GSM-R2-T

1. Introduction

GSM-R2-T is a device designed **for DIN rail mounting**. GSM-R2-T can control one independent electrical circuit in a building, e.g. one circuit of an accumulator stove or circuit for entry gate or garage gate opening. The control is made via SMS messages or by ringing. The device is ready to operate immediately after connection to power supply and inserting of a SIM card of any GSM operator. The GSM-R2-T has one relay output, which can control a coil of a contactor. An electrical appliance e.g. electric heating system can be connected to this contactor. The GSM-R2-T has also one logical input. This input can be activated by external voltage 8 to 30$V_{DC/AC}$. The GSM-R2-T can react on input status change by ringing or sending and SMS on preset phone number. It is also possible to readout the status of this input via status SMS from the GSM-R2-T. Analog input is designed for connection of temperature sensor and can be used in "temperature regulation" function of GSM-R2-T which can control connected heating system to maintain the preset temperature. The temperature of a temperature sensor can be readout via SMS.

2. Package

1pc **GSM-R2-T**
1pc GSM antenna GSM-ANT11K
1pc 8 pin connector (3.5mm)
1pc 2 pin connector (3.5mm)
1pc screwdriver BERNSTEIN
1pc printed documentation

Note.*) temperature sensor GSM-C-T2 is not part of the package. It has to be ordered separately

3. Instalation

1. To operate the GSM RELAY a SIM card of any GSM operator is necessary. SIM card must be functional, active and must have PIN code turned off. Also some credit is necessary if the SIM card is pre-paid.

Before inserting the SIM card into the GSM-R2-T device, it is necessary to turn off setting of the "PIN code"!

Insert the active SIM card (= at least one call was made) to any mobile phone and turn off the requirement of setting the PIN. On most mobile telephones, this option can be found in menu "Setting the telephone protection" or "Setup -> Security -> PIN control".

2. Insert this prepared SIM card into the GSM-R2-T device. See the chapter 5.4 for details.
3. Now it's possible to connect GSM antenna and power supply to GSM-R2-T. Ca **1 minute** later the blue LED diode **GSM** will start flashing with a period of 3 sec.
4. For the first tests of GSM-R2-T the connection of an input and output is not necessary.
5. To make the first test of the GSM-R2-T, use your mobile telephone you want to use to control the appliance and send a SMS text message **1234 ON** to the telephone number of the SIM card inserted into the GSM-R2-T. This will switch on the plugged appliance. GSM-R2-T automatically sends a confirmation message on performing the operation.

To change the password 1234, insert the SIM card into any mobile telephone and in the phonebook on the SIM card in field "Names" for name xCode change the telephone number 1234 to a number you select. The device reacts to the SMS text message from any telephone as long as the access password matches. The very first one (the sender of the message) will be remembered as master and will receive message about events on GSM-R2-T. This user can also switch some output by "ringing" on the device.

6. Try "**ringing**" on device. You can make pulse on OUT for ca. 4 seconds by calling on GSM-R2-T (with factory settings). The device hangs up the call and makes pulse on the output. This can be used for example for opening an entrance gate. You have to use the same phone number as was in the very first SMS sent to the device.
7. Try regulation. You can send SMS in form of 1234 TEMP25 to command device to maintain temperature 25 °C depending on the temperature sensor T1. Range of regulation is between 0 °C and +55 °C. Regulation can be canceled by SMS with command 1234 OFF or by ringing (no confirmation is sent back in case of ringing).

4. Technical specificatins

Parameter		Symbol	MIN.	TYP.	MAX.	Unit
Dimensions	Width	W		54		mm
	Height	H		24		mm
	Depth	D (w/o connectors)		86		mm
Supply	Voltage max. power supply	(during phone call, empty battery and relay ON)	8 V_{DC} 12 V_{AC}	12 V 3.3 W	30 V	$V_{DC/AC}$ W
	Standby	(connected to GSM network)		12 V_{DC} 30 mA		
Digital output	"OUT", signal relay					
	Voltage	U	3	12	60	V
	Current	I			2	A
Digital input	"IN1"					
	Voltage	U	3	4	30	V
	Current	I		0.15		mA
Analog input	"T1" (AIN1) 1x temperature sensor GSM-C-T2 *), accuracy 1 °C for temperatures 0 to 30 °C					
	Temperature measuring		-30		+55	°C
Temperature	Storage	tSTG	-40		+85	°C
	Operational	tA	-20		+65	°C

Use GSM-R2-T inside box with ingress protection at least IP44!
*) Temperature sensor GSM-C-T2 is not part of the package.

