

C7195A2/B/C

WATER FLOW SENSOR

PRODUCT HANDBOOK

APPLICATION

The sensor is primarily designed to measure the Domestic Hot Water (DHW) flow rate in domestic appliances as follows:

- **Combi boiler**
- **Instantaneous Water Heater (IHW)**
- **Other systems such as applications where the instantaneous DHW is produced from district heat input.**



C7195A2, C7195B and C7195C

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DESCRIPTION

The C7195A2/B/C are mechanical water flow sensors. A wheel (A2 and C type) or a turbine (B type), rotates with water flow. The wheel or the turbine support a magnet which rotates in front of a Hall effect sensor

This Hall effect sensor picks up the field of the magnet giving a pulsed output. The output is directly proportional to the water flow through the sensor.

This frequency output is easily processed by an electronic controller which can then modulate the burner load (for feed-forward loop) or simply open heat demand when the flow reaches its defined minimum rate (electronic flow switch).

The sensor body (the A2 and B type) is constructed from pressure and temperature resistant plastic, with easy connections to traditional pipes used in domestic appliances. The C type (cartridge only) is constructed with the same material, but it is used for integration in customized bodies or water manifold.

Feed forward control loop concept

See fig. 1.

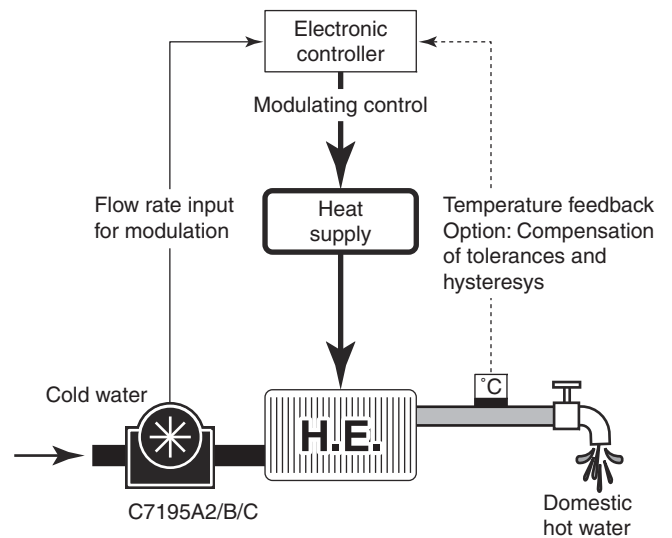


Fig. 1. Feed forward control loop concept

TYPICAL APPLICATIONS

The C7195A2 and B (fig. 3) and the C7195C (fig. 2) Water Flow Sensors are designed to measure the Domestic Hot Water (DHW) flow rate in appliances as follows:

- Combi boiler (instantaneous or with small buffer)
- Instantaneous Water Heater (IWH), gas or electric powered.
- Other systems where DHW is produced instantaneously

