COMMUNICATION MODULE

SCMI-01

SINCLAIR
AIR CONDITIONING

Translation of original user´s manual

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SCMI-01 CONTROL MODULE
DESCRIPTION AND INSTRUCTION MANUAL

1. INTRODUCTION

The SCMI-01 control module is designed for controlling ASGE–xxAIN WK and ASGE-xxAIN-3 WK outdoor inverter units with R410 refrigerant. This module can operate in the autonomous pressure (evaporation temperature) control mode, autonomous temperature control mode for cooling or heating, or as a slave unit. In the slave mode, the module serves as a converter between the control system and outdoor unit; it controls the outdoor unit compressor performance via a serial line according to voltage 0-10V from an external control system. The control module is placed in a standard box for mounting on DIN rail. The front panel has LCD with 2x8 characters and four LED indicators. The green LED indicates the power-up state and three yellow LEDs indicate switching of the module relays. Setting up the module and downloading the stored data is done using four control buttons and a USB connector. The module is powered by AC voltage of 230V/50Hz. To control the outdoor unit, the control module is equipped with 9600bps serial communication channel complemented with power supply circuits to power the outdoor unit communication circuits. To control the other devices, the module contains three relays with a selectable features and a 230V/2A NO (normally-open) contact. In addition, this module has two digital TTL inputs, one voltage input 0-10V/100kΩ, one current input 4-20mA and two inputs for 10kΩ resistance thermometers (ß=3435).
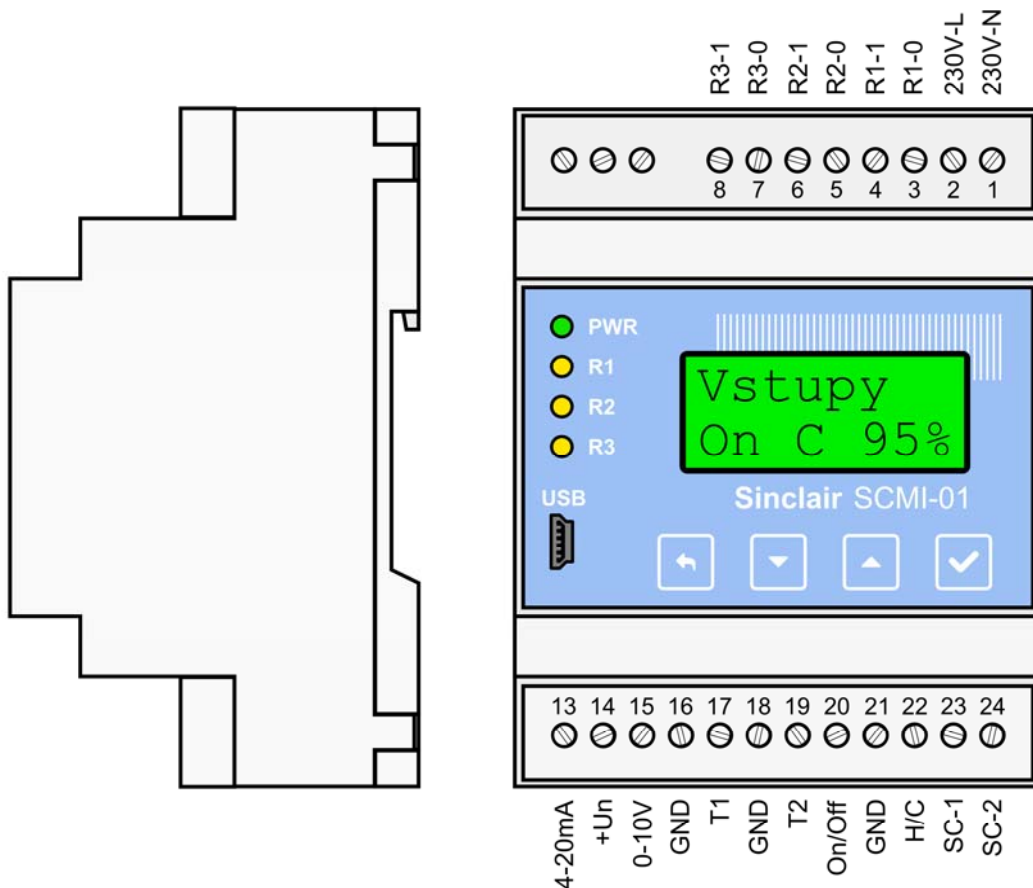

Fig. 1. SCMI-01 control module

2. SAFETY INSTRUCTIONS

WARNING

⚠️ **Please read this manual carefully before installing this device!**

- This manual is a part of the product and must be kept near the device to be available to easily obtain the information.
- This device is not intended to use for other purposes than those described below.
- Before starting operation, check the range of operating conditions of a given installation.
- The SCMI-01 control module may be installed only by a company that has the relevant qualification and is authorized by the manufacturer.
- This device is designed for mounting on DIN rail in a dry and dust-free environment. Do not allow the water to get into the electrical components; there is a risk of electric shock or damage to the unit.
- Do not allow persons without the necessary qualification, and especially children, to manipulate the device.
- Cleaning and maintenance may only be performed by persons with the necessary qualification. Otherwise, it may result in personal injury or property damage. Do not dismantle nor repair the device.
- Unplug the device from the power supply before cleaning or maintenance. Otherwise, it may cause an electric shock.
- Do not touch the device with wet hands, do not operate it in a wet environment and do not wash it with water. Risk of electric shock.
- Damaged power cables must be replaced by the manufacturer, authorized service center or appropriately qualified person.
- Do not repair the device yourself. Otherwise, it may cause an electric shock or damage to the device. Contact your dealer, if you need to repair the device.
- Immediately turn off the device and unplug it from the power supply, if any of the conditions listed below occurs. Then ask your dealer or an authorized service center for repair. If you let the device running under these conditions, this may cause a malfunction, electric shock or fire.
  - The power cord overheats or it is damaged.
  - An abnormal noise during operation.
  - An upstream breaker repeatedly trips.
  - The device smells like something is burning.
- Ensure that the wires for sensors, load and power supply are led separately and far enough from each other, without crossing or parallel leading.

