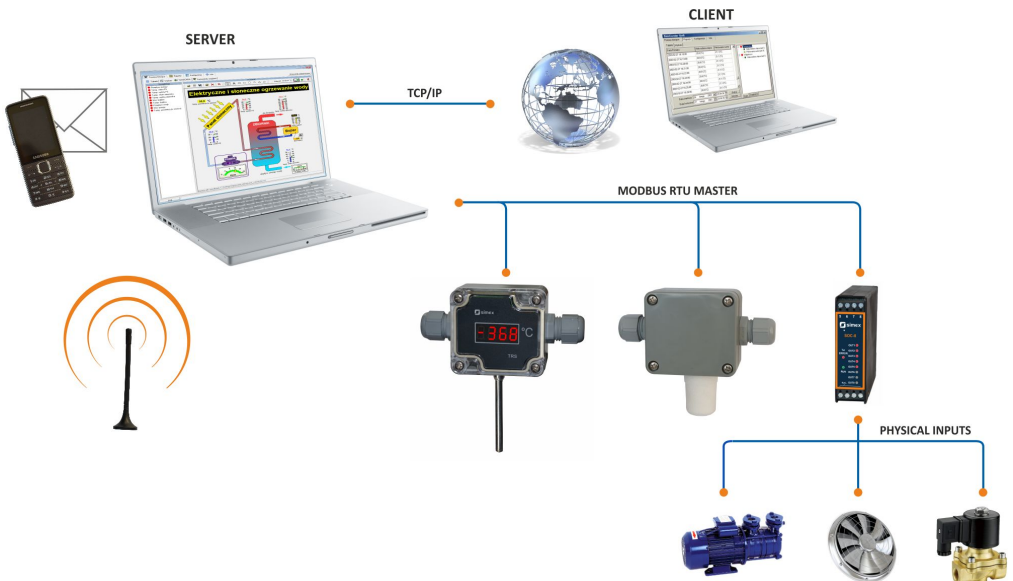


User manual

TEMPERATURE AND HUMIDITY RECORDING SYSTEM

TRS

- Installation and configuration manual



Read the user's manual carefully before starting to use the unit or software.
Producer reserves the right to implement changes without prior notice.

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Explanation of symbols used in the manual:



- This symbol denotes especially important guidelines concerning the installation and operation of the system. Not complying with the guidelines denoted by this symbol may cause an accident, damage or equipment destruction.

IF THE DEVICE IS NOT USED ACCORDING TO THE MANUAL THE USER IS RESPONSIBLE FOR POSSIBLE DAMAGES.



- This symbol denotes especially important characteristics of the system installation. Read any information regarding this symbol carefully

Content of CD-ROM included to configuration set:

- **SimCorder Soft** installer,
- *readme.txt* file with info about software installation,
- user manuals in pdf format.

1. INSTALLATION AND USING GUIDELINES



Power supply must be switched off, while any assembly works

- Typical application has been calculated for about 30 measurement modules, mounted in equal distances to each other, without LED displays - total length of wires about 200m, with cross-sec. 0,75 mm² (e.g. LIYCY-TP 2 x 2 x 0,75).
- **Maximal count of modules depend on total wires length** - before connection, individual current consumption, and voltage drops should be analysed. Minimal supply voltage of sensor is 9V, for modules made before 09.07.2002, and 7V for presently produced modules. If supply voltage is lower than mentioned thresholds additional power supply should be added to the net. While data transmission via Modbus net, modules consumes additional current (about. 50 mA), which causes by higher voltage drop on wires (these drops can causes by transmission errors), so measurement of voltages while modules are in standby mode can be insufficient to verify propriety of supply. To check supply voltages, additional load (about 50÷60mA) to the end of line (the farthest point from power supply) should be added.

