

VEH SERIES ELECTRODES STEAM HUMIDIFIER FOR AIR HANDLING UNIT



Kettle body to be
installed in the AHU

Control
Unit

INSTALLATION, USE AND MAINTENANCE GUIDE

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Read this manual carefully, observing all the safety measures listed in it for the correct use of the humidifier. Keep the humidifier in good working condition. Look closely at all the tips for the installation and use of your humidifier before operating it. It is the absolute obligation for installers to go through the installation manual of this unit: **Elsteam srl declines any responsibility for damages caused to third parties or to the product resulting from the missing or partial application of the rules contained in it.**

Keep this manual and all the documentation that came with your humidifier in a safe place for future reference further.

1 Safety Rules

1.1 General Rules

People who are not familiar with this type of equipment or do not have carefully read this manual should not be allowed to use the humidifier.

Your humidifier is designed to be used with AC 230V 50/60Hz. Do not attempt to use the humidifier with a different kind of tension. Check that the mains voltage corresponds to the humidifier target value.

The humidifier must always be switched off before any maintenance operation.

All maintenance and repair work must be performed by the manufacturer, its service agent or qualified personnel.

Do not scotch the output socket steam humidifier and do not insert any object into any opening.

1.2 Conditions thermo hygrometric (installation)

Make sure that the environmental conditions of the place where the installation is carried out are always compatible with the requirements of the product as required in this manual. Each Elsteam product cannot be installed in places exposed to weather conditions or frost, unless different terms are explicitly expressed in documents countersigned.

1.3 Power supply

The Elsteam equipment must be connected to the power supply strictly following the regulations and specifications stamped on equipment labels.

In particular, it is mandatory that the supply lines are of the correct section and equipped in accordance with safety switch (RCD) that can protect user.

1.4 Water connections

Elsteam equipment may need to be connected to the water network. In this case it is necessary to strictly comply with the regulations and make sure that any fault or water leakage resulting from the installation or by the equipment cannot cause harm to the environment or to third parties. Do not install the unit on walkways or above dangerous objects or susceptible to damage and always provide proper drainage systems that can properly evacuate any water leakage.

1.5 Waste disposal



Directive 2002/96/EC of the European Parliament and the national rules impose an obligation not to dispose of WEEE as unsorted municipal civil, but to set up a special collection of obsolete parts of the humidifier.

The buyer has the option to return the humidifier into disuse at Elsteam srl in case of purchase of an equivalent (or superior) humidifier. Elsteam will take care of disposal directly or through its agents.

The disposal of electrical or electronic components in an abusive manner and not complying with the legislation entails sanctions.

1.6 Warranty

ELSTEAM Srl recognizes on its products the legal guarantees in force at the time of sale of the product. Incorrect use and lack of maintenance entail the automatic forfeiture of any form of guarantee.

2 Manufacturer Data

Manufacturer

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4 General characteristics of the humidifier

The VEH humidifiers series is a class of electrode humidifiers specifically designed for installation inside air handling units.

Normally in these applications, the humidifier is installed externally to the AHU and the steam is conveyed through special piping and steel distributors (which allow the mixing of the steam with the air) inside the AHU.

The standard solution has numerous drawbacks and additional costs:

- The construction of a technical compartment exterior to protect the humidifier
- An antifreeze device which ensures that the water in the humidifier does not freeze in the absence of a request for production
- The use of expensive and bulky rubber tubes for the conveyance of steam-
- The use of steel distributors within the UTA
- The formation of condensation inside the tubes and distributors with decreased performance
- The need to install the pipes avoiding traps and depressions that would prevent the steam to flow properly
- The loss of heat to the outside through both tubes, but especially in the humidifier itself exposed to low temperatures.

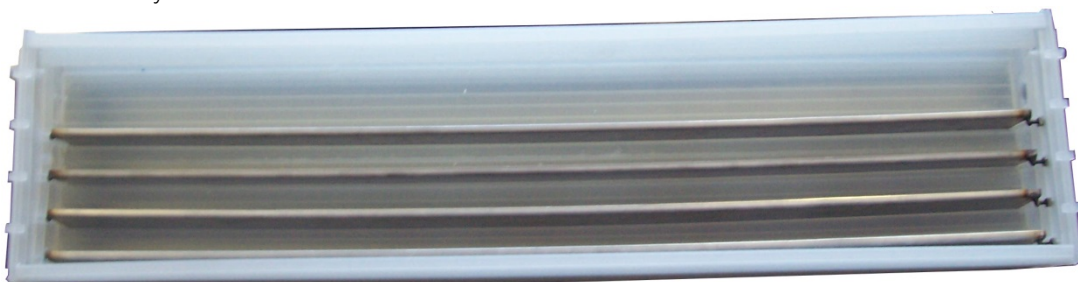
The family of VEH humidifiers, as well as the REH (resistors) and SSH (steam heat exchanger) families, is able to overcome all these problems, greatly simplifying the installation costs and increasing the performance of the product compared to the corresponding humidifiers usually on the market.

