

SCOM-100

Alarming & remote control unit

User guide



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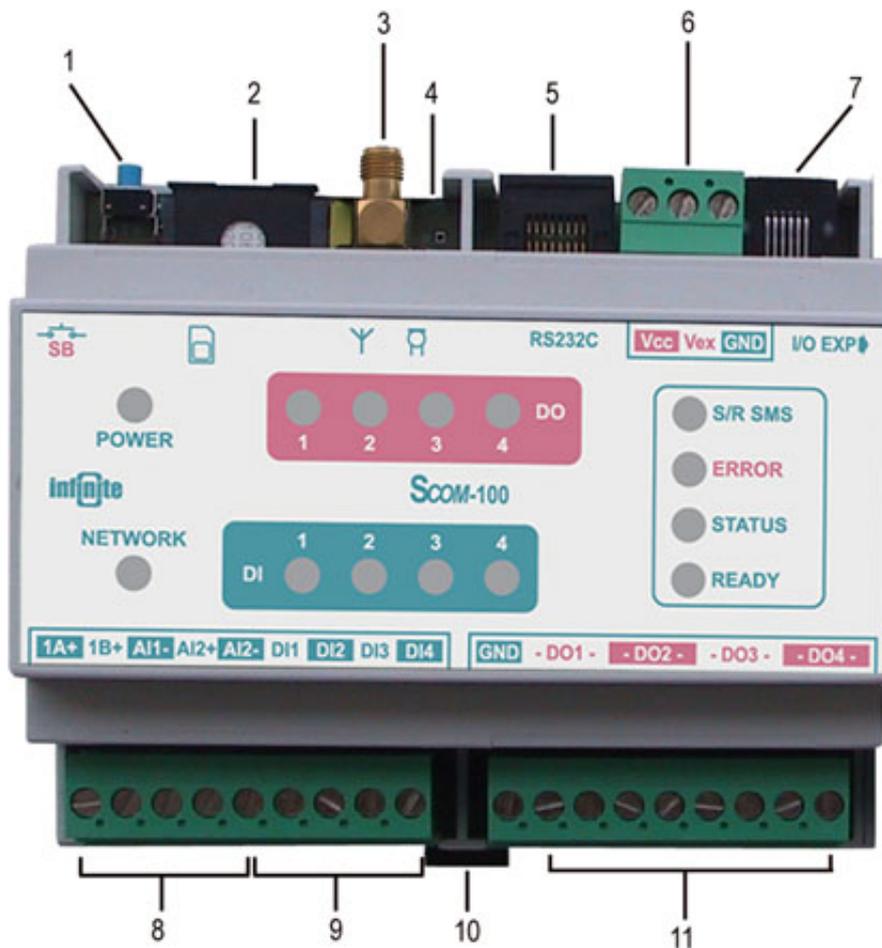
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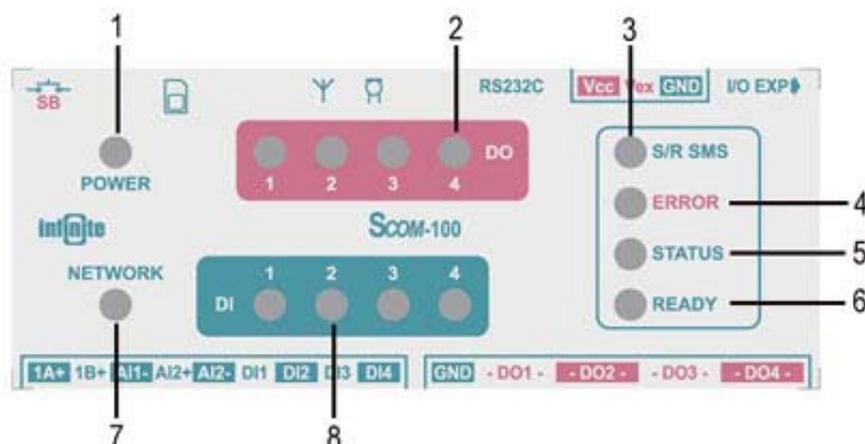
1. Device overview

1.1 Connections



- 1: Start up button
- 2: SIM cardholder
- 3: GSM antenna connector (SMA jack)
- 4: Microphone connector
- 5: Serial port RS232 (RJ-42 connector)
- 6: Power supply connector
- 7: I/O expansion connector (6 pin modular jack)
- 8: Analog inputs screw terminals
- 9: Digital inputs screw terminals
- 10: DIN rail snap
- 11: Digital outputs screw terminals

1.2 LED indications

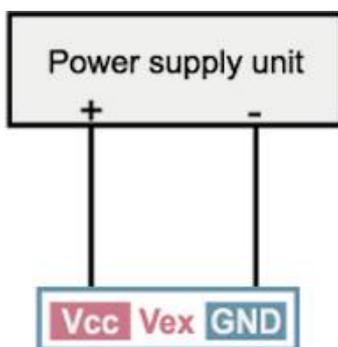


- 1: Power indicator: Turns on after power up.
- 2: Four LEDs indicating the digital output states.
- 3: Turns on while sending or receiving an SMS.
- 4: Turns on if an error occurs during operation. See sections 9.4 and 9.5 for details.
- 5: Monitors the device status (RUN/ MONITOR/ STOP). See sections 6.1 and 9.5 for details.
6. Flashes during device start up. Remains on if the device is ready for operation. Turns off if one or more operating conditions fail. See section 9.5 for details.
7. Flashes if a connection to the GSM provider is established.
8. Four LEDs indicating the digital input states.

2. Wiring

SCOM-100 is a simple device, not requiring special technical background for configuration and operation. However an electrical technician should undertake the installation of the device.

2.1 Power supply



Power supply requirements are:

SCOM-100-12: 12VDC +/-15%

SCOM-100-24: 24VDC +/-15%

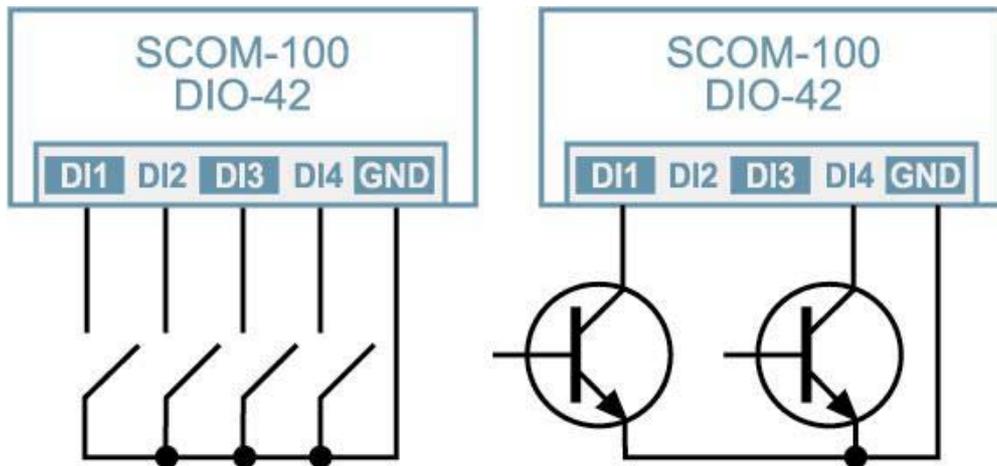
A low ripple power supply output is recommended.

Output voltage stabilization is not required.

See section 9.3.1 for details.

2.2. Digital inputs

SCOM-100 has 4 built in digital inputs, which can be expanded by the DIO-42 expansion modules. The digital inputs are wired by means of screw terminals.

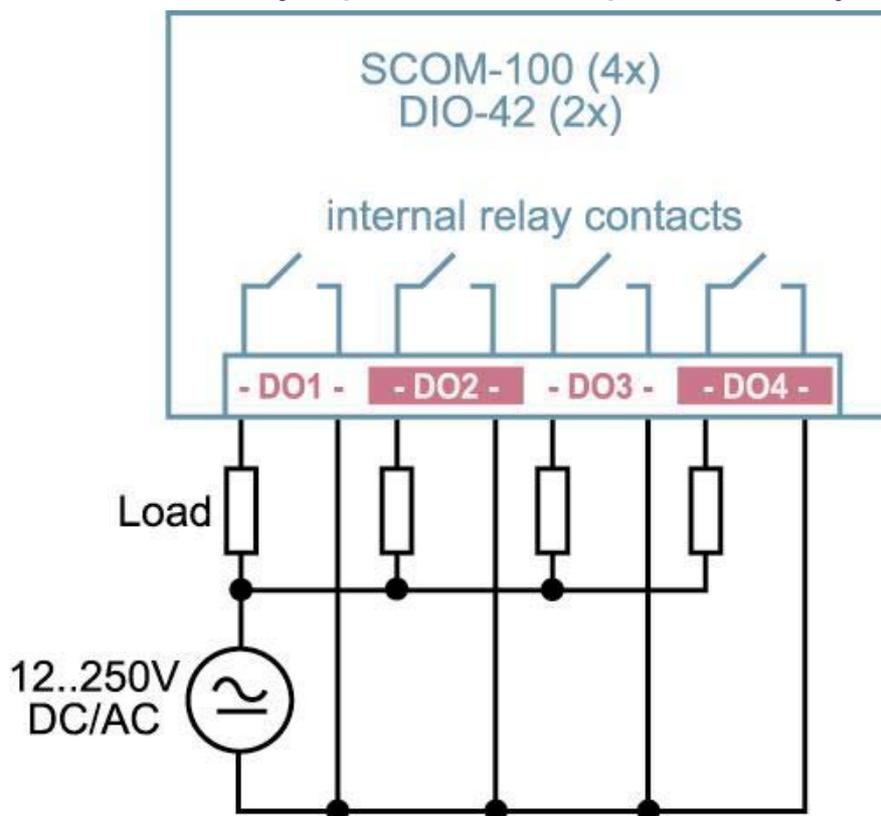


The digital inputs can be driven either by switches or transistors (open collector stages). Transducers with push-pull output are also applicable.

Note: Output voltages higher than +5V or negative voltages (lower than GND) will be clamped from the comparator input protection zener. The impedance of the input circuit is, in this case, 4.7K. An external transducer with 24V output must be capable of driving a current of 5 mA.

2.3 Digital outputs

SCOM-100 has 4 built in digital outputs, which can be expanded by the DIO-42 expansion modules. The digital outputs are wired by means of screw terminals. Each output has a normally open contact power relay.



Voltage	Current	Mode
250VAC	10A	AC1
250VAC	1A	AC2,3
150VDC	0.5A	DC

It is recommended to use external power relays to drive inductive or capacitive loads demanding more than 0.5A.

