Watts Cazzaniga designs a large part of the components used in building up a fuel oil system such as mechanical and pneumatic level indicators, multi-function dip units, various types of filters, leak detection systems and various accessories. Range and quality, combined with rigid commercial professional standards and continuous search for new solutions and improvements, lie behind the current success of WATTS Cazzaniga: such success is also thanks to the relationship of respect and trust with all operators in the heating industry.
FIELD OF APPLICATION

These regulations apply to heating systems with capacity higher than 30,000 kcal/h up to 4,000,000 kcal/h running on petroleum-derived combustible liquids.

TANK CHARACTERISTICS

3.1. The tanks should have adequate protection against corrosion and they should be provided with:
   a. omisiss
   b. omisiss
   c. device designed to interrupt, during the filling phase, the flow of fuel when 90% of the geometric capacity of the tank is reached. Such device must have the approval of the Interior Ministry following tests carried out at the Centro Studi ed Esperienze Antincendi (Centre for Fire Studies and Experiments), Rome. (SW90 relief valve)

BURNER FEED SYSTEM

4.1 The burner can be fed by suction, gravity or forced circulation. In the case of gravity feed or via siphon or forced circulation, the pipe supplying liquid to the burner should be provided with an automatic shut-off device which allows the fuel to flow only while the burner is operating. Such device should have suitable characteristics in relation to the upstream pressure of the device. When such device has successfully passed the tests carried out on the prototype at the Centro Studi ed Esperienze Antincendio, it is to be considered as suitable. (SIC10 diaphragm valve, M10/M15 solenoid valve).

4.2 The fuel supply pipe should also be provided with a quick shut-off device which can be remotely controlled outside the tank and boiler rooms. (MB220 dip unit for tanks, LAC fire lever)

4.3 In the case of gravity feed, directly or via siphon, the return pipe should be provided with check valve (RG2-RV2 filters, VRU check valve)

At least one of the shut-off devices in accordance with points 4.1 and 4.2 should be installed outside the boiler room.

N.B. During the design and manufacturing stages of the system, due observance should also be made of Act 10/91 and relative implementation regulation (DPR 412/93).

DIN standard and European Directives for double-wall tanks

The risk of hazardous contaminations caused by leaks from the tanks of inflammable liquids falling in Classes IIA, IIB and IIC, has required legislators to adapt the standards to avoid such problems. Application example is the DIN standard which imposes installation of double wall tanks with LAG device to indicate leaks of hazardous liquids before they can be dispersed in the environment.

Art. 10 - BURNERS

10.11 - It is obligatory to install a fuel filter device on the burner supply lines; such device should be located so as to allow its easy cleaning and inspection (Filters RG2-RV2-RV1-RZ-V1).

Interior Ministry, Central Management. Fire-fighting services, circular N° 73, 29.7.1971, carrying the new safety regulations for heating systems running on combustible liquids.
MOUNTING

The TELEVAR pneumatic level indicator is fastened to the wall via the 3 external mounting slots with screws and wall plugs. Plastering and decorating should be finished before proceeding to mount the indicator on the wall to avoid risk of damage to the instrument.

If it is really necessary to mount the instrument before such work, protect it properly against knocks or deposits of foreign matter.

CALIBRATION

To calibrate the level indicator, proceed as follows:

1. Remove the transparent cover by pressing the opening tab (12).
2. Make sure that the instrument is at atmospheric pressure (nut 1 loosened).
3. Calibrate the instrument by turning calibration screw (5) until index K appears in the sight window (6). Index K corresponds to the tank diameter (or height) in metres.
4. Reset pointer (10) by turning resetting screw (4).
5. Refit the transparent cover.
6. Insert pipe (2) fully home in connection (3), then securely tighten nut (1).

THE TELEVAR LEVEL INDICATOR IS CALIBRATED FOR MEASURING THE CONTENTS OF A FUEL OIL TANK

To measure contents of other liquids:

1. Identify the K coefficient corresponding to the specific gravity of the liquid concerned in relative chart.
2. Calibrate the instrument as described in previous point 3 with reference to the K coefficient deduced from the chart.

TECHNICAL CHARACTERISTICS

| Range of adjustment of the measurable height | From 900 mm to 3,000 mm fuel oil column (d = 0.84 kg/dm³) |
| Dial | Graduated in % cylindrical tank volume |
| Accuracy | ±2% |
| Max. measuring distance | 50 metres |

It is possible to superimpose a dial in litres, for cylindrical, parallelepiped and spherical tanks, without any modification to the instrument or the calibration. Complete with compensating screw for resetting the pointer.

