

## LEVEL CONTROLS A41 - A42

new execution with direct hand control on the floating-ball

### USE

Level Controls Group A4 are used to control fluids level into boilers and tanks with a pressure up to 16 bar.

1. Dual electric control mechanism permits supervisory control of feed pump or alarm signal, where level is not restored by feed control.
2. Safety bulb is of change-over type (see diagram No 4); for this reason it can be used both as alarm signal by a bell, lamp or other device and as automatic burner shut down protection.

### OPERATION

Boiler Water Level Controls Group A4 consist of a floating-ball connected with metal rod that controls, through a special level system unit, two mercury bulbs making electric contacts. Control unit is coupled with contacts unit by a device allowing level adjustment jumps from 35 to 100% of the maximum level admitted by the equipment. Every desired adjustment is possible.

### FEATURES

Level Controls Group **A4** is available in two standard types, i.e. **A41** and **A42** respectively.

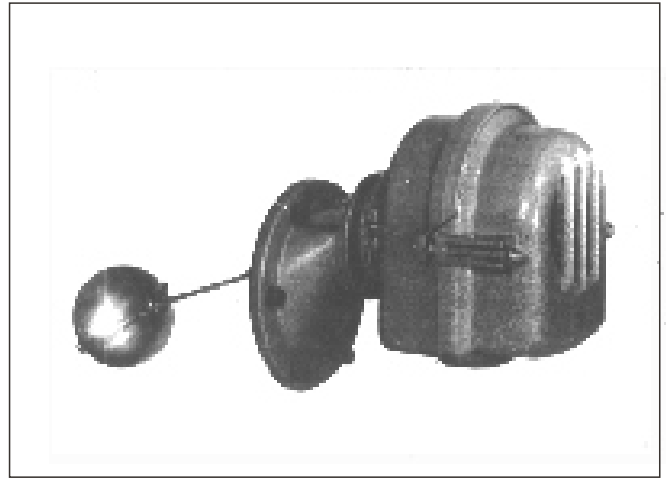
**TYPE A41** Floating-ball in stainless steel AISI 304-iron flange and counterflange for vessel welding-metal bellows guaranteed for pressure up to 355 lbs. - cast iron body of high impact anti-resilient strength - special mercury bulbs for high temperature - ceramic terminal block - adjusting device for level jump from 35 to 100% of maximum level - armoured and enclosed manufacture with protected opening for outside visibility of mercury bulbs - armoured output cables.

**TYPE A42** Same design and manufacture of Type A41, but coupled with cast-iron body, floating-ball protection with female nipples 1" gas for pipe connection between fluid area and steam or air zone of the boiler.

### ELECTRICAL FEATURES

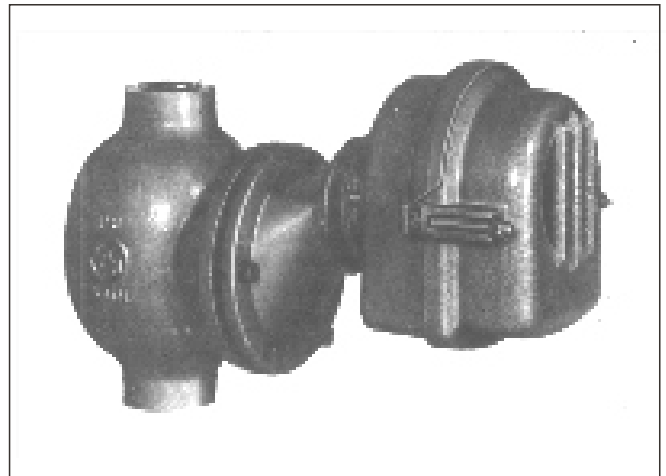
Nominal insulation tension	Ui 380V~		
Continuous duty nominal current	Ith 6A		
Operating nominal current Ie:	220V-	250V~	
Resistive load	AC-12	-	5 A
Inductive load	AC-15	-	2 A
Direct current	DC-13	0,2A	- -

For steam boilers up to **16 Bar**



Sizes: len 350 - high 215 - br. 158

Fig. 1



Sizes: len 365 - high 235 - br. 158

Fig. 2

TYPE	Level differential mm	Max working pressure bar	Max temperature of the liquid °C	Working temperature °C	Protection degree	Weight each Kg.	Box pcs. N°
<b>FLANGE CONNECTION</b>							
<b>A41A</b>	25 to 50 25 to 75	16	200	-25 to 60	IP54	5,4	
<b>A41B</b>	55 to 210 65 to 305 95 to 370 140 to 570	16	200	-25 to 60	IP54	5,1	
<b>1"BSP female connection</b>							
<b>A42A</b>	25 to 50	16	200	-25 to 60	IP54	9,3	

