

MANVIA SAMPLE DEGASSING SYSTEMS

INSTALLATION, OPERATION & MAINTENANCE MANUAL



SAMPLE DEGASSING SYSTEM DG-50



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Notes on Safety

In this manual, you will find various notes categorized under the following levels with the signal words “DANGER” and “CAUTION”.

 <p>DANGER</p>	<p>Indicates a hazardous situation which, if materialized, could result in a serious injury and even in death.</p>
 <p>CAUTION</p>	<p>Indicates a hazardous situation which, if materialized, could result in material damage or a moderate injury.</p>

 <p>DANGER</p>	<p>Never use the input and output signals of the unit for operations that may threaten human life, cause damage to the system.</p>
	<p>Turn off the power supply when you set up the unit, connect new cables, or perform maintenance or inspections. Failure to do so could cause electric shock or damage to the unit.</p>
	<p>Never touch any terminals while the power is on. Otherwise, electric shock may occur.</p>

 <p>CAUTION</p>	<p>Periodically check that the terminal screws on the power supply terminal block and mounting nuts are firmly tightened. Using the unit with loose screws may result in fire or malfunction.</p>
	<p>Connect the cables correctly to the power supply terminals of the unit in accordance with the specified voltage and wattage. Failure to supply the correct voltage or wattage, or improper cable connection may cause fire, malfunction, or damage to the unit</p>
	<p>Do not attempt to repair, disassemble, or modify DG-50 sample degassing system, MANVIA is not responsible for any damages resulting from repairs, disassembly, or modification by unauthorized personnel.</p>
	<p>Do not use sharp-pointed tools to press touch switches. Doing so may damage the screen.</p>
	<p>Do not uninstall or remove the protection against thermal contacts. It could cause moderate burns to the operator.</p>
	<p>Only personnel who possess the required knowledge and technical skills are authorized to set up the unit, connect the cables, and perform maintenance and inspections.</p>

1 APPLICATIONS

MANVIA DG-50 System offers a new design for conductivity measurement for water-steam cycle chemistry monitoring. This system ensures an effective CO₂ removal from sample and an appropriate temperature conditioning for an accurate degassed conductivity measurement. Therefore, maximizing power production and minimizing corrosion of equipment. Furthermore, optional sample self-cooling is available.

2 SPECIFICATIONS

Max Pressure/Temp Rating:	4 bar(g) / 50 °C
Sample Flow:	80 - 250 ml /min.
Sample Connections Inlet/Outlet:	1/4" NPTF
Drain (sample and condensates common)	½" NPTM
Cooler Cooling Water Connect. (Only external cooling Opt)	¼" NPTF
Cooling Water Consumption (Only external cooling Opt)	4 l/min
Input Power:	120 VAC 60 Hz or 230 VAC 50 Hz
Power Consumption:	1600 Watts
Plate mounting material :	Stainless steel AISI 304
Electric Enclosure Rating:	IP66 / NEMA 4
Dimensions (HxWxD)	850 x 350 x 328 mm. (33.5 x 13.8 x 12.9")
Weight	25 kg (55.1 lbs.)

3 GENERAL DESCRIPTION

The objective of the degassing system is to raise the temperature of the sample to its boiling point, in order to remove the greatest amount of CO₂ from it. To maximize the extraction efficiency of CO₂ and minimize the production of water vapor, precise temperature control has been designed by means of a control loop formed by a temperature controller, an RTD and a heating cartridge that provides the necessary heat, to raise and maintain the temperature at the required set point.

The CO₂ extracted from the sample leaves the atmosphere through a tube, which travels through the interior of a cooler, which guarantees that, in case of vapor occur at any time, it will condense and will be removed by means of the general drainage of the system.

