spirax **/sarco**

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 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 of construction

Body	Cast malleable iron, 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 CE 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.
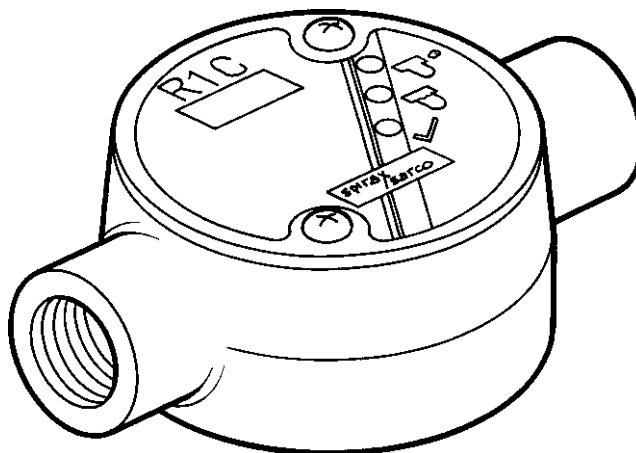
Trap leaking steam detection period

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, 63, 85, 111, 140, 169 or 191°C. 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	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.

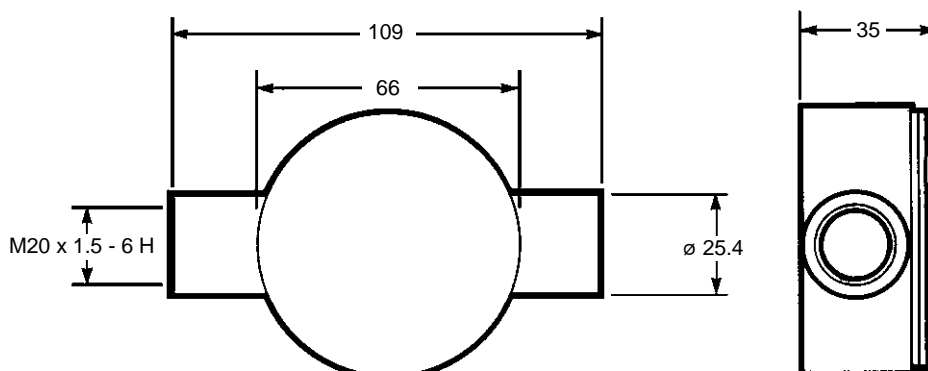| Trap status	R1C digital outputs	
	Waterlogged	Steam leak
Trap operating correctly	On	On
Trap leaking steam	On	Off
Trap blocked or waterlogged	Off	On
Trap cold, but free of condensate (or R1C failure)	Off	Off

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.

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)

Dimensions (approximate) in millimetres