Level controls type A41A/24E have interchangeable beams: long and short, permitting nominal range adjustment 15 ÷ 50 or 25 ÷ 75 mm (5/8 ÷ 2 or 1 ÷ 3).  
Level controls type A41B/24E have mounted floating-ball with interchangeable beams, permitting nominal range of 50 ÷ 210, 65 ÷ 305, 95 ÷ 370 and 145 ÷ 570 mm

**LEVEL CONTROL TYPE A41 INSTALLATION**

Fix the highest required level point and connect the iron flange of the Level Control to the boiler so that its horizontal middle line is 25 mm higher than the maximum desired level point (see our diagram on the right).

- 1 - Carefully weld inside and outside flange in order to have a perfect tightness.
- 2 - Connect the Level Control perfectly vertically relative with its middle line. Connections and flexible rubes for cables outlet must result to be downward.
- 3 - Effect connections by means of insulated conduits suitable for the Level Control temperature according to the diagrams on page No 4

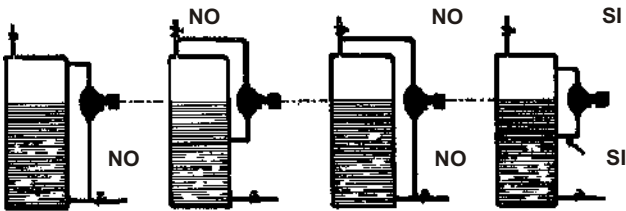
**IMPORTANT** - For a perfect operation of the bulbs it is necessary that the flange middle line be absolutely vertical.

**LEVEL CONTROL TYPE A42 INSTALLATION**

Fix the highest required level point and effect connections on the boiler for conduits of 1" gas, being careful about the following points:

- 1 - It is necessary that connection to the liquid area is not influenced by the feed liquid and therefore avoid connection to feed pipes.
- 2 - It is necessary that the connection point to the air or steam zone is far away from the starting pipe to avoid a sinking of the liquid surface and a possible inner alteration of the level.

Fig. 4



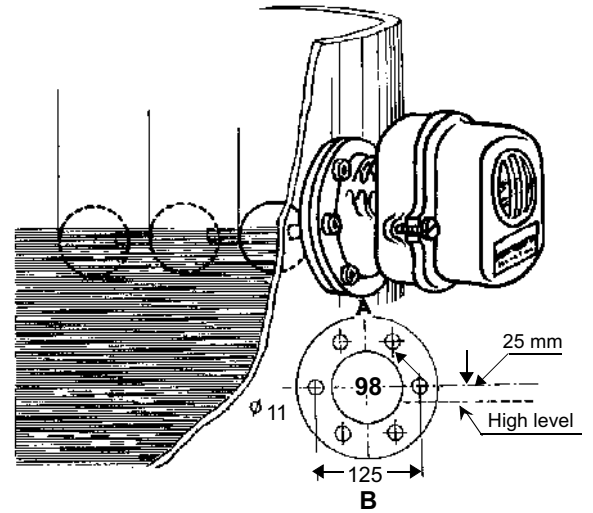
3 - Effect careful connections by means of pipes to 1" gas being careful that the two spans of are pipes be fixed perfectly vertically.

**IMPORTANT** - It is preferable that the connection pipes to the water zone is as short as possible because, otherwise, they may cause a remarkable sinking of the liquid temperature inside the pipes or in the Level Control. In addition to that, the water specific weight would consequently be higher.

It may happen that water, if not perfectly pure and clean, influences the level of the regulator. In this case it is advisable to protect the water inlet by means of a perforated grid or other devices.

**Instructions**

(Fig. 3)



(Fig. 4 e 5)

