

# *Raychem*

## HTC-915

Universal heat tracing control system



CAUTION: installation, configuration and commissioning should only be performed by properly trained personnel. Local regulations regarding the installation & safety must be followed.

## APPLICATION

|                        |                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                   | Surface sensing/ambient sensing                                                                                                                                                                                                                                                                                                                                                      |
| Area of use            | Non-hazardous area indoors, typically panel mounted                                                                                                                                                                                                                                                                                                                                  |
| Approval certification | CE marked    TC RU C-BE.Б/108.B.01634<br>(Kazakhstan, Belarus)<br>For other countries contact your local Chemelex representative. |

## PRODUCT SPECIFICATION

|                              |                                                                                                                                            |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature range controller | -60°C to 570°C in steps of 1 K                                                                                                             |
| Control algorithms           | EMR: Line sensing on/off, proportional ambient<br>SSR: Line sensing on/off, proportional, proportional ambient, power limiting, soft start |
| Switching accuracy           | 1 K                                                                                                                                        |

## ENCLOSURE

|                                     |                                  |
|-------------------------------------|----------------------------------|
| Ambient operating temperature range | -40°C to +50°C                   |
| Ambient storage temperature range   | -40°C to +85°C                   |
| Relative humidity                   | 0% to 90% Non condensing         |
| Ingress protection                  | Housing: IP40, Terminals: IP20   |
| Material                            | ASA-PC, color: green             |
| Flammability class                  | V0 (UL94)                        |
| Mounting method                     | Panel mounting on 35 mm DIN rail |

## WARNING

|                                                                                     |                                              |
|-------------------------------------------------------------------------------------|----------------------------------------------|
|  | IEC 60417-5032 (2002-10) Alternating current |
|  | IEC 60417-5031 (2002-10) Direct current      |

## ELECTRICAL PROPERTIES

|                                                                                     |                                  |                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection terminals and cabling                                                    |                                  | Screw type terminals. All terminals suitable for stranded and solid core connection cables having a cross section between 0.5 and 2.5 mm <sup>2</sup> (24 to 12 AWG) The 915-HTC and 915-Alarm Relay connector outputs (240V) require ferrules on the connecting wires if stranded wires are used. The wires shall handle a minimum wire temperature of 75°C |
|  |                                  |                                                                                                                                                                                                                                                                                                                                                              |
| Supply voltage                                                                      |                                  | CE/EAC: 100 Vac to 250 Vac, +10% -10%, 50/60 Hz, 0.15 A to 0.06 A<br>CSA: 100 Vac to 277 Vac, 50/60 Hz, 0.15                                                                                                                                                                                                                                                 |
| Power consumption                                                                   |                                  | Max 20 VA with limiter connected                                                                                                                                                                                                                                                                                                                             |
| Control output                                                                      | Contact control output           | (EMR) Electromechanical relay rated 3 A/250 Vac, 50/60 Hz                                                                                                                                                                                                                                                                                                    |
|                                                                                     | Solid-state relay control output | (SSR) 12 VDC, 75 mA. max. to drive normally open Solid state relays. Depending on the application, one, two or three phase switching elements have to be used. (Solid state relays are not included)                                                                                                                                                         |
| Switching capacity                                                                  |                                  | Depends on the type of switch element used<br>(The switch element is external)                                                                                                                                                                                                                                                                               |
| Alarm output relay                                                                  |                                  | CE/EAC: Relay contact rated 3 A/250 Vac, 50/60 Hz<br>CSA: Relay contact rated 3A/277Vac, 50/60 Hz<br>Output is user programmable to open or to close on alarm.                                                                                                                                                                                               |

|              |                     |
|--------------|---------------------|
| Power output | 12 Vdc, 200 mA max. |
|--------------|---------------------|