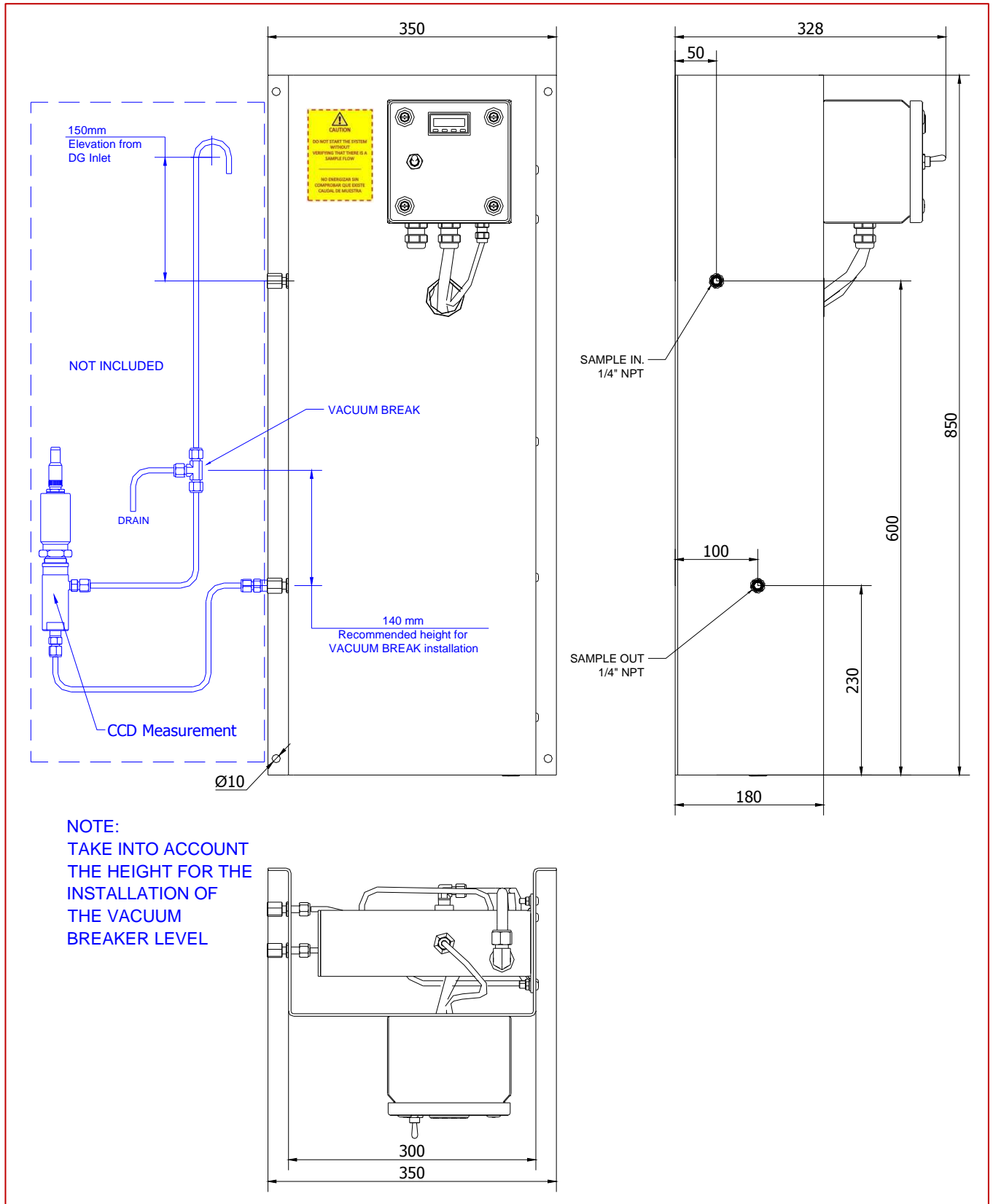


Drainage funnel

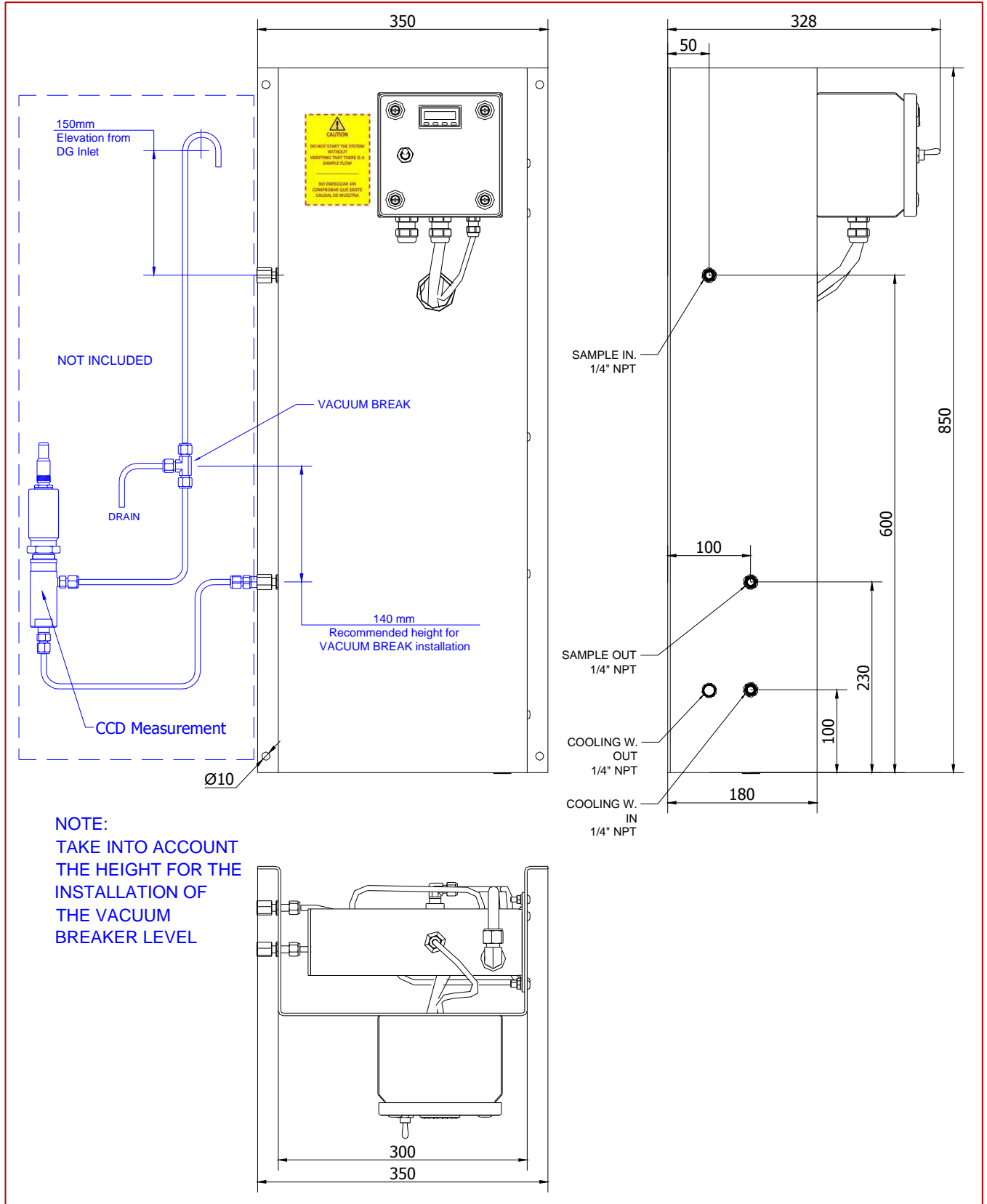
After the elimination of CO₂, the sample requires cooling to perform a measurement of degassed conductivity under optimal conditions. That is why the sample is directed to a cooler, for the operation of which, there are two options: Sample is cooled with cooling water from an external source or it exchanges heat with itself, by passing the sample through the cooler prior to passing through the heater.

*Heat exchanger**Heating cartridge*

The option of self-cooling, guarantees great stability to the system in the event of disturbances in the flow or temperature of the sample, as well as, not requiring a consumption of cooling water and the installation required for cooling water supply.



Self-cooling option dimensional drawing



External cooling water option dimensional drawing

4 INSTALLATION

CAUTION: THE NECESSARY PROTECTIVE EQUIPMENT MUST BE USED IN ORDER TO AVOID KNOCKS, CUTS AND ENTRAPMENTS DURING INSTALLATION. FOLLOW THIS PROCEDURE FOR CORRECT INSTALLATION.