3. TERMINALS AND WIRING THE UNITS

The SCMI-01 control module is equipped with 20 screw terminals to connect an external circuits. On one side of the module, there are terminals for supply voltage 230V/50Hz and terminals for NO contacts of output relays R1 to R3. Terminals on the other side of the module allow you to connect a current output 4-20mA from a relative pressure sensor 0-18bar, output 0-10V from an external performance control, two 10kΩ resistance thermometers with coefficient ß=3435, two digital TTL inputs and two wires of serial communication line for controlling an outdoor unit. To connect external signals from temperature sensors, pressure sensors, control voltage of 0-10V, **ON/OFF** control and **H/C** control, ordinary wires with cross-section of 0.35-1.5mm² can be used. To connect the outdoor units (SC1 & SC2 signals), wires with cross section of 0.75-1.5mm² are needed.

Connecting wires length is not critical. Regarding the thermometers, the temperature measurement error due to wire resistance is 0.1°C, if wire cross-section is 0,35mm² and length is 130m; at wire cross-section 1,0mm² it is 370 meters. The maximum distance between the control unit and outdoor unit with respect to the minimum number of errors in the transmission of commands is about 50m, when using the communication rate 9600bps and wire cross section 0,75mm². To connect the supply voltage of 230V/50Hz and relay outputs, it is necessary to use wires (cables) rated for 230V/50Hz with cross-section of 0.5-1.5mm². **For 1-phase outdoor units, the terminals SC-1 and SC-2 of the module must be connected to the terminals 1 and 2 of the outdoor unit, respectively. For 3-phase outdoor units, the terminals are interchanged, so to work properly, the terminals SC-1 and SC-2 of the module must be connected to the terminals 2 and 1 of the outdoor unit, respectively.**

No.	Label	Signal type	Description
1	230V-N	Input 230V N	Input of the mains supply voltage – phase wire
2	230V-L	Input 230V L	Input of the mains supply voltage – neutral wire
3	R1-0	Relay output	R1 relay NO contact 230V/2A
4	R1-1	Relay output	R1 relay NO contact 230V/2A
5	R2-0	Relay output	R2 relay NO contact 230V/2A
6	R2-1	Relay output	R2 relay NO contact 230V/2A
7	R3-0	Relay output	R3 relay NO contact 230V/2A
8	R3-1	Relay output	R3 relay NO contact 230V/2A
10	-	NC	Not used
11	-	NC	Not used
12	-	NC	Not used
13	4-20mA	Current input	Current input 4-20mA for a pressure sensor
14	+Un	Sensor power supply	Output +(18 to 24)V to power a pressure sensor
15	0-10V	Voltage input	Voltage input 0-10V for an external control voltage
16	GND	GND	Common terminal for an external control voltage
17	T1	Resistance input	Resistance input for T1 temperature sensor (10kΩ, ß=3435)
18	GND	GND	Common terminal for T1&T2 temperature sensors
19	T2	Resistance input	Resistance input for T2 temperature sensor (10kΩ, ß=3435)
20	On/Off	Digital input	Digital input for On/Off signal
21	GND	GND	Common terminal for digital inputs
22	H/C	Digital input	Digital input for Heating/Cooling signal
23	SC-1	Communication signal	Output of serial communication line to control an outdoor unit
24	SC-2	Communication signal	Output of serial communication line to control an outdoor unit

Recommended accessories:
1) Carel NTC015WF00 temperature sensors (NTC type, IP67, 1.5m cable), 2pcs
2) Alco Controls PT5-18M pressure sensor + cable PT4-M15 (1.5m)

The control module is equipped with four buttons to control and set the module. Press these buttons to access and use the module menus. These menus contain a number of items (or submenus). You can select or set the menu items using the ▼/▲ keys. Use the **ENTER** key to confirm the selected menu item or use the **ESC** key to exit the current menu and return one level back. Press this key repeatedly to get to the default screen of the module.

← - ESC key to exit the setting without any change, or exit the menu.

▼ - Down arrow key to decrease the value or move down in the menu.

▲ - Up arrow key to increase the value or move up in the menu.

✓ - ENTER key to confirm the value, or shift to the right

Fig. 2. Keys of the SCMI-01 module

4. SETTING THE MODULE

The SCMI-01 control module can operate in the autonomous pressure (evaporation temperature) control mode, autonomous temperature control mode for cooling, autonomous temperature control mode for heating (simple heat pump) or in the slave mode. After powering on, the module is initialized and then the display shows the default screen. For example, if the module is in the slave mode and the outdoor unit compressor is stopped, the display shows:

```
    Inputs

    Off 0%
```

When the compressor is running in the Cooling mode, the display shows:

```
    Inputs

    On C xx%
```

Character **C** indicates **Cooling** mode and **xx** represents the desired compressor performance in percent. After switching to **Heating** mode (using the **H/C** input), there is character **H** instead of **C**.

