

HELTUN™

IMPOSSIBLY SMART



RELAY SWITCH QUINTO HE-RS01 USER MANUAL

for Hardware v.76 & Firmware v.1.4



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MANUAL REVISION HISTORY

November 2021

- **Firmware V1.4** - Added "**Parameters 66-70 – Restore Relays State**"
- **Firmware V1.4** - Added "**Parameters 46-50 – Hold Mode Duration for External Inputs S1-S5**"
- **Firmware V1.4** – Improved the functionality of "**Parameters 171-175 – Associations Mode**"
- **Firmware V1.3** - Max supported Nodes for each Association Group increased to 3

Detailed Changelog & OTA update files can be found at support.heltun.com

OVERVIEW

This is the user manual for the HELTUN HE-RS01 Advanced Programmable Relay Switch 'Quinto' (i.e. five-channel). It is designed to fit inside standard round, square, or rectangular electrical junction boxes installed behind an existing in-wall switch or inside a circuit breaker panel. Relay Switch Quinto enables On/Off controls of lights, dimmers, blinds, doors, gates, valves, and motors either manually by a direct-connected switch, or remotely through a Z-Wave™ network.

Thanks to the HE-RS01 five-channel relays it can manage up to five On/Off devices, or three On/Off devices and one two-direction motors, or one On/Off device and two two-direction motors. It has two independent inputs for relay channels which allow it to control systems with different power sources or to use relay outputs as dry contacts. Each relay can be loaded up to five amps and uses the HELTUN Advanced Zero-Cross Technology to increase the life of the device and connected system.

The HE-RS01 can also be used to manage motorized systems, e.g. garage doors, window blinds, etc. It allows association with relay switches and roller shutters to control the opening and closing of the system.

The HE-RS01 has an onboard Real Time Clock (RTC) that enables scenarios where connected devices can be triggered on a schedule.

The HE-RS01 has five fully configurable inputs for external switches. Each input can be configured to control the relay output state (from one to five) in any of ten different modes. The inputs also can be used to activate scenes on a Z-Wave Controller.

The HE-RS01 integrates a Z-Wave Plus™ v2 700 platform module allowing it to be used with Z-Wave home automation systems. It supports Z-Wave 'S0' and 'S2' security protocols, SmartStart technology, and can be connected (i.e. "associated") with up to 75 other Z-Wave devices, such as relays, switches, dimmers, motor controllers, etc.

The HE-RS01 is also an excellent choice for managing lighting systems, allowing association to Z-Wave dimmers controlling both On and Off—as well as smooth brighten (Up) and smooth dim (Down)—states using external switches connected to HE-RS01 inputs.

TECHNICAL SPECIFICATIONS

- Dimensions: 50mm (H) x 50mm (W) x 27mm (D)
- Materials: Flame retardant plastic
- LED indicator for device status
- Five-channel relay outputs, resistive load up to 5A each
- Two independent relays inputs, dry contact
- Operating temperature: 0°C to 50°C
- Power supply: 85-265VAC 50Hz/60Hz, or 24-48VDC
- Power consumption: 1W
- Active elements: Electromagnetic Relay Switch
- HELTUN Advanced Zero-Cross relay switching technology
- Relay life: 100.000 switches
- Device control
 - Through Z-Wave network
 - Directly with pilot wires
- IP class: IP21
- Z-Wave Plus V2 SDK: V7.11
- Z-Wave module: ZGM130S
- Requires mounting to flush electrical junction box:
 - round, square, or rectangular type – min. depth 40mm

FUNCTIONS & FEATURES

- Options for Inclusion/Exclusion to/from Z-Wave network
 - Non-Secure
 - S0 Secure
 - S2 Unauthorized, S2 Authorized with Key
- Association control of Z-Wave devices in the network
- Schedule mode
- Motorized device control (roller shutter mode)
- Each of five external inputs can control any relay output
- Up to five different relay channels can be controlled by one external input
- Each external input can be set up to control devices from associated groups
- Each external input & relay output can be managed by a gateway or associated device
- Each external input can trigger scenes (i.e. acts like scene controller)
- Any relay channel may be excluded from control
- Ten modes for each external input:
 1. Momentary
 2. Momentary Reversed
 3. Momentary Toggle
 4. Toggle
 5. Switch ON Only
 6. Switch OFF Only
 7. Timer (ON to OFF)
 8. Timer Reversed (OFF to ON)
 9. Two-Relay Inverse
 10. Roller Shutter
- Adjustable periodic measurements from:
 - Energy consumption meter
- LED blinking function (for easy identification among other Z-Wave devices)
- Software energy consumption logic
- Factory reset function
- SmartStart technology for quick addition to Z-Wave networks
- OTA (Over The Air) encrypted firmware update

INSTALLATION

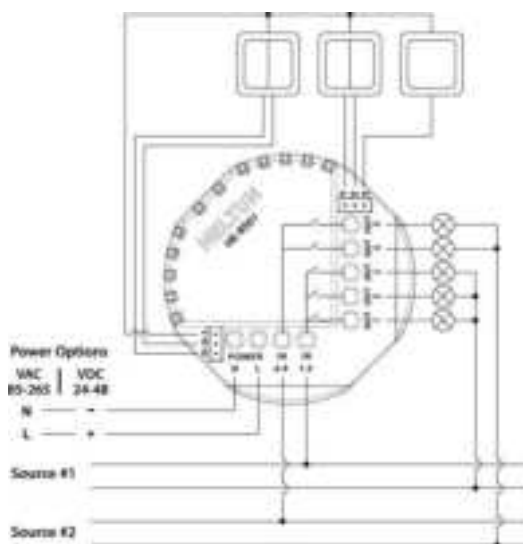
HELTUN recommends the HE-RS01 relay switch be installed by a licensed electrician in a manner that conforms to local regulations and building codes. Provide these instructions to the licensed electrician who is installing the HE-RS01

WARNING: ELECTRICAL POWER MUST BE SWITCHED OFF DURING INSTALLATION.