5. Hardware

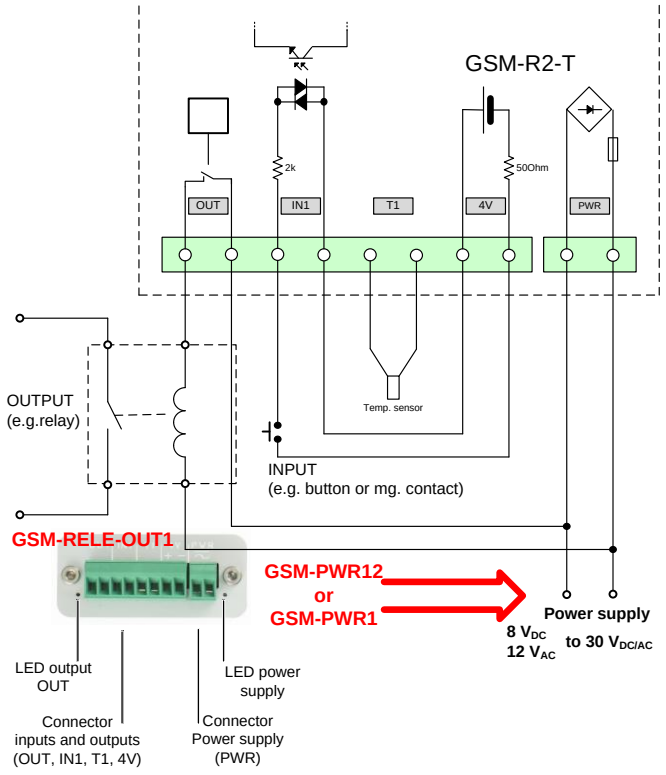
5.1 Power supply, Input and Output

Power supply connector has two pins. I/O connector has 8 pins: digital output (relay contact), digital input (optocoupler), analog input for temperature sensor and +4V accumulator.

PIN	Description	Parameter
OUT	Galvanically separated relay contacts	60 V / 2A
IN1	Bipolar optocoupler with serial resistor 2 kOhm	max 30V_{DC}
T1	Analog input for temperature sensor KTY	KTY210
4V	Internal Li-ION accumulator for input supply equipped by protective serial resistor 50 Ohm	4V, $_{MAX}$ 10 mA
PWR	Power supply	+8 V_{DC} (12V_{AC}) to 30 $V_{DC, AC}$

Power supply is in range +8 V_{DC} (+12 V_{AC}) to 30 $V_{DC/AC}$. It means polarity of power supply is not important.

5.2 Recommended connection



5.3 LED Diodes

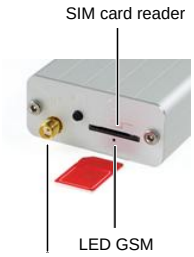
Indication LED diodes.

LED	COLOR	Meaning
GSM	blue	GSM-R2-T status: *dark* … device is starting up *blinking 1:1*… device is starting up *short blink 1 per 3 seconds* … device is ready and in operational state
PWR (supply)	green	*Permanent light* … supplied from an external supply. Blinking whenever GSM-R2-T is supplied from an internal Li-ION accumulator.
OUT (output)	green	*Permanent light* … Output is ON. *Blinking* … regulation function is active.

5.4 SIM card reader and pushbutton

Insert SIM card into GSM-R2-T (see the picture). Proper insertion is indicated by mechanical clicking noise. Push and release to remove the SIM card from GSM-R2-T.

Press shortly the button to change the output "OUT" status. Press the button for 5 seconds (or longer) to switch the GSM-R2-T to sleep mode (this feature is available when supplied from battery only). Sleep mode is canceled when GSM-R2-T is supplied from power supply.



5.5 Antenna

antenna SMA (f)

Antenna is connected using SMA connector. GSM-R2-T is equipped with SMA female connector. It means that antenna has to be equipped with SMA male connector. Impedance is 50 Ω.

6. Configuration

Configuration parameters of GSM-R2-T are stored on a SIM card phone book. The phone book contains a pairs <name, number>. After Power On of GSM-R2-T this phone book is searched for the names in a following table: (**Names are not case sensitive**, xcode = xCODE). If any parameter is not present, the default value for this parameter will be used.

