NOKIA 30
GSM CONNECTIVITY TERMINAL
GUIDE FOR USER CONTROL MODE

NOKIA

Contents

DEFINITIONS AND TERMINOLOGY

ASCII	American Standard Code for Information Interchange
AT	Attention
CORBA	Common Object Request Broker Architecture
CSD	Circuit Switched Data
GSM	Group Special Mobile, Global System for Mobile communications
GPRS	General Packet Radio Service
I/O	Input/output
M2M	Machine-to-Machine, Man-to-Machine, Machine-to-Man
SM	Short Message, text message
SMS	Short Message Service
SW	Software

REFERENCES

1. Nokia 30 GSM Connectivity Terminal Product Guide
2. Nokia 30 GSM Connectivity Terminal Technical Specification
3. M2M System Connector Electrical Specification for Nokia 30 GSM Connectivity Terminal

1. DOCUMENT SCOPE

This document describes how the Nokia 30 GSM Connectivity Terminal can be used in User control mode. The ways of controlling the terminal in this operation mode is described as well as how this can be done in a more secure way.

For more detailed information about the Nokia 30 GSM Connectivity Terminal, other Nokia M2M products and application development for M2M, please visit Forum Nokia and M2M links at http://www.forum.nokia.com.

2. PRODUCT CONCEPT AND USAGE

2.1 GENERAL

Nokia 30 is a GSM Connectivity Terminal for EGSM 900/GSM 1800 networks. It includes a GSM transceiver with built-in data capabilities, a SIM card reader, an internal antenna, an external antenna connector, and an M2M system connector.

The Nokia 30 GSM Connectivity Terminal has three different operation modes:

- User control mode
- AT command mode and
- M2M system mode

In AT command mode the Nokia 30 GSM Connectivity Terminal is used as a GSM data modem using AT commands. In M2M system mode the Nokia 30 is used as a part of Nokia M2M Platform using CORBA messaging.

2.2 USER CONTROL MODE

In the user control mode the Nokia 30 GSM Connectivity Terminal is controlled with e.g. a mobile handset. Text message (short message service = SM) templates that are sent from the mobile to the Nokia 30 instruct the terminal, which in turn controls a device or machine, attached to it through the M2M system connector.

The Nokia 30 processes the SM and sends a response back to the command originator. Finally, a received and recognized command will be deleted by the service. Unrecognised commands would be stored to terminal or SIM as normal messages.

The control or monitoring is through general-purpose inputs and outputs of the M2M System Connector. Thus, there are three general-purpose inputs and five general-purpose outputs on the M2M system connector of the Nokia 30 GSM Connectivity Terminal. The inputs can be used in either digital (on/off) or analog (continuous signal) mode. The outputs can be used in digital mode only (set something on/off).

3. SECURITY

There are three levels of access control for User control mode: message identifier, password and authorization number. A message identifier has to be used i.e. the terminal has to be named in order to be able to use the User control mode of the Nokia 30 GSM Connectivity Terminal. The identifier initiates every text message template aimed to control the Nokia 30 GSM Connectivity Terminal and the application attached to it.

The identifier is entered with the Nokia 30 Configurator software when the terminal is used for the first time.

A user specified password could be used to further secure the communication between the handset and the terminal. The password is entered whenever a text message template is sent to the Nokia 30. The password is activated and/or changed with the Nokia 30 Configurator software or a text message (SM).

Access can be secured by specifying from which phone number the requests for control are allowed, thus determining an authorization number. The number specification is done with Nokia 30 Configurator software. Only one number can be specified as authorization number.

4. GETTING STARTED

4.1 SECURITY SETTING

The following settings must be made first before the User Controlled I/O service can be used. All settings can be made with Nokia 30 Configurator software by opening menu option Remote I/O Control -> User control mode (see Figure 1).

