

Upgrading a Mobrey™ Hydrastep 2457/2467 to a Mobrey Hydrastep 2468

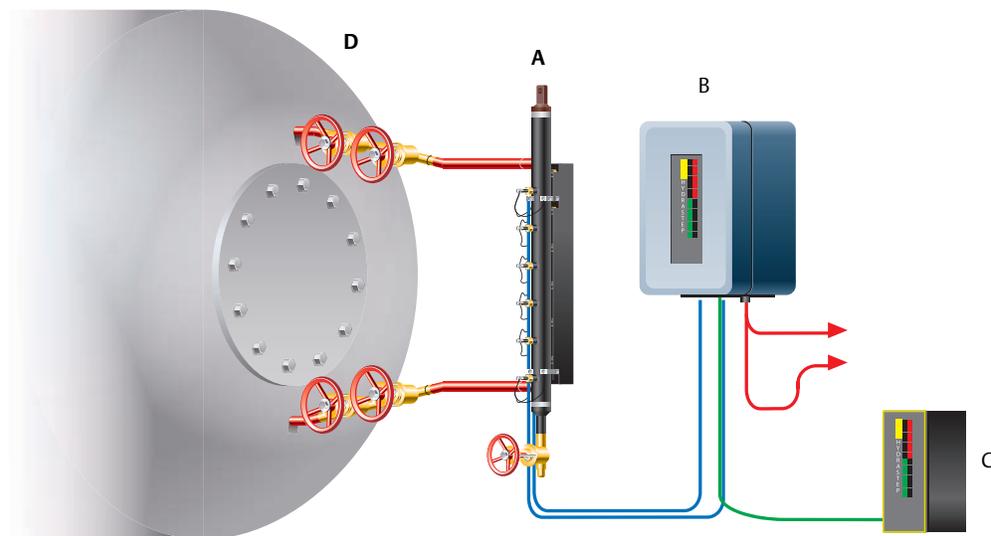
1.1 Introduction

The original Hydrastep was developed in co-operation with the power industry in the 1960's, and has since gone through many design changes and iterations. These changes resulted in the Mobrey Hydrastep 2468 Electronic Gauging System (Figure 1-1), which was launched in 1993 and is still an industry-standard today.

Prior to the Hydrastep 2468 system, the Hydrastep 7 range with the Hydrastep 2457 and Hydrastep 2467 systems were produced. Many of these previous-generation systems are still in operation today, which is a testament to their reliability. However, as there is no longer any support for these in terms of spares availability and repair capability, it is a concern that they are still being used in safety critical applications.

This technical note explains the differences between the present Hydrastep 2468 system and the previous-generation Hydrastep 7 systems, and provides an understanding of the benefits in upgrading to the present system.

Figure 1-1. Mobrey Hydrastep 2468 Electronic Gauging System



A. Hydrastep 2468 water column and electrodes
B. Local Hydrastep 2468 control unit

C. Remote Hydrastep 2468 control unit
D. Boiler drum in plant

1.2 Advantages of the Hydrastep 2468 over the Hydrastep 7 range of systems

The Hydrastep 2468 offers a number of improvements over its predecessors to deliver a more robust system and a more flexible solution.

A study conducted by Factory Mutual Research in the USA (Methodology for the Reliability Evaluation of an Electric Gauging System Used for Safety in Power Boilers) had concluded that the probability of a missed trip incident occurring was dominated by short-circuits on the detection probes being misinterpreted as water.

The Hydrastep 7 range of systems were unable to detect this fault condition. However, the Hydrastep 2468 system provides short-circuit detection on all electrodes using an additional sense-wire connected to the electrodes in water, and a number of other electronics design changes.

The Hydrastep 7 range of systems were limited to twelve electrodes and, therefore, had a limited resolution, especially when being used over a wider site range. Their fault-detection methodology assumed that half the electrodes were in water and the other half were in steam. Electrodes had to be installed such that the 'normal water level' (NWL) was between electrodes numbered 6 and 7, otherwise it could miss certain fault conditions. The Hydrastep 2468 system was designed to accommodate up to thirty-two electrodes, and the NWL could be at any point within that range, without compromising fault detection.

There were further improvements to the Hydrastep 2468 such as adding serial communications between the controller and remote display. This enabled the connection of multiple remote displays at distances of up to 1 km from the controller, doubling the previous distance allowed and reducing the number of conductors needed. Fault-indication was also improved with the LEDs flashing between red and green to show where a specific electrode fault is located.

