HRT4-ZW THERMOSTAT MANUAL
Z-WAVE INFORMATION

Contents

1   Description of System and Unit

1.1   General Description of Horstmann System

HRT4-ZW CONNECTIONS:

NONE

RECEIVER CONNECTIONS:

LIVE

NEUTRAL

NC

NO

COM

COMBI BOILER

HRT4-ZW

RF SIGNAL
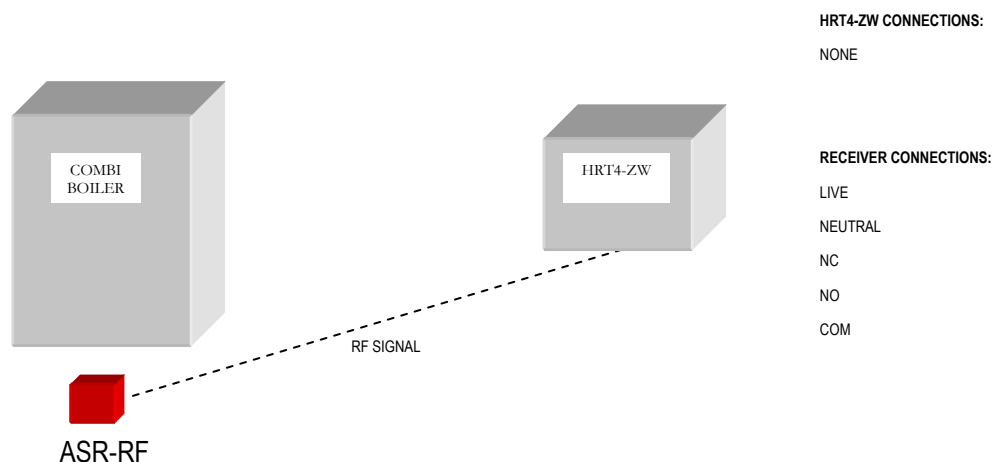
ASR-RF

Figure 1 – System Diagram

The HRT4-ZW unit is part of a system designed by Horstmann to primarily control a boiler, by sending Thermostat Mode SET commands or Binary Switch commands to a control device, such as an ASR-RF – see figure 1. The demand temperature (or Set-Point temperature) can be set locally at the Thermostat or remotely from another unit.

As a secondary function the measured temperature parameter has been made available so that it can function as a temperature sensor in a network for other nodes. If this function is enabled the unit can send temperature reports unsolicited upon specific changes in measured temperature or respond to requests for the measured temperature upon wake up.

As a Z-Wave controller product the unit is capable of including and excluding nodes to its network, and being included or excluded to another controller's network.

1.2 HRT4-ZW Unit Description

The unit is a self-contained unit that operates from 2 x AAA batteries, and does not contain any pins or terminals for external connection.

To power up the unit insert 2 x AAA batteries according to the orientation shown at the battery locations.

Figure 2 – Front View of the Unit

The unit has a push button dial that can be rotated in either direction to control demand temperature or select installer functions, an LCD, and a set of DIL switches on the rear of the unit as shown in figure 3 for function selection.

The LCD has a back-light which only stays on briefly after a button press to save power.

When the unit is in normal working mode – as shown in figure 2, it will send Thermostat Mode SET commands or Binary Switch commands according to its heating algorithm to associated control device(s), but a message will be sent at least every hour (to prevent an ASR-RF entering failsafe mode).

When the unit is in installer mode – Z-Wave functions can be invoked.

