

# Technical Datasheet



## Boiler Water Level Controls

### Modulation Level Controls

#### Key Features

- Easily adjusted for individual operating requirements
- Instant reversion to hand control in an emergency
- Glandless construction
- Fail safe design
- Unaffected by foam



#### Series Overview

Mobrey originally entered the industrial boiler control market in 1923 with a range of steam operated equipment. Since that time, the range has expanded to cover most aspects of control associated with the boiler house.

The Mobrey Modulating Controller is a single element electro-hydraulic control with an electronic feedback, used for controlling the flow of feed water into the boiler. Designed to be used alongside the Delta Mobrey Vertical Air Break Controls (VABC). It is a system of parts, comprising of:

- i) A float operated control unit, either chamber mounted or directly mounted on the boiler shell, fitted with an Inductance Coil 'A' head assembly which can be made suitable for either Industrial or Marine applications.
- ii) A flanged modulating feed water control valve, fitted with an Inductance Coil 'B' and twin solenoid valve assembly, which is mounted in the boiler feed water line.
- iii) An electronic control box.

#### Other products

Other products we can offer :

- Boiler feed water modulation level controls and valves
- Sequencing blowdown valves

#### Product applications

- Water level (feed water valve) control
- First low water alarm and cutout

#### How can we help you?

Delta Mobrey offers fast, efficient and knowledgeable support when and where you need it. Please visit our website at [www.delta-mobrey.com](http://www.delta-mobrey.com) to find your local support centre or call us on: **+44 (0)1252 729140**

## How to order

The instrument can be selected from the table below, which details the specification of each model. For assistance in selecting the model that best suits your needs, please contact your local sales office.

### Modulation level control models

| Type number                      | 81006                               | 81007                               | 81008                             | 81951                               |
|----------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|
| Material                         | Cast iron                           | Fabricated steel                    | Fabricated steel                  | Forged steel flange                 |
| Max. pressure kg/cm <sup>2</sup> | 13                                  | 21                                  | 21                                | 32                                  |
| Connections                      | Side and bottom<br>EN1092 DN25 PN16 | Side and bottom<br>EN1092 DN25 PN40 | Side and side<br>EN1092 DN25 PN25 | Direct mounted<br>EN1092 DN100 PN40 |

Models are available for up to 32kg/cm<sup>2</sup> steam working. Details on request.

### Modulation control box models

| Type number  | 80436                    | 80660                    |
|--------------|--------------------------|--------------------------|
| Input supply | 240 Vac 50/60 Hz<br>±10% | 110 Vac 50/60 Hz<br>±10% |

#### Important notice

Electronic control box must not be subjected to either vibration or excessive temperature. It is therefore recommended that they are NOT mounted directly on to the boiler shell.

### Modulation control valve models

| Type number   | Flanged     | No. of solenoid valves | Electrical supply |
|---------------|-------------|------------------------|-------------------|
| 80310/*       | 1½" table H | 2                      | 230 Vac 50 Hz     |
| 80311/*       | DN40 PN40   | 2                      | 230 Vac 50 Hz     |
| 80653/*       | DN40 PN40   | 2                      | 110 Vac 50 Hz     |
| 80486/*       | DN40 PN40   | 2                      | 230 Vac 50 Hz     |
| 80310/80435/* | 1½" table H | 3                      | 230 Vac 50 Hz     |
| 80311/80435/* | DN40 PN40   | 3                      | 230 Vac 50 Hz     |
| 80653/80435/* | DN40 PN40   | 3                      | 110 Vac 50 Hz     |

#### Note

The internal trim on the modulating valve can be changed without the need to replace the valve should operating conditions change.

\* denotes the size of the valve lid & seat (A-I). Valves can be supplied without the lid and seat fitted.

## Operation

A positive change of water level in the boiler alters the inductance value of Coil "A" causing an imbalance in the system. This signal is transmitted through the electronic control box to the appropriate solenoid valve on the modulating valve thus producing a change of hydraulic pressure on the piston assembly, the movement of which modulates the flow of water to the boiler.