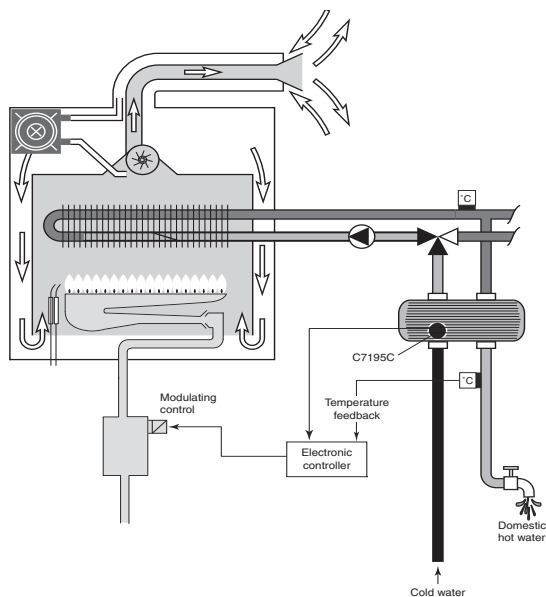


Fig. 2. Instantaneous combi boiler with feed forward or feed back control loop

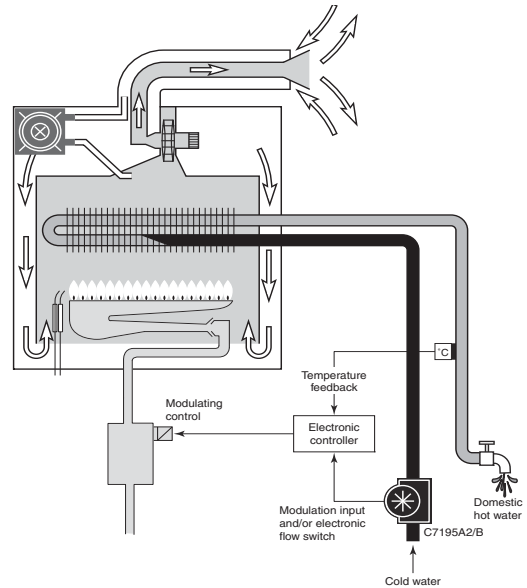


Fig. 3. Instantaneous water heater with feed forward or feed back control loop

For the above mentioned appliances, the sensor can be used in two specific ways:

1 Feed forward control loop

This is an advanced electronic control concept which improves the DHW temperature control thanks to fast reaction to flow rate changes. Indeed, before the temperature sensor sees a change in hot side, the electronic board can react promptly following the flow measurement. A temperature sensor can be used anyway as an option to compensate the tolerances and hysteresis of the complete system.

2 Feedback control loop

This is the traditional electronic control, reacting to the DHW temperature sensor output. A flow detector is needed to detect when the DHW is tapped. The C7195 water flow sensor can be used as an electronic flow switch with the following advantages over ON/OFF switches:

- **Flexibility:**
Electronically (auto)adjustable ON-point, for instance depending on DHW temperature setting point (to avoid ON/OFF recycling)
- **Safety:**
Can not be blocked in ON position (wheel or turbine can only turn with flow).

SPECIFICATIONS

Model

C7195A/B/C water flow sensor

Ambient temperature

-20 ... + 85°C

Dimensions

See fig. 9 for C7195A2

See fig. 10 for C7195B

See fig. 11 for C7195C

Fluid

Water for sanitary use

Permissible fluid temperatur

0 ... 80°C

Minimum operating flow rate

1.5 liter/minute or lower

Maximum operating flow rate

35 liter/minute

Mounting position (C7195A2 only)

- The shaft of the rotor shall be horizontal or vertical $\pm 5^\circ$. See fig. 4.
- Provided the **shaft of the rotor is horizontal**, most positions are acceptable, but the position as indicated in fig. 5. is not recommended because water will remain in the sensor when the installation is drained (frost risk).

Mounting position (C7195B only)

- Recommended position for C7195B is vertical (fig. 6), although horizontal is allowed

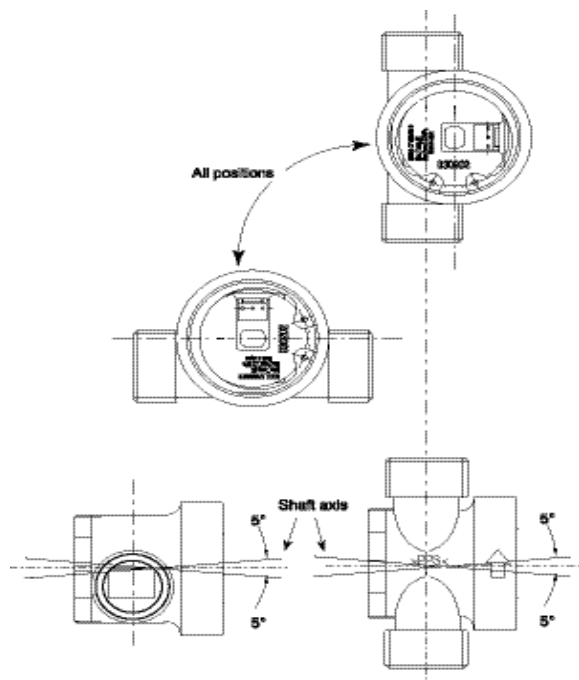


Fig. 4. Mounting positions C7195A2

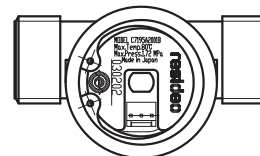


Fig. 5. Not recommended mounting position

Measuring range

C7195A2: 2 ... 30 liter/min

C7195B: 2 ... 35 liter/min

C7195C: 2 ... 30 liter/min

(valid when recommended interface dimensions are respected, see fig. 11)

Nominal output frequency

$f = Q \times 7.0$ (Q = flow rate in l/min; f = pulse signal in Hz) with a 60 mm straight pipe on both sides.

