CIM 250 SMS commands

Installation and operating instructions, supplement

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GRUNDFOS

English (GB) Installation and operating instructions

Original functional profile and user manual.

CONTENTS

1. Symbols used in this document

Note ***Notes or instructions that make the job easier and ensure safe operation.***

2. General description

The CIM 250 can be used as an SMS interface for control and monitoring of Grundfos products (e.g. E-pumps and Hydro MPC booster systems) from a mobile phone.

Using simple SMS messages, it is for instance possible to start and stop the pump/system, change the setpoint and get status of important pump/system data and alarm and warning messages.

SMS messages which can be sent by the user and interpreted by the CIM 250, are called commands.

The general syntax of commands is:

[access code] <command> [parameter, parameter ...]

[ ] indicates a field which is only used in certain cases.

< > indicates a mandatory field.

All texts sent to the CIM 250 are in English and cannot be changed.

10 alarm/warning texts as well as the name and scaling of the CIU 251 input/output signals can be user configured. All other texts sent from the CIM 250 are fixed and written in English.

This manual shows text message communication with mobile phones with the font Courier or in quotation marks.

2.1 CIU 251

The CIU 251 consists of a CIM 250 module and an IO 270 board mounted in a CIU box. The IO 270 adds I/O features to the functionality of the CIM 250. See also section *7. Additional SMS functionality of the CIU 251*.

Command	Description	
`[access code]`	Four numerical characters between 0 and 9. It will be ignored if the access code has not been enabled. Numerical characters in front of <command> will generally be ignored if the access code has not been enabled. A space character after [access code] is optional.	
`<command>`	A legal command as explained in the following sections. If a parameter is entered after the command, there must be one or more space characters between the command and the parameter.	
`[parameter, parameter ...]`	One or more legal parameters for the command in question. The use of symbolic parameters is explained here:	
	`<phone number>:`	+XX YYY ZZZ ZZZZ (according to ITU-T E164). For local calls, '+' and the country code XX are not required.*
	`<access option>:`	`LIST | CODE | BOTH | NONE`. See section *3. Configuring the CIM 250*.
	`<access code>:`	Four numerical characters between 0 and 9 (4-digit code).
	`<alpha numeric string>:`	Max. 50 characters A-Z, a-z, 0-9.
	`<APN string>:`	Max. 64 characters A-Z, a-z, 0-9, '-' and '.' Must not begin or end with '-' and '.'
	`<day of week>:`	ALL, MON, TUE, WED, THU, FRI, SAT, SUN.
	`<hour of day>:`	OFF, 0, 1, 2, … , 24 (0=24).
	`<installation name>:`	All printable characters except @ and ':'.
	`<IP address>:`	xxx.xxx.xxx.xxx; xxx = [000; 255].
	`<port number>:`	1-65535. Default setting: Modbus = 502; GENIpro = 49152.
	`<setpoint>:`	Decimal number with or without a decimal point.
	`<event code>:`	Alarm/warning (event) code from connected product.
	`<text>:`	Max. 50 GSM 3.38 characters except: '@', LF, CR, ESC, ':' (Codes 00h, 0Ah, 0Dh, 1Bh, 3Ah). Automatic truncation will occur. It is allowed for <text> to be empty.
	`<alpha string>:`	Max. 12 ASCII characters A-Z, a-z. Automatic truncation will occur. It is allowed for <alpha string> to be empty.
	`<value>:`	Floating point value according to IEEE 754 but limited to 5-digit precision (e.g. x.xxxx, xxxx.x, etc.). Extra digits will be ignored.
	`< >:`	Empty field (no argument).

* The number of digits depends on the country.

Note

There is no distinction between lowercase and uppercase letters in the commands.

3. Configuring the CIM 250

Before the SMS functions of the CIM 250 can be used, the CIM 250 must be configured using the SMS configuration commands in this section.

The commands are divided into four groups:
One group for basic configuration and three groups for the type of connection to be established.

- Commands for basic configuration (mandatory).
  See section *3.1 Basic configuration*.
- Commands for configuration of the CIM 250 for monitoring and control via SMS.
  See section *3.2 Configuration for monitoring and control via SMS*.
- Commands for configuration of the CIM 250 for a GSM call-up connection.
  See section *3.3 Configuration for GSM call-up connection*.
- Commands for configuration of the CIM 250 for a GPRS connection.
  See section *3.4 Configuration for GPRS connection*.

First, carry out the basic configuration, as it is common to all three types of connection and required for any installation. Then, carry out the configuration for the type of connection to be established. The default setting will work in most cases.

See also section *8. Overview of commands*.

3.1 Basic configuration

Command	Description
`INIT <access code>`	The first time the CIM 250 is used, it has to be initialised with this command. The number of the mobile phone used for initialising the CIM 250 will be added to the internal phone number list of the module. Access via commands can now take place from this number or by using the access code, which must consist of four digits between 0 and 9. Before carrying on the configuration, wait until the CIM 250 has acknowledged the change with this message: **INIT: <phone number> added to the phone number list** **Access code: <access code>** If the CIM 250 has already been initialised, it will send this message: **INIT: Already initialised** Note: When the command "INIT" has been carried out, settings can only be changed from the phone number used for initialising the CIM 250 or with the selected access code in front of the command. After initialisation, the CIM 250 will use the default settings, and in most cases, it will not be necessary to change them. See section *8.1 Configuration commands for the CIM 250*. However, please read the rest of this table, and check that the default settings meet the requirements. If the CIM 250 is to be re-initialised at a later time (for instance if you have forgotten the access code), press the reset button on the module for at least five seconds. This resets settings to the default settings. The command "INIT" must be sent to the CIM 250 again. For further information about hardware reset, see installation and operating instructions for the CIM 2XX GSM module.
`ROAMING <ON | OFF>`	With this configuration command, it is possible to set whether the CIM 250 is to accept roaming or not. The CIM 250 will acknowledge the change with this message: **ROAMING: changed to <ON | OFF>** If roaming is set to "OFF", this will apply to both GSM, SMS and GPRS communication. If roaming is set to "ON", this will apply to GSM and SMS communication, whereas roaming for GPRS communication will only be allowed if "GPRSROAMING" has also been set to "ON". Default setting: ON.