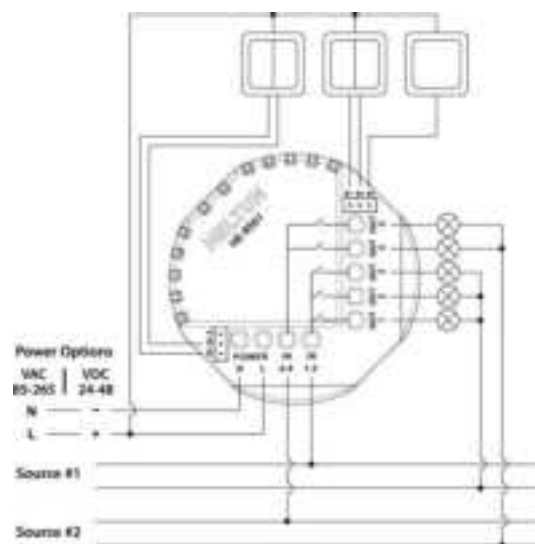


1. FIRST ENSURE THE POWER IS OFF at the main circuit breaker, and then test the wires with a probe or multimeter to verify.
2. Insert power wires into the HE-RS01 "POWER" terminals by inserting a small Phillips-head screwdriver in the slot beneath each terminal and unscrew to open. Follow connection diagrams 1 (or 2 or 3 or 4) and instructions below:

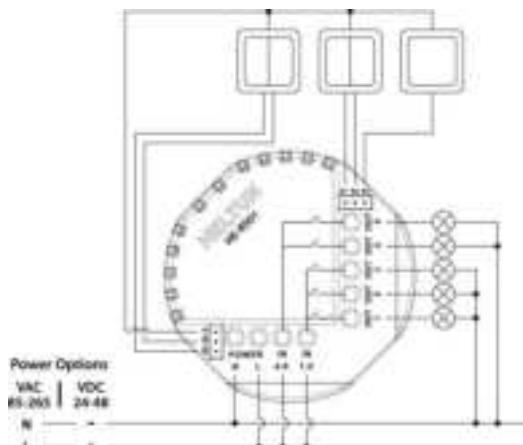
- **Power wires:** for AC power (85-265VAC) connect Line & Neutral wires to L & N terminals labeled “POWER”. For DC power (24-48VDC) connect “+” wire to terminal L and “-” wire to terminal N.
 - **Source 1 wire:** connect the required power source for relays 1, 2, and 3 to the terminal labeled “IN 1-3”.
 - **Source 2 wire:** connect the required power source for relays 4 and 5 to the terminal labeled “IN 4-5”.
 - **Loads:** connect the required loads to the relay output terminals labeled “OUT-1”, “OUT-2”, “OUT-3”, “OUT-4”, “OUT-5”.
- ≡ **Note:** HELTUN recommends installing cord terminals (electric wire ferrules) on the ends of wires before connecting them to the HE-RS01 outputs (various colors terminals are included in the packaging).
- ≡ **Note:** Zero-Cross technology is unavailable if the device operates using DC voltage (24-48VDC).



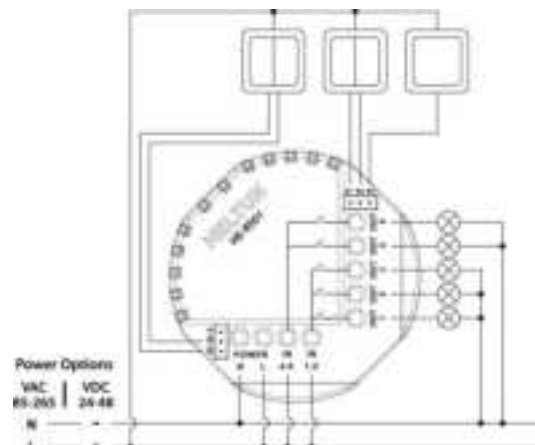
Connection Diagram 1



Connection Diagram 2



Connection Diagram 3



Connection Diagram 4

3. Next, connect terminals S1, S2, S3, S4, S5 to external control keys (switches) following connection diagrams 1 (or 2 or 3 or 4).

≡ **Note:** In case of using connection diagrams 2 or 4, it is MANDATORY to connect external switches to the same wire connected to terminal L on the device.
4. Switch on the main power at the circuit breaker. The HE-RS01 will start up with original default factory

DISASSEMBLY

1. ENSURE POWER IS SWITCHED OFF at the main circuit breaker AND THE LED INDICATOR IS OFF.
2. Disconnect the wires by inserting a small Phillips-head screwdriver into the slot beneath of each wire and turning counter-clockwise to release.

FACTORY RESET

To reset the HE-RS01 to factory defaults, press and hold the service button for six seconds. If successful, the LED indicator will blink white slowly for two seconds, then the device will reboot.

This factory reset procedure will change all parameters to the original factory default values and will also exclude the device from any associated Z-Wave network.

- ≡ **Note:** Please use Factory Reset only when the primary network controller is missing or otherwise inoperable.

Z-WAVE NETWORK

The HE-RS01 may be operated in any Z-Wave network with other Z-Wave-certified devices from other manufacturers. The HELTUN HE-RS01 will act as a 'repeater' (i.e. 'range extender') for other devices regardless of manufacturer or brand to increase the reliability of the overall network.

Adding to Z-Wave network

To add the HE-RS01 to a Z-Wave Network (i.e. "Inclusion"), do the following:

1. Ensure the HE-RS01 is Powered On and the LED indicator blinks red slowly (i.e. it is excluded)
2. Start the Inclusion mode from the gateway/controller
3. To start the inclusion process on the HE-RS01, double-press the service button on the device (with no more than a one-second interval between presses).
4. The LED indicator will blink green quickly.