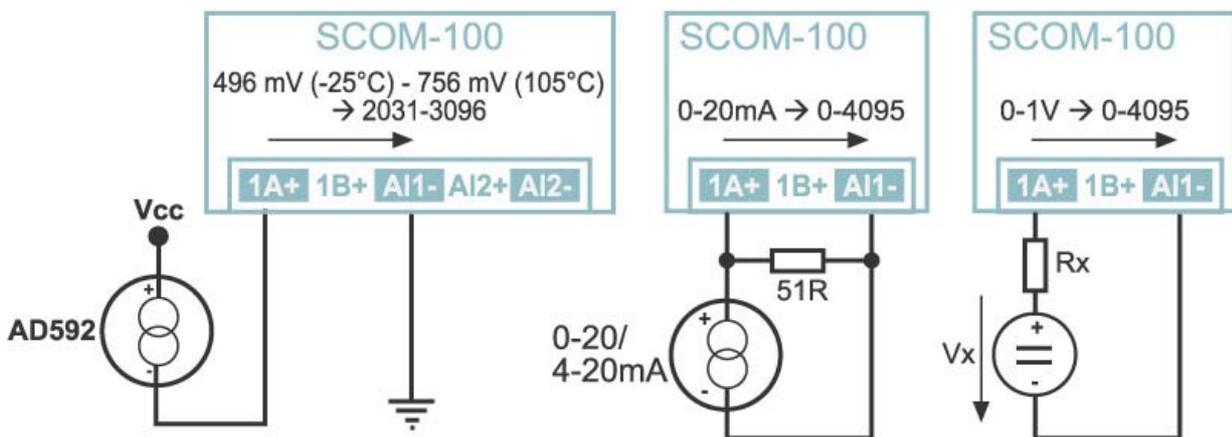
2.4 Analog inputs

SCOM-100 has 2 built in analog inputs (AI1, AI2). A1 is designed for voltage input and A2 for current input.

2.4.1 Analog input 1

Analog input 1 is a voltage input with two wiring options.

Wiring option: A1A



The input voltage range for this wiring option is 0-1VDC. The input resistance is 2K. The input voltage range is converted internally to a digital raw range of 0-4095.

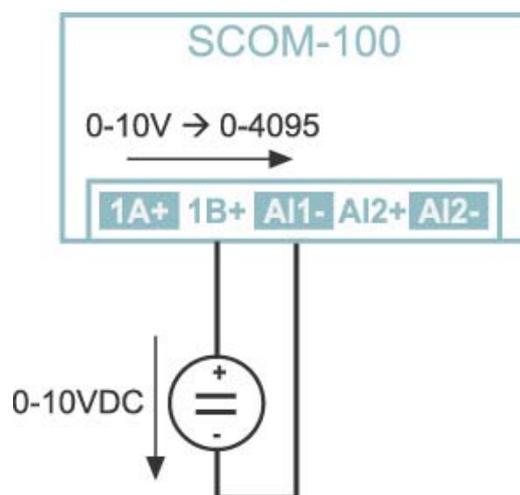
The circuit displayed on the left side of the page uses a monolithic semiconductor sensor (AD592) for temperature measurement. This sensor acts as a high impedance temperature dependent current source of $1\mu\text{A}/\text{K}$. The nominal current output is $298\mu\text{A}$ at 25°C . The voltage drop on the analog input resistor (2K) is 496mV at -25°C and 756mV at 105°C . The SCOM-100 power supply (Vcc) can be used for the sensor's excitation.

The circuit displayed on the center uses an external shunt resistor ($\sim 51.3 \Omega$) wired parallel to the input in order to measure current signals (e.g. 0-20/4-20mA).

The circuit displayed on the right side of the page uses an external resistor (R_x) to measure DC voltage (V_x). R_x and R_{in} (2K) form a voltage divider. The following table illustrates the applicable resistor R_x values for different DC voltages:

V_x	R_x	V_{in}
0..1V	0	0 -1V
0..5V	8K, 1/4W	0 -1V
0..30V	58K, 1/4W	0 -1V
0..60V	118K, 1/4W	0 -1V
0..100V	198K, 1/4W	0 -1V

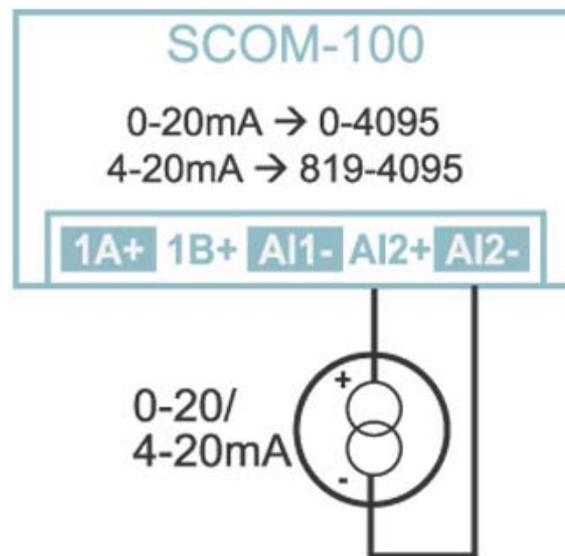
Note: In case of low voltage measurements, use short and shielded wiring to avoid 50Hz (60Hz) line noise interference.

Wiring option: A1B

Wiring option A1B is designed for 0..10VDC signal input through an internal 18K & 2K voltage divider. The input resistance is 20K.

2.4.2 Analog input 2

Analog input 2 is designed as a current input.



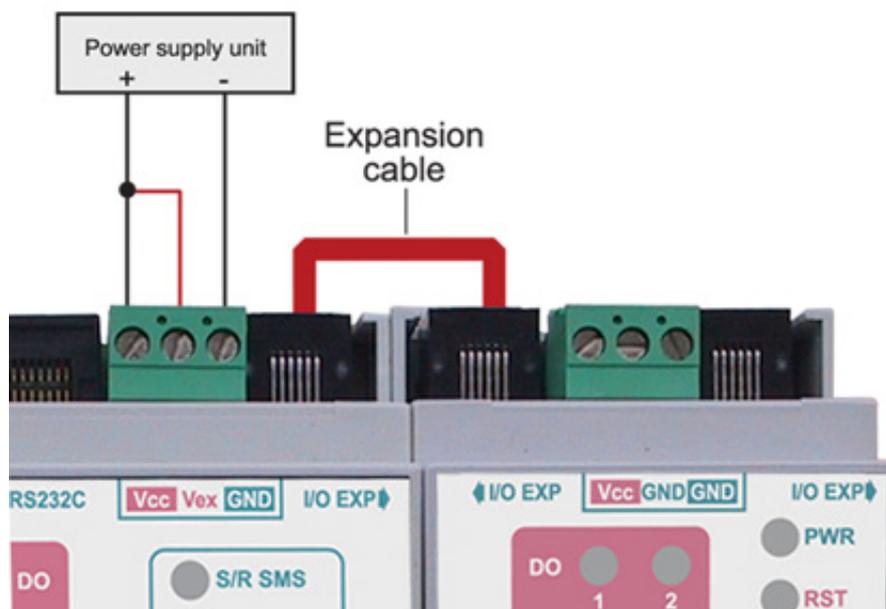
It can be used in conjunction with industry standard current loop transducers & sensors. Input impedance is 50Ω. The 0-20mA input is converted internally to a digital raw range of 0-4095.

Note: Applying a voltage source to the current input AI2 may damage the internal 50Ω input resistor and respectively the entire input circuit.

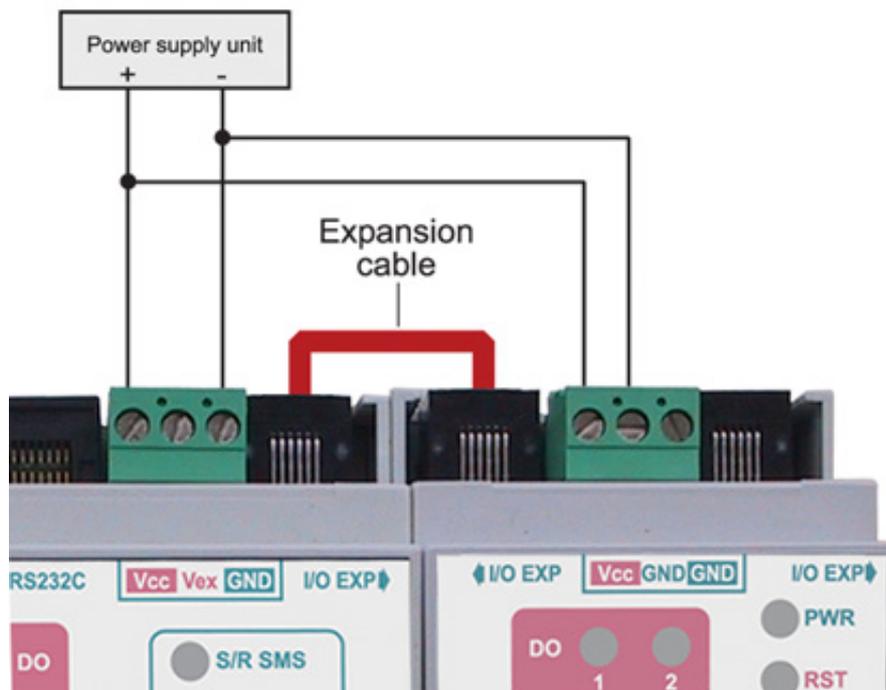
2.5 I/O expansion power supply

SCOM-100 has two ways to provide power supply for the I/O expansion units.

Bridge Vcc to Vex on the main SCOM-100 unit to power a limited number of I/O expansion units (up to 4), as shown below. (Power is then wired through the 6th pin on to the modular I/O expansion connector).



If the number of expansion modules is more than 4, an external power supply source must be connected to the power connector screw terminals of each expansion module, as shown below, and the Vcc to Vex on the main SCOM-100 unit must not be bridged.



Note: The Vex pin must not be connected when an external power source is connected on the expansion modules because the main SCO-100 unit will be damaged.

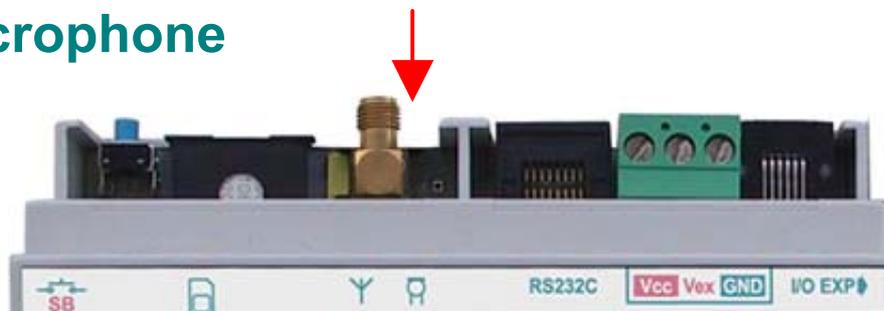
2.6 GSM antenna

An external GSM antenna should be used for locations with weak signal strength. SCOM-100 utilizes an SMA plug connector to connect a GSM antenna.



The GSM antenna must be of appropriate frequency to cover the frequency band of your GSM provider's network.

2.7 Microphone



A two-pin connector is provided to connect an electret type microphone.