All phone numbers must be in an international form: + (Country code) (phone number) e.g. +420777777497.

Tip: Use your mobile phone to make changes in parameters of GSM-R2-T: Insert the SIM card from the GSM-R2-T into your mobile phone. Make necessary changes of parameters in a phone book of a SIM card and put the SIM card back into GSM-R2-T again.

The first person who sends valid SMS to GSM-R2-T with a "clear" SIM card inserted, became a main user (master) of the device.

In all following examples we suppose the GSM-R2-T is already fully functioning with a SIM card. (See the chapter **Installation**).

7. GSM-R2-T Control

7.1 Control output by "ringing"

GSM-R2-T is set by the manufacturer to switch ON an output OUT for 4 seconds based on ringing from any phone number. This pulse is useful e.g. for opening of an entry gate. Test this function by a call to GSM-R2-T from your mobile phone (it's important to send a valid command SMS to GSM-R2-T from your mobile phone if have inserted a "new" SIM card to GSM-R2-T first).

GSM-R2-T rejects a call and then immediately generates a pulse on an output OUT. The number of users is max. 200.

7.2 Remote control via SMS

GSM-R2-T is controlled via SMS of the GMS network. Text SMS are in form:

<PASSWORD> <COMMAND> [<RETURN COMMAND >]

Example

`1234 ON` … GSM-R2-T will switch ON an appliance connected to output "OUT". This action will be confirmed by an SMS.

`1234 OFF NOBACK` … GSM-R2-T will switch OFF an appliance connected to output "OUT". Confirmation SMS message will not be sent back.

Password

Password is a main security item for GSM-R2-T. Command SMS are accepted from any phone number. It means anybody who knows the password and the phone number can control the GSM-R2-T. The password is a string of digits (1 to approx. 20) which must be on the beginning of any command SMS. Otherwise the SMS will be ignored. A text before the password is automatically ignored. It is useful when command SMS are sent from Internet GSM gates.

Factory setting of a password (see chapter List of All Parameters, parameter **xCode**) is:

1234

Command

This part of a message specifies a requested action. See the following table for available commands. GSM-R2-T is not a case sensitive. It's possible to use more commands in one SMS. Commands are separated by a space.

Command	Parameter	Meaning
ON	-	Output "OUT" will be switched ON
OFF	-	Output "OUT" will be switched OFF
PULSE	-	Output "OUT" will be switched ON for 4 seconds (= 4sec. pulse will be generated)
TEMP	0 to 55	Requested temperature setting (value in °C). An output specified by xRegOut parameter will be controlled to maintain this temperature.
STATE	-	Request of status SMS (state of inputs, outputs, signal quality and credit).

Examples:

`1234 ON` … an appliance connected to "OUT" will be switched on

`1234 OFF` … an appliance connected to "OUT" will be switched off

`1234 PULSE` … output "OUT" will be switched ON for 4 seconds (= 4 sec. pulse will be generated) (Note: if an output is already switched on, it will be just switched off after 4 seconds)

`1234 TEMP5` … GSM-R2-T will set and activate the temperature regulator function to +5 °C

Confirmation

If a *command message* contains a valid password (access code) the GSM-R2-T sends back a confirmation message which informs if a command was accepted (see chapter Status SMS). If you don't want a confirmation message (e. g. when sending a command SMS from the Internet GSM gates) add a command "NOBACK".

Command	Meaning
NOBACK, NEZPET	No confirmation SMS will be sent

Example:

`1234 ON NOBACK` … GSM-R2-T will switch on an appliance connected to output "OUT", but no confirmation message will be sent back

7.3 Status message

The status message is send whenever the command message contains a valid password. The typical example of status message:

Status message example	Explanation
GSM R2 T: ON SUCCESS	Command confirmation: to switch OUT ON
out=on	Output OUT status
in=ok	Input IN1 status
Sig=58%	GSM signal level
Temp=28'C	Actual temperature on a temperature sensor T1
Credit=243.15	Credit on a prepaid SIM card

Note: Status message has maximum length of 160 characters. (Characters over the length of 160 will be lost).

7.4 Control via application for OS android

For control and monitoring of GSM-R2-T can be used the app to Android OS call "**SeaControl**", which can be download for free and without any restriction. For details and to download an application, go to www.seapraha.cz, where fill in the field "SEARCH" the text "GSM-CONTROL".
This application communicates with the GSM-R 2-T through SMS messages.