3.2 Configuration for monitoring and control via SMS

Command	Description
`ACCESS <access option>`	Select the access option with this configuration command: • LIST Only numbers in the CIM 250 phone number list can send configuration and control messages. • CODE The 4-digit access code must be used in front of all configuration and control commands. • BOTH Both "LIST" (phone number list) and "CODE" (access code) can be used for access control. Only one is required to get access. • NONE There is no access control. All commands can be sent from a mobile phone without access control. Before carrying on the configuration, wait until the CIM 250 has acknowledged the change with this message: **ACCESS: changed to <access option>** Default setting: BOTH.
`CODE <access code>`	With this configuration command, it is possible to change the 4-digit access code. Before carrying on the configuration, wait until the CIM 250 has acknowledged the change with this message: **CODE: changed to <access code>**
`ADDNUMBER [phone number]`	With this configuration command, it is possible to add a number to the CIM 250 phone number list. The number must be of international format with '+' followed by the country code and the local number. In the case of local numbers, '+' and the country code are not required. Up to four numbers can be stored. When a number has been added, the CIM 250 will acknowledge the change with this message: **ADDNUMBER: <phone number> added to the phone number list** The message will be sent to both the sender of the command and to the phone number which has been added. If the parameter is omitted, the phone number of the sender will be added. When the CIM 250 has been initialised, only the number of the mobile phone used for initialisation will be in the internal phone number list of the module. To see the phone number list, use the command "LIST". **Note:** If all phone numbers are deleted, make sure that the access option is not "LIST", as this would leave the CIM 250 unaccessible and require a hardware reset (press reset button for five seconds) followed by a reconfiguration. For further information about hardware reset, see installation and operating instructions for the CIM 2XX GSM module.

Command	Description
DELNUMBER **phone number | ALL]**	With this configuration command, it is possible to delete a number in the CIM 250 phone number list. If the number exists, it will be deleted, and the CIM 250 will acknowledge the change with this message: **DELNUMBER: <phone number> deleted from the phone number list** The message will be sent to both the sender of the command and to the phone number which has been deleted. If the parameter is omitted, the phone number of the sender will be deleted. If the parameter is "ALL", all phone numbers will be deleted, and the CIM 250 will send this message: **DELNUMBER: Phone number list empty** To see the phone number list, use the command "LIST". **Note:** If all phone numbers are deleted, make sure that the access option is not "LIST", as this would leave the CIM 250 unaccessible and require a hardware reset (press reset button for five seconds) followed by a reconfiguration. For further information about hardware reset, see installation and operating instructions for the CIM 2XX GSM module.
NAME <installation name>	With this configuration command, it is possible to give the CIM 250 an installation name of maximum 30 characters. The name will then be put in front of all messages from the CIM 250. If a name consists of more than 30 characters, it will be shortened automatically. The CIM 250 will acknowledge the change with this message: **<Installation name>** **NAME: New installation name stored** The installation name can be deleted by storing an empty installation name. The CIM 250 will send this message: **NAME: Installation name cleared** Default setting: Empty.

Command	Description
`HEARTBEAT <hour of day>, <day of week>, ..., <day of week>`	When this function is activated, the CIM 250 regularly sends an SMS in form of a "STATUS1" message to all numbers in the phone number list. For further information about the "STATUS1" message, see section *4. Status commands*. "HEARTBEAT" is a CIM 250 configuration command that can be used to set at which hour of the day and on which weekdays the message is to be sent. **<hour of day>: OFF, 0, 1, 2, ..., 24.** 1 is 1.00 o'clock AM, 12 is noon, and 0 or 24 is midnight. "OFF" disables the function. **<day of week>: ALL, MON, TUE, WED, THU, FRI, SAT, SUN.** If "ALL" is selected, the message will be sent every day. If the hour of day is set to "OFF", the parameter day of week will be ignored and can be omitted. **Note:** It is possible to select more than one specific day if they are separated by commas. The CIM 250 will acknowledge the change with this message: **HEARTBEAT: Changed to <hour of day> o'clock on <day of week>** or **HEARTBEAT: Changed to OFF** Example of command: **HEARTBEAT 12, MON, THU** This command will result in a heartbeat message at 12 o'clock Monday and Thursday every week. A heartbeat message contains the same information as a "STATUS1" message and will sent to all numbers in the phone number list. Example of heartbeat message: **[Installation name]** **HEARTBEAT:** **Device OK** **Setpoint: 75 %** **Act. setpoint: 6.5 m** **Act. value: 6.2 m** **START from GSM** **CONTROL: Const press** Continued on the next page.

Command	Description
	"Device OK" will be replaced by an alarm/warning text if there is a fault in the device. See section *4. Status commands*. To perform the function, the CIM 250 depends on time information being available. The CIM 250 normally gets the time value from the GSM network upon initialisation after a power cut. If this service is not available in the network and the heartbeat function has been activated, the CIM 250 will send this message: **NOTICE: Your GSM network does not support time information. Please enter: "TIME yyyy, mm, dd, hh, mm" for the heartbeat function to work.** **Note:** If the message is sent because the heartbeat function was activated, it will only be sent to the phone number that activated the function. If the message is sent because of missing time information at initialisation, it will be sent to all numbers in the phone number list. When the time value has been set either manually with the command "TIME" or automatically from the network service, the internal real time clock of the CIM 250 will work correctly as long as a power supply is present. To see the settings, use the command "GSMSETTINGS". Default setting: OFF.
`TIME <year>, <month>, <day>, <hour>, <minute>`	If the GSM network does not support time information for synchronising the internal real time clock of the CIM 250, this command can be used to supply the information. Once synchronised, the internal clock will run as long as the CIM 250 is powered or connected to its backup battery. **Parameters:** **<year>:2010-2100** **<month>:1-12** **<day>:1-31** **<hour>:0-23** **<minute>:0-59** If the setting has been done correctly, the CIM 250 will send this message: **TIME: Time has been set to <year> <month> <day> <hour>:<minute>** <month>: A three-letter truncation of month. Example: The command "TIME 2010, 5, 6, 9, 30" results in this message: **TIME: Time has been set to 2010 May 6 09:30** If any of the parameters are outside their specified range or missing, the CIM 250 will send this message: **TIME: Illegal or missing command parameter** The real time setting only influences the heartbeat function. To see the value of the internal real time clock, use the command "GSMSETTINGS".