4.1.1 Message identifier

Message identifier is a mandatory parameter that has to be set in order to use the service. If this parameter is not set (i.e. its empty), the service is switched off and commands cannot be executed by the service. The parameter accepts 0-8 characters (ASCII character range 0x20-0x7E) e.g. Nokia30. A command always starts with the Identifier. Note that the Identifier parameter is case sensitive (see Figure 1).

4.1.2 Authorization number

Authorized Number is an optional parameter that could be used if a user wants to secure the system e.g. in case commands will be accepted only from one phone number. The most secure system will be achieved if both, the Authorized Number and the Password, optional properties are activated. The parameter accepts numbers 0-9 and '+' character (ASCII range 0x30-0x39 and 0x2B) e.g. +1234567890 and the maximum length of it 32 (see Figure 1).

If Authorized Number property is activated and a terminal receives a command from some other phone number, it will send a following indication message to the Authorized Number:

Invalid Originator:

Number: X

Command: Y

Where X refers to an invalid command originator phone number, and Y refers to a "command". The command may or may not be a valid command. If a command length is too long to be shown in one message, the Y refers to a text "Too Long". In this case, the indication message looks like this (X as described above):

Invalid Originator:

Number: X

Command: Too Long

4.1.3 Password

Password is an optional parameter that could be used if a user wants to secure system e.g. in case that commands will be accepted from several phone numbers. The parameter accepts 0-8 characters (ASCII character range 0x20-0x7E) e.g. password. The password is case sensitive (see Figure 1).

Figure 1 User Control mode dialog in the Nokia 30 Configurator.

4.2 INPUT MODE AND INITIAL OUTPUT STATE

Input modes and initial output states can be configured with the Nokia 30 Configurator by opening menu option Remote I/O control -> General.

Each of the inputs can be configured as digital or analog depending on the nature of the device being monitored. If the information available from the device is on-off information, the input should be configured as digital. If in turn the information is of a continuous nature, the input should be analog. (See Figure 4 for a view of the Nokia 30 Configurator for Input settings).

It is possible to subscribe events as alarms to a specific phone number. In the case of digital input an alarm can be triggered when the state of the digital input changes. In the case of analog input low and high limits and a period for checking the input state can be set. For more information about subscribing input events, see chapter 7.2.3.

The initial state of each output pin and thus the device being controlled can also be set using the Nokia 30 Configurator. See Figure 2 for a view of the Nokia 30 Configurator for setting initial output states.