8. Examples

The following examples describe the most widely used methods of using the GSM-R2-T. All examples are based on the "default" parameter settings on the SIM card (see Chapter 6)

8.1 Remote control of heating on a cottage

The electrical appliance is connected to output OUT of GSM-R2-T using a contactor.

Following SMS message will **switch ON** the electric power to a heating:

```
1234 ON
```

Following SMS message will **switch OFF** the electric power to a heating:

```
1234 OFF
```

The proper function depends on the following parameters on a SIM card:

xCode	1234
xRegOut	0

Note: If the password was changed from the „default" factory 1234 to another (e.g. 6543), the SMS has to be 6543 on (6543 off).

8.2 Remote control of heating regulation on a cottage

The electrical appliance is connected to output OUT of GSM-R2-T using a contactor.

SMS message in the following format sets the requested temperature to 25 ° C for temperature regulator and activates the function "regulator":

1234 temp25

The proper function depends on the following parameters on a SIM card:

The default factory setting is not necessary to change:

xCode	1234
xReg	1
xRegHyst	1
xRegIn	1
xRegOut	0

8.3 Entry gate opening by phone call from a mobile phone (without confirmation)

The gate control is connected to output OUT of GSM-R2-T. After the first ringing from the phone number from which was sent the first valid SMS command GSM-R2-T rejects a call and the entrance gate will open. The next call will close the entrance gate.

Correct function is affected by following parameters on the SIM card (items in the phone book); default parameters need not to be changed:

xIo0pulseLen	4	(note.: o0 = "ó" and "zero")
xRemDout	0	
xRemCall	1	
xRemConfirm	0	
xMaster	+420777111111	

If you need to control the entry gate using different phone numbers, add these numbers on SIM card:

xRUser1	+420777222222
xRUserPeter	+420777333333

Note. It's possible to append characters to „xRUser" for better identification of a user's phone number.

8.4 Entry gate opening by call from a mobile phone (with confirmation)

After the first ringing from the phone number which is in the list of users (xRUser. ..) of the GSM-R2-T, it rejects a call and calls back. When the calling user rejects the call within 29 seconds, the entrance gate will open.

The setting of parameters on a SIM card is the same as it the previous chapter (8.3), except xRemConfirm parameter which must be set to "1":

xRemConfirm 1

9. Event SMS Messages

Whenever any event appears on the GSM-R2-T input or output for longer than minimum specified time, the GSM-R2-T sends an SMS about this event. To increase the probability the user will read the SMS it can be followed by a voice call from GSM-R2-T. See the xe[...+...+.....] parameters.

If you answer the phone call you will hear a voice message in a form of DTMF signals.

10. Examples of event messages

The following examples describe the most common examples of what can GSM-R2-T to send to you. All the examples are based on the "default" parameter settings on the SIM card (see Chapter 6).

10.1 SMS message based on input event (an input IN1 is activated by voltage)

By applying a voltage to the input IN1 (= input is activated) is sent the following SMS text:

GSM R2 T: In1 ALARM!

out=on

in1=on

Sig=64%

Temp=ERROR

As a phone number is used the phone number from which was sent the first valid SMS (in this example is used phone number +420777111111).

Correct function is affected by following parameters on the SIM card (items in the phone book); default parameters, which need not to be changed:

xMaster	+420777111111

If you need to send the SMS message to other phone numbers, you must add them to the SIM card phone book:

xRUser1	+420777222222
xRUserPetr	+420777333333

10.2 Call when the voltage disappears from input IN1

By disconnecting the voltage from the input IN1 (= input is deactivated) the phone number from which was sent the first valid SMS (+420777111111 in this example) is called.

Correct function is affected by following parameters on the SIM card (items in the phone book); default parameters, which need not to be changed:

xeI1+HL+CALL	+420777111111

10.3 SMS when the temperature drops

If you want to receive SMS when the temperature drops below +5 ° C, it is necessary to set these parameters on the SIM card:

xeA1+HL+SMS	+420777111111
xAIn1Level	10
xAIn1Hyst	5

Level (Level) is set to 10 ° C, the hysteresis (Hyst) at 5 ° C. SMS is sent when the temperature drops below +5 ° C (+10 ° C - 5 ° C). The SMS is re-sent after the temperature rose above +15 ° C (10 ° C + 5 ° C) and then falls below +5 ° C again.