Command	Description
`SMSALARM <ON | OFF>`	With this configuration command, it is possible to enable or disable the transmission of alarm messages from the product in form of a "STATUS1" message to all numbers in the phone number list. For further information about the "STATUS1" message, see section *4. Status commands*. The CIM 250 will acknowledge the change with this message: **SMSALARM: changed to <ON | OFF>** Example of alarm message for a Hydro MPC booster system: **[Installation name]** **ALARM APPEARED** **Water shortage (214)** **Setpoint 78 %** **Act. setpoint: 4.2 bar** **Act. value: 4.0 bar** **Stopped due to alarm** If the function is enabled, a message will also be sent when the cause of the alarm has disappeared and the product has returned to normal state. The message content will be the same, the message will, however, read: **ALARM DISAPPEARED.** To see the setting, use the command "GSMSETTINGS". Default setting: ON.
`SMSWARN <ON | OFF>`	With this configuration command, it is possible to enable or disable the transmission of warning messages from the product in form of a "STATUS1" message to all numbers in the phone number list. For further information about the "STATUS1" message, see section *4. Status commands*. The CIM 250 will acknowledge the change with this message: **SMSWARN: changed to <ON | OFF>** Example of warning message for a Hydro MPC booster system: **[Installation name]** **WARNING APPEARED** **Feedback sensor signal fault (171)** **Setpoint 78 %** **Act. setpoint: 4.2 bar** **Act. value: 4.0 bar** **START from GSM** If the function is enabled, a message will also be sent when the cause of the warning has disappeared and the product has returned to normal state. The message content will be the same, the message will, however, read: **WARNING DISAPPEARED.** To see the setting, use the command "GSMSETTINGS". Default setting: ON.
`STATUSPROTECT <ON | OFF>`	As default, access control does not prevent status commands from being executed. Only unauthorised configuration and control commands are blocked. If access control is to be applied for all commands (status protection), this configuration command can be used to activate status protection. To see the setting, use the command "GSMSETTINGS". Default setting: OFF.

Command	Description
SMSLIMIT <ON | OFF>	The same event message cannot be sent more than 10 times in a row within 24 hours. This prevents the transmission of an unlimited stream of identical messages if the Grundfos product is in a condition where the same event appears and disappears continuously within a short period. The total number of event messages is also limited to 100 within 24 hours. The command activates or deactivates the two limitations. The CIM 250 will acknowledge the change with this message: **SMSLIMIT: changed to <ON | OFF>** If the limitations are activated and one of the limits is reached, the CIM 250 will send this message: **SMS alarm/warning limit of 10 identical messages per day has been reached** or **SMS alarm/warning limit of a total of 100 messages per day has been reached** To see the setting, use the command "GSMSETTINGS". Default setting: ON.
SETCODETEXT <event code> <text>	Alarms and warnings (events) from a connected product are normally sent to all phone numbers in the phone number list, in form of a "STATUS1" message containing the standard English text belonging to the event code in question. The user can configure own texts for up to ten different event codes. This is done one at a time with this configuration command. The event code texts to be changed are changed one by one by repeating the command. Leaving out the <name> argument will reset the text of the event code in question to the original text. Leaving out both arguments will reset all event code texts to their original text. Parameters: <event code>: The event code in question. <text>: The new text for the event code. If this field is left empty, the text of the event code will be reset to its factory default text. If both parameter fields are left empty, all event code texts will be reset to their factory default text. Example: **SETCODETEXT 3 Alarm button pressed** The CIM 250 will acknowledge the command with this message: **SETCODETEXT: Text for event code 3 changed to Alarm button pressed** Example: **SETCODETEXT ”empty” ”empty”** The CIM 250 will acknowledge the command with this message: **SETCODETEXT: Text for all event codes reset to factory text** The text of any event code can always be requested with this command: **GETCODETEXT <event code>.**

Command	Description
`GETCODETEXT <event code>`	This is a status command used to read the text associated with an alarm/warning code (event code). Example: **GETCODETEXT 3** The CIM 250 will acknowledge the command with this message: **GETCODETEXT: Text for event code 3: Alarm button pressed (user defined text)** The last parenthesis tells if the text is a user-defined text or if it is the factory default text.

3.3 Configuration for GSM call-up connection

To see the status, use the command "SCADASETTINGS".

Command	Description
`SETSCADACODE <access code>`	Sets a four-digit SCADA access code. If SCADA access code protection is set to "ON" (see below), the SCADA access code has to be written in the Modbus register "ScadaPinCode" (Reg. 000011) before data can be written to the CIM 250. For the use of SCADA access code protection, see the functional profile and user manual for the product in question.
`SCADACODE <ON | OFF>`	Sets SCADA access code protection to "ON" or "OFF". Default setting: OFF.
`MODBUSADDR <1-247>`	Normally, the Modbus address does not play any role in a GSM or GPRS network, as the SIM card phone number or the assigned IP address replaces the addressing mechanism. The default Modbus address usually works fine, but it can be changed with this command if required. Default setting: 231.

3.4 Configuration for GPRS connection

To see the status, use the command GPRSSETTINGS.

Command	Description
APN <APN string>	Set the Access Point Name (APN) according to the information from your GPRS service provider. Default setting: Empty.
USERNAME <alpha numeric string>	Set the user name for the APN according to the information from your GPRS service provider. In many cases, a user name will not be necessary. Default setting: Empty.
PASSWORD <alpha numeric string>	Set the password for login to the APN according to the information from your GPRS service provider. In many cases, a password will not be necessary. Default setting: Empty.
AUTHENTICATION <NORMAL | SECURE>	Select this option for login to the APN according to the information from your GPRS service provider. In many cases, it will not be necessary to change the setting. Default setting: NORMAL.
CONNECTION <SERVER | CLIENT | DISABLED>	The CIM 250 only supports connection mode "SERVER" or "DISABLED". "DISABLED" can be used as a simple way to disable the GPRS connection without removing the settings in the APN string. Default setting: SERVER.
GPRSROAMING <ON | OFF>	This command makes it possible to enable and disable GPRS roaming if roaming for GSM and SMS communication is enabled with the command "ROAMING". Default setting: OFF.
MODBUSPORT <port number>	It will only be necessary to change the default setting of the Modbus port number in very special cases. Default setting: 502.
GENIPROPORT <port number>	Used for GPRS connection to a Grundfos PC Tool. It will only be necessary to change the default setting of the GENIpro port number in very special cases. Default setting: 49152.

