



R1C

Steam Trap Failure Monitor

Description

The R1C steam trap failure monitor will monitor the performance of a single steam trap when used in conjunction with a Spiratec sensor chamber and sensor or a steam trap with integral sensor. It will indicate whether a trap is operating correctly, passing live steam or has failed closed by means of coloured trap status lights on the unit. Analogue and digital outputs allow it to be connected directly to BEMS/EMS to indicate steam trap status remotely.

System components

To detect a steam trap that is leaking steam, a standard SS1 Spiratec sensor is installed in a sensor chamber or steam trap. To detect a steam trap that is leaking steam or is waterlogged, a WLS1 Spiratec waterlogging sensor assembly is installed in a sensor chamber or steam trap.

R1C system installation

The R1C must be installed in a steel conduit system within 10 m (32.8 ft) of the Spiratec sensor.

Connections

The R1C enclosure is a circular conduit box with M20 threaded entry holes. To maintain resistance to moisture, use a suitable cable gland between the R1C and the Spiratec sensor (Type SS1 or WLS1). If the cable to the BEMS/EMS passes through a conduit, make sure that the threaded connection to the R1C is water-tight to maintain the IP65 enclosure rating. Details of electrical connection are supplied with the product.

Materials

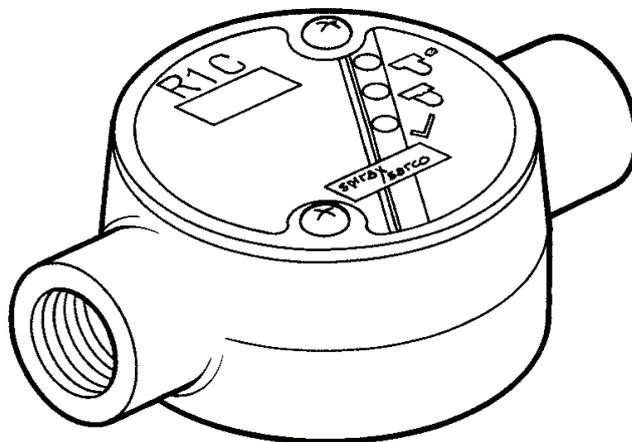
Body Cast malleable iron with a black enamel finish

Enclosure rating

IP65 (when fitted with correct cable glands)

Electromagnetic compatibility directive (EMC) 89 /336 /EEC:

EN 61326: 1997 A1 and A2 Emmissions - Class B equipment,
Table 4 EN 61326: 1997 A1 and A2 Immunity for Industrial
Locations, Annex A



R1C supply voltage

The required supply voltage for the R1C depends on the output signal configuration as described below. To remain compliant the R1C needs to be connected to a  marked BEMS /EMS system or power supply and must be earthed.

| R1C configuration | Supply voltage required |
|---------------------------|-----------------------------|
| 4 - 20 mA output not used | separate 9-30 Vdc, < 35 mA |
| 4 - 20 mA output used | separate 22-30 Vdc, < 35 mA |

R1C operation

| Trap status | Status lights |
|---|---|
| Trap operating correctly | Red and orange lights OFF Green light FLASHING |
| Trap leaking steam | Red light ON Green light FLASHING |
| Trap blocked or waterlogged | Orange light ON Green light FLASHING |
| Trap cold but free of condensate (this is a common state during system start-up or when the system is shutdown). | Red and orange lights ON Green light FLASHING |

Note: During normal operation, the green light flashes ON every second to show that electrical power is connected to the R1C and that it is operating correctly.

Trap leaking steam detection period

Internal switches in the R1C allow the trap leaking detection period to be set to 2, 22, 44 or 88 minutes.

Condensate conductivity levels

Internal switches in the R1C allow the condensate conductivity detection level to be set to 17, 4.8 or 1.2 microsiemens depending on local conditions. In addition it can be disabled if required.

Trap waterlogging temperature levels

Internal switches in the R1C allow the waterlogging temperature level to be set to: 48°C, 63°C, 85°C, 111°C, 140°C, 169°C or 191°C (118 °F, 145 °F, 185 °F, 232 °F, 284 °F, 336 °F or 376 °F). In addition it can be disabled if required.