The unit can be switched between normal working mode and installer mode using DIL switch 1 (on = installer mode).
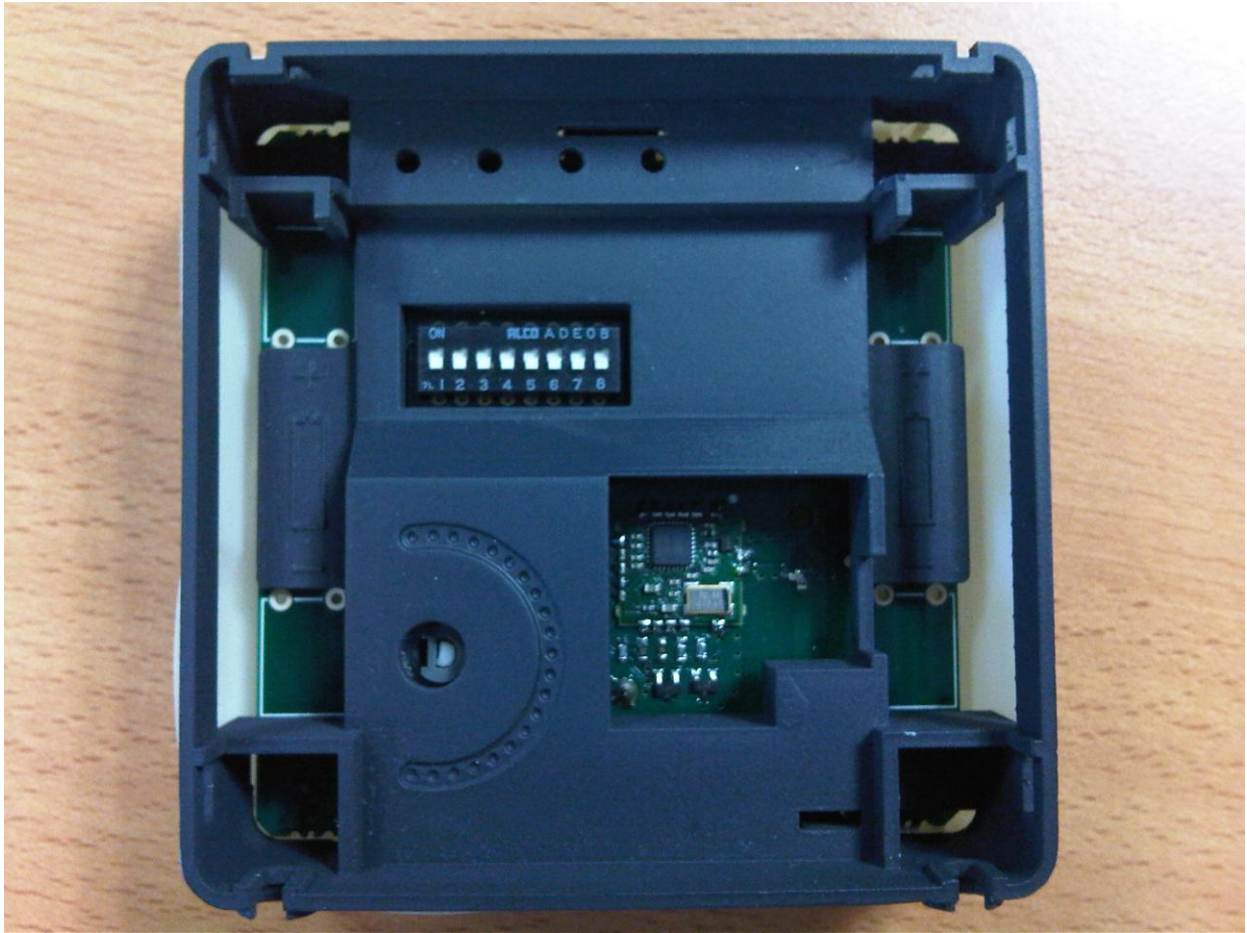
Figure 3 – Rear DIL Switches

1.2.1 Normal Working Mode

When the unit is in normal working mode, the LCD will have the format as shown in figure 2, where a measured or demand temperature is shown.

Pressing the dial will switch the display between the measured (room) or demand (set) temperatures.

Rotating the dial clockwise will increase the demand temperature and rotating anti-clockwise will decrease the demand temperature. The demand temperature range is 5 – 30°C.

If the demand temperature is repeatedly changed to above then below the measured temperature then the unit will switch an associated control device.