In other modes, this screen is omitted and **T1** and **T2** temperatures, which are measured by the resistance thermometers of the module, will appear first. The T1 sensor detects the temperature of the indoor unit heat exchanger, while the T2 sensor detects the temperature of the indoor unit supply air.

```
   T1 xx.x°C

   T2 xx.x°C
```

After the next press of the ▼ key:

```
    P x.xx b

```

```
       T xx.x°C

```

The first line shows the pressure (in bars), which is measured by the SCMI-01 module, and the second line shows the corresponding calculated evaporation temperature for the specific refrigerant type. Pressure and the calculated evaporation temperature are displayed and used for control only in the autonomous pressure (evaporation temperature) control mode. For the other modes, if the pressure sensor is connected, the pressure and the evaporation temperature are also displayed, but these values are for information only, they are not used to control. After the next press of the ▼ key:

```
     Cset xx%

     Cact xx%
```

The **xx** represents the set (**Cset**) and current (**Cact**) compressor performance in %. After next press of the ▼ key, the current speed **Fact** of the evaporator fan and the current position **ExV** of the expansion valve are displayed.

```
     Fact xxx

     ExV   xxx
```

After the next press of the ▼ key:

```
     CurrMode

     Stop<
```

Character **<** indicates the current operation (**Stop**, **Cool**, **Heat**, **Wait**).

If any error of the outdoor unit is detected, the current error code is displayed in last position of the main menu of the control module.

```
     Error

     AABBCCDD
```

The **AABBCCDD** represents the four two-digit hexadecimal numbers. Each number can take values 00, 01, 02, 04, 08, 10, 20, 40 or 80, if one error occurs. If multiple errors occur at the same time, .the displayed value corresponds to the sum of the hexadecimal values of the individual errors. This means that single digit can take a hexadecimal value of 0 to F (i.e. 0-9 and A, B, C, D, E and F). List of errors displayed by SCMI-01 module is given in Chapter 5 on page 19.

Important Cautions:
The actual performance of the compressor (**Cact**), the current fan speed (**Fact**), the current position of the expansion valve (**ExV**) and errors are detected by the outdoor unit and transmitted to the SCMI-01 control module SCMI-01 via the communication line.

When controlling the outdoor unit performance, the SCMI-01 module determines the compressor speed to achieve the required power. The outdoor unit increases the compressor speed according to its algorithm, and when a certain speed is achieved, about a 3 minute delay is used to stabilize the operation. These delays are used usually when 30%, 45% (and also 75% for some units) of the compressor speed is achieved, and the SCMI-01 module takes this feature of the outdoor units into account.

Press the **ENTER** key to enter the main menu for module setting, when the default screen is displayed. This menu consists of the following items (submenus).

Goal val	-	This menu allows you to set the desired temperature depending on the selected mode. **This menu is not accessible in the slave mode!**
Function	-	This menu allows you to select one of the four basic operation modes of the SCMI-01 control module.
Defrost	-	This menu allows you to set the method and necessary parameters to defrost the indoor unit evaporator.
Outputs	-	This menu allows you to set the function and switching logic of the output relays of the module.
Reg.cons	-	This menu allows you to set the control constants needed for the operation of the module.
Display	-	This menu allows you to set the display of the control module.
Password	-	This menu allows you to log in to set the control module. Without logging, you can only view the set parameters (they cannot be changed). **After successfully logging in, this menu is not displayed as long as the log-on state remains valid!**

4.1. Using the Password

The access to the set parameters of the module is **protected by a six-digit password**. **This password must be entered in advance (to log on); otherwise you cannot change any settings except of the display settings.** If you try to change settings without logging, the display returns one level back. When the default screen is displayed, press the **ENTER** key to enter the module setting, and select the **Password** menu.

```
    Settings

    Password
```
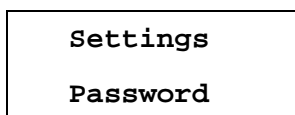
After opening this menu, the display shows:

```
    Password

    000000
```
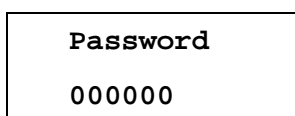
The cursor blinks on the first digit. Use the ▼/▲ keys to set the first digit of the password and **short press the ENTER key** to move to the next digit. Repeat this operation to enter all digits of the password. After setting all digits, **long press the ENTER key to confirm the set password**. If the password is correct, the following message briefly appears:

```
        Password

        Passw OK
```

If an incorrect password is entered, the display shows **Error** and then the display returns one level back. **If the correct password has been entered, it is possible to change the module settings for 30 minutes; then the operator is logged out. While the log-on state remains valid, menu Password is not displayed in the main setting menu of the SCMI-01 module.**

4.2. Setting the Desired Temperature

In the autonomous modes, this menu allows you to set the desired value of the output or evaporation temperature in the range of **–10.0ºC to +60.0ºC**. In the slave mode, the target value is not being set on the module and the compressor performance is controlled by an external voltage 0-10V. Press the **ENTER** key to enter the setting menu, and select the menu for setting the target value.

```
        Settings

        Goal val
```

After opening this menu:

```
        Goal val

        +xx.x
```

The set value is displayed. You can use the ▼/▲ keys to set the selected digit. After you press the **ENTER** key, you can change the sign. If you next press the **ENTER** key, you can set another digits. **Long press the ENTER key to save the set value**; the following message briefly appears:

```
        Saved OK

         +yy.y
```

Then the display returns one level back in the menu.

4.3. Setting the Operation Mode of the SMCI-01 Control Module

Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Function** menu.

```
        Settings

        Function
```

Press the **ENTER** key to open this menu and then you can use the ▼/▲ keys to select the module function. The current (selected) mode is followed by the sign **<**.

`Operated`	-	Slave mode. Unit is controlled by an external voltage of 0-10V. Depending on the external voltage value, the module controls the outdoor unit compressor performance.
`Reg. P`	-	Autonomous pressure (evaporation temperature) control mode.
`Reg. T*`	-	Autonomous temperature control mode for cooling
`Reg. T+`	-	Autonomous temperature control mode for heating

Use the ▼/▲ keys to select the desired mode and press the **ENTER** key to confirm it. Changing of the mode is briefly confirmed by message **Saved OK** and then the display returns one level back in the menu.

