



## AIR HANDLING UNITS RESISTORS HUMIDIFIER: REH



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 made 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.

**The kettle contains boiling water. BEFORE TOUCHING THE HOUSING MAKE SURE THAT THE TEMPERATURE IS DROPPED.**

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 (o 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

The Elsteam S.r.l. recognizes its products legal guarantees applicable at the time of sale of the product and in any case guarantees at all times, even ten years after the sale, the free replacement of components we deem the manifest failure of construction.

Misuse and lack of maintenance involve the automatic loss of any form of guarantee.

## 2 Manufacturer Data

**Manufacturer**

Elsteam S.r.l.

**Legal Office - Administration**

Via ENRICO FERMI 496, 21042 CARONNO PERTUSELLA (VA) - ITALY

**Contacts**

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### 3 Conformity Certificate

#### IL COSTRUTTORE

**ELSTEAM S.r.l.**

*Azienda*

**Via Enrico Fermi, 496**

*Indirizzo*

**21042**

*Cap*

**VA**

*Provincia*

**Caronno Pertusella**

*Città*

**Italy**

*Stato*

#### DICHIARA CHE LA MACCHINA

**Umidificatore a resistenze per UTA**

*Descrizione*

**REH**

*Modello*

**REH**

*Serie/Matricola*

**2015**

*Anno costr.*

**Umidificatore Proporzionale ad Alta Pressione**

*Denominazione commerciale*

**Umidificazione di ambienti**

*Uso previsto*

**E' conforme alle direttive comunitarie**

- Direttiva macchine 2006/42/CE
- Direttiva compatibilità elettromagnetica 2014/30/UE
- Direttiva 2014/35/UE bassa tensione
- DLGS 81/08 Testo unico salute e sicurezza in ambienti di lavoro

**Claudio Cattaneo**

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**Dirigente**

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**2016**

*Anno*

## 4 General characteristics of the humidifier

The humidifier REH is a range of humidifiers based on electric immersion heaters specifically designed for installation inside air handling units.

Normally in these applications, the humidifier is installed externally to the air handling unit and the steam is conveyed through pipes inside the units and distributed through stainless ramps that allow the steam mixing with air.

This 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 REH humidifiers, as well as the VEH (electrodes) 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 REH humidifier

The humidifier REH consists of two units electrically connected to each other: the hydraulic unit and the microprocessor-based control unit. The hydraulic unit is installed inside the AHU, lying on the condensate drain pan immediately downstream of the cooling coil. The control unit can be positioned into the AHU electric panel or on the AHU panels.

The hydraulic unit is constituted by a kettle of stainless steel with dimensions 52 cm x 80 cm x 15 cm in height.



**Figura 1 - REH humidifier hydraulic unit**

Inside the hydraulic units are arranged longitudinally the heaters (special stainless steel resistor with protection) connected to the electrical power supply phases and easily removable.



**Figura 2 - heaters elements inside kettle**

On top cover are present longitudinal slits that allow the output of the produced steam. Due to the positioning of the unit inside the AHU, the steam can mix with air flow along the unit section.

This solution prevents the formation of condensate in the piping and also prevents any increase of the steam pressure in the boiler due to obstructions in the steam conveying tubes.

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

- Level switch
- Drain block



The drain block 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

When switched on, the humidifier performs a complete drain of kettle, thus ensuring to operate with clean water. If the humidistat requires steam production, the humidifier starts to fill with water until it reaches the level of exercise. If the time required to reach that level is greater than a predetermined value, the humidifier stops and indicates an alarm (possible causes are lack of power or breaking of level switch). Upon reaching the water level, the control unit switches the control system of the heater elements (resistors).

The resistors are connected to three contactors so as to allow the production to be proportional to the request. The control unit will maintain production at the set value with additions or discharges of water.

The maximum temperature of the boiler is controlled by NTC sensors (max value set at 125°C) with humidifier stop and signalling in case of alarm. Each heater element has an intrinsic supplementary safety system constituted by a thermistor fuse that opens when the resistor temperature exceeds 150°C.

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.

In case of use of not demineralized water, the control unit, at the end of washing turns on the heating elements for a very short period in absence of water. Such ignition will overheat the elements, causing an abnormal dilation. The limestone that was attached to the heater elements, having a different behaviour will shatter and will be then removed in the subsequent washing.

If the humidistat request is zero for a long period, the control unit provides to empty all the water contained in the kettle so as to avoid health problems due to rotting in the water tank.

