risycor®

Risycor CX

Corrosion monitor

+

X-fix

Threaded connector

CX-F_UM_V1_01

MANUAL

■ TABLE OF CONTENTS

■ 1 LIST OF ABBREVIATIONS

EN

HVAC	Heating, Ventilation, Air conditioning and Cooling
USB	Universal Serial Bus
LED	Light Emitting Diode
VDI	Association of German Engineers (Verein Deutscher Ingenieure)
PC	Personal Computer
VAC	Volts Alternating Current
VDC	Volts Direct Current
(m)A	(Milli)ampères
mm	Millimetre
CE	European Conformity (Conformité Européenne) (in agreement with European legislation)
EMC	Electro-magnetic Compatibility
RoHs	Restriction of Hazardous Substances
Rc	Radius of Curvature
Hz	Hertz
W	Watt
RH	Relative Humidity
LAN	Local Area Network

■ 2 SYMBOLS

Warning about bodily harm/injury

CAUTION! Warning of poor operation and/or damage to equipment

NOTE Hints for easier use

■ 3 GENERAL DESCRIPTION

3.1 RISYCOR

The Risycor corrosion monitor is a patented measuring instrument that monitors the durability of your heating and cooling installation in a reliable manner by providing timely warning of corrosion (the formation of rust), and therefore also of the particularly harmful effects that may be caused by corrosion.

The corrosion monitor therefore prevents unwanted problems, such as the breakdown of boilers and pumps, blocked valves, leaks and blockages caused by poor water quality. The corrosion monitor thereby paves the way for a much longer service life of your heating and cooling system, improved living comfort, fewer unwanted costs and significant savings of energy and raw materials.

The corrosion monitor consists of two components: a probe and a logger. Using the threaded connector, the probe is mounted perpendicular to the pipe whereby the metal coupon at the tip of the probe is located in the water flow. The oxidation of this coupon is representative of the uniform corrosion within the system. The logger records the corrosion rate against time, and warns in case of inadmissible values or a defect. The memory can be read out with a computer.

For more information about Risycor, please go to www.risycor.eu.

3.2 CORROSION IN WATER-BASED THERMAL INSTALLATIONS

See also ww.resus.eu for a more detailed explanation.
about corrosion in hydronic systems.

■ 4 CONTENT OF THE PACKAGING

EN

• Logger + instructions for use

• Probe with protective cap

• Threaded connector

• Mains adaptor:

• Tie wrap for strain relief for the mains adaptor cable

• Manual

• Assembly guide

■ 5 APPLICATIONS

Risycor is a corrosion monitor for water-based thermal installations. From studies with regard to corrosion processes in heating installations and directives *(see Chapter 16, Standards and directives),* it has been shown that corrosion is quite a complex phenomenon that is influenced by many factors. Everyone agrees, however, that the presence of oxygen in the water system is the main factor responsible for the uniform corrosion in a system. Based on the electromagnetic principle, such as used in a proximity switch, Risycor measures the mass loss of a 50 μm iron coupon with very high accuracy. This unique method for the measurement of the uniform corrosion is patented under the patent number EP2081009 (B1).

The major causes of oxygen in the system water are as follows:

- oxygen ingress due to vacuum zones in the installation, caused by inadequate pressure maintenance (expansion system);
- oxygen ingress resulting from diffusion through materials that are not oxygen-tight (plastic pipes, rubber hoses, membranes of expansion tanks, etc.);
- oxygen in the make-up water due to improper topping up (~10 mg/l);
- oxygen in the residual air due to insufficient venting of the system during initial filling;
- oxygen in the filling water (~10 mg/l) during the initial filling;
- open systems!

In some cases, certain chemicals or inhibitors are added to the system water. These influence the behaviour of the materials of the installation and the system water, so that we can no longer speak about a uniform reaction. The measurement results in chemically treated installations should therefore be interpreted with caution. For more detailed information about the application of the corrosion monitor, please refer to www.resus.eu.

■ 6 INSTALLATION

See also the 'Application Guideline' document, where the philosophy of the use of the Risycor is explained in detail (www.resus.eu).