4.1 Mechanical

This device must be located avoiding vibrations and direct exposition to sunlight. The system incorporates four holes in the four corners of degassing system panel, in order to fix it to a vertical wall. The degassing system must be mounted in vertical position, using four M-10 bolts in order to fix it to a smooth and bare wall. It is important that in normal operation, the rear part of the mounting plate doesn't be accessible in order to avoid burns to operators.



Anchorage holes in mounting plate

4.2 Process connections

Depending on the degassing system option chosen, process connections may vary in number and type, according to the next chart:

CONNECTION DESCRIPTION	DG50-0-C	DG50-0-D	DG50-1-C	DG50-1-D
SAMPLE INLET	1/4" NPTF	1/4" NPTF	1/4" NPTF	1/4" NPTF
SAMPLE OUTLET	1/4" NPTF	1/4" NPTF	1/4" NPTF	1/4" NPTF
DRAIN	1/2" NPTM	1/2" NPTM	1/2" NPTM	1/2" NPTM
COOLING WATER INLET	N/A	N/A	1/4" NPTF	1/4" NPTF
COOLING WATER OUTLET	N/A	N/A	1/4" NPTF	1/4" NPTF

Cooling water connections

Cooling water connections are not required when self-cooling option is installed. In case of external cooling water option, follow next steps:

- Keep the length of all tubing to a minimum. Only 80 mm of straight tube, must be respected from connection fitting (1/4" NPTF) to the previous curve upstream.
- Connect the cooling water IN. Should be piped to the left lower side of the mounting plate, in 1/4" nominal bore tube and connected by means of 1/4" NPTM fitting to 1/4" NPTF connector. Connection is labelled with the indication "COOLING W. IN".
- Pipe the cooling water OUT. Should be piped to the left lower side of the mounting plate, in 1/4" nominal bore tube and connected by means of 1/4" NPTM fitting to 1/4" NPTF connector. Connection is labelled with the indication "COOLING W. OUT".



Cooling water inlet and outlet connections

Sample inlet and outlet connections

- It is advisable, the use of corrosion resistant pipework, suitable for the fluid being sampled, in order to connect degasser system, to sampling stream.
- Keep the length of tubing to a minimum. Only 80 mm of straight tube, must be respected from connection fitting ($\frac{1}{4}$ " NPTF), to the previous curve upstream.
- Connect sample IN, in the left upper side connections of the degasser system by using $\frac{1}{4}$ " NPTM fitting to $\frac{1}{4}$ " NPTF connector. Connection is labelled with the indication "SAMPLE IN".
- Connect sample OUT, in the left upper side connections of the degasser system by using $\frac{1}{4}$ " NPTM fitting to $\frac{1}{4}$ " NPTF connector. Connection is labelled with the indication "SAMPLE OUT".



Sample inlet and outlet connections

Drain connections

All possible effluents produced by the degassing system, are directed to a funnel in the lower part of the panel. Therefore, there is an only drain connection in the system. The drain pipe, must be connected to the $\frac{1}{2}$ " NPTM threaded connection, in the lower part of the funnel.

Drain pipe length must be as short as possible, and minimum size $\frac{1}{2}$ " in order to avoid backpressure. Furthermore, funnel must be higher than any other point in drain pipe path and drain point, must be at atmospheric pressure.