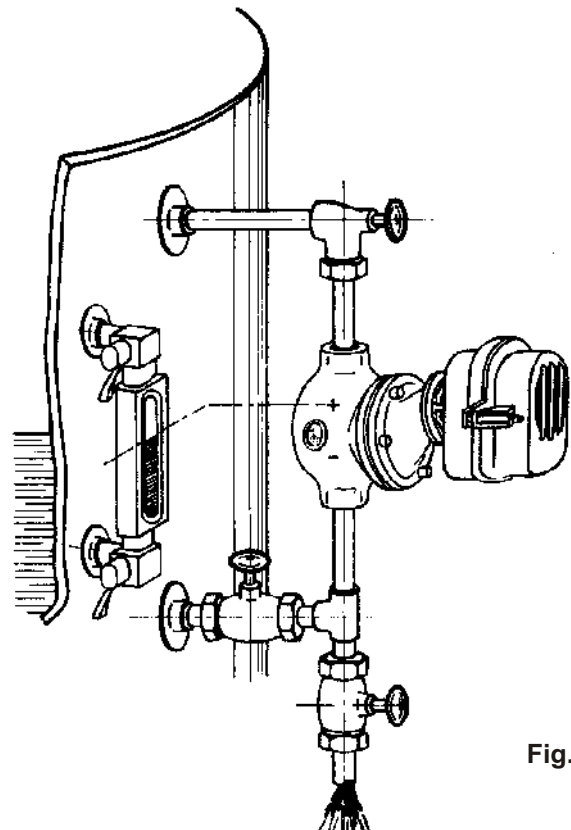
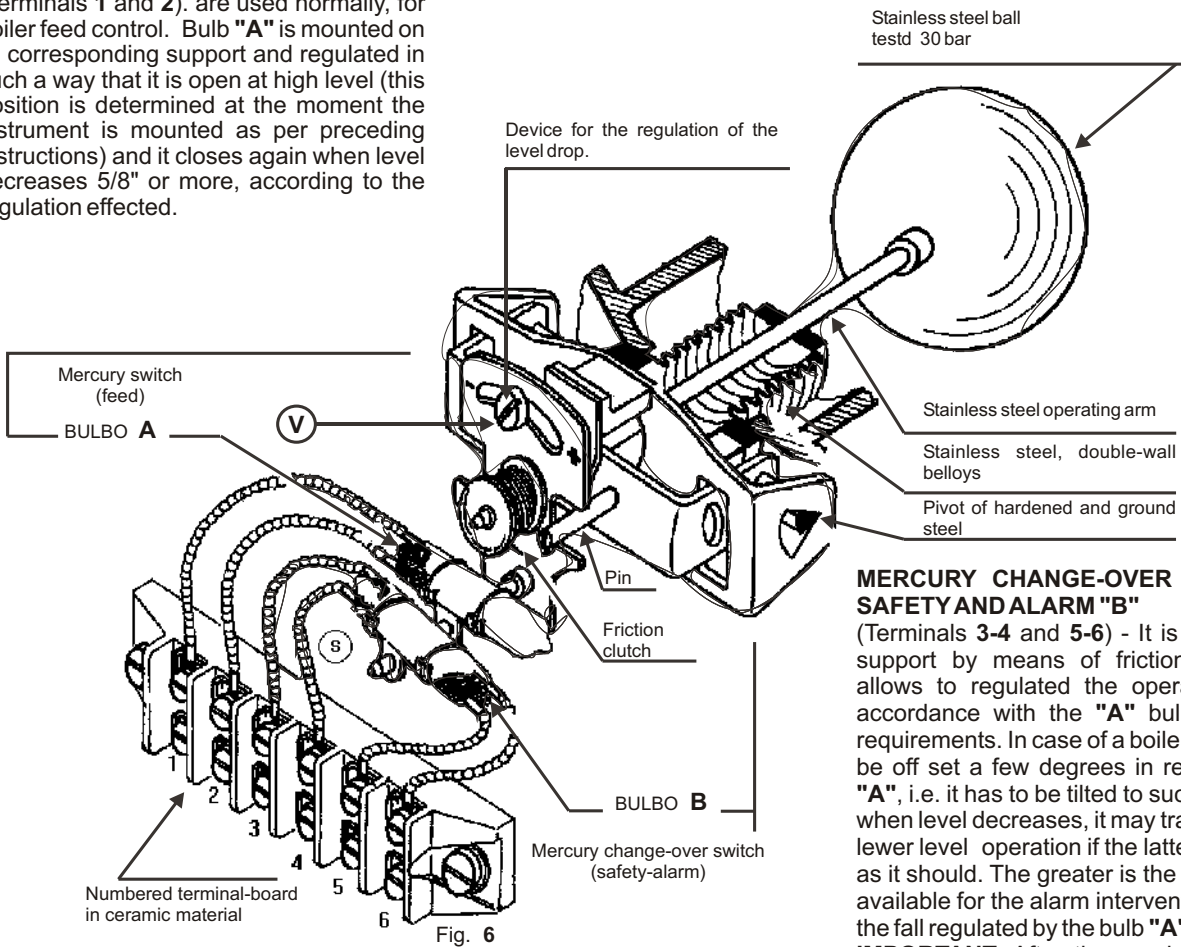


Fig. 5

## INSTRUCTIONS FOR SETTING UP WATER LEVEL CONTROLS

### MERCURY SWITCH FOR FEEDING (A)

(Terminals 1 and 2) are used normally, for boiler feed control. Bulb "A" is mounted on its corresponding support and regulated in such a way that it is open at high level (this position is determined at the moment the instrument is mounted as per preceding instructions) and it closes again when level decreases  $5/8$ " or more, according to the regulation effected.



