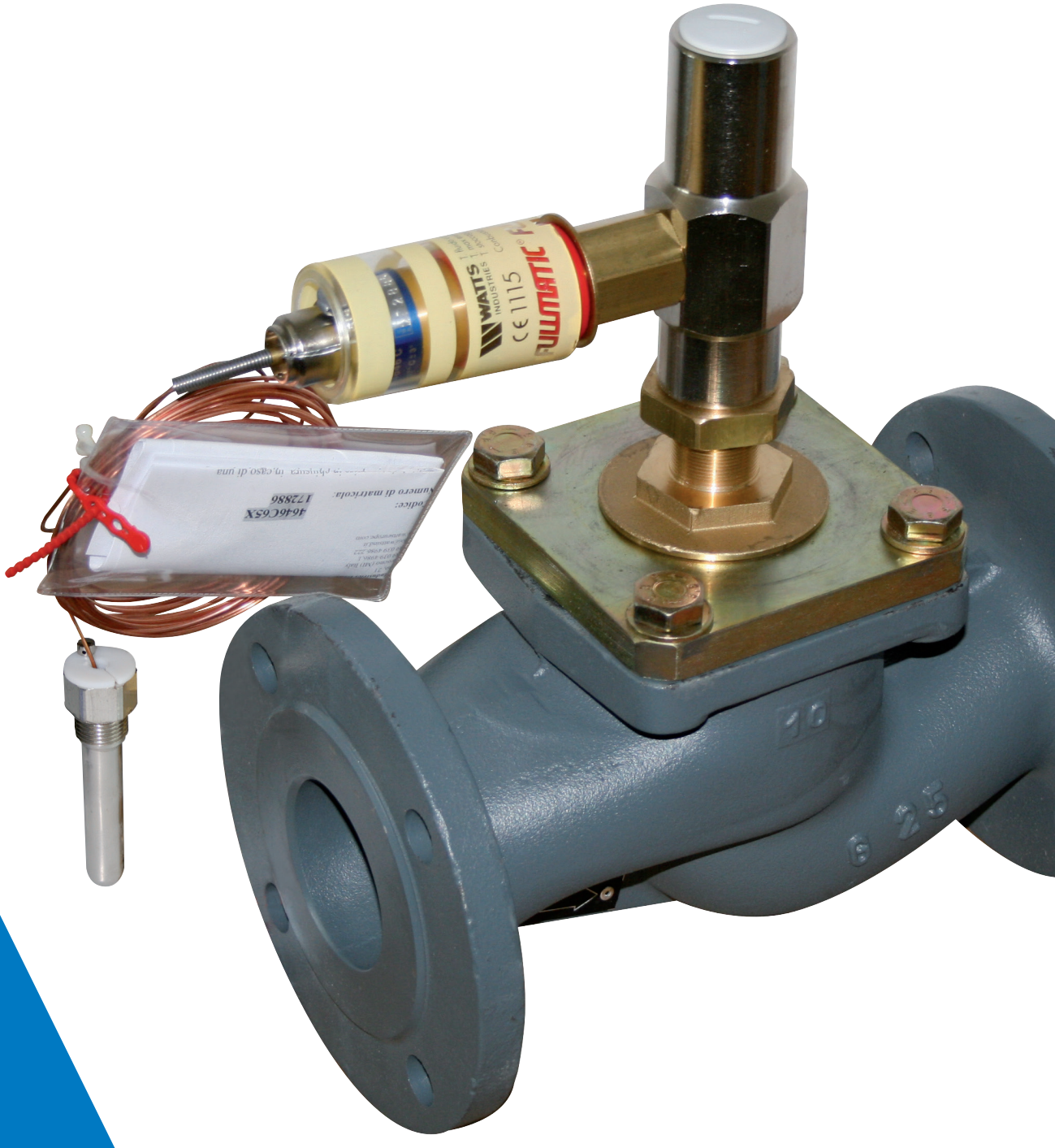
464-FULLMATIC Series

Fuel shut-off valve

Technical Data Sheet



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Description

The **FULLMATIC** fuel shut-off valve plays the important role of stopping the supply of fuel to the burner so as to prevent the water temperature in the boiler from exceeding its boiling temperature at atmospheric pressure (100°C).

