



RELY ON COMMUNICATION

# SEVERA<sup>®</sup>

User instructions



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Adesys bv, Wieringeren, NL

[www.adesys.nl](http://www.adesys.nl)

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# 1 GENERAL

## 1.1 INTRODUCTION

This manual relates to Severa modems with firmware version 5 or higher.

### 1.1.1 PSTN / GSM model

The Severa is an alarm system raising the alarm and forwarding notification of malfunctions and calamities by telephone for both manned and automated installations and processes. Depending on the model used, forwarding is done via either the fixed (PSTN) or mobile network (GSM). Changes in status are forwarded as SMS message.

Depending on the type ordered the Severa comes complete with all contact inputs, relay outputs, inputs for analogue signals and/or modem functionality. The user can set the SMS text for reporting changes, which is also the case with the desired dialling sequence and reset procedure.

### 1.1.2 GPRS model

The Severa is also available as a special model for GPRS applications with its own manual available. With this Severa you are "always on line" with your applications in the field. Severa's unique "auto log on" concept replaces the often complex GPRS technology with standard modem technology. Consult our website for more information or contact one of our employees.

### 1.1.3 Severa series features

- Adjustable delays
- Built-in emergency power supply (may vary per model)
- Mains monitoring (may vary per model)
- Serial interface RS232 connection (9 pole sub D and RJ10 connector)
- Settings and SMS texts are permanently stored in the Severa's internal flash memory.
- The Severa can be programmed using the '**SevProg**' program, which can be downloaded free of charge at [www.adesys.nl](http://www.adesys.nl). This programming tool software is also available on CD-ROM and can be ordered from Adesys as an optional extra.

To make the best possible use of all the features offered by the Severa, we recommend that you read this user manual carefully.





### 1.1.4 Pictograms used

This user manual uses various pictograms.

The meanings of these pictograms are as follows:



Tip or matter of attention



Action to be performed



Reference in an illustration

## 1.2 CHECKING YOUR ORDER

Check the packaging for any damage. If your order is damaged or incomplete upon receipt, contact your supplier immediately.

### The standard order includes:

- Severa
- Connection clamps
- Modem/programming cable set
- Telephone wire with country-specific telecom plug (only with Severa PSTN)
- This user manual
- Guarantee card

### Optional extras are:

- Antenna and antenna cable (various models, such as a vandalism-resistant model)
- Mains adapter 230VC / 12VDC (article number **SV-20**)
- RS-232, 9-polig Sub-D cable male / female (article no. **TB-14**)
- USB-SERIAL adapter (article no. **TB-18**)
- 'SevProg' programming tool software (article no. **SV-40**)



### **1.2.1 The environment**



This product contains materials that might harm the environment. To protect the environment, if the product is to be replaced at the end of its useful life, please do not deposit it with your household waste. You can return the product to your supplier or turn it in at a special depot.

## **1.3 GUARANTEE AND LIABILITY**

Each Severa is subjected to extensive testing by ADESYS prior to shipment.

ADESYS offers one year's guarantee, provided that the guarantee card accompanying the Severa is completed and returned to us.

### **The following will terminate the guarantee:**

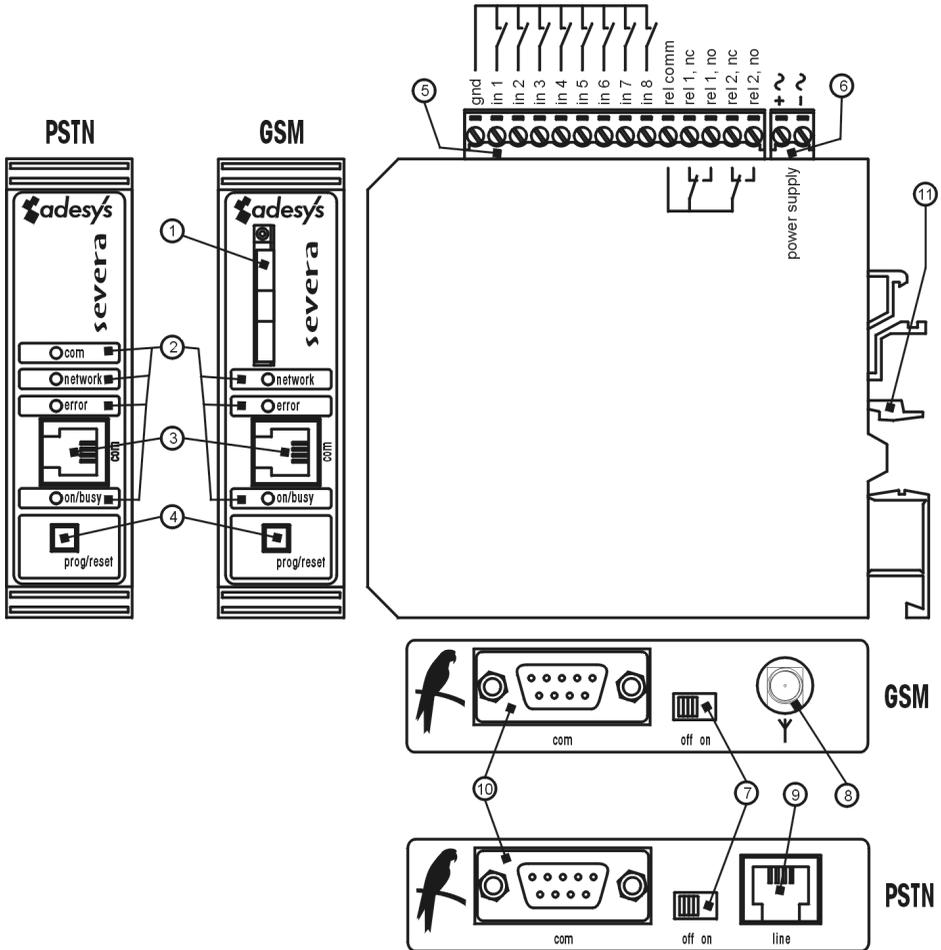
- If the malfunction was caused by gross negligence or inexpert installation
- If the product has been opened and/or any repairs or changes have been made without the permission of ADESYS
- If the serial number proves to have been removed or damaged.

ADESYS cannot be held liable for any consequential damages if the alarm stagnates. Alarms do not offer a 100% guarantee against damages, but are merely tools for preventing damages. Consequently, we recommend that you discuss the remaining risk with your insurance company.



# 2 IDENTIFICATION

## 2.1 CONNECTION DIAGRAM





- 1 SIM card holder (only with GSM and GPRS models)
- 2 LED status indicator: antenna level (**network**), error messages (**error**) and general status (**on/busy**)
- 3 Serial interface RS-232, RJ-10 connector (*com*)
- 4 Programming / resetting key (**prog/reset**)
- 5 Input / output connection clamps
- 6 Mains connection clamps
- 7 Power switch (**on/off**)
- 8 Antenna connection type SMA female (only with GSM and GPRS models)
- 9 RJ-11 telephone connection (only with PSTN models)
- 10 Serial interface RS-232, 9-pole sub-D connector
- 11 DIN rail mounting clamp



## 3 INSTALLATION

### 3.1 LOCATION

Place the Severa outside the effects of direct sunlight or other heat sources. Select the place where you will mount the Severa in such a way that no moisture can enter the machine. The Severa can be mounted without using screws on a TS35 rail. The surrounding temperatures permitted range from -20°C to +55°C for the electronic equipment and from -5°C to +55°C for the NiMH battery (emergency power supply).



The Severa has greater transmitting power than standard mobile telephones. In certain cases, this may affect the functioning of nearby electronic equipment. The effects depend on the distance between the antenna and the surrounding equipment.

### 3.2 DIGITAL INPUTS

The digital contact inputs can be used with either make-contacts or breaker contacts. Activate the entries only using potential-free contacts or open-collector outputs. The open clamp voltage should be no less than 1.8V and no more than 3.6V. The contact voltage should be no more than 350µA @ 3.6V.

### 3.3 OUTPUTS

The outputs of the GSM and GPRS models can only be switched remotely. The maximum voltage allowed for these relay contacts is 100V / 1A AC/DC.



The internal insulation distances are not suitable for direct switching using 230V. Always use an additional relay with a spool voltage of no more than 100V.

### 3.4 RS-232 (COM) PORTS

The Severa is set up by means of the available RS-232 (com) ports. The cable set included and the downloadable software programming tool **SevProg**, are used for this purpose. Which RS-232 (com) port is used makes no difference to setting up.

If the Severa is used as an external modem it is necessary to choose between the 4 pole RJ-10 or 9 pole SUB-D connections. Default the 9 pole SUB-D connector is selected. This can be changed via the **SevProg** using the tab "Modem" and "Handshake" settings.

"Flowcont" or "no flowcont" (=standard) applies to the 9 pole SUB-D connection. When using the 4 pole RJ-10 connection a choice has to be made from DCD, DTR or RI.

This depends on which control signals are used for the application that is employed. However, a lot of applications do not use these signals.



### 3.5 SIM-CARD (Only with Severa GSM and GPRS)

Read the instructions for setting the PIN code etc. that are shown on the separate form.

Insert the required SIM card as follows:

- Switch the Severa **off** ⑦.
- The SIM cardholder is made accessible using a pointed object to press the adjacent button, which releases the holder ①.
- Place the SIM card in the holder and slide the holder back into the Severa ①.

Switch the Severa **on** ⑦.



The SIM card should only be inserted when the Severa is fully switched off. Inserting or removing the SIM card while the Severa is switched on may damage the memory of the SIM card.



We strongly advise against using a prepaid SIM card for alarm purposes. The mobile network is not equipped to automatically request the level of telephone credit available. This means that the absence of credit will not be noticed and will lead to outgoing alerts coming to a standstill!



If dialling up with a modem on a GSM model Severa, the Severa should always have a SIM card with data supplement (GSM data)! Consult your telecom provider concerning this.

### 3.6 ANTENNE (only with Severa GSM and GPRS)

In areas with reduced reception, place the antenna as high as possible. Connect the optional antenna cable to the Severa's antenna connection ⑧.