Overall dimensions (mm)

**Part No.**
- 0101103  h = 3 m
- 0101105  h = 5 m
## K Coefficient Chart

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### Causes of Incorrect or Missing Indication:

**Incorrect indication:**
1. Coefficient K appearing in sight window (6) does not correspond to the actual tank diameter (or height); if tank contents differ from fuel oil, is the specific gravity correct?
2. The probe immersed in the tank does not reach the bottom; the bottom part is not measured.
3. There is a small leak in the connecting tube or tube fitting.

**No indication:**
1. There are appreciable air leaks in the tube connecting to the tank thus preventing formation of the measuring pressure.
2. Connection fittings to the indicator or tank have not been made correctly thus causing considerable air leaks.
3. The tank is empty or the probe is incorrectly immersed in the liquid.

**The pointer exceeds 100%:**
1. The connecting tube between the indicator and tank is clogged thus preventing the air from flowing.
2. The end of the probe immersed in the liquid is clogged (e.g. because of sludge) thus preventing air from flowing out.

---

### Calculation of Contents for Tanks of Different Shapes

It is possible to deduce from the graph below at what percentage volume of parallelepiped or spherical tanks does the value indicated on the standard equipment (cylindrical tank) correspond to.

#### Conversion for parallelepiped and spherical tanks

![Graph showing conversion for parallelepiped and spherical tanks](image-url)
To calibrate the MECAV mechanical level indicator merely turn the scale graduated in cm until the bringing of number corresponding to the tank height (diameter) to the reference point indicated.

A very simple method can be adopted when the tank is empty: introduce the float into the tank and gradually lower it until it rests vertically on the bottom. Next screw the instrument on the connection and turn the dial until the zero point coincides with the indicator pointer.

N.B. Insert the mechanical level indicator into the tank at a certain distance from the fill connection or in the “protective tube” to avoid the float from being pulled by the fuel jet when filling the tank.

MECAV
Universal remote mechanical level indicator for remote measurement of any level of non aggressive liquid at atmospheric pressure, suitable for tanks of any shape for heights not exceeding 2000 m.

MECAH
Like MECAV but with horizontal reading.

G20
Fuel oil probe. Mounted on the tank for connection to the TELEVAR remote level indicator.

PE50
Black polyethylene flexible tubing dia. 4x6, suitable for connection of the TELEVAR pneumatic level indicator to the tank. To ensure correct operation of the indicator, install the polyethylene tube carefully avoiding very narrow bends which could cause obstruction. The tubing must not have any holes and/or cracks: it should be possible for the pressure exerted by the indicator pump to reach the tank bottom.
When the burner is started, it causes a negative pressure in the suction pipe, which lifts the plug of the dip valve from the seal seat and draws fuel oil into the suction pipe up to the burner.

When the burner is stopped, owing to lack of negative pressure, there is no longer a suction effect and the valve plug, under its own weight, is placed back in position on the seat thus closing the flow of fuel gas. Hence the plug acts as check valve by not allowing the emptying of the suction pipe when the burner is turned off.

The top pull lever can be used for quick shut-off of the suction pipe: when the lever is horizontal, fluid flow is stopped. The lever can also be moved remotely through a cable and fire lever LAC.

**ASSEMBLY**

1. Introduce counterweight (11) in the tank, shortening the dip tubes if too long.
2. Screw the valve body into the 1” fitting on the tank.
3. Insert tube holder bushings (5) in relation to the tube diameter (8, 10, 12 mm) into the suction and return fittings.
4. Slightly tighten lock nuts (6) in the connection.
5. Insert the tubes in the bushings fully home, bend them exactly so they are not submitted to stress which could impair their operation.
6. Tighten lock nuts (6) securely.
7. With the same procedure, attach the tube of level indicator (16) to connection (13) with nut (15) and O-ring (14).

**OPERATION**

When the burner is started, it causes a negative pressure in the suction pipe, which lifts the plug of the dip valve from the seal seat and draws fuel oil into the suction pipe up to the burner.

When the burner is stopped, owing to lack of negative pressure, there is no longer a suction effect and the valve plug, under its own weight, is placed back in position on the seat thus closing the flow of fuel gas. Hence the plug acts as check valve by not allowing the emptying of the suction pipe when the burner is turned off.

The top pull lever can be used for quick shut-off of the suction pipe: when the lever is horizontal, fluid flow is stopped. The lever can also be moved remotely through a cable and fire lever LAC.

**APPROVALS**

Approved by the Interior Ministry (only MULTIBLOC MB).