## TEMPERATURE SENSOR

|          |                                                                                                                                                                                           |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type     | 100 $\Omega$ platinum Pt 100, 3-wire, $\alpha = 0.00385 \Omega/^{\circ}\text{C}$ . Can be extended with a three core shielded cable of maximum 20 $\Omega$ lead resistance per conductor. |
| Quantity | 2 RTD inputs available                                                                                                                                                                    |

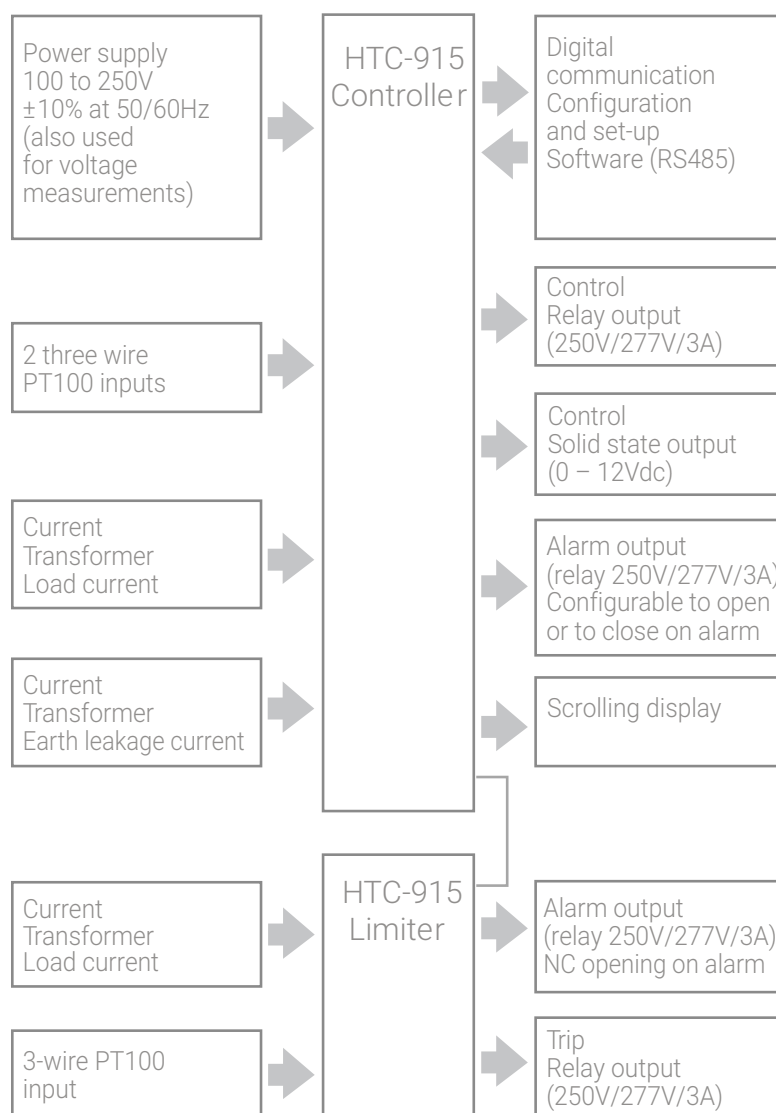
## COMMUNICATIONS

|          |                                                                      |
|----------|----------------------------------------------------------------------|
| Protocol | Modbus RTU or ASCII                                                  |
| Topology | Multidrop/daisychain                                                 |
| Cable    | Single shielded twisted pair, 0.5 mm <sup>2</sup> (24 AWG) or larger |
| Length   | Typical 2.7 km max @ 9600 Baud                                       |
| Quantity | Up to 32 devices                                                     |
| Address  | Programmable                                                         |