5. If the inclusion has been successful, the LED indicator will turn green for three seconds then continue slowly blinking green continuously while the HE-RS01 is Powered On.
6. If the inclusion was not successful, the LED indicator will turn red for three seconds then continue slowly blinking red continuously while Powered On. In that case repeat the inclusion process (steps 2-5) above.



Removing from Z-Wave network

To remove the HE-RS01 from a Z-Wave Network (i.e. “Exclusion”), do the following:

1. Ensure the HE-RS01 is Powered On and the LED indicator is slowly blinking green (i.e. it is included in a Z-Wave network).
2. Start the Exclusion mode from the gateway/controller.
3. To start the exclusion process on the HE-RS01, double-press the service button on the device (with no more than a one-second interval between presses).
4. The LED indicator will blink red quickly.
5. If the inclusion has been successful, the LED indicator will turn red for three seconds then continue blinking red slowly continuously while the HE-RS01 is Powered On.
6. If the inclusion was not successful, the LED indicator will turn green for three seconds then continue slow blink green all the time the device is Powered On. In that case repeat the exclusion process (steps 2-5) above.

- ≡ **Note:** If the HE-RS01 has previously been part of a Z-Wave network and has not been Excluded since (the LED indicator blinks green slowly), inclusion is not possible without first performing an Exclusion or Factory Reset procedure.

Security

S0, S2 unauthorized, and S2 authorized Inclusion Modes are supported. If you use the S2 authorized Inclusion Mode, the security key should be used during the inclusion process. Security key is the first 5 digits of DSK (device DSK is printed on the rear of the device plus on the Security Card included in the packaging, see Figures 2 & 3).

- ≡ **Note:** Be sure to save this key. Without the key, it is impossible to perform an inclusion in S2 authorized mode.

SmartStart

SmartStart-enabled products can be added to a Z-Wave network by scanning the Z-Wave QR Code shown on the product (see Figures 1 & 3) with gateways/controllers that allow for SmartStart inclusion. In this case, no further action will be required and the SmartStart product will be added automatically within ten minutes of being turned on in the vicinity of a network.

To add the HE-RS01 to a Z-Wave network using **SmartStart**:

1. Input the HE-RS01 DSK code to the controller's Node Provisioning List (or scan the QR code).
2. Power on the device.
3. Wait for the inclusion process to complete.
4. Successful adding will be confirmed by a message on the Z-Wave controller (depending on the controller type) and the LED indicator on HE-RS01 will turn green for three seconds then continue to slowly blink green continuously while the device is Powered On.

≡ **Note:** The device QR code and DSK are printed on the front and rear of the HE-RS01 plus on the Security Card included in the HE-RS01 packaging, (see Figures 1, 2 & 3).



Figure 1



Figure 2



Figure 3

Firmware OTA Update

To wirelessly update the HE-RS01 firmware, follow these steps:

1. Check the device current firmware version in the gateway/controller.
2. Start the process from the Z-Wave gateway/controller.
3. Download the latest firmware that corresponds to the HE-RS01 (see <http://support.heltun.com/>)
4. Set the main controller in Firmware OTA ("over-the-air") Update Mode (see the gateway/controller manual).
5. As soon as the Firmware update begins, the LED indicator will sequentially blink red→green→blue (this will take a few minutes).
6. When the Firmware has updated, the LED will turn blue for two seconds and then the HE-RS01 will reboot.
7. When the update has been completed, the HE-RS01 will return to normal operation.

8. If desired, verify the update was successful by checking firmware version from the gateway/controller.

Z-Wave Plus V2 Specifications

Generic Device Class: GENERIC_TYPE_WALL_CONTROLLER

Specific Device Class: SPECIFIC_TYPE_NOT_USED

Supported Command Classes

Command Class	Version	Required Security Class
Z-Wave Plus Info	V2	none
Association	V2	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Association Group Info	V3	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Multi Channel Association	V3	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Multi Channel	V4	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Switch Binary	V2	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Central Scene	V3	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Meter	V5	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Clock	V1	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Transport Service	V2	none
Security 0	V1	none
Security 2	V1	none

Version	V3	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Manufacturer Specific	V2	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Device Reset Locally	V1	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Powerlevel	V1	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Supervision	V1	none
Indicator	V3	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Configuration	V4	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Application Status	V1	none
Firmware Update Meta Data	V5	highest granted (S2 Authenticated, S2 Unauthenticated or S0)
Basic	V2	highest granted (S2 Authenticated, S2 Unauthenticated or S0)

Meter Command Class:

Meter Type	Scale	Rate Type	Precision	Size
Electric [0x01]	Electric_kWh [0x00]	Import [0x01]	2	4
Electric [0x01]	Electric_W [0x02]	Import [0x01]	0	2

Associations

Association enables the HE-RS01 to control other Z-Wave devices over the network. The HE-RS01 has 6 Endpoints and 16 Association Groups. Each Association Group (except group 1) may include five other devices from different brands and/or manufacturers.

EndPoint 0 Groups:

The Root Device (EndPoint 0) of HE-RS01 has 16 association groups:

Group 1 – “Lifeline”: reports full state of the device and is used to communicate with the Z-Wave gateway. The group supports one Node.

- ≡ **Note:** It is not recommended to modify this group.
- ≡ **Note:** For correct operating in Fibaro gateways, the Single Channel Association should be removed from the device LifeLine (EndPoint 0 Group 1).

Group 2 – “External Input S1 Basic Set”: is assigned to the state of S1 input and will be triggered when the button is pressed on the switch connected to input S1. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

Group 3 – “External Input S1 Multilevel Set”: is assigned to the state of S1 input. It sends MULTILEVEL SWITCH command class frame when the button is held on the switch connected to input S1. Is used to send UP/DOWN command to the associated devices. The group supports five Nodes

Group 4 – “External Input S2 Basic Set”: is assigned to the state of S2 input and will be triggered when the button is pressed on the switch connected to input S2. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

Group 5 – “External Input S2 Multilevel Set”: is assigned to the state of S2 input. It sends MULTILEVEL SWITCH command class frame when the button is held on the switch connected to input S2. Is used to send UP/DOWN command to the associated devices. The group supports five Nodes.