If there is no acknowledgement from the associated control device on sending the Thermostat Mode SET or Binary Switch SET command, the unit will retry until an acknowledgement is received or up to 2 more times, whichever sooner. If no acknowledgement is received then the unit will give a loss of communications warning, which can only be cleared by a successful communication with the control device.

1.2.2 Installer Mode

To enter installer mode switch the installer switch in the DIL switch array on the rear of the unit up.

 Only from this mode can Z-Wave network functions be invoked.

The display will default to the first option in the installer menu, which is 'I' for inclusion, and that function can be selected by pressing the dial. Another function can be selected by rotating the dial and pressing it.

To exit installer mode return DIL switch 1 to its original position (normal mode), but note that any Z-Wave function in progress will be cancelled by this action. *Note: It may be necessary to remove a battery, wait for the display to disappear and then re-insert the battery after leaving installer mode if the ASR relay does not switch when the dial is turned and the gas flame indicator changes on or off.*

2 Network Functions

2.1 Network Initiator Sequences

The following table shows how to select the standard Z-Wave functions.

Z-Wave Function	Initiator Sequence	Mode Indication
Include Node on to this network	Using the dial find 'I' and press it to select the function.	'I' flashes
Exclude Node from this network	Using the dial find 'E' and press it to select the function.	'E' flashes
Transmit a Node Information Frame (NIF)	Using the dial find 'n' and press it to select the function.	'n' flashes
Inclusion / Exclusion by another controller	Using the dial find 'L' and press it to select the function.	'L' flashes
Inclusion and reception of primary role	Using the dial find 'L' and press it to select the function.	'L' flashes
Receive Period Enabled (Listening)	Using the dial find 'Li' and press it to select the function.	'Li' flashes
Protocol Reset	Using the dial find 'P' and press it <u>twice</u> to select the function.	'P' flashes
Associate Control Unit	Using the dial find 'A' and press it to select the function.	'A' flashes
Disassociate Control Unit	Using the dial find 'd' and press it to select the function.	'd' flashes
Controller Shift	Using the dial find 'C' and press it to select the function	'C' flashes

Table 1 – Z-Wave Function Initiators

2.2 Include Node on to this Network

When include has been selected the unit will wait until a successful outcome is received or a failed outcome is received and indicate this on the LCD with a 'P' or 'F' respectively.

If the installer does not start the inclusion process of the other node within 60s, or the unit does not receive a response within 4 minutes of beginning inclusion with another node, or 5 minutes is up (60s + 4 minutes) a failed outcome will be indicated.

NOTE: If the node added to the network supports the Thermostat Mode command class or Binary Switch command class that node will be associated in to Group 1 or Group 2 – see Figure 4.

2.3 Exclude Node from this Network

When exclude has been selected the unit will wait until a successful outcome is received or a failed outcome is received and indicate this on the LCD with a 'P' or 'F' respectively.

If the installer does not start the exclusion process of the other node within 60s, or the unit does not receive a response within 4 minutes of beginning exclusion with another node, or 5 minutes is up (60s + 4 minutes) a failed outcome will be indicated.

NOTE: If the node excluded from the network was associated it will be disassociated by removing it from Group 1 or Group 2 automatically.

2.4 Transmit Node Information Frame

When this function has been selected, a Node Information Frame (NIF) is sent and after the operation a successful outcome is indicated on the LCD with a 'P' within approximately 1s.

If an outcome is not received within 5s then an 'F' is displayed.

2.5 Inclusion/Exclusion by another Controller

When this function indicated by 'L' (Learn) has been selected the unit will wait until a successful outcome is received or a failed outcome is received and indicate this on the LCD with a 'P' or 'F' respectively.

If the installer does not start inclusion/exclusion on another controller within 60s, or the unit does not receive a response within 4 minutes of engaging in Learn mode with another node, or 5 minutes is up (60s + 4 minutes) a failed outcome will be indicated.

NOTE: Any associations will only be cleared if the unit has engaged in Learn mode with another controller regardless of a successful or failed outcome, and the associations will need to be re-made by Z-Wave message or manually through the Association function.

NOTE: The unit does not support control group replication.