Simultaneously this same vertical travel creates a change in the inductance value of Coil "B" until the balance is restored, thus closing the solenoid valve and hydraulically locking the modulating valve spindle.

This sequence is repeated in very small steps until the feed water input equals the required evaporation rate of the boiler.

To prevent the modulating valve responding to random water movement against the general direction of level change, a 13 mm reversal or (dead) band is incorporated in the electronic circuitry.

Low water alarm and burner cut out contacts are also provided within the control box to operate when the water level falls to a predetermined position.

## Installation notes

For the further safety of boilers, it is recommended that the Mobrey Control Unit is mounted on a Mobrey Sequencing Valve.

The water connection from the boiler to the float chamber should be as short as possible and the control head float chamber should be mounted close to the gauge glasses.

The chamber band mark indicates the lowest adjustment position of the low level alarm and it is our recommendation that the positioning of the boiler control chambers relative to the water level gauge glasses and the N.W.L. is such that there is always water visible in the gauge glass even at the lowest operating band level. If required our technical staff will advise on individual installations.

## Application notes

### Throttle control

Modulating Valve in feed line

Suitable for automatic cold start conditions

Used for all pumps capable of operating against a closed discharge.

With a rising water level in the boiler, the modulating valve closes progressively to reduce the rate of feed into the boiler. The size of valve lid is determined by the actual capacity of the boiler plus an allowance. See below for the sizing of the valve lids.

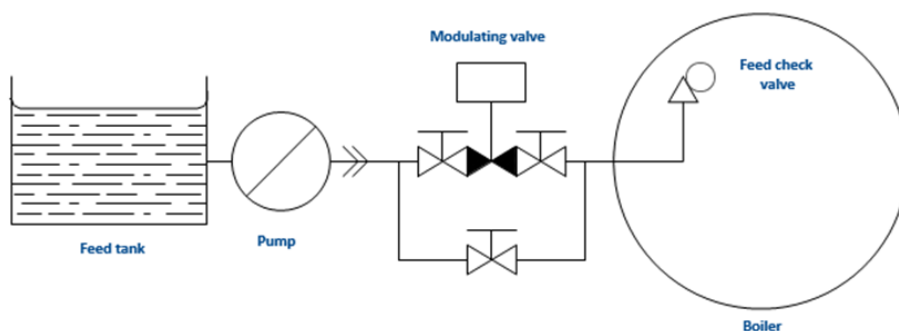
### Power failure and high water shutdown – with a third solenoid valve

Where one pump is feeding more than one boiler it is imperative that a boiler cannot be overfilled. Therefore a third solenoid valve can be installed on the modulating valve which is operated by either a loss of power on the boiler control circuit or the high water alarm. In either case the valve will be closed and prevent further water entering the boiler. The third solenoid valve can be retrofitted to existing valves.

### Common feed pump arrangement

Multi-boiler installations operating on a common feed system require special sizing consideration and full details should be provided so that a suitable valve can be recommended.