3. Getting started

3.1 Preparing a SIM card

Before installing the SIM card, use your phone to:

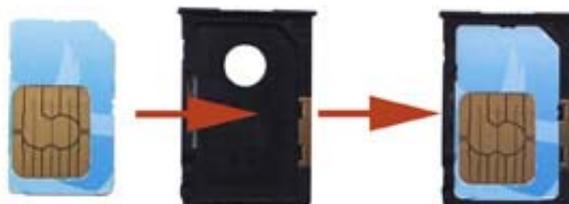
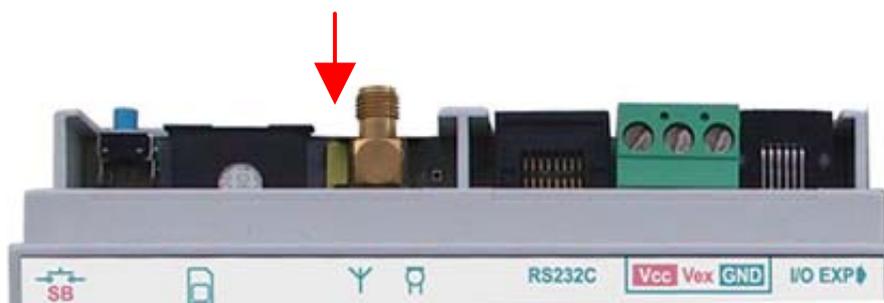
1. Clear the PIN code (no PIN needed).
2. Enter your name and phone number in the first place of the phonebook directory of the SIM card.

Note: You can alternatively power up the unit without a SIM card and set the PIN number using a terminal program on a PC, or you can set a PIN in later configuration stages.

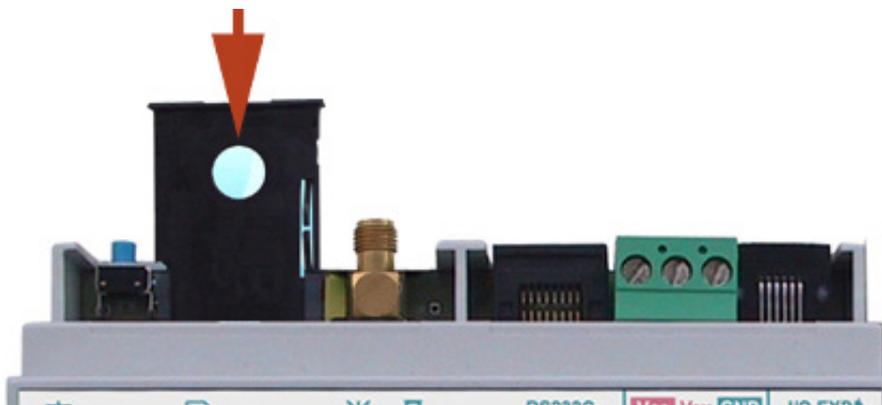
3.2 Installing the SIM card

Note: Always remove or install the SIM card, having the unit powered down!

Slide the card tray out by pressing the cardholder's button with a spiky object such as a pencil or screwdriver.

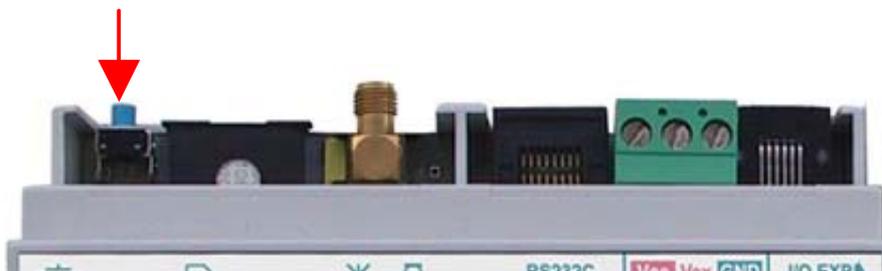


Insert the card into the tray and slide the tray with the card faced down into the cardholder.



3.3 First power up & factory settings

Power up the unit and hold the startup button pressed until the ready LED starts blinking rapidly.



The unit executes the startup procedure setting all parameters to the factory defaults, reads the SIM card's phonebook entry, enters the RUN (Control) mode and sends a HELLO SMS message to the mobile phone number that was found in the SIM phonebook entry.

LED indication states are:

1. READY LED will switch on indicating the successful reading of the SIM card's phonebook entry.
2. STATUS LED will switch on indicating the RUN (Control) mode.
3. NETWORK LED will be blinking to state successful connection to the GSM provider's network.

4. Device operation

4.1 SMS commands

The SCOM-100 unit accepts text SMS commands to configure operational parameters, control the unit's operation modes, and control the unit's outputs. Several commands can be packed in one SMS message.

An SMS command has the following structure:

```
XXXX,A..A, ..., ...,Z..Z
```

XXXX: Command identification number 0000-9999

A..A, Z..Z: Command parameters

The comma character (',') is used as a separator in the command structure. The semicolon character (';') is used to separate more than one commands packed in a single SMS.

4.2 Naming the unit

You can specify a unit name for identification purposes. The unit name will be used in several device's SMS transmissions and responses. The command to name the unit is:

```
0300,My SCOM-100
```

0300: Command ID

My SCOM-100: Device name

Use your mobile phone to edit an SMS containing the above command. Type in the characters without any

spaces between except in text strings (eg. The name 'My SCOM-100' may contain spaces). Send the SMS to the SCOM-100 mobile phone number of the SIM. You will receive an SMS with the following response:

```
COMMAND PROCESSED OK
```

indicating that the device's name is configured.

4.3 Configuring a digital input for alarming

A digital input can be configured to initiate an alarm SMS transmission after a signal change. The following selections can be made:

1. Give a name to the digital input. This name will be attached to the alarm SMS if the unit answer mode is verbose.
2. Configure the signal transition desired to initiate the alarm SMS by selecting between a positive (0 to 1), a negative (1 to 0) or any transition.
3. Specifying a delay time for alarm annunciation. The signal change must persist during this delay period in order to initiate an alarm SMS.

The DI configuration command structure is:

```
1100,m,n,s,a,d
```

1100:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
n:	Input number (1-4)

- s: Input signal name (Text: 0-15 characters, may include space characters)
- a: Transition selection (0: No alarm, 1: positive 2: negative 3: both transitions)
- d: Delay time in seconds (0-65535)

The following example illustrates how to configure digital input 1 to initiate an alarm SMS after any signal transition, a delay time of 30 seconds and a signal name configured to “Door contact”.

The configuration command would be:

```
1100,0,1,Door contact,3,30
```

Send an SMS to the SCOM-100 unit with the respective command.

Connect a contact or a loop wire to digital input 1 according to the wiring diagram in section 2.2. Close the contact/loop and leave it closed for more than 30 seconds. The S/R SMS LED will blink and you will receive an alarm SMS message and the following contents:

```
My SCOM-100  
Door contact  
POSITIVE ALARM
```

Now open the input contact/loop for 30 seconds. You will receive an alarm SMS message with the following contents:

```
My SCOM-100  
Door contact
```

NEGATIVE ALARM

If you close or open the contact without maintaining a delay time of 30 seconds, you won't receive any alarm SMS message.

4.3.1 Setting alarm message's texts

You can set up to 128 custom text messages to be announced in an SMS alarm as a descriptive reason instead of the default causal text (e.g. POSITIVE ALARM).

The command to configure a text message is:

```
0630, ID, s
```

0630:	Command ID
ID:	Message ID (1-128)
s:	Message text (0-31 characters, may include space characters)

The command to associate a text message to an output at a signal transition is:

```
1101, m, n, ID1, ID2
```

1101:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
n:	Input number (1-4)
ID1:	ID number 0-128 of the message's text for the negative transition (1 to 0)
ID2:	ID number 0-128 of the message's text for the positive transition (0 to 1)

Note: ID1/ID2 value 0 indicate the default message.

Let us specify alarm text messages for the previous example. The message for the positive (0 to 1) transition should be '**Door is opened**'. The respective message for the negative transition should be '**Door is closed**'.

The commands to configure these text messages are:

```
0630,1,Door is opened;  
0630,2,Door is closed
```

Now we have to associate the text messages to the signal transitions of the example.

The respective command for our example is:

```
1101,0,1,2,1
```

We can pack all three commands in one SMS message and send them to the SCOM-100 unit:

```
0630,1,Door is opened;  
0630,2,Door is closed;  
1101,0,1,2,1
```

After sending and receiving an 'OK' response, repeat the signal changes by closing the contact/loop for at least 30 seconds and then open it again.

Closing of the input for at least 30 seconds will issue an alarm SMS with the following contents:

```
My SCOM-100  
Door contact  
Door is opened
```

Opening the contact/loop for at least 30 seconds will issue the negative transition alarm message:

```
My SCOM-100
```

Door contact

Door is closed

4.3.2 Clearing the digital input configuration

Any digital input configuration settings such as alarm, naming and message associations can be cleared using the command:

```
1110,m,n
```

1110:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
n:	Input number (1-4)

4.4 Controlling the digital outputs

4.4.1 Setting a digital output

SCOM-100 digital outputs are internal relay normally open contacts (see section 2.3).

The command to set a digital output is:

```
1000,m,n
```

1000:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
n:	Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)

Let us set output 2 of the main unit. The respective command is:

```
1000,0,2
```

Send an SMS with the above respective command to the device's phone number.

The output LED 2 will switch on and you will hear the relay contact switch to a closed state. You will then receive an "OK" SMS message response.

4.4.2 Resetting a digital output

The command to reset an output is:

```
1001,m,n
```

1001:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)

n: Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)

In our example the respective command to reset the output 2 of the main unit is:

```
1001,0,2
```

Send an SMS with the respective command to the device's phone number.

The output LED will switch off and you will hear the relay contact switch to the initial open state. You will then receive an "OK" SMS message response.

4.4.3 Configuring an output as a closed contact

SCOM-100 digital outputs, as mentioned above, are normally open contacts. In some cases an initial closed contact state is required. In those cases, you can configure the respective output to be a closed contact in its initial state.

The respective configuration command is:

```
1071,m,n
```

1071: Command ID
m: Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
n: Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)

Send the following command to configure output 2 of the main unit as a closed contact:

```
1071,0,2
```

The output LED 2 will switch on and you will hear the relay contact switch to a closed state.

Now repeat the set/reset procedure of the last two examples. You will receive messages with a reverse behaviour of the output LED and relay contact. E.g. after a 'SET' command, the LED goes off and the relay contact switches to the open state and opposite.

An output configured as a closed contact can be reconfigured to an open contact using the 'Clear DO configuration' command (see 4.4.8) or using the opposite configuration command.