464

FULLMATIC.
Liquid and gas fuel shut-off valve. Positive action with manual resetting. Liquid expansion thermostat. Capillary length 5m.
Bronze body 3/4" to 2" versions. Cast iron body for DN 65 to DN 80 versions. 1/2"M sensor sheath connection. Setting temperature: 97°C ± 3°C. Min. operating temperature: 2°C. Maximum operating pressure: 1 bar. Maximum temperature, valve side: 40°C. Maximum temperature, sensor side: 115°C. DN65 and 80 flanged models.
Compact sensor.

INAIL (ex ISPESL) approved and set. Compliant with ATEX 2014/34/EU. Compliant with PED 2014/68/EC

Type	Part No.	DN	Kv	Weight (g)
464	4641C34X	3/4" FF	6.3	1,725
464	4642C1X	1" FF	10	2,250
464	4643C114X	1.1/4" FF	16	2,600
464	4644C112X	1.1/2" FF	23	3,650
464	4645C2X	2" FF	33	4,900
464	4646C65X	65	63	22,500
464	4647C80X	80	100	26,500

Technical features	
Nominal pressure, DN 3/4" - 2" valve body	PN16
Operating pressure	1 bar
Operating temperature	2÷40°C
Storage temperature	from -15 to 50°C
Maximum operating temperature, sensor side	115°C
Setpoint temperature	97±3°C
Reset temperature	< 85°C
Probe connection	1/2" M
Capillary length	5m

Features	
Valve body: (DN 3/4"-2") (DN 65-80)	 Bronze CuSn5Zn5Pb5-B UNI EN 1982 Cast iron EN-GJL-250 UNI EN 1561
Thermostat element	Copper
Springs	Stainless steel
Bellows	Phosphor bronze

INAIL approval

The **FULLMATIC** shut-off valve conforms with INAIL approval specifications.
Each pack includes assembly instructions and a factory calibration report certifying the testing of each individual device.
Every valve manufactured within the time limits covered by the certificate is indefinitely approved and not subject to any expiry date for use.
In the event of loss of the original certificate included in the pack, you can request a cumulative certificate from the manufacturer.

Application

According to the provisions of “R” regulations Ed. 2009, the technical specification for the application of Title II of Italian Ministerial Decree 1/12/75 pursuant to art. 26 of the said decree concerning "central heating systems using pressurised hot water at a temperature not exceeding 110°C and maximum overall rated power of the space heaters (or maximum overall heat output of the space heaters) greater than 35 kW", the use of fuel shut-off valves is required in the following cases:

- systems with closed expansion vessel (CHAP. R.3.B., point 1., letter b);
- closed-vessel systems with heat exchangers supplied with fluids at temperatures exceeding 110°C to the primary circuit (CHAP. R.3.D., point 2.2.1., letter g);
- systems with modular boilers (chap. R.3.F.).

Operation

The **FULLMATIC** valve is a self-operated device (requiring no external energy) **with positive action and manual resetting**.
The valve consists of a body, a disc assembly, a sensitive element and a click-fit system.
In normal conditions, when the temperature of the water in which the sensitive element is immersed is less than 97°C, the valve remains open irrespective of the pressure of the fluid; if the temperature rises above 97°C, the liquid in the thermostat element expands, causing the valve to close immediately. In the event of failure of the sensitive element or capillary, the valve closes regardless of the temperature (positive safety). The valve can only be reset, by manually turning the ring-nut under the cap, if the fluid temperature is less than 85°C; it cannot be reset if the element has failed.
The reliability of the **464 Series** fuel shut-off valves is guaranteed by the fact that every single product undergoes testing.

Charts

The **FULLMATIC** valve is suitable for use with liquid or gas fuels. Valve selection is based on maximum flow rate, while checking that the pressure drops are easily covered by the pressure supplied by the diesel burner or mains gas. In the majority of cases, system designers select a valve of the same diameter as the fuel supply pipe or make their selection on the basis of the data shown in **Table 1**.

