



Bitesize Guide:

# Type B HP

## RCDs

for Heat Pump  
Applications

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## Why Use Hager's Type B HP RCDs for Heat Pump Applications?

**Type B HP RCDs** are unique devices specifically designed for heat pumps. While meeting the Type B device standard, Type B HP RCDs are also engineered to function at frequencies greater than 20 kHz, ensuring a minimum tripping threshold of 150 mA for frequencies above 1 kHz.

**Type B RCDs** are the only devices that protect against DC faults. Given the typical installation setup of air source heat pumps, such as external, ground-mounted locations and the presence of large, exposed conductive parts like metal casings, there is an increased risk of electric shock in the event of a fault. For this reason, using a Type B RCD is essential as the protective device.

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## Why Type B HP RCDs Are Essential for Heat Pumps.

**Heat pumps**, particularly those with inverter-driven compressors, generate high-frequency currents during AC-DC switching. These currents often include DC components and high-frequency residual currents that exceed the capabilities of standard 50 Hz Type B RCDs.

**Some installers mistakenly believe that Type B+ devices are suitable for heat pump applications. However, Type B+ is a VDE standard and is not recognised by BS 7671.**



**Hager's Type B HP RCD** takes this a step further by operating at frequencies greater than 20 kHz and maintaining a minimum tripping point of 150 mA for frequencies above 1 kHz. This precision is critical for the reliable and safe operation of heat pumps.

**Regulation 531.3.3** states that different types of RCD exist and advises the appropriate device shall be selected depending on their behaviour in the presence of DC components. Essentially where DC passes through an RCD it needs to be able to tolerate it, otherwise the RCD can become magnetised and this will compromise the devices functionality. This problem is known as RCD blinding because the device is unable to see earth faults under such conditions.

## **Why Some Type B RCDs Trip at 1 kHz.**

Not all Type B RCDs are designed to handle high-frequency currents reliably. Devices that function only at or below 1 kHz may trip unnecessarily when exposed to the higher frequency residual currents common in heat pumps. This can result in nuisance tripping and system downtime, highlighting the importance of using a device like the Type B HP RCD, engineered for higher frequency performance.

## **Type B HP RCDs are Specifically Designed to:**

- Detect and protect against smooth DC faults.
- Operate effectively at high frequencies, such as 20 kHz or greater, making them ideal for heat pump applications.
- Ensure safety and compliance with BS 7671 standards, offering robust protection in modern electrical systems.

**With their advanced detection capabilities and compliance with BS 7671 standards, Hagers Type B HP RCDs are the only reliable choice for heat pump installations.**

**Regulation 134.1.1** requires proper materials shall be used in the erection of the electrical installation. The installation of electrical equipment shall take account of manufacturers' instructions.

## RCD Selection table:

| RCD Type | Marking Symbol  | Characteristics   |
|----------|---|---|
| AC       |    | Unsuitable for heat pump installations.   |
| A        |    | Fail to trip reliably in the presence of smooth DC faults or high-frequency currents.   |
| F        |   | Limited high frequencies. Do not provide adequate protection against smooth DC faults.  |
| B        |  | Capable of detecting and tripping under smooth DC faults at any level. Limited to frequencies up to 1 kHz.  |
| B HP     |  | Capable of detecting and tripping under smooth DC faults at any level. Tested to handle frequencies greater than 20 kHz, ensuring a minimum tripping threshold of 150 mA for frequencies above 1 kHz. |

## **Addressing Common Misunderstandings: Type B+ vs. BS 7671**

Some installers mistakenly believe that Type B+ devices, a VDE standard, are suitable for heat pump applications. However, it is essential to note that Type B+ is not recognised under BS 7671. This misunderstanding underscores the importance of selecting devices specifically designed and tested for compliance with UK standards. Hager's Type B HP RCDs meet these stringent requirements, providing peace of mind for installers and end-users alike.

## **The Future of Electrical Safety in Renewable Energy**

As the adoption of renewable energy technologies continues to grow, the electrical industry must adapt to new challenges. Heat pumps, with their complex electrical characteristics, highlight the need for advanced protective devices like Hager's Type B HP RCDs. These devices not only ensure compliance with evolving regulations but also address the unique safety risks associated with modern installations.

By offering high-frequency protection and robust performance in demanding conditions, Hager's Type B HP RCDs set a new standard for safety and reliability in the electrical industry. For installers and specifiers, the choice is clear: when it comes to heat pump applications, Hager's Type B HP RCDs are a reliable solution.





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