As supplied, the R1C comes factory set as follows:

| Channel | Failure detection | Notes |
|------------------------------------|-------------------|---|
| Leak detection period | 22 minutes | The trap must leak steam for 22 minutes before the R1C signals a fault. |
| Leak detection level | 4.8 µS | The conductivity of the condensate in the sensor chamber must be greater than 4.8 microsiemens for correct operation. |
| Waterlogging detection temperature | 85°C (185 °F) | The condensate in the sensor chamber must cool below this temperature before the R1C signals a waterlogging fault. |

Output signals for remote indication of trap status

Digital outputs

PNP open collector output

Use this output to connect the R1C to a BEMS / EMS whose digital inputs are pulled down to 0 volts. The pnp outputs act like switches connected to the R1C's power supply. During normal trap operation, the pnp outputs will switch ON and give out a voltage equal to the R1C's power supply minus 0.4 V. Their output resistance in this state is 220 ohms. If the trap fails, one of the pnp digital outputs will switch OFF.

NPN open collector outputs

Use this output option to connect the R1C to a BEMS / EMS whose digital inputs are pulled up to a positive voltage. The npn outputs act like switches connected to 0 volts. During normal trap operation, the npn outputs will switch ON, giving out 0 volts with an output resistance of 220 ohms. If the trap fails, one of the npn digital outputs will switch OFF.

| Trap status | R1C digital outputs | |
|--|---------------------|------------|
| | Waterlogged | Steam leak |
| Trap operating correctly | On | On |
| Trap leaking steam | On | Off |
| Trap blocked or waterlogged | Off | On |
| Trap cold, but free of condensate (or R1C failure) | Off | Off |

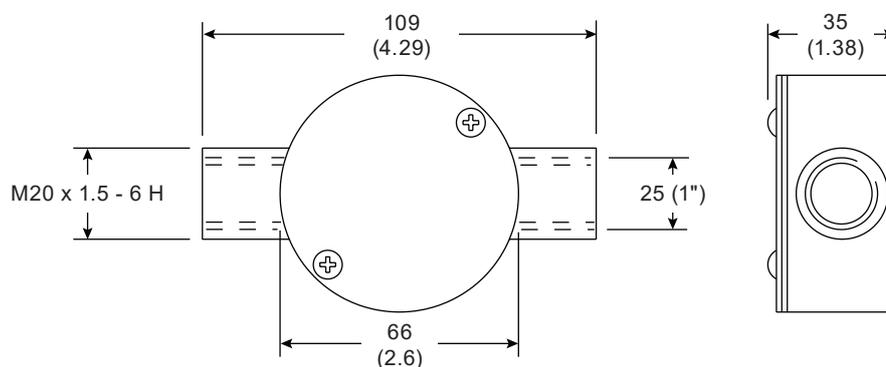
Analogue output:

An analogue output is available as standard for use with BEMS / EMS's that operate on an analogue input signal. Setting details are given below:

| Trap status | Nominal output current from R1C | Recommended BEMS/ EMS alarm threshold settings |
|--|---------------------------------|--|
| Trap operating correctly | 20 mA | 23.0 mA > set point > 17.5 mA |
| Trap leaking steam | 15 mA | 17.5 mA > set point > 12.5 mA |
| Trap blocked or waterlogged | 10 mA | 12.5 mA > set point > 7.5 mA |
| Trap cold, but free of condensate (or R1C failure) | 4 mA | 7.5 mA > set point > 0 mA |

The current output from the R1C is derived from an internally powered loop and is capable of driving into an impedance of at least 550 ohms. In practice, this means that the maximum permissible distance between the R1C and the BEMS / EMS will be governed by the type of connecting cable used.

Dimensions (approximate) in mm (inches)



Maintenance

There are no user serviceable parts in the R1C.

How to order example

- 1 - Spirax Sarco R1C Steam trap failure monitor (pnp digital outputs),
- or
- 1 - Spirax Sarco R1C Steam trap failure monitor (npn digital outputs)