Tab.1 - Indicative flow rates of natural gas (ΔP = 20 mm wg) and diesel in kg/h

Art.	DN	NATURAL GAS[1]			DIESEL		
		Flow rate Nm^3/h	Rating kW	Rating kcal/h	Flow rate kg/h	Rating kW	Rating kcal/h
4641C34X	3/4”	8.50	79.1	68,000	100	930.4	800,000
4642C1X	1.	13.50	125.6	108,000	150	1395.6	1,200,000
4643C114X	1.1/4”	21.60	201.0	172,800	250	2326.0	2,000,000
4644C112X	1.1/2”	31.00	288.4	248,000	350	3256.4	2,800,000
4645C2X	2.	44.50	414.0	356,000	500	4652.0	4,000,000
4646C65	65	110.00	1023.4	880,000	-	-	-
4647C80	80	160.00	1488.6	1,280,000	-	-	-

[1] The flow rates can be much higher if higher pressure is available

The valve can be sized on the basis of the following:
- maximum flow rate;
- fuel type;
- burner characteristics;
- diameter and length of the burner-tank connection pipe;
- height difference between burner and tank (or available pressure if the fluid is a gas);
- the pressure drop of the valves determined from the flow curves in Fig.1 (diesel) and Fig.2 (natural gas).

Fig.1 - Pressure drop flow curve for FULLMATIC valve (diesel) 10.3 cSt

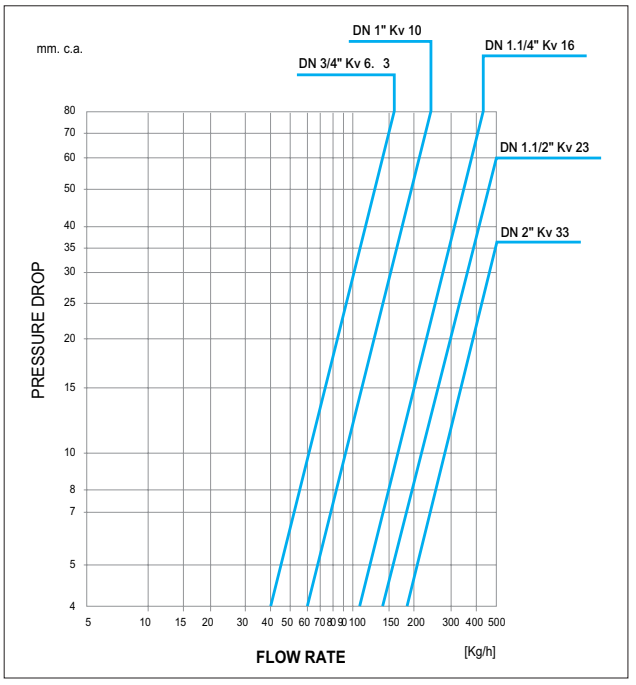
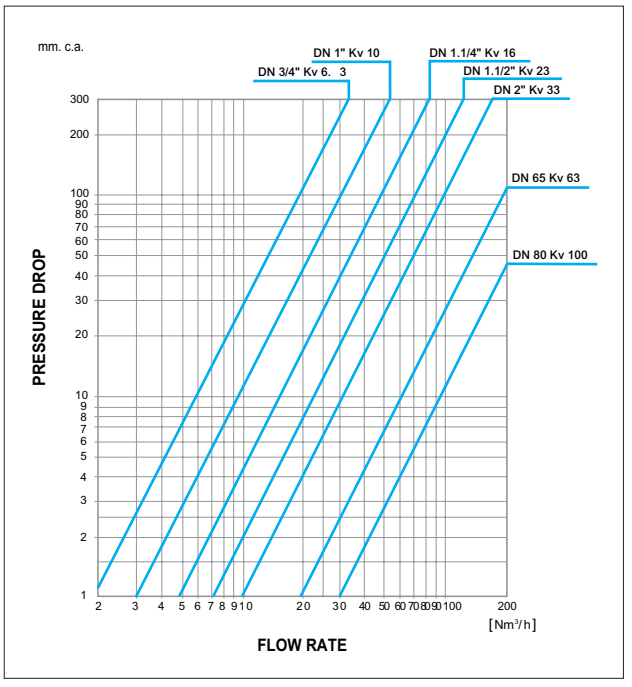