Group 6 – “External Input S3 Basic Set”: is assigned to the state of S3 input and will be triggered when the button is pressed on the switch connected to input S3. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

Group 7 – “External Input S3 Multilevel Set”: is assigned to the state of S3 input. It sends MULTILEVEL SWITCH command class frame when the button is held on the switch connected to input S3. Is used to send UP/DOWN command to the associated devices. The group supports five Nodes.

Group 8 – “External Input S4 Basic Set”: is assigned to the state of S4 input and will be triggered when the button is pressed on the switch connected to input S4. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

Group 9 – “External Input S4 Multilevel Set”: is assigned to the state of S4 input. It sends MULTILEVEL SWITCH command class frame when the button is held on the switch connected to input S4. Is used to send UP/DOWN command to the associated devices. The group supports five Nodes.

Group 10 – “External Input S5 Basic Set”: is assigned to the state of S5 input and will be triggered when the button is pressed on the switch connected to input S5. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

Group 11 – “External Input S5 Multilevel Set”: is assigned to the state of S5 input. It sends MULTILEVEL SWITCH command class frame when the button is held on the switch connected to input S5. Is used to send UP/DOWN command to the associated devices. The group supports five Nodes.

Group 12 – “Relay 1 Basic Set”: is assigned to the state of relay N1 and will be triggered on the relay state change. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

Group 13 – “Relay 2 Basic Set”: is assigned to the state of relay N2 and will be triggered on the relay state change. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

Group 14 – “Relay 3 Basic Set”: is assigned to the state of relay N3 and will be triggered on the relay state change. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

Group 15 – “Relay 4 Basic Set”: is assigned to the state of relay N4 and will be triggered on the relay state change. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

Group 16 – “Relay 5 Basic Set”: is assigned to the state of relay N5 and will be triggered on the relay state change. Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. The group supports five Nodes.

EndPoints 1-5 Groups:

Group 1 – “Lifeline”: reports state of the device and used to communicate with the Z-Wave gateway. The group supports one Node.

≡ **Note:** It is not recommended to modify this group.

Group 2 – “Basic Set”: Is used to send Basic Set ON (value 255) and Basic Set OFF (value 0) commands to the associated devices. Each group supports five Nodes.and it is mapped to EndPoint 0 groups.

Here is a truth table for EndPoints 1-5 groups mapping to the root device (EndPoint 0) groups:

EndPoints 1-10 groups	Root (EndPoint 0) groups
Endpoint 1, Group 2 – “Relay 1 Basic Set”	Group 12 – “Relay 1 Basic Set”
Endpoint 2, Group 2 – “Relay 2 Basic Set”	Group 13 – “Relay 2 Basic Set”
Endpoint 3, Group 2 – “Relay 3 Basic Set”	Group 14 – “Relay 3 Basic Set”
Endpoint 4, Group 2 – “Relay 4 Basic Set”	Group 15 – “Relay 4 Basic Set”
Endpoint 5, Group 2 – “Relay 5 Basic Set”	Group 16 – “Relay 5 Basic Set”

Gateway compatibility requirement:

In order to make a reliable connection and data exchange with the gateway make sure that the gateway/controller is multi-channel capable. The gateway/controller lifeline association should be configured as a “multi-channel association.” Some Gateways need this option to be manually configured.

≡ **Note:** Fibaro Home Center 2: In order to enable correct communications between a Fibaro Gateway/Controller and the HE-RS01, the lifeline association should be configured as a “multi-channel association.” Make sure that only the Multi-channel association check box is selected under Device > Settings > Advanced > Setting Association > Group1 tab (lifeline). By default, there are two checkboxes for Single-channel and Multi-channel associations. Please deselect the checkbox under Single-channel associations.

OPERATION

The HE-RS01 has five relays and five external inputs (S1, S2, S3, S4, S5).

1. Each relay can be controlled by any external input or via a Z-Wave network (using a Z-Wave gateway).
2. Each external input can be configured to control any relay output state (from one to five) in the modes below:

- 1) **MOMENTARY** (factory default mode): When the button on an external switch is held, the relay output turns ON. As soon as the button is released, the relay output state changes to OFF (see Parameters 41-45 settings).
- 2) **MOMENTARY REVERSED**: When the button on an external switch is held, the relay output turns OFF. As soon as the button is released, the relay output state changes to ON (see Parameters 41-45 settings).
- 3) **MOMENTARY TOGGLE**: When the button on an external switch is held, the relay output inverts state (from ON to OFF or from OFF to ON), as soon as the button is released the relay output inverts state again (see Parameters 41-45 settings).
- 4) **TOGGLE**: Press button on external switch: relay output inverts state: (ON to OFF) or (OFF to ON).
- 5) **SWITCH ON ONLY**: Press button on external switch: relay output switches to ON state (i.e. contacts are closed).
- 6) **SWITCH-OFF**: Press button on external switch: relay output switches to OFF state (i.e. contacts are opened).
- 7) **TIMER: ON>OFF**: Press button on external switch: relay output switches to ON for the specified time, then reverts to OFF. (Tip: This function is useful to open/close garage doors, blinds, curtains, etc.)
- 8) **TIMER REVERSED: OFF>ON**: Press button on external switch: relay output switches to OFF for the specified time then reverts to ON. (Tip: This function is useful for switching off security systems for a short time.)

≡ **Note:** Time can be configured from 0 to 12 hours (0 to 43200 seconds).

- 9) **TWO-RELAY INVERSE**: When two relays are in Inverse mode, after pressing a button on external switch the corresponding relay (connected to that button) inverts its state: (from ON to OFF, or from OFF to ON) and the second relay will be switched OFF.