**DESIGN-TECHNICAL CHARACTERISTICS**

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<th>Dip</th>
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**MB**
MULTIBLOC.
Multi-function dip unit for connection between the fuel tank and burner.
Combines 5 different functions:
- connection of burner suction pipe until bottom of tank
- dip length 2200 mm
- return connection to tank
- check valve on suction pipe
- quick shut-off lever on the suction pipe
- connection with dip probe for remote pneumatic level indicator TELEVAR-TLM.

**MKF200**
MULTIBLOC.
Multi-function dip unit like MB220 but with overlapping 3/8” male connections and metal bushings for tube dia. 8 and dia. 10. The body is provided with an extra 3/8” male connection for suction from a second bank-mounted tank. The return pipe from the burner is conveyed to the tank bottom.

<table>
<thead>
<tr>
<th>Part No.</th>
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**TELEVAR-TLM.**
Flow rate/Pressure drop diagram

Overall dimensions (mm)

MB

Overall dimensions (mm)

MKF200

Characteristics BM

Characteristics MKF200

Key:
1. Pull lever
2. Control pin
3. Top bushing
4. Spring
5. Tube holder bushing
6. Lock nut
7. Suction pipe
8. Valve body
9. Suction dip tube
10. Clip
11. Counterweight
12. Measuring dip tube
13. Nipples
14. O-ring
15. Mounting nut
**RIS**

Quick shut-off valve for fuel oil in the burner suction pipe. Ministerial Decree N° 73 prescribes a quick shut-off device designed also for remote control. The pull lever can be remotely controlled by cable and fire lever LA, LAC, LA/CPT, LAC/CPT.

**VRU**

Check valve for fuel oil suction pipes.

**VFU**

Foot valve with check for fuel oil tanks. The valve is provided with a bottom spacer which prevents drawing on the bottom surface so as not to suck up any foreign matter deposited together with the fuel oil.

**RDA**

Double angle fitting (45°) for connection to the tank of the suction and return pipes of the burner; the suction connection is the through type and allows inserting the pipe on the tank bottom without interruptions.

---

**DESIGN-TECHNICAL CHARACTERISTICS**

**RIS**

- **Body**: Hexagonal brass bar
- **Connections**: 3/8" female with plastic bushings for pipes ø 6 x 8, ø 8 x 10, ø 10 x 12
- **Pressure drops**: 30 mm WG with flow rate 50 litres/h, 85 mm WG with flow rate 100 litres/h

**VRU**

- **Body**: Hexagonal brass bar
- **Check valve**: Plastic with O-ring
- **Connections**: 3/8" female with plastic bushings for pipes ø 6 x 8, ø 8 x 10, ø 10 x 12

**VFU**

- **Body**: Hexagonal brass bar
- **Bottom spacer**: Plastic
- **Check valve**: Plastic with O-ring
- **Connections**: 3/8" female with plastic bushings for pipes ø 6 x 8, ø 8 x 10, ø 10 x 12

**RDA**

- **Body**: Hexagonal brass bar
- **Body**: Shot-blasted stamped brass
- **Tank connection**: 1" male
- **Suction and return**: 3/8" female with plastic bushings for pipes connections ø 6 x 8, ø 8 x 10, ø 10 x 12

---

**Overall dimensions (mm)**

- **RIS**: 3/8"F 0120100
- **VRU**: 3/8"F 0120140
- **VFU**: 3/8"F 0120160
- **RDA**: 1"M x 3/8"F 0120120
**MAINTENANCE**

For all models provided with shut-off valve (RG2, RZ, RV2, RV1) it is possible, with the valve closed, to remove the bowl, then clean the filter cartridge, without emptying the piping. For other models (V1, V1AP) it is necessary to shut off the piping at upstream side and empty it.

To clean the filter cartridge, proceed with a low pressure jet of water (or air) from inside to the outside of the filter cartridge.

Removal of the bowl also allows withdrawal of samples of fuel in accordance with DPR 1391, 22.12.1970, under Article 5.6.

---

**Overall dimensions (mm)**

**RG2**

- Part No.: 0130100
- 3/8"F
- Two-way fuel oil filter, with shut-off and check valve on the return line, bowl locked by ring nut and filter cartridge by bayonet coupling (universal).

**RV2**

- Part No.: 0133100
- 3/8"F
- Two-way fuel oil filter, with shut-off and check valve on the return line, complete with threaded bowl and pressure filter cartridge.

**RV2M**

- Part No.: 0133200
- 3/8"F
- Like RV2, but with metal bowl.

**RV1**

- Part No.: 0135100
- 3/8"F
- One-way fuel oil filter, with shut-off valve, complete with threaded bowl and pressure filter cartridge.