Slave unit mode

Outdoor unit compressor performance is controlled by the SCMI-01 module according to direct voltage **0-10V** from an external device. The voltage value corresponds to the desired compressor performance **0-100%**. The **On/Off** switch must be in the **On** position and, at the same time, the control voltage must be higher than 0.5V. Otherwise, if the control voltage drops below 0.5V, the module switches to the **Off** state. The slave unit can operate in the heating mode (**Heat**) or cooling mode (**Cool**). **In the cooling mode**, the outdoor unit heat exchanger operates as a condenser and transfers the heat to the surrounding environment. The thermometer **T1** measures the temperature of the indoor unit heat exchanger (operates as an evaporator), and based on the measured temperature T1, the evaporator defrosting is controlled. **In the heating mode**, the outdoor unit heat exchanger operates as an evaporator and its defrosting is controlled by the outdoor unit circuits. The indoor unit heat exchanger operates as a condenser and its temperature **T1** is used to control the outdoor unit and to protect against exceeding the condensation temperature of the refrigerant used. The thermometer **T2** measures the temperature of the indoor unit supply air. The heating (cooling) mode can be set via the input H/C and the control module can be activated via the input On/Off. **If the input H/C is not connected, the module operates in the cooling mode; if this input is connected to the common terminal, the module operates in the heating mode. If the input On/Off is not connected, the module is switched off; if this input is connected to the common terminal, the module is switched on.** The outdoor unit is controlled via a serial line, which also supplies its communication circuits. For 1-phase outdoor units, the terminals SC-1 and SC-2 of the module must be connected to the terminals 1 and 2 of the outdoor unit, respectively. For 3-phase outdoor units, the terminals are interchanged, so to work properly, the terminals SC-1 and SC-2 of the module must be connected to the terminals 2 and 1 of the outdoor unit, respectively.

Fig. 2. SCMI-01 control module in the slave mode

Autonomous pressure (evaporation temperature) control for cooling

In this mode, the outdoor unit compressor performance is controlled to keep the desired pressure behind the indoor unit evaporator and thereby also the evaporating temperature of the refrigerant R410A. The pressure is measured by the pressure sensor with the output of **4-20mA** in the range of 0-18bar (relative). The resistance thermometer **T1** measures the temperature of the indoor unit evaporator and the SCMI-01 control module uses this temperature to control the evaporator defrosting. The thermometer **T2** measures the temperature of the indoor unit supply air. The control module can be activated remotely using the digital input **On/Off**. **If the input On/Off is not connected, the module is switched off; if this input is connected to the common terminal, the module is switched on.** The outdoor unit is controlled via a serial line, which also supplies its communication circuits. For 1-phase outdoor units, the terminals SC-1 and SC-2 of the module must be connected to the terminals 1 and 2 of the outdoor unit, respectively. For 3-phase outdoor units, the terminals are interchanged, so to work properly, the terminals SC-1 and SC-2 of the module must be connected to the terminals 2 and 1 of the outdoor unit, respectively.
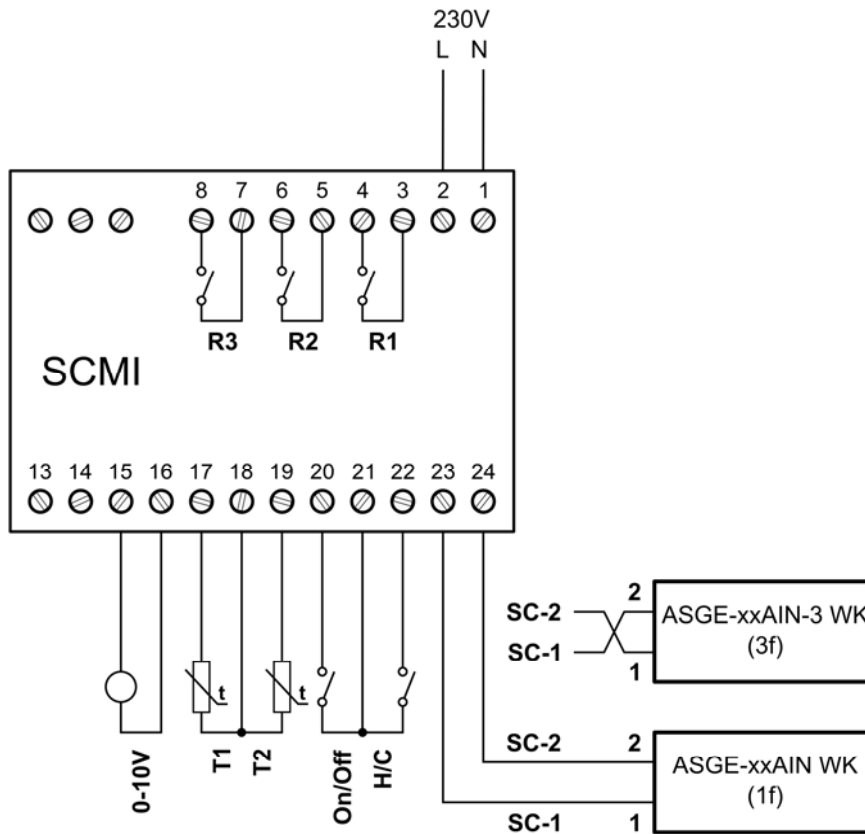
Fig. 3. SCMI-01 control module in the autonomous pressure control mode

Autonomous temperature control mode for cooling (heating)