2.6 Inclusion and Reception of Primary Role

When this function indicated by 'L' (Learn) has been selected the unit will wait until a successful outcome is received or a failed outcome is received and indicate this on the LCD with a 'P' or 'F' respectively.

If the installer does not start inclusion on another controller within 60s, or the unit does not receive a response within 4 minutes of engaging in Learn mode with another node, or 5 minutes is up (60s + 4 minutes) a failed outcome will be indicated.

NOTE: Any associations will be cleared if the unit has engaged in Learn mode with another controller regardless of a successful or failed outcome, and the associations will need to be re-made by Z-Wave message or manually through the Association function.

2.7 Receive Period Enabled

Since this unit is regarded as a remote controller, it is not a 'listening device' therefore, a 'listening window' needs to be made available, where the unit can receive and respond to messages.

Selecting this function keeps the unit awake for 60s to respond to any commands.

At the end of the 60s period, the display will indicate that time is up by no longer flashing 'Li'.

2.8   Protocol Reset

This function provides a full protocol reset as documented by Zensys and a restoration of all parameters to their defaults. The unit will go back to being a primary controller with its factory set Home ID and no record of nodes included on its network or any associated nodes. It effectively restores the unit back to original factory conditions.

When this function has been selected, a successful outcome is indicated on the LCD with a 'P' within approximately 2s.

If an outcome is not received within 5s then an 'F' is displayed.

2.9   Association

This function allows the installer to manually associate a boiler control node so that the unit can control that node.

When the function is selected the installer has 60s to initiate a NIF from the control node for the association to take place, from which a response produces a 'P' or 'F' outcome indication on the LCD. In the event of the 60s period elapsing a failed response will occur, but in the event of no response received for 65s the LCD will show an 'F'.

The criteria and method used for association in to Group1 or Group 2 or not are shown in figure 4.

NOTE: Nodes can also be added to Group 1 or Group 2 using the Z-Wave Association Command Class.

2.10 Disassociation

This function allows the installer to manually disassociate a boiler control node so that the unit can no longer control that node.

When the function is selected the installer has 60s to initiate a NIF from the control node for the disassociation to take place, from which a response produces a 'P' or 'F' outcome indication on the LCD. In the event of the 60s period elapsing a failed response will occur, but in the event of no response received for 65s the LCD will show an 'F'.

If the Node ID matches one of those stored in Group 1 or Group 2 then it is removed and a 'P' will be displayed, otherwise an 'F' will be displayed.

NOTE: Nodes can also be removed from Group 1 or Group 2 using the Z-Wave Association Command Class.

2.11 Controller Shift

This function allows the installer to manually relinquish the primary controller role of the HRT4-ZW to become a secondary or inclusion controller. The role of primary controller is passed to another controller.

When the function is selected, the installer has 60s to initiate Learn mode on another controller for the controller shift to take place, from which a response produces a 'P' or 'F' outcome indication on the LCD. In the event of the 60s period elapsing a failed response will occur, but in the event of no response received for 65s the LCD will show an 'F'.

2.12 Network Update Scheme

When the unit is a secondary or inclusion controller with a SUC/SIS present, the unit will request network updates once every 23 hours.