## 7 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
- 




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***The kettle contains boiling water. BEFORE TOUCHING THE HOUSING MAKE SURE THAT THE TEMPERATURE IS DROPPED.***

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***The resistances cables must be arranged and fixed so that they not contact any part of the kettle, being at an elevated temperature (100 ° C)***

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***THE OPERATION OF THE HUMIDIFIER MUST ALWAYS BE SUBJECT TO THE WORKING OF THE AHU FAN AND ONLY IF INSTALLED INTO A AHU***

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## 7.1 Water connection

The humidifier must be connected to the water supply through a solenoid valve driven by the control unit. Such a solenoid valve is connected to the hydraulic unit through a flexible tube that can withstand pressure shocks, which allows, moreover, a rapid disassembly for inspection and cleaning of the solenoid filter. The solenoid valve has female fitting 3/4-inch.

You can use demineralized water, network or softened by the resistance problems that do not.

Input pressure must be between 2 and 10 bars.

## 7.2 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




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***IF THE HUMIDIFIER IS PLACED IN AN ENVIRONMENT WITH STRONG INTAKE THE 90° BEND MUST BE DIRECTED IN THE AIRFLOW DIRECTION (otherwise the joined 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).***

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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.



### 7.3 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.




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***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.***

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Before starting ensure the following conditions:

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




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***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.***

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### 7.4 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.

### 7.5 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) 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**

## 8 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 4 hours, the tank will be emptied, to avoid the formation of bacteria.

## 9 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:

### 9.1 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).

### 9.2 Language

Set the menu and messages language:

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

### 9.3 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

### 9.4 Nominal Current

Set the rated current of the humidifier.