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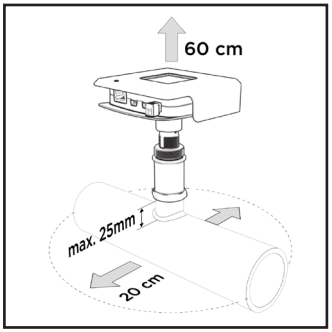
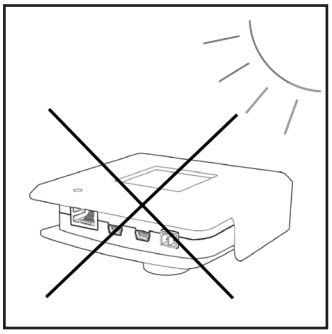
PREPARATION

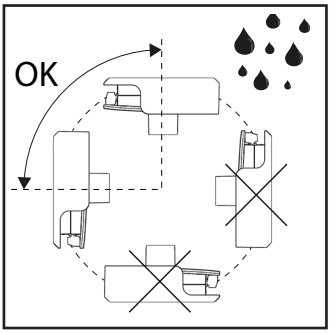
- The corrosion monitor is best installed in the return line of the system, in a place where there is sufficient flow. The water must flow completely around the tip of the probe. The installation must be pressureless at the fitting location during first installation.

- Select a location with space all round in order to be able to use the Retractor for extension under pressure, where necessary.



- Avoid placing the corrosion monitor in extreme sunlight and align the corrosion monitor in a position where the connectors will be protected against splashing water.



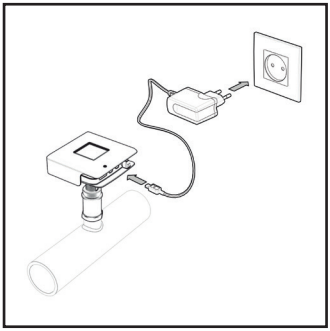


- The corrosion monitor can be installed in various ways:
    a. in an existing opening;
    b. in a T-piece: in this case, provide a T-piece with a "female tapered thread" (Rc ½") in the transverse leg, without an internal strut or collar at the end of the internal thread.

CAUTION! T-pieces with a strut or collar could narrow the threaded connector due to radial compression, and this in turn could block the probe tip in the fit, which has now become too narrow, and cause irreparable damage.

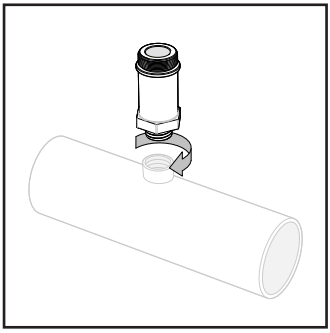
    c. In a weld socket of max. 25 mm length (probe tip must be positioned in the flow).

- Ensure that there is an electrical outlet nearby.



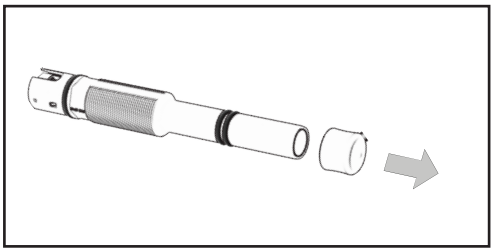
INSTALLATION

1. Tighten the threaded connector firmly and seal with a suitable sealant.



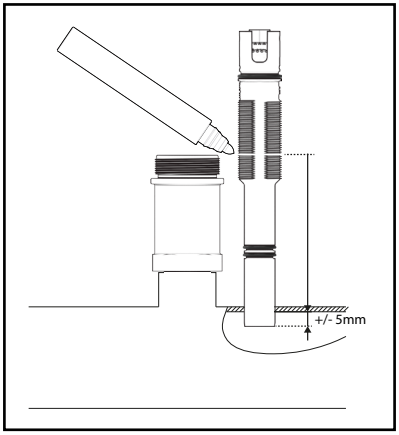
CAUTION! Tighten the threaded connector by hand, and then turn an additional quarter turn using a spanner. The connection must not be forced. If it is screwed tight with too much force, the threaded connector can be constricted through radial compression, which locks the probe tip in a fit that is too tight and can damage it irrevocably.

2. Remove the protective cap from the probe.



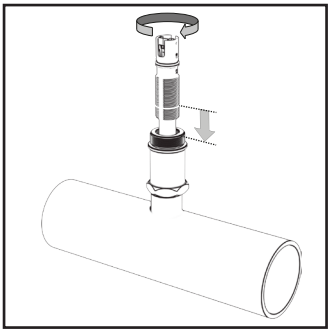
CAUTION! The probe tip must not be damaged.