In this mode, the outdoor unit compressor performance is controlled to keep the set temperature for cooling (or heating). The room temperature is measured by the resistance thermometer **T2**. The resistance thermometer **T1** measures the temperature of the indoor unit heat exchanger. The thermometer **T2** measures the temperature of the indoor unit supply air. In the cooling mode, this heat exchanger operates as an evaporator and the measured temperature is used to control its defrosting, while in the heating mode, it operates as a condenser and the measured temperature is used to control the outdoor unit and protect against exceeding the condensation temperature of the refrigerant used. The control module can be activated remotely using the digital input **On/Off**. **If the input On/Off is not connected, the module is switched off; if this input is connected to the common terminal, the module is switched on.** The outdoor unit is controlled via a serial line, which also supplies its communication circuits. For 1-phase outdoor units, the terminals SC-1 and SC-2 of the module must be connected to the terminals 1 and 2 of the outdoor unit, respectively. For 3-phase outdoor units, the terminals are interchanged, so to work properly, the terminals SC-1 and SC-2 of the module must be connected to the terminals 2 and 1 of the outdoor unit, respectively.
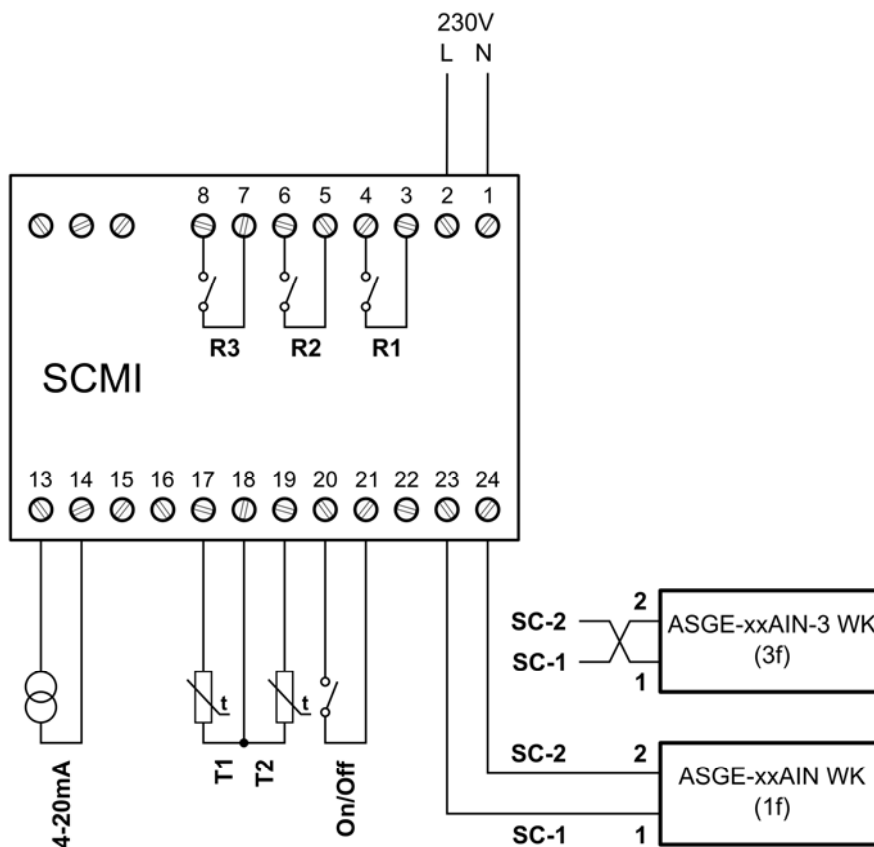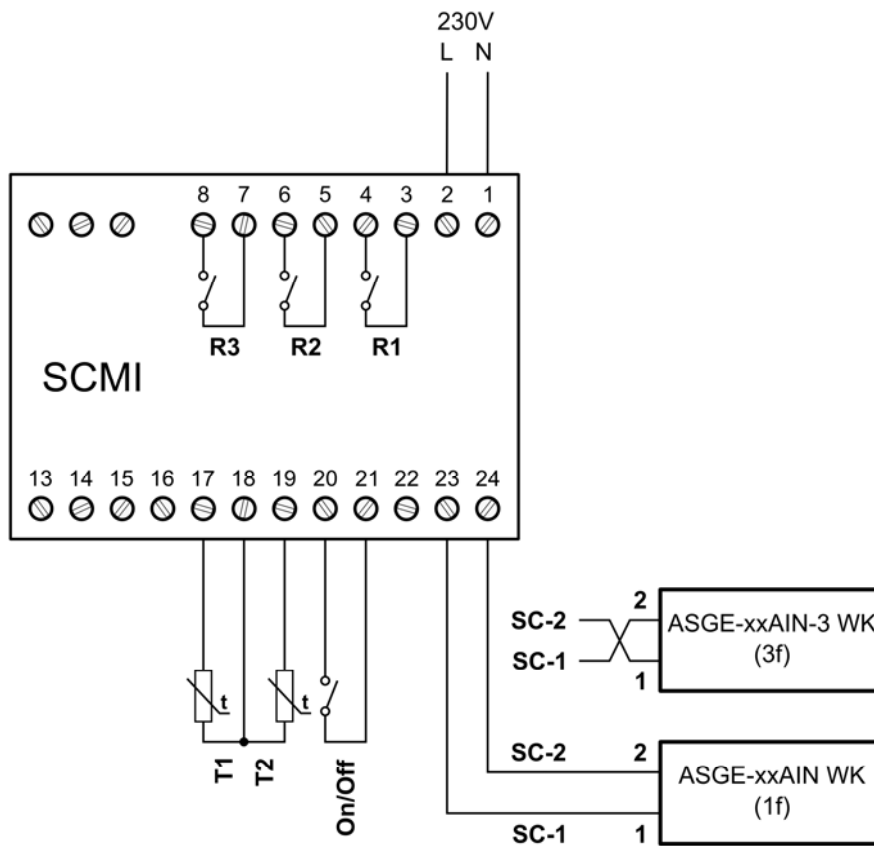
Fig. 4. SCMI-01 control module in the autonomous supply air temperature control mode

4.4.   Setting the Evaporator Defrosting

This menu allows you to set the method and necessary parameters to control the defrosting of the evaporator of the indoor unit, when running in the cooling modes. In the heating modes, the indoor unit heat exchanger operates as a condenser and defrosting of the outdoor unit evaporator is controlled by the outdoor unit. Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Defrost** menu.

```
   Settings

   Defrost
```
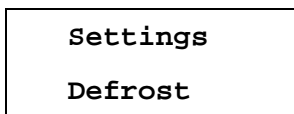
After opening this menu, you can use the ▼/▲ keys to select and set the following parameters:

Mode	-	Setting the defrosting mode of the indoor unit evaporator.
Period	-	Setting the minimum time period (in minutes) between successive defrosting cycles of the indoor unit evaporator.
Length	-	Setting the maximum duration (in minutes) of defrosting of the indoor unit evaporator.
Start	-	Setting the T1 temperature to start defrosting of the indoor unit evaporator.
Stop	-	Setting the T1 temperature to stop defrosting of the indoor unit evaporator.

