluid up to the drain hole, in order to avoid triggering the low level contact and the appearance of a fault.

The heating fluid in the tank must not go down below the visible level.

 IMPORTANT NOTICE: THE PUMPS MUST NEVER BE DRY OPERATED.

- Fully open the possible tap located on the outlet of the usage circuit.
- Monitor the pressure at the outlet of the usage circuit: it must always be less than the maximum total manometric height (TMH) of the pump. This maximum pressure is read when the start tap is completely closed.

 IMPORTANT NOTICE: THE START TAP MUST NOT BE CLOSED FOR MORE THAN 10 SECONDS.

- Carry out a cooling operation test in "Forced cooling" mode (or by setting the set point to minimum value), then, the power used then switches to -100%, which indicates that the cold fluid injection valve is completely open. If Vulcatherm is fitted with a chilling unit (type 10823), it will start after approximately 30 seconds. If Vulcatherm is air cooled (10823 with air condensation or type 10833), the ventilator(s) will start.
- When the minimum temperature is reached, stop Vulcatherm and adjust the bottom level of the tank (to the height of the adjusting tap). This operation is essential to avoid overflowing of a tank at high temperature.
- Return to "regulation" mode (or reset the previous set point).
- Henceforth, VULCATHERM® is ready to regulate the heating and cooling.

 IMPORTANT NOTE:

The receiver must be perfectly sealed (particularly if its high point is located above VULCATHERM), in order to avoid overflowing of the tank after stopping of the pump (by the connected vessels phenomenon).

The receivers run through at low speed by the thermal fluid (tanks, double covers...) must be fitted with a air vent at their high point. This air vent can be of type "automatic" only if VULCATHERM is installed above the receiver. In the absence of a degassing, air pockets, compressed by the pump pressure, would push back thermal fluid towards the tank after the stopping of the pump.

The air vents are essential on the pipes between the receiver and VULCATHERM, when they are very long and they have a high point.

 NEVER BLOCK THE DRAIN HOLE.

If the pump generates an abnormal noise during heating or if the pressure falls, repeat the reduced flow degassing operation as described above at the start of the paragraph.

 IMPORTANT NOTE:

Generally, the air vents are not indispensable at the high points of the receivers run through at high speed by the heating fluid (coils, exchangers, channels within the tooling...). They are, however, essential on the piping between the receiver and VULCATHERM®. If these are very long and have a high point.

If the pump generates an abnormal noise during heating of if the pressure and the flow are not stable, continue the degassing operation.

9 START PROCESS IN REGULAR USE:

- Check that the inlet and outlet taps of the heating fluid and cooling water are open.
- Voluntary choking of the insulation tap on the usage outlet can accelerate the degassing process in the case where there was too much air introduced, provided, however, that the flow doesn't fall below the minimum flow threshold triggering a fault.

The flow and the pressure are checked in of Machine details page (page U2 USER Menu, directly accessible by the button [F2] from the Home page).

 IMPORTANT NOTE:

If Vulcatherm is controled by a digital link (except for the ENGEL link), this link prevails on the automatic degassing filling sequence. Thus, this sequence is not executed. In this case, it is essential that the Vulcatherm control system induces this sequence (by controlling Vulcatherm 1 minute in filling then 1 minute in forced cooling) at least once a day (or even on each starting, if Vulcatherm operates continuously). This sequence must not be triggered if Vulcatherm is already at a temperature greater than 60°C at start-up.

10 SPECIAL CONTROLS ASSOCIATED WITH FLUID SUPERPOSITION:

10.1 "Filling" Function:

This function is controlled by selecting the "Filling" mode (See chapter 5.2.1). It is essential to fill the heating circuit.

 IMPORTANT:

Except in special cases, this function must not be permanently used. Indeed, the filling is carried out by massively injecting the cold fluid in the heating fluid. This function causes an effect comparable with the "forced cooling" mode.