3. Measure the mounting depth as shown in the figure below. Mark this distance on the probe.



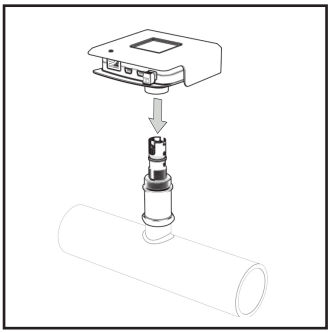
CAUTION! The probe tip must be positioned in the flow.

4. Fit the probe into the threaded connector to the correct depth, as marked.



CAUTION! Do not use any sealing material (flax, Loctite, ...) The O-rings of the probe provide sufficient sealing. The thread is used to ensure the proper installation depth for the probe. The thread must not be damaged in any way. Do not cause any scratches!

5. Click the logger firmly onto the probe (only one position is possible).



CAUTION! Check that the logger is pushed over the probe to a sufficient depth (the O-ring on the probe must be completely covered by the collar of the logger). Never use the logger to tighten the probe, however.

■ 7 ACTIVATION

CAUTION! The activation of the corrosion monitor should be carried out:

- **In a new installation: before the first filling / flushing with water;**
- **In an existing installation: during the installation process.**

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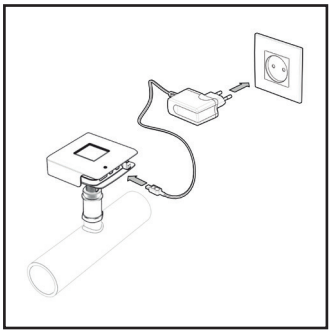
1. Plug in the mains adaptor into the nearest electrical outlet and connect the logger to the power supply. Provide strain relief for the cable of the AC adaptor, possibly by using the supplied tie wrap.



NOTE: If no power outlet is available, or if the power cable is too short, an extension cord can be used to connect the mains adaptor to an outlet further away or to the power supply panel of the boiler. Do not use a USB extension cable.

CAUTION! Never (dis)connect a logger to probe when the logger is connected to the mains adaptor. This could lead to irreparable damage!

The LEDs light up green. When the 'monitor LED' *(see Chapter 8, Operation/Use)* lights up red, the logger is not connected to the probe.

The corrosion monitor carries out a measurement every 20 minutes. A corrosion rate is determined every 7 hours. An indicative corrosion rate is calculated for a few days, which will be sufficiently correct after seven days to generate an alarm, if necessary.

2. Connect the Risycor CXE or CXI to the appropriate network. The Risycor CXL connects itself automatically to the network.

   Risycor CXE: read-out via Ethernet (within the LAN) using a web browser
   In order to be able to use the ethernet application, the corrosion monitor must be connected to the appropriate connector using an ethernet cable. This ethernet cable must be able to provide a connection to the local LAN network.

   Risycor CXI: read-out via Internet using a suitable cloud application
   In order to be able to use the internet application, the corrosion monitor must be connected to the appropriate connector using an ethernet cable. This ethernet cable must be able to provide a connection to the Internet. Go to www.resus.eu for technical network requirements.

   Risycor CXL: read-out via the LoRa data transmission network and internet using a suitable cloud application
   In order to be able to make use of the LoRa data transmission network, nothing else needs to be connected. This is a wireless network that is available from various large telecom providers, and which is intended to convey information at ultra-low power consumption.

3. Enter the date of the installation on page 23 .

4. Using the green terminal connector, the integrated, volt-free contact can be connected to an external safety circuit (e.g. building management, external signalling device or the safety circuit of the heat source). The circuit is closed in case of normal operation of the corrosion monitor, and is interrupted in case of an alarm, as well as when there is no power supply.

   CAUTION! The volt-free contact with a normally open contact is closed during the operation of the corrosion monitor. In the case of an alarm, the volt-free contact interrupts the external safety circuit of max. 48 VDC/VAC, 2 A, 60 W.

   NOTE: If the safety circuit of the heat generator is connected, and the mains supply to the corrosion monitor fails (e.g. faulty cables, power supply, fuse, etc.), the heating system can no longer

work. In this case, the 'ALARM IGNORE' function may also not work. This can be rectified by a bridge in the terminal connector. The volt-free contact will thereby be closed, so that the heat generator can function again. The corrosion monitor will still not function, however.