≡ **Note:** In this mode both relays cannot be switched ON simultaneously. Can be used for motor direction control.

- 10) **ROLLER SHUTTER**: When two relays are connected to the same external switch, they will operate in 'roller shutter' mode. After entering this mode, relays will switch to OFF state, and never switch ON simultaneously. The four-cycle relay behavior is as follows (in this order):

- 1st press: first relay will be switched ON, second relay will be switched OFF
- 2nd press: both relays will be switched OFF
- 3rd press: second relay will be switched ON, first relay will be switched OFF
- 4th press: both relays will be switched OFF

The above-mentioned two relays are defined according to parameters 101 & 102 (e.g. if "54" is set as the parameter value, it means the fifth relay and fourth relay will be operated in inverse mode).

≡ **Note:** This can be used to control motor directions with one button only.

Switches connected to external inputs (terminals S1-S5) can also be used to run scenarios or change modes in the connected gateway or associated devices.

If the HE-RS01 is associated with a Z-Wave gateway, the scene controller and five binary switches will appear. The scene controller indicates which external input was pressed, held, or released and allows the running of scenes on the Z-Wave gateway. The five binary switches allow the relay outputs to be managed.

SCENARIOS

Scenarios can be created that allow connected devices to be triggered by the HE-RS01 onboard Real Time Clock (RTC). The user should configure the output number, state, time, state change condition, in the Parameters (from 111 - 120) which will trigger the scenes.

POWER AND ENERGY CONSUMPTION

The HE-RS01 monitors all connected loads active (i.e. 'real time') power, and total energy consumption, through software energy consumption logic. This data is periodically reported to the main Z-Wave controller according to Parameter 04.

Total Energy Consumption is the electrical power being used by connected device in real time during use. Power usage is calculated by the software using the values that were manually set when configuring Parameters 1241-1645, multiplied by the time tracked when the HE-RS01 corresponding output was in an ON state. Using your connected device's power consumption specification (see associated owner's manual), set the load in Watts for: "OUT-1" in Parameters 12, "OUT-2" in Parameter 13, "OUT-3" in Parameter 14, "OUT-4" in the Parameter 15, and "OUT-5" in Parameter 16.

Resetting Cumulative Consumption Memory:

The HE-RS01 enables you to erase stored consumption data through the Z-Wave network as follows:

1. Make sure the HE-RS01 is powered.
2. If not already done so, include the device into Z-Wave Gateway network
3. Reset memory consumption data using the Reset Command in COMMAND_CLASS_METER (see the Gateway owner's manual).

≡ **Note:** Power cycling the HE-RS01 (On>Off>On) will not erase the consumption data as it is stored in non-volatile memory

SETTINGS (available through Z-Wave network)

All configuration parameters are accessed through Z-Wave
 COMMAND_CLASS_CONFIGURATION

Parameters List & Factory Defaults

Number	Size	Description	Default Value	Value Range
1	1 byte	Frequency Region	Read Only	0 ... 9
2	1 byte	Inclusion / Exclusion Mode	Read Only	0, 1
3	4 bytes	Hardware and Software Versions	Read Only	XXYYZZ
4	4 bytes	Energy Consumption, kW	Read Only	Total consumption
5-6	Reserved by the manufacturer			
7	1 byte	Relay 1 output NO or NC mode	0	0, 1
8	1 byte	Relay 2 output NO or NC mode	0	0, 1
9	1 byte	Relay 3 output NO or NC mode	0	0, 1
10	1 byte	Relay 4 output NO or NC mode	0	0, 1
11	1 byte	Relay 5 output NO or NC mode	0	0, 1
12	2 bytes	Power of the Relay 1 load in W	0	0...1100
13	2 bytes	Power of the Relay 2 load in W	0	0...1100
14	2 bytes	Power of the Relay 3 load in W	0	0...1100
15	2 bytes	Power of the Relay 4 load in W	0	0...1100

16	2 bytes	Power of the Relay 5 load in W	0	0...1100
17-18	Reserved by the manufacturer			
19	1 byte	Time correction by controller	1	0, 1
20	Reserved by the manufacturer			
21	1 byte	Week Day	1	1, 2, 3, 4, 5, 6, 7
22	2 bytes	Time: Hour and Minutes	0	0 ... 2359
23-40	Reserved by the manufacturer			
41	1 byte	Hold control mode for input S1	2	0, 1, 2, 3, 4
42	1 byte	Hold control mode for input S2	2	0, 1, 2, 3, 4
43	1 byte	Hold control mode for input S3	2	0, 1, 2, 3, 4
44	1 byte	Hold control mode for input S4	2	0, 1, 2, 3, 4
45	1 byte	Hold control mode for input S5	2	0, 1, 2, 3, 4
46	2 bytes	Hold mode duration for external input S1	500	200 ... 5000
47	2 bytes	Hold mode duration for external input S2	500	200 ... 5000
48	2 bytes	Hold mode duration for external input S3	500	200 ... 5000
49	2 bytes	Hold mode duration for external input S4	500	200 ... 5000
50	2 bytes	Hold mode duration for external input S5	500	200 ... 5000
51	1 byte	Click control mode for input S1	1	0, 1, 2, 3, 4, 5
52	1 byte	Click control mode for input S2	1	0, 1, 2, 3, 4, 5