Typical installation of the modulation valve



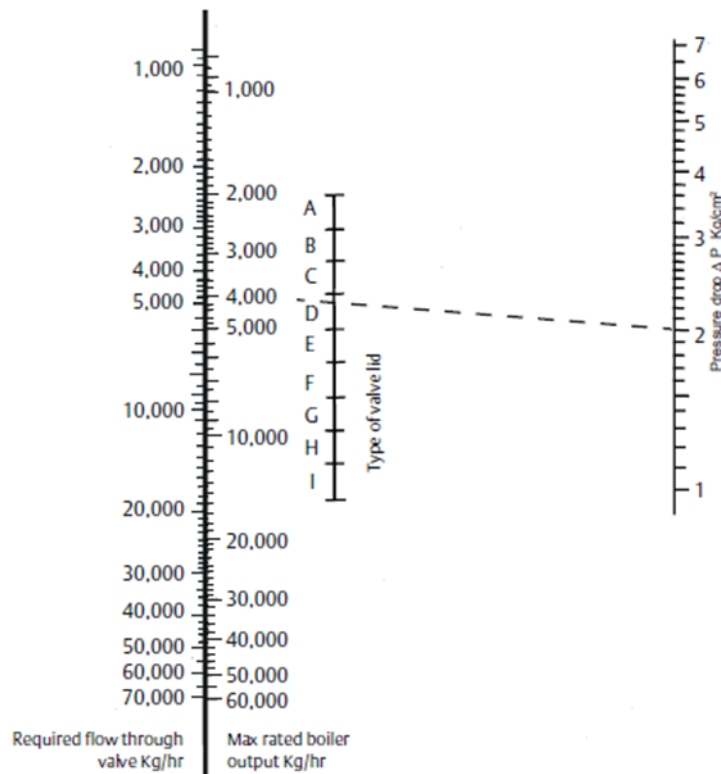
**Sizing of valve lids**

A range of valve lids and associated seats are available, and provide linear flow characteristics. A table of Cv values for water (S.G.=1) is given below for valve lids in the fully open position.

Sizing of the valve lids

| Type of lid | Cv = kg/hr for 1 kg/cm <sup>2</sup> |
|-------------|-------------------------------------|
| A           | 1690                                |
| B           | 2260                                |
| C           | 3030                                |
| D           | 4100                                |
| E           | 5480                                |
| F           | 7480                                |
| G           | 9840                                |
| H           | 13520                               |
| I           | 18480                               |

Modulation control valve sizing chart



The formula for determining the Cv value and correct size of valve lid are given below. The pressure drop across the valve should be 1.4 kg/cm<sup>2</sup> or greater – normally, the higher the pressure drop the better the degree of control. The lid size is that with the nearest Cv value above the calculated value.

$$C_v = \frac{Q}{\sqrt{P}}$$

Where:

Q = Actual Evaporation of Boiler plus 15 per cent margin kg/hr.

P = Pump discharge pressure in kg/ cm<sup>2</sup> when passing Q quantity of water minus (boiler max working pressure + 0.4 kg/cm<sup>2</sup>).

In the following example, an allowance of 0.4 kg/cm<sup>2</sup> has been made for all feed line losses. In practice, the allowance should be that of the installation under consideration and may well be in excess of 0.4 kg/cm<sup>2</sup>, particularly where the feed pump is remote from the boiler and/or where an anti-siphon valve adjacent to the boiler feed check valve has been fitted.

**Example**

Boiler evaporation (actual) = 4000 kg/hr.