After having connected the antenna, always check the antenna signal's field strength (no more than 5 pulses of the yellow **network** LED). Changes in the signal strength will be reported very slowly ( $\pm 30$  sec.); bear this in mind when relocating the antenna etc.



## 3.7 POWER SUPPLY

### 3.7.1 Mains adapter SV-20

A 230VAC / 12VDC mains adapter power supply (article number SV-20) is available for the Severa as an option.

Take care to check the polarity of the connection block when connecting it to the supply cable.

The yellow connecting wire on the supply cable is positive (+) and the white connecting wire is negative (-).

An extra fuse is not necessary here.

When the Severa is not supplied by the mains adapter mentioned above, the connection instructions given in articles 3.7.3 and 3.7.4 apply.

### 3.7.2 Built-in emergency power supply

Severa modems are also available with a built-in emergency power supply as an option. This consists of a charger and two NiMH rechargeable batteries. The life expectancy of these batteries depends very much on the circumstances under which they are used. Regularly check that the emergency power supply is working correctly by disconnecting the mains supply. It is important that the batteries are replaced if they are defective otherwise they could damage the Severa.

### 3.7.3 Severa PSTN

Connect the Severa PSTN to a direct-voltage power supply of 8 to 35VDC (minimum of 2W) or an 8 to 28 VAC transformer (minimum of 3VA). The Severa PSTN's power plug is galvanically separated from the other connections, allowing the Severa PSTN to be simply connected to existing power supplies. Always insert a 1AT fuse between the power supply or transformer and the Severa.

### 3.7.4 Severa GSM and GPRS

Connect the Severa GSM to a direct-voltage power supply of 8 to 35VDC (minimum of 3W) or a 15 to 28 VAC transformer (minimum of 5VA). The Severa GSM power plug is **not galvanically separated** from the other connections. The power connection's GND plug is linked directly to the input connector and COM port's GND plug inside.



Connecting the Severa GSM or Steady Connect to an application (process regulator, PLC, computer, active answering machine, etc.) without galvanic separation if the Severa GSM is connected to the same power supply creates a real risk of earth loops and/or short circuits in that power supply!

As such, we recommend that in the case of any doubt you always check whether or not the application to which the Severa GSM is to be connected has galvanic separation. You can verify this simply using an ohm meter to measure the resistance between the power source and each connector of the application to which the Severa is to be hooked up. If that resistance is less than 10M, they are not fully separated and there is a risk of malfunctions and/or damage to the Severa and/or the application.



If the Severa can be connected to an existing power supply, always insert a 1AT fuse in the supply clamps' + or AC connectors.

The Severa can also be powered using the optional 230VAC network adapter (article no. **SV-20**), in which case no fuse is required between the power supply and the Severa.

### **3.8      PROG / RESET BUTTON**

When the Severa is switched on, you can check the functioning of the indicator LEDs using the **prog/reset** button. When you press this button, all LEDs will light up. The **prog/reset** button also allows you to confirm all active input points **at once**. For more information, see chapter 5.6 CONFIRMING A REPORT MESSAGE



This **prog/reset** button also serves for activating the Severa's programming mode. See chapter **Fout! Verwijzingsbron niet gevonden.**



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## 4 SETTING UP THE SEVERA

### 4.1 INSTALLING AND USING SEVPROG

This software programming tool for the PC is used to set up all Severa models. The program can be downloaded free from Adesys' website ([www.adesys.nl](http://www.adesys.nl)). All basic and modem settings are stored in the Severa's internal flash memory.

#### **It is not possible to store the settings on the SIM card!**

SevProg has to be installed on your PC before it can be used. Follow the directions given on your PC screen during the installation process precisely. As soon as the installation process has been completed start the program by using the shortcut or the MS Windows program menu.

Connect the Severa to a power supply and make a connection between the Severa and the PC using the serial cable set, which is included.

It makes no difference which of the RS-232 ports is used for setting up. The (serial) cable set, which is included, is suitable for both connection possibilities. It is also unimportant which of the included adapters you use. Both the DCD (Data Carrier Detect) and the RI (Ring Indicator) adapter are suitable for this purpose.

If your PC has no serial connection it is possible to use a USB port on the computer by using the USB SERIAL adapter, which is available as an option. This adapter can be ordered from Adesys stating article number TB-18.

The Severa can now be switched on.

After switching on the Severa set it to programming mode by pressing the prog/reset button. After doing this all the LEDs will start to flash. This is only possible while the green LED flashes on/busy. If this doesn't happen switch the Severa off and repeat the previous procedure.

Now select the COM port that the Severa is connected to using the "Options" tab. At the bottom of the SevProg window, the "Status info" will show whether the Severa has been connected properly.

Enter all the required set-up data in the necessary fields and if necessary follow any instructions displayed in the right-hand text field. Once all the necessary data has been entered the settings will be stored in the Severa's internal flash memory by pressing the "Program" button.

This completes the Severa set-up.

### 4.2 DEFINITIONS OF THE TERMS USED

#### 4.2.1 Main message (Location name)

The *main message* is always displayed first with all report messages. If the messages in question are sent to a central point from various locations, the *main message* can be used to report the location from where the status is reported. The maximum number of characters for the message is twelve.



#### 4.2.2 Status message

The *status message* is linked to an input channel. In this way, for example, the machine can be indicated that is causing the status change on the input channel in question. The maximum number of characters for this part of the message is twelve.



The maximum number of characters that can be displayed in the *main* and *status* messages is twelve. If more than twelve characters are entered, only the first twelve will be displayed in the SMS message.

#### 4.2.3 Dial-back time

The *dial-back time* determines the space of time within which a report message is to be confirmed. Confirmation can be either by sending back an SMS message (GSM and GPRS models) or by phoning the Severa (PSTN). The maximum value that can be set is “60” minutes. If it is set to “0”, alarms need not be confirmed.



Please note that status changes of other input points will not be reported until a current report has been completed. Consequently, the *dial-back time* should be selected carefully.

#### 4.2.4 Contact input point

Both make-contacts and breaker contacts can be used. Set to “NO” (standard setting) if a make-contact is used and “NC” for a breaker contact. **NO** stands for **N**ormally **O**pen (make-contact) and **NC** for **N**ormally **C**losed (breaker contact).

#### 4.2.5 Delay

The *delay* can be used to set a delay for the status message (active and idle). This means that the report will not be started until the contact has been activated or deactivated for longer than this amount of time. The maximum value that can be set is “3600” seconds.



If the input channel returns to the idle mode within the delay, **no** report procedure will be started.

#### 4.2.6 Correction report (Idle)

If you wish, once the input channel has returned to the idle mode, a correction report can be sent. In order to activate this report, set this report field to “yes”.



If **no** dial-back time has been set, a correction report will be sent to all numbers set for the input point in question. If a dial-back time **has** been set, only the telephone number to which the final report message is sent will receive a correction report.

#### 4.2.7 Report block on input channels during mains failures

It may be desirable to block status reports during mains failures until the failures have been resolved. To activate the block, enter “yes”. In the event of In the event of a mains failure, any current reports



will immediately be terminated. The input points for which the status report has not yet started or for which the status report has been terminated will not be restarted until the mains failure has been resolved.

#### 4.2.8 Telephone number and dialling sequence

The maximum number of digits that can be entered per field is 20. The maximum number of telephone numbers per input channel is eight. There can be different telephone numbers and dialling sequences per input. The sequence for dialling out is always from 1 to 8.



The telephone numbers must **always** be entered in the international format, with the country code. For Dutch numbers this is +31.

For example: 0651627384 should be entered as +31651627384

#### 4.2.9 Required basic settings

Before you can start programming, you must first complete a number of required basic settings/actions:

##### For the SIM-card

-  Place the SIM card that you wish to use in a mobile telephone or SIM card reader/writer to enter the following settings.
-  Change the SIM card's "old" PIN code to the new PIN code to be used with the Severa, **or** else deactivate the PIN code.
-  **Activate** caller identification (using your provider's service menu).
-  **Deactivate** Voicemail (using your provider's service menu).
-  Program your provider's SMS switchboard number (only necessary near borders).

##### For the receiving telephone

-  **Activate** caller identification (only necessary for accepting/confirming alarms).



Deactivating caller identification and activating Voicemail may cause the Severa to malfunction. If caller identification is deactivated, it will be impossible to confirm reports.



## 5 HOW THE SEVERA WORKS

### 5.1 FUNCTIONS

Once the Severa has been connected, programmed and tested, it is ready for use.

The following functionalities are available:

- Reporting status changes
- Reporting mains failures
- Confirming report messages
- Remote switching (only with the Severa GSM and GPRS)
- Requesting version number (only with the Severa GSM and GPRS)



Statuses of input and output points are **not** stored in a permanent memory. If the power supply is cut off *and* if the built-in battery, if fitted, is entirely discharged, the content of this memory will be lost. When the power supply is restored, the Severa will act as if it is started for the first time. This may have the following consequences:

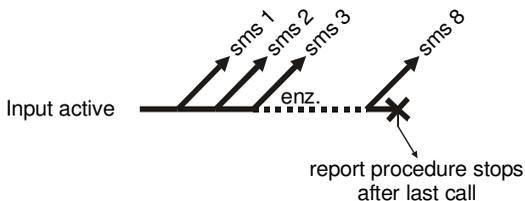
- After the power supply has been restored **only** active input points will be reported **again**.
- **No** correction report will be sent because the status of that input point has been reset **during** the power loss.
- Active output points are deactivated.

### 5.2 REPORT PROCEDURE

The Severa has two ways of reporting. These can be set for each input channel and depends on the dial-back time.

#### Dial-back time "0"

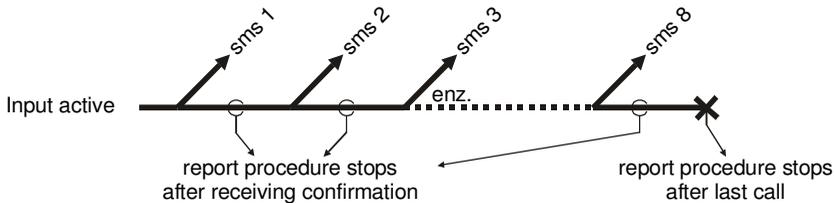
As soon as an input channel becomes active, the report procedure starts. The appropriate report message is sent to all telephone numbers listed in sequence.