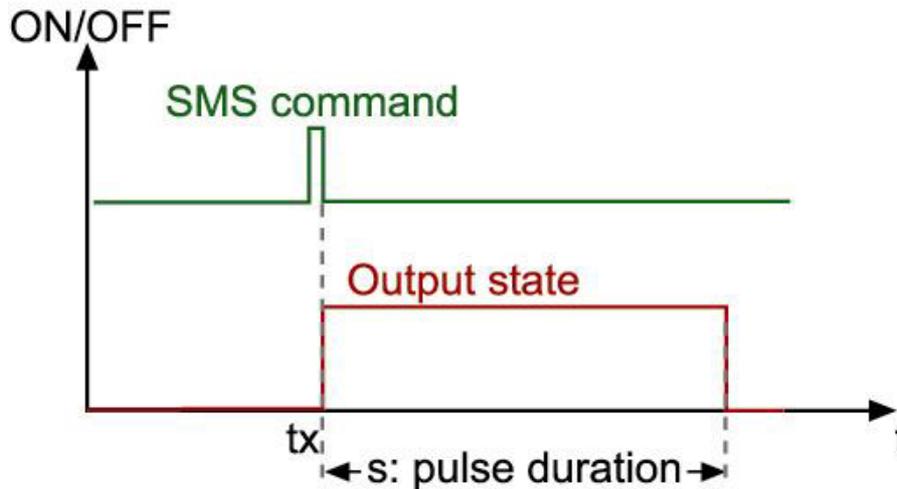
Configure output as an open contact:

```
1070,m,n
```

1071:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
n:	Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)

4.4.4 Pulse digital output

A digital output set with a pulse behaves as shown on the time-based diagram below.



This behavior is that of a monostable timer. The command to set an output with a pulse is:

```
1010,m,n,s
```

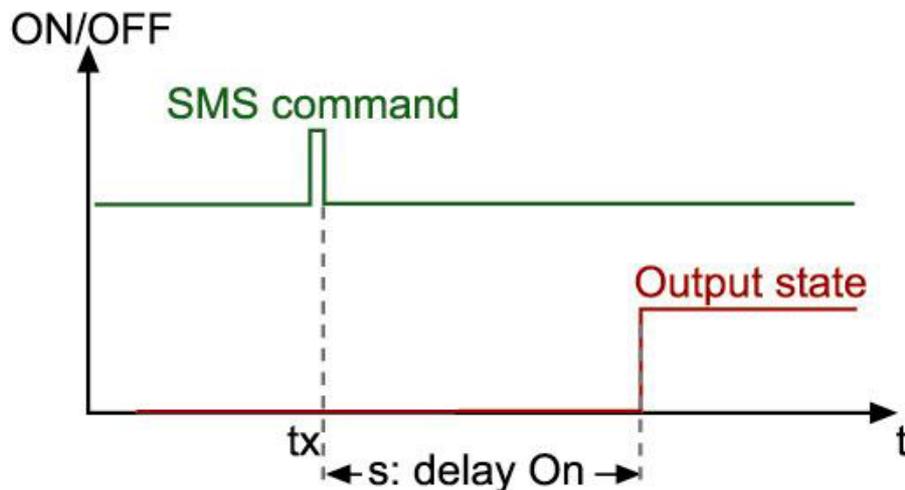
- 1010: Command ID
- m: Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
- n: Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)
- s: Pulse duration in seconds (1-79200)

Test the pulse command by sending an SMS:

```
1010,0,2,25
```

4.4.5 Setting a digital output after a delay

A command is available to set a digital output with an initial delay time. The digital output's switching behaviour is shown on the time-based diagram below.



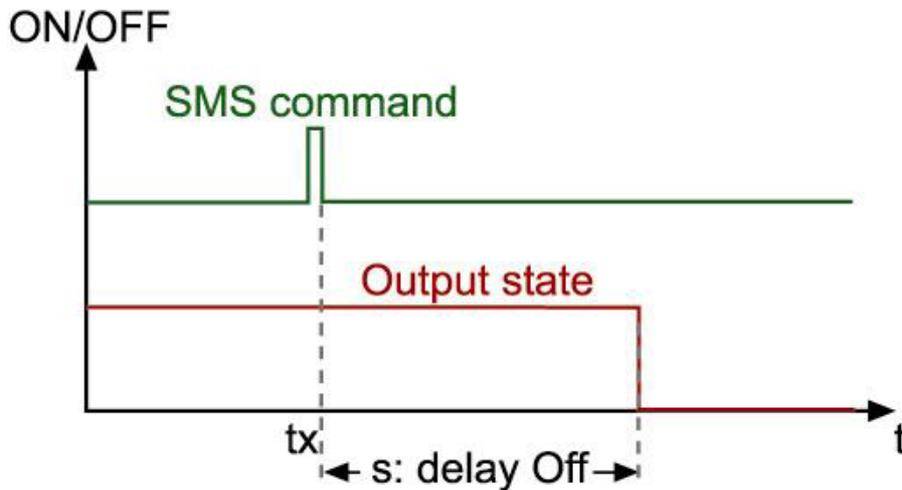
The command to set an output after an initial delay is:

`1020,m,n,h,mn`

- 1020: Command ID
- m: Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
- n: Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)
- h: Delay on duration hours (0-21)
- mn: Delay on duration minutes (0-59)

4.4.6 Resetting a digital output after a delay

A command is available to reset a digital output with an initial delay time. The digital output's switching behaviour is shown on the time-based diagram below.



The command to reset an output after a delay is:

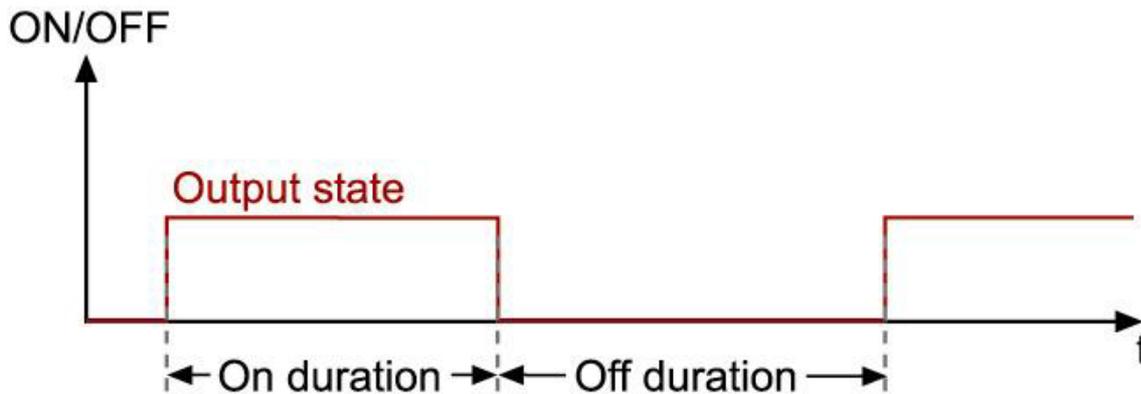
`1021,m,n,h,mn`

- 1021: Command ID
- m: Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
- n: Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)
- h: Delay off duration hours (0-21)
- mn: Delay off duration minutes (0-59)

4.4.7 Digital output time based scheduling

Multivibrator

A multivibrator is a continuous time based switching sequence as shown in the following diagram:



Although the output's switching is continuous, commands for temporary setting or resetting (1000, 1001) are also applicable and accepted by the device. The command to set a digital output as a multivibrator is:

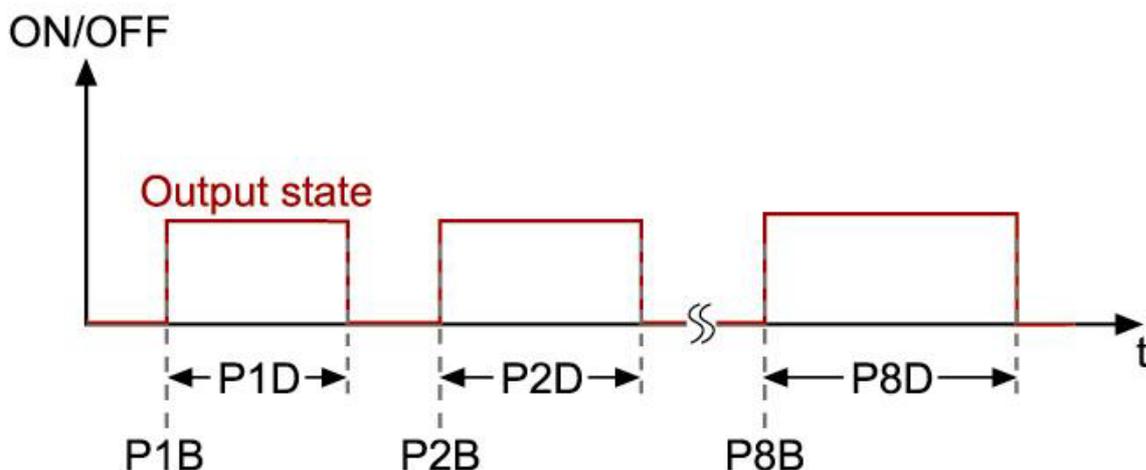
```
1040,m,n,mon,moff
```

- 1040: Command ID
- m: Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
- n: Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)
- mon: On duration in minutes (1-1320)
- moff: Off duration minutes (1-1320)

The 'Clear DO configuration' command can be used to remove the multivibrator configuration from an output (see 4.4.8).

Time schedule program

Time schedule programs relate to absolute daytimes. Up to 80 time schedule programs can be stored in the SCOM-100 power fail safe memory, 10 programs for each day of a week (Sunday to Saturday), and 10 programs for an 'everyday' schedule. Every program permits up to 8 on switching sequences. The time based characteristic of a schedule is shown in the following diagram:



The command to configure and set up a time schedule is:

```
1700, ID, d, P1B-P1D, P2B-P2D, ..., P8B-P8D
```

- 1700: Command ID
 ID: Schedule ID
 d: Day of the week 1-7 & 0 (1 for Sunday to 7 for Saturday & 0 for everyday)
 P1B to P8B: Switch on time stamps (HH:MM)
 P1D to P8D: On duration in minutes

For example the following command defines a daily program with an ID number 1 containing three ON sequences:

```
1700,1,0,8:00-120,11:30-100;16:45-180
```

A schedule program can be attached the device's outputs by using the following command:

```
1030,m,n,ID
```

1030: Command ID
m: Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
n: Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)
ID: Time schedule ID (1-10)

A device output attached on a schedule ID will operate according to the following rules:

1. On each day the specific daily schedule program with the respective ID is followed.
2. If no specific day (e.g. for Tuesday) program with the respective ID exists, the 'Everyday' program is followed.
3. If no specific day program and also no 'Everyday' program with the respective ID exist, the output remains off for the whole day.
4. The output is activated at the next switch on time stamp.

The 'Clear DO configuration' command can be used to remove the time schedule configuration of an output (see 4.4.8).

A special command is available for controlling the total ON time duration in a day program:

```
1701,ID,P
```

- 1701: Command ID
- P: Factor in % (0-100%). The ON duration of each program sequence is calculated by multiplying this factor with the initial sequence duration.