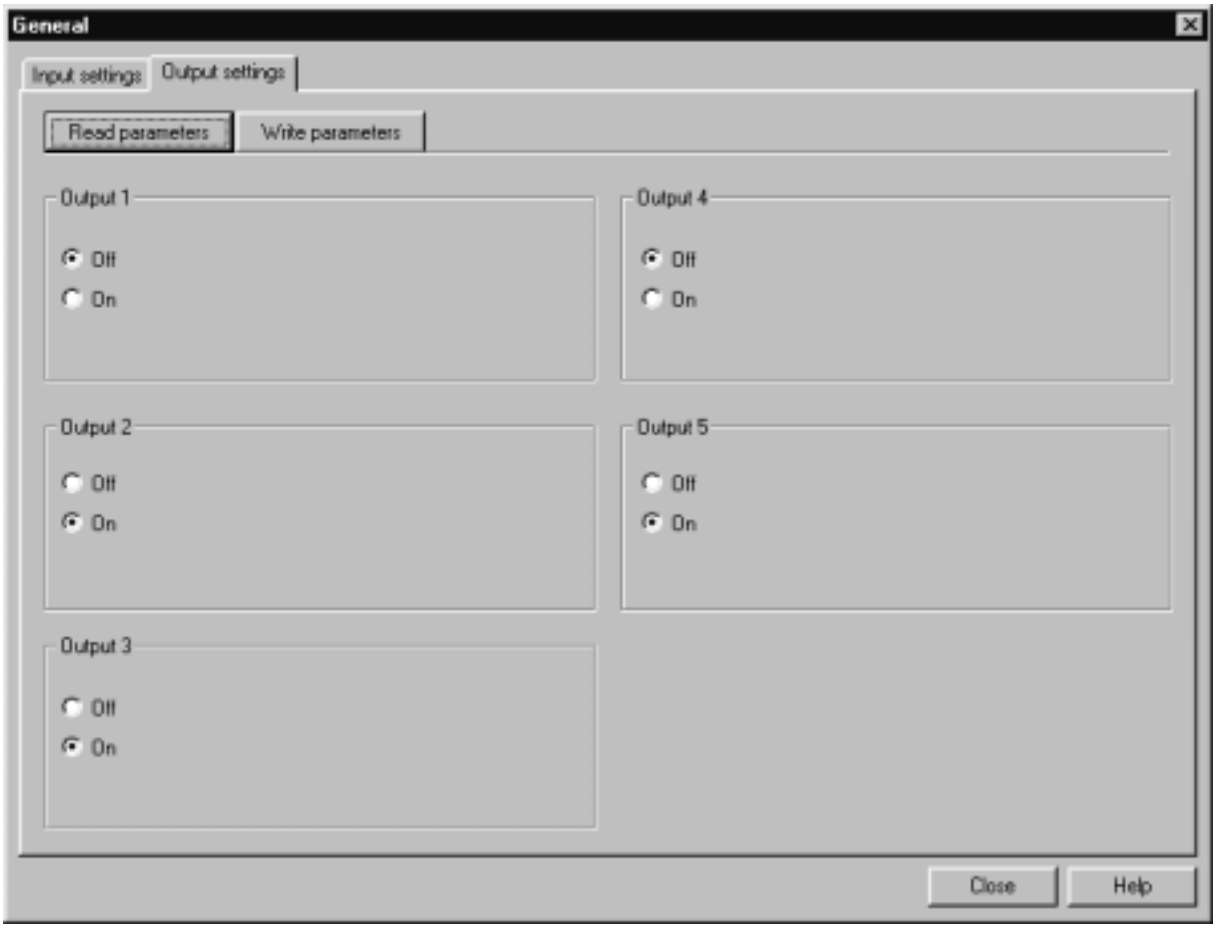

Figure 2 Setting initial output values with the Nokia 30 Configurator.

4.3 SMS CENTER NUMBER

SMS Centre Number must be set. If it is not set, the service is in off mode. The SMS Centre number can be set with the Nokia 30 Configurator software by opening menu option GSM Settings -> Advanced -> Short messages (see Figure 3):

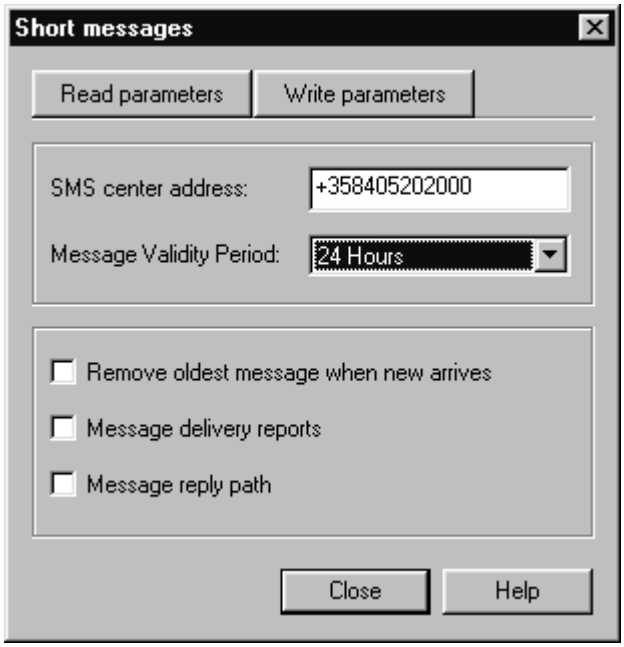

Figure 3 Setting SMS centre number with the Nokia 30 Configurator

Note that it is recommended that the terminal should be switched off and on every time parameters are changed.