### With dial-back time “1” ..... “60”

The report procedure starts as soon as an input channel becomes active. After each report message has been sent, the Severa waits for the dial-back time for confirmation. The report procedure is completed when the report message has been confirmed or when the final report has been made.



If the input channel returns to idle within the delay set, the report procedure will be terminated at the end of the delay. However, if the input channel becomes active again during the delay, the report procedure will be continued.

### 5.3 STRUCTURE OF THE REPORT MESSAGE

The messages that the Severa sends to a mobile telephone have a fixed structure. The report message is structured as follows:

#### **MAIN MESSAGE,INPUT CHANNEL,STATUS REPORT,STATUS,ACTION.**

- “MAIN MESSAGE”; contains a text (message) that you select, which precedes all report messages for status or mains failure reports.
- “INPUT CHANNEL”; indicates which channel number is active or idle.
- “STATUS REPORT”; contains a text (message) that you select, which is connected to the input channel.
- “STATUS”; indicates whether an input channel is **Active** or **Idle**.
- “ACTION”; this field indicates WHETHER OR NOT the alarm message has to be confirmed. If this field is left blank (,), no confirmation is needed. If **Confirm** is set, receipt of the alarm message has to be confirmed. For more details, see chapter 5.6 CONFIRMING A REPORT MESSAGE

### 5.4 REPORTING STATUS CHANGES

When an input channel becomes active, the appropriate report message will be sent to the first number in the sequence connected to that input point. Once input channel 1 has been activated, the following will happen.

- The green LED (**on/busy**) will flash 1x to indicate that input channel 1 is active.
- After several seconds, the green LED (**on/busy**) will start flashing rapidly, indicating that the SMS message is being sent.



- The LED (**on/busy**) will flash 1x again. The SMS message has been sent and the Severa is waiting for confirmation, if any is required, of the report message sent.
- The report message is displayed on the mobile telephone to which the SMS message was sent. The report message might be structured as follows:

**LOCATION,1,PUMP MALFUNCTION,Active,Confirm.**

- The green LED (**on/busy**) will continue to show the input point's status until it is no longer active.
- Once the input point returns to the idle mode and if the Severa is set to send a correction report, the report message will be structured as follows:

**LOCATION,1,PUMP MALFUNCTION,Idle**



All status reports must be completed before a new status change (for a different input channel) can be reported. This means that the report message must be confirmed or that a report message must have been sent to all telephone numbers programmed for the input point in question. The exception to this is the network malfunction report. See chapter 5.5 REPORTING MAINS MALFUNCTIONS (only with built-in emergency power supply)

## **5.5 REPORTING MAINS MALFUNCTIONS (only with built-in emergency power supply)**

If the Severa's power supply is cut, a mains failure report will be started. The relevant report message will be sent to the first number in the sequence linked to the mains failure. This is only possible if the Severa is fitted with the optional emergency power supply. After the power supply has been cut, the following will happen:

- The red LED (**error**) will flash 5x to indicate that the power supply has been cut.
- After a few seconds, the green LED (**on/busy**) will start flashing rapidly, indicating that the SMS message is being sent.
- The green LED (**on/busy**) will start flashing again continuously. The SMS message has been sent and the Severa is waiting for confirmation of the report message, if it is programmed to.
- The message will appear on the mobile telephone to which the SMS message was sent. The message can be structured as follows:

**LOCATION,9,MAINS FAILURE,Active,Confirm.**

- The red LED (**error**) will continue to show the status of the mains failure until it has been restored.
- Once the power supply has been restored and if the Severa is set for sending correction reports, the report message will be structured as follows:

**LOCATION,9,MAINS FAILURE,Idle,.**



Mains failures always have precedence over current reports of status changes. After the mains failure has been reported, any interrupted messages will be restarted, after which the reports for status changes not yet reported are continued. This rule of precedence applies to both **Active** and **Idle** status changes.

Owing to the lack of power supply during mains failures, any active output points will return to idle. After the power supply has been restored these output points will return to active, if the memory for remembering the status of the various input and output points has not been lost (see chapter 5.1 "FUNCTIONS").

## 5.6 CONFIRMING A REPORT MESSAGE

### 5.6.1 Severa GSM nand GPRS

If a report message requests that you **Confirm** its receipt, you can simply return the/an SMS message or dial back from the telephone on which the message was received.

Confirming receipt by telephoning does not cost anything, because the Severa recognizes the telephone number and confirms the receipt of the report message. The confirmation is completed if the Severa rings 3x and the connection is terminated. If the connection is terminated almost immediately, the confirmation has failed. The dial-back time has been exceeded and the report message has already been sent to the next telephone number in the dialling sequence.

If an SMS message is sent or returned as confirmation of the report message, the confirmation message need not have any content. As with dialling back, the report is confirmed by recognition of the telephone number.

The **prog/reset** button can be used to confirm all active input points **at once**. Current reports are immediately terminated.



Report messages can only be confirmed using the telephone to which the SMS message was sent. If caller identification has been disabled, it is not possible to confirm status reports.

If a status report has already been sent to the next telephone number in the dialling sequence (if the dial-back time for the previous report has been exceeded), only the new telephone can confirm the report message. This means that only the telephone that last received a report message can confirm the report.

### 5.6.2 Severa PSTN

Report messages are confirmed by returning the call from any telephone within the set time. When the Severa answers, a long protracted beep will sound as confirmation, after which the connection is automatically terminated. Caller identification does NOT apply here.



## 5.7 ANALOGUE INPUTS

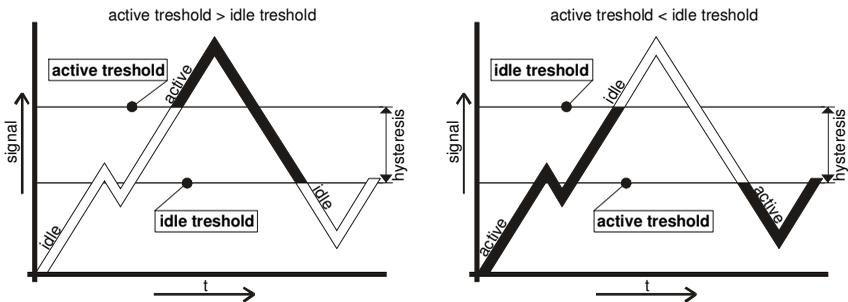
The Severa is also available with analogue voltage or power inputs. This makes combinations of normal contact inputs and analogue voltage or power inputs possible.

This chapter explains how the analogue inputs should be set up and how the data can be read out

### 5.7.1 Setting up Alarms

In order to set up the analogue inputs it is necessary to know how the voltage and power are reproduced internally. The measured values that are available on the analogue inputs are standardised for both the voltage (0..10V) and power inputs (0..20mA) to a value between 0 and 1000.

Two threshold values, the active threshold and the idle threshold, have to be assigned for the alarms to be set correctly. If the active threshold is higher than the idle threshold the input will become active when the measured value is greater than the active threshold. The idle position is reached once the measured value falls below the idle threshold. This means that a top limit is monitored. If the active threshold is lower than the idle threshold, a lower limit is monitored. The difference between the thresholds forms the hysteresis.



These thresholds can be set with the SevProg. An analogue input, for example, will look as follows:



In 1	In 2	In 3	In 4	In 5	In 6	In 7
Input Name	input 1					
Active threshold	700					
Passive threshold	300					
Callback Time						
Input Delay						
Reset Report	No					

In this example the active threshold is 700 and the idle threshold 300. This means that if there is a voltage input, input1 will become active if the voltage rises above 7.00V. If the voltage falls below 3.00 V the alarm will be raised.

In the case of analogue Severas with an on-board data logger (-L version), it is possible to store the value of the analogue input periodically. To do this the log time (unit second, maximum 65000s) has to be entered.

The SevProg screen will then look as follows:

In 1	In 2	In 3	In 4	In 5	In 6	In 7
Input Name	input 1					
Active threshold	700					
Passive threshold	300					
Logtime	60					
Callback Time						
Input Delay						
Reset Report	No					

The input in this example is consequently stored in the data logger every 60s. If an input may not be stored, the log time should be set to 0.



### 5.7.2 Severa menu

The current value and the data logger content can be read out by dialling in to Severa using the Hyper Terminal program. If a transparent modem connection has been built up, the special Severa menu can be started by entering ###.

Now, it could also be the case that an application sends ### as data, and this cannot result in the activation of the menu. In order to prevent this from happening the ### characters should be preceded and followed by 1 second of data silence.

The Severa menu will then look as follows for example:

*SV4400PM-ED*

*Severa Menu*

*Actual analog values (1000 = 10V)*

*Input 5: 271*

*Input 6: 270*

*Input 7: 270*

*Input 8: 270*

*Type:*

*O = back Online,*

*D = Disconnect,*

*? = rebuild menu,*

First of all, the current values of the analogue inputs are displayed. Knowing that 1000 is equal to 10V (voltage model) or 20mA (power model) the voltage or power can be calculated.

The following choices can be made in the Severa menu:

O = This is used to exit the Severa menu and return to the transparent modem connection (On-line).

D = This is used to break the modem connection.

? = This choice or a Carriage Return is used to build up the menu again. This is useful for refreshing the current value for example.



## 5.8 REMOTE SWITCHING (only with the Severa GSM and GPRS)

Depending on the Severa model, it is possible to set an output point to **Active** or **Idle** using an SMS message. An output can also be activated for 2 seconds (pulse switch).

The SMS message for this is structured as follows:

**#<Command><parameter1><parameter2>#**

Where:

Command = **O** (Output)

Parameter1 = **A** (Active) or **I** (Idle)

Parameter2 = **1** and/or **2**

Or:

Command = **O** (Output)

Parameter1 = **P** (Pulse switch, active 2 seconds)

Parameter2 = **1** and/or **2**

After a switch message has been sent, for example **#OA1#** (output point 1 is set to active), the Severa returns a confirmation with the following message,

**Severa confirms: Output command.**

This means that the Severa has understood the command. If no confirmation is sent, the command may have been phrased incorrectly.