Example:

Reducing the total ON duration of program 3 to the half:

`1701, 3, 50`

4.4.8 Clearing the digital output configuration

The command clears any output configurations related with multivibrator or time schedules:

`1090, m, n, ID`

- 1090: Command ID
- m: Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
- n: Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units)

4.5 Analog signal alarming

4.5.1 Analog input configuration

The SCOM-100 analog inputs can be configured to initiate alarm SMS messages when preset alarm limit conditions (low & high alarm limits) are met. A user configurable scale can be defined to associate an analog input signal to physical units. The configuration command is:

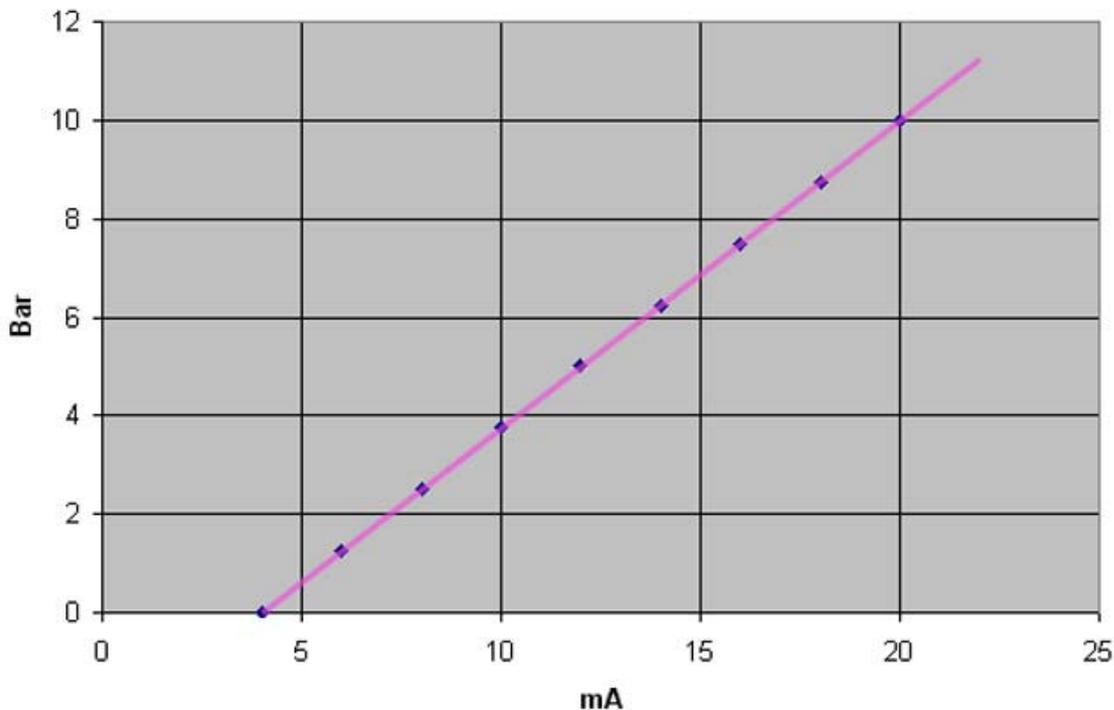
```
1200,m,n,s,SSL,SSH,SCL,SCH,ALL,ALH,u,d
```

1200:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-4 for AI-4 expansion units)
n:	Input number (1-2 for SCOM-100 main unit, 1-4 for AI-4 expansion units)
s:	Input signal name (Text: 0-15 characters, may include space characters)
SSL:	Raw value reading for scale low (0-4095)
SSH:	Raw value reading for scale high (0-4095)
SCL:	Scale low in physical units (-100,000 to 100,000)
SCH:	Scale high in physical units (-100,000 to 100,000)
ALL:	Alarm low limit in physical units (Number in the range of SCL to SCH with one optional decimal digit. Example: ALL = 52.3)

- ALH: Alarm high limit in physical units
(number in the range of SCL to SCH
with one optional decimal digit.
Example: ALH = 121.5)
- u: Physical unit (0-15 characters)
- d: Delay time in seconds (0-65535)

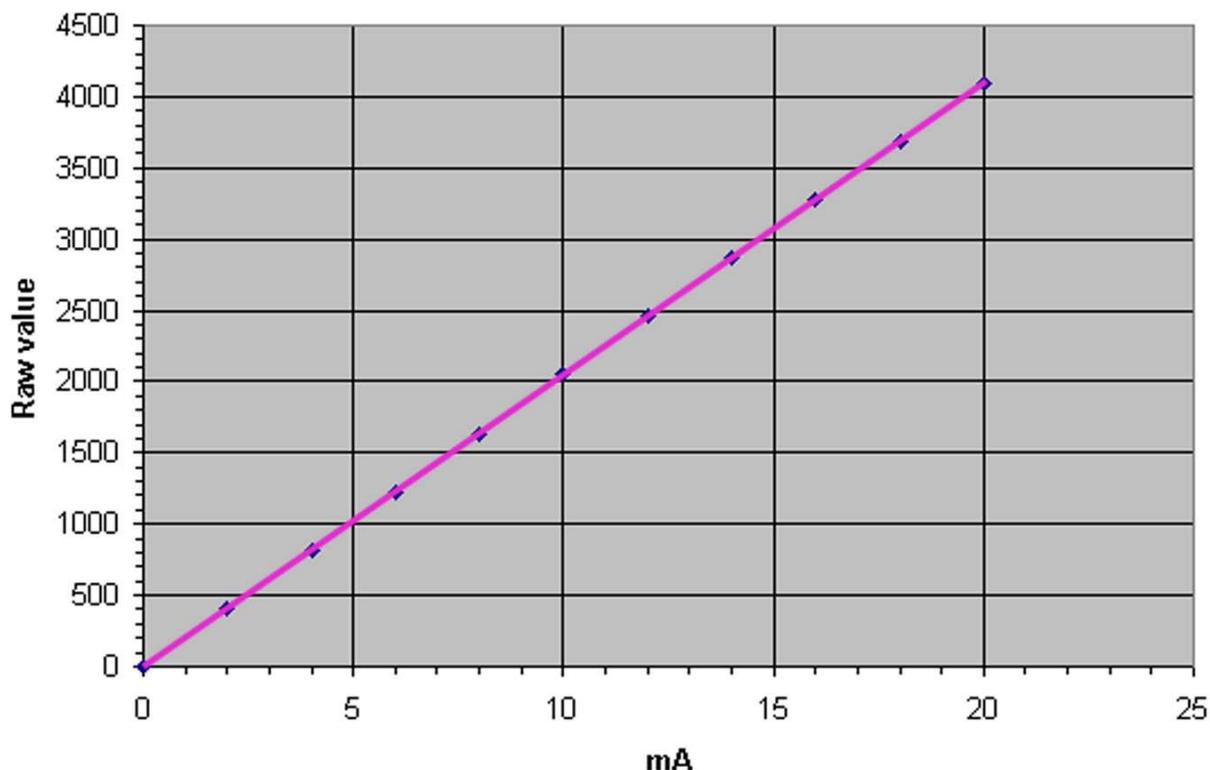
For example let us explain all the different parameter settings to use a 4-20mA, 0-10 bar pressure sensor wired on analog input 2 on the main unit (See section 2.4.2).

The pressure sensor characteristic is shown in the diagram below:



The 4-20mA input signal is converted by the internal A/D converter in the digital raw range of 819 to 4095.

The following diagram illustrates the conversion characteristic:



The conversion values are given by the formula:

Raw digital value:= $4095 * I_x/20$

I_x : Input current value (mA)

According to the formula, a 4mA input is converted to:

Raw digital value= $4095*4/20 = 819$

This is the value setting for **SSL**.

A 20mA input is converted to a raw reading of 4095.

This is the value setting for **SSH**.

SCOM-100 physical scale values are limited to integer values between -100,000 and 100,000. It is reasonable to select the physical scale in the range of 0 to 10,000 mBar to gain a better resolution.

The configuration command would then be:

```
1200,0,2,Pressure,819,4095,0,10000,2500,8500,mBar,15
```

The low alarm limit is set to 2.5 Bar, the high alarm limit to 9.5 Bar. A 15 second delay is also set so that the input signal must persist in value and exceed alarm limits (low or high) for 15 seconds. If these clauses are met then an alarm SMS will be initiated.

Note: Alarm annunciation is cancelled if the respective Scale (low or high) and limit alarm values (low or high) are equal.

4.5.2 Setting alarm message's texts for analog inputs

A similar command to the one for digital inputs is available to associate low and high alarm events with respective SMS messages (1-128 messages, see 4.3.1).

The configuration command is:

```
1201,m,n,ID1,ID2
```

1201:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-4 for AI-4 expansion units)
n:	Input number (1-2 for SCOM-100 main unit, 1-4 for AI-4 expansion units)
ID1:	ID number 0-128 of the message's text for exceeding the low limit
ID2:	ID number 0-128 of the message's text for exceeding the high limit

Note: ID1/ID2 value 0 means no message.

4.5.3 Clearing the analog input configuration

Any analog input configuration settings such as alarm, naming, messaging and scaling can be cleared using the command:

```
1210,m,n
```

- 1210: Command ID
- m: Module number (0 for SCOM-100 main unit, 1-4 for AI-4 expansion units)
- n: Input number (1-2 for SCOM-100 main unit, 1-4 for AI-4 expansion units)

4.5.4 Setting the analog inputs alarm deadband

A special command is available to configure alarm deadband (hysteresis) for all analog inputs. Alarm deadband is a small range in the total scale of the input signal where alarm states remain indifferent, holding on their last value - in order to avoid frequent SMS transmissions.

The Alarm deadband is given as a percent of the total scale.

```
1800,d
```

- 1800: Command ID
- d: Alarm deadband value in % up to 5% of the total scale (0-5% in 0.1 steps).
Example: d =2.3%

4.6 Special I/O Functions

4.6.1 ON/OFF and PID control

Up to four ON/OFF or PID control function blocks are available. Each block uses an analog input for measuring the process value and a digital output for control.

Function block configuration

`1250, id, m, n, m1, n1, sp, g, it, dt, ct, h`

1250:	Command ID.
id:	Function block ID (1-4).
m:	Module number (0 for SCOM-100 main unit, 1-4 for AI-4 expansion units).
n:	Input number (1-2 for SCOM-100 main unit, 1-4 for AI-4 expansion units).
m1:	Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units).
n1:	Output number (1-4 for SCOM-100 main unit, 1-2 for DI-42 I/O expansion units).
sp:	Set point value in the range of the analog input scale.
g:	'Gain' value (P) between 1 and 100%. The block function depends on the 'Gain' value: A zero value selects the ON/OFF control function. A non zero value selects the PID function.
it:	'Integral time' (I) value between 1-1000 sec. A zero value disables the integral part (not relevant for ON/OFF control).

- dt: 'Derivative time' (D) value between 1-200 sec. A zero value disables the derivative part (not relevant for ON/OFF control)..
- ct: 'Cycle time' value between 1 and 15 minutes, representing the pulse width modulation period of the digital output (not relevant for ON/OFF control).
- h: 'Hysteresis' value in [%] of the analog input scale (0-20%) for ON/OFF control (not relevant for PID control).

Changing the set point value

`1255, id, sp`

- 1255: Command ID.
- id: Function block ID (1-4).
- sp: Set point value in the range of the analog input scale.

Setting the Function block state

The ON/OFF or PID control function block can be enabled or disabled with this SMS command:

`1251, id, s`

- 1251: Command ID.
- id: Function block ID (1-4).
- s: 1: enable, 0:disable

Controlling the Function block state

A digital input can be configured to control the Enabled/Disabled status of the function block.

The following command selects the digital input.

`1252, id, m, n`

- 1252: Command ID.
id: Function block ID (1-4).
m: Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
n: DI input number (1-4)

The following command clears the digital input function.