5 Structure of VEH humidifier

The VEH humidifier is constituted by two parts connected together electrically: the hydraulic part and the control unit based on a microprocessor board. The hydraulic part is completely inserted into the AHU, lying on the condensate drain tank immediately downstream of the cooling coil. The control unit can be placed in the cabinet already aboard the AHU.

The hydraulic boiler is made up of plastic polypropylene "channel" having a section of 33 cm x 16 cm height, and having a length proportional to the width of the AHU.

Inside the boiler are arranged longitudinally the stainless steel electrodes, connected to the power supply phases and easily removable



Picture 1 - Electrodes

The lid is made of plastic sections with slope, so as to allow any condensation that falls by gravity into the boiler in order to avoid power losses. Between the plastic sections is obtained a narrow longitudinal slot which allows the output of the steam produced, that meets the air for the whole length of the AHU section.

This solution prevents the formation of condensate in the pipes and also prevents any increase in steam pressure in the boiler due to blockages in the pipes conveying steam.



Picture 2 - Cover with slits for steam outlet

On one side of the kettle (the easiest to access once installed) you have the body of hydraulic management of the system:

- Maximum water level sensor
- Draining bloc



The draining bloc has been specially designed to empty the tank from water and limestone pieces without having to block and having to be able to work without pressure.

It is essentially constituted by a valve having a free passage of 32 mm in diameter, closed by a damper operated by an electric motor and a cam. Grafted rigidly on the pivot motor is an electronics rotation sensor, which, communicating with the microprocessor control is able to manage the correct operation of the system and communicate any faults that appear in the display.

6 Working Principle

At power the humidifier performs a complete cleaning of tank for cleaning the electrodes. This phase is followed by a total emptying of water eventually contained inside the kettle, so as to secure an operation with hygienically perfect water. The humidifier performs a current control in the electrodes to ensure that the kettle is totally empty. In case presence of current is detected, control system will signal the "clogged drain" alarm. If the humidistat requires production to the humidifier, the electronics inserts the power control system and starts to fill the kettle with water to continue with the production phase. The conductivity of the water varies a lot, not only depending on the hardness of the water itself, but also on the temperature: cold water is poorly conductive, and its conductivity increases with temperature up to a maximum of around 95°C before falling back slightly at boiling point. It is a good practice that the electronics manages current values when the water is close to boiling to compare realistic values of steam production.

At this point, the humidifier will start filling water at short intervals until reaching a production equal to the required one.

Following, the control system will keep production at set values with programmed fill or drain of water.

If the production exceeds the required value or the maximum supplied by the setting, the control system will start to choke the power, taking care, however, that the average value of the output current is always zero, to avoid excessive corrosion of the electrodes.

At regular intervals, the humidifier makes also small purges, so as to ensure that the salt content in the water is not too high and thus avoiding an excessive deposit of limestone.

At much longer intervals (default value 4h) the control system will make complete draining of the boiler to remove limestone deposits.