Switching both output points with the same command is also possible using a single switch message. For example, the command **#OI12#** sets output points 1 and 2 to idle.



When sending switch messages, always use **UPPER-CASE LETTERS!**

Owing to the lack of power supply during mains failures, any active output points will return to idle. After the power supply has been restored these output points will return to active, if the memory for remembering the status of the various input and output points has not been lost (see chapter 5.1 "FUNCTIONS").



## **5.9 REQUESTING VERSION NUMBER (only with the Severa GSM and GPRS)**

With the command **#V#** you can request the Severa's software version. The message sent in response will contain the following text:

**VERSION: SV-x.xx**



When requesting the version number, always use **UPPER-CASE LETTERS!**

## **5.10 RECHARGING THE INTERNAL BATTERY (emergency power supply)**

The internal battery (NiMH) can be recharged from the external power supply. For the connection details, see chapter 3.7 "POWER SUPPLY". Even when the Severa is switched off, the internal battery will be charged.



## 6 SEVERA GPRS STEADY CONNECT

The Severa Steady Connect is able to link existing applications to the GPRS network. The modem can be set up so that it emulates either a direct connection or an analogue Hayes modem. All data is then sent via the GPRS network.



The Severa Steady Connect should preferably be programmed by a technician with sufficient knowledge and experience in the field of internet communications and more specifically network protocols (IP).

### 6.1 CLIENT/SERVER

The Severa Steady Connect can function as either client or server. The modem always automatically functions as client if the server is switched off which means that the modem will initiate the connection. The modem can't be accessed or pinged from outside when it is in the idle state so the client mode is selected by turning off the server mode.

When the server mode is switched on the modem functions as server when idle. Under these circumstances the modem can be accessed externally to make a connection.

When necessary, for example if there is a change of status to one of the contact inputs, the modem switches to client mode and establishes a connection with the server.

### 6.2 CLIENT MODE

The Severa takes the initiative in making the connection. The following settings are possible when the Severa Steady Connect is in the client mode:

#### 6.2.1 Modem Emulation

In this mode it is possible to establish a connection with a server using the ATD command. In actual fact a conventional Hayes modem is emulated and a CONNECT report is given once the connection has been made. In addition, the various RS-232 signals such as DCD, DTR, RI etc. are supported.

Contact input status changes can also be reported in this mode.

#### 6.2.2 Transparent

This mode can offer a solution for applications that aren't capable of sending Hayes commands. A connection is made with the server when data is sent to the serial port. Data that is sent to the serial port is buffered up to a maximum of 50 characters and sent as soon as the connection is ready.

Contact input status changes can also be reported in this mode.



### **6.2.3 Contact Only**

In this mode the connection with the server is only made if there is a status change to the contact inputs or if there is a mains failure when the Severa has an optional emergency power supply.

### **6.2.4 Autologon**

After power up the Severa, it will directly connect to the server without external commands. In case the established connection drops, it will automatically tries to connect to the server again.

Depending on the DTR setting (&D0 or &D2), it is also possible to make a connection by controlling the DTR hardware signal. This means that the Severa isn't connecting when the DTR is not present. Once DTR appears, the connection will be made. When DTR drops, the connection will be disconnected.

With the DCD hardware signal it is possible to check if the GPRS connection is successful. It is also possible to sent a start string. This start string is sent to the server when the connection is established.

## **6.3 SERVER MODE**

If the server mode is switched on the Severa will wait in idle mode until a connection is made from outside. However, when there is a status change to the contact inputs or when data is sent to the RS-232 port, the Severa will switch to client mode and take the initiative in establishing the connection.

The following settings are possible in server mode:

### **6.3.1 Modem emulation**

With this setting the modem is in server mode which means that the client can take the initiative in making a connection. Subject to the ATSO auto answer command, the connection will either automatically go transparent or only do this after the application has sent the ATA answer command. The connection is immediately available to the client whereas it doesn't have to be transparent for the server (Severa) yet. A variable startstring can be sent as soon as the connection is fully transparent to inform the client that the server is ready.

A CONNECT is then sent to the serial port as well. The various RS-232 signals such as DCD, DTR, RI etc. are also supported. Contact input status changes can also be reported in this mode.

In this mode the AT14 command can be used to call up the IP address that has been obtained. This is particularly useful when the IP address that has been set is not known and the on-site technician needs this information.

### **6.3.2 Transparent**

With this setting the modem is again in server mode which means that the client can take the initiative in establishing a connection. So in this mode there is no modem emulation but the connection is immediately transparent.

A variable startstring can also be sent in this mode to inform the client that the server is ready. Contact input status changes can also be reported in this mode.



### **6.3.3 None**

With this setting the server mode is turned off and the modem is in client mode. This means that the modem can't be pinged or accessed by other means. The modem only logs in to the GPRS and establishes a connection with the server if a connection has to be made. The modem will log out of the GPRS network again if the connection is lost. Contact input status changes can also be reported in this mode.

## **6.4 CONTACT INPUTS**

A report can be sent via IP in a number of different ways. If necessary, an SMS report can be sent when there is no IP connection available.

Forwarding contact input status changes is always completed and will not be interrupted by other reports.

The following actions are possible:

### **6.4.1 Report input status including acknowledge (ACK)**

The Severa will send the status change to the server using the following format:

<Location Text>,Input No,<Channel Text>,<Status>

<Location Text> and <Channel Text> are created with Sevprog.

Example of an active Pump Failure (on input 2) at the Wateringen site:

Wateringen,2,Pumpfailure,Active

An acknowledge should also be given for this action. This consists of the server sending the string "(ACK)" back. If this string isn't received the report will be sent again.

### **6.4.2 Reporting input status without ACK**

This action is identical to the one above apart from the report not having to be accepted with an acknowledge. Establishing the connection with the server is sufficient for accepting the report.

### **6.4.3 Reporting input status without ACK, then transparent**

This action is identical to the one above apart from establishing a transparent connection after the report.

### **6.4.4 Transparent**

If this action is selected a change of status will result in a transparent connection being made with the server. Establishing the connection with the server is sufficient for accepting the report.



## **6.5 TIMEOUTS**

Various timeouts have been implemented in order to prevent the modem from hanging in certain modes due to unforeseen events. These ensure that the modem is reset and it will then return to its idle mode.

### **6.5.1 Data timeout**

This timeout is activated when there is a connection with the server but no further data is received via the GPRS network. The time can be set from 1 to 54,000 seconds. This timeout is inactive if the value entered is 0.

### **6.5.2 Connect timeout**

This timeout is activated if connecting with the server takes longer than the time set. This can be set from 1 to 900 minutes. This timeout is inactive if the value entered is 0.

### **6.5.3 IP Activity timeout**

This timeout is activated if no connection with the server has been established within a pre-set time which can be set from 1 to 1,500 hours. This timeout is inactive if the value entered is 0.

## **6.6 SYSTEM ERRORS**

It may happen that it's not possible to connect to the GPRS network or server. This can be reported with an SMS message. As soon as the malfunction has been corrected this is reported by sending an SMS. System errors are forwarded as alarm 10. The following system errors may occur:

### **6.6.1 GPRS error**

This malfunction occurs if it isn't possible to make a connection with the GPRS network. The SMS message then looks as follows:

<Location Text>,Input No, GPRS ERROR,<Status>

Example: Wateringen,10, GPRS ERROR,Active (GPRS malfunction)

### **6.6.2 Server error**

This malfunction occurs if it isn't possible to make a connection with the server. The SMS message then looks as follows:

<Location Text>,Input No, SERVER ERROR,<Status>

Example: Wateringen,10, SERVER ERROR,Idle (server accessible again)

### **6.6.3 Listen error**

This malfunction occurs if it's not possible to set the modem as server.

The SMS message then looks as follows:

<Location Text>,Input No, LISTEN ERROR,<Status>

Example: Wateringen,10, LISTEN ERROR,Active (server mode not possible)



---

This malfunction can occur if there are problems with the provider's network for example.



## 6.7 SETTING UP SEVERA IP

### 6.7.1 GPRS settings

Algemeen	GPRS	In 1	In 2	Voeding	Modem	Systeem
Access point naam (APN)	internet	Server Mode	Modem Emulatie	Server Port	1040	
Access point naam (APN)		Client Mode	Modem Emulatie	Port Remote Server	1040	
Inlognaam		Data Timeout (s)	900	Connect Timeout (min)	1440	
Wachtwoord		IP Activity Timeout (uur)	24			
IP Remote Server	89.221.181.4					
IP Remote Server						
IP Filter	89.221.181.4					
IP Filter						
Server Startstring	START					

#### APN

It is necessary to enter an APN (Access Point Name) to establish a GPRS connection. The APN is provided by the internet provider.

#### LOGIN NAME/PASSWORD

Depending on your provider it may be necessary to enter a login name and password.

#### IP REMOTE SERVER

Remote server's IP address.

#### PORT REMOTE SERVER

Remote server's port.

#### IP FILTER

The client's IP address which is the only one that is given access to the Severa (in server mode).

#### SERVER STARTSTRING

In server mode this startstring will be sent to the client if the connection is transparent.

#### SERVER MODE

Possible settings are *modem emulation*, *transparent* or *none*.

#### SERVER PORT

The port on which the server's modem can be accessed.

#### CLIENT MODE

Possible settings are *modem emulation*, *transparent*, *contact only* or *autologon*.



## DATA TIMEOUT

This timeout is activated when there is a connection with the server but no further data is received via the GPRS network within the time set. This timeout is inactive if the value entered is 0.

## CONNECT TIMEOUT

This timeout is activated if connecting with the server takes longer than the time set here. This timeout is inactive if the value entered is 0.

## IP ACTIVITY TIMEOUT

This timeout is activated if no connection is established with the server within the time set. This timeout is inactive if the value entered is 0.

### 6.7.2 Input settings

GPRS	In 1	In 2	Voeding	Modem	Systeem
Ingangsnaam	Pompstoring		Numerus 1		IP
Meld Actie	Ingang inc AC		Numerus 2		+31650421085
Contactingang	Norm. Open		Numerus 3		
Ingangsvertraging	Ingang inc ACK		Numerus 4		
Herstel melding	Ingang exc ACK		Numerus 5		
	Transp. + Ingang		Numerus 6		
	Transp.		Numerus 7		
			Numerus 8		

## INPUT NAME

Description of what causes the status change to the input channel in question.