### MERCURY CHANGE-OVER SWITCH FOR SAFETY AND ALARM "B"

(Terminals 3-4 and 5-6) - It is fixed on its "S" support by means of friction device which allows to regulated the operation setting in accordance with the "A" bulb and with the requirements. In case of a boiler, bulb "B" has to be off set a few degrees in relation with bulb "A", i.e. it has to be tilted to such an extent that when level decreases, it may transfer at a pump lower level operation if the latter does not work as it should. The greater is the differential level available for the alarm intervention, the smaller the fall regulated by the bulb "A".

**IMPORTANT:** After the regulation of the two mercury bulbs make sure that bulb "B" effects a lower level its complete transfer stopping the burner and sounding an alarm at the desired level.

### ADJUSTMENT AD DF THE LEVEL DROP OF BULB "A" CONTROLLING THE FEED PUMP

To regular of the level drop loose screw "V" and shift the plate towards "min" or "max", in accordance with the requirements.

#### 1 - MAXIMUM LEFT POSITION (Fig. 7-1)

When screw "V" is on the extreme left the level drop is at the minimum admitted value. After this adjustment bulb "B" may be tilted a few degrees to one side or to the other in relation with the transfer position of bulb "A", depending on whether you want safety operation at a above or below level operation of bulb "A" or whether you want an alarm at level increases. In case of a boiler bulb "B" must of course be adjusted for transfer after bulb "A" when level decreases.

#### 2 - MIDDLE POSITION (Fig. 7-2)

When the screw is located in the middle position the level drop is in midrange; this position also allows you to use bulb "B" for alarm and safety functions during the burner shut down. For your information: when the screw is in the middle position you obtain a level difference of about  $1-3/8$ " between the stop and start of the pump and this allows you to use the safety and alarm for an abnormal level decrease of about  $5/8$ ". This position represents a typical and safe adjustment.

#### 3 - MAXIMUM RIGHT POSITION (Fig. 7-3).

#### IMPORTANT

When the screw is located on the extreme right, the level drop is at the maximum admitted value. Please use this position rarely, as bulb "B" cannot be tilted further in relation with bulb "A" and on account of this, the two bulbs rotating together do not allow you a safety margin. In this case you may use bulb "B" for alternate functions in place of those normally designated for safety.

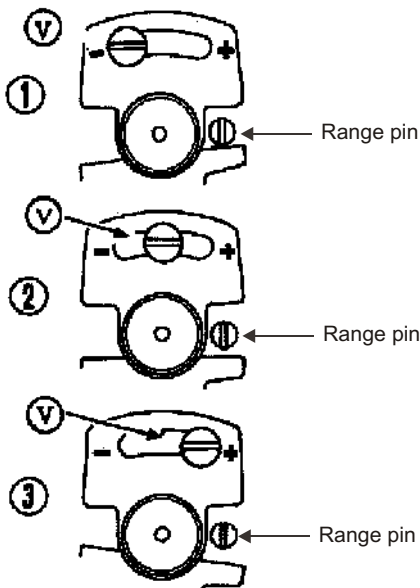


Fig. 7

**"B" BULB ADJUSTMENT FOR ALARM AND SAFETY FUNCTIONS.**

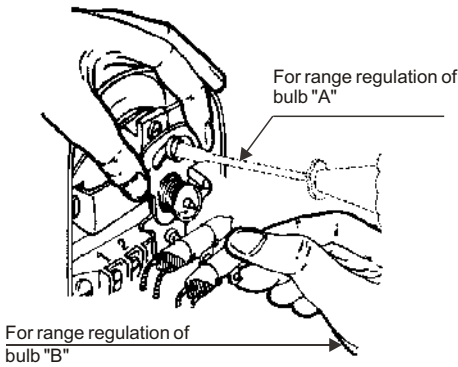


Fig. 8

Bulb "B" is adjustable in order to change the safety shut-down point. To adjust it relative with bulb "A" slightly loose the set screw which is placed underneath bulb "B". Using two fingers rotate the bulb on its axis and kept tight the support bearing screw "V" (see Fig. 8). If it is a question of a boiler it is necessary, for this regulation, to shift bulb "B" so that it transfers at a lower level than the contact level of bulb "A". Do not forget to tighten the set screw of bulb "B" again.  
**IMPORTANT:** In every case bulb "B" has to be adjusted in such a way that it transfers completely when level decreases. For this reason it is necessary that the transfer takes place before the float switch has reached the end of its travel so that there is still a safety overtravel of about 1/8" left. Please note that the usual regulations of bulb "A" are effected between the "min" and "middle" position of screw "V", which generally allows a sufficient tilt of bulb "B" for safety intervention.