**Default** 20A

### 9.5 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".

### 9.6 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".

### 9.7 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".

### 9.8 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".

### 9.9 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.

### 9.10 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

### 9.11 Pressure threshold

2000Pa

### 9.12 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.

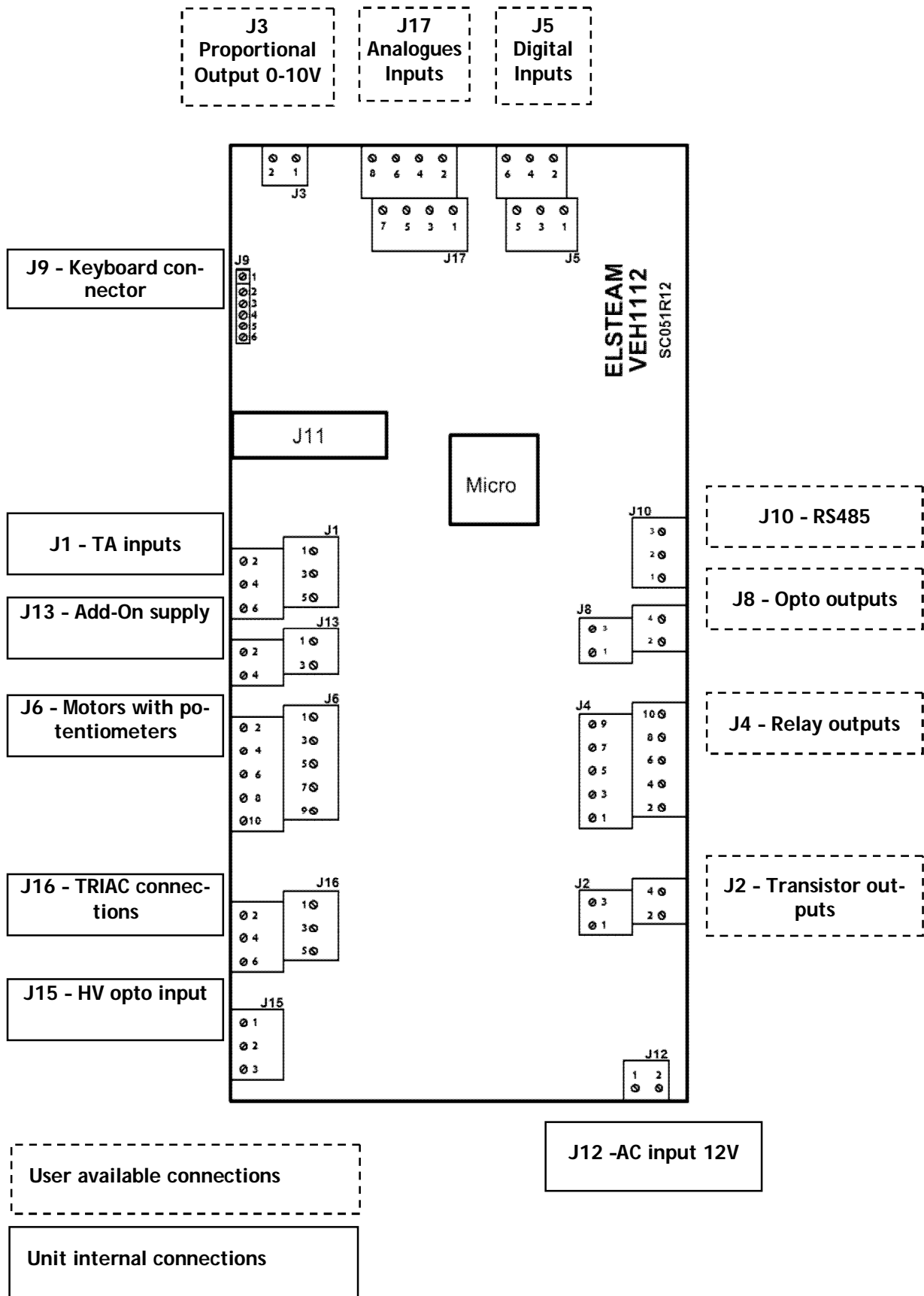
### 9.13 Water change interval

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

## 10 Alarms

<b>DISPLAY</b>	<b>Description</b>	<b>Resolution</b>
<b>A L A R M NTC KO</b>	NTC open Damaged element or low temperature	Check NTC element Check heater connections Check contactors
<b>A L A R M RESISTOR T.</b>	Heater element temperature above 125°C	The humidifier stops for some minute to lower temperature, and then restarts, so to avoid damaging of heaters
<b>A L A R M LACK WATER</b>	No water in the kettle	Check the input solenoid Check the electrical connections of the solenoid
<b>A L A R M DRAIN MOTOR</b>	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
<b>A L A R M CLOGGED DRAIN</b>	limestone blocks draining block	Check the amount of scale in the kettle/draining block. Perform manual cleaning of kettle/draining block

# 11 Connections



### 11.1 Used and available connections

**J1 -TA Input**

- 1 Phase-R -
- 2 Com ---
- 3 Phase-S -
- 4 Com ---
- 5 PhaseT -
- 6 Com ---

**J16 -TRIAC Connections**

- 1 +R -
- 2 - R -
- 3 + S -
- 4 - S -
- 5 + T -
- 6 - T -

**J17 Analogue Inputs**

- 1 Vcc -
- 2 +NTC0 -
- 3 -NTC0 -
- 4 - CLOOP -
- 5 + CLOOP -
- 6 IN-ANO -
- 7 IN-AN1 -
- 8 GND -

**J6 - 8 - V\_Aux+**

• 3 available analogue inputs

Humidistat ON-OFF

Humidistat 0-10V

**J2 - Transistor Outputs**

- 1 Out1 + -
- 2 GND -
- 3 Out2 + -
- 4 GND -

• 1 available output

Inlet solenoid valve

**J15 -HV Opto Input**

- 1 IN-DIG0+ -
- 2 IN-DIG0- -

**J5 - Opto Inputs**

- 1 IN-DIG1+ -
- 2 IN-DIG1- -
- 3 IN-DIG2+ -
- 4 IN-DIG2- -
- 5 IN-DIG3 +
- 6 IN-DIG3 -

- 2 available opto inputs

Float level sensor (N.C or N.O.).  
Alternative to the HV sensor.  
Jumper JP2 closed

**J17 Analogue INputs**

- 8 GND -

Enable contact  
(Active if closed)

**J6 - Motor with Potentiometer**

- 1 - Mot1\_A -
- 2 - Mot1\_B -
- 3 - V\_Aux + -
- 4 - In\_Pot1 -
- 5- GND -
- 6 - Mot2\_A -
- 7 - Mot2\_B -
- 8 - V\_Aux+ -
- 9 - In\_Pot2 -

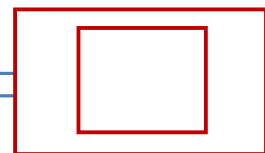
- 1 available motor control with potentiometer

- Mot  
+ Mot  
+ V pot  
Pot  
- Pot

Drain motor with position potentiometer.

**J12 -12V AC Input**

- 1 -
- 2 -



Supply  
230/400 - 12Vac

**J4 - Relays Outputs**

- 1 - Relay 1 A -
- 2 - Relay 1 B -
- 3 - Relay 2 A -
- 4 - Relay 2 B -
- 5 - Relay 3 A -
- 6 - Relay 3 B -
- 7 - Relay 4 A -
- 8 - Relay 4 B -
- 9 - Relay 5 A -
- 10 - Relay 5 B -

Relay alarm signal.

CONTACTOR1

CONTACTOR2

CONTACTOR3



**J3 - 0-10V  
Proportional  
Output****1 - Out + -  
2 Gnd -**

- Available 0 - 10V proportional output.

**J10 - RS485****1 - A -  
2 - B -  
3 - Gnd -**

- Available RS485 line.

**J8 -Opto  
Outputs****1 - Out 2 C -  
2 - Out 1 E -  
3 - Out 2 E -  
4 - Out 1 C -**

- 2 available optocoupled outputs

12 Schematic diagram