## REPORT ACTION

Choice of reports with or without *acknowledge* and that will either go *transparent* or not.

## CONTACT INPUT

The choice here is between make and breaker contacts.

## INPUT DELAY

Delay in the status report (active and reset reports).

## RESET REPORT

A reset report can be sent once the input channel is in idle mode.

## NUMBER



Enter "IP" to report to the remote server or a telephone number for an SMS report.

In the above example a status change is forwarded to the remote server. Reporting has been completed if this is accepted. If the server doesn't accept the report two further attempts will be made. If the report still isn't accepted it will be sent by SMS.

Under normal circumstances *IP* will be the most obvious choice for reporting to the first position. Entering a 06 number in the first position makes it possible to send reports via SMS immediately. Giving the same number repeatedly makes it possible to send an alarm to the same destination over a longer period or to access a series of 06 numbers in turn.

### 6.7.3 System settings

Label	Value
Nummer 1	+31650421085
Nummer 2	
Nummer 3	
Nummer 4	
Nummer 5	

System errors can be sent by SMS if there are problems with the GPRS network or server. The numbers can be entered on the above screen.

Reporting is complete if the first number accepts the report. If the server doesn't accept the report two further attempts will be made. After this the following number in the list will be used.

## 6.8 GPRS SUBSCRIPTIONS

There are various options available when taking out a GPRS subscription depending on the functionality required. It is possible to ask for a fixed IP address and it is also often possible to specify whether or not the modem can be accessed externally.

A subscription with a fixed IP address and the "external access" option is necessary if the modem is to be set in server mode. This enables a client to make a remote connection with the modem which always has a fixed IP address.

The "external access" option isn't necessary when the Severa Steady Connect is only used as client. A fixed IP address also isn't necessary when the client mode is used, but it is useful because the server can recognise the communication by its IP address.



## 7 SEVERA GPRS WEBMETER

The Severa Webmeter sends current values and status changes to a server via the GPRS. A current overview of the Severa's analogue or digital inputs can be generated from this server. The data format is such that this data can be displayed quickly and the Webmeter uses HTTP POST messages for this.

The server can attach switch commands to the reaction to these messages so that the Severa's outputs can be used for remote switching.

The modem won't log in to the GPRS network when idle and it can't be accessed or pinged remotely when it is in this mode. The modem will only log on to the GPRS network and connect to the server if data has to be sent. The modem will log out of the GPRS network and return to idle mode automatically once the data has been transferred.

Status changes can be sent immediately or saved in a flash memory first. Inputs can also be saved in the same memory periodically. The contents are sent to the server once fifty or more samples have been saved. It is also possible to have the memory contents sent at predetermined intervals which you set yourself. This is known as the *connect interval*.

### 7.1 ALARM REPORTS AND MONITORING

The HTTP POST protocol is used for alarm reports and monitoring the inputs.

#### 7.1.1 Synchronisation

Because the Severa does not have a real time clock, the time on startup is 01/01/1970 00:00:00 (start time in UNIX/epoch format). In order to synchronise the time a startup message is first sent to the server after starting up. The reaction to this message will synchronise the time.



The Severa will not send any data if the time hasn't been synchronised. If time synchronisation should fail for any reason, such as there being no GPRS connection or connection with the server, the Severa will still log in but then the time/date will start on 01/01/1970 00:00:00.

After synchronising the time the Severa's current status is forwarded. The server will then know all the inputs and their statuses and the corresponding settings for all the inputs will also be sent.



### **7.1.2 Activating data transfer**

The Severa will be in idle mode after the synchronisation procedure and will only send data when one of the following happens:

- the status of one of the inputs changes
- the number of samples that have been saved are equal to or more than the set maximum.
- the *connect interval* has expired.

## **7.2 LIGHT WEIGHT SIGNATURE**

In order to be certain that outsiders do not gain access to data, the messages can be accompanied by a signature, the LWS (Light Weight Signature). The generation of this signature is based on two keys the Local Key (LKEY) and the Floating key (FKEY).

The LKEY is the key that has been set on the Severa. The LKEY for a specific location is also known by the server, however, this is never sent. The FKEY is the key that the server gives when reacting to a message.

The Severa does not have a FKEY immediately after starting up. The server knows this so it won't reject the first message even though it isn't accompanied by an LWS.

If it is decided not to use any keys and signatures at all, then the server won't send an FKEY which will result in the Severa also not sending a LWS.

Adesys can provide more detailed information.

## **7.3 SYSTEM ERRORS**

It can happen that it's not possible to connect to the GPRS network or the server. This can then be reported with an SMS. As soon as the malfunction has been corrected this is reported by sending an SMS. System errors are forwarded as alarm 10. The following system errors are possible:

### **7.3.1 GPRS error**

This malfunction occurs if it isn't possible to make a connection with the GPRS network. The SMS message will then look like this:

<Location Text>,Input No, GPRS ERROR,<Status>

Example: Wateringen,10, GPRS ERROR,Active (GPRS malfunction)

### **7.3.2 Server error**

This malfunction occurs if it isn't possible to make a connection with the server. The SMS message will then look like this:

<Location Text>,Input No, SERVER ERROR,<Status>



Example: Wateringen,10, SERVER ERROR,Idle (server accessible again)

## 7.4 SETTING UP THE SEVERA WEBMETER

### 7.4.1 General

The location name has to be entered on the *General* screen. This name or ID is given with the message so that it is always clear where the information comes from. If the Adesys server is used to display the data, its location name will also be required to log in to the Adesys server.

### 7.4.2 GPRS settings

Algemeen	GPRS	In 1	In 2	In 3	In 4	In 5	In 6	In 7	In 8	Voeding	System
Access point naam (APN)	internet		Port Remote Server		80						
Access point naam (APN)			IP Activity Timeout (uur)		1						
Inlognaam			Connect Interval (min)		30						
Wachtwoord			Maximum samples		35						
IP Remote Server	85.17.142.										
IP Remote Server	145										
LKEY											
Path File	newpost.php										
Path Map	httppost										
Path Host	www.meld										
Path Host	centrale.nl										

#### APN

It is necessary to enter an APN (Access Point Name) to establish a GPRS connection. The APN is provided by the internet provider.

#### LOGIN NAME/PASSWORD

Depending on your provider it may be necessary to enter a login name and password.

#### IP REMOTE SERVER

Remote server's IP address.

#### PORT REMOTE SERVER

This is almost always port 80 for this application.

#### LKEY

The local key.

#### PATH FILE

The name of the script that the messages process e.g. newpost.php.



## PATH MAP

The name of the directory on the server that contains the script e.g. httpost.

## PATH HOST

The Path Host is the domain name e.g. www.meldcentrale.nl. This is only necessary if a number of domains are linked to the IP address (virtual hosting) that has been set for the *IP Remote Server*.

## IP ACTIVITY TIMEOUT

This timeout is activated if no connection has been established with the server within the time set. This timeout is inactive if the value entered is 0.

## CONNECT INTERVAL

This setting ensures that the Severa periodically makes a connection with the server, regardless of whether there have been status changes or how much information is saved. This function is inactive if the value entered is 0.

## MAXIMUM SAMPLES

This setting ensures that the Severa tries to contact the server if the number of samples saved is equal to or more than the number set here. This function is inactive if the value entered is 0.

### 7.4.3 Input settings

GPRS	In 1	In 2	In 3	In 4	In 5	In 6	In 7	In 8	Voeding	Systeem
Ingangnaam	Input 5				Nummer 1 IP					
Actiefdrempel	600				Nummer 2 +31650421085					
Rustdrempel	300				Nummer 3					
Logtijd	240				Nummer 4					
Ingangsvertraging					Nummer 5					
Herstelmelding	Ja				Nummer 6					
					Nummer 7					
					Nummer 8					

## INPUT NAME

Description of what causes the status change to the input channel in question.

## ACTIVE THRESHOLD (only for voltage and/or current inputs).

The value, above or below which the alarm is activated.

## IDLE THRESHOLD (only for voltage and/or current inputs).

The value, above or below which the alarm goes to idle mode.

## LOG TIME



The value of the input can be saved periodically. The log time is the interval used for this.

### INPUT DELAY

Delay in the status report (active and idle report).

### RESET REPORT

A reset report can be sent once the input channel is in idle mode.

### NUMBER

Enter "IP" to report to the remote server or a telephone number for an SMS report. The settings for the "IP" option are made on the GPRS tab.

In the above example a status change is forwarded to the remote server. Reporting has been completed if this is accepted. If the server doesn't accept the report two further attempts will be made. If the report still isn't accepted it will be sent by SMS.

Under normal circumstances *IP* will be the most obvious choice for reporting to the first position. Entering a 06 number in the first position makes it possible to send reports via SMS immediately. Entering the same number repeatedly makes it possible to send an alarm to the same destination over a longer period or to access a series of 06 numbers in turn.

#### 7.4.4 System settings

System
Nummer 1 <input type="text" value="+31650421085"/>
Nummer 2 <input type="text"/>
Nummer 3 <input type="text"/>
Nummer 4 <input type="text"/>
Nummer 5 <input type="text"/>

System errors can be sent by SMS if there are problems with the GPRS network or server. The numbers can be entered on the screen above.

Reporting is complete if the first number accepts the report. If the server doesn't accept the report two further attempts will be made. After this the following number in the list will be used.

### 7.5 GPRS SUBSCRIPTIONS

There are various options available when taking out a GPRS subscription depending on the functionality required. It is possible to ask for a fixed IP address and it is also often possible to specify



if the modem can be accessed externally. The “external access” option is redundant for the Severa Webmeter given that it can’t be set up as a server.

A fixed IP address isn’t necessary but can be useful because the server can recognise the communication by its IP address.

A standard GPRS subscription (with a dynamic IP address) is sufficient for the Severa Webmeter.

## **7.6 HTTP POST PROTOCOL**

This chapter is intended for web programmers who are going to build the application that processes the incoming messages themselves.