Boiler working pressure = 6.6 kg/cm<sup>2</sup>

Pump discharge pressure at Q quantity = 6.6 kg/cm<sup>2</sup>

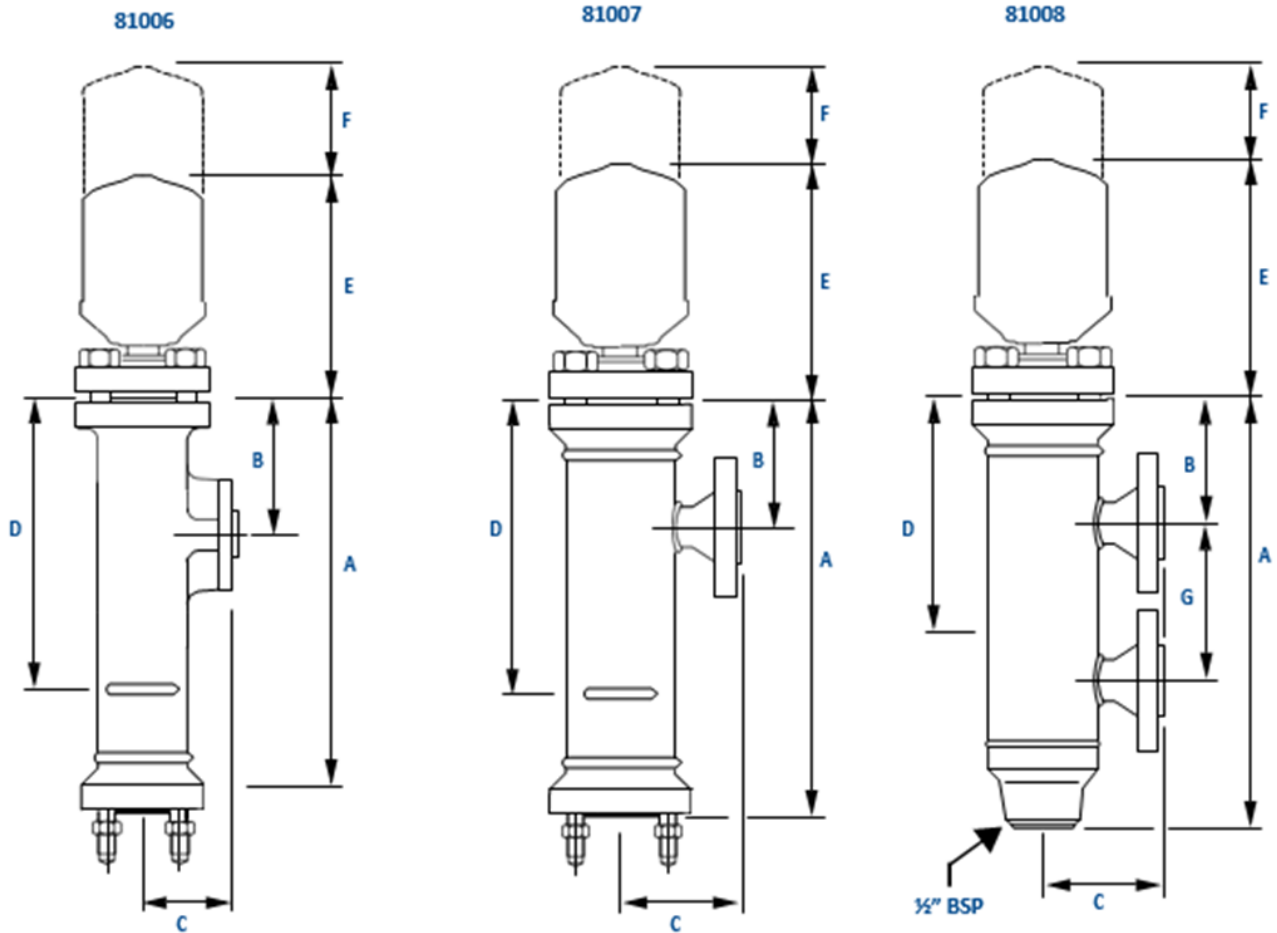
$$C_v = \frac{4000 \times 1.15}{\sqrt{11 - (6.6 + 0.4)}} = 2300$$

Lid required: Type C

## Technical Specifications

### Dimensional and operating data

Standard control heads and chambers



| Type number                      | 81006                               | 81007                               | 81008                             | 81951                               |
|----------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|
| Material                         | Cast iron                           | Fabricated steel                    | Fabricated steel                  | Forged steel flange                 |
| Max. pressure kg/cm <sup>2</sup> | 13                                  | 21                                  | 21                                | 32                                  |
| Connections                      | Side and bottom<br>EN1092 DN25 PN16 | Side and bottom<br>EN1092 DN25 PN40 | Side and side<br>EN1092 DN25 PN25 | Direct mounted<br>EN1092 DN100 PN40 |
| A                                | 468                                 | 468                                 | 570                               | -                                   |
| B                                | 100                                 | 100                                 | 100                               | -                                   |
| C                                | 102                                 | 87                                  | 100                               | -                                   |
| D                                | 277                                 | 277                                 | 335                               | -                                   |
| E                                | 390                                 | 390                                 | 390                               | 390                                 |
| F                                | 430                                 | 430                                 | 430                               | 430                                 |
| G                                | -                                   | -                                   | 270                               | -                                   |

**Chamber mounted models**

Float chambers are manufactured in these approved materials:

Cast iron equal to BS1452 Grade 17  
 – for up to 13 kg/cm<sup>2</sup> rating.