**POSITION OF BULBS "A" AND "B" AT THE THREE CONTROL POINTS FOR ELECTRICAL CIRCUITS CORRESPONDING TO LEVEL VARIATIONS**

Fig. 9 - HIGH LEVEL POSITION  
 - feed pump OFF  
 - burner ON

Fig. 10 - LOW LEVEL POSITION  
 - feed pump ON  
 - burner ON

Fig. 11 - DANGEROUS LEVEL POSITION  
 - feed pump ON  
 - burner shut off and alarm ON

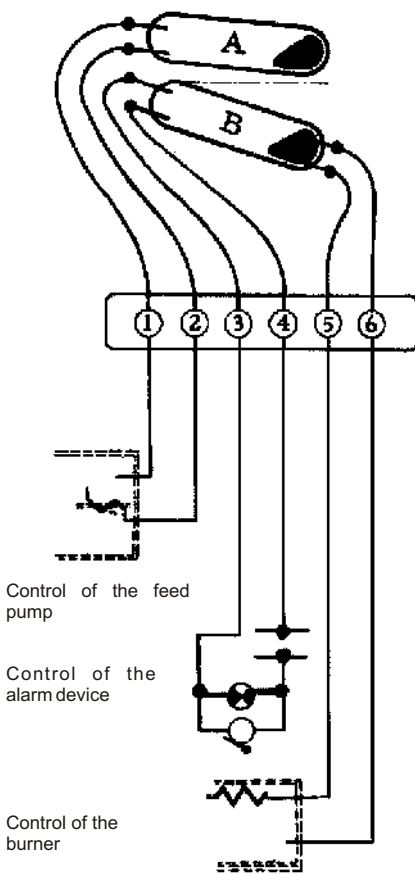
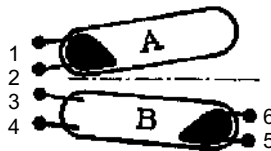


Fig. 12

**NORMAL SCHEME**  
 - Pump control  
 - Control of optical and acoustical alarms  
 - Burner control.



**THESE THREE POSITIONS OF THE 2 BULBS ARE MEANT FOR EACH OF THE FOLLOWING WIRINGS**

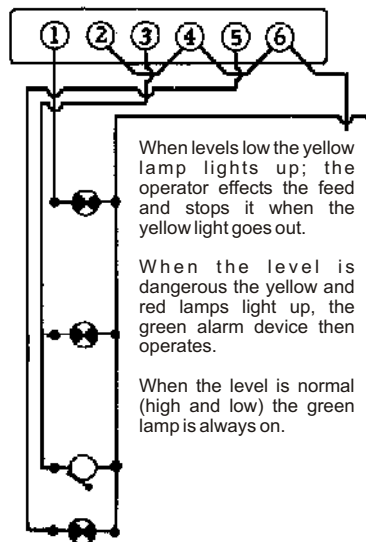
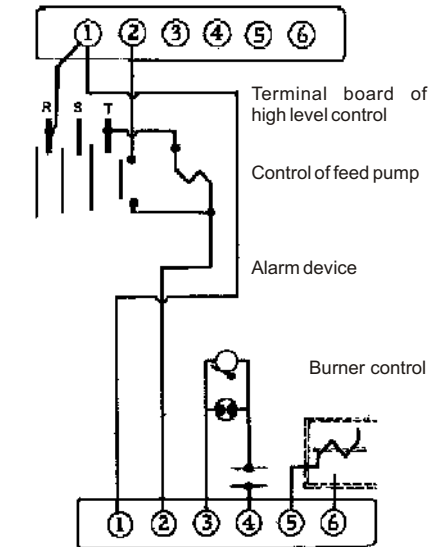
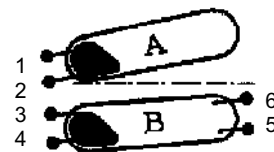


Fig. 13

**SCHEMATIC FOR SIGNALS ONLY**  
 - Warning of high level  
 - Warning of low level  
 - Warning of dangerous level.  
 Every optical signal can always be transformed into optical and acoustical by setting an alarm device parallel to the lamp.



Terminal board of low level control  
 Fig. 14

**SCHEMATIC FOR HIGH LEVEL DIFFERENCES**  
 Control of feed pump  
 Control of optical and acoustical devices  
 Control of burner  
 This scheme requires two water level controls.