`1253, id`

- 1253: Command ID.
id: Function block ID (1-4).

Clearing the Function block configuration

The command erases the function block configuration and frees the function block instance and the respective I/O.

`1260, id`

- 1260: Command ID.
id: Function block ID (1-4).

Note: Analog or digital inputs involved in ON/OFF or PID control function blocks can be used for alarming, while involved digital outputs are dedicated to control and cannot be remotely controlled through SMS commands.

5. User administration

Up to 20 SMS users can be declared in a user list for an SCOM-100 unit. Only declared users can interact (send, receive SMS) with the unit.

SCOM-100 features three user privileges reflecting different user rights. For each user the following privilege flag can be configured:

1. User administration. A user has the right for user administration (Create, Delete, Set privileges) or not.
2. Device configuration. A user has the right to configure the SCOM-100 device or not.
3. Alarm SMS recipient. A user can be an SMS alarm recipient or not.

5.1 Create a new user

The device accepts the command only if it is issued by users who have the administration privilege.

```
0500, id, n, p, c1, c2, c3
```

0500:	Command ID
id:	User ID (1-20)
n:	User name (0-15 characters)
p:	Phone number (3-15 characters)
c1:	User administration privilege (0 for 'No' 1 for 'Yes')
c2:	Device configuration privilege (0 for 'No' 1 for 'Yes')
c3:	Alarm SMS recipient (0 for 'No' 1 for 'Yes')

5.2 Change user configuration

A user with the user administration privilege can use this command to edit other user privileges.

```
0502, id, c1, c2, c3
```

0502:	Command ID
id:	User ID (1-20)
c1:	User administration privilege (0 for 'No' 1 for 'Yes')
c2:	Device configuration privilege (0 for 'No' 1 for 'Yes')
c3:	Alarm SMS recipient (0 for 'No' 1 for 'Yes')

5.3 Delete a user

A user with the user administration privilege can use this command to remove a user from the user list.

```
0501, id
```

0501:	Command ID
id:	User ID (1-20)

5.4 Defining specific alarm recipients

Special commands are available for defining a subset of the user list as SMS recipients for each alarm.

5.4.1 Set a DI alarm recipient

```
1102, m, n, id
```

1102:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)

n: DI input number (1-4)

id: User ID (1-20)

5.4.2 Set an AI alarm recipient

`1202,m,n,id`

1202: Command ID

m: Module number (0 for SCOM-100 main unit, 1-4 for AI-4 expansion units)

n: AI input number (1-2 for SCOM-100 main unit, 1-4 for AI-4 expansion units)

id: User ID (1-20)

5.4.3 Clear DI alarm recipients

The command removes all recipients for a specific DI alarm.

`1109,m,n`

1109: Command ID

m: Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)

n: DI input number (1-4)

5.4.4 Clear AI alarm recipients

The command removes all recipients for a specific AI alarm.

`1209,m,n`

1209: Command ID

m: Module number (0 for SCOM-100 main unit, 1-4 for AI-4 expansion units)

n: AI input number (1-2 for SCOM-100 main unit, 1-4 for AI-4 expansion units)

6. Device status & mode controls

6.1 Setting the device status

A SCOM-100 unit has three operation states:

1. The RUN (Control) state: The unit sends alarm SMS and accepts output control commands. The Status LED is then on.
2. The MONITOR state: The unit sends alarm SMS. All outputs are reset to their initial state. Output control commands are executed by storing the output states internally. The actual output states are restored upon switching to the RUN state. The Status LED is blinking.
3. The STOP state: The unit does not send SMS and rejects all output control commands. All outputs are reset to their initial state. The Status LED is then off.

Configuration and monitoring commands are accepted and answered in all operation modes.

6.1.1 RUN (Control) command

0100

The Status LED switches on and the unit enters the RUN (Control) state.

6.1.2 Monitor command

0110

The Status LED starts blinking and the unit enters the MONITOR state.

6.1.3 STOP command

0000

The Status LED switches off and the unit enters the STOP state.

6.2 Controlling the device status

A digital input can be used to switch between RUN and MONITOR mode for power saving purposes.

`1105,m,n,v`

1105:	Command ID
m:	Module number (0 for SCOM-100 main unit, 1-8 for DI-42 I/O expansion units)
n:	DI input number (1-4)
v:	Input state for switching to MONITOR mode (0,1).

The function can be deactivated with the 'Clear DI configuration command (See 4.3.2).

6.3 Controlling the device response

6.3.1 Send acknowledgement SMS

The device sends a typical acknowledgement response SMS to all configuration commands. The contained text in these SMS can be 'COMMAND PROCESSED OK' or 'OK' (according to the active answer mode Verbose or Brief) in case of successful command execution or All acknowledgement SMS send by the device can be cancelled using the command:

`0621`

Note: In the case of a rejected command, the error response SMS is always being sent.

The acknowledgement SMS can be restored using the command:

0620

6.3.2 Response format

The device acknowledgement SMS can be in verbose or brief format. The verbose format is informative text and is recommended for man to machine applications. Brief format is a briefly coded format for use in machine-to-machine applications. Verbose acknowledgement can be cancelled using the command:

0611

The verbose acknowledgement can be restored using the command:

0610

6.3.3 Merge concurrent alarms

The device can send a separate SMS for each alarm or merge concurrent alarms in one SMS. Alarm merging can be applied using by the command:

0660

Alarm unmerging can be applied using the command:

0661

6.4 Setting up an SMS counter

An SMS counter can be activated for counting down available SMS transmissions. A preset limit can be set for user alarming when the limit is reached.

The counter can be set to a number of remaining SMS messages using command:.

0650, v

0650: Command ID

v: Remaining SMS number (0-4294967295)

Remaining SMS messages limit reach will be acknowledged to users if a limit is set using command:

```
0600,1
```

0600: Command ID

l: Remaining SMS alarm limit (0-4294967295)

Remaining SMS alarm annunciation can be cancelled using the command:

```
0601
```

6.5 Setting date and time

The device real time clock (RTC) can be set through the following command:

```
1600,d,m,y,h,m,s
```

1600: Command ID

d: Day of the month (1-31)

m: Month of the year (1-12)

y: Year

h: Hour

m: Minutes

s: Seconds

6.6 Setting a GSM PIN

An optional SIM card PIN can be set through the following command:

```
0783,p
```

0783: Command ID
p: 4 number characters

7. Monitoring capabilities

7.1 Monitoring commands

The following command invokes a response about device state and active I/O information:

```
5100
```

A typical response SMS is:

```
UNIT:My SCOM-100
```

```
MODE:MONITOR
```

```
Door contact (DI 0,1):OFF
```

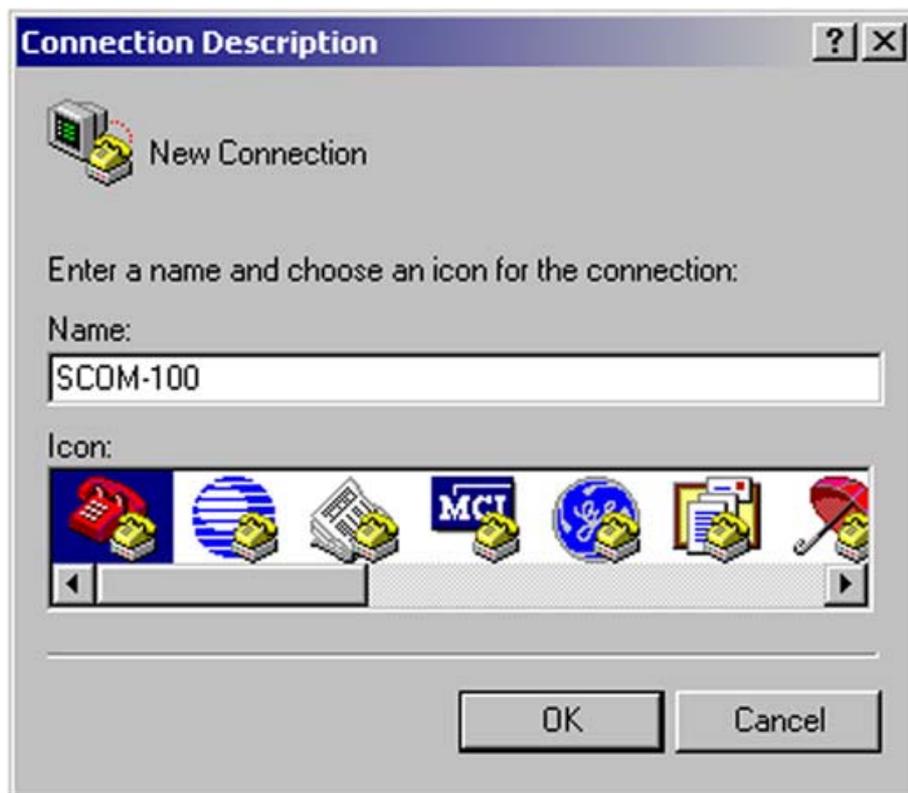
Several commands are available for monitoring the actual device configuration, I/O status and device status. See 9.1.6 command summary for more information on monitoring commands.

7.2 Connecting a PC

The SCOM-100 device can be connected to a PC via the device's serial port and special serial cable.

7.2.1 Using the Hyperterminal for configuration

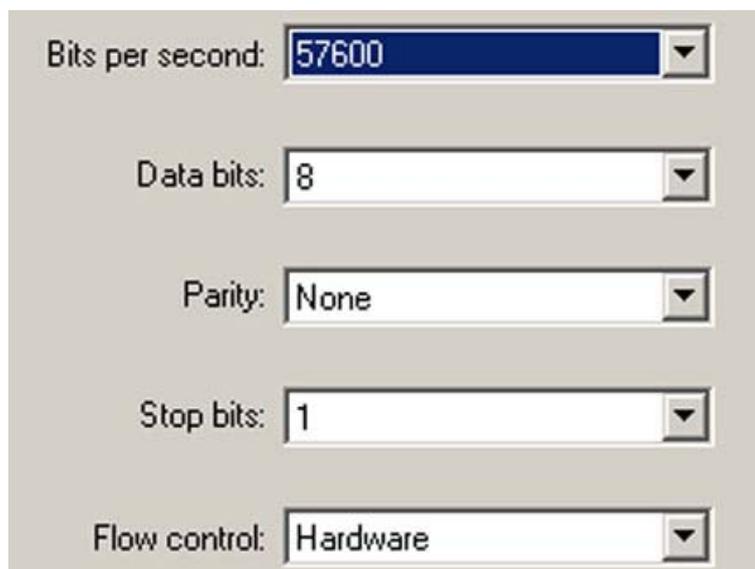
Connect the SCOM-100 unit to a PC. Open the HyperTerminal and set up a new session.