Fabricated steel BS3602 - HFS 27  
 – for both 21 kg/cm<sup>2</sup> and 32 kg/cm<sup>2</sup> ratings.

For chamber dimensions and process connections arrangement refer to the dimensional and operating information above.

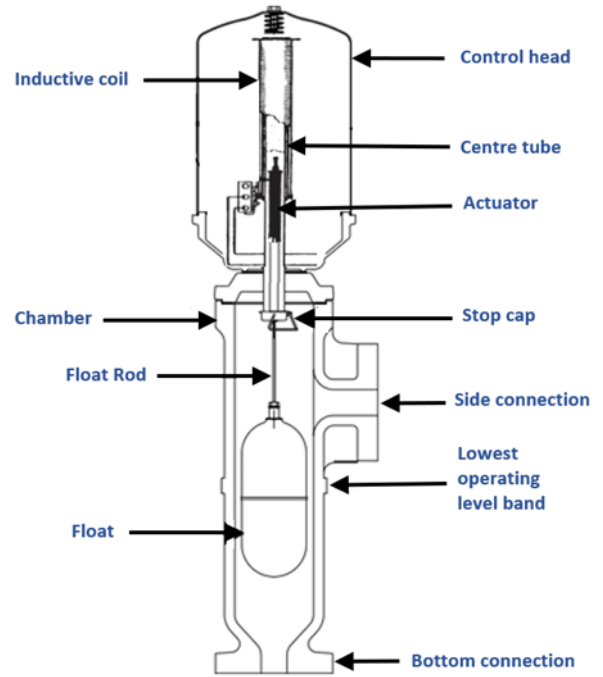
Control heads contain an inductive coil in a housing comprising die-cast base with a zinc coated mild steel casing.

Two 25mm BS.4568 cable entries are provided.

The centre tube is made of non-magnetic stainless steel and expanded into the top cover flange. It is fitted with a stop cap which also acts as a guide for the float rod carrying the actuator.

Floats are manufactured in Monel metal.

Float rods are manufactured in stainless steel.

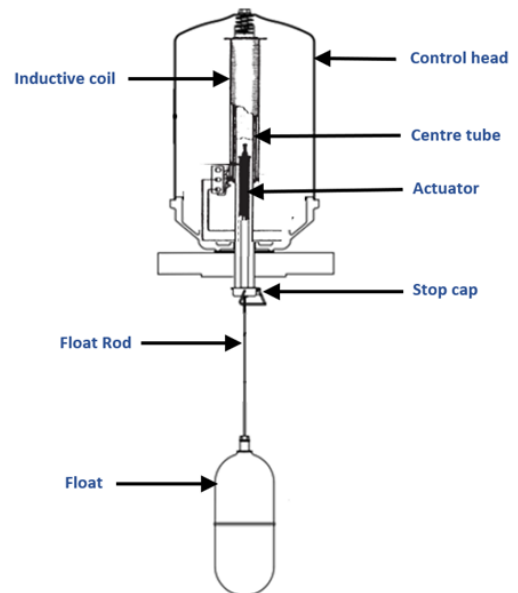


The Chamber band mark indicates the lowest adjustment position of the low level alarm. We recommend that the positioning of the boiler control chamber is relative to the water level gauge glass and that, even at the lowest operating band level, the N.W.L. is such that there is always water visible in a gauge glass.

**Direct mounted models**

Direct Mounted Modulation Level Controls have the same principles of operation and piece parts as the chamber-mounted equivalents, except that the chamber is exchanged for (1) a large round flange and (2) the tube assembly for mounting the control directly on to the boiler shell connection.

A fixed or removable stilling or guide tube should be provided to ensure that the float rod is not damaged and the correct vertical movement is achieved.