Command	Description
SETGPRS <parameters>	It is possible to configure the GPRS connection with this single multiparameter command. Parameters: <APN>:APN string or IP address <Modbus port>:1-65535 <GENIpro port>:1-65535 <user name>:alpha numeric string <password>:alpha numeric string <authentication>:NORMAL | SECURE <connection>:SERVER | CLIENT | DISABLED <GPRS roaming>:ON | OFF Example 1: **SETGPRS Grundfos.dk2.tdc,502,49152,Grundfos,4321, NORMAL,SERVER,OFF** Example 2: **SETGPRS Grundfos.dk2.tdc,502,49152,,,NORMAL** In the second example some parameters have been omitted in the middle and at the end of the parameter string. The CIM 250 acknowledges the change with the same message as for the status command "GPRSSETTINGS".

4. Status commands

It is possible to get information about the status of the CIM 250 and the Grundfos product by means of status commands. See table below. Apart from the commands "LIST", "GPRSSETTINGS" and "SCADA", the commands are not subject to access control (unless "STATUSPROTECT" = "ON") as they do not change anything in the CIM 250 or the Grundfos product.

Command	Description
GSMSETTINGS	With this status command, it is possible to see the configuration status of the CIM 250. Example of reply: **[Installation name]** **Configuration status:** **Access control: CODE** **Heartbeat: At 12:00 Wed** **Roaming: OFF** **SMS alarm: ON** **SMS warning: ON** **SMS limit: ON** **TIME: 2010 Mar 29 08:35** **Status protection: OFF**
LIST	With this status command, it is possible to see which numbers are in the CIM 250 phone number list. The CIM 250 will send a message with all phone numbers. Each number takes up a line. Example of reply: **[Installation name]** **LIST:** **+4520509988** **+4521190627** **+4522814495** If there are no numbers in the phone number list, the CIM 250 will send this message: **[Installation name]** **LIST: Phone number list empty** **Note:** "LIST" is subject to access control if another access option than "NONE" has been selected.
SIGNALLEVEL	With this status command, it is possible to get information from the CIM 250 about the detected signal strength of the GSM network: (Not detected, 0 %, 25 %, 50 %, 75 %, 100 %) Example of reply: **[Installation name]** **GSM signal level:** **Actual 100 %** **Average 50 %** The actual value is the value read from the CIM 250 right now; the average value is the average of the signal during the last hour. **Note:** Not all network operators support this service.

Command	Description
STATUS1/STATUS2	With these status commands, it is possible to get information from the CIM 250 about the Grundfos product. The values measured are as reported from the Grundfos product. The content of the message depends on the product type. Example of "STATUS1" message for a pump: **[Installation name]** **Setpoint: 65 % of (0-10 bar)** **Act. setpoint: 6.5 bar** **Act. value: 5.2 bar** **START from GSM** **Control: Const. press.** Example of "STATUS2" message for a pump: **[Installation name]** **Head: 8.4 m** **Flow: 24 m3/h** **Power: 1830 W** **Performance 79 %** **Energy: 4570 kWh** **Hours: 2568 h**
VERSION	With this status command, it is possible to get pieces of information, such as the software version of the CIM 250 and the type of Grundfos product. Example of reply: **[Installation name]** **CIM 250 V01.00.00** **Telit 07.03.101** **Hydro MPC booster** **IMEI: 3570220010091936** **IMSI: 770008945629634** IMEI is the equipment identity number, and IMSI is the subscriber identity number.
BATTERY	With this status command, it is possible to get information about the battery status if the CIM 250 is equipped with a battery (optional). Example of reply: **[Installation name]** **External voltage: Yes** **Battery voltage: 3.5 V** **Battery temp: 37 C** **Battery charging: Yes** **Charging suspended: No** Battery charging is suspended if the temperature is too high.
NETWORK	With this status command, it is possible to get information about the GSM network and the network operator. Example of reply: **[Installation name]** **Operator: <operator>** **Band: 900 MHz** **GSM roaming: Yes** **GPRS roaming: No** **Power on: 1672:32 h**

Command	Description
SCADA	With this status command, it is possible to get information about the SCADA settings. Example of reply: **[Installation name]** **SCADA code: <access code>** **SCADA code: ON** **Modbus address: 231** **Note:** "SCADA" is subject to access control if another access option than "NONE" has been selected.
GSMDATA	With this status command, it is possible to get information about the GSM data counters. Example of reply: **[Installation name]** **SMS sent: 4502** **SMS received: 37** **Dial-in: 188:22 h** **Call-back: 44:09 h** **Counter time: 1435:43 h** **Counter time in [h:min] since last GSM counter reset.** The counters can be reset with the command "RESETGSM".
GPRSSETTINGS	With this status command, it is possible to get information about the settings of the GPRS connection. Example of reply: **[Installation name]** **APN: Grundfos.dk2.tdc** **MODBUSPORT: 502** **GENIPROPORT: 49152** **USERNAME: -** **PASSWORD: -** **AUTHENTICATION: NORMAL** **CONNECTION: SERVER** **GPRSROAMING: ON** **SERVER *): 172.16.2.66** **Note:** "SCADA" is subject to access control if another access option than "NONE" has been selected. *) If connection mode is "CLIENT".
GPRSDATA	With this status command, it is possible to get information about the Modbus TCP status. Example of reply: **[Installation name]** **Packets: 374021** **Received: 196684 kb** **Sent: 183427 kb** **Counter time: 419:51 h>** Packets: The sum of Modbus TCP and GENIpro TCP. Counter time: The time since the last GPRS counter reset. The counters can be reset with the command "RESETGPRS".

Command	Description
GPRSSTATUS	With this status command, it is possible to get information about the GPRS status. Example of reply: **[Installation name]** **GPRS: CONNECTED** **IP: 172.16.1.30** **Modbus Port: 502** **GENIpro Port: 49152** **Modbus addr: 231** **Socket 1: OPEN** **Socket 2: CLOSED** **Socket 3: CLOSED** **Socket 4: CLOSED** **Silence timeout: 60 min.** Socket 1-3: Modbus TCP connection. Socket 4: GENIpro TCP connection.

5. Control commands

5.1 CIM 250

Command	Description
RESETGSM	Resets GSM data counters. The CIM 250 will acknowledge the change with this message: **RESETGSM: GSM data counters reset**
RESETGPRS	Resets GPRS data counters. The CIM 250 will acknowledge the change with this message: **RESETGPRS: GPRS data counters reset**

5.2 Grundfos product

By means of the control commands in the table below, it is possible to set the Grundfos product to run in the desired control mode and operating mode and to change the setpoint. The CIM 250 will acknowledge the change by sending a "STATUS1" message to the mobile phone from which the command was sent.