Fig.2 - Pressure drop flow curve for FULLMATIC valve (natural gas) relative density 0.85



The flow curve in **Fig.1** shows the pressure drop for a FULLMATIC valve used with diesel; if naphtha is used, the Δp readings must be increased by 15÷30%.
The fluids (diesel and naphtha) have been considered at viscosities of 10.3 cSt and 100 cSt.
Fig.2 shows the pressure drop with gas = 0.85.
For different densities, apply the following increases:

Gas density	0.8	0.75	0.7	0.65	0.6	0.55	0.5	0.45
Flow rate inc.%	3	6	10	14	19	24	30	37

Liquid fuels

The flow curves in **Fig.3 and Fig.4** show the hydraulic characteristics of copper pipes (external diameter) and steel pipes. For diesel we assumed a viscosity at 2°C of 10.3 cSt = 1.85 °E **(Fig.3)** and for naphtha we assumed a viscosity at 20°C of 100 cSt = 13.17°E. The dotted line shows the recommended maximum flow rate in kg/h.

Fig. 3

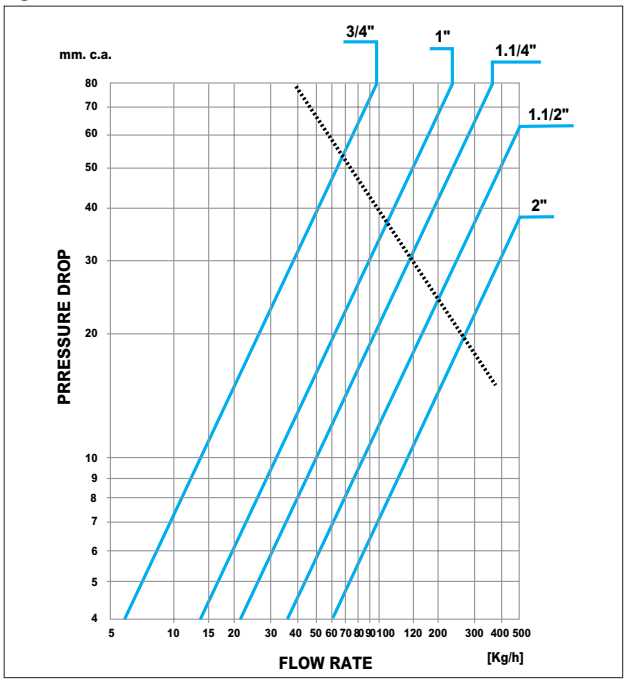
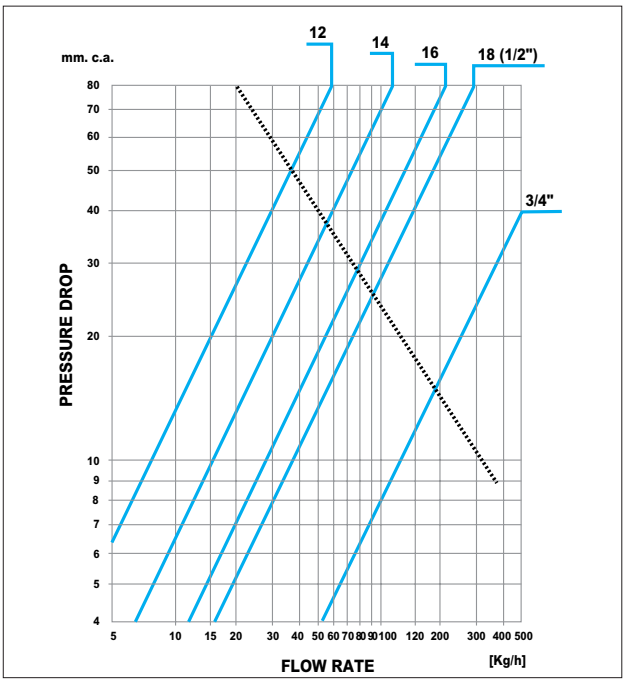


Fig. 4



Gas fuels

For use of the FULLMATIC valve with gas fuels, see the **flow curve in Fig.2**.
If the flow rate and pressure drop for selecting the shut-off valve are not included in the flow curve, use the following formula:

$$Q = \frac{\sqrt{\Delta p} \times Kv \times 27.846}{\sqrt{d}}$$

where:

Q = flow rate in Nm^3/h
Δp = desired pressure drop in bar
Kv = flow coefficient
d = density of the gas in question, in relation to air

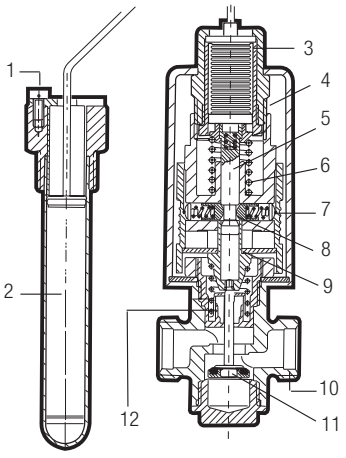
Indicative flow rates in Nm^3/h for different types of gas (density from 0.6 to 2), which cause a pressure drop in the valve of 1 mbar (10 mm wg)

Gas relative density	4641C DN 3/4"	4642C DN 1"	4643C DN 1.1/4"	4644C DN 1.1/2"	4645C DN 2"
d = 0.6/0.8	6.9	11	17.6	24.2	34.7
d = 0.8/1	5.8	9.2	14.7	21.3	30.6
d = 1/1.3	5.0	8.0	12.8	18.5	26.5
d = 1.3/1.6	4.5	7.3	11.7	16.5	23.7
d = 1.6/2	4.1	6.6	10.5	15.1	21.6

Sectional views

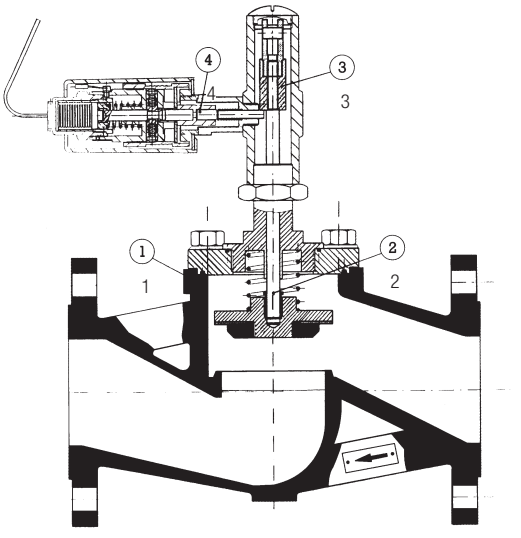
Threaded models (4641C……..4645C)

1) Capillary
2) Immersion probe
3) Bellows
4) Protection cap
5) Stem
6) Counter-spring
7) Ring-nut for manual resetting
8) Plugs
9) Drilled plate
10) Valve body
11) Disc assembly
12) Disc spring



Flanged models (4646C, 4647C)

1) Cast iron body with stainless-steel-coated seat PN 10/16 flanged connections
2) Shut-off device
3) Bracket for resetting
4) Positive-action thermostatic actuator



Installation

The valve must be installed on the fuel pipe, upstream of the burner, in accordance with the direction of flow shown by the arrow on the valve body.
The flow temperature probe must be installed on the pipe within 1 m of the boiler, upstream of any shut-off valve.
The probe is fitted in the sheath, and the fluid must flow over it, preferably in the direction shown in **Figures A and B.**
When connecting the valve to the pipe, take the utmost care not to damage the capillary.
When fitting the probe in the sheath and installing the capillary, bear in mind the following:

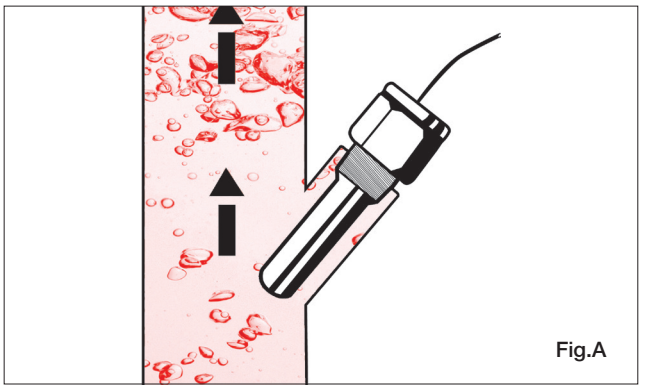


Fig.A

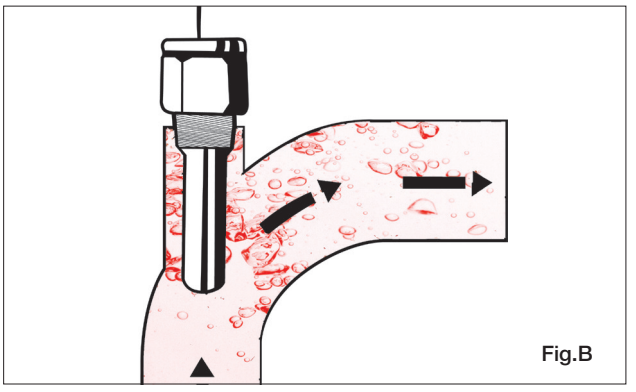


Fig.B

- leave a straight run of 15 cm above the valve so that the cap can be removed to reset the valve **(see Fig.C)**;
- arrange at least one full turn of capillary on the valve side and sheath side **(Fig.D)**. These two positions will accommodate any unused length of capillary;
- do not bend to a radius of less than 10 mm;
- fit the probe in the sheath and fasten the plastic flange with the screw **(Fig.E)**;
- seal the screw with lead to prevent tampering;
- the capillary must be fixed, and if necessary protected, along its entire route.

You can tell whether the valve is open or closed by the colour that appears in the viewer on the valve protection cap.
Blue means the valve is open **(Fig.F)**; red means it is closed **(Fig.G)**.