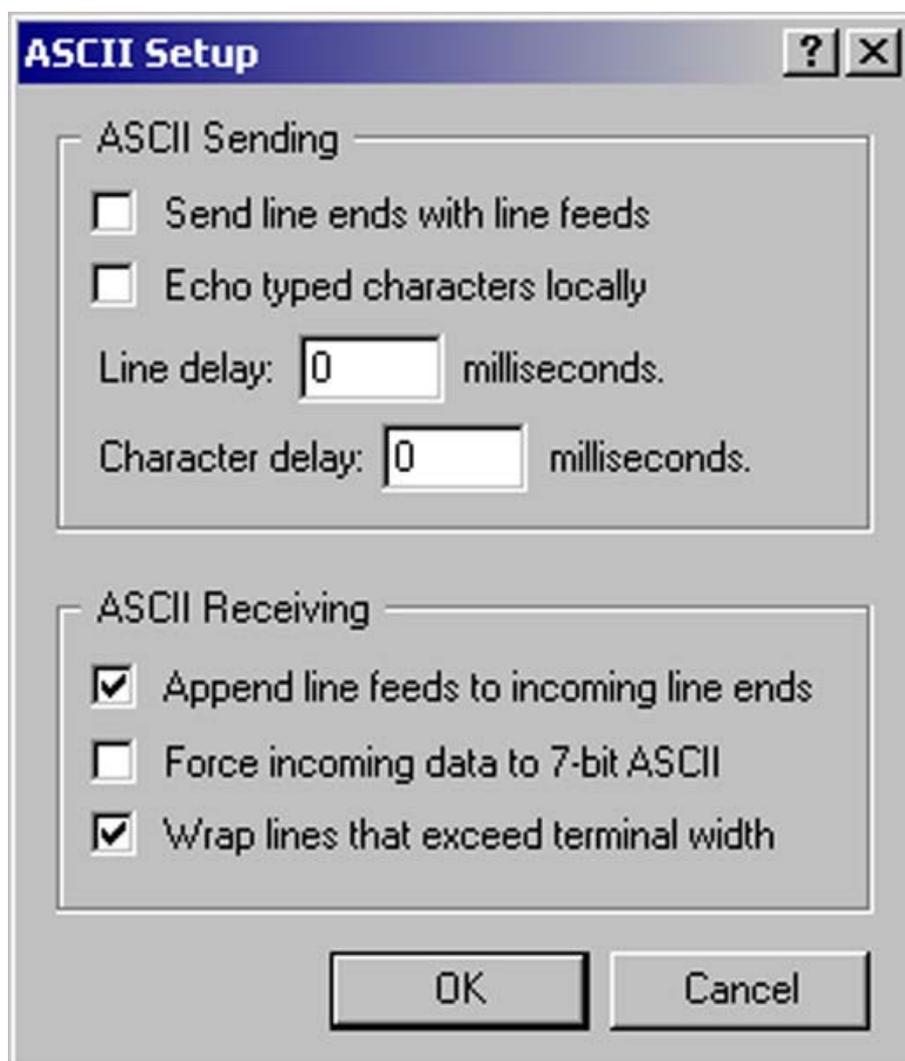
Press OK to create a new connection.



Select a serial connection, choose the appropriate serial port and press 'OK'. Select the following settings for the serial port:



Open the 'Properties' menu and press the 'ASCII Set up' button.



Check the option 'Append line feeds to incoming line ends' and press 'OK' to leave the Properties dialog.

Type in:

at

and press <ENTER>.

If a connection is established the answer is 'OK'. If you don't see your typed characters, give the following command to enable character echoing:

```
Atel
```

All configuration commands can be passed to the unit from the Windows HyperTerminal. The command structure is the same to that of the SMS commands, except the fact that they are embedded in an overall 'atsms' command.

Example:

The SMS command:

```
1100,0,1,Door contact,3,30
```

for digital input configuration can be given via the terminal as:

```
atsms="1100,0,1,Door contact,3,30"
```

All device responses are routed to the terminal's screen.

7.2.2 Using the SCOM Configurator for configuration

The SCOM Configurator is a Windows application for convenient configuring and commissioning the SCOM-100 unit. See the SCOM Configurator's manual for more information.

8. Using the microphone input

A microphone input is provided for the temporary auditive room observation in a remote SCOM-100 site installation. An electret microphone must be connected to the respective input for using this option.

SCOM-100 answers incoming voice calls from users with the administration privilege. All remote control and alarming capabilities are temporary suspended during the auditive session. Any occurring alarms are transmitted after the session termination.

The auditive session is terminated automatically after 10 minutes by the SCOM GSM modem or can be anytime terminated by a user hang up.

9. Appendix

9.1 Command reference

9.1.1 General parameter settings

Cmd	Description	Syntax	Comments
0000	Set Unit Mode: Stop	cmd	
0100	Set Unit Mode: Control	cmd	
0110	Set Unit Mode: Monitor	cmd	
0150	Get Last Error Report	cmd	
0171	Reset Device	cmd	
0183	Set Factory Defaults	cmd,cmd	
0200	Clear Error Led	cmd	
0300	Set Device Name	cmd,s	s:0-15
0310	Set Device Description	cmd,s	s:0-60
0600	Set Remaining SMS Alarm Limit	cmd,l	l:0-4294967295
0601	Cancel Remaining SMS Alarm	cmd	
0610	Set Verbose Responses	cmd	

Cmd	Description	Syntax	Comments
0611	Cancel Verbose Responses	cmd	
0620	Set acknowledgement SMS	cmd	
0621	Cancel acknowledgement SMS	cmd	
0630	Set Alarm Message Text	cmd,id,s	id:1-128, s:0-31
0650	Set Remaining SMS Counter	cmd,v	v:0-4294967295
0660	Merge Concurrent Alarms	cmd	
0661	Unmerge Concurrent Alarms	cmd	
0783	Set GSM PIN	cmd,p	p:4

9.1.2 User configuration

Cmd	Description	Syntax	Comments
0500	Create User	cmd,id,n,p, c1,c2,c3	Id:1-20, n:0-15, p:3-15, c1-c3: 0-1 (config users, config device, receive alarm SMS)
0501	Delete User	cmd,id	id:1-20
0502	Set User Configuration	cmd,id,c1,c 2,c3	id:1-20, c1-c3: 0-1 (config users, config device, receive alarm SMS)
1102	Set DI Alarm Recipient	cmd,m,n,id	m:0-8, n:1-4, id:1-20
1202	Set AI Alarm Recipient	cmd,m,n,id	m:0-4, n:1-2 (base) or 1-4 (ext), id:1-20
1109	Clear DI Alarm Recipients	cmd,m,n	m:0-8, n:1-4
1209	Clear AI Alarm Recipients	cmd,m,n	m:0-4, n:1-2 (base) or 1-4 (ext)

9.1.3 Output control & configuration

Cmd	Description	Syntax	Comments
1000	Set DO	cmd,m,n	m:0-8, n:1-4 (base) or 1-2 (ext)
1001	Reset DO	cmd,m,n	m:0-8, n:1-4 (base) or 1-2 (ext)
1010	Pulse DO	cmd,m,n,s	m:0-8, n:1-4 (base) or 1-2 (ext), s:1-79200 seconds
1020	Set DO After Delay	cmd,m,n,h,mn	m:0-8, n:1-4 (base) or 1-2 (ext), h:0-21 hours, mn:0-59 minutes
1021	Reset DO After Delay	cmd,m,n,h,mn	m:0-8, n:1-4 (base) or 1-2 (ext), h:0-21 hours, mn:0-59 minutes
1030	Attach DO to Time Schedule	cmd,m,n,id	m:0-8, n:1-4 (base) or 1-2 (ext), id:1-10
1040	Set DO as Multivibrator	cmd,m,n,mon, moff	m:0-8, n:1-4 (base) or 1-2 (ext), mon:1-1320 minutes, moff:1-1320 minutes
1050	Set DO Name	cmd,m,n,s	m:0-8, n:1-4 (base) or 1-2 (ext), s:0-15

Cmd	Description	Syntax	Comments
1070	Init DO as Open Contact	cmd,m,n	m:0-8, n:1-4 (base) or 1-2 (ext)
1071	Init DO as Closed Contact	cmd,m,n	m:0-8, n:1-4 (base) or 1-2 (ext)
1090	Clear DO Configuration	cmd,m,n	m:0-8, n:1-4 (base) or 1-2 (ext)

9.1.4 Input configuration

Cmd	Description	Syntax	Comments
1100	Set DI Configuration	cmd,m,n,s,a,d	m:0-8, n:1-4, s:0-15, a:0-3, d:0-65535
1101	Set DI Alarm Messages	cmd,m,n,id1,id2	m:0-8, n:1-4, id1/id2:0-128
1110	Clear DI Configuration	cmd,m,n	m:0-8, n:1-4
1200	Set AI Configuration	cmd,m,n,s,ssl,ssh,scl,sch,all,alh,u,d	m:0-4, n:1-2 (base) or 1-4 (ext), s:0-15, ssl/ssh:0-4095 scl/sch/all/alh: -100000...100000, u:0-15, d:0-65535

Cmd	Description	Syntax	Comments
1201	Set AI Alarm Messages	cmd,m,n,id1,id2	m:0-4, n:1-2 (base) or 1-4 (ext), id1/id2:0-128
1210	Clear AI Configuration	cmd,m,n	m:0-4, n:1-2 (base) or 1-4 (ext)
1800	Set analog IN deadband	Cmd,d	D:0-5% of the total scale with 0.1 steps

9.1.5 I/O Functions

Cmd	Description	Syntax	Comments
1250	Set ON/OFF - PID Control Configuration	cmd,id,m,n,m1,n1,sp,g,it,dt,ct,h	id:1-4, m,n:AI, m1,n1:DO, sp:-100000-100000, g:0.0-100.0, it:0-1000 sec, dt:0-200 sec, ct:1-15 min, h:0.0-20.0 %
1251	Set ON/OFF - PID Control state	cmd,id,s	id:1-4, s:0-1
1252	Set PID Control DI	cmd,id,m,n	id:1-4, m:0-8, n:1-4
1253	Clear PID Control DI	cmd,id	id:1-4

Cmd	Description	Syntax	Comments
1255	Set PID Control Set Point	cmd,id,sp	id:1-4, sp:-100000-100000
1260	Clear PID Control Configuration	cmd,id	id:1-4
1105	Set DI for device Status control	cmd,m,n,v	m:0-8, n:1-4, v:0-1

9.1.6 RTC & Time scheduling

Cmd	Description	Syntax	Comments
1600	Set RTC Time	cmd,d,m,y,h,m,s	d: Day of month (1-31), m: Month of year (1-12), y:Year, h:Hour, m:Minutes, s:Seconds
1700	Set Time Schedule Day	cmd,id,d, p1b-p1d, p2b-p2d,..., p8b-p8d	id:1-10, d:1-7 (1:Sun, 2:Mon, etc)
1701	Set Time Schedule Duration Percent	cmd,id,p	id:1-10, p:0-100
1710	Clear Time Schedule	cmd,id	id:1-10

9.1.7 Monitoring commands

Cmd	Description	Syntax	Comments
2000	Get Device Status	cmd	
2006	Get Device Software Version	cmd	
2300	Get Device Name	cmd	
2310	Get Device Description	cmd	
2500	Get User Info	cmd	
2600	Get Remaining SMS Alarm Limit	cmd	
2601	Get Remaining SMS Alarm Status	cmd	
2610	Get Verbose Responses	cmd	
2620	Get Acknowledge Status	cmd	
2630	Get Alarm Message Text	cmd,id	id:1-128
2650	Get Remaining SMS Counter	cmd	
2660	Get Alarm Merge Status	cmd	
2710	Get Available Alarm Message ID	cmd	
3000	Read DO	cmd,m,n	m:0-8, n:1-4 (base) or 1-2 (ext)

