NBM-520 Remote Control Documentation

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1. Introduction

1.1 Communication Parameters

The NBM-520 can be remote controlled via optical link. For remote control the communication parameters of the controlling device (computer) have to be set to the following values:

Baud rate	115 200 baud (optical interface) / 460 800 baud (USB)
Start bit	1
Data bits	8
Stop bit	1
Parity	None
Handshake	None

The NBM ignores soft handshake signals (/DC1, /DC3) and does not send soft handshake signals.
The NBM ignores /CR and /LF signals.

1.2 Enabling Remote Control

The command "REMOTE ON" has to be sent to the NBM first in order to enable the remote control mode !!!

Sending "REMOTE ON" will close all dialogs and menus (and will stay closed all the time in remote mode). However, the measurement views are shown like in normal operation.

The key pad is not active in remote control mode.

Normal mode can be invoked by sending the command "REMOTE OFF" or by pressing the On/Off key of the NBM.

1.3 Syntax Rules

1.3.1 Command

The remote commands consist of ASCII strings. The following syntax rules apply to all commands:

A command consists of the command string and optional parameters

Command ***[Parameter_1]*** **, … ,** ***[Parameter_n]*** **;**

Note: [ ] marks an optional string. The square brackets are not part of the string.

The command string interpreter does not distinguish between upper and lower case.

Command ***[Parameter]*** **;** is the same as **COMMAND [PARAMETER];**

The command string is separated from the parameter string by one or more white spaces (blanks).

Parameters have to be separated by a comma.

A command or response must be terminated with a semicolon.

The NBM sends an additional /CR after the comma at defined places to allow line separation in long responses

A command string for a Get Command contains a question mark. The NBM will answer with a response.

Command? ***[Parameter]*** **;**

A command string for a Set Command does not include any question mark.

1.3.2 Response

The response to a query has the same syntax as a command, just the command string is missing.

The NBM sends an additional /CR after the semicolon of a response.

The NBM is also sending a response after receiving a Set Command. It's the same response as for an "ERROR?" command. Checking this response may be usefull to verify that communication works properly. Normally a value of zero will be returned. Other values indicate an error occurred by handling the last command. See the chapter "Error Codes " for details. The communication with Get Commands can be verified with the query response. A communication problem is expected in case of no response within 10 seconds.

1.3.3 Parameter

Parameters of type "String" must be enclosed with quotation marks (").

Semicolons are not allowed within a string.

1.3.4 Examples

Examples for valid commands are:
CMD_A;
CMD_B param1;
CMD_C param1,param2/CR/LFparam3;
CMD_A?;
CMD_B? param1;

Examples for query responses returned by the NBM are:
param1;/CR
param1, param2;/CR
param1, param2, /CR param3;/CR

2. Definitions

2.1 Parameter Formats

The following table shows the possible formats for parameters:

String	The maximum number of characters is specified. Within a string upper and lower case is distinguished. Also white space is maintained within a string
Enum	Stored as a four byte value A set of defined strings is specified for each command
Float /Double	Stored as 32/64 bit float value Input parameters are converted in to float Output parameters are automatically formatted
Byte	Stored as 8 bit unsigned integers Sometimes a allowed range or set of values is specified
Integer	Stored as 16 bit signed integers Sometimes a allowed range or set of values is specified
LngInt	Stored as 32 bit signed integers Sometimes an allowed range or set of values is specified
date (dd.mm.yy)	Date stored as three bytes Input and output as a 8 char string: dd.mm.yy d: 01 to 31, m: 01 to 12, y: 00 to 99. The range of the days is also restricted to possible dates in the years 2000 to 2999
time (hh:mm.ss)	Time stored as three bytes Input and output as a 8 char string: hh:mm:ss h: 00 to 23, m: 00 to 59, s:00 to 59.
xtime	same as above, but hours from 0 to 99
Version	Vdd.dd.dd (V00.00.00 … V99.99.99)

Note: Date and time formats used for remote control are fixed.
They are independent from the selected GUI date and time formats.

2.2 Column Abbreviations

The table of commands in the next chapter uses some short column descriptors.
The descriptors are defined below.

Columns

S	Belongs to	a **S**et command
G	Belongs to	a **G**et command
R	Belongs to	the **R**esponse of a get command
O	Command available with	Option O only
P		not persistent
	x	setup parameter
	P	recalled at power on
	M	Manufacturer Data (saved at production time)

In the next chapter "Commands" there is also information, regarding parameters and default values, included:
The factory defaults values and the default values for none persistent parameters are shown in " **bold**"
in the column "Range".

2.3 Probe Connection Types

Four connection types have been defined to consider differences in probe technology. The table below shows which probe model belongs to which connection type. This kind of association is required to handle measurement and data logger formats.