**V1**

- Part No.: 0138100
- 3/8"F
- One-way fuel oil filter, with threaded bowl and pressure filter cartridge.
**DESIGN-TECHNICAL CHARACTERISTICS**

- **Body**: Shot-blasted stamped brass except for model V1AP in aluminium
- **Bowl**: Transparent plastic with O-ring
- **Connections**: 3/8” female with plastic bushings for pipes ø 6 x 8, ø 8 x 10, ø 10 x 12 (except for model V1AP)
- **Mounting bracket**: Tropicalized steel (except for V1AP)
- **Stainless steel filter cartridge**: 260µ (RG2), 140µ (RV2-RZ-RV1-V1), 100µ (V1AP)

N.B. Models RV2 – RZ – RV1 – V1 can be supplied, on request, with a metal bowl. A sintered (60µ) or felt (50µ) cartridge can be supplied for model RG2.

**Flow rate/Pressure drop diagram**

![Flow rate/Pressure drop diagram](image)
**INSTALLATION**

The SICUREX diaphragm valve should be installed on the burner supply pipe, close to the burner and at the same height, and before the filter so that the latter is included in the section of protected piping.

**OPERATION**

The valve diaphragm in direct contact with the outlet, has a surface 36 times greater than the surface of the seal seat. The spring, which tends to close the plug, is set at 18,000 mm WG (1.8 bar). The plug is opened when a force \( F = \frac{18,000}{36} = 500 \text{ mm WG} \) is applied on the diaphragm. Hence the negative pressure created by the burner commands the opening of the SICUREX diaphragm valve. As a result its action is progressive and jerk-free because the fuel oil acts as shock absorber. When the burner stops, the negative pressure is decreased until it ceases, thus allowing the spring to gradually close the plug.

**APPROVALS**

Approved by the Interior Ministry.

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**DESIGN FEATURES**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>Die-cast aluminium</td>
</tr>
<tr>
<td>Diaphragm</td>
<td>Oil-resistant rubber</td>
</tr>
<tr>
<td>Connections</td>
<td>3/8&quot; female with plastic bushings for pipes ø 6 x 8, ø 8 x 10, ø 10 x 12</td>
</tr>
</tbody>
</table>

**TECHNICAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. operating capacity</td>
<td>200,000 kcal/h</td>
</tr>
<tr>
<td>Max. operating pressure</td>
<td>3 bar</td>
</tr>
<tr>
<td>Min. opening negative pressure</td>
<td>500 mm WG</td>
</tr>
</tbody>
</table>

**Overall dimensions (mm)**

**Flow rate/Pressure drop diagram**

N.B. Max. difference in level between SICUREX and burner should not exceed 300 mm.
### APPROVALS

### DESIGN-TECHNICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Nd</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>0150210</td>
<td>3/8&quot;F</td>
<td>230V</td>
</tr>
<tr>
<td>0150215</td>
<td>1/2&quot;F</td>
<td>230V</td>
</tr>
</tbody>
</table>

**M10-M15**

Normally closed solenoid valves, for shut-off of fuel oil burner supply pipes when the burner is turned off.

**Overall dimensions (mm)**

**M10-M15**

Body: Stamped brass

Power supply: 230V-50Hz (on request also 12 Vac/Vdc; 24 Vac/Vdc)

Max. operating pressure: 4 bar

Operating temp. range: -5 ÷ 60 °C

Orifice diameter: 5,6 mm

Connections: 3/8" for model M10

degree of protection: IP65

**OPERATION**

During the tank filling phase, the liquid level rises until reaching the float. When the float rises, it lowers a cylinder that closes the two side slots through which the fuel passes.

**APPROVALS**

Approved by the Interior Ministry

**DESIGN FEATURES**

<table>
<thead>
<tr>
<th>Body</th>
<th>Die-cast aluminium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Float</td>
<td>Oil-resistant rubber</td>
</tr>
<tr>
<td>Connections</td>
<td>2&quot; male on tank</td>
</tr>
<tr>
<td></td>
<td>2&quot; female for fill hose</td>
</tr>
</tbody>
</table>
Overall dimensions (mm)

**LA/LAC/LACP/LACPT**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0153100</td>
<td>Fire lever with screws and wall plugs, for remote control, through metal cable, of quick shut-off valves for shutting off flow of fuel (M8220, MKF200, RIS).</td>
</tr>
<tr>
<td>0153110</td>
<td>Fire lever LA, complete with PVC-coated metal cable, intermediate slots with wall plugs.</td>
</tr>
<tr>
<td>0153120</td>
<td>Fire lever like LA but with transparent protective cover.</td>
</tr>
<tr>
<td>0153130</td>
<td>Fire lever like LAC but with transparent protective cover.</td>
</tr>
</tbody>
</table>