5. The threshold value for the annual corrosion rate is pre-set to 24 µm per year. If necessary, this value can be set for each type (CXE, CXI or CXL) in the provided display software (see Chapter 9, Read-out).

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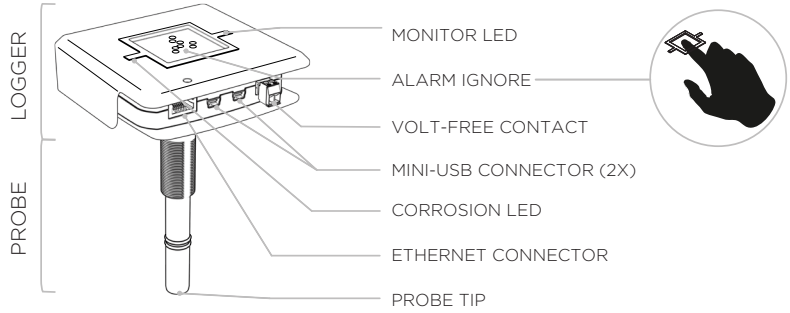
■ 8 OPERATION / USE



1. LEDs:

CORROSION LED	MONITOR LED	PROBLEM	ACTION	SOLUTION	VOLT-FREE CONTACT
Problem with the central heating	Problem with Risycor	Everything ok			Closed
		Corrosion speed too high		Identify cause and solve	Open
		Problem with Risycor		Contact installer, check error code	Open
		Probe not connected or defect	ALARM IGNORE = 3 days no alarm*	Replace probe, possibly with Retractor	Open
		Risycor not connected or defect	Check power supply	Replace logger	Open

* If 'ALARM IGNORE' is activated, the white LEDs will blink rapidly.

2. The **'ALARM IGNORE' function** deactivates the alarm for 3 days by pressing on the 4 white LEDs. The Risycor will not trigger any more alarms for three days, even though the alarm condition may still be active. The bright SOS blinking of the four white LEDs turns into rapid blinking.

3. The logger has two **'MINI-USB CONNECTORS'**:
- One to connect the logger to the mains by means of the supplied USB mains adaptor;
- One to download the measurement data via a separate USB/mini-USB data cable *(see Chapter 14, Accessories) (see Chapter 9, Read-out)*;
- Both connectors are compatible with all the functions.

4. A corrosion-alarm indicates that the corrosion rate at that time has exceeded the pre-set threshold value. The damage caused to the installation thereby depends on the value of the corrosion rate, the frequency and/or the duration of the alarm. In an ideal situation, the BMS should be programmed so that these conditions, possibly combined with alarms from other Risycors in the same system, can be sensibly passed on.
It is recommended to locate the cause of the problem and to correct it if one of the following conditions is met:
- **there have been more than 7 alarms in 7 weeks**
- **the alarm lasts longer than 7 days**
- **several Risycors in the same system give alarms at the same time**

 **Contact your installer / technician.**

■ 9 READ-OUT

The measurement data can be read out sporadically. Reliable values are available at the earliest 7 days after the start *(see Chapter 7.1, Activation)*.

READING OUT VIA USB
1. Go to the Resus PC Dashboard download link via www.resus.eu.
2. Download and install the Resus PC Dashboard.
3. Connect the mini-USB connector from the logger to a PC using a separate (standard) data cable USB / mini USB *(see Chapter 14,*

Accessories).

NOTE: Measured data downloads via USB are also possible using the Risycom reader. Disconnect the mini-USB power adaptor from the logger and connect it to the Risycom for power. Connect the black mini-USB spiral cable from the Risycom to the logger.

CAUTION! The USB ports cannot be used to carry out 2 read-outs at the same time. Only one Risycom or 1 PC can thereby be connected at any time!

4. The measurement data can now be read out. When connected to a PC, follow the instructions in the Resus PC Dashboard manual. If connected to Risycom, press the "Download" button, and wait until the LED on the Risycom indicates that the connection can be disconnected. The SD memory card now contains all the data, which can be further analysed in the PC using the Resus PC Dashboard software.
5. Do not forget to reconnect the mains adaptor to the logger.

READ-OUT VIA ETHERNET (CXE)

Over the same LAN (sub-)network

1. Open any web browser on a device within the same LAN (sub-) network to which the corrosion monitor is connected.
2. Surf to the local web page address **http://risycorcxe_SN.local/**, whereby **SN** stands for the serial number that can be found on the underside of the green logger (e.g.: http://risycorcxe_160100001.local/).
3. The measurement data can be read-out via this web page, as well as data for the further analysis of alarms.

