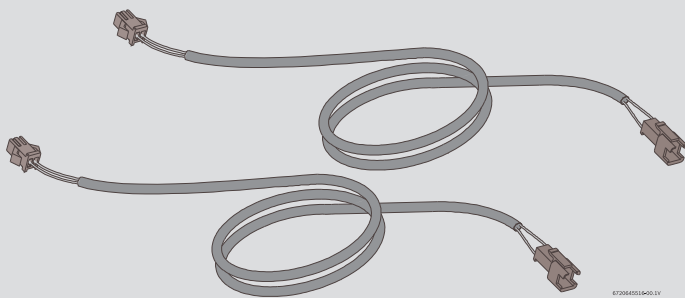


Intelligent cascading kit



Kit components:
Cascading cable (2X)

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1 Key to symbols and safety instructions

1.1 Key to symbols

Warnings



Warnings in this document are identified by a warning triangle printed against a grey background. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- **DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.
- **NOTICE** is used to address practices not related to personal injury.

Important information



This symbol indicates important information where there is no risk to people or property.

Additional symbols

Symbol	Explanation
▶	Step in an action sequence
→	Cross-reference to another part of the document
•	List entry
–	List entry (second level)

Table 1

2 Preparation



DANGER: Risk of fatal injury from electric shock!

- ▶ Before servicing the water heater, unplug power supply cord from outlet. Failure to do so could result in severe personal injury or death.

- ▶ Push power button to "OFF" and unplug power cord.
- ▶ Loosen two Phillips head screws on bottom rear of front cover.
- ▶ Pull cover bottom outwards then lift cover upwards to remove.

3 Cascading operation

(for models RTG 199HE and RTG 199ME)

Cascading allows up to twenty four appliances to be connected in parallel. One of the appliances will serve as the controlling primary appliance and will attempt to meet the hot water demand. If the hot water demand is beyond the capacity of the primary appliance, a signal is sent to one or more of the secondary appliances to ignite. A cascading kit must be purchased and installed for each secondary appliance included in the installation.

Example: A 7 unit cascade installation includes 1 primary appliance and 6 secondary appliances. 6 intelligent cascading kits must be purchased for this installation. With the Intelligent Cascading kit, after each 100 hours of operation, the system will automatically rotate which heater is serving as the primary.

3.1 Plumbing set up

The plumbing should be connected in the reverse return method with a minimum number of elbows to aid in balancing pressures between the appliances. A electric storage water heater may be used as a buffer tank to stabilize temperatures and eliminate the "cold water sandwich" that occurs when turning on and off a hot water fixture.

Locating the appliances as close together as possible improves performance.

- Follow industry plumbing practices when installing multiple appliances.
- Minimum pipe diameter: ¾"
- Minimum water pressure: 50 psi
- Maximum distance between appliances: 36"
- Insulate pipes to prevent heat loss.