Changing of control mode, operating mode or setpoint for a pump will automatically set the pump to remote-controlled operation. These settings will be saved in the CIM 250 module in case of power cuts. They can also be changed via a GSM call-up connection or a GPRS connection. The latest change of settings will apply. Changes via GSM call-up connection or GPRS connection, however, are not saved in the CIM 250 in case of power cuts.

Note: The commands depend on the Grundfos product. If the command is not supported by the product, the product will ignore the command, and the CIM 250 will send this message:

<command>: Command not supported by connected device type

Note: The commands are all subject to access control if another access option than NONE has been selected.

Note: Control of Hydro MPC via CIM 250 requires this setting via the control panel of the CU 351.

Settings > Secondary functions > Control source. Select "From bus". For further information, see the installation and operating instructions for Hydro MPC on WebCAPS.

Command	E-pumps	UPE, MAGNA	Hydro MPC	Hydro Multi-E	MP 204	CIU 252	Description
RESETALARM	●	●	●	●	●	●	Resets an alarm or a warning in the Grundfos product if the fault no longer exists. The product will try to restart.
REMOTE	●	●	●	●	-	-	Sets the Grundfos product to remote-controlled operation. (The Grundfos product is controlled via the CIM 250.)
LOCAL	●	●	●	●	-	-	Sets the Grundfos product to locally controlled operation. (The setpoint, operating mode and control mode can be changed on the product or by means of a Grundfos R100 remote control.)
START	●	●	●	●	●	-	Starts the Grundfos product.
STOP	●	●	●	●	●	-	Stops the Grundfos product.
MIN	●	●	●	-	-	-	Changes the operating mode of the Grundfos product to "Min.". It will run according to the min. curve.
MAX	●	●	●	●	-	-	Changes the operating mode of the Grundfos product to "Max.". It will run according to the max. curve.
SETPOINT <value>	●	●	●	●	-	-	Sends a new setpoint value to the product. If the setpoint is outside the permissible range, it will automatically be changed to the nearest value within the range. Due to the limited scaling range and the resolution, the resultant setpoint may deviate from the one sent to the product. **Closed loop** The setpoint is specified as a decimal point value scaled in the same unit as the feedback sensor. The command "STATUS1" provides information about the sensor scaling. **Note:** UPE and MAGNA pumps always use [m]. Units on the MPC display can differ from "unit" if other units than standard SI units have been selected for sensors. **Open loop** The setpoint is specified as a decimal point value scaled in %.
CONSTCURVE	●	●	●	-	-	-	This command sets the Grundfos product to control mode "Constant curve".
CONSTPRESS	●	●	●	-	-	-	This command sets the Grundfos product to control mode "Constant pressure".
PROPPRESS	●*	●	●	-	-	-	This command sets the Grundfos product to control mode "Proportional pressure".
AUTOADAPT	-	●**	-	-	-	-	This command sets the Grundfos product to control mode "$AUTO_{ADAPT}$".

Command	E-pumps	UPE, MAGNA	Hydro MPC	Hydro Multi-E	MP 204	CIU 252	Description
ALARMSIM <code>	-	•**	•	-	•	•	This command makes the Grundfos product simulate an alarm with an event code. If the product supports the alarm selected and "SMSALARM" is set to "ON", it will react accordingly for instance by sending an alarm message.
WARNSIM <code>	-	-	•		•	•	This command makes the Grundfos product simulate a warning with an event code. If the product supports the warning selected and SMSWARN is set to ON, it will react accordingly for instance by sending a warning message.

* Only TPE 2000.

** Only MAGNA.

Example 1

The CIM 250 has been configured to access option "CODE", and the access code has been set to "8977". An alarm can be reset with this command:

8977 RESETALARM

Example 2

The number of your mobile phone is in the phone number list of the CIM 250, and the access option is "BOTH" (default setting). The setpoint can be changed to 4.5 m with this command:

SETPOINT 4.5

Note that the unit of the setpoint is not to be written as a part of the command parameter, as it is implicitly given by the scaling unit of the feedback value.

6. Messages from the CIM 250

The CIM 250 will send messages in case of faults or other special conditions in the module itself. These messages do not depend on the Grundfos product. They can be enabled/disabled with the command "SMSALARM <ON | OFF>". If "SMSALARM" is set to "ON", they will be sent to all numbers in the phone number list.

Note: No message will be sent if the phone number list is empty (for instance, if the module has not been initialised).

The message is triggered by an event. If the CIM 250 is switched off and on (the battery must be removed), it will send the message again if the cause of the message still exists.

6.1 No connection to product

If the communication between the CIM 250 and the Grundfos product is interrupted for more than one minute, the CIM 250 will send this message to all numbers in the phone number list.

[Installation name]
GSM module error:
No connection to product

Note: If the cause of the interruption is the fact that the power supply to the product was interrupted, the CIM 250 will send this message instead:

No mains supply, using battery.

See below.

6.2 No mains supply, using battery

If the CIM 250 detects that it is being supplied from the battery, it will send this message to all numbers in the phone number list:

[Installation name]
GSM module error:
No mains supply, using battery

This fault type will probably disappear by itself, as the message is typically triggered by a short power cut. In case of this special fault (but not the other ones), the CIM 250 will send a message, telling that the fault has disappeared:

[Installation name]
GSM module:
Mains supply returned

If the battery is worn out or the CIM 250 has no battery, the CIM 250 will not detect if the power supply to the Grundfos product has been interrupted, as it will loose power supply itself. It can therefore not send a message. To inform the user that there has been a power cut, the CIM 250 will always send a message when the power supply has returned:

[Installation name]
GSM module:
Power on occurred

6.3 Change GSM module battery

If the CIM 250 detects that the battery is worn out and must be replaced, it will send this message to all numbers in the phone number list:

[Installation name]
GSM module error:
Change GSM module battery

Note: The CIM 250 GSM module battery is optional.

6.4 GSM module battery low

If the CIM 250 detects that the battery level is low, it will send this message to all numbers in the phone number list:

[Installation name]
GSM module error:
GSM module battery low

Note: The CIM 250 GSM module battery is optional.

7. Additional SMS functionality of the CIU 251

7.1 Introduction

The CIU 251 consists of a CIM 250 module and an IO 270 multipurpose I/O module mounted in a CIU box. See fig. 1.

The IO 270 adds I/O features to the functionality of the "standard" CIU 250. See fig. 2. This functional profile describes the additional Modbus registers relating to the IO 270.