7 Characteristics

| Models | | VEH3 | VEH5 | VEH10 | VEH20 | VEH30 | VEH40 | VEH60 | VEH80 | VEH100 | |
|-----------------------------|-------------------------------|--|------|---------|-------|-------|-------|-------|-------------|--------|--|
| STEAM PRODUCTION | | | | | | | | | | | |
| Steam Capacity | [Kg/h] | 3 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 | |
| Max pressure | [mm H ₂ O/ bar] | no limits under normal conditions within the AHU | | | | | | | | | |
| ELECTRICAL DATA | | | | | | | | | | | |
| Power | [kW] | 2.5 | 4 | 7.5 | 15 | 22.5 | 30 | 45 | 60 | 75 | |
| Supply | [Vac, Hz] | 230, 50 | | 400, 50 | | | | | | | |
| Phases | [n] | 1 | 2 | 3 | | | | | | | |
| Max Current per Phase | [A] | 10 | 10 | 10 | 21 | 32 | 40 | 60 | 80 | 100 | |
| HYDRAULIC DATA | | | | | | | | | | | |
| Input Water Quality | | Complies with the microbiological requirements defined for drinking water by the regulations in force in the area of use, possibly partially demineralized | | | | | | | | | |
| Input Water Conductibility | μS*cm | 70...1250 | | | | | | | | | |
| Input Water Hardness | °Fr | 5...50 | | | | | | | | | |
| Input Water Pressure | [MPa/bar] | 0,02...1/0,2...10 | | | | | | | | | |
| Input Water Connection | | M 3/4" G | | | | | | | | | |
| Drain Water Connection | [mm] | 42 | | | | | | | | | |
| GENERAL DATA | | | | | | | | | | | |
| Control Unit Dimensions | WxHxD [mm] | 400x350x150 | | | | | | | 450x400x200 | | |
| Hydraulic Unit Dimensions) | WxH [mm] | 320x160 (Depth depending on required capacity and AHU size) | | | | | | | | | |
| Standard width 4 electrodes | [mm] | 580 | 580 | 580 | 730 | 930 | 1130 | 1330 | / | / | |
| Standard width 7 electrodes | [mm] | / | / | / | 580 | 730 | 730 | 930 | 1130 | 1330 | |
| Weight | [kg] | 12 | 15 | 15 | 18 | 20 | 24 | 26 | 31 | 33 | |
| IP Hydraulic Unit | | 20 | | | | | | | | | |
| IP Control Unit | | 44 | | | | | | | | | |
| REGULATION | | | | | | | | | | | |
| Control | | Internal controller (4-20mA humidity probe), external signal (0-10V, ON-OFF) | | | | | | | | | |

8 Humidifier installation

The hydraulic part is simply placed inside the compartment of humidification of the AHU on the condensate drain pan immediately downstream of the cold battery, with the control group placed on the sides of the AHU where inspection is easier.

If the AHU is subjected to shock and transport, secure it with screws.

During the humidifier installation carefully follows these points:

- The opening and the closing of the power electronic control box takes place through 4 screws
- Since water is discharged at a temperature of 100 ° C, it is necessary to connect the drain with a plastic tube of greater length possible (at least 1 meter)
- The model listed above are only for operation in OEM application within AHU
- As above said the humidifier of these families cannot be installed in direct contact with people and objects

8.1 Water connection

The humidifier is connected to the water through a rubber pipe that can withstand pressure surges, already included in the humidifier, so as to allow a rapid disassembly for inspection and cleaning of the filter on the solenoid. Connection type is 3/4 inch female

The supply water must not be demineralized water (not having conductivity, the humidifier does not produce), preferably un-sweetened, because generally softened water is corrosive for the electrodes (even if made of stainless steel). Normal water can be used to feed the humidifier. If the hardness exceeds 30 French degrees, you can provide a partial softening. However, it can also be used without softening, providing some supplementary maintenance. Input pressure must be between 2 and 10 bars.



8.2 Draining connection

If it is allowed, it is sufficient for letting the drain in the condensate drain pan of UTA who will then evacuated through its draining connection. In this case you have to connect a 90° bend to the draining block. This connection assures us that the downloaded limestone cannot block the draining outlet



IF THE HUMIDIFIER IS PLACED IN AN ENVIRONMENT WITH STRONG INTAKE THE 90° BEND MUST BE DIRECTED IN THE AIRFLOW DIRECTION (otherwise the joint contribution of the aspiration of the air flow on the water and the pressure of the air onto the draining will prevent a correct draining of kettle).

If you are asked to separate the two drain systems, connect the 40 mm humidifier drain pipe with a sewer drain trap having at least the same cross section.

8.3 Electrical connection

You need to connect the control unit to the power supply making sure that the cables sections comply with the regulations and that a circuit breaker is installed upstream.

You do not need the neutral and ground lines.



All operations related to electrical installation MUST be carried out by qualified personnel (eg electrician or staff with appropriate training). The customer is responsible for the use of qualified personnel.

Before starting ensure the following conditions:

- ◇ The size of the power cables must be convenient to the maximum current that must pass through them.



Before any maintenance and installation power connection should be discontinued and protected against any accidental connection. Before performing the electrical connections make sure that the voltage available is equivalent to that of the humidifier.