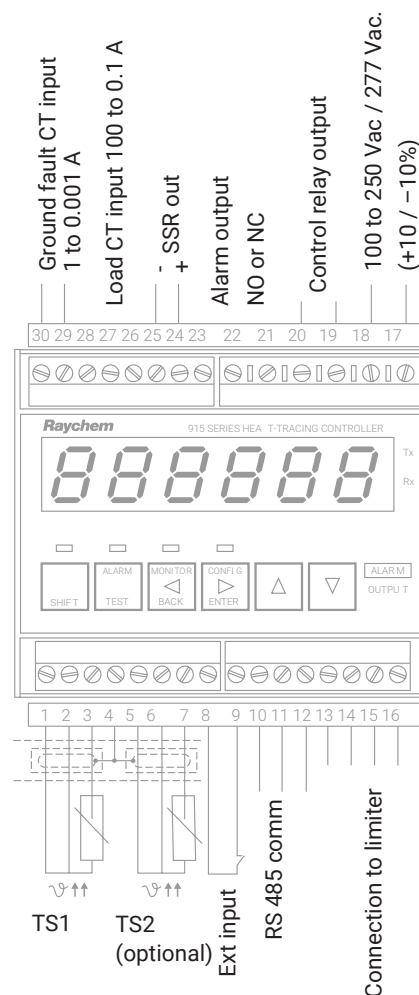
For technical support call Chemelex or write an E-mail to [info@chemelex.com](mailto:info@chemelex.com)

## FUNCTIONAL OVERVIEW

The Raychem HTC-915 is a full featured temperature control system for heattracing applications.



## CONNECTION DIAGRAM TERMINAL ASSIGNMENTS



| Terminal assignments for the controller                                                                                                                                                                                                            | Terminal assignments of the limiter |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. RTD 1 source                                                                                                                                                                                                                                    | 1. Digital common (from HTC 13)     |
| 2. RTD 1 sense                                                                                                                                                                                                                                     | 2. +12Vdc in (from HTC 14)          |
| 3. RTD 1 common                                                                                                                                                                                                                                    | 3. RX data (from HTC 15)            |
| 4. Shield                                                                                                                                                                                                                                          | 4. TX data (to HTC 16)              |
| 5. RTD 2 source                                                                                                                                                                                                                                    | 5. RTD 1 source                     |
| 6. RTD 2 sense                                                                                                                                                                                                                                     | 6. RTD 1 sense                      |
| 7. RTD 2 common                                                                                                                                                                                                                                    | 7. RTD 1 common                     |
| 8. External Input + (Inhibit/override)                                                                                                                                                                                                             | 8. Shield                           |
| 9. External Input – (Inhibit/override)                                                                                                                                                                                                             | 9. Control relay output             |
| 10. Communications (RS-485+)                                                                                                                                                                                                                       | 10. Control relay output            |
| 11. Communications (RS-485-)                                                                                                                                                                                                                       | 11. Alarm relay output              |
| 12. Shield                                                                                                                                                                                                                                         | 12. Alarm relay output              |
| 13. Digital common (to Limiter 1)                                                                                                                                                                                                                  | 13. Load Current CT input           |
| 14. +12Vdc out (to Limiter 2)                                                                                                                                                                                                                      | 14. Load Current CT input           |
| 15. TX data (to Limiter 3)                                                                                                                                                                                                                         |                                     |
| 16. RX data (from Limiter 4)                                                                                                                                                                                                                       |                                     |
|  17. Mains Input (L1)<br>18. Mains Input (L2/neutral)<br>19. Control relay output<br>20. Control relay output<br>21. Alarm relay output<br>22. Alarm relay output |                                     |
| 23. PE                                                                                                                                                                                                                                             |                                     |
| 24. SSR control output +                                                                                                                                                                                                                           |                                     |
| 25. SSR control output –                                                                                                                                                                                                                           |                                     |
| 26. Load Current CT input                                                                                                                                                                                                                          |                                     |
| 27. Load Current CT input                                                                                                                                                                                                                          |                                     |
| 28. Shield                                                                                                                                                                                                                                         |                                     |
| 29. GF CT input                                                                                                                                                                                                                                    |                                     |
| 30. GF CT input                                                                                                                                                                                                                                    |                                     |