### **7.6.1 Composition of outgoing messages**

Alarms and statuses are sent under the name ‘data’ using a multipart HTTP POST message. The syntax is as follows:

DEV=SV4402IL-AD,5.0

ID=adesys

LWS=:MR (optional)

D01S0000001212392526

D01T0000601212392527

U05S0000021212392530

U05T0000601212392530

U05H0000001212392531

U05L0000001212392531

D09S0000001212392537

D00I0000451212392557

D01P0000001212392557

U05P0000021212392558

U08P0000031212392558

DEV: This is where the type number, software version and any *special* numbers (for variant versions) are forwarded.

ID: The location’s unique location name or ID code.

LWS: Light Weight Signature: signature for securing messages (optional).

The log data follows this. This is described separately in the following chapter: Composition of log data.

It may be that messages contain no log data in which case the server should take this into account.



## 7.6.2 Composition of log data

The log data is composed as follows:

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	Input type	Input number		Report type	Status	Analogue data, time interval or active and idle threshold					Time stamp in epoch format										Carriage return	Linefeed

### Input type

The first element of the string indicates the input type:

D : digital input (contact input)

U: analogue voltage input

I: analogue current input

### Input number

Elements 2 and 3 indicate the input number. Inputs 1 to 8 are displayed as 01 to 08 and the Mains Failure is input 9. Input 00 is used for special reports such as the startup message.

### Report type

Element 4 indicates the type of report:

P: periodic report

S: status report resulting from a change to the input.

T: gives the time of the periodic report

H: analogue input's active threshold

L: analogue threshold's idle threshold

I: connect interval.

R: reset report



## Report status

Element 5 is only used for status reports. For an alarm report the status is '1' while a '0' is sent for an idle report.

## Data field

Elements 6 to 10 are used for sending analogue values. These are also used for the T, H and L reports when the communicator starts up, to forward the measurement interval and the active and idle thresholds of analogue inputs respectively.

## Epoch time

Elements 11 to 20 are used for forwarding a time stamp. The time is in the epoch format (Unix Timestamp), which is the number of seconds since 1970.

## Closing

The string is always closed with a carriage return and a line feed.

### 7.6.3 HTTP POST reactions

The server has to send a reaction if the HTTP POST message that has been received has been parsed . The following reactions are possible:

HTTP/1.1 200 OK – Data has been received and processed by the server

HTTP/1.1 403 Forbidden – Severa is not known to the server

HTTP/1.1 500 Internal Server Error – Server error (temporarily out of service)

HTTP/1.1 503 Service unavailable – Server overloaded

There is space available immediately after "HTTP/1.1 200 OK" for sending back more details. Care should be taken to ensure that the content type is set to text/plain since PHP for example, sends an HTML message back as standard.

The details mentioned could look as follows:

```
HDR
STAT=OK
FK=N0XP:YDN
TM=1212159712
FR=0
OUT1=A
OUT2=P
END
```

This part (HDR to END) must be generated by the PHP or ASP script used. In this example it is the newpost.php script.



This header can contain the following elements:

**STAT**

OK is given once the message has been received correctly. FID is sent if the ID is unknown. FLWS is sent if the signature doesn't correspond and FP indicates that there is a protocol error. If the status doesn't correspond the message is repeated 3 times maximum.

**FK**

Floating key. See the "Light Weight Signature" chapter as well.

**TM**

Time. The Severa will synchronise with this time.

**FR**

Flash reset. The entire flash memory will be reset by sending "FR=1" back.

**OUT1**

Output 1 can be set to either on (Active) or off (Idle) and a pulse (P) can be given.

**OUT2**

Ditto as OUT1.

The STAT (status) element must be included in every reaction. The other elements aren't compulsory but it is strongly recommended that the TM element should always be sent. This will ensure that the time in the Severa is synchronised regularly.



## 8 THE SEVERA AS A MODEM

The Severa is equipped with a modem functionality, and acts as any standard analogue modem when this functionality is in use. For example, the basic set of AT commands result in the same responses, regardless of the communications network selected. In this way, the various Severa models are completely interchangeable. A comprehensive set of AT commands is available on our website ([www.adesys.nl](http://www.adesys.nl)) for expert users.

### 8.1 The basic AT commands

The basic set of AT commands for the Severa offer all control options needed in most cases to establish a modem connection. AT commands always begin with the letters AT (an abbreviation of “attention”), followed by a letter for the command, sometimes followed by a number as a parameter. The command ends with a carriage return, or Enter. After receiving an AT command, the modem will send a response to indicate whether the command has been carried out.

The Severa AT commands:

#### Verification commands

- AT Checks the connection, does not contain any command.
- ATI Provides information such as the modem's type and version numb (Info).

#### Commands for response in the COM port

- ATE Determines whether commands typed in are sent back to the user (Echo).
- ATQ Determines whether the modem gives feedback reports (Quit).
- ATV Determines whether modem responses are given by way of readable text or numerical codes (Verbal).
- ATX Determines whether the modem gives comprehensive or abbreviated responses (eXtended reply).

#### Commands for the modem connection

- ATA Starts the modem when it is called (Answer).
- ATD Starts the modem to start dialling (Dial).
- ATO Resets from command to modem mode (Online).
- ATH Closes modem connections (Hang-up).
- AT\N Determines the response of error checks during modem connections.
- AT%C Determines the response of data compression during modem connections.
- +++ Switches from modem mode to command mode, if preceded and followed by 1 second of data silence.

#### Other commands

- ATL Determines the loudspeaker volume (Loudness).
- ATM Determines the loudspeaker response (Monitor).
- ATS Completing or calling up so-called S registers such as:
  - S0 Determines automatic responses.
  - S7 Maximum delay before establishing connections.



ATZ	Resets the modem and all it's setting to the starting position.
AT&D	Defines the response to the DTR signal.
AT&F	Returns all settings to the factory settings.
AT&W	Sets the current settings as new start-up positions.
AT+CMGS	Sending an SMS message immediately
AT+CSQ	Requesting the RF reception quality

After receiving an AT command, the Severa will send a modem response. Depending on the ATQ, ATV and ATX commands, a response will be given as text or as a numerical code, or no response will be sent. The following table lists all possible Severa responses:

Reactie	Code	Omschrijving	ATX
OK	0	Command completed	0.4
CONNECT	1	Modem connection established, connection speed $\geq$ 300bps	0.4
RING	2	Incoming call	0.4
NO CARRIER	3	Modem connection, or dialling, terminated	0.4
ERROR	4	Command error or Severa busy during initialization or alarm reports	0.4
CONNECT 1200	5	Modem connection made, connection speed 1200bps	1.4
NO DIALTONE	6	No dial tone detected	2.4
BUSY	7	Telephone number engaged	3.4
NO ANSWER	8	No modem detected after outgoing call	0.4
CONNECT 2400	10	Modem connection established, connection speed 2400bps	1.4
CONNECT 4800	11	Modem connection established, connection speed 4800bps	1.4
CONNECT 9600	12	Modem connection established, connection speed 9600bps	1.4
CONNECT 19200	14	Modem connection established, connection speed 19200bps	1.4
CONNECT 7200	15	Modem connection established, connection speed 7200bps	1.4
CONNECT 12000	16	Modem connection established, connection speed 12000bps	1.4
CONNECT 14400	17	Modem connection established, connection speed 14400bps	1.4
CONNECT 16800	18	Modem connection established, connection speed 16800bps	1.4
CONNECT 21600	19	Modem connection established, connection speed 21600bps	1.4
CONNECT 24000	20	Modem connection established, connection speed 24000bps	1.4
CONNECT 26400	21	Modem connection established, connection speed 26400bps	1.4
CONNECT 28800	22	Modem connection established, connection speed 28800bps	1.4
CONNECT 31200	23	Modem connection established, connection speed 31200bps	1.4
CONNECT 33600	24	Modem connection established, connection speed 33600bps	1.4

### 8.1.1 ATA

After a RING is received, the ATA command can be given to start the modem. After ATA, one of the CONNECT (...) responses or BUSY should be awaited. If any data is transmitted over the COM port before then, the connection is terminated (without the modem responding).



### **8.1.2 ATD**

The ATD command can be used to set up a modem connection. The telephone number of the receiving modem should be entered after the ATD command. After the ATD command has been sent, you should wait for one of the CONNECT (...) responses, NO DIALTONE, BUSY or NO ANSWER. If any data is transmitted over the COM port before then, the connection is terminated (without the modem responding).

### **8.1.3 ATE**

ATE determines whether the commands that are typed are sent back to the user. This is a useful feature if a user is in contact with the Severa for a terminal emulation, to see exactly what has been typed. However, some applications are interrupted by the signs sent back. This is often the case if the modem is controlled by an automated system such as a PLC. After the ATE command, the modem responds with OK.

ATE0 (Echo off) typed commands are not sent back

ATE1 (Echo on) typed commands are sent back

### **8.1.4 ATH**

ATH is used to terminate active modem connections. The modem must first be set to command mode (see +++). After the ATH command, the modem responds with OK.

### **8.1.5 ATI**

ATI can be used to request modem information to determine differences in models or versions. After the ATI command, the modem information is given, followed by OK.

ATI0 Requests that Severa's type coding

ATI1 Requests the Severa software's version number

### **8.1.6 ATL (only with Severa PSTN)**

ATM is used to set when the monitor speaker produces sounds (see also ATL). After the ATM command, the modem responds with OK.

ATL0 Speaker off

ATL1 Speaker at low-level volume

ATL2 Speaker at mid-level volume

ATL3 Speaker at high-level volume

### **8.1.7 ATM (only with Severa PSTN)**

ATM is used to set when the monitor speaker produces sounds (see also ATL). After the ATM command, the modem responds with OK.

ATM0 Speaker always off

ATM1 Speaker is on during dialling and when the connection is being made, and is off during the connection

ATM2 Speaker is always on



ATM3 Speaker is on when the connection is being made, and is off during dialling and the connection

### **8.1.8 ATO**

ATO can be used to switch from the command mode (see +++) to the modem mode. This can only be done if a modem connection has already been made. The modem responds with CONNECT (..).