Drain connection

4.3 Electrical connections



CAUTION: IT WILL BE NECESSARY TO VERIFY THAT THERE IS NO VOLTAGE IN POWER SUPPLY CABLE BEFORE TO START ELECTRIC WIRING. FOLLOW THIS PROCEDURE FOR CORRECT INSTALLATION:

Power supply connection

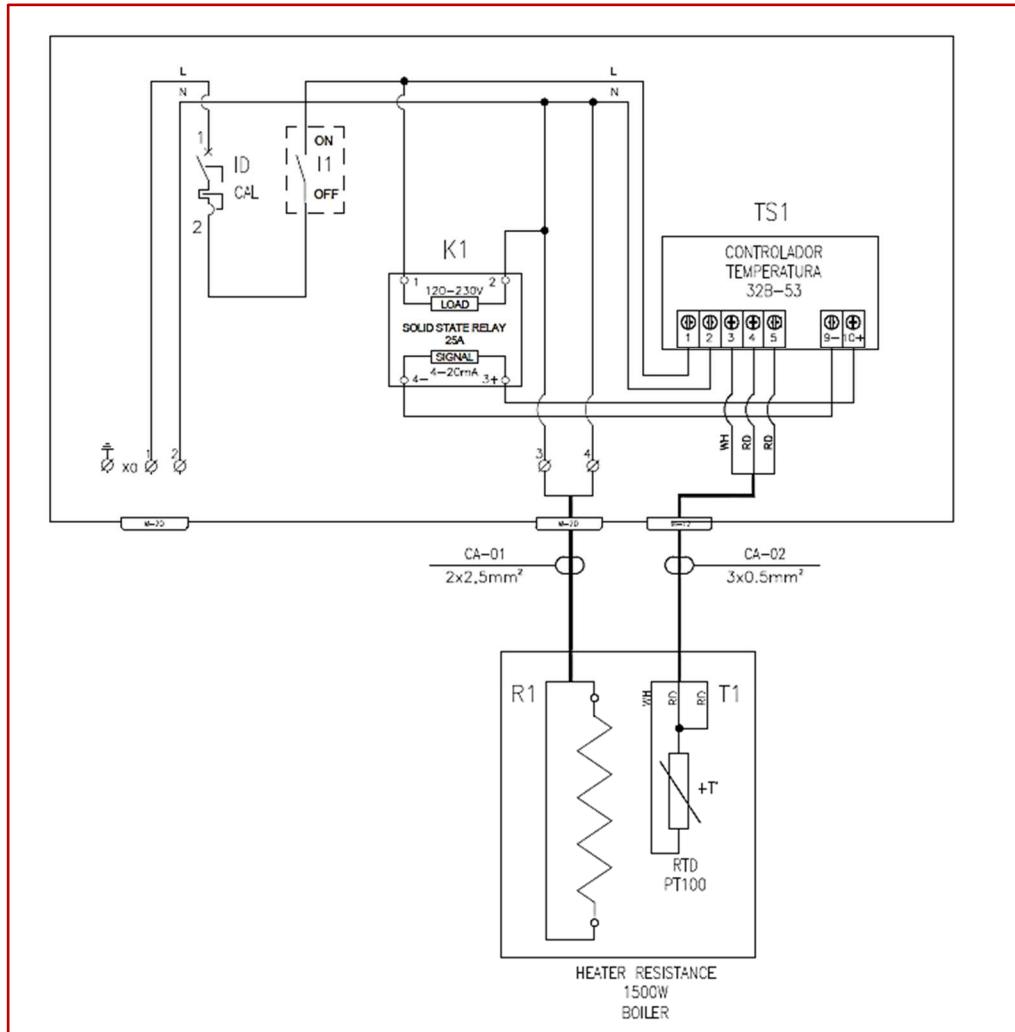
Degassing system, must be electrically supplied by connecting power supply cable to terminals X0. Required cable has to be three wires and size of wires must be 4 mm^2 (L+N+PE). Before connect cable, voltage supply must be checked and must be between 100-240 VAC 50/60 Hz.



Power supply terminals block

Follow next steps:

- Open the steel electrical box, located in the upper part of the panel.
- Verify that the automatic switch (Q1) is switched off. If not, switch them off.
- Introduce three wire power supply cable by using M-20 gland in left lower side of electrical box
- Connect the main cables in terminals 1, 2, and ground cable in green/yellow terminal, in X0 terminals block, in the lower side of terminals.
- Finally, adjust gland to the cable and ensure that is correctly clamped.