8.4 Enable Contact

This connection should be made only for humidifiers placed in centralized and ducted ventilation systems. It allows stopping the steam production each time the air ventilation in the channels stops. If production is not stopped it would create a steam accumulation in the channels and a subsequent condensation with water leaks.

To obtain this enable, you must bring a connection between the auxiliary contact of the fan contactor (voltage free contact) to terminals J5-6 and J17-8 the humidifier electronic board.

If you do not use such enable, left the contact shorted (J5-6 and J17-8 terminals) as received from Elsteam.

8.5 Draining block manual calibration

The drain block is calibrated in the best closed position during the testing phase. In case this position were to vary with time (you see the high losses of the draining pipe), it should proceed to a new adjustment of the closure of the draining block.

This procedure must be carried out with the full water kettle to allow the search of the optimal closed position.

Please proceed as following:

- 1) Switch the humidifier OFF
- 2) Press and hold SET and OK simultaneously while providing voltage. The word "DISCHARGE SETTING" appears on the display.
- 3) 3) Press the + and - buttons to adjust the position of the drain block until you no longer see leaks from the drain.
- 4) Press OK.

ELSTEAM s.r.l.

HUMIDIFIER VEH1112

(Version 1.2)

Control System Programming

9 Working Principle

- a) At power-up, the humidifier performs an emptying of the tank by opening the drain for the time value set in "T. Emptying".
- b) If the request for production is greater than zero, water is charged for the time value set in "T. Load Water". If it is the first load of water, and then the tank is empty, the charging time will be twice the set value.
- c) Follows a period of waiting to heat water, the duration of which is set by the parameter "T. Heating".
- d) At the end of heating time, the system tries to balance production with the request, in the following way: if production is less than the request, it returns to step b. If, however, the production is higher than the required heating phase continues until the output value becomes not less than the requested value.
- e) If, at the end of the heating period, the current is still zero, a **lack of water** alarm is set.
- f) During normal operation, there is an active system for changing the water: after one hour of operation, the system provides to the discharge of a small part of water and the relative refilling. Every 4 hours, is, instead, a total change of the tank water.
- g) If the demand of production remains at zero for a period of more than 1 hours, the tank will be emptied, to avoid the formation of bacteria.

10 Menu and Parameters

Pushing the "SET" button, you can access the configuration menu of the system. The buttons "+" and "-" allow increasing and decreasing the parameter value. Click "OK" to confirm the new parameter value and passes to the next. The modifiable parameters are:

10.1 ON/OFF Mode

During normal operation (not in alarm) by pressing the "RESET" button for 5 seconds, the humidifier goes into OFF mode disconnecting the contactor. To resume operation press the "RESET" button for 5 seconds (ON mode).

10.2 Language

Set the menu and messages language:

- a. *Italian* (**default**).
- b. English.
- c. French.
- d. German (not yet implemented)

10.3 Humidity selection

Set the source of humidity sensor:

- a. Internal: in this case it is proposed to set the desired humidity value between 0 and 100%.
Internal controller uses a humidity probe 4-20mA connected at
J17.pin5 = +V
J17.pin4 = IN
J17.pin8 = GND (if needed)
- b. External: in this case you have to select the type of used humidistat:
 - I. On-Off type
 - II. Proportional 0-10V type
 - III. Proportional 4-20mA type

Default: Extern humidistat. Proportional 0-10V type

10.4 Nominal Current

Set the rated current of the humidifier.

Default 20A

10.5 Drain time.

Set the time during which the drain system remains open to allow emptying of the tank. The time is in seconds, from 1 to 250.

Default 120".

10.6 Water fill time

Set the time during which the inlet valve is open water. The time is in seconds, from 1 to 250.

Default 10".

10.7 Purge Time.

Set the purge time during which the drain system remains open to allow a small discharge of water. The time is in seconds, from 1 to 250.

Default 1".

10.8 Heating time

Set the waiting time during which the water in the tank is heated by the passage of the current. The time is in seconds, from 1 to 1200 (= 20min.).

Default 80".

10.9 TA coefficient.

Set the coefficient for the TA mounted in the humidifier. It is a number from 10 to 9999, modified in steps of 10.

Default 750.

10.10 Level sensor

Set the type of level sensor connected. Can be chosen among:

- HV Level switch (High Voltage). Input IN-DIG0
- Contact with float on input IN-DIG1 (jumper JP2 must be closed):
 - a. N.C. = normally closed.
 - b. N.O. = normally open.