### **8.1.9 ATQ**

ATQ switches the modem's responses on and off. Some automated systems cannot process these modem responses. In such cases, the responses should be switched off. The response to the ATQ command is OK.

ATQ0 (Quit off) modem sends responses

ATQ1 (Quit on) modem does not send responses

### **8.1.10 ATS**

The modem has what are known as S registers for storing certain settings. Using the ATS command, these registers can be read and information can be entered. Use a question mark (?) to read an S register. For example, the command ATS0? reads S register 0. The modem responds with the value of the register requested, followed by OK. Writing information to these registers uses the equal sign (=), for example ATS7=55 sets the value of S register 7 to 55.

The Severa has the following S registers:

ATS0 regulates the automatic answering of calls to the modem. If S0 is set to 0, the modem does not answer automatically. Every value greater than 0 signifies the number of rings after which the modem is to answer. The modem is started automatically, in the same way as with the ATA command. The modem then sends the response CONNECT (...) or BUSY. If any data is transmitted via the COM port before that time, the connection is terminated (without any response from the modem).

ATS7 determines the maximum amount of time to be spent making a modem connection. If the connection has not been established after the set time (in seconds), the attempts are stopped and the modem returns to the idle status.

### **8.1.11 ATV**

Numerical codes are necessary for some automated systems that control the modem. The modem responds with OK (or 0).

ATV0 Modem sends numerical responses (numerical codes)

ATV1 Modem sends text responses

### **8.1.12 ATX**

This command is used to set two functions. Firstly, it determines whether the modem uses the signals from the telephone switchboard, such as the dialling tone and busy tone. . In addition, it determines



the level of detail of the responses (see the response table below for further information). After this command, the modem responds with OK.

ATX0	Telephone signals are not used, basic responses
ATX1	Telephone signals are not used, detailed responses
ATX2	Only the dialling tone is used, detailed responses
ATX3	Only the busy tone is used, detailed responses
ATX4	All telephone signals are used, detailed responses

### **8.1.13 ATZ**

ATZ resets the modem to its original position. All settings return to the last recorded value (see also AT&W), and if the modem is connected that connection is terminated. The modem response is OK.

In addition to using the AT&W command, the original position can also be adjusted directly in the telephone book via the programming environment. If this has not been set properly, the response to the ATZ command will be ERROR.

### **8.1.14 AT\N (only with Severa PSTN)**

The Severa modem has built-in protocols to check the connection for errors, and to compress the data. There are two different protocols available for this: V.42 and MNP. Naturally, these protocols can only be used if the modems at both ends of the connection are fitted with them. Please note that some modems do not feature these protocols. Despite the possibility to detect their presence automatically, it is sometimes necessary to switch of the protocols entirely. The AT\N command regulates the activation and deactivation (see also AT%C). The modem responds to the AT\N command with OK.

AT\N0	All protocols are deactivated. Recommended for communication with modems that do not feature error checks and compression
AT\N1	Idem
AT\N2	Automatic detection of MNP error check protocol
AT\N3	Automatic detection of V.41 error check protocol (also possible with MNP active)

### **8.1.15 AT%C (only with Severa PSTN)**

If an error check protocol has been activated using the AT\N command, AT%C can be used to determine whether the transmitted data is to be compressed. Depending on the type of data, this can save considerable amounts of time.

AT%C0	Data compression deactivated
AT%C1	Data compression fully activated
AT%C2	Data compression only activated for outgoing data
AT%C3	Data compression only activated for incoming data

### **8.1.16 AT&D**

Modem connections can be terminated by sending the DTR signal. However, if this signal is missing, the functionality should be switched off using the AT&D command.

AT&D0 DTR signal is ignored and is assumed to be "ON" . This allows you to work with



terminals that do not feature DTR signals

AT&D1 Not applicable

AT&D2 "hang-up" If the DTR signal is idle, the modem switches "OFF-LINE"

### 8.1.17 AT&F

AT&F returns all modem settings to the factory settings. The response is OK.

### 8.1.18 AT&W

AT&W stores all current settings, and so determines the new start-up position when the modem is started and after the ATZ command is entered. As with every Severa setting, this setting is stored in the telephone book. It can also be used to directly program the modem when programming the Severa. This setting can also be adjusted manually, although great care should be observed. Wrong settings may have unpredictable consequences.

### 8.1.19 AT+CMGS

By using the AT+CMGS command it is possible for most GSM modems to send an SMS message immediately. This command is also available for the Severa from firmware version 3.25.

Command: +CMGS=<telno><CR>

<telno> = Telephone number of the recipient of the SMS message in +316..... format

<CR> = Carriage return

After the CR the modem will react with the > character. You can now enter your text. Enter CTRL-Z to close your text. The modem will react to this with +CMGS: 000 and an OK to indicate that it has been sent successfully.

If you want to interrupt the command after the > character, then you can send an ESC instead of a CTRL-Z.

Example:

```
AT+CMGS="+31622446098"[CR]
```

```
> Test message[CTR-Z]
```

```
+CMGS: 000[CR]
```

```
OK
```

Setting up different SMS settings, such as the SMS Service Centre Address (+CSCA) and the Message Format (+CMGF) is not supported.

It is not a problem if these commands are already in your application software. The Severa can be set up in such a way that unknown AT commands can be ignored. A simple OK will be sent. This setting relates to **SevProg**.

The SMS Service Centre Address is taken from the SIM card.



This command is also supported for analogue (PSTN) lines. In this case it is then necessary to set the switchboard number using **SevProg**.

The maximum number of characters that can be sent is 145 for GSM and 45 for PSTN.

### **8.1.20 AT+CSQ**

Requesting the RF reception quality. The value is given in a linear scale from 0 to 31 where 0 equals no reception (0%) and 31 equals maximum reception strength (100%).

### **8.1.21 +++**

If the modem is set to data mode, the +++ command can be used to return to the command mode. In command mode, for example, the connection can be terminated (see ATH). In order to prevent premature switching, the +++ symbols must be preceded and followed by 1 second's data silence.

In other words, the modem switches to command mode after 1sec. idle, +++, 1sec. idle. The modem response is OK. After that response, commands can be entered.

### **8.1.22 Basic AT command settings for Severa PSTN, GSM and GPRS modems**

The following basic AT command settings can be stored in the Severa's memory by using SevProg. Go to the "Modem" tab to do this.

#### **PSTN modem**

AT&W (basic init): E1V1Q0X4&D0

AT&W (basic init): %C1\N3L2M0

AT&W (basic init): S0=0S7=90

#### **GSM / GPRS modem**

AT&W (basic init): E1V1Q0X4&D0

AT&W (basic init): niets invullen

AT&W (basic init): S0=0S7=90

The "auto answer" function is off with this setting. The command S0=0 should be changed to S0=2 in order to have the modem respond after two rings for example.

This "auto answer" function can still be set remotely on a Severa that is already in operation by sending an SMS message with the following text: #AA#

The modem will now respond after one ring. However, this remotely entered setting will not be stored in the flash memory permanently!

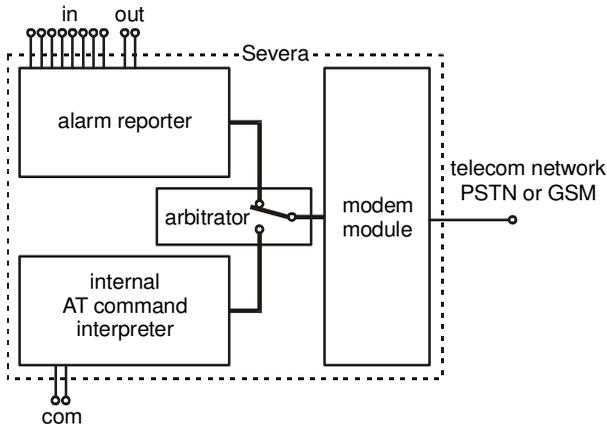


## 8.2 EXPERT MODEM USERS

As mentioned above, the Severa's basic set of AT commands will generally be sufficient for modem communications. However, in some cases one of the many other AT may be necessary for establishing a connection. The Severa offers options in this respect. Using these options, however, requires a thorough understanding of modems. Incorrect use may result in unpredictable responses from the Severa. Moreover, it is important to bear in mind that these expert commands have to be used differently with the various Severa models.

### 8.2.1 The inside of the Severa

Using the expert commands requires a degree of understanding of how the Severa is constructed inside.



The Severa contains an intern AT command interpreter that allows the basic AT set to function. If a modem connection has to be established, this will be done through the modem module, which depends on the type of telecom network the Severa uses. Differences between modem modules are taken care of by the interpreter, making the Severa's interchangeable. To prevent the modem and alarm functions in the Severa from interfering with one another, an arbitrator has been inserted, which ensures defined switching from the alarm function to modem communication and vice versa.

### 8.2.2 Starting a modem connection

With the ATD and ATA commands, or by auto answer, a modem connection is started. The internal AT command interpreter will ask use of the modem module via the arbitrator. If this works, i.e. if no alarm occurs, that module is fully initialized. Next, the connection process is started.

There are 3 stages in the initialization of the modem module: the basic init, the AT interpreter init, and the expert user init. The basic initialization deals with the modem module's responses, allowing the interpreter to control those responses consistently. Next, the settings that the user has programmed using the AT interpreter are sent to the module. With expert user initialization, the AT commands programmed in the telephone book are sent to the modem module.



### 8.2.3 Expert user modem initialisation

The AT command set for the modem modules can be found at [www.adesys.nl](http://www.adesys.nl), on the download page. This documentation is only available in English.

If a modem connection is to be initialized using a command from the expert AT set, that command must be stored in the telephone book. Fields 100 to 109 are reserved for these commands. Omit the letters "AT" before the command. The Severa will send all fields preceded by the letters "AT" and concluding with a carriage return to the modem module. If a command is too long for one field, the next field can be used for the rest of the command, in which case the final symbol in the first field must be a backslash (\).

Examples (AT set used for PSTN):

<b>Telephone book</b>	<b>Description</b>	<b>To module</b>
+GCI=42	Set the modem for use with the German telephone network	AT+GCI=42<cr>
+MS=V22B,1,\ 2400	Limit the modem to a V22bis connection	AT+MS=V22B,1,2400<cr>



Commands that change the response of the modem module may have an adverse effect on the Severa's performance.