Accuracy

C7195A2: -30 ... +10% over 2 to 3 l/min
-20 ... +10% over 3 to 10 l/min
± 10% over 10 to 30 l/min

C7195B: -30 ... +10% over 2 to 3 l/min
-20 ... +10% over 3 to 5 l/min
± 10% over 5 to 35 l/min

C7195C: -30 ... +10% over 2 to 3 l/min
-20 ... +10% over 3 to 5 l/min
± 10% over 5 to 30 l/min
(valid when recommended interface dimensions are respected, see fig. 11)

Withstand pressure

When a water pressure of 17.5 bar is applied, no external leakage shall be measured and no body damage shall occur.

Water connections

C7195A2: PF 1/2" minimum 8 mm (4.4 threads)

C7195B : PF 3/4" (15 mm quick pipe connection on request)

C7195C : Not applicable

Recommended tightening torque of inlet/outlet connections

2.5 ... 3.5 Nm

Pressure drop

0.15 bar or less at 10 l/min flow rate.

(Outlet pressure is at atmospheric pressure)

Endurance

Indicated value will shift < 5% under following conditions:

10000 hr at 10 l/min and 20°C

7000 hr at 4 l/min and 45°C

or

100,000 cycles ON/OFF at 10 l/min and 45°C

Housing material

PPS

Flow limiter

Inlet port seat suitable for water flow limiter from NEOPERL®

C7195A2: type 'MR01 FG'

C7195B: type 'MR04 AKM'

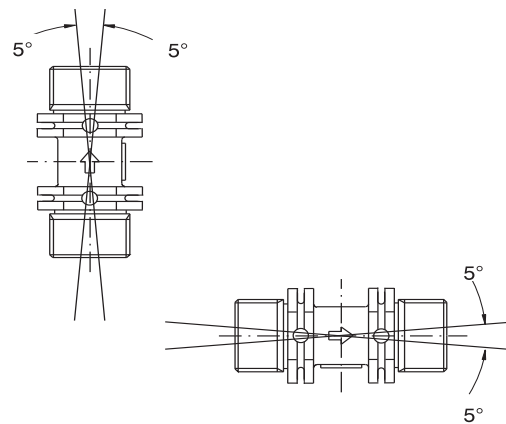


Fig. 6. Mounting position for C7195B

ELECTRICAL SPECIFICATIONS

Nominal voltage (V_{CC}):	12 V (absolute maximum: 18 V)
Current (I_{sink}): 10 mA (absolute maximum: 15 mA)	
Output saturation voltage (V_{sat}):	< 0.4 V with output "ON" and at $I_{sink} = 10$ mA
Supply current (I_{CC}):	8 mA with output "OFF"
Cable:	1 meter cable : 45.900.419-039

Electrical code (recommended)

White:	V_{out}
Red:	V_{CC}
Black:	ground

Duty cycle of electrical output signal
30 ... 70%

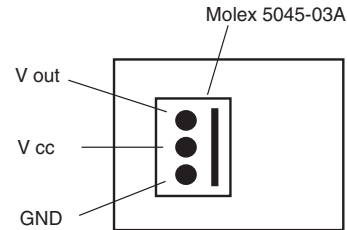


Fig. 7. Electrical connection C7195A2/B/C

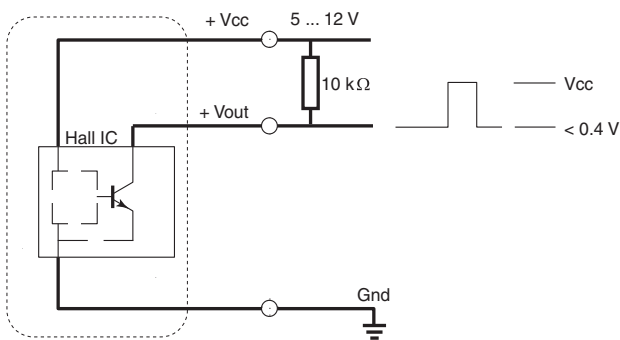


Fig. 8. Suggested interface schematic

PERFORMANCE

Design life

10,000 hour continuous operation at 10 l/minute at 20°C

7,000 hour continuous operation at 10 l/minute at 45°C

or:

100,000 cycles operation (ON = 5 s/OFF = 5 s) at 10 l/minute at 45°C.

