



risycor[®]

X2 beta



MANUAL

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■ 1 LIST WITH ABBREVIATIONS

HVAC	Heating, Ventilation, Air-conditioning and Cooling
USB	Universal Serial Bus
LED	Light Emitting Diode
VDI	Verein Deutscher Ingenieure (German Engineers Association)
PC	Personal Computer
VAC	Volts Alternating Current
VDC	Volts Direct Current
(m)A	(Milli)amperes
mm	Millimetre
CE	European Conformity (in accordance with the European legislation)
EMC	Electromagnetic Compatibility
RoHS	Restriction of Hazardous Substances
Rc	Radius of Curvature
Hz	Hertz
W	Watt
RH	Relative Humidity

■ 2 SYMBOLS



Warning about bodily harm/injury

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

NOTE Tips for easier use



Risycor X2 Beta version with lifetime guarantee. Upon return of this beta-model you will receive the latest version of Risycor X free of charge.

■ 3 GENERAL DESCRIPTION

3.1 RISYCOR

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

Risycor therefore prevents unwanted problems, such as the breakdown of boilers and pumps, seized valves, leaks and blockages caused by poor water quality. The sensor thereby ensures a much longer service life for your heating system, higher living comfort, less unwanted costs and significant savings of energy and materials.

The sensor consists of two components: a probe and a logger. By means of the threaded connection, the probe is mounted sideways on the lead, with the tip in the water flow. The oxidation of the small piece of metal is representative for the uniform corrosion within the system. The sensor records the corrosion speed and warns when incorrect values appear or is defective.

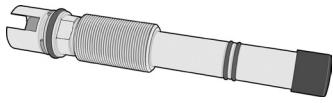
For more information about Risycor, go to www.resus.eu.

3.2 CORROSION IN WATER-BASED THERMAL SYSTEMS

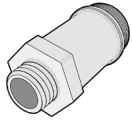
Also refer to www.resus.eu for a more detailed explanation about corrosion in hydronic systems.

■ 4 CONTENT OF THE PACKAGING

- Probe with protective cap



- Threaded connection



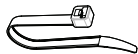
- Logger + Instructions for use



- Mains adapter



- 2x Tie wraps (colson strips)



- Manual
- Assembly guide

■ 5 APPLICATIONS

Risycor is a corrosion sensor for water-based thermal systems. From studies relating to corrosion processes in heating systems and guide-lines (of which the VDI 2035 could be considered as the most important), it can be demonstrated that corrosion is a rather complex phenomenon that is affected by many factors.

Experience shows that the presence of oxygen in the system water is the main cause of uniform corrosion in a system. Risycor is based on an innovative and patented technology that measures this uniform corrosion directly by means of a metal coupon.

The major causes of oxygen in the system water are the following: (see also the European standard EN14868)

- oxygen ingress due to under-pressure zones in the system, caused by inadequate pressure maintenance (expansion system);
- oxygen ingress due to diffusion through materials that are not oxygen-tight (synthetic pipes, rubber hoses, membranes of expansion tanks, etc.);
- oxygen in the extra filling water through 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!

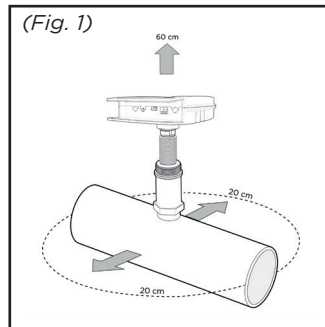
Certain chemicals or inhibitors change the behaviour of the system materials or of the system water, as a result of which the reaction is no longer uniform. The measurement of Risycor in systems that have been treated with chemicals or inhibitors must therefore be interpreted with caution. For more detailed information regarding the application of the sensor, we refer to www.resus.eu.