11. Advanced functions

11.1 Automatic Voice Call

Automatic voice call enables to verify the ability of the GSM-R2-T to make a voice call in case of any event (i.e., functionality, the credit, the GSM signal etc.).

In the following example the GSM-R2-T will call you between 9:00 and 18:00 of a local time. It means you will not be woken up in the middle of night. If you will not answer the call, the GSM-R2-T will repeat the call after 2 minutes again.

Example of parameters on a SIM card:

xAutoCall = +420123456789 … (= call the phone number +420123456789)
xAutoCallInt = 1 … (= call every month)
xAutoCallIntFrom = 9 … (= call between 9 am
xAutoCallIntTo = 18 and 6 pm)

Format of **xAutoCallInt** parameter is: 1 = 1 month, #2 = 2 days, *3 = hours, 1#2*3 = 1 month 2 days 3 hours. The time period between calls starts whenever new value of the parameter is set (it happens when the SIM card is inserted into GSM-R2-T and the power supply is set on).

11.2 Automatic SMS message

This function is useful for reporting "I am alive" and inputs and outputs status via SMS messages. You can set a phone number to send automatic SMS message (xAutoSms), time period between two SMS messages (**xAutoSmsInt**), begin (**xAutoSmsIntFrom**) and end (**xAutoSmsIntTo**) time, when automatic SMS message is allowed to be sent.

Example of parameters on a SIM card:

GSM-R2-T sends SMS message every day between 18:00 and 21:00.
xAutoSms = +420123456789 … (= send SMS toe phone number +420123456789)
xAutoSmsInt = #1 … (= send an SMS every day)
xAutoSmsIntFrom = 18 … (= send an SMS between 6 pm
xAutoSmsIntTo = 21 and 9 pm)

Format of **xAutoSmsInt** parameter is: 1 = 1 month, #2 = 2 days, *3 = hours, 1#2*3 = 1 month 2 days 3 hours. The time period between SMS starts whenever new value of the parameter is set (it happens when the SIM card is inserted into GSM-R2-T and the power supply is set on).

After saving parameters on the SIM card the GSM-R2-T sends an SMS with the following text:
GSM R2 T: Device OK. .... followed by status information.

11.3 Limit the number of alarm SMS (max. 1 SMS every 3 days)

Example of parameters on a SIM card:

xLimit	1
xLimitCount	1
xLimitTime	3

11.4 Setup credit limit to 70 CZK

When credit drops below 70 CZK, GSM-R2-T will send warning SMS message.

Example of parameters on a SIM card:

xCredit	1
xCreditLimit	70
xEvent8004 *)	+420777777497

*) These parameters must be created by user in the phone book on SIM card.

11.5 Redirection of SMS without valid password

Master (parameter xMaster) can get all messages sent to the GSM-R2-T without valid password. This function helps to watch all unauthorized attempts to control the GSM-R2-T. Every SMS message without valid password is forwarded to phone number depending on the xMaster parameter, in case this function is switched on. For example credit warning message from provider.

Use parameter **xRedirect** to switch this function on or off (value 1 = function on, value 0 = function off).

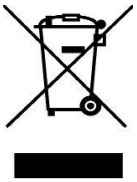
12. Warranty

General **warranty period is 24 months** after purchase, when eventual malfunction device will be repaired free of charge in SEA spol. s r.o. while shipping to SEA is paid by customer and SEA pays for shipping back to customer.

The warranty does not cover any damage caused by wrong use which does not comply the technical specifications and user instructions and any accidental damage (e.g. by water, lightening etc.).

SEA spol. s r.o. has NO RESPONSIBILITY for any damage, lost, costs and any other problems direct or inducted, caused by device malfunction from any reason.

In case of incompleteness or any damage in the packaging it is necessary to inform SEA spol. s r.o. immediately (within five days).



CE Declaration of conformity

in accordance with the Radio and Telecommunications Terminal Equipment Directive 1999/5/EC (R&TTE) and Directive 2011/65/EU (ROHS).