After life test accuracy must be within $\pm 5\%$ of measured value at first stage.

GENERAL CONSIDERATIONS

When magnetic materials like iron or materials which generates magnetism are close to the flow sensor, operation characteristics may change.

In order to avoid the invasion of small particles like sand, iron and rust into the water flow sensor, it is advisable to install a mesh filter.

The waterflow to the inlet of the flow sensor should be undisturbed to meet the accuracy specifications. If a device causes significant flow disturbance at the inlet of the device, contact your Resideo representative.

DIMENSIONAL DRAWING

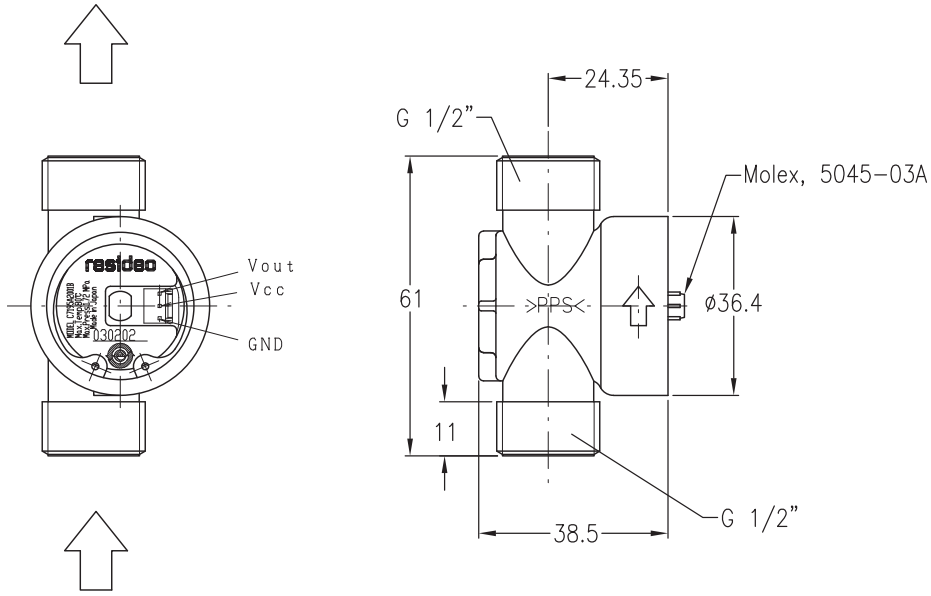


Fig. 9. Dimensional drawing C7195A2

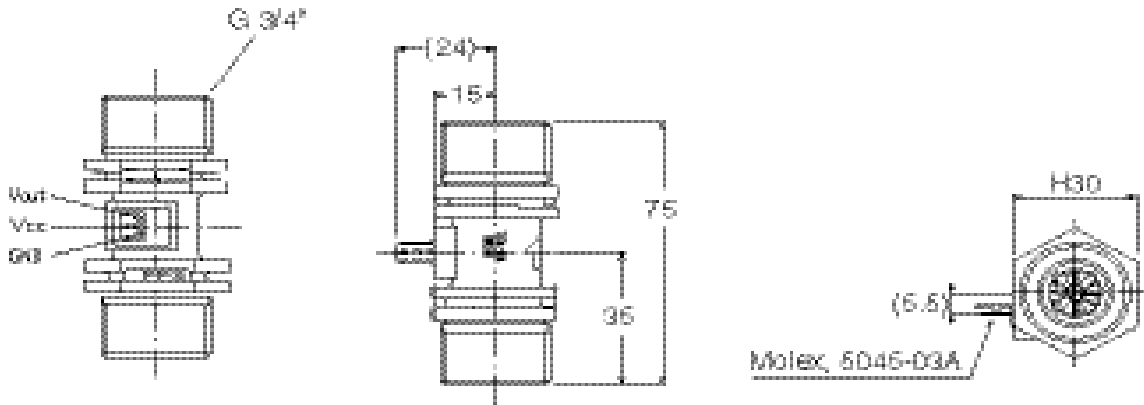


Fig. 10. Dimensional drawing C7195B

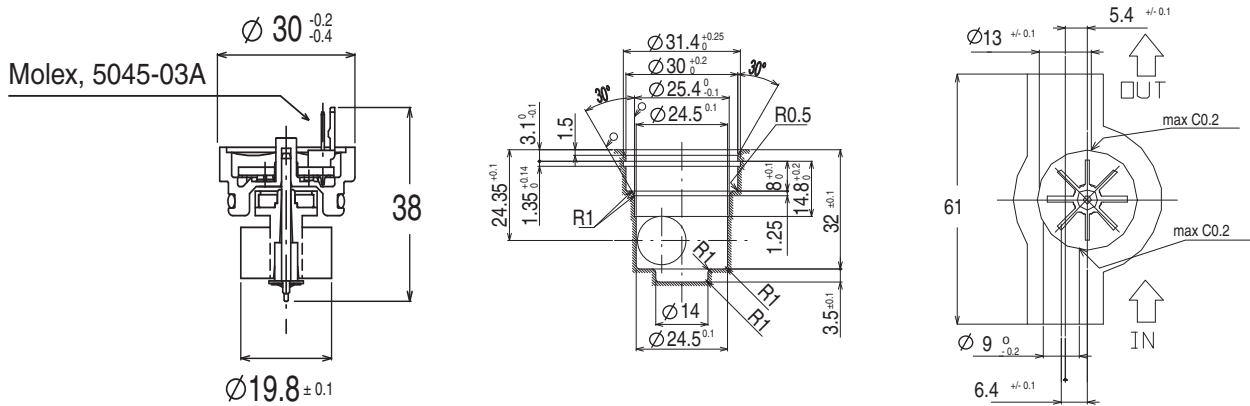


Fig. 11. Dimensional drawing cartridge (C7195C) and recommended seat dimensions for customized body or water manifold

STANDARDS AND APPROVALS