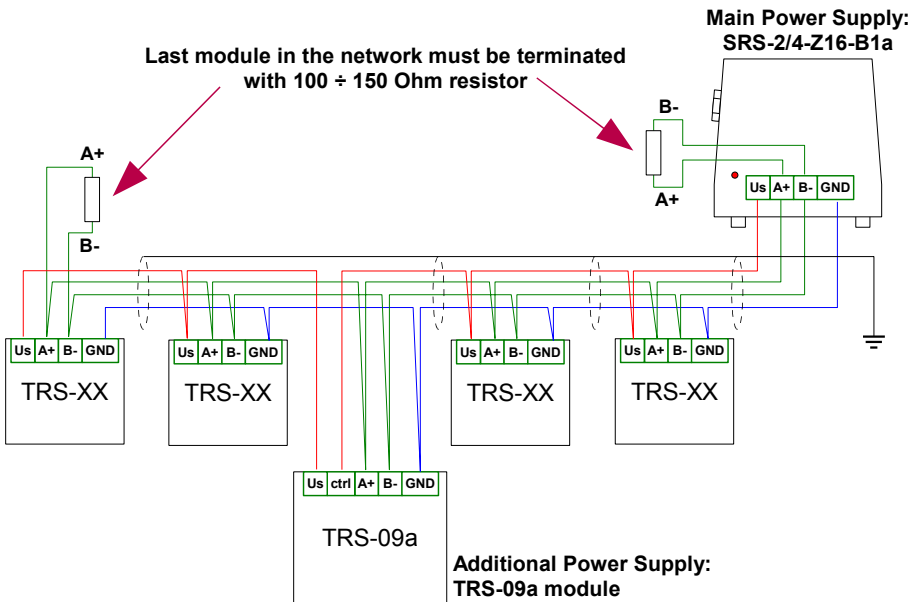


Figure 1.1. Connection of additional power supply.

- Connections should be made with, shielded 2 pairs cable (2 x 2 x 0,75 mm²) necessarily with circular cross section. For small network (few modules and short connections) wires with cross-sec. 0,5 mm² can be used, but special attention must be taken to higher drops of supply voltage.
- All connections inside covers should be made carefully. Supply and communication wires should make a pairs (one pair for supply, and another for communication). Protected shield should be connected to each other using additional terminal block (not included). Because of small dimensions of module, shield should be insulated carefully. Connections of all wires (and shield) must warrant proper electrical contact. Special attention should be taken to short cuts created by thin wires protrude out of connectors.
- RS 485 transmission line can not be branched, and its total length should be smaller than 1 km. If it is necessary to build longer network line amplifiers (repeaters), and additional power supplies should be used.
- Cover of each module must be installed carefully. Glands and screws should be screwed evenly, to get proper tightness. Wires can not be curved directly beside glands, because it can causes by leakage. Cables outgoing of glands should be mounted horizontally, if they are mounted vertically (from above to down), a loop should be formed to avoid of contended vapour. Only one cable can outgoing from one gland. Diameter of cable should not be to small, to warrant proper tightness. If seal of cables is ineffective, gland should be sealed with sealant (e.g. silicone).