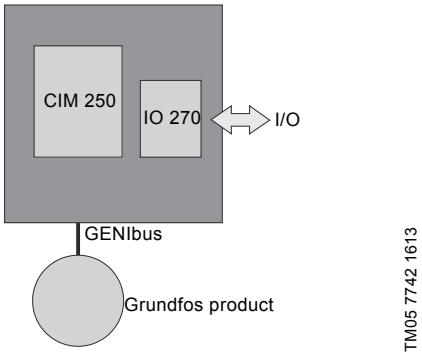

Fig. 1 CIM 250 and IO 270 built into a CIU 251 and connected to a Grundfos product via GENIbus

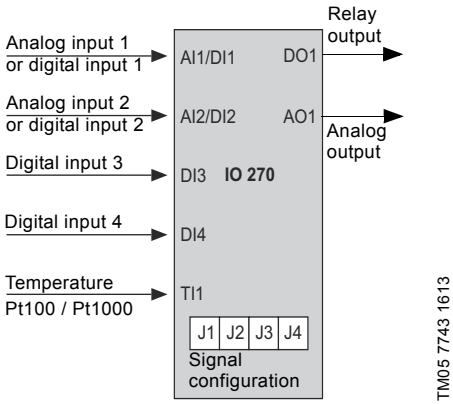

Fig. 2 IO 270 I/O signals. Jumpers are used to configure analog input signal types and selection between AI1/DI1 and AI2/DI2.

The tables below show how to configure the analog and digital inputs using jumpers J1-J4. It also gives an overview of the options. Details as how to connect sensors, relays, etc., and the layout of the terminals can be found in the installation and operating instructions "Multi-purpose IO module in CIU 27X", which is the IO 270 hardware manual.

Selection AI1 / DI1		
J1	**J2**	**Signal**
Open	Open	Analog 0-10 V
Open	Closed	Analog 0-20 mA
Closed	Open	Analog 4-20 mA
Closed	Closed	Digital (default)

Selection AI2 / DI2		
J3	**J4**	**Signal**
Open	Open	Analog 0-10 V
Open	Closed	Analog 0-20 mA
Closed	Open	Analog 4-20 mA
Closed	Closed	Digital (default)

7.2 Configuration of IO 270 signal names

You can change the default signal names "Analog input 1 (AI1)", "Digital input 1 (DI1)", etc.. The table below shows the commands for this purpose.

Naming of AI1	**AI1NAME <text>**
Naming of AI2	**AI2NAME <text>**
Naming of TI1	**TI1NAME <text>**
Naming of DI1	**DI1NAME <text>**
Naming of DI2	**DI2NAME <text>**
Naming of DI3	**DI3NAME <text>**
Naming of DI4	**DI4NAME <text>**
Naming of AO1	**AO1NAME <text>**
Naming of DO1	**DO1NAME <text>**

Example: To change the name of AI1, use the command "AI 1NAME" followed by the new name in < >.

If the < > field is left empty, the user name will be cleared and reset to the factory default name.

The CIM 250 will send one of these messages:

Positive acknowledgement of name change	**AI1NAME: Changed to <name>**
Positive acknowledgement of name clearing	**AI1NAME: User defined name cleared**
Negative acknowledgement	**AI1NAME: Illegal name format** See symbolic parameters, section *2.1*.

The text configuration of signals is accepted whether the IO 270 module is present or not, as long as the command syntax is correct. Seeing the status of configured signal texts is only possible with the command "IOSTATUS" if there is an IO 270.

7.3 Configuration of IO 270 signal scaling

The default scale of analog readings of the IO 270 is 0-100 %. The scaling of each analog signal can be adjusted to the actual sensor using the commands in the table below.

Scaling of AI1	**AI1SCALE [<value> <value> <alpha string>]**
Scaling of AI2	**AI2SCALE [<value> <value> <alpha string>]**
Scaling of AO1	**AO1SCALE [<value> <value> <alpha string>]**

Note Temperature input TI1 has a fixed scaling of [-50; 204] C corresponding to the scaling in the corresponding Modbus register 01222 IO270_Temperature.

Leaving out all arguments to one of these commands will reset the scaling of the input in question to its factory setting [0; 100] %.

An acknowledgment SMS is replied to the phone. This is shown below for command "AI1SCALE".

Positive acknowledgement (changed scaling)	**AI1SCALE: Changed to range: <value> to <value> <alpha string>**
Positive acknowledgement (reset to default)	**AI1SCALE: Scaling reset to factory scaling [0; 100] %**
Negative acknowledgement	**AI1NAME: Illegal or missing command parameter**

The negative acknowledgement appears if one or more command parameters are missing or have a syntax error, or if the scaling range is inconsistent.

The configuration of signal scaling is accepted whether the IO 270 is present or not, as long as the command syntax is correct. To see the status, use the command "IOSCALING".

7.4 IO 270 operation

IOSTATUS

Command to request status. The CIM 250 GSM module replies with information about the status of the IO 270. The measured values are as reported by the IO 270 device.

[Installation name]	
AI1: 87.1 %	'-' if used as DI1, 'sensor error' if sensor signal fault (Reg. 01211).
AI2: -	'-' if used as DI2, 'sensor error' if sensor signal fault (Reg. 01212).
TI1: 48.4 C	'sensor error' if sensor signal fault (Reg. 01213).
DI1: -	'-' if used as AI1.
DI2: On	'-' if used as AI2.
DI3: Off	
DI4: On	
AO1: 55.6 %	Using default 0-100 % scaling in this example.
DO1: On	Terminal NO = closed, terminal NC = open.
IOSMS: On	IO event-triggered SMS is enabled.

Note

This example assumes that user-defined signal names (section 7.2) or analog signal scaling (section 7.3) has not been configured.

If signal names or analog signal scaling has been configured, the reply to "IOSTATUS" could e.g. look like this:

[Installation name]	
AI1: Tank pressure: 4.59 bar	'-' if used as DI1, 'sensor error' if sensor signal fault (Reg. 01211).
AI2: Tank outlet: 34.2 m3/h	'-' if used as DI2, 'sensor error' if sensor signal fault (Reg. 01212).
TI1: Air temperature: -5.6 C	TI1 scaling is always [-50; 204] C.
DI1: -	'-' if it is used as AI1.
DI2: -	'-' if it is used as AI2.
DI3: Burglar alarm: Off	
DI4: Door switch: Off	
AO1: Cooling fan: 55.6 %	Using default 0-100 % scaling in this example.
DO1: Light switch: On	Terminal NO = closed, terminal NC = open.
IOSMS: On	IO event-triggered SMS is enabled.