■ 6 INSTALLATION

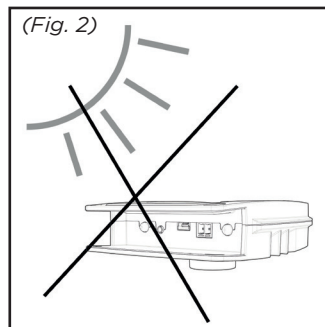
See also the document 'Application guide Risycor'

PREPARATION

1. The sensor is preferably installed in the return section of the system, at a location with adequate flow. The tip of the sensor must be placed properly in the flow. The installation location must be free of pressure during the initial installation.
2. Select a location with sufficient space around it in order to be able to use the Retractor to replace under pressure when necessary. (Fig. 1)



3. Avoid placing the sensor in extreme sunlight. (Fig. 2)



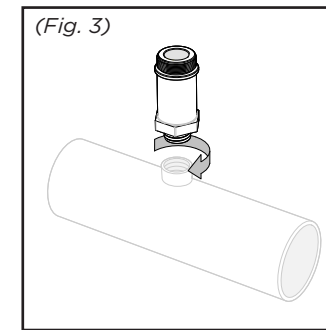
4. The sensor can be installed in different manners:
 - a. in an existing opening
 - b. in a T-piece: in this case, provide a T-piece with a "tapered thread" in the transverse leg (Rc 1/2), without internal strut or collar at the end of the internal thread. (Fig. 3)

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

- c. in a welding sleeve with a length of max. 25 mm (sensor tip must be well within the flow).

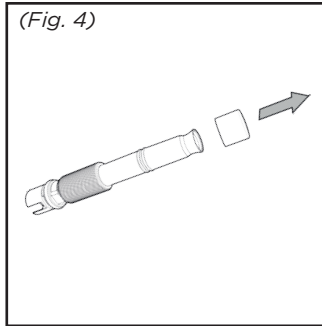
INSTALLATION

1. Screw the threaded connection tight and seal with a suitable sealant. (Fig. 3)



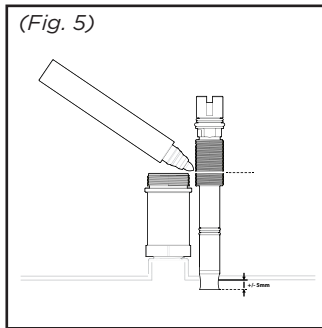
CAUTION! Hand-tighten this threaded connection loosely and then tighten another quarter turn using a wrench. The connection should not be forced. If tightened with too much force, the threaded connection could be narrowed due to radial compression, and this, in turn, could block the sensor tip in the fit that has now become too narrow, and cause irreparable damage.

2. Remove the protective cap from the probe. (Fig. 4)



CAUTION! The sensor tip should not be damaged.

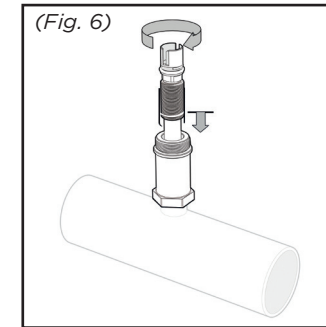
3. Measure the mounting depth as shown in Fig. 5. Mark this distance on the probe.



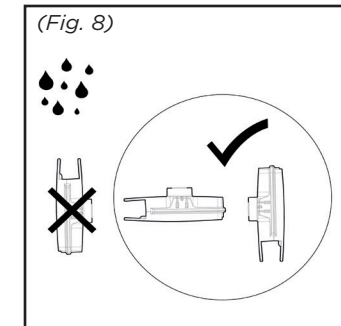
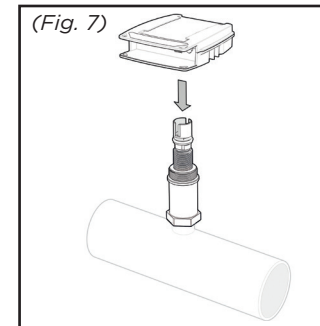
CAUTION! The sensor tip must be well within the flow.