### Alarm availability

An alarm can be generated if the actual measured value is higher or lower than the value specified in the controller's set-up. Alarms are available for: temperature, voltage, current, power, earth leakage current, etc... refer to HTC-915 operating manual for details. A copy of this manual can be downloaded from [chemelex.com](http://chemelex.com) (Doc-2106)

## OPERATOR CONSOLE & OPERATION

### ALPHA-NUMERIC DISPLAY

The Console incorporates LED display. Messages and prompts that are greater than 6 characters long are scrolled.

### KEYPAD

The local keypad consists of 6 keys that allow you to select the console mode function. For certain keys, the SHIFT key selects an alternate function, as shown by the text above that key.

## Quick Notes on Operation

Basic rules for efficient Console use:

- use the SHIFT key followed by the appropriate function key – ALARM, MONITOR, or CONFIG – to select the operating mode
- use  and  to move around in the menu
- use  to enter a new menu, enter a new value, or select a menu item
- use  to exit the current menu or cancel an edit

| Key                                                                                                                   | Function                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SHIFT</b>                                                                                                          | <ul style="list-style-type: none"> <li>• Press to activate a <b>SHIFT</b> function – the next key pressed uses the alternate (shifted) function.</li> <li>• The <b>SHIFT</b> LED illuminates, indicating the next key uses the alternate (shifted) function pressing <b>SHIFT</b> again cancels the alternate (shifted) function.</li> </ul> |
| <b>TEST</b>                                                                                                           | <ul style="list-style-type: none"> <li>• Turns on tracing for 30 seconds when prefixed by the <b>SHIFT</b> key, this key switches the console to the <b>Alarm</b> mode.</li> </ul>                                                                                                                                                           |
|  <b>BACK</b><br>[shift<br>MONITOR]   | <ul style="list-style-type: none"> <li>• Exits the current menu (or cancels the new setting when editing a parameter).</li> <li>• Moves the cursor to the left when editing an alpha-numeric parameter.</li> <li>• When prefixed by the <b>SHIFT</b> key, this key switches the console to the <b>Monitor</b> mode.</li> </ul>               |
|  <b>ENTER</b><br>[shift<br>CONFIG] | <ul style="list-style-type: none"> <li>• Selects the item in the display (or accepts the setting when editing a parameter).</li> <li>• Moves the cursor to the right when editing an alpha-numeric parameter.</li> <li>• When prefixed by the <b>SHIFT</b> key, this key switches the console to the <b>Configure</b> mode.</li> </ul>       |
|                                    | <ul style="list-style-type: none"> <li>• Moves to the previous item in a menu increments the value when editing.</li> </ul>                                                                                                                                                                                                                  |
|                                    | <ul style="list-style-type: none"> <li>• Moves to the next item in a menu decrements the value when editing.</li> </ul>                                                                                                                                                                                                                      |

## LED INDICATORS

The console includes eight LED indicators:

Four LEDs indicate the Console operating mode.

(**SHIFT** function, **ALARM**, **MONITOR**, or **CONFIGURE** modes).

There are two status LED's which indicate the alarm and control output status of the controller:

The output LED, the alarm LED will flash

(approximately once per second) when the controller has detected an alarm condition. The two additional LEDs are used to indicate external communications activity.

## Changing the Configuration

To change the Controller configuration:

- Position the desired parameter (menu item) in the display.
- Press the  key to initiate an edit session.
- If the console is "locked" you are prompted to enter the passcode.
- The present setting will flash on the display to indicate that you are editing the parameter.
- Use the  and  keys to change the value.
- The operation of the  and  varies depends on the type of data being edited.

**Note:** Once you have initiated an edit session, you must end it before switching to another mode or invoking another function.