If there is no IO 270, or the connection to it is faulty, the CIM 250 will send a negative acknowledgement:

```
IOSTATUS: IO 270 module not present
```

IOSCALING

Command for status of signal scaling. The CIM 250 module replies with information about the status of the analog signal scaling of the IO 270.

[Installation name]	
AI1: [0.0; 10.0] bar	Indicating with '-' if it is used as DI1.
AI2: [-20.0; 80.0] C	Indicating with '-' if it is used as DI2.
TI1: [-50; 204] C	This scaling is fixed and cannot be changed by the user.
AO1: [0; 100] %	The example shows the default (factory) scaling.

Signal	Register	Scale		SMS
AI1	10223 IO270_AnalogInput1	0.1 %	►	[$AI1_{min}$; $AI1_{max}$]
AI2	10224 IO270_AnalogInput2	0.1 %	►	[$AI2_{min}$; $AI2_{max}$]
AO1	01201 SetAnalogOutput1	0.1 %	◄	[$AO1_{min}$; $AO1_{max}$]

User-defined signal scaling is used by the SMS interface, but the Modbus register scaling is fixed.

ANALOGOUT <value>

Control command for setting the value of AO1. The argument "value = [0.0; 100.0] %" is default if no user-defined scaling is used. "value" is written to Modbus register 01201: IO270_SetAnalogOut.

If analog signal scaling is used for AO1, it must also be used when specifying the signal value to send to AO1. See section 7.3.

Example

The analog output signal range has been configured to [-20; 40] C.

To change an analog output value to for instance -5.8 C, write this command:

```
ANALOGOUT -5.8
```

The resulting voltage at AO1 will be:
$(-5.8 - range_{min}) / (range_{max} - range_{min}) * 10\ V = 2.36\ V$.

Taking the scaling range and resolution into consideration, the value is mapped as precisely as possible and sent to the analog output of the IO 270. A small rounding deviation may occur.

The CIM 250 will send an acknowledgement in form of an "IOSTATUS" message to the phone from which the SMS command was sent.

If <value> is not a legal floating point number (for instance if it contains illegal characters), the CIM 250 will send a negative acknowledgement:

```
ANALOGOUT: Illegal command parameter.
Must be a number
```

If <value> is outside the scaling range, the CIM 250 will send a negative acknowledgement:

```
ANALOGOUT: Illegal command parameter.
Must be inside scaling range.
```

If an IO 270 is incorrectly installed or the connection is faulty, the CIM 250 will send a negative acknowledgement:

```
ANALOGOUT: IO 270 module not present
```

RELAYOUT <ON|OFF>

Control command for the output relay.

"ON" means that the relay is in its activated state. Terminal NO = closed, terminal NC = open.

The "ON" or "OFF" value is written to Modbus register 01202 SetRelayOut with the values "ON = 1" and "OFF = 0".

The CIM 250 will send an acknowledgement in form of an "IOSTATUS" message to the phone from which the SMS command was sent.

If the argument differs from "ON" or "OFF", the CIM 250 will send a negative acknowledgement:

```
RELAYOUT: Illegal command parameter.
Must be ON or OFF.
```

If there is no IO 270, or the connection is faulty, the CIM 250 will send a negative acknowledgement:

```
RELAYOUT: IO 270 module not present
```

7.5 Self-triggered IO event messages

The event that a digital input changes its state from "Off" (low) to "On" (high) or from "On" (high) to "Off" (low) can be configured to trigger an SMS informing the user about the event. Similarly, when an analog input becomes higher or lower than a configurable monitor level, this can also trigger an SMS.

We will refer to such an SMS as a self-triggered IO event message. This function can be enabled or disabled.

IOSMS <ON | OFF>

Configuration command for enabling or disabling the transmission of self-triggered IO event messages. Factory setting: OFF.

The CIM 250 acknowledges the change with this message:

```
IOSMS: changed to <ON|OFF>
```

Changing the status of "IOSMS" is possible whether the IO 270 is present or not, as long as the command syntax is correct. Seeing the status of "IOSMS" is only possible with "IOSTATUS" command though, and only if IO 270 is present.

If the command parameter is illegal or missing, the CIM 250 will send a negative acknowledgement:

```
IOSMS: Illegal command parameter. Must be ON or OFF.
```

When self-triggered IO event messages are enabled, messages like the examples below will be sent when a digital input changes its state or an analog input value crosses the monitor level:

DI1: -> On	DI1 is now "On" (high).
DI3: -> Off	DI3 is now "Off" (low).
DI4, Door switch: -> Off	DI4 is now "Off" (low).
AI1, Tank pressure: -> High	AI1 exceeds level.
AI2: -> High	AI2 exceeds level.
TI1, Water temperature: -> Low	TI1 falls below level.

SETAI1LEVEL <value | "empty">

Configuration command for the GSM module. It is used to configure the monitor level for AI1. A similar command exists for AI2 and TI1. The three monitor level values are not available on Modbus.

"value = [0.0; 100.0] %" as default if no user-defined scaling is used. See section *7.3*.

If analog signal scaling is used for AO1 (see section *7.3*), the scaling must also be used when specifying the signal value to send to AO1.

Example

The analog output signal range has been configured to [0; 50] m^3/h.

To get a monitor level of 35 m^3/h, write:

```
SETAI1LEVEL 35
```

The CIM 250 will send this message to the phone from which the SMS command was sent:

```
SETAI1LEVEL: Analog input 1 level set
to <value> <alpha string>
```

The alpha string represents the unit.

If <value> is not a legal floating point number (for instance if it contains illegal characters), the CIM 250 will send a negative acknowledgement:

```
SETAI1LEVEL: Illegal command parameter.
Must be a number
```

If <value> is outside the scaling range, the CIM 250 will send a negative acknowledgement:

```
SETAI1LEVEL: Illegal command parameter.
Must be inside scaling range
```

If an empty argument is used, the monitor level will be reset to its factory default value equalling the maximum range of the input (100 %).

Configuring monitor levels is possible whether the IO 270 is present or not, as long as the command syntax is correct.

GETLEVELS

Status command for displaying the monitor values of AI1, AI2 andTI1. Below is an example of a reply:

[Installation name]
Monitor level AI1: 8 bar
Monitor level AI2: 35 m^3/h
Monitor level TI1: -3.5 C

The levels will be shown as scaled (as above) if the input is scaled.