To start defrosting of the indoor unit evaporator, the set temperature to Start defrosting must be reached **and simultaneously** the set minimum Period from the last defrosting must have elapsed. Evaporator defrosting is stopped when the set temperature to Stop defrosting is reached **or** the set maximum time Length of defrosting has elapsed.

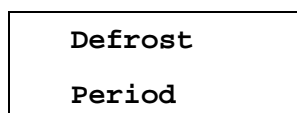## Setting the defrosting mode of the indoor unit evaporator.

Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Defrost** menu. After opening this menu, select and set the **Mode** menu with the following options:

Off	-	Defrosting the indoor unit evaporator is not in use.
External	-	If condition for defrosting the evaporator is met, the compressor is stopped until the condition for termination of defrosting is met. Simultaneously, to accelerate the defrosting process, relay with **Defrost** function can activate an external device (the heating cable, fan etc.).
Reverse	-	If the condition for defrosting the evaporator is met, the operating mode is switched from cooling to heating, function of indoor and outdoor heat exchangers is swapped, and the indoor unit evaporator is defrosted. After the condition for termination of defrosting is met, the operating mode returns to its original state.

You can use the ▼/▲ keys to select the desired indoor unit evaporator defrosting mode and confirm it with the **ENTER** key. Changing of the defrost mode is briefly confirmed by message **Saved OK** and then the display returns one level back in the menu.

Setting the minimum defrosting period

Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Defrost** menu. After opening this menu, select the **Period** menu.

```
Defrost

Period
```

After opening this menu:

```
        Period

         xx.x
```

The **xx.x** represents the set minimum defrosting period in minutes. Use the ▼/▲ keys and the **ENTER** key to set the individual digits. **You can set 0.1-99.9 hours**; the default value is 1 hour. **Long press the ENTER key to save the set value**; the following message briefly appears:

```
       Saved OK

         YY.Y
```

Then the display returns one level back in the menu.

Setting the maximum duration of defrosting

Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Defrost** menu. After opening this menu, select the **Length** menu.

```
       Defrost

       Length
```

After opening this menu:

```
        Length

         xx.x
```

The **xx.x** represents the set maximum duration of defrosting in minutes. Use the ▼/▲ keys and the **ENTER** key to set the individual digits. **You can set 1.0-99.9 minutes**; the default value is 10 minutes. **Long press the ENTER key to save the set value**; the following message briefly appears:

```
       Saved OK

         YY.Y
```

Then the display returns one level back in the menu.

Setting the T1 temperature to start defrosting

Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Defrost** menu. After opening this menu, select the **Start** menu.

```
       Defrost

       Start
```

After opening this menu:

```
    Start

    -xx.x
```

The set temperature to start defrosting is displayed. Use the ▼/▲ keys and the **ENTER** key to set the individual digits and sign. **You can set –20.0°C to +5.0°C**; the default value is -5.0°C. **Long press the ENTER key to save the set value**; the following message briefly appears:

```
   Saved OK

    -yy.y
```

Then the display returns one level back in the menu.

Setting the T1 temperature to stop defrosting

Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Defrost** menu. After opening this menu, select the **Stop** menu.

```
   Defrost

    Stop
```

After opening this menu:

```
    Stop

    +xx.x
```

The set temperature to stop defrosting is displayed. Use the ▼/▲ keys and the **ENTER** key to set the individual digits. **You can set +3.0°C to +25.0°C**; the default value is +7.0°C. **Long press the ENTER key to save the set value**; the following message briefly appears:

```
   Saved OK

    yy.y
```

Then the display returns one level back in the menu.

4.5. Setting the Output Relays

SCMI-01 control module has three output relays with NO (normally-open) contacts, which can switch 230V/2A. Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Outputs** menu. After opening this menu, you can select the desired relay.

Relay 1	-	Setting the output relay R1 of the control module
Relay 2	-	Setting the output relay R2 of the control module
Relay 3	-	Setting the output relay R3 of the control module

Then you can set its function and switching logic.

Relay function

This menu allows you to set the function of the selected relay.

```
Relay x

Function
```

Relays of the control module may have the following functions:

ON/OFF	-	Relay is controlled by the digital input On/Off of the control module.
Compres.	-	Relay is controlled identically with the outdoor unit compressor.
Defrost	-	Relay is controlled identically with the defrosting of the indoor unit evaporator.
Error	-	Relay is activated, if an error state is detected.
Heat/Coo	-	Relay is controlled by the current state of the system (Heat/Cool).

Relay logic

This menu allows you to set the switching logic of the selected relay.

```
Relay x

Logic
```

Relay switching logic can be direct or inverse.

Direct	-	Relay contact is closed, if relay function is activated (and vice versa)
Inverse	-	Relay contact is opened, if relay function is activated (and vice versa). (This applies only when the module is turned on.)

4.6. Setting the Control Constants

This menu allows you to set the control constants of the SCMI-01 control module. Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Reg.cons** menu. After opening this menu, you can select and set the control constants.

`Time con`	- Setting the time constant of the module.
`Prop.con`	- Setting the proportional constant of the module.
`Int.cons`	- Setting the integral constant of the module.
`Der.cons`	- Setting the derivative constant of the module.