4.4 CONNECTING A DEVICE OR A MACHINE

A device to be controlled with the Use control mode of the Nokia 30 is connected physically to it through the M2M System Connector. The general-purpose inputs and outputs of the M2M System Connector described in Chapter 5 are connected to the device.

For more information about how to connect a device electrically to the Nokia 30, please see reference 3. For information about the mechanical characteristics and recommended connector types for the M2M System Connector, please see Reference 1.

5. INPUT/OUTPUT PIN DESCRIPTIONS

The Nokia 30 GSM Connectivity Terminal has the following input and output pins that can be controlled using the services of the User Control mode (see Table 1):

Table 1 Nokia 30 GSM Connectivity Terminal inputs and outputs and available modes

Name	Analog / Digital	R/W	Pin Number (*)
Input 1	Analog / Digital	R	31
Input 2	Analog / Digital	R	33
Input 3	Analog / Digital	R	36
Output 1	Digital	R/W	37
Output 2	Digital	R/W	39
Output 3	Digital	R/W	40
Output 4	Digital	R/W	42
Output 5	Digital	R/W	43
Supply Pwr	Analog	R/W	11
(*) Pin number on M2M System Connector			

6. COMMAND SYNTAX

The command syntax varies according to activated options. Only one space character is accepted between between words. There may also be spaces in commands as seen on the example below. Password is case sensitive.

Command without a Password:

X Y X=Terminal Name, Y=Command.

E.g. Nokia30 Output_Set All On

Command with a Password:

X Y Z X=Terminal Name, Y=Password, Z=Command

E.g. Nokia30 password Output_Set All On

7. COMMAND TEMPLATES

7.1 COMMAND LIST

The Nokia 30 GSM Connectivity Terminal supports the following text message templates as commands and they are not case sensitive (see Table 2).

Table 2 Nokia 30 GSM Connectivity Terminal User control mode command list

Command	Description
Change_Pword	*Change password*
Input_Get All	*Return states of all inputs*
Input_Get 1	*Return a state of input 1*
Input_Get 2	*Return a state of input 2*
Input_Get 3	*Return a state of input 3*
Input_Get_Change All	*Subscribe a input state change of all inputs*
Input_Get_Change 1	*Subscribe a state change of input 1*
Input_Get_Change 2	*Subscribe a state change of input 2*
Input_Get_Change 3	*Subscribe a state change of input 3*
Output_Get All	*Return a state of all outputs*
Output_Get 1	*Return a state of output 1.*
Output_Get 2	*Return a state of output 2*
Output_Get 3	*Return a state of output 3*
Output_Get 4	*Return a state of output 4*
Output_Get 5	*Return a state of output 5*
Output_Set 1 On	*Set output 1 ON*
Output_Set 1 Off	*Set output 1 OFF*
Output_Set 2 On	*Set output 2 ON*
Output_Set 2 Off	*Set output 2 OFF*
Output_Set 3 On	*Set output 3 ON*
Output_Set 3 Off	*Set output 3 OFF*
Output_Set 4 On	*Set output 4 ON*
Output_Set 4 Off	*Set output 4 OFF*
Output_Set 5 On	*Set output 5 ON*
Output_Set 5 Off	*Set output 5 OFF*

Output_Set All On	*Set all outputs ON*
Output_Set All Off	*Set all outputs OFF*
Supply_Pwr_Get	*Return a state of supply power*
Supply_Pwr On	*Set supply power ON*
Supply_Pwr OFF	*Set supply power OFF*

7.2 DETAILED COMMAND INFORMATION AND RESPONSES

Note that all example commands use the Nokia 30 identifier string and the password property is set off in all following chapters.

Note: If a command string is not identified but the Identifier and the optional Password are ok, the terminal will send a following response to the command originator:

E.g.