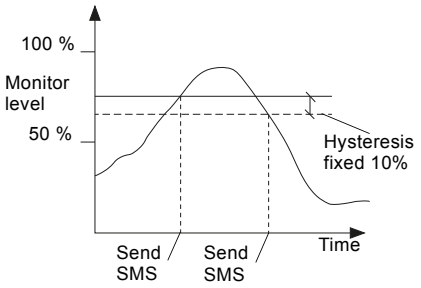

Fig. 3 Event messages triggered by the monitor level of an analog input

8. Overview of commands

8.1 Configuration commands for the CIM 250

Command	Description	Default setting
Basic configuration		
INIT <access code>	Initialisation of the CIM 250	-
ROAMING <ON | OFF>	Enabling/disabling of roaming	**ON**
Monitoring and control via SMS		
ACCESS <LIST | CODE | BOTH | NONE>	Change of access option	**BOTH**
STATUSPROTECT <ON | OFF>	Setting of status protection	**OFF**
CODE <access code>	Change of access code	-
ADDNUMBER [phone number]	Adding a phone number	-
DELNUMBER [phone number | ALL]	Deleting a phone number	-
NAME <installation name>	Selection of installation name	-
HEARTBEAT <hour of day>, <day of week>, ..., <day of week>	Setting of heartbeat value	**OFF**
TIME <year>, <month>, <day>, <hour>, <minute>	Setting of time	-
SMSALARM <ON | OFF>	Setting of SMS alarms	**ON**
SMSWARN <ON | OFF>	Setting of SMS warnings	**ON**
SMSLIMIT <ON | OFF>	Setting of event message limit	**ON**
SETCODETEXT <event code> <text>	Setting of user-defined code texts	Default texts
GSM call-up connection		
SETSCADACODE <access code>	Setting of SCADA access code	-
SCADACODE <ON | OFF>	Setting of SCADA access code	**OFF**
MODBUSADDR <1-247>	Setting of Modbus address	**231**
GPRS connection		
APN <APN string>	Setting of APN	-
USERNAME <alpha numeric string>	Setting of GPRS login user name	-
PASSWORD <alpha numeric string>	Setting of GPRS login password	-
AUTHENTICATION <NORMAL | SECURE>	Setting of GPRS authentication	**NORMAL**
CONNECTION <SERVER | CLIENT | DISABLED>	Setting of connection mode	**SERVER**
GPRSROAMING <ON | OFF>	Setting of GPRS roaming	**OFF**
MODBUSPORT <port number>	Setting of Modbus port number	**502**
GENIPROPORT <port number>	Setting of GENIpro port number	**49152**
SERVER <APN string | IP address>	Setting of subsystem server*	-
SETGPRS <APN>, <Modbus port>, <GENIpro port number>, <user name>, <password>, <authentication>, <connection>, <GPRS roaming>, <server>	Complete setting of GPRS	-

* If connection mode is "CLIENT".

8.2 Status commands for the CIM 250

Command	Description
Basic status	
GSMSETTINGS	Status of basic configuration
LIST	Phone number list
SIGNALLEVEL	GSM network signal level
VERSION	Version information
BATTERY	Battery status
NETWORK	GSM network status
GSMDATA	GSM statistics
GPRS status	
GPRSSETTINGS	GPRS settings
GPRSSTATUS	GPRS status
GPRSDATA	Modbus TCP status
SCADA status	
SCADA	SCADA settings

8.3 Control commands for the CIM 250

Command	Description
RESETGSM	Resetting of GSM data counters
RESETGPRS	Resetting of GPRS data counters

8.4 Status commands for the product

Command	Description
STATUS1	Primary status of the Grundfos product
STATUS2	Secondary status of the Grundfos product

8.5 Control commands for the product

Command	Description
RESETALARM	Resetting of alarms and warnings
REMOTE	Setting to remote control
LOCAL	Setting to local control
START or NORMAL	Setting to operating mode Start
STOP	Setting to operating mode Stop
MIN	Setting to operating mode Min.
MAX	Setting to operating mode Max.
SETPOINT <value>	Setting of setpoint
CONSTCURVE	Setting to control mode Constant curve
CONSTPRESS	Setting to control mode Constant pressure
PROPPRESS	Setting to control mode Proportional pressure
AUTOADAPT	Setting to control mode $AUTO_{ADAPT}$
ALARMSIM <code>	Simulation of alarm with event code
WARNSIM <code>	Simulation of warning with event code

8.6 IO 270-related configuration commands

Configuration		
Command	**Description**	**Default setting**
AI1NAME <text>	Naming of analog input 1 (AI1)	Empty
AI2NAME <text>	Naming of analog input 2 (AI2)	Empty
TI1NAME <text>	Naming of temperature input (TI1)	Empty
DI1NAME <text>	Naming of digital input 1 (DI1)	Empty
DI2NAME <text>	Naming of digital input 2 (DI2)	Empty
DI3NAME <text>	Naming of digital input 3 (DI3)	Empty
DI4NAME <text>	Naming of digital input 4 (DI4)	Empty
AO1NAME <text>	Naming of analog output (AO1)	Empty
DO1NAME <text>	Naming of relay output (DO1)	Empty
AI1SCALE [<value> <value> <alpha string>]	Scaling of analog input 1 (AI1)	[0; 100] %
AI2SCALE [<value> <value> <alpha string>]	Scaling of analog input 2 (AI2)	[0; 100] %
AO1SCALE [<value> <value> <alpha string>]	Scaling of analog output (AO1)	[0; 100] %
IOSMS <ON | OFF>	Enable/disable self-triggered IO event messages	OFF
SETAI1LEVEL <value>	Monitor level for analog input 1 (AI1)	100 %
SETAI2LEVEL <value>	Monitor level for analog input 2 (AI2)	100 %
SETTI1LEVEL <value>	Monitor level for temperature input 1 (TI1)	100 %

8.7 IO 270-related status commands

Status	
Command	**Description**
IOSTATUS	Status of values measured by the IO 270
IOSCALING	Status of the IO 270 analog signal scaling
GETLEVELS	Displaying monitor values of AI1, AI2 and TI1

8.8 IO 270-related control commands

Control	
Command	**Description**
ANALOGOUT <value>	Setting the value of analog output AO1
RELAYOUT <ON|OFF>	Operating the value of relay output DO1

Subject to alterations.

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Revised 18.04.2013

96861082 0513

ECM: 1113692