4. Screw the probe into the threaded connection to the correct depth, as marked.

CAUTION! Do not use sealant (flax, Loctite, etc.). The O-rings seal off the probe sufficiently. (Fig. 6) The screw thread serves to ensure that the correct mounting depth for the sensor is reached. The screw thread must never be damaged. Do not scratch!



5. Click the logger firmly onto the probe (only one position is possible). (Fig. 7) Position the logger as shown in Fig. 8 to protect the connectors and control button from spray water.



CAUTION! Verify that the logger has been pushed far enough over the probe (O-ring of the probe should be fully inside the collar of the logger). Never use the logger to tighten the probe, however.

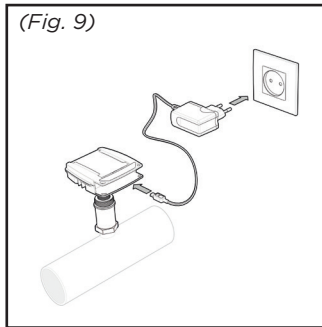
CAUTION! The USB connector between logger and probe is not suitable for reading using a USB cable.

■ 7 ACTIVATION

CAUTION! The activation of Risycor takes place as follows:

- in a new system: before the initial filling/rinsing with water;
- in an existing system: during assembly.

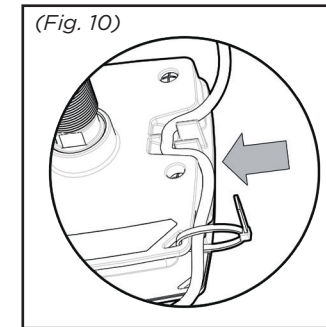
1. Plug the mains adapter in the nearest socket and connect the logger to the power supply. (Fig. 9)



NOTE: If not available, or if the power cable is too short, an extension cord can be used to connect the mains adapter to a socket further away, or to the power supply panel of the boiler. Do not use a USB extension cord.

When connecting the logger to the power supply, the LEDs will blink alternately red and green several times.

2. Secure the cable with the provided strain relief (labyrinth or tie wrap), and lay the cable in a loop to prevent dripping or splashing water from reaching the connector along the cable. (Fig. 10)



From now on, the sensor LED will blink green every 2 seconds. The corrosion LED lights green and will blink off every 8 seconds. From now on, the Risycor will run a measurement every 20 minutes and log it every 7 hours. Four days are sufficient to calculate an indicative value for the yearly corrosion rate, seven to generate an alarm if needed. (See also 9. Reading.)

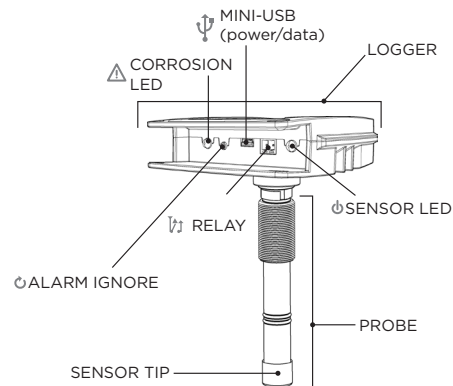
3. Enter the date of installation on page 40.
4. The integrated alarm relay can be connected to an external safety circuit through a green terminal connector (e.g. a building management system, an external alarm system or the safety circuit of the heat generator). The circuit is closed in case of normal operation of the Risycor and interrupted in case of an alarm, as well as when there is no power supply.

CAUTION! The relay with normally open contact is closed during the operation of the sensor. In the event of alarm, the relay interrupts the external safety circuit of max. 48 VAC/VDC. 2 A / 60 W. The relay is NOT suitable for 230 volt.

NOTE: If the safety circuit of the heat generator is connected and the mains power supply of Risycor fails (e.g. faulty cable, supply, fuse, etc.), the heating system stops operating. In this case, also the 'ALARM IGNORE' key does not work. This can be temporarily remedied by a bridge in the terminal connector. This causes only the relay to be seemingly closed, so that the boiler can operate again. The sensor still does not operate, however.