Default HV Level switch

10.11 Pressure threshold

2000Pa

10.12 Minimum 0-10V Input Calibration

This parameter allows varying the minimum threshold for intervention in the case of using an external controller with different voltages from 0-10V.

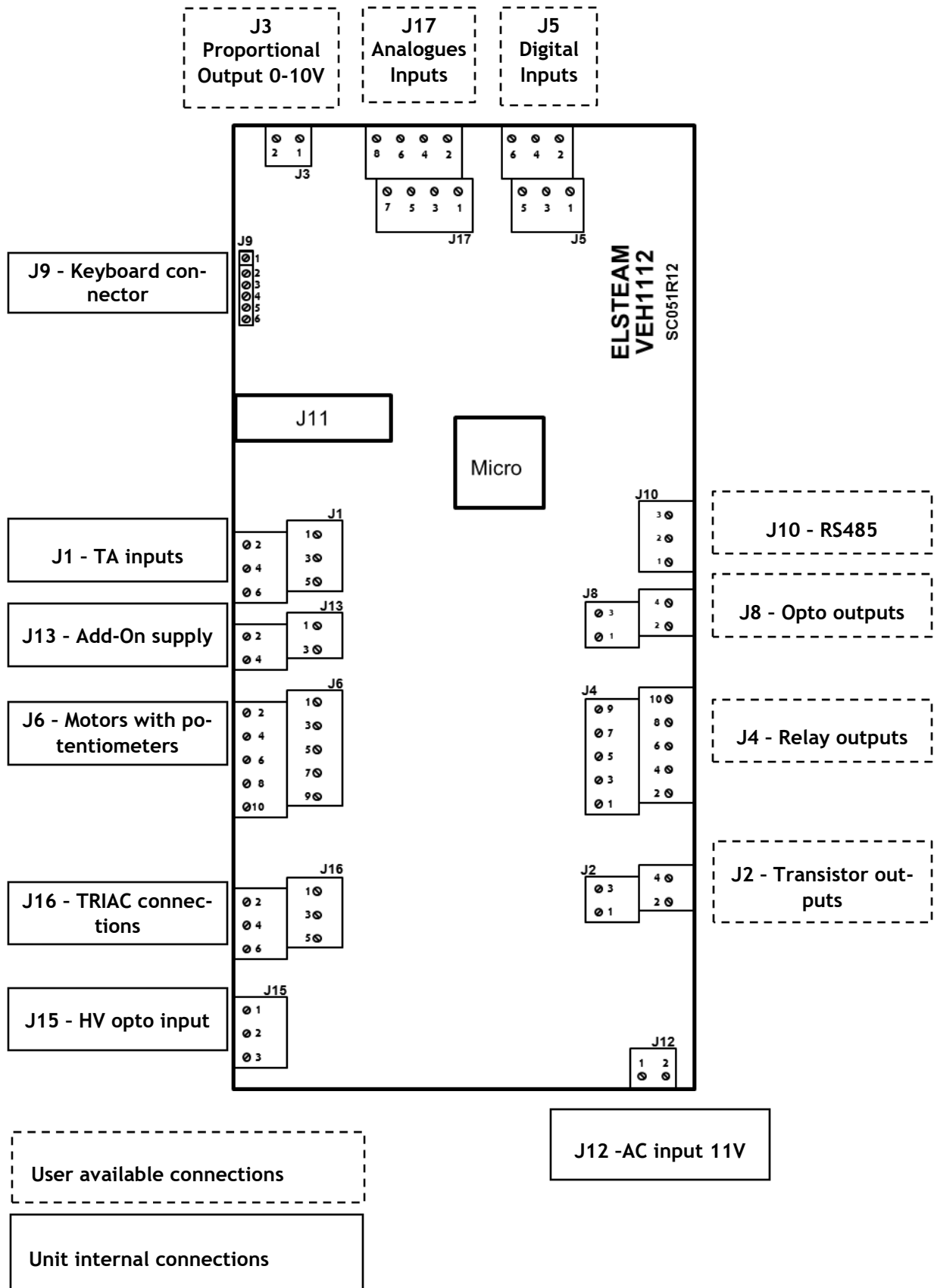
10.13 Water change interval

It indicates the interval between complete changes of water in the kettle.
(Default 4h)