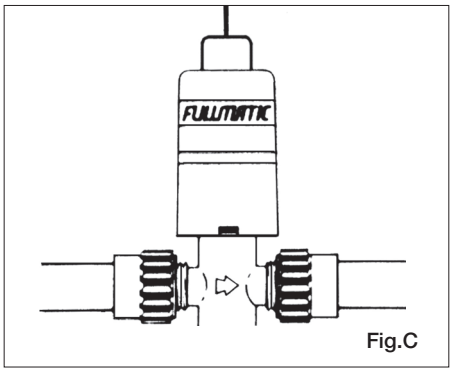


Fig.C

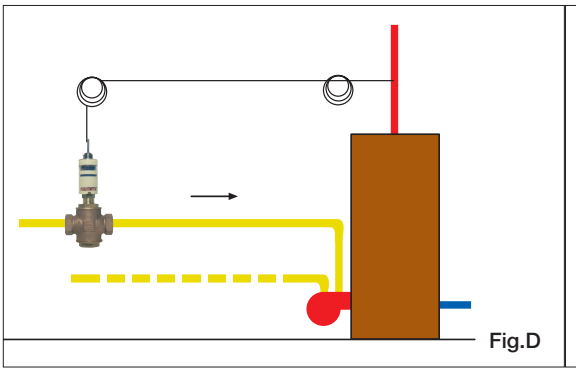


Fig.D

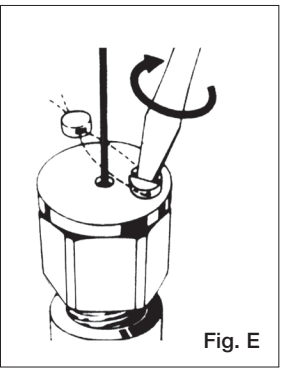


Fig. E

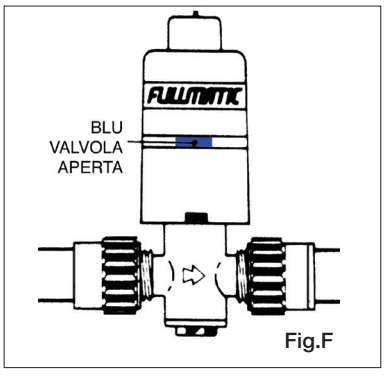


Fig.F

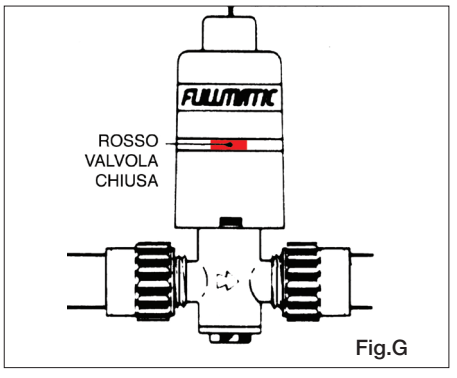


Fig.G

Manual resetting

As previously stated, the valve closes automatically when the temperature of the fluid controlled by the probe exceeds the set-point (97°C).
The valve can only be opened manually (manual resetting) if the temperature of the controlled fluid has fallen below 85°C.

To reset the valve manually, proceed as follows:

a) remove the valve protection cap by inserting a screwdriver in the slot **(Fig.H)**;
b) turn the ring-nut towards the valve body **(Fig.I)**;
c) refit the cap and make sure viewer turns blue again.

Before resetting, it is advisable to locate the causes of the excessive temperature increase (setting thermostats, insufficient circulation of fluid in the boiler, etc.).

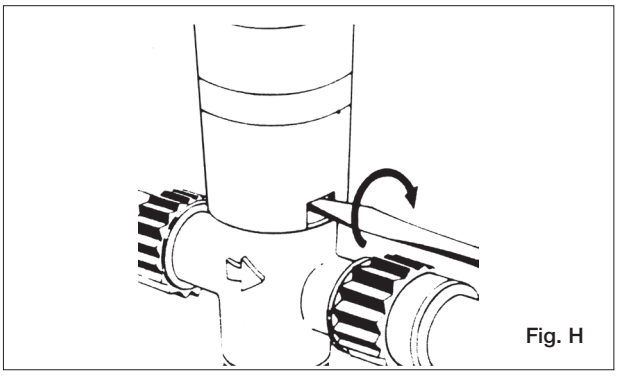


Fig. H

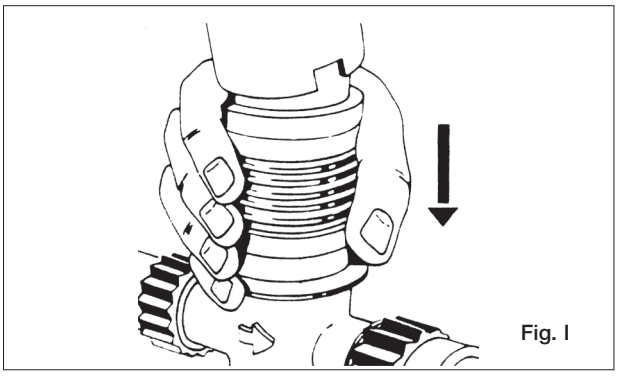
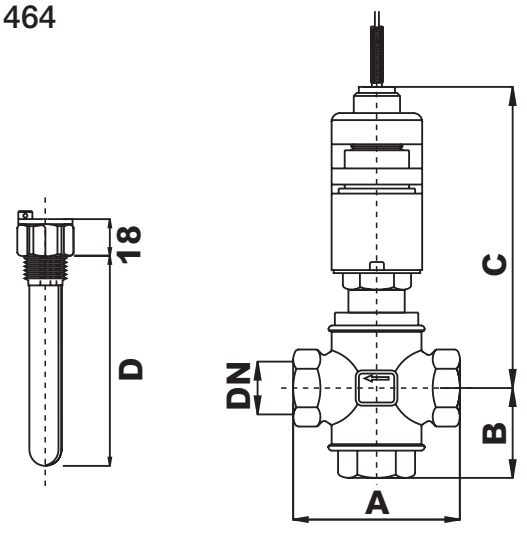


Fig. I

Overall dimensions (mm)

464



DN	A	B	C	D
3/4”F	85	40	200	87
1”F	105	50	207	87
1.1/4”F	120	55	215	87
1.1/2”F	145	63	245	87
2”F	175	72	262	87
65	290	90	280	105
80	310	100	285	105

Specification text

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Max. temperature, valve side: 40°C. Maximum temperature, sensor side: 115°C. DN 65 and 80 flanged models.
Compact sensor.
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