- Setting the limit value for the annual corrosion rate. The limit value is pre-set to 24 µm per year. This value can be adjusted by means of the Resus Dashboard software (see Chapter 9).

■ 8 OPERATION / USE



1. LED'S:

CORROSION LED	SENSOR LED	PROBLEM	ACTION	SOLUTION	RELAY
●	●				Closed
●	●	Corrosion speed too high		Identify and repair the cause	Open
○	●	Sensor problem		Contact technician, check error code	Open
●	●	Corrosion speed too high and sensor tip used up		Identify and repair the cause and replace probe	Open
●	●	Sensor tip used up		Replace probe	Open
○	○	Sensor not connected or faulty		Check power supply	Replace logger

(*)

(**)

(*) Problem with the central heating

(**) Sensorproblem

● or ●	SENSOR LED blinks 1x per 2 sec on CORROSION LED blinks 1x per 8 sec off
○	LED does not blink
●● or ●●	'alarm ignore' button has been pushed SENSOR LED blinks 2x per 2 sec on CORROSION LED blinks 1x per 4 sec off

- The **'ALARM IGNORE' button** deactivates the alarm for 3 days.
- The **'MINI-USB' output** has two functions:
 - standard: connecting the logger with the mains by means of a USB mains adapter;
 - exception: downloading the measuring data (see Chapter 9) using a USB/mini-USB data cable (see Chapter 14).
This should be carried out by the service technician/installer.

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■ 9 READING

- The measuring data can be read out sporadically, at the earliest 7 days after startup (see also 7.2 Activation).

CAUTION! This should be carried out by the service technician/installer.

- Install the Resus Dashboard software using www.resus.eu and save the electronic manual.
- Disconnect the power supply from the logger and connect the mini-USB connector with a PC or the Risycom reader using a separate (standard) USB/mini-USB data cable (see Chapter 14).
- The measurement data can be read, as well as the data for the further analysis of alarms.
In case of connection with a PC: follow the instructions in the Resus Dashboard manual.
In case of connection with Risycom: push on the button "download", wait until the LED on the Risycom indicates that the connection can be disconnected. The SD memory card now includes all data, which can be further analysed in a PC using the Resus Dashboard software.
- Don't forget to plug the power cable back again into the logger.

■ 10 REPLACEMENT

If a fault occurs, or when the sensor tip has been used, the probe must be replaced.

PRESSURELESS DISMOUNTING OF THE OLD PROBE

In the absence of pressure, the old probe can simply be unscrewed, i.e. the reverse of screwing it in during the initial assembly (see *chapter 6, Installation*).



The replacement 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*.

PRESSURELESS INSTALLATION OF A NEW PROBE

If the system is not under pressure (or at least the part where the probe is installed), the new probe can simply be screwed in as described earlier for the initial assembly (see *Chapter 6, Installation*).

REPLACEMENT UNDER PRESSURE

If the system cannot be made free of pressure, it is possible to replace the probe by using a Retractor (see *Chapter 14*).

■ 11 DISMANTLING

At the end of the service life, the logger and probe can be taken out of service. See *Chapter 10* for the dismantling of the probe.

What should be done with the old logger and probe?

Please return logger and probe to Resus (address information can be found at the back). Do not throw this away.



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

■ 12 REMARK

Risycor will stop measuring when the power supply cable is removed. The internal data will be retained. When the power cable is reconnected, the measurements simply continue.