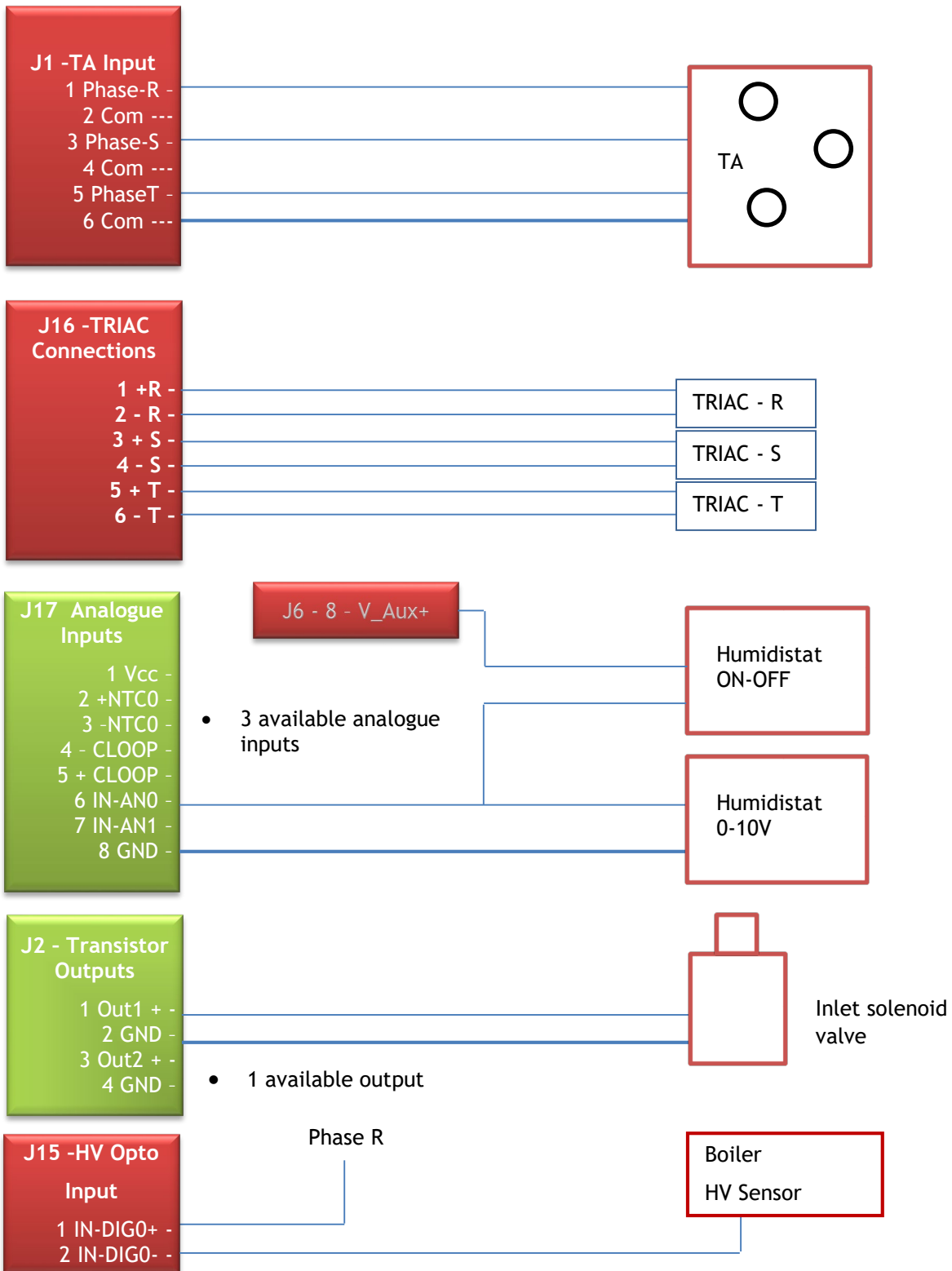
11 Alarms

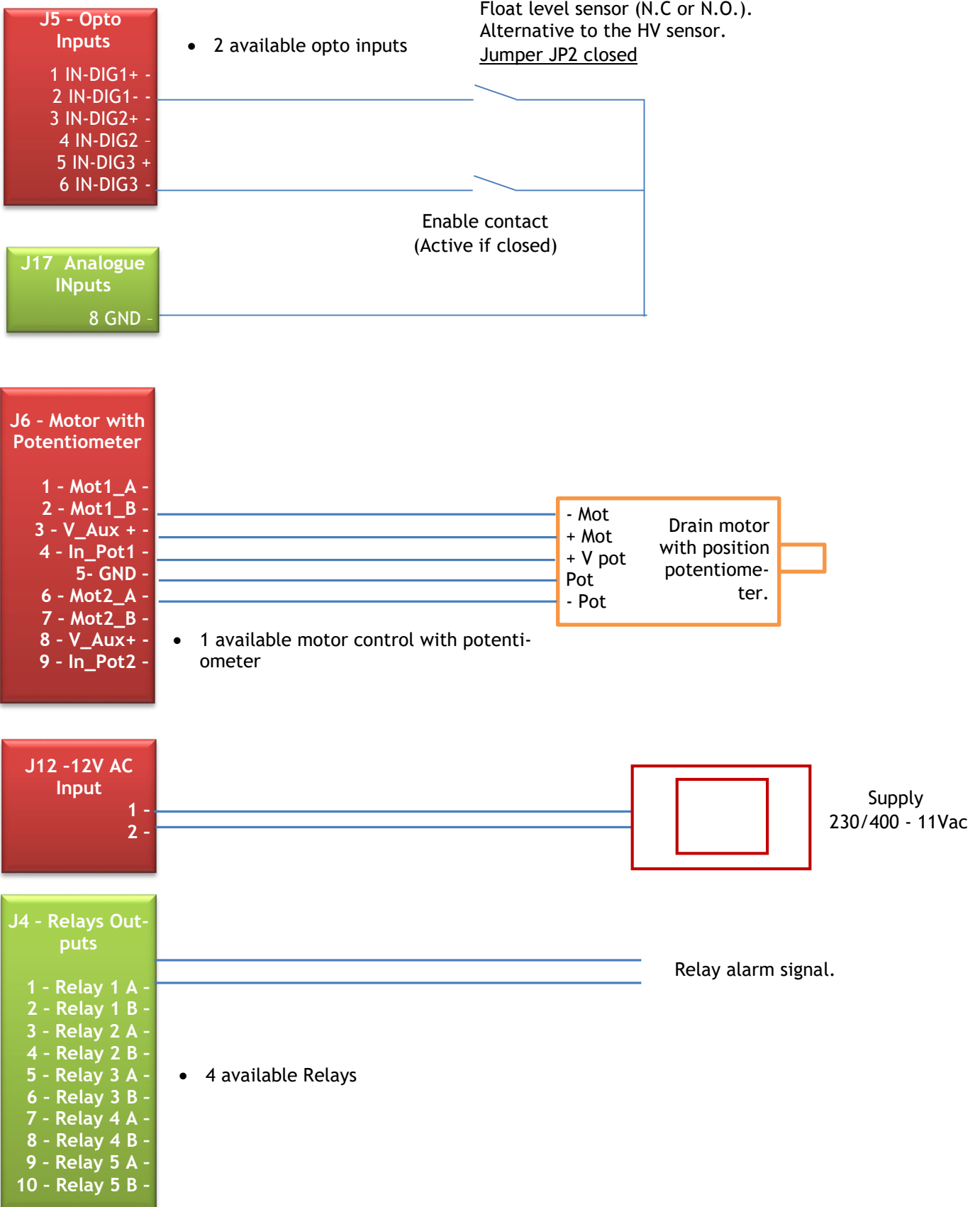
| DISPLAY | Description | Resolution |
|------------------------|--|--|
| ALARM LACK WATER | No water in the kettle | Check the input solenoid Check the electrical connections of the solenoid |
| ALARM DRAIN MOTOR | The drain motor is not closed within the allotted time. (Timeout of closing) | Check the electrical connections of the motor Check that there are no blocks of limestone or objects blocking the closure |
| ALARM CLOGGED DRAIN | limestone blocks draining block | Check the amount of scale in the kettle/draining block. Perform manual cleaning of kettle/draining block |

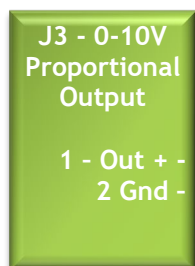
12Connections



12.1 Used and available connections in VEH1112



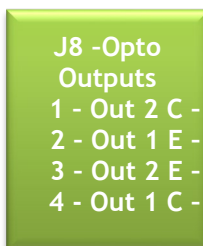




- Available 0 - 10V proportional output.



- Available RS485 line.



- 2 available optocoupled outputs

13 Schematic diagram