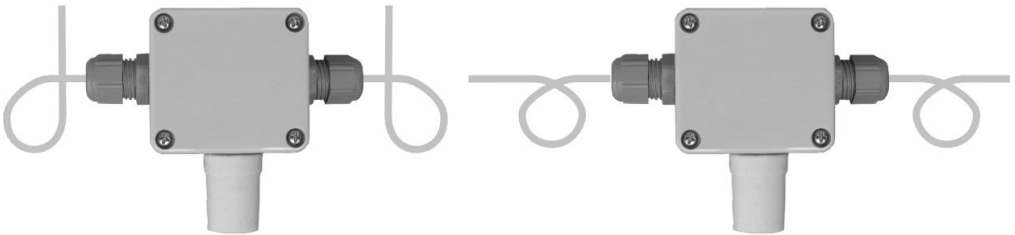


Figure 1.2. Proper mounting of cables in glands

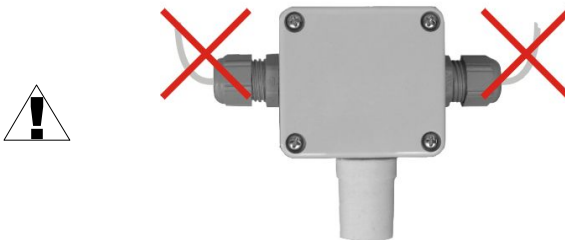


Figure 1.3. Improper mounting of cables in glands

- Case of module has protection level IP65. Heavy projections of pressured water (similar to heavy waves) to modules are not allowed (e.g. while cleaning of room).
- Cables connected to the TRS system should not be installed near of power transmission lines (powered motors and other heavy loads of inductive character).
- **High** temperature and humidity differenced can appear in every room depend on measurement place. Every door opening, movement, turning on/off of machinery and air-conditioning can cause by changes of local humidity and temperature. In most unfavourable conditions (e.g. opening of refrigeration plant doors, delivery of vaporize products, cleaning of room) condensation of vapour on the sensor can appear. Due to mentioned problems modules must be mounted in place, where it will be not exposed to risk of vapour condensation, specially with continuous or long term character.

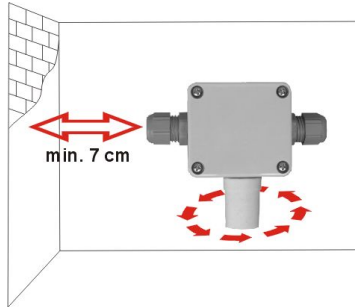


- **Avoid of** module installation near doors, windows (especially in rooms with higher temperature), air conditioners, ventilation, or assembly line where people work, machinery emitted vapours or high temperature, or needed periodic cleaning. Modules must not be mounted in direct sunlight, or artificial light sources (bulbs, burners). To protect of installation changes (and it's costs), it is recommended to plan all places where sensors will be installed due to experiments made with portable temperature and humidity sensor.



- It can happen, that it is impossible to find place without vapour condensation. This situation can take place specially in refrigeration chambers connected with warmer rooms by air curtains, airlocks. Special means should be taken to avoid of vapour condensation (e.g. cover the sensors of direct air and vapour flow) or assume high variations of measurements.

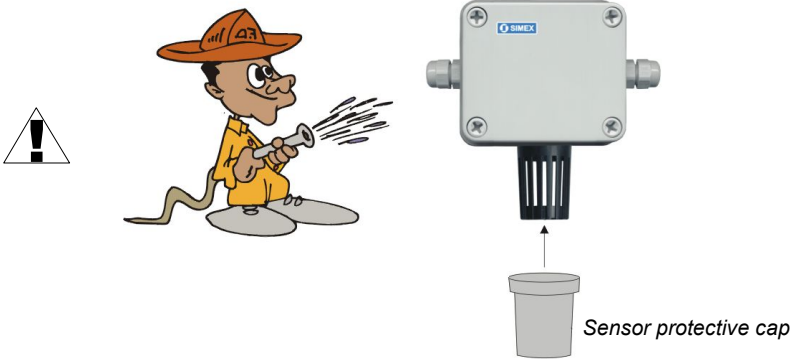
- It is very important, to install measurement modules in place allowing free air flow around of sensors (best if flow is not stimulated mechanically). If module is mounted on absorbent or wet walls distance from sensor to wall should be higher than 7 cm. Remember, that stagnant air is perfect thermal insulator, so it can make significant differences between near placed sensors. To avoid of these situations, mechanically stimulated (but soft) air flow is recommended. Modules should be mounted in that way to direct sensors down.