We SEA, spol. s r.o., Dolnoměcholupská 21, CZ 102 00 Praha 10, Czech Republic, **ID**: 47117931 (**manufacturer**) **declare under our sole responsibility, that product** GSM RELE2 TEMP **type** GSM-R2-T **is in conformity with the following standards:**

health and safety:	EN 60 950-1:2005+A1:2009 EN 60 950-1:2006+A11:2009+A1:2010+A12:2011	
EMC:	ETSI EN 301 489-1	ETSI EN 301 489-7 v1.3.1
radio frequency:	EN 301 511 v 9.0.2	

The last two digits of year in which the CE marking was affixed: 13

CE

Place of issue: Praha **Name:** Ing. Vladimír Rosůlek
Date of issue: 25.11.2013 **Grade:** director

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13. Frequently Asked Questions (FAQ)

What is necessary to use the GSM-R2-T:

- Good quality GSM signal in the place where GSM-R2-T is used (at least 2 bars on your mobile phone)
- Sufficient credit (in case a pre-paid SIM card is used)
- No phone call redirection
- The user has to know to operate his mobile phone (PIN usage deactivation, Phonebook contact changing)

Problem description	Possible cause	Solution
Blue LED diode GSM does not start blinking once per 3 seconds during 3 minutes after power on of GSM-R2-T	No SIM card inserted or SIM card is not functional	Test the SIM card in your mobile phone. Try to make a call and receive a call from another mobile phone. Try to send a receive SMS message. Switch off using PIN on a SIM card. Cancel all call redirection for a SIM card. (Ask your mobile operator for help if necessary)
	New SIM card which was not activated yet	New SIM card has to be activated. (Ask your mobile operator for help if necessary)
	Low credit on a pre-paid SIM card	Check credit on a prepaid SIM card Tip: in the Czech Republic the codes are: *22# Vodafone (Vodafone card) *101# T-Mobile (Twist) *104*# O2 (GO)
	Low quality GSM signal	Test the GSM signal level with your mobile phone in the same location where you will use the GSM RELAY 2. For a test use a SIM card from GSM RELAY 2 (it's important to test GSM signal of the same GSM operator). The mobile phone should show the signal level at least 2 bars.
The pulse on an output is not generated based on an incoming call (e. g. for a gate opening)	Phone calls are redirected for the SIM card which is inserted in GSM-R2-T	Cancel all phone calls redirection for the SIM card which is inserted into GSM RELAY.
The "temperature regulation" function of GSM-R2-T was deactivated	GSM-R2-T was deactivated by incoming phone call by master	Change the parameter xRemCall = 0 on SIM card to deactivate the function "pulse by ringing". Then activate the "temperature regulation" function again by SMS. E.g. "1234 TEMP25".
The temperature from an external temperature sensor is wrong	Too long lines to an external temperature sensor	The accuracy of temperature depends on a line length to an external temperature sensor (16 Ohms means 1°C). Use thicker wires to temperature sensor.
Some parameters are missing on the SIM card	The phone book on a SIM card is full. (There is no place on a SIM card for parameters)	Delete some of contacts in the phone book on a SIM card (minimum is 60 free contacts).

14. A list of the most frequently used parameters

See www.seapraha.cz , find the device's website and download the file "Complete list of commands".

15. The factory setting of parameters and their values on the SIM card

Name (= parameter)	Phone number (= value)
xCode	1234
xCredit	1
xCreditCode	*22#
xCreditFreq	60
xCreditLimit	50
xeA1+HL+SMS	
xeA1+LH+SMS	
xeI1+LH+CALL	
xeI1+LH+SMS	
xeI1+LH+SMS	+420777111111

Name (= parameter)	Phone number (=value)
xMaster	+420777111111
xRedirect	0
xReg	0
xRegHyst	1#0
xRegIn	1
xRegLevel	20#0
xRegOut	0
xRegSafe	10
xRemCall	1
xRemConfirm	0
xRemDout	0
xRUser	
xRUserMaster	+420777111111

Name (= parameter)	Phone number (=value)
xain1delay	1
xain1hyst	1#0
xain1level	5#0
xain1neg	0
xain1state	1
xAutocall	
xAutocallFrom	9
xAutocallInt	#30
xAutocallTo	18
xAutosms	
xAutosmsFrom	9
xAutosmsInt	#30
xAutosmsTo	18

Name (= parameter)	Phone number (=value)
xGprs	0
xHistory	0
xIO0neg	0
xIO0pulseLen	4
xIO0state	1
xIO1delayHL	1#0
xIO1delayLH	1#0
xIO1neg	0
xIO1state	1
xLanguage	1
xLimit	1
xLimitCount	30
xLimitTime	7