NOTE: For the purposes of interoperability with other manufacturers, the above modes can be used to include / exclude any Z-Wave certified products on to / off its network. The HRT4-ZW can also become part of any Z-Wave network, and supports the capability to be removed from it.
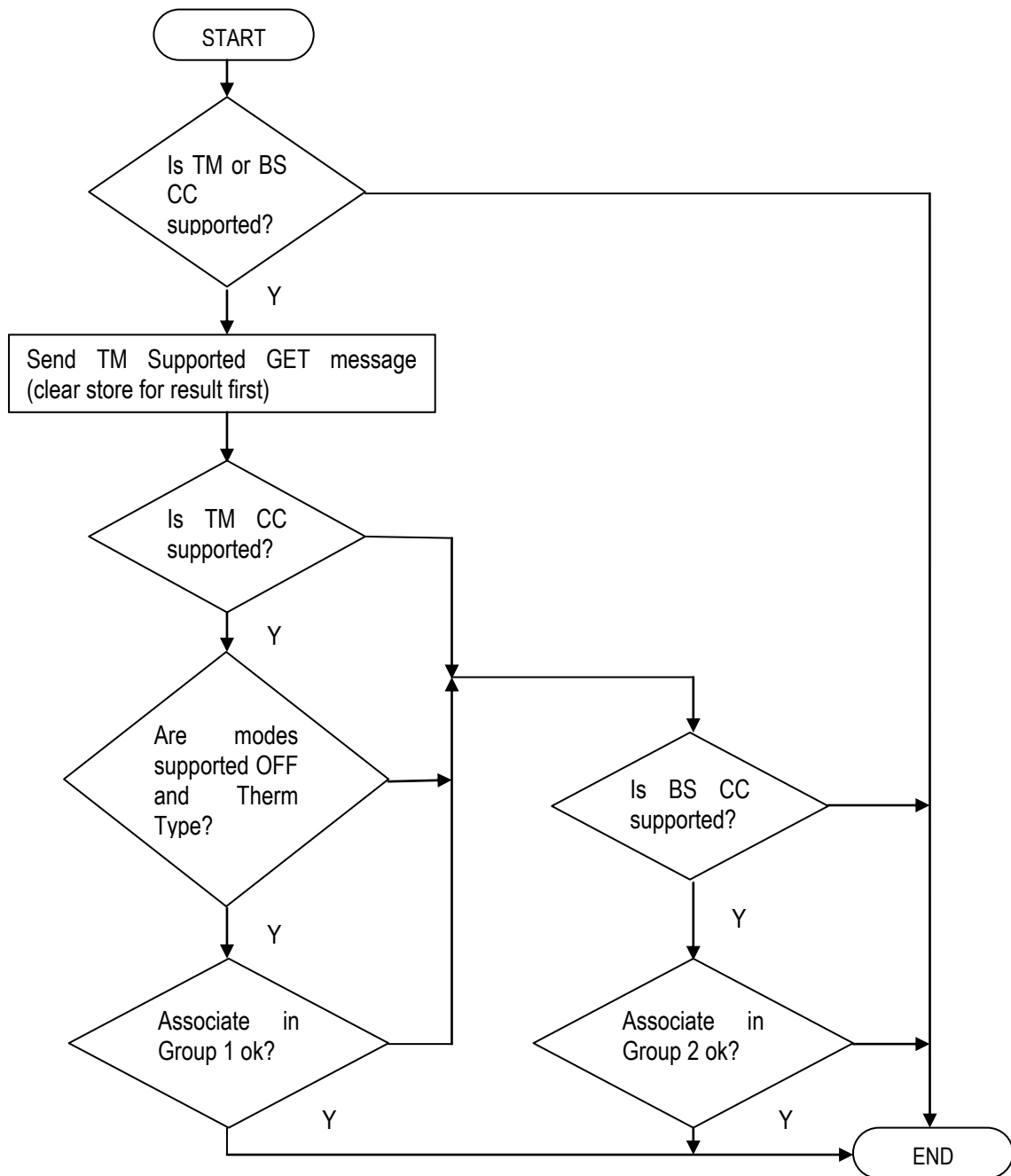
Figure 4 – Association Algorithm

Where Therm Type = Heating Thermostat.

Association in to Group X will take place if there is room for that node in the Group.

3   Device and Command Classes

3.1   Device Classes

The Z-Wave network role for the unit will be a primary portable (battery operated) controller, that is not receive enabled at all times **[1] [3]**.

Basic Device Class = PORTABLE CONTROLLER.

Generic Device Class = THERMOSTAT GENERIC DEVICE CLASS.

Specific Device Class = NOT USED.

3.2   Command Classes Supported

Support requires that the unit is able to receive commands and respond within that command class **[2]**. Unless stated each command class supported is version 1.