The commands for the modem modules for PSTN, GSM and GPRS do not all respond in the same ways. We recommend reading the appropriate description of the AT command set carefully.



## 9 TECHNICAL SPECIFICATIONS

Digital input terminals:	0, 2, 8 points activated by potential-free NO or NC contact or open collector output points. Minimum open clamp voltage is 1.8V, maximum is 3.6V. Maximum contact current is 350 $\mu$ @ 3.6V.
Analogue input terminals:	2 or 4 voltage inputs (0...10V) 2 or 4 current inputs (0...20mA) (for some versions only)
Output relay terminals:	0 or 2 points (only with Severa GSM and GPRS) relay contact, output points NO and NC maximum charge allowed 100V- 1A AC/DC
Report channels:	8 externally activated channels mains failure channel
Report in the event of:	<b>active</b> mode <b>idle</b> mode, with externally activated channels
Number of dialling numbers	8 numbers per input point, up to 20 digits per number
Report using:	SMS message or by logging onto the GPRS network
Confirmation of message:	by dial-back (based on caller identification with Severa GSM) by returning the SMS message, based on caller identification (only with Severa GSM)
Mobile network:	GSM 900/1800 MHz (dual band)
Antenna connection:	connector type SMA female
Fixed telephone network:	PSTN
Telephone connection:	Connector type RJ45
COM port:	Serial interface RS-232, sub-D 9 pol. or RJ-10. Pin configuration RJ-10: TXD-out pin 1, RXD-in pin 2, HANDSHAKE pin 3, GND pin 4
Power supply:	Severa GSM+GPRS: 8-35VDC (min. 3W) or 15-28VAC (min. 5VA) <b>Not</b> galvanic separated Severa PSTN: 8-35VDC (min. 2W) or 8-28VAC (min. 3VA) Galvanic separated Battery-powered model: 2x IEC LR6 (alkaline, size AA)
Built-in emergency power supply:	NiMH battery 2.4V - 700mAh, standby time is 15 hours (depending on the condition of the battery).
Measurements of DIN rail (TS35) housing:	23mm x 95mm x 104mm (w x h x d)
IP-65 wall housing: (excluding swivels)	122mm x 120mm x 39mm (w x h x d)



Weight:	130gr. excluding battery 155gr. including battery
Max. temperature for use: Electronics: NiMH battery (emergency power supply):	-20 °C to +55 °C -5 °C to +55 °C



# 10 APPENDIX

## 10.1 LED STATUS INDICATION

network/line (yellow)	GSM	PSTN	Steady connect/ webmeter
Off	No antenna level	Not connected to telephone line	No antenna level
On	Modem connection (online)	ditto	Connection made (socket opened)
1 x flash	Antenna level 1% - 20 %	Connected to telephone line	Ditto as GSM. However, the antenna level is requested once during startup.
2 x flash	Antenna level 21% - 40%	--	
3 x flash	Antenna level 41% - 60% (minimum recommended	--	
4 x flash	Antenna level 61% - 80%	--	
5 x flash	Antenna level 81% -	--	
1 x long flash (as ring signal)	There is an incoming call	There is an incoming call	In server mode: Client is establishing a connection
Faster flashes	Modem connection is being established	Ditto	In client mode: Connection being established (open socket)
Slow flashes	--	--	Idle mode: Server mode on: logged on to GPRS Server mode off: logged on to GSM



error (red)	GSM	PSTN	Steady connect/ webmeter
Off	No error(s)	ditto	Ditto GSM
1 x flash	General error	ditto	Ditto GSM
2 x flash	No SIM card available	input active though no telephone line is connected	Ditto GSM
3 x flash	Incorrect PIN code	--	Ditto GSM
4 x flash	3 x times incorrect PIN code, enter PUK code	--	Ditto GSM
5 x flash	Mains failure	ditto	Ditto GSM
6 x flash	No number or incorrect telephone or service centre number entered -- Or -- Insufficient antenna level for sending and/or receiving SMS	ditto  --	Ditto GSM -- Or -- no antenna level
7 x flash	No telephone number entered in first position of a series of numbers of input channels	Ditto	Ditto GSM -- Or -- Connect GPRS failed
8 x flash	--	--	Connect Server failed



on/busy (green)	GSM	
Off	Severa has been turned off	ditto
On	Severa is turned on and ready to report messages	ditto
Faster flashes	Severa is starting up or is sending an SMS message	ditto
	Busy with modem module	ditto
1 x flash	Input channel 1 is active	ditto
2 x flash	Input channel 2 is active	ditto
3 x flash	Input channel 3 is active	ditto
4 x flash	Input channel 4 is active	ditto
5 x flash	Input channel 5 is active	ditto
6 x flash	Input channel 6 is active	ditto
7 x flash	Input channel 7 is active	ditto
8 x flash	Input channel 8 is active	ditto

Tx / Rx (green)	GSM + steady connect + webmeter	PSTN
Off	--	No data is being sent or received
flashing	--	Data sent or received (goes with the RS-232 signal)



If multiple input channels are active, each channel's status is indicated consecutively.

If all LEDs start flashing simultaneously when the Severa is started up, it is possible that it is not connected to the mains and the optional internal emergency battery is too low.

**10.2 LIST OF SETTINGS (only with Severa GSM)**

<b>COMMAND</b>	<b>ACTIVITY</b>	<b>CONFIRMATION</b>
#V#	Request software version number	VERSION: SV-x.xx
#OA1#	Output point 1 becomes active	Severa confirms: Output command.
#OA2#	Output point 2 becomes active	Severa confirms: Output command.
#OA12#	Output points 1 and 2 become active	Severa confirms: Output command.
#OI1#	Output point 1 becomes idle	Severa confirms: Output command.
#OI2#	Output point 2 becomes idle	Severa confirms: Output command.
#OI12#	Output points1 and 2 become idle	Severa confirms: Output command.
#OP1#	Output 1 will be active for 2 seconds	No confirmation
#OP2#	Output 2 will be active for 2 seconds	No confirmation
#OP12#	Outputs 1 and 2 will be active for 2 seconds	No confirmation



### 10.3 BATTERY-POWERED SEVERA MODEL

The functionality of the battery-powered Severa (type identified as “**BW**”) differs from that of the mains-powered models in several respects, namely:

- The supply voltage originates from 2 IEC LR6 (Alkaline, format AA) batteries (included). The amount of electricity used in the sleep mode is only a few  $\mu\text{A}$ .
- The Severa does **NOT** work with pulse contacts! As such, contact input points must remain active at least until the moment that the SMS message is sent.
- When an alarm input point has been activated, the Severa comes out of its sleep mode. It then logs onto the network of a telecom provider (as per the SIM card fitted), using its built-in GSM engine, after which the SMS message is sent. Since the Severa is not constantly logged onto the telecom provider’s network (to save energy), this procedure takes some time to process (+/- 90 sec).
- No dial-back acceptance time can be programmed. After the SMS message has been sent, the Severa immediately returns to its sleep mode.
- If the Severa has been in sleep mode for more than 30 days, it automatically restarts for 0.5 second to test the batteries. However, it does **not** test the condition of the batteries, it only measures whether they are still above the “empty” level. If they are below that level, the Severa automatically sends a “battery empty” message. This report is the same as the “mains failure” report of the mains-powered models.
- The push button on the print can be used to check the performance of the indicator LEDs. If that button is pressed, all LEDs will light up, and a “battery empty” test is performed. If the button is pressed for more than 3 seconds, the Severa will be start up and will remain on for 1 minute. This allows the user to read any statuses and the antenna level.
- With this model, the software version **CANNOT** be called up as described in chapter 5.8.



## 10.4 REPORTING TO ARA

In order to send reports to ARA-pro (Adesys Alarm Registration and Processing system) alarm centre, the message must contain the following text (format).

**<location>** = location code e.g. **<0001>** (enter in line 1, "main message")

**<alarm><SV>** = alarm number (contact input point) e.g. **<1><SV>**

Since there are no separate entry options for alarm and idle reports, the number of the alarm input point must be followed by **<SV>**. The line interface will then see from the *IDLE* or *ACTIVE* indication whether the report is an alarm or an idle report.



Forwarding to ARA-pro is only possible if the system is equipped with an SMS receiver, type AR-MT2SG



## 10.5 SEVERA-COMPRI LINK

### 10.5.1 Modem settings

To use the Severa in combination with a *Compri* system, a number of factors should be taken into consideration.

In the Priva package, an *initialization string* should be entered, which the *Compri* then shoots into the Severa. In no event may this string include **&F**.

An example of a properly working string is **ATM0E0V0S0=2S7=80**

The last part (**S7=80**) is only necessary if it takes longer to establish modem connections than the standard *timeout* of 50 seconds. This is the case if, for example, the Severa sends its reports to an ARA system where all incoming options are active for "*Programming COM port*", i.e. all acceptance reports, semadigit and modem messages.

The following modem settings must be programmed:

- **Baudrate**
- **Parity** (8N1)

Consult the specifications of the equipment used for the exact settings.



A special communication cable is available for both the *Compri-8* and the *Compri-HX*. The article number for this is SV-22 (RS-232 cable Severa // *Compri* – RJ-10 / RJ-45 / adapter Sub-D9).

When using the RJ-10 connector the handshake pin has to be set on DCD (set via "Modem" tab in **SevProg**).

The firmware of the ARA / Smart-Alarm line interface must be at least **X14P** or **X25P**.

**As with all ARA systems, speech must be spoken into the line interface!**

### 10.5.2 *Compri-HX* / Severa mounting recommendations

- Connect the **earth leakage** of the *Compri-HX* to the **earthing block** using the shortest possible connection (as per the Priva prescriptions).
- Connect the **GND** of the Severa's power supply to the **earthing block** using again the shortest possible connection, preferably with mounting wire of at least **1mm<sup>2</sup>** and a maximum length of **1m**.
- Connect the power cable for the Severa to the 24VAC power supply using a **1AT** fuse. The diameter of this power cable must be at least **0.5mm<sup>2</sup>**, and its length no more than **5m**.





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