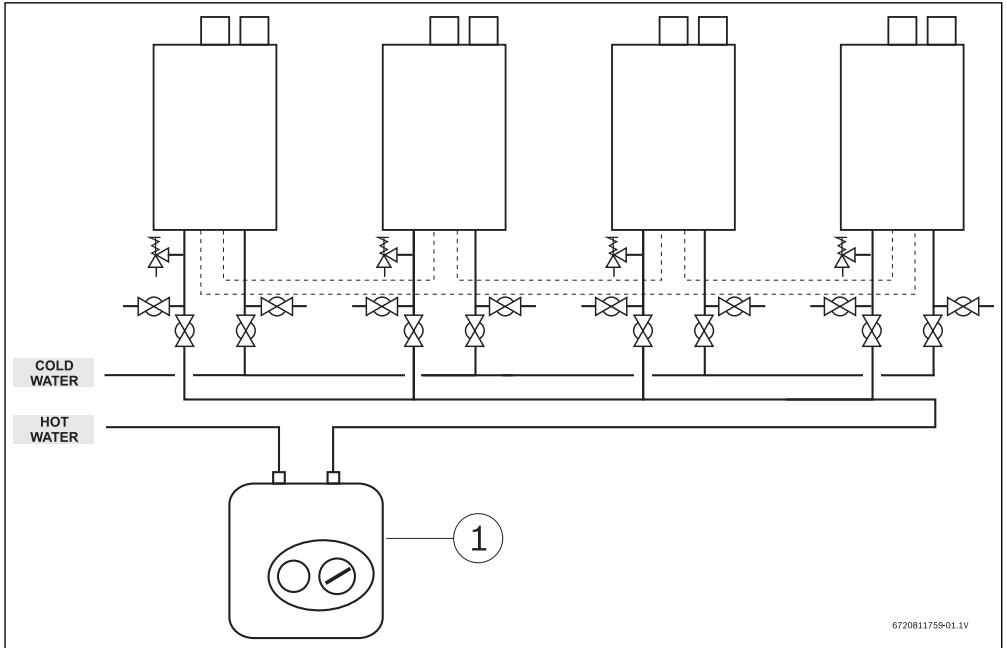


Fig. 1

[1] Electric storage water heater

3.2 Installation of Intelligent Cascading Kit

Each appliance comes equipped with two connectors inside for the installation of the intelligent cascading kit. The connectors are labeled 'cascading input' and 'cascading output'. To access connectors, remove front cover per the installation manual.

Although intelligent cascading will rotate the primary appliance, it is essential to install the kit starting with the appliance that is furthest from the cold water main.

- ▶ Starting with the appliance furthest from the cold water main, connect the male end of the cascading cable to the connector inside labeled 'cascading output'.

- ▶ Feed the cascading cable to the left from the primary appliance through the hole at the bottom of the adjacent secondary appliance.
- ▶ Connect to the 'cascading input' connector of the secondary appliance (Fig. 2).
- ▶ Repeat this procedure for all the secondary appliances.
- ▶ Complete the circuit by connecting a cascading cable from the "cascading output" connector on the last secondary appliance to the "cascading input" connector on the primary appliance. Cascading cables may be connected in series if one cable is not long enough.

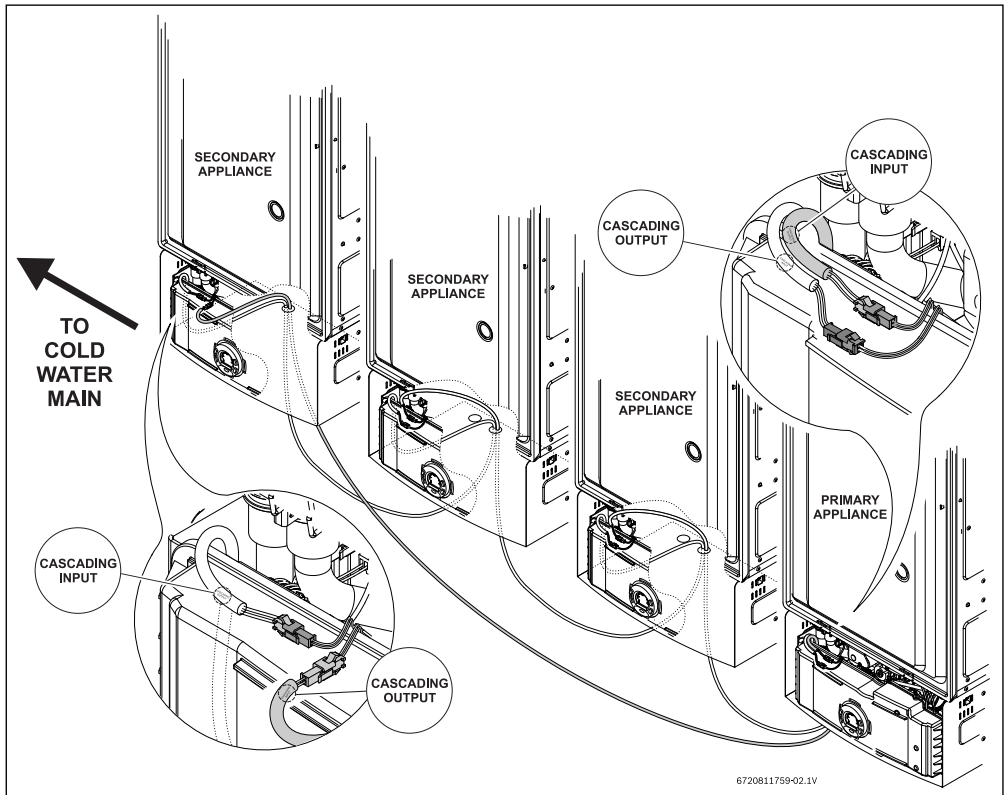


Fig. 2 Example of installation for: RTG 199HE, RTG 199ME

3.3 Appliance cascading mode setting



Perform this procedure on all appliances in the cascading set up.