**DESIGN FEATURES**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>Brass-plated mazak</td>
</tr>
<tr>
<td>Base connection</td>
<td>2” female to tank</td>
</tr>
<tr>
<td>Cover connection</td>
<td>2 1/2” female with seal</td>
</tr>
<tr>
<td>Slots for padlock and chain</td>
<td></td>
</tr>
</tbody>
</table>

**TC**

Tank fill plug, meeting requirements of Act N° 615 which specifies that tank fill holes should be provided with hermetic closing.

Part No. 0155100 2”F x 2.1/2”M

**DESIGN FEATURES**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locking ring and cap</td>
<td>High impact plastic</td>
</tr>
<tr>
<td>Metal mesh flame spreader</td>
<td></td>
</tr>
</tbody>
</table>

**CTS**

Caps for tank vent pipe, threadless, with fixed spacers and mounting screws, adaptable to pipes of different diameters.

<table>
<thead>
<tr>
<th>Codice</th>
<th>DN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0160125</td>
<td>1”- 1.1/4”</td>
</tr>
<tr>
<td>0160140</td>
<td>1.1/2”- 2”</td>
</tr>
</tbody>
</table>
TECAL
PVC cladded aluminium pipe. Mainly used as connecting pipe between the fuel tank (fuel oil) and the burner. Its lightweight and malleability properties make for easy insulation as it is possible to work without welding. The Tecal PVC cladded aluminium pipe also finds application in low pressure hydraulic and pneumatic systems. The protective sheath covering the pipe is made up of PVC (polyvinyl chloride) film 0.75 mm thick, applied by co-extrusion to form a continuous sheath.

LAG
Leak indicator system for double chamber tanks designed for storage of inflammable liquids.
Complete with indicator unit LAGN, level indicator BAE10.
- Power consumption 10VA
- Relay for additional alarm 5A-250V (NO/NC)
- Standard front panel in English
Conforms with DIN6608, EEC 89/336 EEC 73/23.

LAGN
Electronic indicator unit for tank leak detector system.
Standard front panel in English
Conforms with DIN6608, EEC 89/336 EEC 73/23.

BAE10
Auxiliary tank for test liquid.
Complete with seal

**DESIGN-TECHNICAL FEATURES**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Power</th>
<th>Power supply 230V-50Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>0190100</td>
<td>230V</td>
<td>10VA</td>
</tr>
<tr>
<td>0190200</td>
<td>230V</td>
<td></td>
</tr>
</tbody>
</table>

**Overall dimensions (mm)**

BAE10

- 27 mm
- 31 mm
- 3/4"
**OPERATION**

The leak indicator monitors the intermediate chamber (test chamber) filled with indicator liquid and signals any leak from the outer or inner shell. The device consists of an electronic unit (indicator element) designed to activate a visual and audible alarm, and a tank containing indicator liquid with transducer (probe), perhaps one or more tanks without transducer if the configuration requires two or more tanks of indicator liquids installed in parallel. The tank of indicator liquid is connected to the test chamber of the main tank with special piping and is normally filled with a suitable liquid up to the max. liquid mark.

The indicator works on the principle of conductivity and is provided with electrodes which activate the alarm without any moving mechanical part, i.e. solely by measuring the resistance between the electrodes immersed in the tank of indicator liquid.

The green (power on) indicator lamp on the electronic unit indicates operating condition of the device.

In the event of a leak from the tank, the indicator liquid flows from the tank thus interrupting the transducer circuit and activating a comparator which immediate actuates a visual alarm (red), an audible alarm and a relay for additional and/or remote alarm.

**N.B.** The indicator liquid used should be BAM certified (anti-pollution).

**APPROVALS**

CESI certificate Ex 94.c.054 - [Ex ia] IIC
PTB certificate (Germany) 01/PTB Nr.III B/S 2401
Type approval: Interior Ministry NS 4517 – 4113 sub 227

**LEAK INDICATOR SYSTEM FOR DOUBLE CHAMBER TANKS**

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![Diagram of leak indicator system for double chamber tanks](image_url)

**Key:**

1. Electronic unit
2. TEST push button
3. POWER indicator lamp
4. ALARM indicator lamp
5. ALARM OFF push button
6. Indicator liquid tank
7. Level indicator
8. Indicator liquid
9. Pipe entry (sealed)
10. Fuel tank
11. Insulating joint
12. Exhaust valve