Via a 'point-to-point' connection

1. Connect the logger directly to a computer using the ethernet cable.
2. Open any web browser on the computer.
3. Surf to the web page address **http://169.254.237.100/**
4. The measurement data can be read-out via this web page, as well as data for the further analysis of alarms.

READ-OUT VIA INTERNET (CXI)

1. Open any web browser on a device that has access to the internet.
2. Surf to the web site **http://cloud.resus.eu/** to open the Resus Cloud Dashboard, or go to the supplier-specific cloud application.
3. When using this for the first time, you must register as a user and add the corrosion monitors to the Resus Cloud Dashboard.
   A corrosion monitor can be added in two ways:
   a. Scan the QR code on the underside of the green logger with your smartphone (which is connected to the internet). You can then log in (or register if this has not already been done) on the website that opens up;
   b. Add the corrosion monitor manually by entering the serial number and activation code into the website. These can be found on the underside of the green logger.
4. The measurement data can be read-out via the website, as well as data for the further analysis of alarms.

READ-OUT VIA THE LoRa DATA TRANSMISSION NETWORK (CXL)
See read-out via internet (CXI).

■ 10 REPLACEMENT

The probe must be replaced if a fault occurs or when the probe tip has been used up.

PRESSURELESS REMOVAL OF THE FAULTY PROBE
In the absence of pressure, the old probe can simply be unscrewed, i.e. the reverse of screwing it in during the initial installation *(see Chapter 6, Installation)*.

The removal of the probe must be carried out with the necessary caution by a qualified person.

What should be done with the old probe? *see Chapter 11, Decommissioning*.

PRESSURELESS INSTALLATION OF A NEW PROBE
If the system is not under pressure (or at least the part where the probe is to be installed), the new probe can simply be screwed in, as described earlier during the initial installation *(see Chapter 6, Installation)*.

REPLACEMENT UNDER PRESSURE
If the system cannot be made pressureless, it is possible to replace the probe with the help of a retractor *(see Chapter 14, Accessories)*.

■ 11 DECOMMISSIONING

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The logger and the probe can be decommissioned at the end of their life cycle. *See Chapter 10, Replacement* for the dismantling instructions of the probe.

What should be done with the old logger and probe?
Preferably return the logger and probe to Resus.
(See below for the address details) Do not throw it away.

The removal of the probe must be carried out with the necessary caution by a qualified person.

■ 12 REMARKS

The corrosion monitor will stop measuring when the power supply cable is removed. The internal data will be retained. The measurements will simply continue when the power cable is reconnected. Measurements older than 7 days have no influence on the determination of the corrosion rate.

■ 13 TECHNICAL DATA

13.1 OUTPUTS, SIGNALS, ALARMS

Visual:
- Various LEDs for displaying the operational and alarm status

USB:
- Memory readout

Wired network:
- CXE: read-out via Ethernet (within LAN) by means of a web browser
- CXI: read-out via the Internet by means of a suitable cloud application. Go to www.resus.eu for technical network requirements.

Wireless network:
- CXI: read-out via the LoRa data transmission network and the Internet through a suitable cloud application

Volt-free contact for:
- Building management system, remote surveillance, other signal transmitter (SMS module, claxon, flash of light ...), shutting down of the boiler, ...

The alarm conditions are:
- Corrosion rate too high (adjustable)
- Fault in the corrosion monitor
- End of the service life of the metal coupon on the probe

13.2 CHARACTERISTICS

Physical:
- Pressure range: 0 to 6 bar
- Temperature range: 5 to 95 °C, integrated temperature compensation
- Environment: 0 to 45 °C, no condensation
- Storage: -20 to 60 °C

- Probe: PPS
- Logger: PC

- Coupon: Fe
- Threaded connector: brass CW614N
- See also dimensions

Electrical:
- Mains adaptor: CEE 7/16, 230 VAC, 50 Hz →5 VDC mini-USB
- Power consumption: 6 W
- Volt-free contact:
  - nominal 24 VDC/VAC, 100 mA
  - max. 48 VDC/VAC, 2 A, 60 W
- RJ45
- IP52

13.3 OTHERS

- Autonomy of the memory: 10+ years
- Data storage: every 7 hours

13.4 DIMENSIONS (NOMINAL)

• Logger:	101 mm * 104 mm * 31.5 mm
• Probe:	Ø20 mm * 135 mm
• Threaded connector:	Ø34 mm * 70 mm with R ½" screw thread (max. 25 mm deep!)
• Mains adaptor:	75 mm * 59 mm * 6 mm (power cord length 1.5 m)
• Carton packaging:	256 mm * 192 mm * 64 mm
• Total weight:	800 g

■ 14 ACCESSORIES

14.1 USB CABLE

A separate USB/mini-USB data cable is used for reading out the logger (available on the normal market).