10.2 "Continuous degassing" function:

This function is controlled by selecting the "Continuous degassing" mode (See chapter 5.2.1). It allows continuously evacuating very small quantities of air trapped in the heating circuit. For this, the "continuous degassing" function injects every 2 minutes approximately a small quantity of cold fluid in the heating circuit. The heating circuit is designed in a way that this fluid inlet pushes, back towards the tank, the air trapped at the top of the speed-breaking device placed at the suction of the pump.

At high temperature, this function can eventually interfere with the regulation and/or limit the available heating power.

10.3 "Water separation" function:

The heating fluid can be polluted by an input of water or of another fluid evaporating at low temperature (for example alcohol). This input can originate, for example, from a receiver having been used previously with water or cleaned with alcohol. This situation is characterised by the un-priming of the main pump as soon as the heating fluid reaches 100 or so degrees. Indeed, at this temperature, the water contained in the heating fluid vaporises, causing the main pump to un-prime. For alcohol, the vaporisation temperature is lower.

This function is controlled by selecting the "continuous degassing" mode (see chapter 5.2.1), when the temperature of the heating circuit falls between 80 and 100°C. The function can only be activated within this temperature range.

The applicable procedure is as follows:

- Check that the Vulcatherm® is in a well ventilated room,
- Check the cooling water supply to the Vulcatherm® (only for the water cooling or condensation machines),
- Remove the plug from the tank to facilitate the evacuation of vapours,
- Start up the Vulcatherm® with a set point adjusted to 95°C (or lower if the pollution does not allow this temperature to be reached, but at least 80°C),
- When the set point is reached, select the "water separation" mode,
- Wait for the thermal regulator to return to "regulation" mode. Depending on the starting temperature, the operation can take between 40 minutes and 2 hours.

During the cycle, the tank will heat up gradually, at the rate of 0.2°C per minute, until it reaches the final temperature of 105°C. In this way, the polluting fluid will be forced to evaporate. The temperature of the tank can be displayed on page U7 (see chapter 3.11.2).

The function can be cancelled at any time by selecting another operating mode.

Special case of type 10823: This type of Vulcatherm is cooled by chilling unit. The "Water separation" function brings the tank of this chilling unit to +105°C. This temperature is incompatible with the normal operation of the chilling unit. During the water separation sequence, the chilling unit is thus forced to stop. Which means that Vulcatherm must not be connected to an exothermal load during this sequence. If Vulcatherm is restarted immediately after the water separation sequence, a special sequence is used to bring the tank temperature to a value compatible with the chilling unit. During this sequence (which lasts approximately 2 minutes) Vulcatherm displays "Tank under forced cooling". During this period, the chilling unit is loaded at its maximum power, which means that it will consume the maximum flow rate of cooling water (in case of water condensation), or that the fan(s) will rotate at high speed (in case of air condensation).

10.4 Operation in the absence of cooling water:

With some restrictions, some Vulcatherm® (only of the type 10803) fitted with cooling by fluid superposition can optionally operate in the absence of cooling water.

For For this purpose, Vulcatherm® (main switch) must be energised in the absence of cooling water.

 Caution:

Cooling water inlets and returns must be left free (not connected or blanked off).

The NW (no water) indicator lights up on page U7, but SGC does not report the fault and Vulcatherm® is ready to start.

If there is no cooling water, the restrictions are:

- The "Filling" function is no longer available if the reserve temperature is above 80°C,
- The "Water separation" function is no longer available,
- The "Continuous degassing" function can cause the overheating of the tank. Especially if it is used for a long time at a high temperature.

11 REMOTE CONTROL:

See the corresponding chapter of the Sgcv2 manual.

12 DRAINING

It is always possible to drain part of the heating circuit, in order to limit the loss of fluid during the dissasembly of the connecting pipes.

Stop the device, after having checked that the heating fluid is at a temperature lower than 50°C. Otherwise, use beforehand forced cooling or lower the regulation set point.

Close the cooling water inket taps.

Carefully open the drain tap or plug of the speed-breaking bottle, after having eventually connected therein an evacuation pipe to the tap of the retention tray.

 REMINDER: NEVER OPERATE THE PUMP WHEN DRY.