- Strong air pollution, aggressive chemicals and often vapour condensation flow to humidity sensors' working life. In that cases it is recommended to use porous filters, made of Teflon (Polytetrafluorethylen, PTFE) – these filters are standard equipment of presently produced modules. The filter protect sensor of dust, water and other substances, extend working life of sensor and avoid it of temporal vapour condensation (e.g. caused by opened door of refrigeration chamber).
- Direct contact of module with aggressive chemicals (contain chlorine, ammonia, etc.) can cause permanent damage of sensor. If damage is caused by aggressive chemicals warranty became not valid.



- While periodical cleaning of rooms, assembly lines etc. sensors should be protected with protective rubber cap, to avoid sensor of pressurized water (it is recommended to units with protective basket made of ABS). Protective caps are available as additional accessories.



1.1. PERIODICAL CHECKING OF SENSORS

User of the modules should take notice to necessarily of periodical checking (testing) of modules' measurement correctness. Frequency of tests depends on environment conditions of the modules:

- If modules works in dry rooms, stores with soft working environment, without dust, the humidity sensors should measure correctly at least 24 months, and should be checked after that time.
- If modules works in soft environment, but from time to time vapours can condensate on the sensors (e.g. while periodical cleaning of machinery) then humidity sensors should measure correctly at least 18 months, and should be checked after that time.
- If humidity of air in the room (chamber) is often over 90%, and module works continuously in these conditions then first testing should be done after 6 months since installation, and next tests every 12 months.

If modules work in hard environment, with high density of vapours and dust, or haze of aggressive substances, testing should be done every 6 months. Additional protective Teflon filters should be changed before testing, and measurements should be done after its replacement.



Testing, conservation, and calibration are normal exploitation activities, and they are not included to guarantee. Producer can made testing, conservation or calibration for a fee, on special order of customer.

1.1.1. Conditions of testing.



Important ! Testing should be done while constant temperature and humidity. Stable air flow (about 0.5 ÷ 2 m/s) should be kept while tests.

Measurement should go on at least 15 minutes (assuming that, vapour condensation on humidity sensor has not occurred directly before measurement).

Warning:

Vapour condensation can occur while the sensor is moved from cold to warmer room. While measurement standardized sensor must be placed as near as possible, to tested sensor. **No one** of the sensors can be held in hand, while measurement.

1.2. CONDITIONS OF CORRECT MEASUREMENTS

- To obtain correct measurement of relative humidity it is essential to, sensor get the same temperature as its ambient air. Unfortunately, even if difference of temperature is small (i.e. 1°C, @ 20°C and 50% RH in room), then difference of indicated humidity is about 2.5%. Effective equalizing of sensor and ambient temperatures can be made using fans. It is recommended to use fans in rooms and chambers, but air flow should be not greater than 2m/s
- While measurement of temperature and relative humidity in room, make sure that measured parameter is stable. If changes are small (few degrees of temperature, teen % RH per hour) and continuous air movement (about 0.5 - 2 m/s) stabilisation of measurement is obtained after few minutes. If changes of temperature or RH are bigger than mentioned above, or without air movement, stabilisation of measurement result can take up to 30 minutes.
- If vapour condensation occurs on the sensor, time necessary to correct measurement increases significantly. Measured value approach real value just after equalizing of sensor and ambient temperature, and evaporation of water from sensor. If real RH is high then vaporization of water from sensor can take up to few hours.
- Even if measurement has been done correctly, obtained information can inform user what is local temperature and relative humidity. In huge chambers, rooms, stores differences of temperatures and RH in different point can be significant, (few degrees, and teen %RH). In such cases it is recommended to use few standard sensors to obtain more detailed informations about arrangement of temperatures and RH.

2. GENERAL CHARACTERISTICS OF THE SYSTEM

Temperature and Humidity Recording System - **TRS** together with **SimCorder Soft** is complete PC based measurement system. Its main purpose is acquisition and recording of information of temperature and relative humidity. System can be used in refrigerator plants, cold storage, workshops, etc.