Time constant

It determines the time period to perform the control and can be set from **10 to 999** sec. The default value of the time constant is 30 seconds.

Proportional constant

It has a basic effect on the control process. The smaller proportional constant, the minor interventions of the controller in the period given by the time constant. The default value is 35 and can be set from **0 to 999**.

Integral constant

It allows to reach the minimum deviation of the regulation. Use caution when adjusting the integral constant. If this constant is too high, the controlled system may be unstable and prone to oscillation. The default value is 0 and can be set from **0 to 999**.

Derivative constant

It determines how the rate of the changes of the controlled variable effects the control process. At higher derivative constant the system will be more responsive to the changes and will counteract these changes. The default value is 60 and can be set from **0 to 999**.

How to set the control constants

Characteristics of the controlled system must be considered when adjusting the control constants. According to the rate of change of the controlled variable, the time constant must be set first. The time constant should be generally at least twice the time it takes, when the change of the desired value, set on the control module, starts to show in the system output. It is not recommended to set the time constant value lower than about 30 seconds. The value of the proportional constant affects the control accuracy and also the influence of the derivative and integral constants on the controlled process. If you cannot achieve the desired value with the required minimum deviation, it is necessary to increase the proportional constant. It is also necessary to monitor the deviation between the desired and actual value, and adjust the derivative constant according this deviation. If the system responds too fast to the interventions of the controller and there is overshooting of the controlled variable, it is necessary to increase the derivative constant. If the system cannot reach the desired minimum deviation from the desired value for a long time, it is necessary to carefully increase the integral constant. Settings of the control constants for the given operation mode of control module may need to be adjusted and adapted to the new conditions when the mode is changed.

4.7.   Settings the Display

This menu allows you to set the parameters of the display of the SMCI-01 control module. Press the **ENTER** key to enter the setting menu and use the ▼/▲ keys to select the **Display** menu.

```
Settings

Display
```
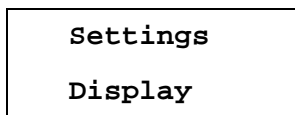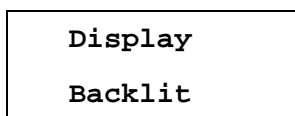
After opening this menu, you can set the following display parameters.

Backlit   -   Setting the brightness of the LCD backlight.

Contrast   -   Setting the contrast of the LCD.

IdleTime   -   Setting the time period after which, in case of operator inactivity, the display returns to the default screen.

Language   -   Setting the language version.

Setting the backlight and contrast of the LCD

Both settings are similar and you do not need to enter the password to log on and set them. After opening the **Display** menu, the menu item for setting the backlight is displayed.

```
Display

Backlit
```

After opening this menu, the current backlight level is displayed using 1 to 16 bars.

```
Backlit
|||||||||
```
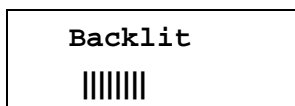
You can use the ▼/▲ keys to change the backlight level and then use the **ENTER** key to save the setting. In a similar way, you can set the contrast of the LCD.

Setting the timeout

This menu allows you to set the time period after which, in case of operator inactivity, the display returns to the default screen. To set the time period of inactivity, open the **Display** menu and then open the **IdleTime** menu.

```
Display

IdleTime
```
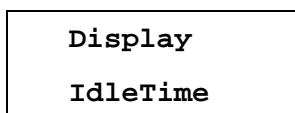
After opening this menu:

```
    IdleTime

        xxx
```

You can use the ▼/▲ and **ENTER** keys to set the timeout from **1 to 999** sec. and then long press the **ENTER** key to save the set value. Saving is briefly confirmed by message **Zaps. OK** and then the display returns one level back in the menu.

Setting the language version

This menu allows you to change the language version of the SCMI-01 control module. Currently, the Czech and English versions of the program are available. To set the language version, open the Display menu and then open the **Language** option.

```
    Display

    Language
```

After opening this menu:

```
    Language

    Cesky
```

or

```
    Language

    English
```

The current (selected) language version is followed by the sign **<**.

You can use the ▼/▲ keys to change the language version and then press the **ENTER** key to save the setting. Saving is briefly confirmed by message **Zaps. OK** for the Czech version or **Saved OK** for the English version and then the display returns one level back in the menu.

5. DISPLAYING THE ERROR MESSAGES

Current errors of the outdoor unit are displayed in last position of the main menu of the SCMI-01 module. The first line contains the title **Error** and the second line contains four two-digit hexadecimal error codes (or sum of these codes, if multiple errors occur). After eliminating the displayed errors, this item will cease to be displayed. To view already not displayed errors, you should press **ESC** and **ENTER** keys simultaneously, when the default screen of the SCMI-01 module is displayed. You must press these keys in the given order, i.e. first press and hold **ESC** key and then press also the **ENTER** key. The display shows:

```
    Err -1

    AABBCCDD
```

The number **–1** after the title **Error** identifies the last (previous) error and the second line is the same as when displaying the current error, i.e. four two-digit hexadecimal error codes (or sum of these codes, if multiple errors occur). You can use the ▼/▲ keys to display another previous errors with numbers **–2** to **–8**, i.e. it is possible to display up to eight previous errors. If the number of errors stored in the SCMI-01 module memory is lower than 8, horizontal dashes will be displayed instead of error codes in the empty positions. If the number of previous errors exceeds 8, all stored error records are shifted and the oldest one is deleted. In this way, the error list is updated whenever a new error occurs and it cannot be deleted nor changed by another way. Summary of errors is given in the following tables:

Errors displayed in the **AA** position

E4	**01**	-	Compressor discharge high temperature protection
	02	-	Refrigerant deficiency protection
	04	-	Fan DC motor protection
	08	-	4-way valve protection
	10	-	Overcurrent protection
H3	**20**	-	Overload protection
E3	**40**	-	Compressor low pressure protection
E1	**80**	-	Compressor high pressure protection