Nokia30 passWORD ResetAll -> ERROR (Unknown Command)

7.2.1 Change_Pword

The *Change_Pword* command is used to control password property (see Table 3).

Table 3 Command templates for the password

Command type	Command template	Comments
Changing Password	**Nokia30 passWORD Change_PWord wordPASS** OK Response: **CHANGE_PWORD: OK** Fail Response: **CHANGE_PWORD: FAILED (Invalid new password)**	The example changes the password from 'passWORD' to 'wordPASS'
Activating Password Property	**Nokia30 Change_PWord wordPASS** OK Response: **CHANGE_PWORD: OK** Fail Response: **CHANGE_PWORD: FAILED (Invalid new password)**	The example changes an empty password to 'wordPASS'
Deactivating Password Property	**Nokia30 wordPASS Change_PWord** OK Response: **CHANGE_PWORD: OK** Fail Response: **CHANGE_PWORD: FAILED (Invalid new password)**	The example changes the password from 'wordPASS' to an empty

7.2.2 Reading Inputs

The *Input_Get X* commands are used to read inputs. A response depends on how each input has been configured. Each input can be configured either as digital or analog (see Table 4).

Table 4 The Input_Get X commands

Command type	Command template	Comments
Input_Get All	**Nokia30 Input_Get All** Response: **INPUT_GET ALL: OK** **INPUT1: X** **INPUT2: X** **INPUT3: X** The **X** varies according to the input pin state and it can be: **ON** or **OFF** if the input is in digital mode **xxxx mV** if the input is in analog mode (xxxx=value between 0-5400).	The command reads all inputs and the response returns the state of those according to input pin configuration
Input_Get Z , Z = 1,2 or 3	**Nokia30 Input_Get Z** Response: **INPUT_GET Z: X** The **X** varies according to the input pin state and it can be: **ON** or **OFF** if the input is in digital mode **xxxx mV** if the input is in analog mode (xxxx=value between 0-5400).	The command reads input **Z** (Z = 1,2 or 3) and the response returns the state of it according to input pin configuration

7.2.3 Subscribing Input Events

The *Input_Get_Change X* commands are used for subscribing input state changes (see Table 5). A subscription will cause a sending of one event per input state change to the subscriber phone number. The user can subscribe events of all input state changes at once or each input can be subscribed separately. Note that an input has to be configured properly in order to get events with this service.

An input can be configured in two ways to operate with event sending:

- Digital input
- Analog input + Alarming + Input High Limit + Input Low Limit + Input Period

When the Input mode is set to digital, an event is sent when the state of the digital input changes from 0 -> 1 or 1 -> 0.

When the Input mode is set to analog + alarming, an event is sent if the value is equal or exceeds the high limit or is equal or gets lower than the low limit. The state of the input is queried in a frequency defined in the period box.

The subscription of events can be used by configuring the correct settings with Nokia 30 Configurator software by selecting menu option Remote I/O Control -> General (see Figure 4).