14.2 RETRACTOR

The retractor is a specially designed tool to service any X-probe during normal operation without interruption.
For this use the special X3 retractor shaft coupling.
Refer to the Retractor manual.

14.3 RISYCOM

The Risycom is a portable device for the convenient copying of collected data on SD card (.CSV files).

14.4 RISYALERT

The Risyalert is a module that can be connected to the volt-free contact of a Risycor in the absence of a building management system. This module is pre-programmed with the conditions for an alarm.
- there have been more than 7 alarms in 7 weeks
- the alarm lasts longer than 7 days

■ 15 DECLARATION OF CONFORMITY

DECLARATION OF CONFORMITY

EN

Resus Industries NV
Kleine Monnikenwerve 9, 8000 Brugge, Belgium.

declares, that the product **Risycor CXE**
Risycor CXI

conforms to the following Product Specifications and Regulations:

EMC:

EN 55032:2012	Emission
EN 5516-2-3:2010 + A1:2010	Enclosure Power Port Radiated Emission
EN 55024:2010	Immunity; and according following basic standards
Enclosure Port	
EN 61000-4-2:2009	Electrostatic Discharge
EN 61000-4-3:2006 +A1:2008 +A2:2010	RF Immunity
EN55022	Conducted emission

Safety:
EN 60950-1:2006/A2:2013
EN 60950-1:2006/AC:2011

RoHS:
EN 50581:2012

The product herewith complies with the requirements of the Low Voltage Directive **2006/95/EC**, the EMC Directive **2004/108/EC**, the RoHS Directive **2011/65/EU** and carries the marking accordingly.

Risycor CXE and Risycor CXI are made in **BELGIUM**

Brugge,
21/12/2016

Yves Arys, Managing Director
Resus Industries NV

■ 16 STANDARDS AND DIRECTIVES

The following standards and directives are applicable to the subject of corrosion in heating and/or cooling installations (non exhaustive list).

Europe:
EN 14868: Bescherming van metalen tegen corrosie - Richtlijn voor de beoordeling van corrosiewaarschijnlijkheid in gesloten watercirculatiesystemen.
Publication date: October 2005
EN 12828+A1: Verwarmingssystemen in gebouwen - Ontwerp voor watervoerende verwarmingssystemen
Publication date: May 2014

Belgium:
WTCB: Gesloten watersystemen in gebouwen - aanbevelingen ter beperking van afzettingen en corrosie
Status at February 2017: under development

Germany:
VDI 2035 Blatt 2: Vermeidung von Schäden in Warmwasser-Heizungsanlagen - Wasserseitige Korrosion
Publication date: August 2009
Status at January 2017: revision in progress, merging pages 1 & 2

Netherlands:
ISSO publication 13: Aanbevelingen ter voorkoming van corrosie en ketelsteenvorming in watervoerende installaties
Publication date: March 1983 - will be replaced by a new publication in the form of "Voorkomen en verhelpen van corrosie en vervuiling in gesloten systemen - in ontwerp, aanleg en beheer"
Status at February 2017: under development

United Kingdom:
BS7593:2006 Code of practice for treatment of water in domestic hot water central heating systems
BS8552:2012 Sampling and monitoring of water from building services closed systems – Code of practice
BSRIA BG 50: Water treatment for closed heating and cooling systems
Date of publication: 2013

■ 17 CONTACT

ABOUT RESUS

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Resus develops, produces and sells corrosion monitors that will help protect your heating and cooling system and warn you in time against the particularly harmful effects of corrosion, scaling and deposit. The Resus corrosion monitors thereby ensure a much longer service life of your heating and cooling system, improved living comfort, fewer unwanted costs and significant savings on energy and raw materials.

If you would like to know more, or if you have questions or remarks, please contact Resus.

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www.resus.eu

EN

Enter the date of first use here: ____ /____ /____

Name of the installer: _____

Tel. no. of the installer: _____

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