For the water cooling models (10803 and 10823 with water condenser) : Do not store the device where there is a risk of frost without previously fully draining the cooling circuit.

13 ECONOMICAL OPERATION, OPTIMISATION OF REGULATION PARAMETERS

See the corresponding chapter of the Sgcv2 manual.

14 STATUS AND FAULT OR ANOMALIES DIAGNOSTIC AID MESSAGES

This chapter presents several messages likely to be displayed on the status indicator of the machine. You can find all the messages in the SgcV2 manual.

14.1 Status messages

- **Initialization**: The machine is being initialised.
- **Vulcatherm ready**: The thermal regulator is ready to start:
- **Pump alone**: The machine operates in "Pump alone" mode.
- **Regulation**: (see USER menu)
- **Power proportioning**: The machine operates in "Power proportioning" (see USER Menu)
- **Forced cold**: The machine is trying to cool down.

14.2 Help for the diagnosis of faults or breakdowns

- **Lack of flow rate**: The thermal fluid flow rate is less than the minimum contractual value. Check the opening of the insulation valves, cleanliness of the filter, or loss of load of the receiver. Degas the installation if necessary
- **Impos. init. too much noise on Delta P**: The signal of a pressure probe is unstable and it is impossible to calibrate this probe. The problem can originate from the probe itself, its electric connection or still from the acquisition card of the Sgc.
- **DeltaP >> during initialisation**: The difference in pressure is too high compared to the threshold value during initialisation.
- **CPP signal outside limit**: Concerns the pump pressure probe. Break in one of the 2 power supply wires or measurement signal out of tolerance.
- **CPV signal outside limit**: Concerns the output pressure probe. Break in one of the 2 power supply wires or measurement signal out of tolerance.
- **Very high output pressure**: The output pressure of VULCATHERM has exceeded the authorised maximum.
- **Very low pressure**: The pump pressure has reached the authorised minimum.
- **Main pump fault**: Primary pump thermal relay circuit breaker.
- **Thermostat triggering**: Over heating of the heater or tank in fluid superposition.
- **Emergency stop**: "Emergency stop" button pressed.
- **Internal T° probe fault**: Break in one of the 3 power supply wires or abrupt short-circuit in the internal probe.
- **External T° probe fault**: Same as the internal temperature probe, see above.
- **Fluid level low**: The tank level is very low. Check that there is no leak and add fluid.
- **TCK limitation fault T° Elemen** : Break in one of the 2 wires of a thermocouple inserted in the thermal insulation sheath of the heating element.
- **Voltage return**: If the option "Fault in Voltage return" is activated, this message is displayed after the switching on of the machine.
- **Door open fault : V**ulcatherm 1082x with the chiller fan Directly available in the hydraulic compartment. When the message is displayed, the machine goes into default only if the fan is operating

14.3 Information messages

These messages scroll in alternation with the status or anomaly messages.

- Band alarm: Temperature deviation between measurement and set point is exceeded.
- High alarm: Maximum authorised temperature is exceeded.
- Low alarm: Minimum authorised temperature is exceeded.
- Safety devices INHIBITED: Indicates that the safety devices are inactive.

 CAUTION: INHIBITING THE SAFETY DEVICES CAN CAUSE MAJOR DAMAGE TO PROPERTY AND PEOPLE (See CONFIGURATION Menu)

- Maintenance necessary: The machine requires maintenance.
- URGENT: Replace the battery: The battery needs replacing. Not replacing the battery will lead to the loss of the Vulcatherm parameters.

15 BACKUP BATTERY REPLCAMENT PROCESS

See the corresponding chapter of the Sgc manual.

16 TROUBLESHOOTING

Troubleshooting and maintenance actions must be carried out by a trained and competent professional using this user manual and the hydraulic and electrical files. Generally, operating anomalies are displayed in plain language on the home page. However, if unable to quickly solve a malfunction problem, contact the After Sales Service at VULCANIC or its local dealer.