## Changing a Numeric Parameter

To change a numeric parameter (e.g. the control setpoint):

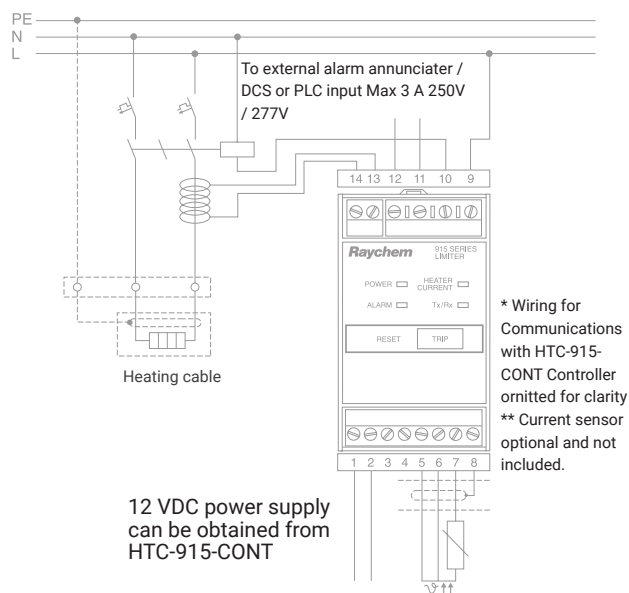
- Position the appropriate parameter in the display.
- Press the  key to initiate the edit session.
- If the console is "locked" you are prompted to enter the passcode.
- The present value is displayed and the last (rightmost) digit blinks.
- The blinking digit identifies the digit that you are editing.
- Use  or  to set the desired value.
- Use  or  to move to a different digit.
- To enter a negative value, scroll to the first (leftmost) digit until a "-" appears in the display.
- Pressing  while on the last (rightmost) digit saves the new value.
- Pressing  while on the first (leftmost) digit ends the edit session without altering the parameter.

## Passcode Protection

The HTC-915 Series Controller provides a passcode for protection of its configuration. You may view any portion of the configuration with the console "locked", however, when you attempt to initiate an edit session by pressing , you are prompted to enter the passcode. A new unit will not be password protected.

## USE OF THE HTC-915-CONT CONTROLLER WITH AN OPTIONAL HTC-915-LIM LIMITER

### LIMITER CONNECTION DIAGRAM TERMINAL



### Terminal assignments of the limiter

1. Digital common (from HTC 13)
2. +12Vdc out (from HTC 14)
3. RX data (from HTC 15)
4. TX data (to HTC 16)
5. RTD 1 source
6. RTD 1 sense
7. RTD 2 common
8. Shield
9. Control relay output
10. Control relay output
11. Alarm relay output
12. Alarm relay output
13. Load current CT input
14. Load current CT input

## ASSIGNMENTS

## PROGRAMMING THE LIMITER

In order to protect the settings of the limiter for unwanted changes the user interface provides some special restrictions.

### Changing the Limiter set point

The limiter set point is changed through the user interface of the HTC-915-CONT in exactly the same manner as for the controller. However, before the new value will be copied in the limiter memory the user has to press and release the SHIFT key followed by CONFIG. This additional requirement avoids unwanted changes of the limiter set point.

### Uninstalling the limiter from a HTC-915 control system

Once a limiter is added to the system it can only be removed (from software) by uninstalling it. This can be done through the Misc. Setup Sub-menu of the HTC-915-CONT. However, unlike for installing the limiter the user now will need to hit the SHIFT key before pressing the CONFIG button to confirm the removal of the limiter.

### Limiter Current sensor input

For specific installations the limiter can be configured such that it will allow for a temperature overshoot as long as there is no current flowing to the heating system. This would be the case when the high temperature is caused by an external heat source such as steam cleaning, exothermal processes, etc..

Sensors are permanently monitored for short circuit and cable breakage.

In case an open / short input is detected, the limiter will trip instantaneously.