Conn. Type	Probe Model	Remark
A	EF0391, EF1891, HF3061, HF0191	Flat probes, 3 separate axes
B	EF5091, EF5092, EF6091	Flat probes, 3 combined axes (RSS)
C	EA…ED5091	Shaped probes, 3 combined axes (RSS)
D	not available yet	

3. Commands

Parameters from the measurement settings menu

Default values are marked **BOLD**

Time Out

Description	Command	S	G	R		P	O	Parameter Name	Format	Unit	Range	TO (s)	Remarks
Averaging time	AVG_TIME	x				x		Averaging Time	integer	2 s	2 …**180** … 900	<.5	
	AVG_TIME?		x									<.5	
				x		x		Averaging Time	integer	2 s	2 …**180** … 900		
Switch the alarm function on or off	ALARM	x				x		Alarm Function	Enum		ON, **OFF**	<.5	
	ALARM?		x									<.5	
				x		x		Alarm Function	Enum		ON, **OFF**		
Alarm threshold for normal probes	ALARM_THR_N	x				x		Alarm Limit (Normal)	Integer		0 … **60** ...120	<.5	Range is in 1 dB steps
	ALARM_THR_N?		x									<.5	default= 100V/m (2.5 mW/cm2)
				x		x		Alarm Limit (Normal)	Integer		0 … **60** ...120		
Alarm threshold for shaped probes	ALARM_THR_S	x				x		Alarm Limit (Shaped)	Integer		0 ... **33** …50	<.5	Range is in 1 dB steps
	ALARM_THR_S?		x									<.5	default= 200%
				x		x		Alarm Limit (Shaped)	Integer		0 ... **33** …50		
Time interval for automatic zeroing	AUTO_ZERO	x				x		Auto-Zero Interval	Enum	min	6, **15**, 30, 60, Off	<.5	
	AUTO_ZERO?		x									<.5	
				x		x		Auto-Zero Interval	Enum	min	6, **15**, 30, 60, Off		
Time from last key stroke until	AUTO_POWER	x				x		Auto Power-Off	Enum	min	6, **15,** 30, 60 , Off	<.5	Disabled in remote mote
power off	AUTO_POWER?		x									<.5	
				x		x		Auto Power-Off	Enum	min	6, **15,** 30, 60 , Off		
Time from last key stroke until	AUTO_LIGHT	x				x		LCD Backlight	Enum	s	OFF, 5, **10**, 30, 60, PERMANENT	<.5	
turn off the back light	AUTO_LIGHT?		x									<.5	
				x		x		LCD Backlight	Enum	s	OFF, 5, **10**, 30, 60, PERMANENT		
Mode of spatial averaging	SPATIAL_MODE	x				x		Spatial AVG Mode	Enum		**CONTINUOUS**, DISCRETE	<.5	Continouslytaken from "Start" to
	SPATIAL_MODE?		x									<.5	"Stop" or separate samples
				x		x		Spatial AVG Mode	Enum		**CONTINUOUS**, DISCRETE		

Parameters accessible by soft or hard keys

Description	Command	S	G	R		P	O	Parameter Name	Format	Unit	Range	TO (s)	Remarks
Select the result type like averaging	RESULT_TYPE	x				x		Result Type	Enum		**ACT**, AVG; MAX; MAX_AVG	<.5	SK in measurement views
maximum hold or actual result	RESULT_TYPE?		x									<.5	
				x		x		Result Type	Enum		**ACT**, AVG, MAX, MAX_AVG		
Select the unit of the measurement	RESULT_UNIT	x				x		Unit	Enum		V/m, A/m, **mW/cm^2,** W/m^2	<.5	SK in Main menu
results	RESULT_UNIT?		x									<.5	
				x		x		Unit	Enum		V/m, A/m, **mW/cm^2,** W/m^2		
Contrast of the LCD display	CONTRAST	x				P		Contrast	Integer	2%	0… **25**… 50	<.5	HKs for up and down
	CONTRAST?		x									<.5	
				x		P		Contrast	Integer	2%	0… **25**… 50		

General functions and data

Description	Command	S	G	R		P	O	Parameter Name	Format	Unit	Range	TO (s)	Remarks
Remote Mode	REMOTE	x						Remote Mode	Enum		ON, **OFF**	<.5	must be set to ON to use
	REMOTE?		x									<.5	any other command. Must be set
				x				Remote Mode	Enum		ON. **OFF**		to OFF to return to normal GUI operation
System Error	ERROR?		x									<.5	See Error Code listing
				x				ErrorNumber	Enum				
Invoke a zeroing immediately	ZERO	x						Zero Mode	Enum		SWITCH, NO_SWITCH	<1	Zeroing takes approx. 7 seconds
	ZERO?		x									<.5	
				x				Zeroing State	Enum		ZERO, OK		
Reset AVG and MAX_AVG	RESET_AVG	x										<.5	
Reset MAX	RESET_MAX	x										<.5	
Time remaining until initial averaging	AVG_PROGRESS?		x									<.5	
is complete				x				Average Progress	Integer	s			