Table 1-1. Faults Displayed Using LEDs

Hydrastep System	Electrodes	Open-circuit disconnected or broken lead	Short-circuit fouled electrode or high conductivity	Comments
2457/2467	Electrodes 1 to 6 (water)	Steam below water. Amber fault LED flashes	No indication	Except at steam/water interface
	Electrodes 7 to 12 (steam)	Water above steam. Amber fault LED flashes	Water above steam. Amber fault LED flashes	Except at steam/water interface
2468	All electrodes	Red/green LED flashes to indicate specific electrode. Amber fault LED on.	Red/green LED flashes to indicate specific electrode. Amber fault LED on.	No exceptions

Note

For the 2457/2467, the above conditions are only valid when the steam/water interface is between electrodes 6 and 7.

A summary of the advantages of the current-generation Hydrastep 2468 over the previous-generation Hydrastep 7 range of systems:

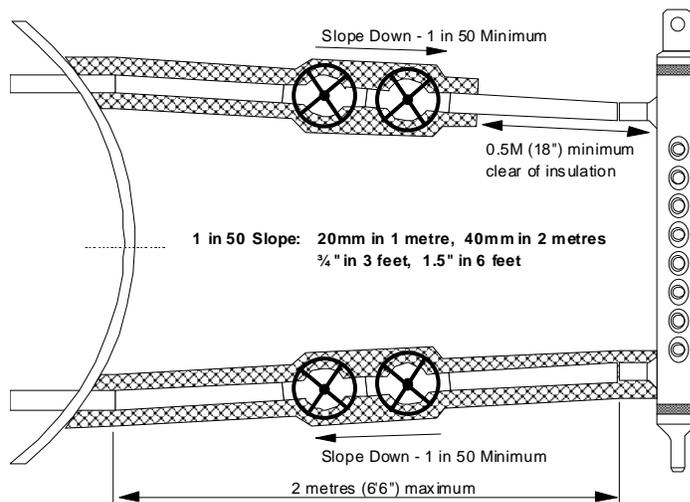
- Currently supported with spare parts, factory repair, and on-site service.
- Improved fault detection, including a fouled electrode in water.
- Improved fault indication with electrode LED indicating the fault position.
- Installation of up to thirty-two electrodes (with previous systems limited to twelve).
- Normal water level (NWL) is not restricted and can be at any position on the column.
- Greater choice of electrode types.
- Greater choice of remote displays (with previous systems limited to one type).
- Installation of up six remote displays (with previous systems limited to one)
- Remote displays are serial driven, reducing the number of conductors needed.
- Remote display maximum cable distance of 1 km (with previous systems limited to 500 m).

1.3 Upgrading from Hydrastep 7 systems to Hydrastep 2468 systems

The Hydrastep 2468 has improved sensitivity to fault conditions. This also means that it is essential that it is installed correctly. Therefore, if upgrading from an older system to a new system, it is important to review the existing installation and ensure that our recommendations are followed.

A common mistake is to omit the slope (Figure 1-2) from the water and steam legs. While an earlier Hydrastep 7 system may tolerate this, the current Hydrastep 2468 may not and so this requirement becomes critical.

Figure 1-2. Recommended Slope



A cable upgrade is required to compensate for the single-wire connections to electrodes 1 to 6 because the 2468 must have a two-wire connection to all electrodes. New electrode cables will need to be supplied and fitted to provide the two-wire connection.

Any existing water column will have been in place since 1993 or before and will have been subject to high temperatures and pressures for many years. It is therefore highly recommended that this is replaced by a new column.

1.3.1 Items required for an upgrade

- Water column
- Electrodes
- Electrode cables
- Hydrastep controller
- Remote display(s) (optional)

Note

See Product Data Sheet BP2468 for all item part numbers. This is available electronically by visiting the web site page at delta-mobrey.com. At the Mobrey home page, click on the link “Product Data Sheets” (from the Documentation section) and then the link “Electromechanicals”.

1.3.2 Points to consider prior to upgrade

- Are the existing steam and water legs suitable, with sufficient range and with the slope as described above?
- Is any existing remote display cabling suitable for digital communications (shielded, or free from interference)?
- Is the same number of electrodes required, or should this be increased for greater resolution?
- The Hydrastep 2468 4-20mA output is single ended (one side is grounded) while the 2457 was floating - ensure that this can be accommodated.

1.4 Hydrastep web site page

For all product information and documentation downloads, see the on-line Mobrey Hydrastep web site page at delta-mobrey.com. At the Mobrey home page, click on the link “Electromechanical” (from the products section) and then the link “Mobrey Hydrastep 2468”.

Standard Terms and Conditions of Sale can be found on the [Terms and Conditions of Sale page](#).

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