3.2.1   Manufacturer Specific Command Class (V1)

The unit shall respond to the GET command with the following REPORT parameters:

Manufacturer ID = 0x0059 (assigned by Z-Wave vendor)

Product Type ID = 0x0001 (assigned by Horstmann, 0001 is the ID for a RADIO_THERMOSTAT COMPONENT)

Product ID = 0x0003 (assigned by Horstmann).

3.2.2   Version Command Class (V1)

The unit shall respond to the GET command with a REPORT containing version information for the Z-Wave code, and a two byte identifier for the application code (written by Horstmann). Production Code will start from Version 1 Revision 0 so the two byte identifier shall start from 0x01 0x00.

The unit shall respond to the Version Command Class GET with the Version Command Class REPORT for any requested command class that is supported or not. For unsupported and uncontrolled classes, the version number returned is 0.

3.2.3   Battery Level Command Class (V1)

The unit shall respond to the Battery Level GET command with a Battery Level REPORT with a battery level parameter of 0x00 to 0x64.

Battery Level Reports and Low Battery Warnings (Battery Level Reports with parameter = 0xFF) can also be sent unsolicited to the nodes in Group 3.

3.2.4   Wake Up Command Class (V2)

The unit supports Wake Up Command Class version 2 and supports a range of wake up intervals in steps of 1s and a default wake up interval. These values are available through the Wake Up Capabilities Report.

The default is used if the unit is not included on to a network and has not received a valid wake up interval. Any out of range wake up interval received is ignored.

3.2.5   Multilevel Sensor Command Class (V1)

The unit shall respond to the Multilevel Sensor GET command with a Multilevel Sensor REPORT.

The report carries the measured temperature as a 2 byte signed number with a scale of C or F and a precision of 1 decimal place.

The report can be requested or sent unsolicited to the nodes in Group 5.

NOTE: If the temperature sensor functionality is disabled the measured temperature reported is 0x8000 (indicates it's not in use).

3.2.6 Thermostat Set Point Command Class (V1)

The unit supports the Thermostat Set Point Command Class.

Set Point type of Heating is supported.

The unit will accept Set Point SET commands if the set point type matches the thermostat type configuration.

The unit will send a Set Point REPORT in response to a Set Point GET or unsolicited to the nodes in Group 4 upon a change of demand temperature made locally at the unit.

3.2.7 Association Command Class (V1)

The following association groups are supported in the grouping identifier range 1 – 5 respectively:

> Group 1 - Nodes controlled by Thermostat Mode SET command.
>
> Group 2 - Nodes controlled by Binary Switch SET command.
>
> Group 3 - Nodes to receive unsolicited Battery Level Reports or Low Battery Warnings.
>
> Group 4 - Nodes to receive Thermostat Set Point Reports.
>
> Group 5 - Nodes to receive unsolicited Multilevel Sensor Reports.

Each group contains a maximum of 4 nodes.

3.2.8 Configuration Command Class (V1)

The unit supports 3 single byte configurations for the temperature sensor functionality of the unit in the range 1 – 3 respectively.

> Configuration Parameter Number 1:
> 0–127 disables temperature sensor, 128-255 enables temperature sensor. Default = 0.
>
> Configuration Parameter Number 2:
> 0-127 = Celsius, 128-255 = Fahrenheit. Default = 0.
>
> Configuration Parameter Number 3:
> 1 – 100 = Delta T in steps of 0.1 degree. Default = 10 (1.0).

3.3 Command Classes for Control

Control requires that the unit is able to send commands and receive responses within that command class **[2]**. Unless stated each command class is version 1.

3.3.1 Thermostat Mode Command Class (V1)

The unit will be able to send the Thermostat Mode SET command, whereby the mode parameter will operate a control unit for a boiler.

If a control unit is associated to Group 1 then the thermostat will use thermostat modes off and heat.

3.3.2 Binary Switch Command Class (V1)

If a control unit is associated to Group 2 then the thermostat will use Binary Switch SET commands to control a boiler.

3.4 Basic Command Class

The basic command class GET and SET commands are ignored, and the REPORT response is not supported.

The manufacturer deems that no relevant commands are available for mapping to the basic command class.

HORSTMANN

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