General functions and data - continued

Description	Command	S	G	R		P	O	Parameter Name	Format	Unit	Range	TO (s)	Remarks
Content of the	DEVICE_INFO?		x									<.5	
device information screen				x				Product Name	String		max. 15 chars		
				x				Production ID	String		max. 15 chars		
				x				Serial Number	String		max. 15 chars		
				x				Device ID	String		16 chars		
				x				Device Type	Enum		BIG, SMALL		NBM-550 = BIG, NBM-520 = SMALL
				x				Firmware Version	Version		V00.00.00 … V99.99.99		
				x				Calibration Date	Date				
				x				Cal, Due Date	Date				
				x				No. of Options			0 to 63		
				x				Options Name			max. 30 chars		empty if not unlocked
Content of the	PROBE_INFO?		x									<.5	
probe information screen				x				Product Name	String		max. 15 chars		
				x				Production ID	String		max. 15 chars		
				x				Serial Number	String		max. 15 chars		
				x				Calibration Date	Date				
				x				Cal, Due Date	Date				
				x				Field Type	Enum		E, H, S		S for connection Type D probes
				x				Lower Frequency Limit A	Float	Hz			
				x				Upper Frequency Limit A	Float	Hz			
				x				Lower Frequency Limit B	Float	Hz			Required for combi probes only (E+H field)
				x				Upper Frequency Limit B	Float	Hz			Required for combi probes only (E+H field)
				x				Shaped	Enum		YES, NO		
				x				Standard Name	String		max. 30 chars		empty if not shaped

General functions and data continued

Description	Command	S	G	R		P	O	Parameter Name	Format	Unit	Range	TO (s)	Remarks
Battery capacity	BATTERY?		x									<.5	
				x				Battery Capacity	Integer	%	0 … 100		
Hold Mode	HOLD	x						Hold Mode	Enum		ON, **OFF**	<.5	
	HOLD?		x									<.5	
				x				Hold Mode	Enum				
Get the current measurement value(s)	MEAS?		x									<.5	See Measurement Formats
				x				Result 1	Float	x			
Start cyclic measurement output	MEAS_START	x										<.5	same format as with MEAS?
Stop cyclic measurement output	MEAS_STOP	x										<.5	

General functions and data continued

Description	Command	S	G	R		P	O	Parameter Name	Format	Unit	Range	TO (s)	Remarks
Connection type of the probe	PROBE_CT?	x										<.5	see Definitions
			x					Probes Connection Type	Enum		A, B, C, D		
The minimum field strength of the probes part A	E_MIN_A?		x									<.5	
				x				Emin_A	Float	V/m			
The minimum field strength of the probes part B	E_MIN_B?		x									<.5	only available for probe types C and D
				x				Emin_B	Float	V/m			
The maximum filed strength of the probes part A	E_MAX_A?		x									<.5	
				x				Emax_A	Float	V/m			
The maximum field strength of the probes part B	E_MAX_B?		x									<.5	only available for probe types C and D
				x				Emax_B	Float	V/m			
Rate at which measurement values are sampled and calculated	SAMPLE_RATE	x						Sample Rate	Enum	Hz	**5**, 50, 60	8	50 and 60 Hz in remote mode only
	SAMPLE_RATE?		x									<.5	
				x				Sample Rate	Enum	Hz	**5**, 50, 60		

4. Measurement Formats

RT means selected result type (ACT, MAX, AVG or MAX_AVG)

NBM-520

Parameter Name	Format	Unit			Content
		Probe	Normal	Shaped	
Result 1	Float		"Unit"	%	RSS (RT)

5. Error codes

Code	Description
0	no error
401	remote command is not implemented in the remote module
402	invalid parameter
403	invalid count of parameters
404	invalid parameter range
405	last command is not completed
406	answer time between remote module and application module is too high
407	wrong quit message from application module
408	invalid or corrupt data
409	error while accessing the EEPROM
410	error while accessing hardware resources
411	command is not supported in this version of the firmware
412	remote is not activated (please send "REMOTE ON;" first)
413	command is not supported in the selected mode
414	memory of data logger is full
415	defragmentation of flash file system is required
416	option code is invalid
417	incompatible version
418	no Probe