Main elements of the system: measurement modules, indication modules, signalling modules, data transmission cable, data converter, data buffer and recording software.

Data transmission and supply voltage are guaranteed by 4-wires, shielded transmission cable, which connects all system devices to the PC.

3. INSTALLATION OF TRS SYSTEM

TRS system is easy to installation, we took pains to customer could make it himself.

3.1. INSTALLATION GUIDELINES

Allowed materials for trunking

- stainless steel (recommended)
- PVC (white)

Kinds of trunking

- pipes (distanced from the wall at least 25mm), smooth fasteners
- closed profiles (squared, rectangular) – roofing is required (angle 45 grades)

Sensors location

- height 2 m, not closer than 1 m from ceiling
- if it is possible, in the middle of the walls, do not install it in the corner
- do not install sensors near to doors, windows, fans E.T.C.



- Relative humidity sensors, should be used in the rooms where temperatures are always positive.
- Relative humidity sensors, mus not be cleaned with pressured water and other pressured substances
- Be careful while screwing of sensor cap and glands, proper tightness must be preserved

3.1.1. TRS system connection circuit

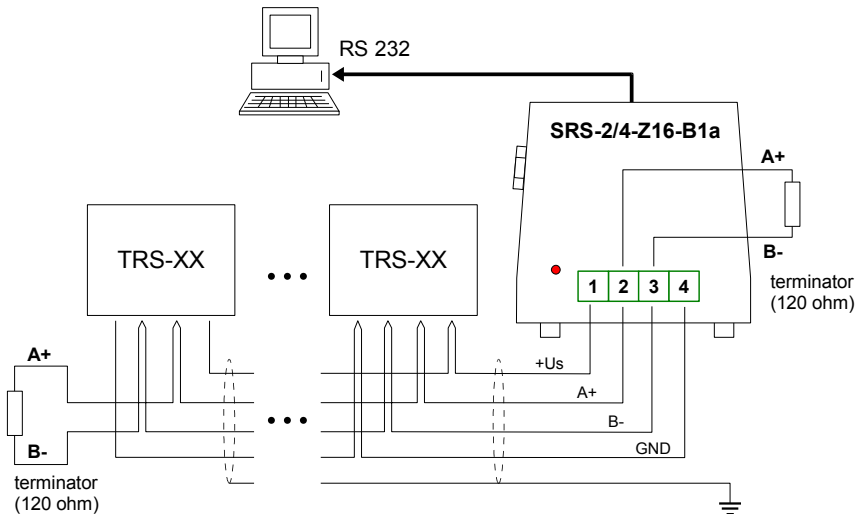


Figure 3.1. Connection diagram of TRS system network

3.1.2. Connection of power supply / data converter SRS-2/4-Z16-B1

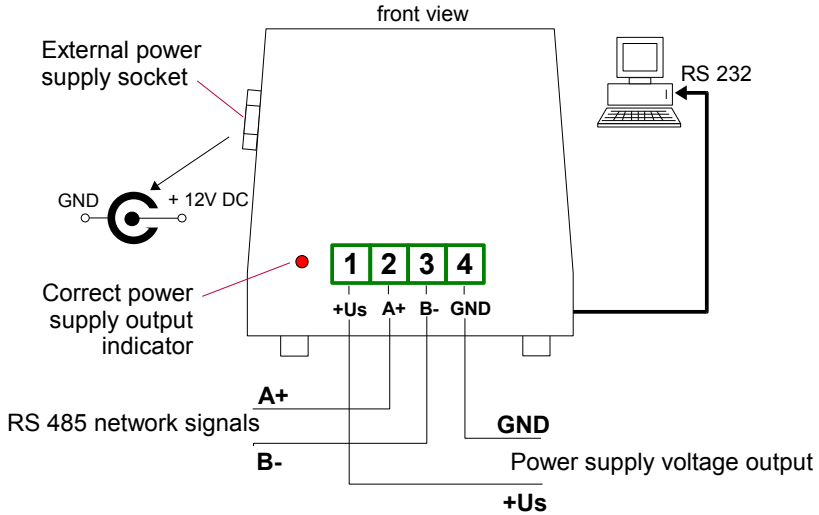


Figure 3.2. Connection diagram of data converter

3.1.3. Relative humidity and temperature sensors connection circuit

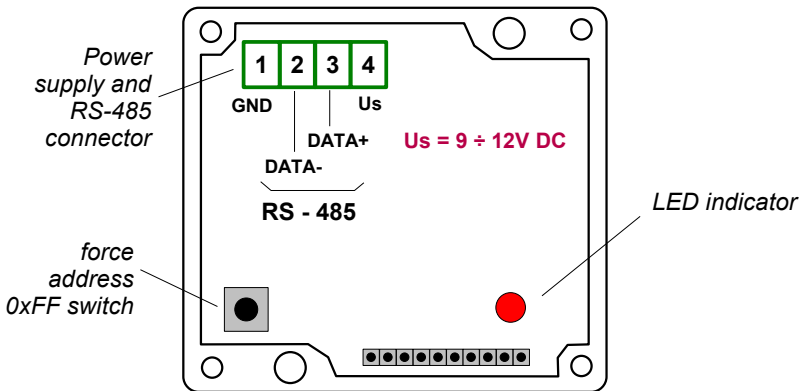


Figure 3.3. Connection of humidity or / and temperature transducer

Description of sensors connections

- to connect measurement modules (sensors), 4 wires, paired and shielded cable should be used, (i.e. Technokabel LIYCY-P 2 x 2 x 0.5),
- all modules must be connected parallel to each other
- last module must be equipped with termination resistor (100 ÷ 150 Ohm). Terminal resistor is included to the kit.
- data converter has no internal termination resistor, so it must be equipped with termination resistor too.