 CAUTION: The CPV, CPP and CPPA pressure probes are essential measuring devices, which ensure the monitoring of the hydraulic parameters of VULCATHERM. Take care not to mechanically block, shock or constrain them, during the assembly or removal operations.

Their output voltage is factory-set, thanks to 2 internal potentiometers, with values of 1 VDC for 0 bar and 5 VDC for 13.8 bars.

16.1 Preventive maintenance

After 10 hours of operation, then after 200 hours, 1000 hours, and every 2000 hours, proceed with the following operations:

- Check the presence of a sieve filter in the cold water inlet. Caution: non-respect of this instruction can result in the blocking in open position of the cooling solenoid valve. On the industrial water supply networks, it is essential to install a 100µm filter upstream, as these present high risk of pollution.
- Check the state of clogging of the filter on the auxiliary circuit of the heating fluid.
- Check the operation of the level probe (on expansion tank).

 **DANGER: RISK OF EXPLOSION !**

For <u>type 10823 only</u>, verification of the operation of the expansion tank level probe must be carried out carefully. This in order to eliminate any risk of explosion due to the presence of the anti-condensation electric immersion heater placed in the upper tank.

- Check the cleanliness of the ventilation grids, inside the electric cabinets and hydraulic enclosures.
- Check the tightening of all the electric connections and the status of the relay contacts.
- Monitor the correct operation of the regulation.
- Monitor the status of joints and thermal insulation, so as to preventively act to avoid the risk of burns to the personnel. Test the operation of the very low flow rate alarm by closing the insulation valves of the outlet. If the alarm is not triggered at the end of 50 seconds, proceed with the setting of the max. TMH (Total Manometric Height).
- Test the operation of other safety devices and their setting value.
-

After 6000 hours of operation:

- Completely drain the installation in order to regenerate the quality of the heating fluid.
- Measure the change of the contractual values: flow, pressure, intensities, reaction time, temperature difference.

16.2 Recommended list of spare parts

See the electrical and hydraulic lists. Is the subject of another supply contract. Most of the standardised components are available in stock at VULCANIC or with its supplier.

16.2.1 First emergency batch:

Cooling solenoid valve, mechanical seal of the pump, thermocouple and regulation or limitation probe, safety thermostat, analog pressure probe, pressure switch, sieves for filters, fuses and bulbs.

16.2.2 Second emergency batch:

Heating elements, cooling exchanger, power unit.

16.2.3 Third emergency batch:

Main and auxiliary motor pumps, heating body, SGC v2.

17 PARAMETER SETTING

- SGC parameter setting : See the SGC manual instruction « UT30789 ».
- Parameter setting of the electronic expansion valve control (If applicable) : See the CVEND parameter manual.
- Parameter setting of the overload pum protection : Use the pump(s) rating plate.
- Setting the output safety temperature thermostat (THx) : 10°C above the maximal température indicated on the rating plate.
- Setting the tank thermostat : If exist, setting the tank thermostat at 130°C.

DANGER: RISK OF EXPLOSION !

For type 10823 only.

The TH2 thermostat must never be set above 130°C, unless the heating fluid has a self-ignition temperature clearly greater than 440°C. This in order to avoid any risk of explosion due to the presence of the anti-condensation electric immersion heater placed in the upper tank.

Caution

If your Vulcatherm is submitted to the DESP's class II, it will be equiped with one or several adjustables pressur switch. In this case, please read the DESP manual N°UT_DESP_CATII.

18 GUARANTEE

Its duration is 12 months as from the commissioning, and at the latest 10 months after provision. The terms and conditions of the guarantee are compliant with the general terms and conditions of sale of VULCANIC or with the possible more favourable clauses included in the contract. Particularly, the manufacturer cannot guarantee the performances of the process with which VULCATHERM® is connected, when no study service was ordered from him.

VULCATHERM® guarantees the NON-DEGRADATION of the thermal fluid by cracking or oxidation, in the conditions of operation defined by the initial contract, which govern the settings of the limiters and safety devices.

The repair of the defective parts or manufacturing defects will be carried out at the manufacturer's factory.