All appliances in the installation will run at the same set temperature. After changing set temperature on any appliance the others will update to that new setting.

- ▶ Push ON/OFF switch to the OFF position.
- 1. Press and hold the program button and then press the ON/OFF button to the ON position. As soon as '188' flashes on the display, release the button. The display should now read P2.
- 2. Press the button until P5 appears.
- 3. Press Program button . The display should now read NO (normal mode).
- 4. Press button until CC (cascading mode) appears.
- 5. Press and hold Program button until CC blinks on the display.
- 6. To enter in the main menu, press button.

After the "CC" is selected, two new menus will become available in the main menu, PH and PC.

To access PH and PC menu,

- ▶ Press the button until PH or PC appears.

PC - Primary and Secondary selection

- CN - Primary
 - Only one appliance in the cascading system should be selected as "Primary".
- CS - Secondary (default)
 - The others appliances in the cascading system must be "Secondary".

PH - Cascading mode selection

- IC - Intelligent Cascading (default)
 - The primary will rotate after 100h/work.
 - SC - Simple Cascading
 - There will not be any primary rotation when this appliance is selected as primary.
-



Selection is done pressing the button until the display starts flashing.

The appliance is now programmed to operate in the cascading mode.

3.4 Functional requirements

3.4.1 Hot water requests

Currently operating units reach 80% of their capacity, it passes on hot water requests to the next secondary heater in the system. Secondary acts like a primary to the next secondary. When primary reach 30% of his capacity it will remove the request sent to the secondary.

3.4.2 Water demand from solar

When the primary reads flow higher than 8 GPM and inlet temperature is higher than set point, water will flow through the appliance working with the solar function and the primary will send a hot water request to the next Secondary in the system. This way, when the appliances are in solar mode, the water flow of the cascading system will not be restricted. This function is reset when inlet temperature reaches - 4 °C. Appliances will get out of solar mode and restart normal operation.

3.4.3 Error handling

When one appliance in the cascading system is locked, due to an error code, all actions are passed to the next appliance. If the appliance is a primary, it will request to the next appliance to be the primary.



If the cascaded appliance is powered off or its electronics are damaged or disconnected it will not recruit additional units. If the damaged appliance is the primary, the cascade will not operate.

In this case the damaged appliance must be turn OFF and the cascading cables must be disconnect from the appliance. The two connector ends must be connect between them, in order to close the cascading circuit.

If the damaged appliance is the primary, it's needed to define another appliance as primary, see section 3.3.

3.4.4 Working hours counter

Operation time is measured by each appliance in hours. This values are visible in P4 mode. Menus H0, H1 and H2.

The formula to calculate the total amount of working hours is:
 $H0 + (H1 \times 100) + (H2 \times 10000) = \text{Total working hours.}$

3.4.5 Number of hours to rotate primary

Primary rotation will happen when water flow is OFF and 100 burning hours are reached on the primary appliance. Proper means should be assured to perform primary rotation.

NOTE: In recirculation systems where water is recirculated through the cascaded tankless units the water flow must be OFF at least 1 hour per day, to allow the primary rotation.

Primary appliance will send a message to the next appliance delivering the primary function. This rotation will only occur in stand by and water flow OFF.

3.4.6 Temperature set point change

The set point temperature limitations are the same in a cascade as in a stand alone appliance, all the set point temperatures in the existing appliances will be updated within two seconds. The temperature is adjustable through the same complete set point temperature range as a single appliance.

3.5 Primary identification

Primary appliance is identified by the following symbol:

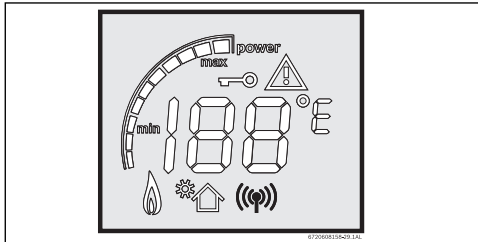


Fig. 3 Primary symbol in cascading mode



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