Approvals

The C7195A water flow sensor series have been approved according to the United Kingdom Byelaws and Regulations Certificate NO. 9711081, and can therefore be used in potable water applications.

Other countries in general accept this certification.

For more details please contact Standards and Approvals department, Resideo Combustion Control Center NL05.

Renewal of the certificate to add C7195B and C is pending.
The materials used in these sensors are the same.

ORDERING INFORMATION

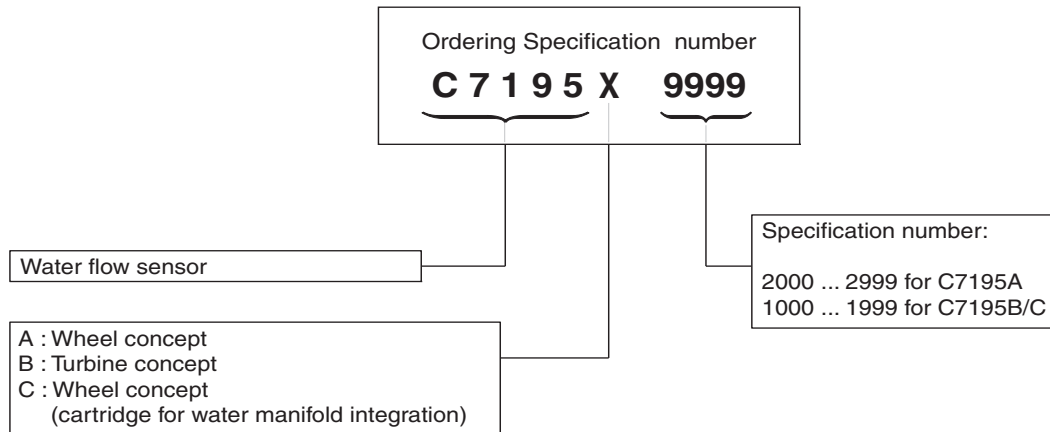


Fig. 12. Model number chart C7195A/B/C water flow sensor

ASSOCIATED PRODUCTS

Electronic controller

W4115C series for IWH application
W4115B series for Combi boiler application
W7073C series for Combi boiler application
SK series
SM series
MCBA series
CVBC series (S4965)

Temperature sensors

T7335 series and SO series (NTC thermistor probes), many options available.

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