53	1 byte	Click control mode for input S3	1	0, 1, 2, 3, 4, 5
54	1 byte	Click control mode for input S4	1	0, 1, 2, 3, 4, 5
55	1 byte	Click control mode for input S5	1	0, 1, 2, 3, 4, 5
56-60	Reserved by the manufacturer			
61	1 byte	Relay 1 control external source	1	0, 1, 2, 3, 4, 5
62	1 byte	Relay 2 control external source	2	0, 1, 2, 3, 4, 5
63	1 byte	Relay 3 control external source	3	0, 1, 2, 3, 4, 5
64	1 byte	Relay 4 control external source	4	0, 1, 2, 3, 4, 5
65	1 byte	Relay 5 control external source	5	0, 1, 2, 3, 4, 5
66	1 byte	Restore 1 st Relay State After Power Failure	0	0, 1
67	1 byte	Restore 2 nd Relay State After Power Failure	0	0, 1
68	1 byte	Restore 3 rd Relay State After Power Failure	0	0, 1
69	1 byte	Restore 4 th Relay State After Power Failure	0	0, 1
70	1 byte	Restore 5 th Relay State After Power Failure	0	0, 1
71	2 bytes	Timer mode duration for button 1	0	0 to 43200
72	2 bytes	Timer mode duration for button 2	0	0 to 43200
73	2 bytes	Timer mode duration for button 3	0	0 to 43200
74	2 bytes	Timer mode duration for button 4	0	0 to 43200
75	2 bytes	Timer mode duration for button 5	0	0 to 43200

76-100	Reserved by the manufacturer			
101	1 byte	Group 1 relay inverse mode	0	0, 12, 13, 14, 15, 21, 23, 24, 25, 31, 32, 34, 35, 41, 42, 43, 45, 51, 52, 53, 54
102	1 byte	Group 2 relay inverse mode	0	0, 12, 13, 14, 15, 21, 23, 24, 25, 31, 32, 34, 35, 41, 42, 43, 45, 51, 52, 53, 54
103-110	Reserved by the manufacturer			
111	4 bytes	Relay control scenario 1	0	0, 1000000 to 5912359
112	4 bytes	Relay control scenario 2	0	0, 1000000 to 5912359
113	4 bytes	Relay control scenario 3	0	0, 1000000 to 5912359
114	4 bytes	Relay control scenario 4	0	0, 1000000 to 5912359
115	4 bytes	Relay control scenario 5	0	0, 1000000 to 5912359
116	4 bytes	Relay control scenario 6	0	0, 1000000 to 5912359
117	4 bytes	Relay control scenario 7	0	0, 1000000 to 5912359
118	4 bytes	Relay control scenario 8	0	0, 1000000 to 5912359
119	4 bytes	Relay control scenario 9	0	0, 1000000 to 5912359
120	4 bytes	Relay control scenario 10	0	0, 1000000 to 5912359
121-140	Reserved by the manufacturer			
141	1 byte	Consumption meter consecutive reporting interval, minutes	10	1 ... 120

142	1 byte	Consumption change report to send to controller	1	0, 1
143-150	Reserved by the manufacturer			
151-170	Reserved by the manufacturer (for notifications)			
171	1 byte	Associations mode for external input S1	0	0, 1, 2
172	1 byte	Associations mode for external input S2	0	0, 1, 2
173	1 byte	Associations mode for external input S3	0	0, 1, 2
174	1 byte	Associations mode for external input S4	0	0, 1, 2
175	1 byte	Associations mode for external input S5	0	0, 1, 2

Z-Wave Frequency

Parameter 01 – Frequency Region

The HE-RS01 has Z-Wave 700 series chip inside which allows to use the device in different Z-Wave frequencies. If there is a need to use the device in the frequency different from the factory default, change the value of this Parameter according to the frequency list below. Modification is possible only while the HE-RS01 is not included to Z-Wave network.

- ≡ **Note:** The factory default frequency differs depending on which region the device was intended for sale in. Check the factory default frequency on the device plate or on the packaging.
- ≡ **Note:** Do not change this Parameter value if there is no special need.
- ≡ **Note:** If change the value of this Parameter, the frequency change will be applied only after removing the device from Z-Wave network (the device will automatically reboot).
- ≡ **Note:** The change of this Parameter will result in inability to control the device, if the device was included to the controller/gateway which supports only one frequency.
- ≡ **Note:** Resetting the device to factory default settings will revert the frequency to the factory default value.
- ≡ **Note:** In most of countries it is not allowed to use the frequency different from the frequency intended for that country.

Frequency list for different regions:

0: EU (868.4 MHz, 869.85 MHz)	5: IL (916.0 MHz)
1: US (908.4 MHz, 916.0 MHz)	6: RU (869.0 MHz)
2: ANZ (919.8 MHz, 921.4 MHz)	7: CN (868.4 MHz)
3: HK (919.8 MHz)	8: JP (922.5 MHz, 923.9 MHz, 926.3 MHz)
4: IN (865.2 MHz)	9: KR (920.9 MHz, 921.7 MHz, 923.1 MHz)

The full list of Z-Wave global regions where Z-Wave works is available at Z-Wave Global Regions SiLabs page.

Hardware & Software Versions

Parameter 03 – Hardware and Software Versions

This Parameter allows to check the hardware and firmware versions of the device. The Parameter returns value in the format XXYYZZ, where XX is Hardware Version, YY is Firmware Major Version and ZZ is Firmware Minor Version.

≡ **Note:** This Parameter is read-only.

Power and Energy Consumption

Parameter 04 – Energy Consumption

This Parameter allows to check the Cumulative Energy Consumption (in kW) of the connected loads.

HE-RS01 monitors Real-Time and Cumulative power Energy Consumption of connected loads using advanced software logic which measures the consumption based on loads power value set in Parameters from 12 to 16.

Cumulative Energy Consumption is the total electrical power being used by connected loads since the Parameter 04 value last reset. Power usage is calculated by the software using the values that were manually set when configuring Parameters 12-16, multiplied by the time tracked when the HE-RS01 corresponding output was in ON state.

Real-Time Consumption and Cumulative Consumption are periodically reported to the Z-Wave controller according to the Parameter 141 and 142 settings.

≡ **Note:** This Parameter is read-only.