## LIMITER OUTPUTS

### Limiter Control output

The relay output of the limiter is typically used to operate an external electro mechanical relay (EMR). This relay will in case of excessive over temperature isolate the load from the mains supply.

### Limiter Alarm output

The limiter alarm output relay will change state (from NC to NO) if

The limiter is powered up the first time after a power outage. The limiter set point is exceeded and thus the limiter has tripped.

An RTD failure is detected.

A limiter current transformer failure (if the limiter CT is being used) is detected.

### Limiter reset

Once the limiter has tripped it has to be reset manually. Resetting the limiter will only be possible if the actual temperature measured by the Pt100 is below the limit temperature minus the unit hysteresis.

### The limiter can be reset using one of the following methods:

1. From the control panel on the HTC-915-CONT by pressing alarm and SHIFT + RESET (assuming presence of the digital communication between controller and limiter).
2. Via pushing and holding the RESET key on the limiter unit for  $t > 2$  seconds.
3. Remotely via the external input of the HTC-915 and a remote contact.
4. Remotely via DCS system. (5 to 24 Vdc).
5. Remotely via the serial interface and the supervisor software.

## APPENDIX - CONFIGURATION SHEET

### 915 HTC Configuration - Firmware versions V1.0X

### BASIC MODE MENU

(All other parameters are set as shown in the Advanced Mode Sub-Menus)

| CONFIGURATION MODE MENU |              |      |
|-------------------------|--------------|------|
| Parameter               | Factory      | User |
| Control Setpoint        | 68°F (20°C)  |      |
| Lo TS 1                 | 14°F (−10°C) |      |
| Lo Load                 | 1.0 A        |      |
| Switch Control Mode     | Deadband     |      |
| Circuit Breaker         | *n/a (30. A) |      |
| Temp. Units             | °C           |      |
| Feature Mode            | Basic        |      |

### ADVANCED MODE MENUS

| CONFIGURATION MODE MENU |              |      |
|-------------------------|--------------|------|
| Parameter               | Factory      | User |
| Control Setpoint        | 68°F (20°C)  |      |
| Lo TS 1                 | 14°F (−10°C) |      |
| Lo Load                 | 1.0 A        |      |
| Switch Control Mode     | Deadband     |      |
| Circuit Breaker         | *n/a (30. A) |      |
| Temp. Units             | °C           |      |
| Feature Mode            | Basic        |      |

| TS ALARMS CONFIGURATION SUB MENU |                         |      |
|----------------------------------|-------------------------|------|
| Parameter                        | Factory                 | User |
| TS 1 Fail                        | Enable                  |      |
| Lo TS 1                          | Enable                  |      |
| Lo TS 1                          | 14°F (−10°C)            |      |
| Hi TS 1                          | Disable                 |      |
| Hi TS 1                          | *n/a<br>212°F (100.0°C) |      |
| TS 2 Fail                        | Disable                 |      |
| Lo TS 2                          | Disable                 |      |
| Lo TS 2                          | *n/a<br>14°F (−10°C)    |      |
| Hi TS 2                          | Disable                 |      |
| Lo TS 2                          | *n/a<br>212°F (100.0°C) |      |
| Lo TS Filter                     | 0 min                   |      |
| Hi TS Filter                     | *n/a (0 min)            |      |
| Latch TS Alarms                  | Yes                     |      |
| CTL TS Fail                      | Enable                  |      |