Degassing system electric wiring diagram

5 START UP



DANGER: TO AVOID THE RISK OF BURNS, IT IS ESSENTIAL BEFORE START-UP, VERIFY THAT IS NOT POSSIBLE TO ACCESS THE REAR PART OF THE MOUNTING PLATE. IF INSTALLED AS SPECIFIED IN THIS MANUAL, THERE IS NO RISK FOR ACCIDENTAL CONTACT WITH HOT PARTS. FOLLOW THIS PROCEDURE FOR SAFE OPERATION:

- Open the cooling water inlet and outlet valves (if installed), for non self-cooling systems and ensure that a full flow can be seen at the cooling water outlet.
- Gradually open the sample inlet valve (not included in the system) and regulate the flow to achieve a value between 100 to 250 cm³/min. Then is necessary to wait the time required for the sample to go out from sample outlet.



CAUTION: BEFORE TO START-UP THE SYSTEM, IT MUST BE VERIFIED THAT THERE IS SAMPLE FLOW, FLOWING AT THE SAMPLE OUTLET. IF NOT, HEATER MAY BE DAMAGED BY INTERNAL OVERHEATING.

- Switch on the circuit breaker (Q1) inside the electrical box to start up the equipment and close the electrical box.
- Then, in order to energize heater and temperature controller, interrupter in electric box cover must be switched on.
- In normal conditions, after circuit breaker is activated, and interrupter in electric box cover is switched on, heater and temperature controller, both will be energized.



Circuit breaker

- In case of cold starting wait at least half an hour until temperature gets stabilized for getting accurate measurements.

Temperature controller parameters (with exception of temperature set point) are workshop adjusted and usually, it won't be necessary to modify it, but if required, this operation is described in chapter 7 (Programming).

6 OPERATION

Main operation display is shown when controller is energized and looks like appears bellow:

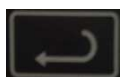


The parameters shown in figure above are:

1. These digits, indicate temperature measured inside boiler in the selected temperature units, if system is stabilized, that will be the boiling point of water in this moment.
2. These digits, indicate the adjusted temperature set point in the selected temperature units. This parameter must be adjusted according to installation site altitude.
3. If working properly, output 1 should control heater, then OUT1 light must be green. AT, OUT2 or ALM, never must be lighted.
4. Depending on the temperature units selected, green light close to °C or close to °F will be lighted, only one must be lighted.

7 PROGRAMMING

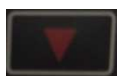
Next figures, show the function name of each key:



Enter key



Index key



Down arrow



Up arrow

7.1 Temperature set point adjusting

There are only two parameters which is mandatory to adjust, before to start-up the system, these parameter is temperature set point, and must be adjusted according to next procedure:

- First of all, temperature units must be adjusted, by default, the controller is workshop programmed for °C:
 - Press enter key and hold for at least 5 seconds. Then appears the next menu:



- Then press index key and the next menu appears:



- By pressing down arrow key is possible to change temperature units to °F:



- To return to °C units, press up arrow key
 - Finally, to return to operation main display, press enter key.
- Second stage, is site installation altitude in meters verification.
 - Once installation altitude is obtained, the corresponding values must be searched in the “Altitude” field of the next table:

Altitude	Boiling temperature	Boiling temperature	Altitude	Boiling temperature	Boiling temperature	Altitude	Boiling temperature	Boiling temperature
meters	°C	°F	meters	°C	°F	meters	°C	°F
0	100	212,0	1800	94	201,2	4150	86,1	187,0
50	99,8	211,6	1850	93,9	201,0	4200	85,9	186,6
100	99,7	211,5	1900	93,7	200,7	4250	85,8	186,4
150	99,5	211,1	1950	93,5	200,3	4300	85,6	186,1
200	99,3	210,7	2000	93,3	199,9	4350	85,5	185,9
250	99,2	210,6	2050	93,2	199,8	4400	85,3	185,5
300	99	210,2	2100	93	199,4	4450	85,1	185,2
350	98,8	209,8	2150	92,8	199,0	4500	84,9	184,8
400	98,7	209,7	2200	92,7	198,9	4550	84,8	184,6
450	98,5	209,3	2250	92,5	198,5	4600	84,6	184,3
500	98,3	208,9	2300	92,4	198,3	4650	84,4	183,9
550	98,2	208,8	2350	92,2	198,0	4700	84,3	183,7
600	98	208,4	2400	92	197,6	4750	84,1	183,4
650	97,9	208,2	2450	91,9	197,4	4800	84	183,2
700	97,7	207,9	2500	91,7	197,1	4850	83,8	182,8
750	97,5	207,5	2550	91,5	196,7	4900	83,6	182,5
800	97,3	207,1	2600	91,3	196,3	4950	83,4	182,1
850	97,2	207,0	2650	91,2	196,2	5000	83,3	181,9
900	97	206,6	2700	91	195,8	5050	83,1	181,6
950	96,8	206,2	2750	90,9	195,6	5100	82,9	181,2
1000	96,7	206,1	2800	90,7	195,3	5150	82,7	180,9
1050	96,5	205,7	2850	90,5	194,9	5200	82,6	180,7
1100	96,3	205,3	2900	90,3	194,5	5250	82,4	180,3
1150	96,2	205,2	2950	90,2	194,4	5300	82,3	180,1
1200	96	204,8	3000	90	194,0	5350	82,1	179,8
1250	95,9	204,6	3050	89,8	193,6	5400	81,9	179,4
1300	95,7	204,3	3100	89,7	193,5	5450	81,7	179,1
1350	95,5	203,9	3150	89,5	193,1	5500	81,6	178,9
1400	95,3	203,5	3200	89,3	192,7	5550	81,4	178,5
1450	95,2	203,4	3250	89,2	192,6	5600	81,2	178,2
1500	95	203,0	3300	89	192,2	5650	81,1	178,0
1550	94,8	202,6	3350	88,8	191,8	5700	80,9	177,6
1600	94,7	202,5	3400	88,7	191,7	5750	80,7	177,3
1550	94,8	202,6	3900	87	188,6	5800	80,6	177,1
1600	94,7	202,5	3950	86,8	188,2	5850	80,4	176,7
1650	94,5	202,1	4000	86,6	187,9	5900	80,2	176,4
1700	94,3	201,7	4050	86,5	187,7	5950	80,1	176,2
1750	94,2	201,6	4100	86,3	187,3	6000	80	176

*If altitude value is between two values, linear interpolation can be done.

- To adjust temperature set point, follow the next steps:
 - Push enter key and hold for three seconds and the next menu appears:



- Then push index key two times and next display appears:



- By pressing down arrow key or up arrow key, is possible to change temperature set point the required value.

7.2 PID control parameters adjusting

If is required, from temperature adjusting display, is possible to access to PID control parameters:

- If index key is pushed once, then is possible to adjust proportional band in % (by using arrow keys), in the next display.



- If index key is pushed twice, then is possible to adjust integration time in seconds (by using arrow keys), in the next display.



- If index key is pushed three times, then is possible to adjust derivative time in seconds (by using arrow keys), in the next display.



- Finally, to return to operation main display, press enter key.



DANGER: MANVIA IS NOT RESPONSIBLE FOR ANY PROGRAMMING CHANGE NOT DESCRIBED IN THIS MANUAL, NEITHER FOR ANY PID CONTROL PARAMETERS CHANGE WHAT ARE WORKSHOP ADJUSTED.

8 MAINTENANCE

8.1 Preventive maintenance

In case of non self-cooling systems, remove scale from cooler by circulating an inhibited sulfamic acid cleaning solution through the cooling water side. No other preventive maintenance operation is needed.

8.2 Spare parts

DEGASSER SYSTEM SPARE PARTS	
Part #	Name
H-1500-120	Heating cartridge 120 VAC
H-1500-230	Heating cartridge 230 VAC
RD-105	Solid State relay 110-230 VAC 50/60 Hz
MV-PT105	Temperature sensor
TC-50	Programmed temperature controller



H-1500-120/230



TC-50



RD-105



MV-PT105

8.3 Standard warranty

MANVIA warrants products manufactured and supplied by it, to be free from defects in workmanship and, to the extent materials are selected by Seller, to be free from defects in materials, for a period of twelve months from shipment.

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