Resetting Cumulative Consumption memory:

The HE-RS01 enables you to erase stored Consumption Data through the Z-Wave network as follows:

1. Make sure the HE-RS01 is powered.
2. If not already done so, include the device into Z-Wave Gateway network.
3. Reset memory consumption data using the Reset Command in COMMAND_CLASS_METER (see the Gateway owner's manual).

≡ **Note:** Turning the device main power off/on will not erase the consumption data as it is stored in nonvolatile memory.

Parameters 12-16 – Relay 1-5 Load Power in watt

These parameters are used to specify the loads power that are connected to the device outputs. Using your connected device's power consumption specification (see associated owner's manual), set the load in Watts for: Relay 1 ("OUT-1") in Parameter 12, Relay 2 ("OUT-2") in Parameter 13, Relay 3 ("OUT-3") in Parameter 14, Relay 4 ("OUT-4") in Parameter 15, and Relay 5 ("OUT-5") in Parameter 16. The factory default value is 0.

≡ **Note:** The range from 0 to 1100 watt can be selected.

Outputs NO/NC Mode

Parameters 07-11 – Outputs NO/NC Mode

These Parameters determine the type of loads connected to the device relay outputs. The outputs type can be NO – normal open (no contact/voltage to switch the load OFF) or NC - normal close (output is contacted / there is a voltage to switch the load OFF). Choose the value 0 if NO contact type is required or value 1 if NC type is required. Set the value for Relay 1 ("OUT-1") in Parameter 07, for Relay 2 ("OUT-2") in Parameter 08, for Relay 3 ("OUT-3") in Parameter 09, for Relay 4 ("OUT-4") in Parameter 10, for Relay 5 ("OUT-5") in Parameter 11. The factory default value is 0 (NO mode).

Time Configurations

Parameter 19 – Time Correction by Main Controller

If this Parameter value = 1 and the HE-RS01 is connected to a Z-Wave gateway, the HE-RS01 time and day will be periodically polled and corrected from the gateway. To switch off auto-correction set the Parameter value to 0. The factory default value is 1.

Parameter 21 – Day of the Week Manual Adjustment

This Parameter allows manual adjustment of the day of the week in case the HE-RS01 is not connected to any Z-Wave gateway or auto-correction is disabled (Parameter 19 value is 0). 1 = Monday, 2 = Tuesday, 3 = Wednesday, 4 = Thursday, 5 = Friday, 6 = Saturday, 7 = Sunday. The factory default value is 1.

Parameter 22 – Time Manual Adjustment

This Parameter allows manual adjustment of Time. The Parameter has the following format: HHMM, where HH is hours and MM is minutes. E.g. for 16:08 set the value 1608 and for 1:00 set the value 100.

Buttons Mode

Parameters 41-45 – Hold Control Mode for external inputs S1-S5 (correspondingly)

0 – Hold function is disabled

1 – Operate like click (Parameters 51 - 55)

2 – When the button on switch connected to external input is held, (key closed) the relay output state is ON, as soon as the button is released (key opened) the relay output state changes to OFF (momentary switch).

3 – When the button on switch connected to external input is held, the relay output state is OFF, as soon as the button is released the relay output state changes to ON (momentary switch).

4 – When the button on switch connected to external input is held or released the relay output state will toggle its state (ON to OFF or OFF to ON).

Set the value for Button 1 in Parameter 41, for Button 2 in Parameter 42, for Button 3 in Parameter 43, for Button 4 in Parameter 44, for Button 5 in Parameter 45. The factory default value is 2.

Parameters 46-50 – Hold Mode Duration for External Input S1-S5 (correspondingly)

These Parameters specify the time the device needs to recognize a hold mode, when the button connected to an external input is held (key closed). The acceptable values are: 200 to 5000 milliseconds.

Set the value for Button 1 in Parameter 46, for Button 2 in Parameter 47, for Button 3 in Parameter 48, for Button 4 in Parameter 49, for Button 5 in Parameter 50.

The factory default value is 500 milliseconds.

Parameters 51-55 – Click control mode for external inputs S1-S5 (correspondingly)

0 – Click function disabled

1 – Toggle switch: relay inverts state (ON to OFF, OFF to ON).

2 – Relay switches to ON state only

3 – Relay switches to OFF state only

4 – Timer: On>Off Mode: Relay output switches to ON state (contacts are closed) then after a specified time switches back to OFF state (contacts are open). The time is specified in parameters 71-75.

5 – Timer: OFF>ON Mode: Relay output switches to OFF state (contacts are open) then after a specified time switches back to ON state (contacts are closed). The time is specified in Parameters 71-75.

Relays Mode

Parameters 61-65 – External Input Number for Relays Output Control

0 – Controlled by gateway or associated device

1 – Controlled by external input S1

2 – Controlled by external input S2

3 – Controlled by external input S3

4 – Controlled by external input S4

5 – Controlled by external input S5

Set the value for Relay 1 ("OUT-1") in Parameter 61, for Relay 2 ("OUT-2") in Parameter 62, for Relay 3 ("OUT-3") in Parameter 63, for Relay 4 ("OUT-4") in Parameter 64, for Relay 5 ("OUT-5") in Parameter 65.

Factory default value: Each relay corresponds to its external input (e.g. for Relay "3" the default value is external input "S3").

Parameters 66-70 – Restore Relays State

These Parameters determine if the last relay state should be restored after power failure or not. Use value 1 if there is a need to restore the last relay state, and value 0 for not restoring the last relay state. The relay state will always be off after power failure if value 0 is selected.

Set the value for Relay 1 in Parameter 66, for Relay 2 in Parameter 67, for Relay 3 in Parameter 68, for Relay 4 in Parameter 69, for Relay 5 in Parameter 70.