| OTHER ALARMS CONFIGURATION SUB MENU |                       |      |
|-------------------------------------|-----------------------|------|
| Parameter                           | Factory               | User |
| Lo Load                             | Enable                |      |
| Lo Load                             | 1.0 A                 |      |
| Lo Load Filter                      | 0 sec                 |      |
| Hi Load                             | Disable               |      |
| Hi Load                             | *n/a (30.0 A)         |      |
| Hi Load Filter                      | *n/a (0 sec)          |      |
| Hi GFI                              | Enable                |      |
| Hi GFI                              | 20 mA                 |      |
| Hi GFI Filter                       | 0 sec                 |      |
| GFI Trip                            | Enable                |      |
| GFI Trip                            | 30 mA                 |      |
| Lo Volt                             | Enable                |      |
| Lo Volt                             | 90 V                  |      |
| Lo Volt Filter                      | 0 sec                 |      |
| Hi Volt                             | Disable               |      |
| Hi Volt                             | *n/a (270 V)          |      |
| Hi Volt Filter                      | *n/a (0 sec)          |      |
| Lo Resist                           | Disable               |      |
| Lo Resist                           | *n/a (50%)            |      |
| Lo Resist Filter                    | *n/a (0 sec)          |      |
| Hi Resist                           | Disable               |      |
| Hi Resist                           | *n/a (50%)            |      |
| Hi Resist Filter                    | *n/a (0 sec)          |      |
| Nominal Resist                      | *n/a (6.00 $\Omega$ ) |      |
| Overcurrent Trip                    | *n/a (Enable)         |      |
| Switch fail                         | Enable                |      |
| HTC Reset                           | Disable               |      |
| C.B. Limiting                       | *n/a (Disable)        |      |
| Output Limiting                     | *n/a (Disable)        |      |
| Switch Limiting                     | *n/a (Disable)        |      |
| Contact Count                       | Enable                |      |
| Contact Count                       | 200,000               |      |
| EEROM data Fail                     | Enable                |      |

| POINT SETUP SUB-MENU  |                  |      |
|-----------------------|------------------|------|
| Parameter             | Factory          | User |
| Tag                   | TAG-(factory ID) |      |
| Switch Control Mode   | Deadband         |      |
| Deadband              | 5°F (3°C)        |      |
| Prop Band             | *n/a (4°F (2°C)) |      |
| Cycle time            | *n/a (10 min)    |      |
| Switch Rating         | *n/a (30.0 A)    |      |
| Circuit Breaker       | *n/a (30.0 A)    |      |
| Outlet Limit Mode     | Disable          |      |
| Max. Power            | *n/a (7200 W)    |      |
| Max. Current          | *n/a (30.0 A)    |      |
| 3 Ph Pwr Calc         | No               |      |
| TS Fail Mode          | Off              |      |
| TS CTL Mode           | TS1-Fail Off     |      |
| TS 1 Hi Limit         | *n/a Disable     |      |
| TS 2 Hi Limit         | *n/a Disable     |      |
| Volt Turns Ratio      | 1.00 to 1        |      |
| Current Turns Ratio   | 1.00 to 1        |      |
| Auto-cycle            | Enable           |      |
| Auto-cycle Interval   | 8                |      |
| Auto-cycle Units      | Hours            |      |
| Override Source       | Remote           |      |
| Load Shedding         | *n/a             |      |
| Limiter Cutout Temp.  | *n/a (50.0°C)    |      |
| Limiter Current Sense | *n/a (Disable)   |      |

| MISC. SETUP SUB-MENU |                   |      |
|----------------------|-------------------|------|
| Parameter            | Factory           | User |
| Temp. Units          | °C                | n/a  |
| Version              | V1.0X.XX          |      |
| Limiter version      | *n/a (V1.0X.XX)   |      |
| Ext. Input           | Not used          |      |
| Flash Alarm Output   | Yes               |      |
| Alarm output         | N.C.              |      |
| Language             | English           |      |
| Passcode             | 0                 |      |
| Scroll Delay         | 0.15 secs         |      |
| Load Defaults        | (See user manual) |      |
| Limiter Installed    | No                |      |