## Approvals

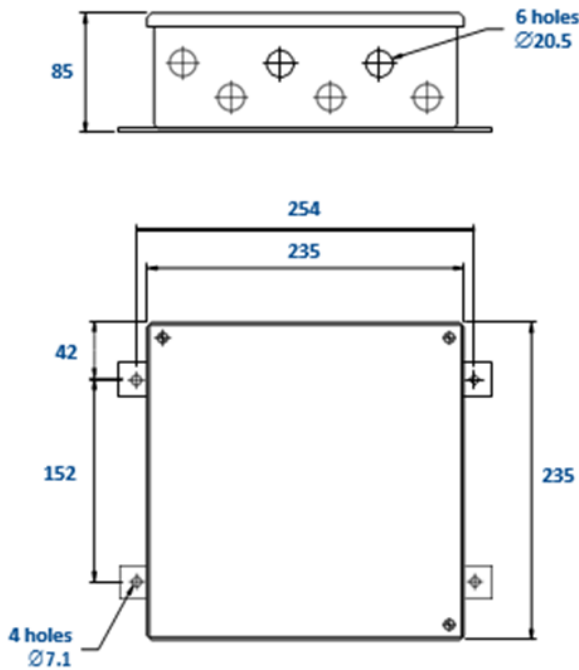
### EUROPEAN DIRECTIVES

#### **Pressure Equipment Directive (PED) 2014/68/EU:**

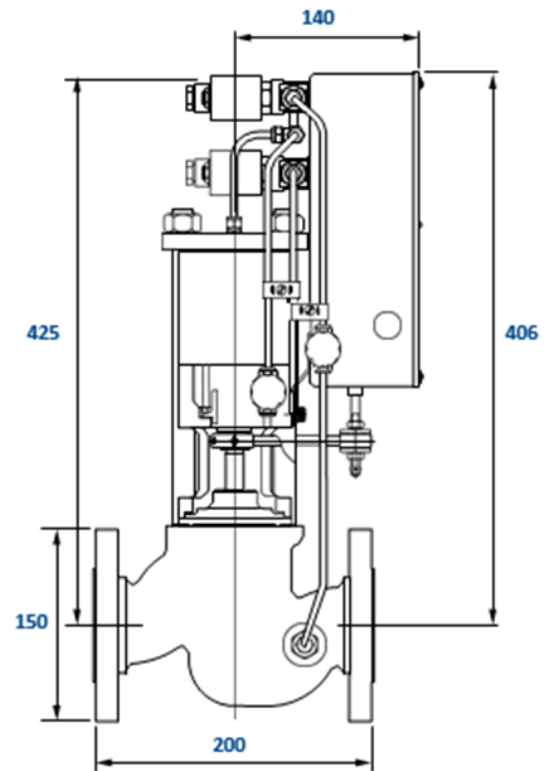
*The level controls, cast chambers and modulation valves are categorised as Sound Engineering Practice (SEP) under Article 4.3.*

*The fabricated chambers are category 1 under Article 4.1(c)(i) for Group 2 fluids and CE marked under Module H*

Control box



Modulation valve



**Electrical characteristics**

Input circuit protected by 1 amp HRC fuse.  
 Alarm and control relays protected by 2 amp HRC fuses. Relay contacts voltage free rating:-  
 Maximum voltage: 250 Vac  
 Maximum current: 2 amp  
 Facility available to special order for separate supply to solenoid valves with 2 Amp HRC

Valve body material: Cast steel

Flanged EN1092 DN40 PN40 or 1/2" BS10 table H

Minimum feed line pressure: 5.3 kg/cm<sup>2</sup>

Maximum feed line pressure: 40 kg/cm<sup>2</sup>

Maximum feed line temperature: 120°C\*

\*180°C is available as high temperature option on request.

*In the interest of development and improvement Delta Mobrey Ltd, reserves the right to amend, without notice, details contained in this publication. No legal liability will be accepted by Delta Mobrey Ltd for any errors, omissions or amendments.*

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