The factory default value is 0

Parameters 71-75 – Relay Timer mode duration

These Parameters specify the duration in seconds for the Timer mode (values 4 or 5 in Parameters 51-55 respectively). Press the button on the switch connected to external input and the relay output goes to ON/OFF for the specified time then changes back to OFF/ON. This function can be used to open/close garage doors, blinds, curtains, etc. or to turn attached devices like door lock or security OFF for a short time. The time values can be configured from 0 sec to 43200 sec (12 hours). Set the value for Relay 1 ("OUT-1") in Parameter 71, for Relay 2 ("OUT-2") in Parameter 72, for Relay 3 ("OUT-3") in Parameter 73, for Relay 4 ("OUT-4") in Parameter 74, for Relay 5 ("OUT-5") in Parameter 75. The factory default value is 0.

- ≡ **Note:** If the parameter value is set to "0" it will operate as a short contact (about 0.5 sec).

Parameters 101, 102 – Relay Inverse Mode

The values in this Parameter will specify the relay numbers that will operate in inverse mode. For this purpose, the value will be encoded as a 2-digit number "AB" where "A" is the number of the first relay, and "B" is number of the second relay. For example, if the Parameter value is "24" or "42" it means the relays N2 and N4 will operate in inverse mode. Relays can operate in an inverse mode in two different ways:

1. When the first and the second relays are connected to two different external switches. In this case, after pressing a button, the corresponding relay connected to that button will toggle its state (ON to OFF or OFF to ON), and the other relay will be switched OFF.
2. When two relays are connected to the same external switch. In this case, the relays will operate in roller shutter mode and their behavior will follow these four cycles:
 - **1st press of button:** the first relay will be switched ON, the second relay will be switched OFF
 - **2nd press of button:** both relays will be switched OFF
 - **3rd press of button:** the second relay will be switched ON, the first relay will be switched OFF
 - **4th press of button:** both relays will be switched OFF

- ≡ **Note:** In this mode, both relays cannot be switched ON at the same time (i.e. simultaneously).
- ≡ **Note:** Switching OFF one relay will always operate before switching ON another relay to prevent both relays from being ON at the same time.
- ≡ **Note:** Two groups of inverse relays can be specified, one group in Parameter 101, another group in Parameter 102.

Scenarios

Scenarios can be created that allow connected devices to be triggered by onboard Real Time Clock (RTC). The user should configure the output number in the Parameters (from 111 - 120) which will trigger the scenes.

Parameters 111-120

In these parameters, the relay state changes depending on day and time. For these configurations, parameter values are encoded as 7-digit numbers: (ABCDEFGG).

A = Relay number (1 through 5)

B = Day of week

0-every day

1-7-corresponding day

8-every weekday

9-every weekends,

C: State Change,

0-Switch OFF

1-Switch ON

DEFG: Condition Value

DE represents Hour (0 through 23),

FG represents Minutes (0 through 59).

All other numbers are reserved and will not affect the operation. To disable this option simply set this parameter to 0.

The factory-default value: "0"

Example: Parameter value 1200350 means A=1 (relay 1 output), B=2 (Tuesday), C=0 (switch the relay Off), DEFG=0350 (time 03:50). In this case each Tuesday at 03:50 the relay 1 output will be switched Off.

- ≡ **Note:** The relays still can be controlled manually using External Inputs S1-S5 according to Parameters 61-65 or via controller/gateway.
- ≡ **Note:** The logic will implement the operation when the time crosses the value in the Parameter. Meaning, that if the logic Switches on the relay and you manually switch it Off, the relay will switch On next time when the value crosses the set parameter.
- ≡ **Note:** Parameters 111-120 are representing independent scenarios.

Energy Report Interval

Parameter 141 – Energy Consumption Meter Consecutive Report Interval

When the device is connected to the Z-Wave gateway (controller), it periodically sends to the gateway reports from its energy consumption meter even if there is no change in the value. This Parameter defines the interval between consecutive reports of real time and cumulative energy consumption data to the gateway. The value can be adjusted from 1 min to 120 min. The factory default value is 10 min.

- ≡ **Note:** If the consumption changes, the device will send the report to the gateway regardless of this Parameter value (the report will be sent according to value in Parameter 142).
- ≡ **Note:** It is not recommended to reduce the value of this Parameter in order not to increase the traffic on your network. We recommend to reduce the value of this Parameter only in case of poor connection, when reports from the device does not always reach the gateway.

Parameter 142 – Control Energy Consumption Report

This Parameter determines if the consumption change will be resulting in the consumption report being sent to the gateway. Use the value 0 if there is a need to stop sending the reports and value 1 to activate reports. The factory default value is 1.

- ≡ **Note:** When the device is turning ON, the consumption data will be sent to the gateway once, even if the value of this Parameter is 0.

Association Commands Configuration

Parameters 171-175 – Associations Mode

These Parameters specify what command should be sent to the associated devices when a button, connected to the external inputs (S1-S5), has been clicked, held or released. These Parameters take effect only when the External Input (S1-S5) Group Associations (Groups 2-11) are associated with a device (dimmer, roller shutter, etc.).

If the external input is associated as multilevel set (Groups 3, 5, 7, 9, 11), the parameter values map is the following:

	Value “0”	Value “1”	Value “2”
Click	“On (value 255)” or “Off (value 0)” alternately	“On (value 255)”	“Off (value 0)”
Hold	“UP (brighten)” or “DOWN (dim)” alternately	“UP (brighten)”	“DOWN (dim)”
Release	-	-	-

If the external input is associated as basic set (Groups 2, 4, 6, 8, 10), the parameter values map is the following:

	Value “0”	Value “1”	Value “2”
Click	“On (value 255)” or “Off (value 0)” alternately	“On (value 255)”	“Off (value 0)”
Hold	“On (value 255)”	“On (value 255)”	“Off (value 0)”
Release	“Off (value 0)”	-	-

Set the value for Groups 2 or 3 in Parameter 171, for Groups 4 or 5 in Parameter 172, for Groups 6 or 7 in Parameter 173, for Groups 8 or 9 in Parameter 174, for Groups 10 or 11 in Parameter 175. The factory default value is 0.

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