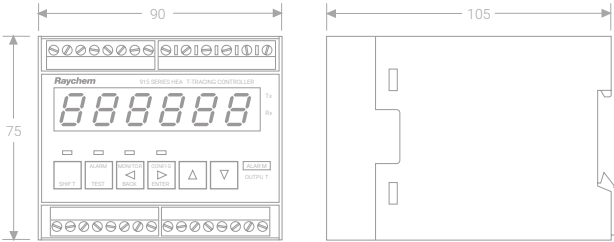
| COMMUNICATION SETUP SUB-MENU |             |      |
|------------------------------|-------------|------|
| Parameter                    | Factory     | User |
| Protocol                     | Modbus RTU  |      |
| Modbus Addr                  | *n/a (1)    |      |
| Modbus Sub Addr              | *n/a (0)    |      |
| Baud Rate                    | Auto        |      |
| Parity                       | *n/a (None) |      |
| Tx Deley                     | 0.06 secs   |      |

\* n/a: Parameter may only appear if certain features are enabled. Values shown in brackets are the Factory defaults if the settings are enabled.

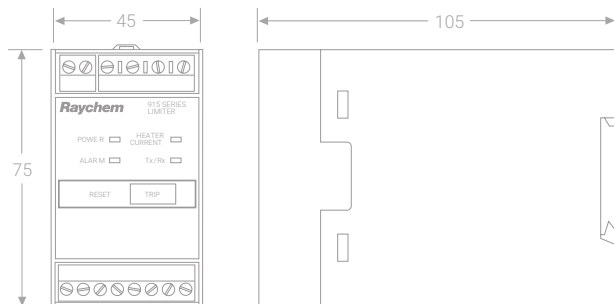
This information defines the default 915 Series Control Module configuration as set by the Factory for firmware V1.0X. These settings are subject to change without notice. It is the user's responsibility to verify that all configuration parameters are chosen appropriately for the intended application.

## PRODUCT DIMENSIONS

### Controller Dimensions



### Limiter dimensions



## INSTALLATION

Ensure all personnel involved in installation, servicing, and programming are qualified and familiar with electrical equipment, their ratings and proper practices and codes.

### Installation Location

Considerations should include expected atmospheric conditions, accessibility for maintenance, testing and ambient temperature. The conditions at the place of installation may affect load current ratings.

### Operator Safety Considerations

**Caution:** Some wiring configurations will use more than one power source and all must be de-energized prior to performing any maintenance on a control circuit.

**Warning:** The HTC-915 control module must be protected by external over current and disconnect devices.

### Mounting Procedures

The HTC-915-CONT and HTC-915-LIM are designed for installation on a standard 35 mm x 7.5 mm (EN50022 compatible) DIN rail.  
Pollution Degree 2  
Altitude 0-2000m

## MAINTENANCE

### Operator Maintenance

The HTC-915 control system is designed to be a maintenance free product.

### Replaceable Parts

There are no user-serviceable parts in the HTC-915 series controller or accessories. The unit is designed to be easily changed out in the field in a matter of minutes.

Any HTC-915 system component appearing inoperative should be returned to the nearest Chemelex office.

### Cleaning

If the HTC-915 components require cleaning, a damp cloth may be used to wipe the units. This should only be done while the units are disconnected from their power source. Do not use any harsh chemicals or solvents, as this may damage the housing or finish.

## ELECTRICAL CONNECTION

Connections are made via screw connections suitable to accept cable diameters between 0.5 and 2.5 mm<sup>2</sup> (24 to 12 Awg). Either solid or stranded wires may be used.

**Do not rely on the controller as a disconnect device!**

### Installation notes

- If contact with live parts is possible while working on the unit, it must be completely isolated from the mains supply. Be aware that the unit might have cables connected to it which are powered from different sources.
- Magnetic or electric fields, eg: from transformers, mobile phones or electrostatic discharge must be avoided in the vicinity of the instrument.
- Route input, output and supply lines separately.
- Arrange sensor cable extensions as twisted and screened cables. Do not run them close to power cables. The shield, if any, shall be earthed on the controller's side only.
- Fluctuations in the supply signals are only permissible within the specified tolerances.

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