Cmd	Description	Syntax	Comments
3050	Get DO settings	cmd,m,n	m:0-8, n:1-4 (base) or 1-2 (ext)
3100	Read DI	cmd,m,n	m:0-8, n:1-4
3110	Get DI Settings	cmd,m,n	m:0-8, n:1-4
3200	Read AI	cmd,m,n	m:0-4, n:1-2 (base) or 1-4 (ext)
3210	Get AI Settings	cmd,m,n	m:0-4, n:1-2 (base) or 1-4 (ext)
3250	Get ON/OFF - PID Settings	cmd,id	id:1-4
3600	Get RTC Time	cmd	
3700	Get Time Schedule	cmd,id	id:1-10
5000	Get HELLO	cmd	
5100	Get Current IO State (AI/DI/AO/DO)	cmd	

9.2 Troubleshooting

<p>The ready LED goes off after the start up sequence.</p>	<p>Case 1: Error LED is off You started the unit for the first time and the SIM card does not contain a user name and phone number in the phone book directory. See chapter 3.1.</p> <p>Case 2: Error LED is on An error occurred during start up. See chapter 9.4 & 9.5.</p>
<p>The unit does not respond to SMS at all.</p>	<p>The unit does not register to the GSM provider network. Check if the 'NETWORK' LED is blinking. Connect a proper GSM antenna to the unit (See chapter 2.6)</p>
<p>The unit does not respond to configuration SMS commands.</p>	<p>The 'Response SMS' parameter is probably off. Set the parameter to on state. Read chapter 6.2.1</p>
<p>The unit does not execute my digital output control commands.</p>	<p>Check the status LED. The unit is probably in STOP or MONITOR status. Set the unit status to RUN. See chapter 6.1. Read the SMS response to your command.</p>

<p>The unit does not send an alarm SMS after a digital input state changes.</p>	<p>The device is in STOP mode. The respective input is not activated for alarming. Activate the input by sending the proper configuration command (See chapter 4.3).</p>
<p>The analog value readings through the monitoring command seem not to be correct.</p>	<p>Check sensor cabling for the corresponding channel (see chapter 2.4) Set the correct analog channel measurement parameters (see 4.5.1).</p>
<p>Alarm SMS of an analog input come too frequently.</p>	<p>Set a higher alarm delay or a deadband value for the analog inputs (see 4.5.4)</p>

9.3 Technical specifications

9.3.1 Main unit

Protection	IP20
Temperature range	-10°C, +70°C, operating
Dimensions	106 x 90 x 58 mm
Weight	0.3 kg
LED indications	4 digital input LED 4 digital output LED 6 control LED
Mounting	EN 60 715 TH35 DIN rails or direct wall mounting.
Supply voltage	SCOM-100-MU-12 : 12VDC+/-10% SCOM-100-MU-24 : 24VDC+/-10%
Supply current	rated 250 mA max, (2 A burst)
Analog inputs	2, resolution 10 bit
Digital inputs	4, pull, GND to Vcc
Digital outputs	4, relay, 250V, 10A AC1
Serial port (COM2)	Baud rate: 2400 to 115200 bps
	Protocols: Hayes AT, Custom AT (atsms)
Interfaces	SIM Card : SIM card holder
	RS232C: RJ-45 connector
	I/O expansion: 6 pin modular connector
	Microphone: 2 pin array connector

	Power supply & I/O: screw terminals
GSM MODEM	Quad Band (850/900/1800/1900MHz)
SMS	GSM Text Format

9.3.2 GE-DIO-42 Digital I/O Expansion module

Protection	IP20
Temperature range	-10°C, +70°C, operating
Dimensions	53 x 90 x 58 mm
Mounting	EN 60 715 TH35 DIN rails or direct wall mounting.
Supply voltage	GE-DIO-42-12 : 12VDC+/-10% GE-DIO-42-24 : 24VDC+/-10%
Supply current	80 mA max
Digital inputs	4, pull, GND to Vcc
Digital outputs	2, relay, 250V, 10A AC1
Interfaces	I/O expansion: 2 x 6 pin modular connector

9.4 Error handling

9.5 Status LED indications

9.5.1 Main unit

LED	Indication
POWER	Presence of power supply voltage
NETWORK	Blinking upon successful registration the GSM provider's network
S/R SMS	Turns on during SMS receive or transmit
ERROR	<ul style="list-style-type: none"> • Turns on after start up: <ul style="list-style-type: none"> SIM card error Modem error Missing I/O expansion module Excessive EM noise or hardware error • Turns on during operation <ul style="list-style-type: none"> Modem error Excessive EM noise or hardware error
STATUS	ON: RUN (Control) state Blink: MONITOR state OFF: STOP state
READY	Blinking slowly: The unit starts up after power up (approx. 1 minute) Blinking fast: The unit starts after holding the start up button pressed during power up: Initialization process (approx. 1 minute) On: Unit start up completed OK Off with ERROR LED off: No user administrator found in SIM Off with ERROR LED on: See ERROR LED

9.5.2 GE-DIO-42 Digital I/O expansion

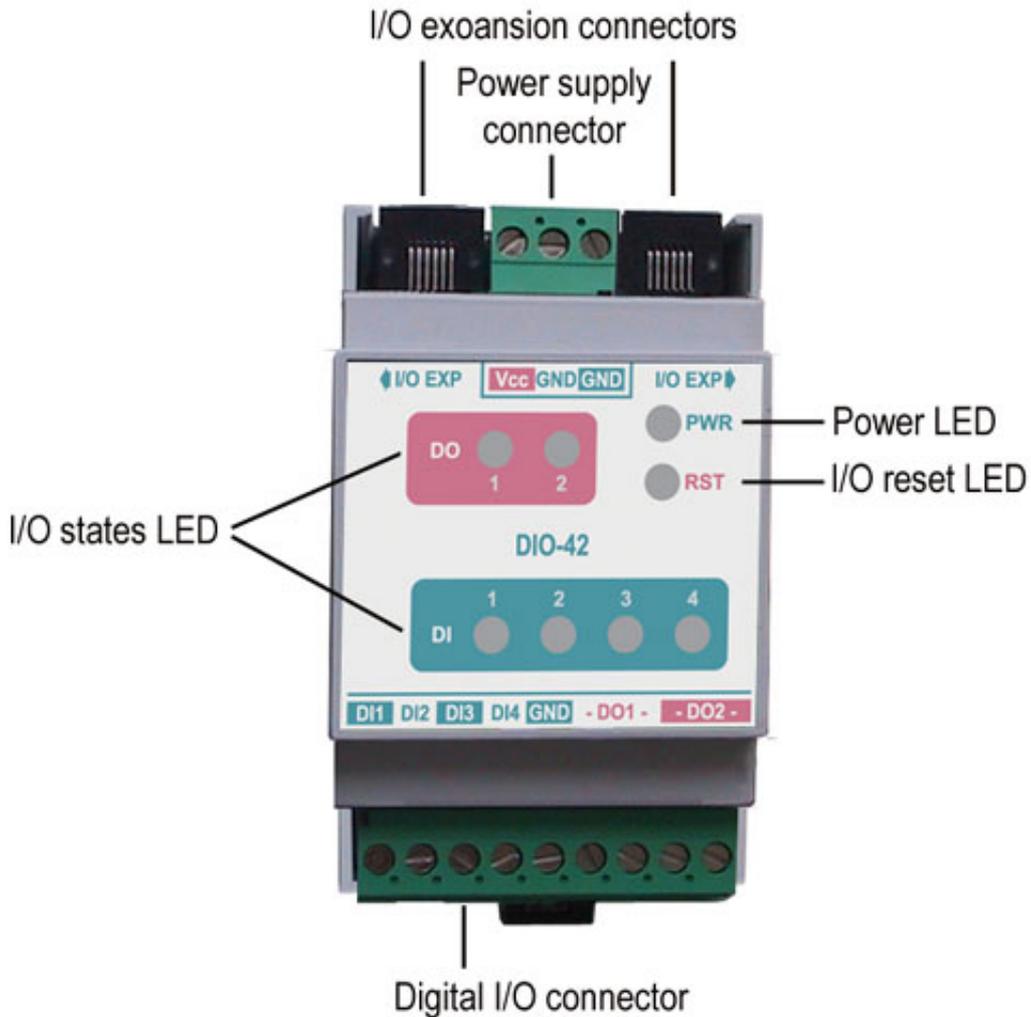
LED	Indication
POWER	Presence of power supply voltage
RST	Digital output reset during STOP or MONITOR status

9.6 Default parameter values (Factory settings)

Parameter	Value
Device Name	SCOM-100
Device description	REMOTE CONTROL UNIT
Response format	Verbose
Send response SMS	Yes
SMS counting	Disabled
Merge concurrent alarms	Yes
GSM pin	None
Language	English
DI alarming	Disabled
AI alarming	Disabled
DO start up state	Open contact
User list	Empty
Time schedule list	Empty
Alarm message list	Empty

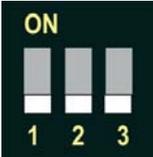
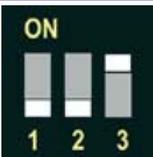
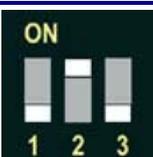
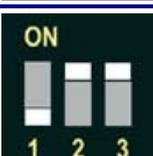
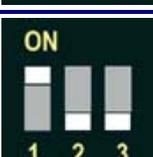
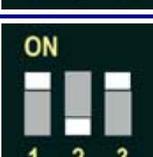
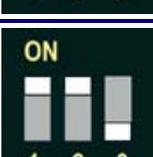
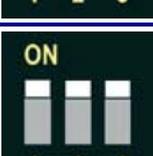
9.7 Setting an I/O expansion module address

9.7.1 GE-DIO-42 digital I/O expansion

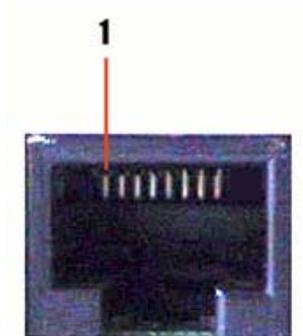


Module number 0 is reserved for the main unit.

The module number (m, see sections 4.3 & 4.4) of an expansion module is determined by the DIP switch settings on the rear side of the module. The settings can be derived from the following table:

Dip switch settings	Module number (m)
	1
	2
	3
	4
	5
	6
	7
	8

9.8 RS232C connector layout



PIN	Type	Acronym	Signal
1	Out	DCD	Data Carrier Detect
2	Out	DSR	Data Set Ready
3	Out	RXD	Receive Data
4	In	RTS	Request To Send
5	In	TXD	Transmit Data
6	Out	CTS	Clear To Send
7	In	DTR	Data Terminal Ready
8	-	GND	Signal Ground