■ 13 TECHNICAL DATA

13.1 FUNCTIONAL

- Sensor for continuous monitoring and signaling if there is a risk of excessive corrosion
- Measurement frequency: every twenty minutes
- Autonomy of the memory: ten years
- Output signal:
 - visual: LED - see *8.1 LEDs*
 - USB port- see *9 READING*
 - Relay: alarm in case of - see *7.4*
- Integrated temperature compensation

13.2 MAINS ADAPTER

- Mains voltage: 90...264 VAC
- Mains frequency: 47...63 Hz
- Maximum power: 6 W
- Efficiency: 71%
- Double insulation, short-circuit proof
- Mini-USB plug
- Output voltage: 5 VDC
- Maximum output current: 1.2 A
- Temperature:
 - Operating temperature: -5 °C...+45 °C
 - Storage temperature: -20 °C...+70 °C

13.3 SENSOR (LOGGER AND PROBE)

- Power supply voltage: 5 VDC (mini-USB)
- Power consumption:
Average consumption: 29 mA (including relay)
Peak consumption (during measurements): 78 mA (including relay)
- Relay output to break an external circuit,
nominal 24 VDC/VAC, 100 mA (max. 48 VDC/VAC, 2A, 60W)
- Probe pressure scope: 0-6 bar
- Probe temperature scope:
Measuring range: 5 °C...+85 °C
Operating range: 15 °C...+95 °C
- Probe storage temperature: 0 °C...+35 °C
- Probe air humidity: 20...90% RH, without condensation

13.4 DIMENSIONS / WEIGHT

SENSOR:

- logger: 90 mm * 100 mm * 35 mm
- probe: Ø20 mm * 135 mm
- threaded connection: Ø34 mm * 70 mm with Rc 1/2" screw thread
- mains adapter: 75 mm * 59 mm * 26 mm (power cord length 1.5 m)

PACKAGING:

- dimensions: 235 mm * 195 mm * 70 mm

TOTAL WEIGHT:

- 680 g

■ 14 ACCESSORIES

14.1 USB CABLE

A standard data cable USB/mini-USB is used to read the logger (commercially available).

14.2 RETRACTOR

The Retractor is used to replace the probe under pressure. See *the Retractor manual*.

■ 15 CONTACT

ABOUT RESUS

Resus develops, manufactures and sells sensors that will help protect your heating system and warn you in time against the particularly harmful effects of corrosion, scaling and deposit. Resus sensors there-by ensure a much longer service life of your heating system, higher living comfort, less unwanted costs and significant savings of energy and materials.

Please contact Resus if you would like to know more, or if you have any questions or comments.

Resus nv

Bredabaan 839
B-2170 Merksem (Antwerp)
Belgium

T +32 3 640 33 91
F +32 3 640 33 93

info@resus.eu
www.resus.eu

DECLARATION OF CONFORMITY



Resus NV

Bredabaan 839, 2170 Merksem, Belgium.

&



Resus Industries NV

Kleine Monnikenwerve 9, 8000 Brugge, Belgium.

declares, that the product **Risycor X2**

conforms to the following Product Specifications and Regulations:

EMC:

EN 55022:2010	Radiated Emission, Conducted Emission
EN 61000-3-2:2006 + A1:2009 + A2:2009	Harmonic Current Emissions
EN 61000-3-3:2008	Voltage Changes, fluctuations and Flicker

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
EN 61000-4-8:2010	Power Frequency Magnetic Field

EN 61000-4-4:2004 + A1:2010	Electrical Fast Transients
EN 61000-4-5:2006	Surges
EN 61000-4-6:2009	RF Common mode
EN 61000-4-11:2004	Voltage Dips
	Voltage Interruptions

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 X2 is made in **BELGIUM**

Merksem,
01/04/2014

Karl Willemen, Managing Director
Resus NV

Yves Arys, Managing Director
Resus Industries NV

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

Name of the installer: _____

Tel. no. of the installer: _____



Risycor X2 Beta version with lifetime guarantee.
Upon return of this beta-model you will receive the
latest version of Risycor X free of charge.

**If a problem occurs,
please contact Resus.**

Resus nv
Bredabaan 839
B-2170 Merksem (Antwerp)
T +32 3 640 33 91
F +32 3 640 33 93
Belgium
info@resus.eu
www.resus.eu