- Cases of measurement modules are being installed to the walls, using two screws
- power supply/ data converter type **SRS-2/4-Z16-B1** should be installed as close to the host computer as possible. RS 485 network must not be branched, and no longer than 1 km.
- at the most 127 modules (including data converter) can be connected to the network.



Detailed description concerning the **TRS** system installation, in chapter: **INSTALLATION AND USING GUIDELINES** at page 3.

3.2. INSTALLATION STEP BY STEP

1. First, cable should be installed in all rooms where temperature and humidity will be measured. Keep recommendations on page 9.
2. Next, measurement modules shall be installed on the walls (holders). Keep recommendations on page 9.
3. After that, connect wires to the block terminals in the modules. All terminals marked **A+** should be connected to each other, and terminals marked **B-** to each other – accordingly to schematics on page 10



In last module on the line, between terminals **A+** and **B-** should be connected via termination resistor (100÷150 Ohm). This resistor is included to the kit.

4. Another end of network, should be connected to data converter (terminals RS 485) due to schema showed on page 10.
5. Next, connect data converter to the PC serial port (remember port name: com1, com2 etc.)



Modern computers has markers (names) placed near of serial ports, older models often has got DB9 socket for com1, and DB25 socket for com2. If mouse is connected to DB9 socket (com1), then DB-25 (com2) can be used with special interface (offered by SIMEX).

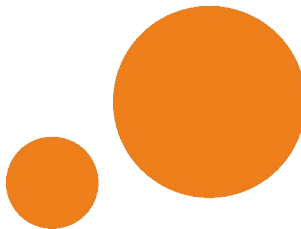
6. Connect data converter to external power supply adaptor.
7. Install **SimCorder Soft** from included CD. **SimCorder Soft** is designed to Windows operating system (Windows 95 or newer).
8. Please read the User's Manual of **SimCorder Soft**.



*designed for
Windows*

System requirements:

At least i486 computer,
Windows® 95 or newer,
Colour monitor with minimum resolution of 640 x 480,
20 MB of free hard drive space.



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