Errors displayed in the **BB** position

	01	-	Indoor unit freezing protection
F3	**02**	-	Outdoor ambient temperature sensor malfunction
F4	**04**	-	Discharge temperature sensor malfunction
F2	**08**	-	Condenser temperature sensor malfunction
	10	-	Condenser inlet tube temperature sensor malfunction
C5	**20**	-	Invalid power code (invalid position of the jumper)
	40	-	Drive unit memory chip malfunction
	80	-	

Errors displayed in the **CC** position

01	-	Protection against starting compressor at a low frequency at a low voltage
02	-	DC Bus overvoltage protection
04	-	AC current protection
08	-	IPM protection
10	-	PFC protection
20	-	Start up malfunction
40	-	Compressor wrong phase order protection
80	-	Drive unit module sensor malfunction

Errors displayed in the **DD** position

P5	**01**	-	Compressor overcurrent protection
	02	-	Power supply protection
	04	-	Circuit current measurement malfunction
H7	**08**	-	Compressor desynchronization protection
	10	-	Compressor stalling protection
	20	-	
	40	-	Drive unit module high temperature protection
	80	-	Drive unit module sensor malfunction

6. TECHNICAL PARAMETERS

Supply voltage range: 230V/50Hz ±10%

Max. input power: 15VA

Net dimensions (W x D x H): 70 x 58 x 90 mm

Net weight: 210g

Operating temperature: 0°C to +60°C

Storage temperature: -25°C to +70°C

Inputs: 2 x digital input with TTL levels
                           2 x input for temperature sensors Carel NTC015WF00, 10kΩ ß = 3435
                           1 x voltage input 0-10V with input resistance of 100kΩ
                           1 x current input 4-20mA for pressure sensor 0-18bar Alco Controls PT5-18M

Outputs: 3 x relay with NO (normally open) contact, max. 230V/2A

Communication: Serial communication for controlling the outdoor unit combined with the power supply of the outdoor unit communication circuits (about 18-22V/100mA).

Service connector: USB, Mini-B connector

Warning: **It is not possible to use an ordinary USB-to-serial data converter to monitor the communication between the indoor and outdoor units because of alternation (time-division multiplexing) between the serial communication data signal and the supply voltage of up to 22V (used to supply the communication circuits of the outdoor unit) on the SC-1&SC-2 terminals of the SCMI-01 module.**

7. CONTENTS OF PACKAGING

SCMI-01 communication module   1pc
Temperature sensor   2pc
Instruction manual   1pc

8. SUMMARY OF THE MODULE SETTINGS

Main menu	Submenu/Option		Range	Default	Note:
Goal val	Setting the desired temperature; this menu is not accessible in the slave mode.				p. 8
Function	Operated	Slave unit mode. The module is controlled by an external voltage 0-10V.			p. 9
	Reg. P	Autonomous pressure (evaporation temperature) control mode.			p. 10
	Reg. T*	Autonomous temperature control mode for cooling			p. 11
	Reg. T+	Autonomous temperature control mode for heating			

Defrost	Mode	Off		Defrosting the indoor unit evaporator is not in use			p. 12
		External		Defrosting with an external support (heating cable etc.)			
		Reverse		Defrosting by switching from cooling to heating mode.			
	Period	Setting the minimum time period between defrosting cycles			0.1 to 99.9	1 hour	p. 13
	Length	Setting the maximum duration of defrosting			1.0 to 60.0	10min	
	Start	Setting the temperature to start defrosting			-20 to +5,0	-5,0°C	p. 14
	Stop	Setting the temperature to stop defrosting			+3 to +25.0	+7,0°C	
Outputs	Relay 1	Function	ON/OFF	Relay is controlled by On/Off input.			p. 15
			Compres.	Relay is controlled according to the compressor			
			Defrost	Relay is controlled according to the operation (Heat/Cool)			
			Error	Relay is controlled according to the error state			
			Heat/Coo	Relay is controlled according to the operation (Heat/Cool)			
		Logic	Direct	Relay switches with direct logic			
			Inverse	Relay switches with inverse logic			
	Relay 2	This setting is the same as setting the Relay 1					
	Relay 3	This setting is the same as setting the Relay 1					
Reg.cons	Time con	Setting the time constant of the module.			10 to 999	30sec.	p. 16
	Prop.con	Setting the proportional constant of the module.			0 to 999	35	
	Int.cons	Setting the integral constant of the module.			0 to 999	0	
	Der.cons	Setting the derivative constant of the module.			0 to 999	60	
Display	Backlit	Setting the LCD backlight.			1 to 16	8	p. 17
	Contrast	Setting the LCD contrast.			1 to 16	8	
	IdleTime	Setting the time period of the operator inactivity			10 to 999	60	
	Language	Setting the language version			CZ / EN	CZ	p. 18
Password	Enter the password **before setting the module**. After logging in, you can perform settings for about 30 minutes. Without knowing the password you can only adjust the contrast and backlight brightness of the display.						p. 7

Note:
Range = adjustable values, Default = default factory setting

NOTE CONCERNING PROTECTION OF ENVIRONMENT

This product must not be disposed of via normal household waste after its service life, but must be taken to a collection station for the recycling of electrical and electronic devices. The symbol on the product, the operating instructions or the packaging indicate such disposal procedures. The materials are recyclable in accordance with their respective symbols. By means of re-use, material recycling or any other form of recycling old appliances you are making an important contribution to the protection of our environment.

Please ask your local council where your nearest disposal station is located.

PRODUCER

Producer: SINCLAIR CORPORATION Ltd., 1-4 Argyll St., London W1F 7LD, UK, www.sinclair-eu.com
This product was manufactured in China (Made in China).

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