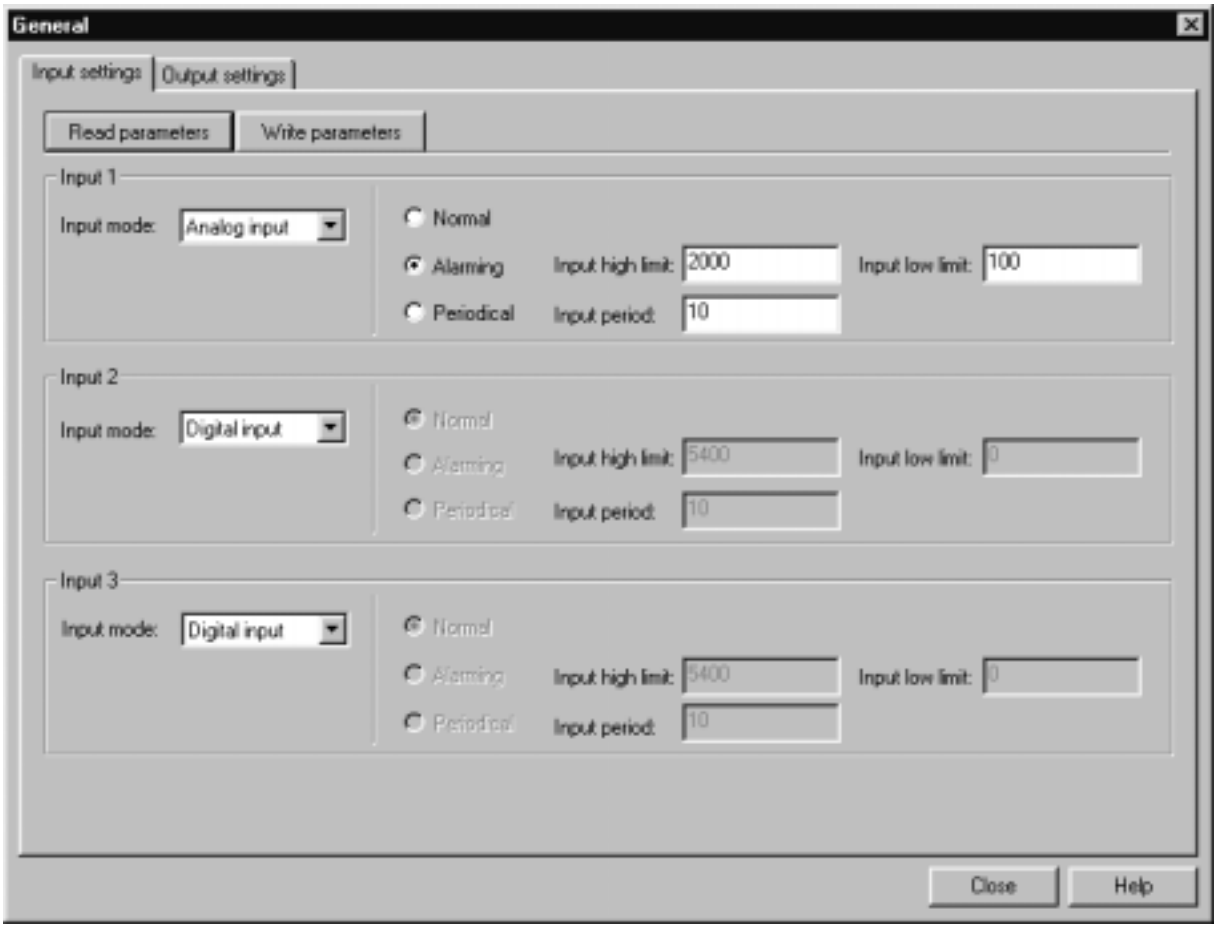

Figure 4. Input configuration for receiving events

Table 5 Input_Get_Change commands for alarm functionality

Command type	Command template	Comments
Input_Get_Change All	**Nokia30 Input_Get_Change All** Response: **INPUT_GET_CHANGE ALL:** **INPUT 1: X** **INPUT 2: X** **INPUT 3: X** The **X** refers to success state and it can be: **OK** or **CHECK CONFIG**. Event data, when input state has changed, contains the following information: **INPUT 1: Y** **INPUT 2: Y** **INPUT 3: Y** The **Y** varies according to the input pin state and it can be: **ON** or **OFF** if the input is in digital mode **xxxx mV** if the input is in analog mode (xxxx=value between 0-5400).	The command subscribes events for all inputs at once and the response returns the state of those according to input pin configuration
Input_Get_Change Z , Z = 1,2 or 3	**Nokia30 Input_Get_Change Z** Response: **INPUT_GET_CHANGE Z:** **INPUT Z: X** The **X** refers to success state and it can be: **OK** or **CHECK CONFIG**. Event data, when input state has changed, contains the following information: **INPUT Z: Y** The **Y** varies according to the input pin state and it can be: **ON** or **OFF** if the input is in digital mode **xxxx mV** if the input is in analog mode (xxxx=value between 0-5400).	The command subscribes the event for input **Z** (Z = 1,2 or 3) and the response returns the state of it according to input pin configuration

7.2.4 Reading Outputs

The Output_Get X commands are used to read digital output states. Note that password property is set off in following example commands (see Table 6).

Table 6 Output_Get X commands

Command type	Command template	Comments
Output_Get All	**Nokia30 Output_Get All** Response: **OUTPUT_GET ALL: OK** **OUTPUT 1: X** **OUTPUT 2: X** **OUTPUT 3: X** **OUTPUT 4: X** **OUTPUT 5: X** The **X** refers to either **ON** or **OFF**.	The command reads all outputs and the response returns the state of those
Output_Get Z , Z = 1,2,3,4 or 5	**Nokia30 Output_Get Z** Response: **OUTPUT_GET Z: X** The **X** refers to either **ON** or **OFF**.	The command reads output **Z** (Z = 1,2,3,4 or 5) and the response returns the state of it

7.2.5 Writing Outputs

The *Output_Set X* commands are used to write digital output states. Note that password property is set off in following example commands (see Table 7).

Table 7 Output_Set X commands

Command type	Command template	Comments
Output_Set Z On , Z = 1,2,3,4 or 5	**Nokia30 Output_Set Z On** Response e.g. when Z = 1: **OUTPUT_SET Z ON:** **OUTPUT 1: ON** **OUTPUT 2: X** **OUTPUT 3: X** **OUTPUT 4: X** **OUTPUT 5: X**, The **X** refers to either **ON** or **OFF**.	The command sets output **Z** (Z = 1,2,3,4 or 5) to ON state and the response returns the state of all outputs
Output_Set Z Off , Z = 1,2,3,4 or 5	**Nokia30 Output_Set Z Off** Response e.g. when Z = 1: **OUTPUT_SET 1 OFF:** **OUTPUT 1: OFF** **OUTPUT 2: X** **OUTPUT 3: X** **OUTPUT 4: X** **OUTPUT 5: X**, The **X** refers to either **ON** or **OFF**.	The command sets output **Z** (Z = 1,2,3,4 or 5) to OFF state and the response returns the state of all outputs
Output_Set All On	**Nokia30 Output_Set All On** Response: **OUTPUT_SET ALL ON:** **OUTPUT 1: ON** **OUTPUT 2: ON** **OUTPUT 3: ON** **OUTPUT 4: ON** **OUTPUT 5: ON**	The command sets all outputs to ON state and the response returns the state of all outputs
Output_Set All Off	**Nokia30 Output_Set All Off** Response: **OUTPUT_SET ALL OFF:** **OUTPUT 1: OFF** **OUTPUT 2: OFF** **OUTPUT 3: OFF** **OUTPUT 4: OFF** **OUTPUT 5: OFF**	The command sets all outputs to OFF state and the response returns the state of all outputs

7.2.6 Controlling Power supply to the device

Power output can be used to supply power through the Nokia 30 to the application. The Supply_Pwr commands are used to read/write power supply line states (see Table 8).

Table 8 Supply_Pwr commands

Command type	Command template	Comments
Supply_Pwr_Get	**Nokia30 Supply_Pwr_Get** Response: **SUPPLY_PWR_GET: X** The **X** refers to either **ON** or **OFF**.	The command reads the power supply line state and the response returns the state of it
Supply_Pwr On	**Nokia30 Supply_Pwr On** Response: **SUPPLY_PWR ON: OK**	The command sets the power supply line to ON state and a response returns the confirmation of it
Supply_Pwr Off	**Nokia30 Supply_Pwr Off** Response: **SUPPLY_PWR OFF: OK**	The command sets the power supply line to OFF state and a response returns the confirmation of it